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**THE RELATIONSHIP BETWEEN SECOND LIENS, FIRST  
MORTGAGE OUTCOMES, AND BORROWER CREDIT**



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## PAPER HAS TWO PRIMARY GOALS

### **1. QUANTIFY SECOND LIENS' IMPACT ON THE PERFORMANCE OF FIRST MORTGAGES.**

- Assess effects on Defaults and Prepayment Rates

### **2. STUDY SECOND LIENS' IMPACT ON HOUSEHOLD FINANCIAL OUTCOMES**

- Compare evolution of credit statistics (e.g., FICO scores, nonmortgage debt, revolving credit utilization rates, etc.) for borrowers with/without second liens.



## IMPORTANT ISSUES TO RESOLVE EARLY ON

### **1. SHOULD SECOND-LIEN IMPACTS BE STUDIED IN AGGREGATE OR SHOULD EFFECTS BE ANALYZED FOR DIFFERENT TYPES OF SECONDS?**

- Separate impact estimates are constructed for both simultaneous (“Piggyback”) and subsequent second liens.
- Separate estimates are produced for HELOCS and Closed-End Seconds (CES)

### **2. WHAT IS THE REFERENCE GROUP?**

- When looking at the impact of second liens on first lien outcomes, what ought to be held constant in the comparison? Should one compare first-mortgage outcomes (burdened vs. unburdened) *holding constant CLTV and total mortgage debt payment*?



## ILLUSTRATION OF THE REFERENCE GROUP ISSUE

- Suppose three types of households exist in a given geographic area. All households purchased homes for \$100K in the same year and have \$2,500 in monthly income. None of the households has nonmortgage debt.
- Now suppose
  - ❖ Type 1 Households: One mortgage for \$80K. Total monthly mortgage payment on the first (and only lien) is \$500
  - ❖ Type 2 Households: One mortgage for \$80K and a second mortgage of \$7K. The total monthly mortgage payment on the first lien is \$500 and on the second lien is \$100.
  - ❖ Type 3 Households: One mortgage for \$87K. The total monthly mortgage payment is \$600.
- When assessing the “impact” of second liens, should one measure it by comparing Type 1 vs. Type 2 or should one control for CLTV and total debt payments and thus compare Type 2 vs. Type 3?
  - Most of paper looks at direct effects (Type 1 vs. Type 2), but paper does address residual relationship (Type 2 vs. Type 3)



- **BASIC METHODOLOGY:** Simple Multinomial Logit *Estimated Separately for Each Vintage of First Liens.*
  - Each observation is an Enterprise first lien
  - Three possible outcomes: “Negative” (D90, REO, DIL, Short Sale), Prepay, Still-Alive
  - Independent variables flagging those mortgages with seconds.

- **MODEL:**

$$\begin{aligned} \text{Outcome (Bad, Prepayment, or Still Alive)}_i = & \\ & \beta_0 + \beta_1 \text{FIRST\_LTV}_i + \beta_2 \text{FIRST\_LTV\_80ABOVE}_i + \beta_3 \text{FIRST\_LTV\_90ABOVE}_i + \\ & \beta_4 \text{STATE DUMMIES}_i + \beta_5 \text{FICO}_i + \beta_6 \text{BAL\_R\_AtOrig}_i + \beta_7 \text{NONMTG\_DLQ\_ATOrig}_i + \\ & \beta_8 \text{MORT\_RATE}_i + \beta_9 \text{FRM}_i + \beta_{10} \text{RT}_i + \beta_{11} \text{CO}_i + \beta_{12} \text{ORIG\_UPB}_i + \beta_{13} \text{SFD}_i + \\ & \beta_{14} \text{PRIMARY}_i + \beta_{15} \text{SECOND LIEN DUMMIES}_i + \varepsilon_i \end{aligned}$$



- **DATA**

- One-in-five data sample of first mortgages guaranteed by one of the two Enterprises between 1996 and 2010.
- Unique credit bureau dataset from Equifax supplements the Enterprise data
  - Annual snapshots of credit bureau statistics for every active loan.
  - As of March of each year, for every active loan, dataset includes:
    - Balance and payment status of open second liens (!)
    - FICO score
    - Revolving/Instalment/Auto loan balances and payment status
    - Credit limits for all trade line types
  - Except for FICO score—which is reported for primary borrower—data are aggregated for all co-borrowers (up to two) on the loan.

