

Collateral channel and small business lending

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Introduction

- Common wisdom:
 - Young and small firms' access to bank credit is limited by the lack of collateral.
- Real estate and housing assets owned by entrepreneurs are, at least potentially, an important source of *pledgeable collateral*.
 - Black et al. (1996)
 - Robb and Robinson (2014)

Introduction

- Less well understood:
 - How important is the variation in the value of housing assets for the ability of small businesses to borrow from banks?
 - E.g., does an increase in the value of housing assets unleash collateral so that small firms can
 - ... borrow more from financial institutions?
 - ... borrow more from all kinds of sources?
 - ... expand their operations (e.g. invest more)?

Prior work on collateral channel

- Collateral channel \approx link between *pledgeable* (redeployable) assets and firms' borrowing capacity (use of debt)
 - Collateral channel at work: Exogenous increases in real estate or housing prices \Rightarrow value of pledgeable assets increase \Rightarrow facilitate firms' access to credit
- Seminal papers by e.g. Bernanke and Gertler (1989) and Kiyotaki and Moore (1997)
 - Greater collateral values ease credit constraints for borrowers \Rightarrow multiplier effects on the economy

Prior work on collateral channel

- Positive link between personal wealth and entrepreneurship...
 - E.g., Evans and Jovanovic (1989), Holtz-Eakin et al. (1994), Gentry and Hubbard (2004), Cagetti and De Nardi (2006)
 - ...is not necessarily evidence for financial constraints
 - Low ability: Lower W and less likely to be entrepreneur
 - Preferences: If $W \uparrow$, desire to be one's own boss \uparrow and risk-aversion \downarrow , etc. (Hurst and Lusardi 2004)
- ⇒ study shocks (e.g., inheritances, lotteries, etc.)

Prior work on collateral channel

- Collateral channel: Analysis of housing price shocks
- Prior studies on collateral channel often study publicly listed firms or use aggregate/regional data
 - Publicly listed firms:
 - E.g., Gan (2007); Chaney et al. (2012); Cvijanovic (2014):
 - Example: If value of real estate owned by US listed firms \uparrow , then leverage \uparrow and costs of borrowing \downarrow (Cvijanovic 2014) and investments \uparrow (Chaney et al. 2012)
 - Aggregate or regional data:
 - E.g., Black et al. (1996); Balasubramanyan and Coulson (2013); Adelino et al. (2014).

Prior work on collateral channel

- Evidence on the link between house prices and entrepreneurial firms' use of debt more scant
 - Schmalz et al. (2014): Evidence from France that
 - ... owning a house in an area where house prices have increased \Rightarrow the probability of a homeowner becoming an entrepreneur relative to renters \uparrow
 - ... entrepreneurs create larger firms and have better survival prospects when the increase in the house value is greater + some evidence of greater debt use
 - Robb and Robinson (2014):
 - US startups use more bank debt in areas with elastic housing supply \Rightarrow housing assets more pledgeable, if their value less volatile

Prior work on collateral channel

– Jensen, Leth-Petersen and Nanda (2014):

- Danish mortgage reform

⇒ allowed homeowners to borrow against home also for non-housing purposes ⇒ entrepreneurship ↑

- ...but the quality of marginal project poor

– Pekkala-Kerr, Kerr, Nanda (2014):

- US evidence on the relation between local housing prices and new venture creation

Our study

- Complements the prior literature in four ways:
 1. Focus directly on the link between local house prices and the use of bank loans by small businesses
 - We observe borrowing from financial institutions + can link the firms to local housing prices
 2. Study a bank-based financial system
 - Less developed risk-capital market for privately-held small firms than e.g. in the US

Our study

3. Use the availability of developable land for construction as the instrument for house prices
 - Share of planned area in the municipalities (more on this later)
 - Use municipality mergers as an additional source of identification
4. Besides allowing us to control for unobserved firm-specific heterogeneity, the dataset includes commercial credit scores
 - Proxy for observable creditworthiness \Rightarrow Isolate the effects of housing price shocks from the shocks to overall creditworthiness of small firms

Data

- *Firm data*: Financial statement panel of Finnish small businesses provided by Asiakastiето ltd
 - Includes commercial credit scores for the firms
- *Regional house prices data*: Zip code -level house prices from Statistics Finland
 - Prices per square meter of previously-owned privately financed condominiums
 - Annual statistics compiled from the asset transfer tax data of the Finnish Tax Administration
- *Municipality-level zoning data*: From the OIVA database of the government's environmental management services

