New Construction and Mortgage Default

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Motivation and Research Question

Motivation

There is reason to expect new homes – relative to existing construction – to depreciate more quickly (or appreciate less quickly) than existing construction.

This implies that, all else equal, equity will be lower following origination for loans used to buy new homes.

$$\frac{L_0}{V_{t=0}^{New}} = \frac{L_0}{V_{t=0}^{Existing}}$$

$$\frac{L_s}{V_{t=s}^{New}} > \frac{L_s}{V_{t=s}^{Existing}}$$

Motivation and Research Question

Motivation

Under both the "double trigger" and "strategic" models of mortgage default

$$\frac{L_s}{V_{t=s}^{New}} > \frac{L_s}{V_{t=s}^{Existing}}$$

$$\Rightarrow Pr[\text{Default}|\text{New Construction}] > Pr[\text{Default}|\text{Existing Construction}]$$

Research Question

All else equal, are purchase loans used to buy new construction more likely to default than purchase loans used to buy existing homes?

Why Might New Homes Depreciate More Quickly?

Location Risk

Many newly constructed homes are located in newly created subdivisions.

Especially early in the development process, there is significant risk that the subdivision is not completed or that promised amenities are not delivered by the developer.

If the market's perception of the viability of the development falls, the values of the newly purchased units could fall significantly.

No one wants to live in a "zombie subdivision."

BUSINESS

The Unfinished Suburbs of America

Thousands of acres across the country were partially developed during the housing boom. What should happen to them now?

ALANA SEMUELS NOV 14, 2014

CURBED

What Should Be Done with America's 'Zombie Subdivisions'?

By Spencer Peterson | Nov 14, 2014, 5:39pm EST

This house was the last developed in a planned community in Stockton. (Alana Semuels)

Why Might New Homes Depreciate More Quickly?

The New Home Premium

Buyers might be willing to pay a premium for "newness" (Coulson, Morris, and Neill, Real Estate Economics, 2016).

A new home premium implies that a home's value depreciates sharply as it transitions from new to existing status.

"Car depreciates the second you drive it off the lot."

"Home value drops the second you walk in."

Could be driven by buyers paying a premium for customization.

Why Might New Homes Depreciate More Quickly?

Bargaining Power

Many new homes are sold by builders that have extensive experience negotiating real estate deals.

Builders with many properties in the local market also have very strong incentives to avoid dropping prices.

Home buyers and non-builder home sellers typically less experienced in real estate negotiations.

$\Rightarrow$ Buyers have a better chance of getting a good deal on existing construction.

$\Rightarrow$ Buyers of existing construction accumulate equity more quickly.

Why Might New Homes Depreciate More Quickly?

Appraisals

New construction is more difficult to appraiser – especially in new developments – because there are few/no comparable sales that can be used to construct a valuation.

Very little information on price discovery.

Because of these issues, appraisers often use the 'cost approach' – which is based on estimates of reconstructing the home – in lieu of the "market approach", which relies upon comparable sales.

$\Rightarrow$ Appraisals may be even less likely to serve as a restraint on overpaying for a property when the property is new construction.

Preview of Results

Using loan-level data on more than 3 million purchase mortgages originated between 2004 and 2009, we find that

- The unconditional default rate for loans used to purchase new construction was 5.6 percentage points higher than the default rate for loans used to purchase existing construction.
- A significant fraction of the difference in unconditional default rates can be explained by where and when new construction occurs.
- Controlling for a rich set of borrower and loan characeristics, loans for new homes were 1.8 percentage points more likely to default.
- Loans for new construction are more likely to default in both boom and bust periods.
- Models that treat the new construction variable as endogenous suggest that mortgages for new construction are between 4.6 and 14.2 percentage points more likely to default.

Data Sources

DataQuick Property Data

Reports transfers and mortgage activity for approximately 150 million properties in the U.S.

Data fields include

- Property location
- Property type (e.g., single-family units)
- Loan amount
- Structural characteristics
- Year in which the property was built

A home is classified as new if the house was between zero and one year old at the time of origination.

Geographic coordinates used to assign properties to Census tracts

Loan information used to identify subordinate liens ("piggyback loans") to get a more accurate assessment of a borrower's equity position in the property at the time of origination

Data Sources

Mortgage Performance Data

Extended OCC Mortgage Metrics Data

Loan-level database for mortgage servicers under OCC supervision

Comprised of loans from across the credit and investor spectrum (FNMA, FHLMC, GNMA, portfolio, PLMBS)

Private-Label MBS (PLMBS) Data

Comprised of loans securitized into private-label mortgage-backed securities

Primarily subprime, Alt-A, and jumbo loans

Data Sources

Home Mortgage Disclosure Act (HMDA) Data

"Near universe" of first-lien loan applications (approved and denied) in the U.S.