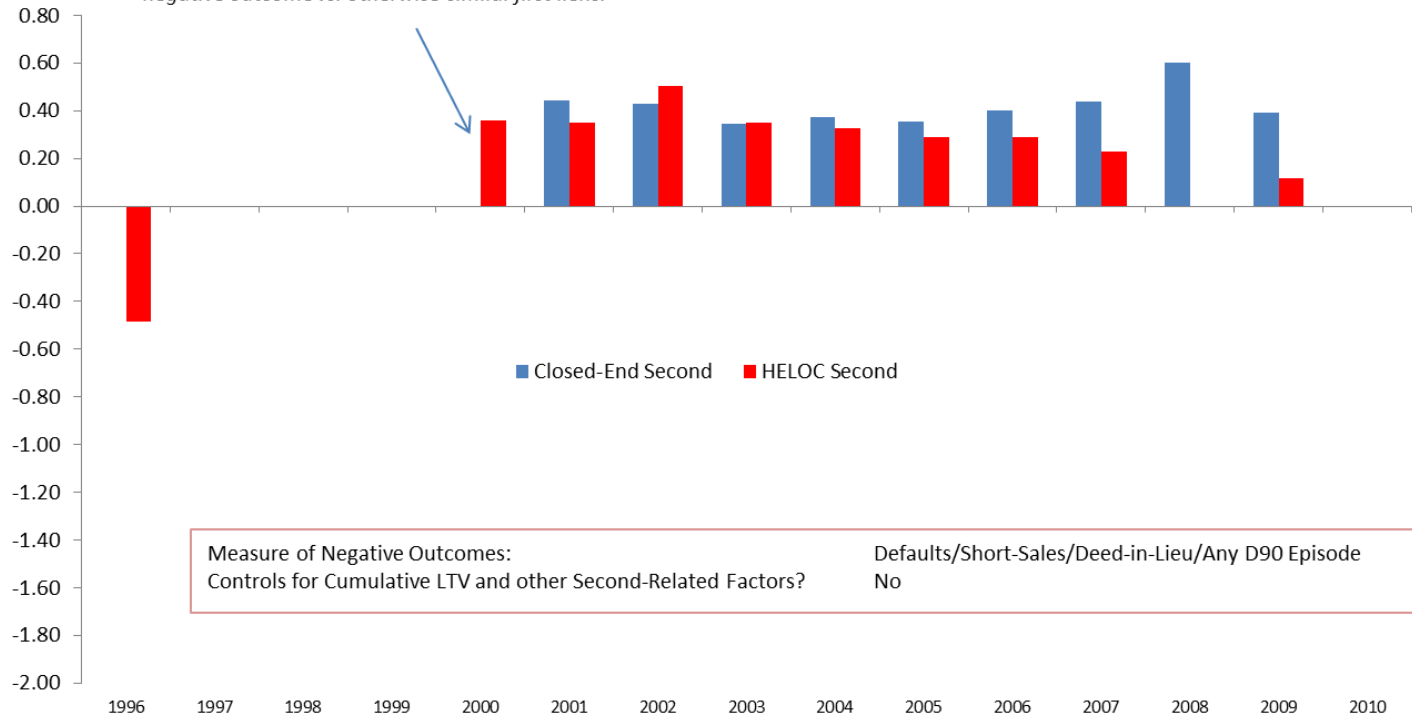


## Did Mortgages with Second Liens have Worse Outcomes than Other Mortgages?

Impact of Having a Piggyback Second Lien on the Likelihood of Having a Negative Outcome

*Interpretation: 2000-originated first liens with piggyback HELOCs had 1.44 times the odds [1.44=exp(.361)] of a negative outcome vs. otherwise-similar first liens.*

Logit Coefficient (Exponentiate to Derive Impact on Odds Ratio)



Measure of Negative Outcomes: Defaults/Short-Sales/Deed-in-Lieu/Any D90 Episode  
 Controls for Cumulative LTV and other Second-Related Factors? No

- 1996-1999: first liens saw little risk increase with piggyback seconds.
- First mortgages with piggyback seconds had 40-80 percent greater odds of negative outcomes.
- CES “worse” than HELOCs

Figures are coefficient estimates for simultaneous second Indicator variables in multinomial logit models specified in the text. The model is estimated separately for each loan origination year. Statistically insignificant coefficients are not shown.



## Did Mortgages with Second Liens have Worse Outcomes than Other Mortgages?

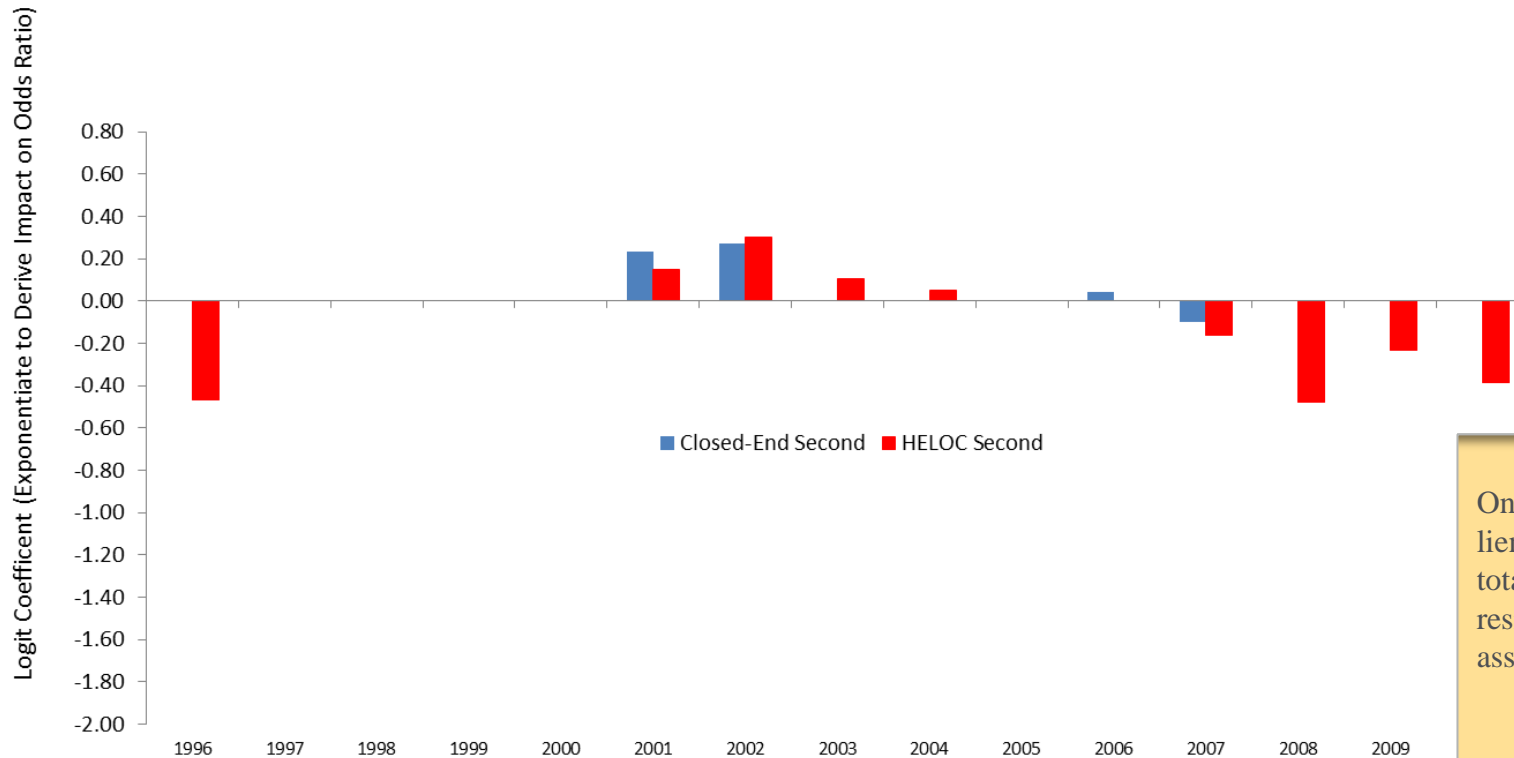
Impact of Having Piggyback Second Lien on the Likelihood of Having a Negative Outcome

