

Credit Supply and House Prices

Evidence from Mortgage Market Segmentation

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Outline

- 1 Motivation and Preview of Results
- 2 Empirical Approach
 - Thresholds in the Housing Market
 - Sample Selection
 - Identification
- 3 Data Description
 - Summary Statistics
 - Hedonic Regressions
- 4 Results
 - Impact of CLL on Financing Choices
 - Main Results
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Empirical Challenge

- Simultaneous rise in house prices, increase in access to credit and reduction in interest rates in the period 2000-2006
- Disagreement about the importance of cost and access to credit:
 - ▶ Easy access to credit as the central force fueling this boom (Favilukis, Ludvigson and Van Nieuwerburgh, 2010; Hubbard and Mayer, 2008; Khandani, Lo and Merton, 2009).
 - ▶ Glaeser, Gottlieb and Gyourko (2010) argue that cheap credit alone cannot explain the house price boom and bust.
- Very hard to establish the direction of causality in empirical tests.

Effect of Credit Supply on House Prices

- Transactions that cannot be financed at 80 percent with a conforming loan have **lower value per square foot** and lower prices after we control for a rich set of house characteristics.
 - ▶ 1.1 dollars per square foot for an average value per square foot of 224 dollars (average house of 1900 square feet).
 - ▶ Estimated elasticity of prices to interest rates close to those in Glaeser et al (2010).
- The results are stronger in the first half of our sample (1998-2001) and in zip codes that experience negative income growth.
- Our estimates point to a strong effect of the availability of financing on house prices.
 - ▶ At least a fraction of the subsidy given to the GSEs is accruing to the sellers of homes, rather than the buyers.

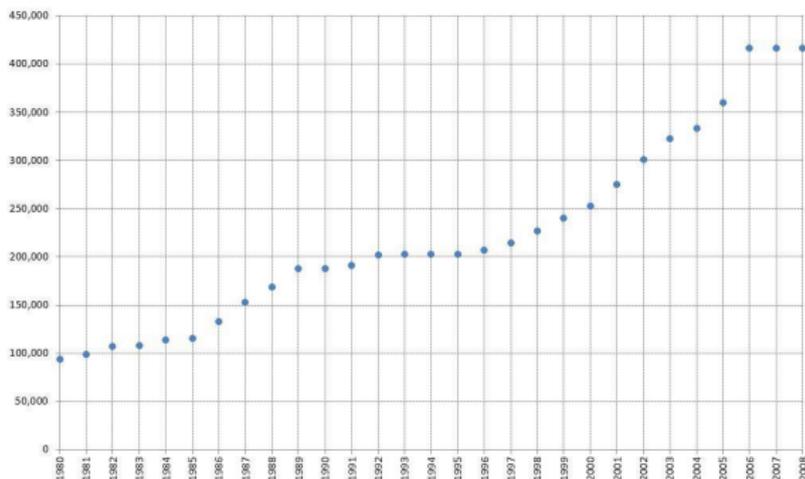
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Our approach

- We use one instance in which we can separately identify the credit channel.
- Conforming Loan Limit (CLL): Fannie Mae and Freddie Mac only purchase mortgages below the conforming loan limit (loans above this limit are jumbo loans).
 - ▶ Jumbo-conforming spread estimated at 15-25 basis points difference in interest rates (McKenzie, 2002; Ambrose, LaCour-Little and Sanders, 2004; Sherlund, 2008).
- 80 percent is an important threshold in the mortgage industry.
- We consider houses “around” a threshold of $CLL/0.8$, i.e. the price at which a borrower can get an 80 percent LTV and a conforming first mortgage.
 - ▶ If a house costs less than $CLL/0.8$ it is **easier and cheaper** to finance.