Data

- Baseline estimation sample:
 - Non-farm and non-financial corporations
 - Mining, utilities, construction, governmental, and non-profit industries removed
 - Sample period: 2004-2008 (pre-crisis) with some further analysis using a longer 2004-2011 sample
 - Restricted to firms smaller than 50 employees
 - Entrepreneurs' personal houses relevant only for smaller firms
 - The house prices data aggregated to the two-digit zip code –level (99 areas)
 - Alternatively: municipal-level (251 areas) or five-digit zip code –level (834 areas) ⇒ Alternative assumptions about the relevant regional area for the location of the collateral

Econometric approach

- Econometric model:

$$y_{it} = \delta y_{i,t-1} + x'_{it}\beta + \gamma z_{rt} + \alpha_i + \mu_t + \varepsilon_{it},$$

where y_{it} = bank debt of firm i in year t , x_{it} = vector of controls, z_{rt} = house prices in region r in year t , α_i = firm-specific effects, μ_t = year dummies, and ε_{it} = error term.

- Use three different estimation approaches:
 - Static models (impose $\delta = 0$):
 - FE: Control unobserved firm and regional heterogeneity by firm-FEs
 - FD-IV: FEs + allow for endogenous housing prices
 - Dynamic models (allow $\delta \neq 0$):
 - Arellano-Bond GMM estimator

Endogeneity of housing prices

- Time-varying regional factors affecting housing prices and bank loans \Rightarrow housing prices endogenous
 - Example: positive local demand shocks \Rightarrow greater demand for loans, greater housing prices
- Address using instrumental variables:
 - Previous literature: Restrictions in zoning and land availability highly correlated with real estate prices (e.g., Saiz 2010)
 - Use a measure of land supply (in)elasticity as the instrument (see Chaney et al. 2012; Adelino et al. 2014)

Instruments

- Our main instrument: Ratio of planned area (town plan zone) to the total area of a municipality
 - Exploit differences in within-regional variation in zoning
 - Intuition (like in the prior work, building on Saiz 2010)
 - Local (potential) supply of land elastic \Rightarrow increase in the housing demand ought to translate into more construction ('quantity adjustment') rather than in higher prices.
 - In the areas where the share of (already) planned area is low to begin with, an increase in the share of planned area increases land supply \Rightarrow lowers house prices.

Instruments

- Relevance and validity
 - Relevance: Can be tested \Rightarrow if increases in the planned area enhance land supply, we should observe a *negative* relation (lower prices)
 - Validity: Controlling for fixed regional and firm-specific factors, should be unrelated to small businesses' use of bank loans at t
 - Planned area \approx bureaucratically and politically determined quantity, subject to a relatively complex bureaucratic and political “zoning process”
 - In the long-term, might eventually mirror local demand shocks, but only after a notable lag
- Allow for a potential nonlinearity: the second-order polynomial of the planned area

Instruments

- We also exploit municipal mergers as an additional instrument.
 - The decision to merge = outcome of a relatively complex political process that is subject to a number of procedural rules and strategic political behaviour
 - On the political determinants of these mergers, see, e.g., Hyytinen, Saarimaa and Tukiainen (2014).
- Mergers increase the land available for construction:
 - ⇒ ... allow for better coordination of planning across the former municipal borders
 - ⇒ ... holding other things constant, the mergers increase supply elasticity ⇒ expect negative relation with house prices

Descriptive statistics

Table 1: Descriptive statistics for 2004-2008

variable	mean	sd	min	p50	max	NT
Bank debt	0.133	0.219	0.000	0.000	1.000	91034
Ln(1+Age)	2.554	0.680	0.693	2.639	4.727	91034
Ln(Total assets)	12.177	1.572	5.011	12.139	21.529	91034
Credit score	0.253	0.184	0.030	0.220	0.990	91034
House prices (5-digit)	1.953	0.982	0.431	1.701	5.254	91034
House prices (2-digit)	1.854	0.777	0.527	1.656	3.346	91034
Planned area	0.161	0.148	0.000	0.096	0.993	91034
Planned area squared	4.788	7.787	0.000	0.922	98.605	91034
Municipal merger	0.087	0.281	0.000	0.000	1.000	91034

Baseline results - FE

Table 3: FE (within) estimates for 2004-2008

	(1)	(2)	(3)
Size class	<5 employees	<10 employees	<50 employees
Dependent variable	Bank debt	Bank debt	Bank debt
House prices (2-digit)	0.023** (0.009)	0.017** (0.008)	0.016** (0.007)
Ln(1+Age)	-0.037*** (0.010)	-0.039*** (0.008)	-0.040*** (0.007)
Ln(Total assets)	0.028*** (0.003)	0.028*** (0.002)	0.027*** (0.002)
Credit score	0.004 (0.008)	0.002 (0.006)	0.004 (0.005)
<i>NT</i>	55549	73002	91034
<i>rho</i>	0.805	0.805	0.806
<i>r2</i>	0.010	0.010	0.009