Measure of Negative Outcomes:

Defaults/Short-Sales/Deed-in-Lieu/Any D90 Episode

Controls for Cumulative LTV and other Second-Related Factors?

**YES**



Once one controls for second liens' impact on equity and totally monthly payments, residual "independent" association is near zero.

Figures are coefficient estimates for simultaneous second Indicator variables in multinomial logit models specified in the text. The model is estimated separately for each loan origination year. Statistically insignificant coefficients are not shown.





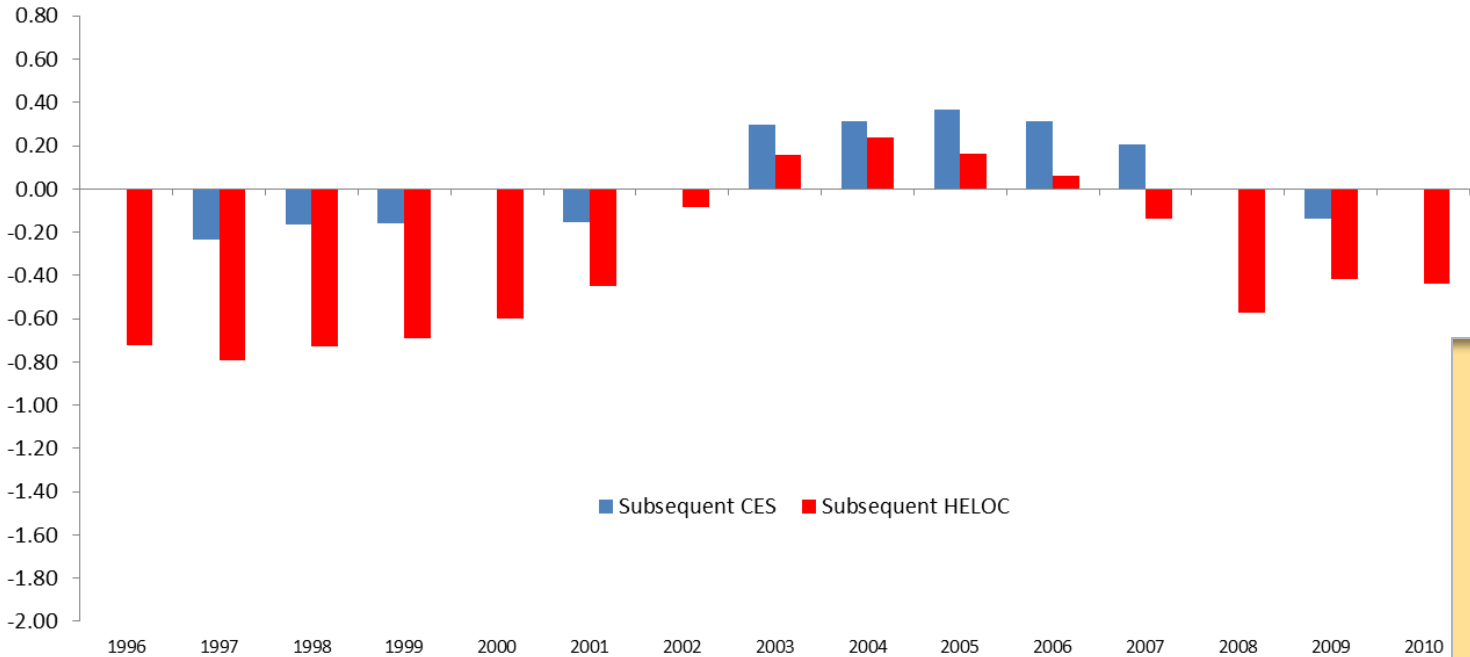
## Did Mortgages with Second Liens have Worse Outcomes than Other Mortgages?

Impact of Having a Subsequent Second Lien on the Likelihood of Having a Negative Outcome

Measure of Negative Outcomes:  
Controls for Cumulative LTV and other Second-Related Factors?