Data fields include

- Loan amount, close date, purpose, and type
- Property Census tract
- Buyer income
- Buyer race/ethnicity

Data Sources

Mortgage Performance Data

Mortgage Metrics and PLMBS both contain

- Monthly delinquency status
- Loan underwriting characteristics (e.g., DTI, FICO, CLTV)
- Mortgage contract characteristics

Data restricted to loans originated between 2004 and 2009

Data also restricted to single-family residences and state-years where our data covered at least 10 percent of the home-purchase originations for 1-4 family dwellings in HMDA.

All data fields standardized between Mortgage Metrics and PLMBS

Loans followed for 4 years following origination

Loan classified as being in default if the loan was reported as being in any stage of the foreclosure process or being at least 90 days-past-due in the 4 years following origination

Data Sources

Final Product

Mortgage Metrics and PLMBS data combined and then "deduped" using a unique transaction identifier

Loans then merged with DataQuick and HMDA files using fields common in all files

Final Product

A unique database of more than 3 million purchase loans originated between 2004 and 2009 that contains detailed information on: the nature of the mortgage contract; the creditworthiness of the borrower; monthly loan performance; the location of the property securing the mortgage; and the age of the property at the time the loan was originated.

Summary Statistics

	Loan Types				
	Default	No Default	New Construction	Existing Home	Total
Observations	613,382	2,816,447	547,593	2,882,236	3,429,829
Default Rate	1.00	0.00	0.23	0.17	0.18
New Construction	0.20	0.15	1.00	0.00	0.16
Balloon Payment	0.07	0.02	0.03	0.03	0.03
Full Documentation	0.50	0.61	0.52	0.60	0.59
Interest Only	0.30	0.15	0.22	0.17	0.18
Option ARM	0.07	0.04	0.05	0.04	0.05
Owner Occupied	0.88	0.85	0.87	0.85	0.86
Piggyback Loan	0.45	0.26	0.33	0.29	0.29
Prepayment Penalty	0.33	0.09	0.14	0.13	0.13
FHA	0.16	0.16	0.13	0.17	0.16
VA	0.02	0.04	0.05	0.04	0.04
Term>30 Years	0.12	0.02	0.04	0.03	0.04
CLTV	94.30	86.38	87.58	87.84	87.80
CLTV> 99	0.46	0.21	0.27	0.25	0.26
FICO	668.47	718.20	707.94	709.57	709.31
Back-end DTI	40.05	36.51	37.89	36.97	37.12

Fixed Effects Models

$$Delinq_{ijt} = \alpha_{0jt} + \alpha_1 New_i + \boldsymbol{\kappa}' \mathbf{X}_i + \epsilon_{ijt} \quad (1)$$

$Delinq_{ijt}$: a dummy variable indicating whether the loan was ever least 90 days past due (90+DPD) or worse or entered the foreclosure process within the first 48 months after origination.

i: indexes the purchase loans in our sample.

New_i: denotes a new home sale, namely sales where the age of the house is either zero or one.

α_{0jt}: denotes a geography-by-origination-year fixed effect. We alternatively define our fixed effects at the county-origination-year and Census-tract-origination-year level.

$\mathbf{X}_i$: Vector of borrower and loan characteristics.

Instrumental Variables Models

If unobservables that vary within the fixed effect level are correlated with the new home indicator, then our fixed effects models are biased.

Construct a Bartik-style shift-share instrument and estimate instrumental variables model where new home variable is treated as endogenous.

Instrument constructed using arm's length sales of single-family homes as reported in the public records data.

Instrumental Variables Models

Instrumental Variable Construction for Census Tract j

1. Calculate fraction of new home sales in tract j in 2004.
2. Use home sale records to count number of new and existing homes in Census tract j in year t.
3. Construct similar counts at the state level.
4. Remove tract-level sales from state-level sales series.
5. Use net-of-tract state-level sales data to create estimate of fraction of new home sales in tract j in 2005.
6. Use net-of-tract state-level data to update value created in step 5 to get estimate of fraction of new home sales in tract j in 2006.

Repeat for years 2005-2009.

Fixed Effects Models: Pooled Sample

	Dependent Variable: Loan Defaults in 48 Months Following Origination				
	Specification				
Coefficient	(1)	(2)	(3)	(4)	(5)
New Construction	0.0555***	0.0386***	0.0424***	0.0256***	0.0175***
	(0.00786)	(0.00702)	(0.00543)	(0.00202)	(0.00180)
Year FEs?	No	Yes	Yes	No	No
County-Year FEs?	No	No	No	Yes	No
Tract-Year FEs?	No	No	No	No	Yes
Controls?	No	No	Yes	Yes	Yes
Observations	3,429,829	3,429,829	3,429,829	3,429,829	3,429,829

Fixed Effects Models: Year-By-Year

	Dependent Variable: Loan Defaults in 48 Months Following Origination		
	Origination Year		
Coefficient	2004	2005	2006
New Construction	0.00427**	-0.00144	0.0214***
	(0.00168)	(0.00298)	(0.00300)
Default Rate	0.0672	0.1710	0.3020
Observations	472,864	776,257	726,067
	Origination Year		
Coefficient	2007	2008	2009
New Construction	0.0316***	0.0349***	0.0182***
	(0.00270)	(0.00321)	(0.00275)
Default Rate	0.2430	0.1370	0.0687
Observations	558,590	465,302	430,749
Tract-Year FEs?	Yes	Yes	Yes
Controls?	Yes	Yes	Yes