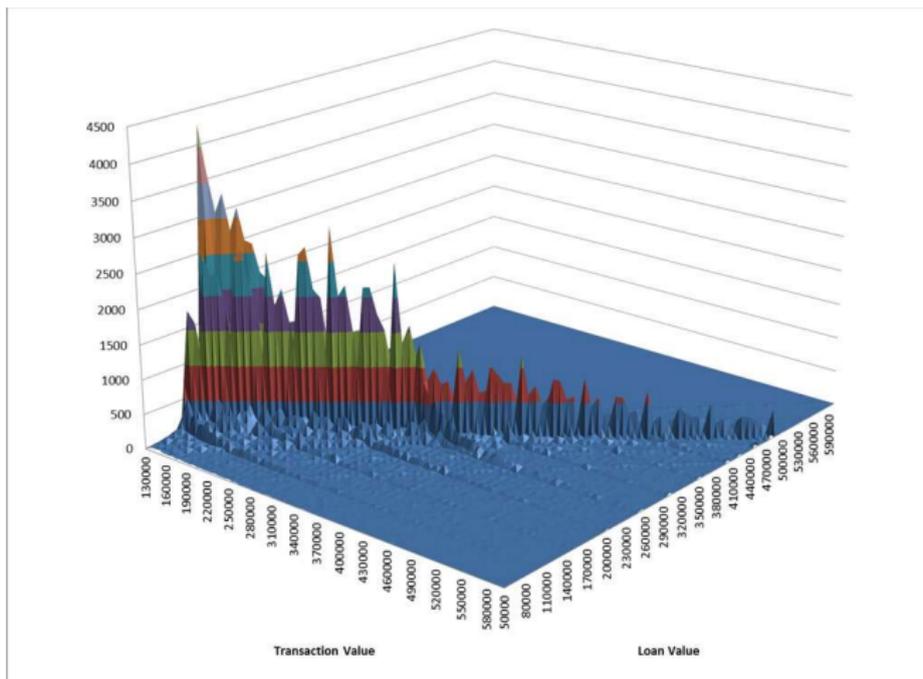
Conforming Loan Limits



- Approximately 150 percent of average house price.
- The change is based on the Oct-Oct change in median house prices.
- Between 1992-2008 the limit was set by the OFHEO and since 2008 this is the responsibility of the FHFA.

Profile of the Housing Market

Figure: Transaction-Loan Value Surface, Year 2000



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Example

- In 1999 the conforming loan limit was USD 240K.
- The threshold we use for transactions in this year is $240/0.8 = 300$ thousand dollars.
- Houses that are **easy** to finance cost USD 290-300K.
- Houses above this threshold (USD 300-310K) are harder to finance.
- In 2000, the limit was 252,700 dollars, so the new threshold is 315,875.
 - ▶ All houses between 290 and 310 thousand dollars can be financed at 80 percent LTV using a conforming loan in 2000.

Example continued

	1999	2000
310	Hard	Easy
300	Easy	Easy
290		

- We run differences-in-differences regressions year by year using houses:
 - ▶ Above and below the threshold.
 - ▶ While the limit is in effect and after it is raised.
- Construct Fama MacBeth coefficients from yearly regressions.
- Measure the effect on Value per square foot and residuals from hedonic regressions.

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Identification Discussion

- We estimate the effect of changes in credit availability on valuation.
- Two alternative mechanisms that we do not distinguish:
 - ▶ Easier credit leads to more bidders for houses and thus higher prices.
 - ▶ Buyers who have easier access to credit are “softer” bidders.

Identification Discussion

- We rule out two alternative hypotheses:
 - ▶ Reverse causality, i.e. increase in price led to the improvement in access to credit
 - ▶ Selection, i.e. buyers above the threshold in the year that the limit is in effect are “different”
 - ★ “Special” buyers above the threshold also harder negotiators.
 - ★ Unobserved quality: Higher wealth / income should bias in the direction of higher unobserved quality, not lower.
 - ★ These buyers would have to be there at this price level in one year and disappear in the next.
 - ★ Robustness checks do not point in this direction.

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Housing Data

- Transactions from deeds and assessors records provided by DataQuick.
- Data from 1998 to 2008 in 10 metropolitan areas (MSA).
 - ▶ Boston, Chicago, DC, Denver, Las Vegas, Los Angeles, Miami, New York, San Diego and San Francisco.
 - ▶ Regressions use only data from 1998 to 2006
- Each observation in the data contains:
 - ▶ Date, transaction price, first and second mortgage and address for the property
 - ▶ Interior square feet, lot size, number of bedrooms, number of bathrooms, total rooms, house age, type of house, renovation status and date, address
 - ▶ Additional characteristics: fireplace, parking, architectural and structural style, type of construction, exterior material, heating and cooling mechanism, type of roof, view, basement, and garage.
- Drop outliers, duplicates and observations with missing characteristics.