Defaults/Short-Sales/Deed-in-Lieu/Any D90 Episode  
No

Logit Coefficient (Exponentiate to Derive Impact on Odds Ratio)



- Striking time-trend in relationship between subsequent seconds and negative outcomes
- Second liens strong, positive signal of quality prior to housing boom.
- First-Liens with CES generally had worse outcomes.

Figures are coefficient estimates for simultaneous second Indicator variables in multinomial logit models specified in the text. The model is estimated separately for each loan origination year. Statistically insignificant coefficients are not shown.



## Did Mortgages with Second Liens have Worse Outcomes than Other Mortgages?

Impact of Having a Subsequent Second Lien on the Likelihood of Having a Negative Outcome

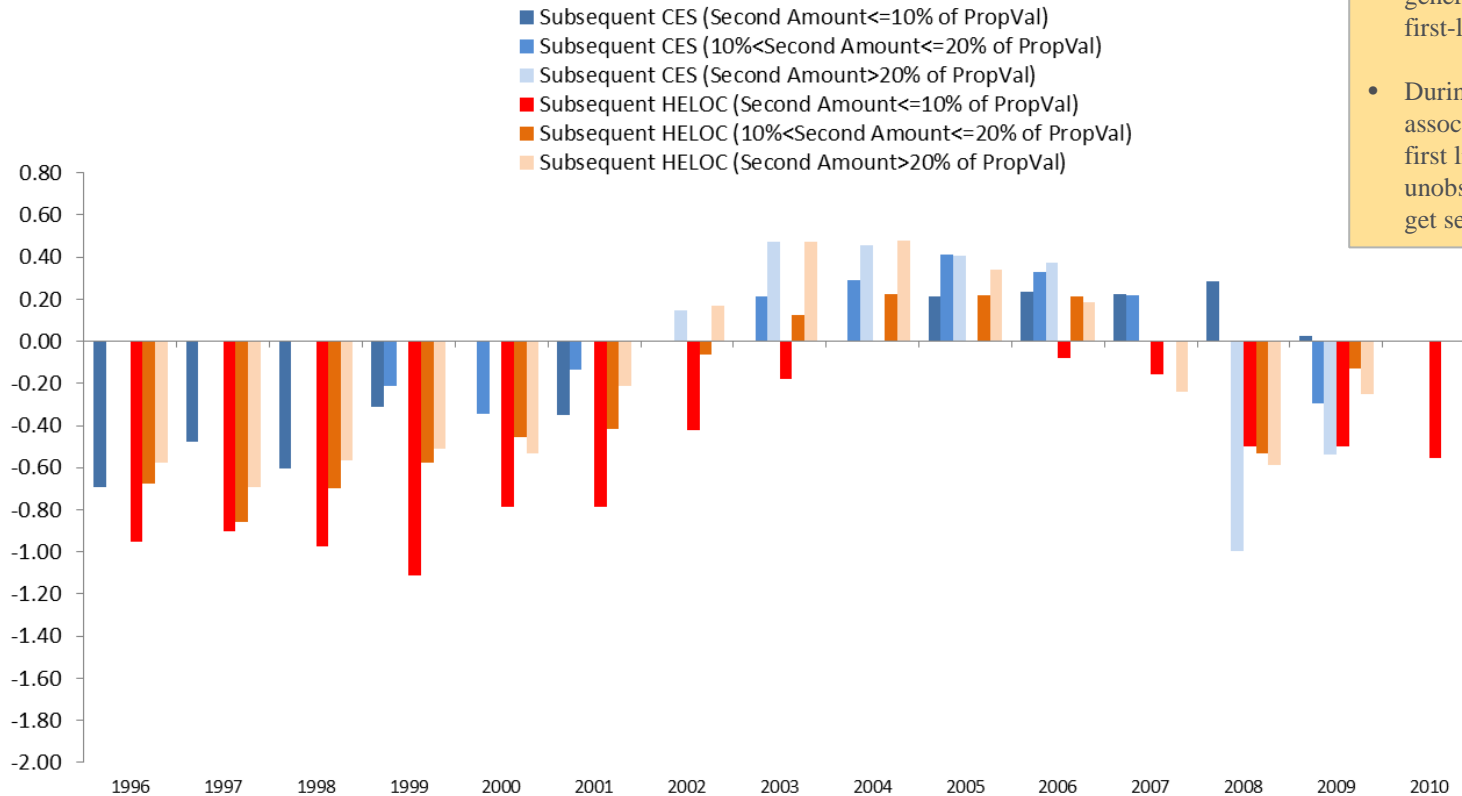
Measure of Bad Outcomes:

Defaults/Short-Sales/Deed-in-Lieu/Any D90 Episode

Controls for Cumulative LTV and other Second-Related Factors?

No

Logit Coefficient (Exponentiate to Derive Impact on Odds Ratio)



- Smaller second liens were generally associated with better first-lien performance.
- During the housing bust, borrowers associated with only the “best” first liens (i.e., of highest unobservable quality) were able to get second liens.

Figures are coefficient estimates for second lien indicator variables in multinomial logit models specified in the text. The model is estimated separately for each loan origination year. Statistically insignificant coefficients are not shown.