Baseline results - FD-IV

Table 4: FD-IV estimates for 2004-2008



	(1)	(2)	(3)
Size class	<5 employees	<10 employees	<50 employees
Dependent variable	Bank debt	Bank debt	Bank debt
House prices (2-digit)	0.150* (0.079)	0.168** (0.067)	0.126** (0.056)
Ln(1+Age)	-0.028*** (0.010)	-0.030*** (0.009)	-0.032*** (0.007)
Ln(Total assets)	0.011*** (0.003)	0.010*** (0.002)	0.009*** (0.002)
Credit score	-0.011 (0.007)	-0.012** (0.006)	-0.013** (0.005)
<i>NT</i>	39336	51799	64938
<i>Hansen's J statistics</i>	1.850 [0.3965]	2.102 [0.3497]	1.098 [0.5775]
<i>Kleibergen-Paap Wald statistics</i>	739.159	1107.423	1532.720
<i>First-stage</i>	House prices	House prices	House prices
Planned area (instrument)	-1.068*** (0.062)	-0.986*** (0.053)	-0.970*** (0.047)
Planned area squared (instrument)	0.022*** (0.001)	0.021*** (0.001)	0.022*** (0.001)
Municipal merger (instrument)	-0.045*** (0.002)	-0.043*** (0.001)	-0.043*** (0.001)

Robustness check - FD-IV (municipal-level prices)

	(1)	(2)	(3)
Size class	<5 employees	<10 employees	<50 employees
Dependent variable	Bank debt	Bank debt	Bank debt
→ House prices	0.112* (0.068)	0.131** (0.058)	0.102** (0.048)
ln(1+Age)	-0.028*** (0.010)	-0.030*** (0.009)	-0.033*** (0.007)
ln(Total assets)	0.011*** (0.003)	0.010*** (0.002)	0.008*** (0.002)
Credit score	-0.011 (0.007)	-0.012** (0.006)	-0.013** (0.005)
NT	39336	51799	64938
Hansen's J statistics	2.722 [0.2564]	3.282 [0.1938]	1.687 [0.4303]
Kleibergen-Paap Wald statistics	926.916	1378.302	1921.839
→ First-stage	House prices	House prices	House prices
Planned area (instrument)	-1.725*** (0.092)	-1.589*** (0.076)	-1.546*** (0.067)
Planned area squared (instrument)	0.031*** (0.001)	0.030*** (0.001)	0.030*** (0.001)
Municipal merger (instrument)	-0.044*** (0.002)	-0.042*** (0.002)	-0.043*** (0.002)

Baseline results - Arellano-Bond

Table 5: Arellano-Bond estimates for 2004-2008

	(1)	(2)	(3)
Size class	<5 employees	<10 employees	<50 employees
Dependent variable	Bank debt	Bank debt	Bank debt
 Bank debt (t-1)	0.647*** (0.027)	0.655*** (0.024)	0.652*** (0.024)
House prices (2-digit)	0.066*** (0.023)	0.045** (0.020)	0.051*** (0.017)
Ln(1+Age)	-0.009 (0.013)	-0.017 (0.013)	-0.018 (0.015)
Ln(Total assets)	0.014 (0.015)	0.021 (0.016)	0.014 (0.021)
Credit score	0.042** (0.019)	0.034** (0.016)	0.017 (0.014)
<i>NT</i>	39336	51799	64938
 <i>Long-run effects</i>	0.188** (0.068)	0.129** (0.058)	0.145** (0.050)
<i>Arellano-Bond test</i>	0.3865 [0.6991]	0.5983 [0.5496]	1.276 [0.2020]
<i>Sargan test</i>	16.2992 [0.5027]	18.9814 [0.3296]	18.337 [0.3679]

Robustness check - Arellano-Bond (municipal-level prices)

	(1)	(2)	(3)
Size class	<5 employees	<10 employees	<50 employees
Dependent variable	Bank debt	Bank debt	Bank debt
→ Bank debt (t-1)	0.649*** (0.027)	0.656*** (0.024)	0.654*** (0.024)
House prices	0.057** (0.022)	0.038** (0.019)	0.044*** (0.016)
ln(1+Age)	-0.009 (0.013)	-0.017 (0.013)	-0.018 (0.015)
ln(Total assets)	0.014 (0.015)	0.021 (0.016)	0.014 (0.021)
Credit score	0.042** (0.019)	0.034** (0.016)	0.017 (0.015)
NT	39336	51799	64938
→ Long-run effects	0.161** (0.064)	0.110** (0.056)	0.127*** (0.048)
Arellano-Bond test	0.3769 [0.7063]	0.5955 [0.5515]	1.2748 [0.2024]
Sargan test	16.5529 [0.4850]	19.3476 [0.3090]	18.5908 [0.3525]