Summary Statistics

	Whole Sample N=4,752,214			Restricted Sample N=229,607		
	<i>Mean</i>	<i>Std. Dev.</i>	<i>Median</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Median</i>
Transaction Value	298.72	122.45	275.00	369.37	54.98	375.00
Loan to value	0.81	0.15	0.80	0.76	0.13	0.80
House Size (sqft)	1,603	630	1,463	1,887	681	1,765
Lot Size (sqft)	8,669	15,299	5,998	11,539	17,323	7,200
Number of rooms	6.54	1.69	6.00	7.19	1.62	7.00
Number of bedrooms	2.94	0.86	3.00	3.30	0.78	3.00
Number of bathrooms	1.92	1.00	2.00	2.05	1.04	2.00
House age (years)	34.56	26.35	30.00	36.59	26.90	36.00

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Hedonic Regression

- Difference in prices could be interpreted as
 - ▶ lower quality of the houses.
 - ▶ lower prices conditional on house quality.
- In order to distinguish these two explanations, we estimate hedonic regressions of value per square foot and house price.

$$LHS_{i,j,t} = \gamma_0 + \Gamma X_i + month_i + zipcode_i + \varepsilon_i$$

- ▶ By MSA and by year (coefficients vary along these two dimensions).
- ▶ The estimated R^2 of each of these regressions (80 in total for each left-hand side variable – 10 MSAs in 8 years) is approx. 50-70% for value per square foot and 40-60% for transaction value.

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Empirical Specification

$$Valuation_i = \alpha 1_{AboveCLL/0.8} + \beta 1_{YearCLL} + \gamma 1_{AboveCLL/0.8 \times YearCLL} + 1_{ZIP} + \varepsilon_i$$

- We use three alternative valuation measures:
 - ▶ Value per Square Foot
 - ▶ Residual from the hedonic regressions using House Price.
 - ▶ Residual from the hedonic regressions using Value per Square Foot.
- Run the above specification for each year between 1998 and 2005.
- After we obtain α , β and γ for all 8 years (1998-2005) we estimate Fama MacBeth averages of these coefficients and obtain the standard errors of this average.

Effect of CLL on Loan and LTV Choice

Panel A: Loan to Value

	All Transactions			0.5<LTV≤0.8 Transactions		
	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold	-0.004*** (0.001)	-0.006*** (0.002)	-0.002*** (0.001)	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)
Year CLL	-0.008*** (0.002)	-0.006** (0.002)	-0.011*** (0.001)	-0.004*** (0.001)	-0.001 (0.001)	-0.007*** (0.001)
Above Threshold x Year CLL	-0.003** (0.001)	-0.003 (0.003)	-0.003* (0.002)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)

Panel B: Loan Amount

	All Transactions			0.5<LTV≤0.8 Transactions		
	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold	6,000*** (768)	4,574*** (1,163)	7,426*** (218)	6,771*** (180)	6,822*** (285)	6,721*** (262)
Year CLL	-2,318** (914)	-2,290 (1,748)	-2,347** (918)	-1,683*** (539)	-368 (338)	-2,997*** (302)
Above Threshold x Year CLL	-2,097** (869)	-1,303 (1,571)	-2,892*** (795)	-1,795*** (290)	-1,709*** (383)	-1,882*** (490)

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CLL and House Valuation

Panel A: Value Per Square Foot

	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold	1.261** (0.561)	1.470*** (0.471)	1.052 (1.103)
Year CLL	-23.516*** (4.225)	-14.931*** (2.328)	-32.101*** (5.364)
Above Threshold x Year CLL	-1.113*** (0.281)	-1.359*** (0.188)	-0.867 (0.540)
No. Obs.	229,607	99,983	129,624

CLL and House Valuation

Panel B: Transaction Value Residual from Hedonic Regressions

	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold	4,235.3*** (181.8)	4,092.1*** (103.4)	4,378.5*** (360.3)
Year CLL	12,077.9*** (1,876.7)	9,107.2*** (1,324.9)	15,048.7*** (2,966.0)
Above Threshold x Year CLL	-331.1* (172.8)	-415.5 (323.0)	-246.7 (174.0)
No. Obs.	221,195	94,645	126,550

Panel C: Value Per Square Foot Residual from Hedonic Regressions

	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold	1.603*** (0.405)	1.918*** (0.415)	1.289* (0.725)
Year CLL	3.590*** (0.658)	3.456*** (0.472)	3.723*** (1.337)
Above Threshold x Year CLL	-0.646** (0.278)	-0.985*** (0.371)	-0.308 (0.383)
No. Obs.	221,469	94,791	126,678