## Did Mortgages with Second Liens have Worse Outcomes than Other Mortgages?

Impact of Having a Subsequent Second Lien on the Likelihood of Having a Negative Outcome

Measure of Bad Outcomes:

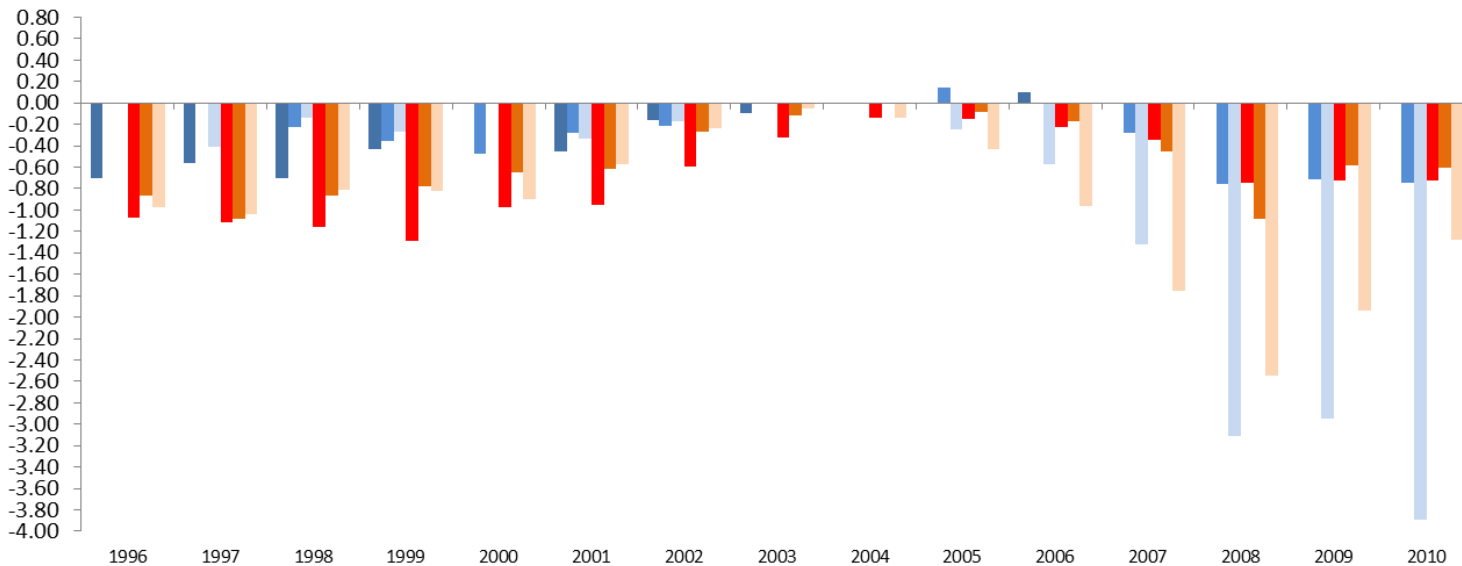
Defaults/Short-Sales/Deed-in-Lieu/Any D90 Episode

Controls for Cumulative LTV and other Second-Related Factors?

**Yes**

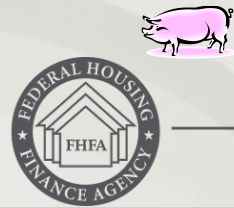
- Subsequent CES (Second Amount ≤ 10% of PropVal)
- Subsequent CES (10% < Second Amount ≤ 20% of PropVal)
- Subsequent CES (Second Amount > 20% of PropVal)
- Subsequent HELOC (Second Amount ≤ 10% of PropVal)
- Subsequent HELOC (10% < Second Amount ≤ 20% of PropVal)
- Subsequent HELOC (Second Amount > 20% of PropVal)

Logit Coefficient (Exponentiate to Derive Impact on Odds Ratio)



- Once one controls for CLTV and monthly payment impact, one can see strong signaling effect; first liens with seconds almost always performed better under such controls.
- Weight of the “signaling” effect is notably modest during the height of the housing boom.

Figures are coefficient estimates for second lien indicator variables in multinomial logit models specified in text. The model is estimated separately for each loan origination year. Statistically insignificant coefficients are not shown.