Extensions

- Baseline results: House values increase \Rightarrow small businesses rely more on bank debt
 - The effect appears to be somewhat more pronounced among the smallest firms
- Is there a genuine collateral channel at work?
 1. Is the effect greater for firms with more tangible assets?
 2. Is the effect weaker after the onset of the financial crisis?
 3. Is there an effect on total debt?
 4. Is there evidence for a wealth effect?

... Is the effect greater for firms with more tangible assets?

- Trimmed sample: Drop firms with a low amount of tangible assets (lowest quartile)
- FD-IV results: Yes, the effect is greater for small firms with more tangible assets
 - House price coefficients and statistical significance increase quite a bit
- Arellano-Bond GMM results: less affected

... Is the effect weaker after the onset of the financial crisis?

- Prior work: The financial crisis
 - has changed the lending behavior of banks (see, e.g., Ivashina and Scharfstein 2010)
 - has had an effect on the collateral channel (see, e.g., Norden and van Kampen 2013).
- ⇒ Banks may have become less willing to accept housing or real estate assets as collateral for their small business lending.
- Our finding: The link between housing prices and use of bank debt has become weaker since 2009.

... Is there an effect on the total debt?

- Our finding: No, total debt is not significantly positively associated with house prices
- This is, indeed, what we would expect, if there is a collateral channel at work
- The results ought to be weaker for the broader debt measure,
- ... because it includes non-collateralizable debt and/or non-bank debt.

... Is there a wealth effect?

- Bliss et al. (2014): In the presence of financial constraints, firms resort to dividend payout reductions as a substitute source of capital.
 - Our insight: In the presence of a genuine collateral channel effect, the owner-managers of small firms do not increase the dividend payout when housing prices increase
 - If a small business is financially constrained and does not therefore pay (large) dividends to start with,
 - ... enhanced availability of external finance ought to increase the dividend payout...
 - if and only if the firm's (marginal) investments are no longer financially constrained.

... Is there a wealth effect?

- Our test:
 - Collateral channel: If there are financial constraints that (still) bind, the firms increase borrowing against the unleashed new housing collateral when housing values ↑
 - Wealth effect: We could expect firms to increase the dividend payout ratio
 - (to, e.g., finance a wealth-induced increase in the desired consumption; Campbell and Cocco 2007).
- Our finding: No evidence of a positive relation between the dividend payout and house prices

Other robustness checks

- Technical checks:
 - Alternative industry trimming, alternative definition of the dependent variable, include the credit score in a nonlinear way, disaggregated zip code –level prices
- Investment opportunities:
 - *Firm-specific growth opportunities*: If growth opportunities persistent ⇒ use realized sales growth as an additional control variable
 - *Regional growth opportunities*: Use regional data on taxable income, share of start-up firms and unemployment rate as additional controls
 - *Industry-specific growth opportunities*: Use industry-year interactions as control variables

Conclusions

- Higher regional house prices facilitate small businesses' use of bank loans:
 - Our baseline (dynamic) estimations for the smallest micro firms suggest that a 100€ increase in regional house prices increases the use of bank debt by ~ 1.88 %-points.
 - This is not a small effect: The mean of bank debt is a bit more than ten percent.
- In sum, our findings are consistent with the view that collateral values are important for the borrowing capacity of opaque small businesses

Conclusions

- But shouldn't we then also observe some positive "real effects"?
- This is a fair question: To explore this, we
 - ... used three alternative measures (net investments, number of employees, labor productivity) and
 - ... re-estimated the FE, FD-IV, and Arellano-Bond models using the three measures
- Findings: No positive effects, some evidence of a negative relation between LP and housing prices.

Conclusions

- Possible interpretation:
 - The marginal borrowers, who benefit from increasing housing values in the form of increased pledgeable collateral, tend to perform no better than the others.
 - In line with what Pekkala-Kerr et al. (2014) report for the US, and with the results of Andersen and Meisner Nielsen (2012) and Jensen et al. (2014) for Danish entrepreneurs:
 - When financial constraints are relaxed, the quality of the marginal entrepreneurial projects that can as a result be implemented, is low.
 - For a theoretical analysis, see Manove, Padilla and Pagano (2001):
 - The use of collateral may reduce banks' screening effort and lead them to finance lower quality projects