Placebo Test

<i>Shift on CLL</i>	<i>All Transactions</i>			<i>0.5 < LTV ≤ 0.8 Transactions</i>		
	<i>VALSQF</i>	<i>HP Res.</i>	<i>VALSQF Res.</i>	<i>VALSQF</i>	<i>HP Res.</i>	<i>VALSQF Res.</i>
-100000	0.295	1,756.0	1.305	-0.607	1,750.5	1.078
-90000	0.310	145.9	-0.169	0.540	245.2	-0.049
-80000	-0.440	332.1	0.009	-0.833	-81.2	-0.105
-70000	-0.260	122.6	0.221	-0.254	-9.2	0.046
-60000	-0.294	633.3	0.229	-0.186	634.0	0.346
-50000	0.417	468.6	0.198	0.296	569.6	-0.130
-40000	-0.502	336.9	0.036	-0.241	219.4	0.366
-30000	-0.500	-317.0	-0.411	-0.526	-211.1	-0.536
-20000	-0.258	630.2	0.478	-0.341	517.7	0.409
-10000	0.287	84.8	-0.059	0.063	11.8	-0.167
<i>CLL (0)</i>	<i>-1.113</i>	<i>-331.1</i>	<i>-0.646</i>	<i>-1.189</i>	<i>-365.9</i>	<i>-0.851</i>
10000	0.820	399.1	0.243	0.834	238.7	0.164
20000	0.541	481.3	0.254	0.044	204.2	0.123
30000	0.581	756.0	0.312	0.415	574.3	0.010
40000	-0.962	-472.1	-0.968	-0.481	-102.8	-0.683
50000	0.256	130.9	-0.110	-0.322	-217.3	-0.669
60000	0.814	1,304.2	1.068	0.459	1,095.0	0.855
70000	0.915	257.4	0.623	0.851	-80.0	0.284
80000	0.532	403.0	0.284	0.339	367.4	0.317
90000	-0.067	-270.3	-0.098	-0.072	-655.7	-0.034
100000	0.010	-417.2	-0.250	0.001	-140.0	-0.308
<i>CLL Rank</i>	1	3	2	1	2	1
<i>CLL Rank below only</i>	1	1	1	1	1	1

Income Growth Interaction

Panel A: Value Per Square Foot

	<i>2001-2005</i>	<i>2001-2005</i>
Above Threshold x	-0.990**	-0.933**
Year CLL	(0.432)	(0.370)
Above Threshold x		-2.206**
Year CLL x Inc Decrease		(1.060)
No. Obs.	157,472	157,472

Panel C: Value Per Square Foot Residual from Hedonic Regressions

	<i>2001-2005</i>	<i>2001-2005</i>
Above Threshold x	-0.482	-0.437
Year CLL	(0.312)	(0.299)
Above Threshold x		-0.304
Year CLL x Inc Decrease		(1.045)
No. Obs.	153,048	153,048

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Different Groups of Transactions

Panel A: Value Per Square Foot

	Keeping Conforming			Keeping Jumbo		
	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold x	-0.873**	-1.075***	-0.671	-2.189***	-2.756**	-1.621
Year CLL	(0.405)	(0.367)	(0.777)	(0.756)	(1.204)	(1.000)

Panel B: Transaction Value Residual from Hedonic Regressions

	Keeping Conforming			Keeping Jumbo		
	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold x	-660.8**	-469.7	-852.0***	-2.1	-1,091.3	1,087.2**
Year CLL	(299.1)	(541.4)	(316.4)	(580.3)	(766.2)	(439.8)

Panel C: Value Per Square Foot Residual from Hedonic Regressions

	Keeping Conforming			Keeping Jumbo		
	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold x	-1.318***	-1.148**	-1.488**	0.130	-0.858	1.118
Year CLL	(0.392)	(0.507)	(0.663)	(0.602)	(0.609)	(0.819)

Constrained Sample ($0.5 < LTV \leq 0.8$)

Panel A: Value Per Square Foot

	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold x	-1.189**	-1.448***	-0.929
Year CLL	(0.466)	(0.558)	(0.810)

Panel B: Transaction Value Residual from Hedonic Regressions

	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold x	-365.9	-601.5	-130.2
Year CLL	(332.1)	(611.3)	(322.5)

Panel C: Value Per Square Foot Residual from Hedonic Regressions

	<i>All years</i>	<i>1998-2001</i>	<i>2002-2005</i>
Above Threshold x	-0.851**	-1.100***	-0.602
Year CLL	(0.354)	(0.421)	(0.606)

Conclusion

- In this paper we use the changes in the conforming loan limit to identify one setting in which conditions in the credit market affect house prices directly.
- By looking locally around the maximum price of a house that can be financed at 80 percent with a conforming loan, we estimate that easier access to credit leads to an increase in value per square foot of 1.1 dollars (for an average value per square foot of USD 224).
- The result is stronger in the earlier part of our sample when borrowers were less likely to have access to other forms of financing such as second liens and when the interest rate differential between jumbo loans and conforming loans was larger.