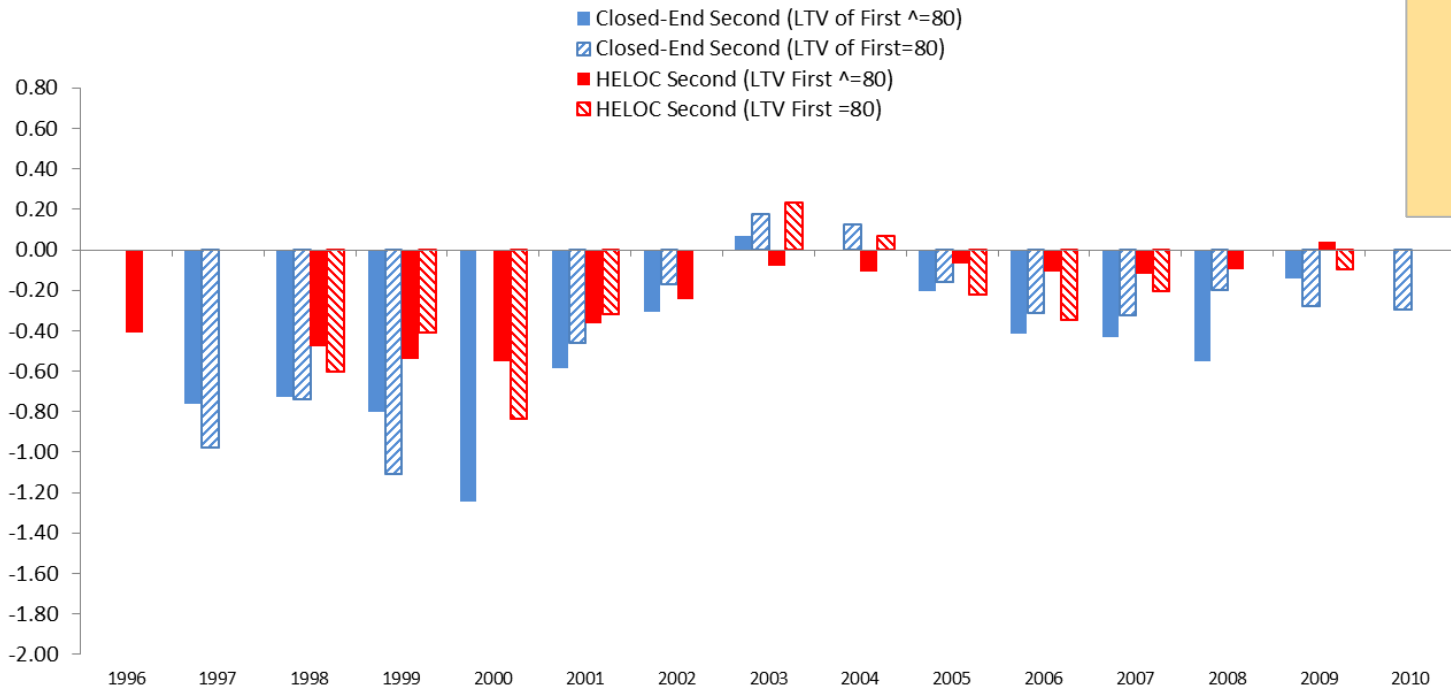


## Did Mortgages with Piggyback Seconds Prepay More/Less Readily than Other Mortgages?

Impact of Having Piggyback Second on Likelihood of Having "Prepay" Outcome

Prepayment Window: Ever  
 Controls for Cumulative LTV and other Second-Related Factors? No

Logit Coefficient (Exponentiate to Derive Odds Ratio)



- First liens with piggyback seconds generally had lower odds of prepayment vis-à-vis other loans, although the difference varied significantly over time.
- “At-80” LTV first liens do not look systematically different. No evidence for “savvy” borrower hypothesis.

Figures are coefficient estimates for second lien indicator variables in multinomial logit models specified in text. The model is estimated separately for each loan origination year. Statistically insignificant coefficients are not shown.

# HOW DID NON-MORTGAGE FINANCIAL OUTCOMES EVOLVE BEFORE AND AFTER SECOND-LIEN ORIGINATION?



- Pre- and Post- Origination Credit Patterns: No Second vs. Piggyback Seconds vs. Subsequent Seconds
- Credit Patterns for Subsequent Seconds: By Loan Size
- Credit Patterns for Different Cohorts of Subsequent Seconds

## Did Post-Origination Credit Patterns Look Different for Different Types of Borrowers

### Evolution of Credit Characteristics

	Average for Active Loans					Avg. Change (vs. Year 0): Nonmissing Values				
	One Loan	Closed (Piggy.)	Closed (Subs.)	HELOC (Piggy.)	HELOC (Subs.)	One Loan	Closed (Piggy.)	Closed (Subs.)	HELOC (Piggy.)	HELOC (Subs.)
	<b><u>Average Non-Mortgage Debt</u></b>									
3 Years Before			\$27,256		\$23,848			(\$7,148)		(\$5,207)
At Orig. of Second Lien	\$23,986	\$34,336	\$32,097	\$28,822	\$27,211					
2nd Orig + 3yrs	\$24,782	\$35,400	\$34,942	\$28,593	\$29,662	\$2,266	\$1,691	\$2,663	\$356	\$2,124
2nd Orig + 6yrs	\$22,842	\$31,636	\$33,355	\$26,094	\$28,776	\$1,583	\$385	\$1,066	(\$959)	\$836
2nd Orig + 9yrs	\$20,648	\$27,704	\$31,043	\$23,356	\$27,002	\$930	\$348	\$3,158	(\$1,832)	\$3,172
	<b><u>Average Revolving Debt Utilization Rate</u></b>									
3 Years Before			36%		20%			8%		0%
At Orig. of Second Lien	21%	27%	29%	21%	21%					
2nd Orig + 3yrs	21%	28%	31%	27%	22%	1%	3%	2%	7%	2%
2nd Orig + 6yrs	19%	27%	32%	23%	24%	1%	2%	2%	3%	3%
2nd Orig + 9yrs	18%	25%	30%	21%	23%	-1%	0%	0%	1%	3%
	<b><u>Average Credit Limit--NonMtg Debt</u></b>									
3 Years Before			\$69,021		\$74,220			(\$17,508)		(\$15,472)
At Orig. of Second Lien	\$67,218	\$78,710	\$73,859	\$82,164	\$77,197					
2nd Orig + 3yrs	\$69,822	\$80,381	\$81,612	\$80,314	\$85,439	\$4,472	\$770	\$6,128	(\$3,405)	\$6,683
2nd Orig + 6yrs	\$67,344	\$74,421	\$75,627	\$73,712	\$78,673	\$2,828	(\$796)	\$976	(\$9,043)	\$69
2nd Orig + 9yrs	\$63,814	\$69,356	\$71,758	\$68,246	\$75,112	\$3,584	\$1,504	\$9,653	(\$10,775)	\$7,917
	<b><u>Average Contemporaneous FICO® Score (First Borrower)</u></b>									
3 Years Before			721.7		743.9			(2.8)		(6.5)
At Orig. of Second Lien	731.6	715.6	713.7	736.3	738.3					
2nd Orig + 3yrs	736.4	719.4	709.5	739.0	738.2	1.5	(2.0)	(6.4)	(1.1)	(0.3)
2nd Orig + 6yrs	741.1	722.0	708.2	741.6	734.0	5.5	1.0	(5.9)	1.1	(2.3)
2nd Orig + 9yrs	745.4	726.1	710.3	742.7	735.6	9.2	7.2	2.7	2.6	1.2
	<b><u>Average Number of 30+ DQs--Non-mortgage</u></b>									
3 Years Before			0.13		0.07			(0.05)		(0.01)
At Orig. of Second Lien	0.10	0.12	0.17	0.07	0.10					
2nd Orig + 3yrs	0.17	0.24	0.28	0.16	0.14	0.08	0.15	0.12	0.10	0.05
2nd Orig + 6yrs	0.22	0.32	0.42	0.19	0.23	0.13	0.22	0.21	0.13	0.12
2nd Orig + 9yrs	0.22	0.35	0.44	0.21	0.22	0.15	0.26	0.02	0.15	(0.00)