Instrumental Variables Models

	Dependent Variable: Loan Defaults in 48 Months Following Origination				
	Specification				
Coefficient	(1)	(2)	(3)	(4)	(5)
New Construction	0.0606***	0.1418***	0.0812***	0.0855***	0.0463***
	(0.0090)	(0.0327)	(0.0313)	(0.0221)	(0.0091)
First-Stage F Statistic	-	597.62	578.14	597.52	556.75
Endogeneity Test Statistic	-	7.06***	2.02	4.94**	3.83**
Model Includes Controls?	No	No	No	Yes	Yes
Year FEs?	No	No	No	Yes	No
County-Year FEs?	No	No	No	No	Yes
Observations	2,941,014	2,941,014	2,941,014	2,941,014	2,941,014

Conclusion

Mortgages backed by new homes are unconditionally and conditionally more likely to experience default.

Results holds true in both boom and bust years.

Estimated performance differences are economically significant (between 1.8 and 14.2 percentage points depending on the model specification).

Because new home buyers were typically prime borrowers, our findings also contribute to the literature that explores the role of **prime** borrowers in the mortgage crisis (e.g., Ferreira and Gyourko (2015) and Adelino, Schoar, and Severino (2016)).

Conclusion

Thank You!

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	Dependent Variable: Loan Defaults in 48 Months Following Origination				
	Specification				
Coefficient	(1)	(2)	(3)	(4)	(5)
New Construction	0.0555***	0.0386***	0.0424***	0.0256***	0.0175***
	(0.00786)	(0.00702)	(0.00543)	(0.00202)	(0.00180)
Term>30 Years			0.305***	0.205***	0.186***
			(0.00660)	(0.00456)	(0.00519)
Piggyback Loan			-0.0137***	-0.0138***	-0.00737***
			(0.00329)	(0.00159)	(0.00153)
Prepayment Penalty			0.129***	0.109***	0.0988***
			(0.00498)	(0.00376)	(0.00344)
Option ARM			0.0555***	0.0181***	0.0197***
			(0.00629)	(0.00450)	(0.00448)
Interest Only			0.108***	0.0516***	0.0542***
			(0.00779)	(0.00329)	(0.00298)
Full Documentation			-0.0614***	-0.0447***	-0.0419***
			(0.00376)	(0.00187)	(0.00181)
Fixed Rate			0.0102**	-0.0169***	-0.0173***
			(0.00449)	(0.00224)	(0.00191)
Owner Occupied			-0.0260***	-0.0219***	-0.0115***
			(0.00325)	(0.00283)	(0.00201)
Balloon Payment			0.0297***	0.0127***	0.00859***
			(0.00486)	(0.00273)	(0.00280)
			(0.00460)	(0.00446)	(0.00389)
FHA			-0.0319***	-0.0319***	-0.0283***
			(0.00396)	(0.00314)	(0.00255)
VA			-0.144***	-0.132***	-0.119***
			(0.00709)	(0.00534)	(0.00451)
Back-end DTI (DTI)			0.00183***	0.000902***	0.000841***
			(8.18e-05)	(4.62e-05)	(4.90e-05)
DTI Missing			0.0133***	0.00929**	0.00672
			(0.00428)	(0.00400)	(0.00423)
Year FEs?	No	Yes	Yes	No	No
County-Year FEs?	No	No	No	Yes	No
Tract-Year FEs?	No	No	No	No	Yes
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	Dependent Variable: Loan Defaults in 48 Months Following Origination				
	Specification				
Coefficient	(1)	(2)	(3)	(4)	(5)
CLTV Buckets					
$70 < CLTV \leq 80$			0.0216***	0.0290***	0.0263***
			(0.00199)	(0.00252)	(0.00255)
$80 < CLTV \leq 90$			0.0809***	0.0869***	0.0765***
			(0.00459)	(0.00507)	(0.00504)
$90 < CLTV \leq 99$			0.109***	0.123***	0.110***
			(0.00579)	(0.00635)	(0.00588)
$CLTV > 99$			0.191***	0.198***	0.175***
			(0.00955)	(0.00927)	(0.00796)
FICO Buckets					
$620 < FICO \leq 659$			-0.0988***	-0.106***	-0.100***
			(0.00502)	(0.00467)	(0.00430)
$659 < FICO \leq 719$			-0.187***	-0.193***	-0.183***
			(0.00647)	(0.00626)	(0.00576)
$719 < FICO \leq 769$			-0.251***	-0.253***	-0.238***
			(0.00564)	(0.00567)	(0.00510)
$FICO > 769$			-0.274***	-0.279***	-0.260***
			(0.00460)	(0.00446)	(0.00389)
FHA			-0.0319***	-0.0319***	-0.0283***
			(0.00396)	(0.00314)	(0.00255)
VA			-0.144***	-0.132***	-0.119***
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