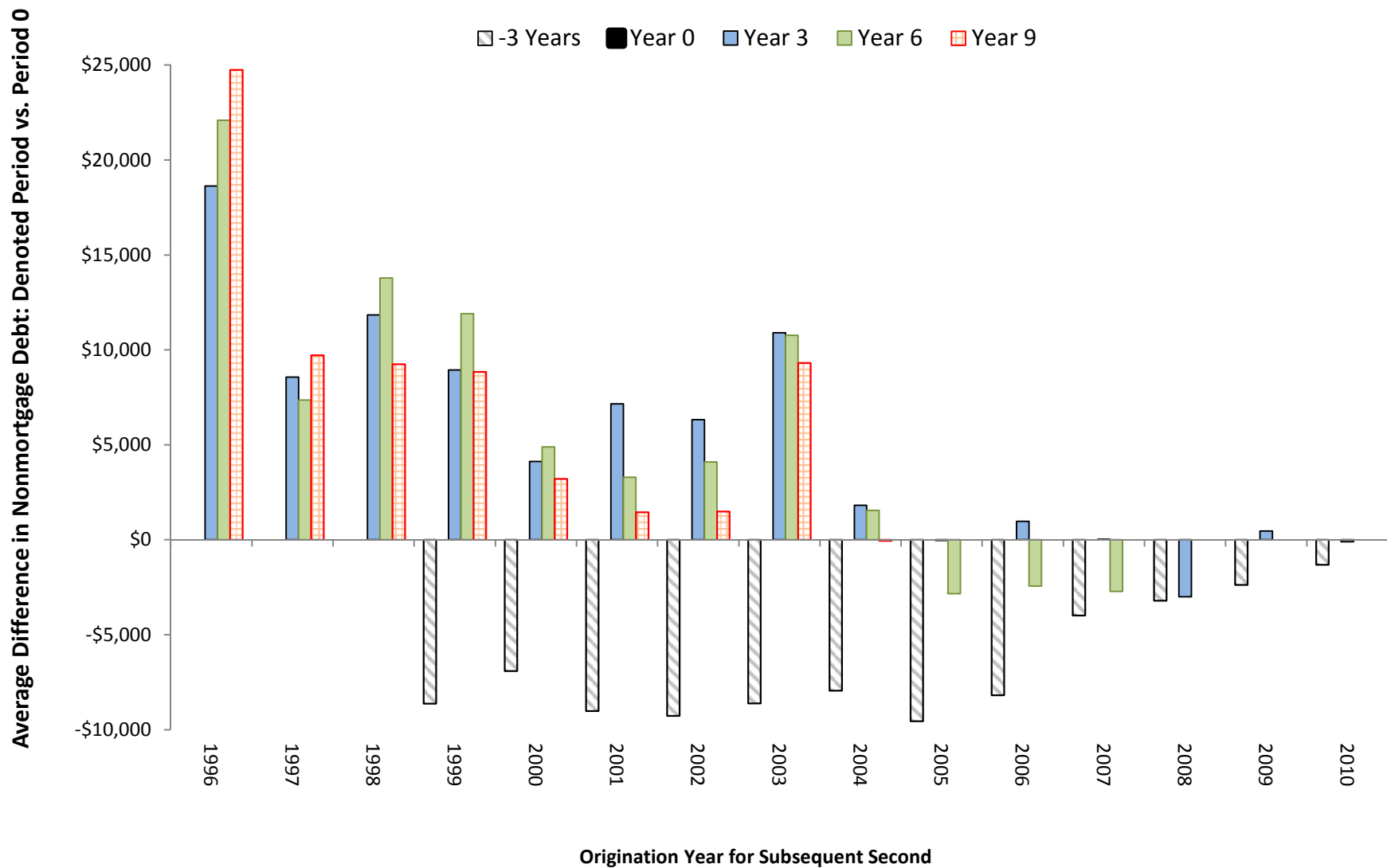
# Did Post-Origination Credit Patterns Look Different for Borrowers with Subsequent Seconds of Different Sizes (Size Measured in Months of Income)

## Evolution of Credit Characteristics

	Average for Active Loans					Avg. Change (vs. Year 0): Nonmissing Values				
	No Post-Orig 2nds	6 mos. or less	6.01 mos.- 12 mos.	12.01 mos.- 18 mos.	>18 mos.	No Post-Orig 2nds	6 mos. or less	6.01 mos.- 12 mos.	12.01 mos.- 18 mos.	>18 mos.
<b><u>Average Non-Mortgage Debt</u></b>										
3 Years Before	\$18,684	\$23,959	\$26,958	\$28,101	\$27,476					
At Orig. of Second Lien	\$24,416	\$26,616	\$32,199	\$35,152	\$37,014					
2nd Orig + 3yrs	\$25,234	\$30,200	\$34,531	\$35,733	\$35,537	\$2,116	\$3,548	\$1,621	(\$754)	(\$2,662)
2nd Orig + 6yrs	\$23,240	\$29,558	\$33,281	\$33,483	\$32,447	\$1,311	\$2,914	(\$183)	(\$3,852)	(\$5,757)
2nd Orig + 9yrs	\$20,873	\$28,092	\$30,727	\$30,042	\$29,137	\$782	\$4,501	\$2,033	(\$480)	(\$1,112)
<b><u>Average Revolving Debt Utilization Rate</u></b>										
3 Years Before	13%	20%	26%	51%	23%		0%	-1%	24%	-2%
At Orig. of Second Lien	21%	22%	28%	28%	25%					
2nd Orig + 3yrs	21%	23%	30%	30%	27%	1%	2%	2%	2%	3%
2nd Orig + 6yrs	20%	24%	32%	32%	29%	1%	3%	3%	4%	5%
2nd Orig + 9yrs	18%	24%	30%	29%	26%	-1%	2%	2%	3%	4%
<b><u>Average Credit Limit--NonMtg Debt</u></b>										
3 Years Before	\$72,942	\$72,742	\$72,388	\$74,607	\$75,786					
At Orig. of Second Lien	\$68,359	\$73,939	\$77,975	\$83,700	\$89,949					
2nd Orig + 3yrs	\$71,033	\$84,592	\$84,495	\$86,681	\$88,865	\$3,946	\$9,540	\$4,133	(\$435)	(\$3,923)
2nd Orig + 6yrs	\$68,215	\$79,666	\$77,056	\$76,680	\$77,093	\$1,766	\$5,317	(\$3,461)	(\$11,351)	(\$15,737)
2nd Orig + 9yrs	\$64,351	\$76,067	\$72,008	\$71,938	\$72,808	\$2,853	\$11,680	\$3,348	(\$2,558)	(\$3,914)
<b><u>Average Contemporaneous FICO® Score (First Borrower)</u></b>										
3 Years Before	760.9	741.3	728.5	728.4	731.6		(6.9)	(3.4)	(2.9)	(4.6)
At Orig. of Second Lien	731.9	734.4	720.9	722.6	730.8					
2nd Orig + 3yrs	736.7	735.9	716.3	714.9	720.2	1.2	1.2	(5.5)	(9.3)	(11.5)
2nd Orig + 6yrs	741.1	734.0	711.5	708.5	712.8	5.0	1.6	(8.6)	(14.4)	(17.3)
2nd Orig + 9yrs	745.3	734.5	711.9	711.8	718.7	8.8	4.7	(4.5)	(10.0)	(10.0)
<b><u>Average Number of 30+ DQs--Non-mortgage</u></b>										
3 Years Before	0.04	0.09	0.09	0.08	0.07		(0.01)	(0.03)	(0.03)	(0.03)
At Orig. of Second Lien	0.10	0.12	0.14	0.13	0.11					
2nd Orig + 3yrs	0.17	0.15	0.22	0.23	0.22	0.08	0.04	0.10	0.13	0.13
2nd Orig + 6yrs	0.22	0.23	0.35	0.38	0.34	0.13	0.10	0.19	0.24	0.22
2nd Orig + 9yrs	0.22	0.24	0.37	0.38	0.32	0.15	0.00	0.00	(0.00)	(0.00)

# Pre- and Post-Origination Trend in Non-Mortgage Balances

By Year of Subsequent Second







## MORTGAGE OUTCOMES

### ➤ PIGGYBACK SECONDS

- ❑ Burden of piggyback second liens was large for most cohorts: 40-80 percent increase in odds of negative outcomes for associated first mortgages.
- ❑ Once one controls for CLTV and total mortgage payment, little residual relationship exists between piggyback mortgages and first-lien outcomes.

### ➤ SUBSEQUENT SECONDS

- ❑ The “signaling” relationship between subsequent seconds and performance was strong for much of history: during most of the time frame studied, subsequent seconds were associated with better outcomes even though those liens brought on additional debt and debt servicing.
- ❑ A notable time trend exists in the relationship between subsequent seconds and first-lien outcomes. Worse performance is evident for second-lien-burdened first liens originated during the height of the housing boom.



## NON-MORTGAGE OUTCOMES

### ➤ *PIGGYBACK SECONDS*

- In general, the evolution of non-mortgage outcomes was not materially different for households with piggyback liens than for households with one loan.

### ➤ *SUBSEQUENT SECONDS*

- Although not consistent across all metrics, certain nonmortgage outcomes showed some relative deterioration for borrowers with subsequent seconds.
  - Borrowers with subsequent seconds showed substantial increases in their uptake of non-mortgage debt and their revolving credit utilization. Also, FICO® Scores fell after second liens were originated (vs. steady growth for one-loan households).



## CIRCUMSTANCES UNDER WHICH SECOND LIENS WERE ORIGINATED

- In many cases, subsequent seconds were originated in the context of a significant expansions in household borrowing.
- Across-cohort analysis indicates vast differences in how household credit conditions evolved before and after the second-lien origination.
  - Households that took out second liens in the late 1990 and early 2000s saw substantial post-origination growth in non-mortgage borrowing. Households that took out second liens in later years in many cases saw declines in non-mortgage balances.