

# WHAT HAPPENS AFTER YOU OVERPAY FOR A HOUSE

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# Introduction

- 1 Appraisal is usually required for every mortgage in the US.
- 2 Appraisers are assumed to be professional and objective.
- 3 However, appraisers do have a misaligned incentive, a problem well known in the industry but new to average home buyers.
- 4 Hence, 95% of appraisals are simply confirming that the contract is done right.

# Introduction

- 1 AVM is not new for mortgage industry professionals.
- 2 AVM has different methodologies, and may be pretty off the mark too.
- 3 AVM uses actual home sales, so could be inflated as well because if slow-learning Bayesian.
- 4 However, AVM has less human intervention from the lenders.
- 5 Hence, AVM could be very useful benchmark for the borrowers.

# Introduction

Preview of the results: if one overpays compared to the benchmark,

- ① s/he is much more likely to become serious default (6-month delinquent within five years of loan acquisition);
- ② and the magnitude of such effect is huge: in 2007, the top decile of overpayment defaults at 23% while the bottom at 17%.
- ③ if s/he is lucky and survives until the next time the house is sold, s/he will realize less profits compared to her or his peers.

This holds true for various kinds of AVMs, even a simple mark-to-market valuation.

# Four Benchmarks

- Origination AVM
- Contemporaneous MTM
- Post-Acquisition AVM
- Ex Post MTM

# Four Benchmarks

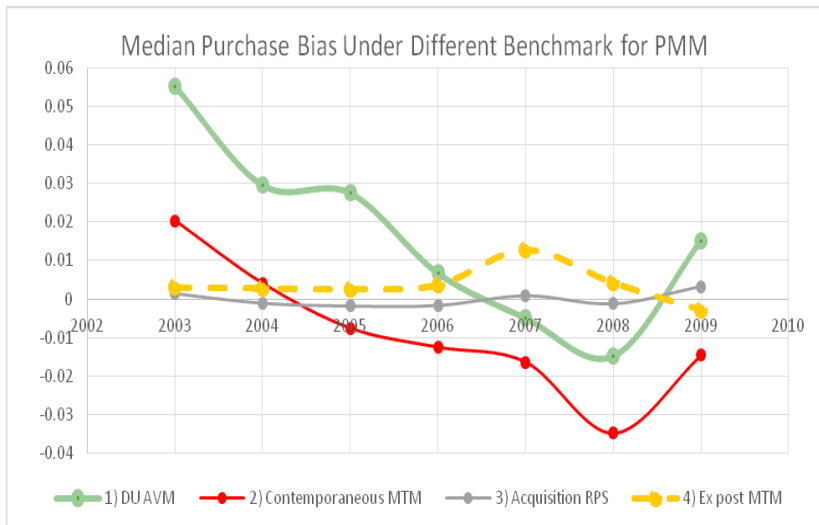


Figure: Four Benchmark Predictions

# Regressions: Spread bw Sales and AVM

Spread	Loan Acquisition Year				
	2003	2004	2005	2006	2007
<-15	-0.19**	-0.36***	-0.33***	-0.24***	-0.22***
[-15, -10)	-0.10	-0.17**	-0.16***	-0.15***	-0.07***
[-10, -5)	-0.13	-0.12**	-0.13***	-0.03	-0.04
[-5, -1)	-0.05	-0.04	-0.05	0.01	-0.04*
[-1, 1]	0.00	0.00	0.00	0.00	0.00
(1, 4]	0.03	-0.01	-0.01	0.08**	-0.02
(4, 8]	0.06	-0.02	0.14***	0.12***	0.07***
(8, 12]	0.15*	0.06	0.20***	0.14***	0.13***
(12, 20]	0.23***	0.08	0.27***	0.21***	0.23***
>20	0.43***	0.32***	0.43***	0.29***	0.35***

Note: \*\*\* represents significant at 1% confidence level, \*\* at 5%, and \* at 10%.

# Regressions: Spread bw Sales and AVM

Spread	Loan Acquisition Year						
	2003	2004	2005	2006	2007	2008	2009
<-15	1.58	2.22	4.31	9.24	15.88	6.79	0.70
[-15, -10)	1.72	2.68	5.10	10.02	18.04	7.76	0.75
[-10, -5)	1.68	2.79	5.25	11.15	18.55	8.09	0.87
[-5, -1)	1.82	3.04	5.65	11.60	18.42	8.03	0.95
[-1, 1]	1.91	3.15	5.92	11.45	19.10	8.37	1.12
(1, 4]	1.97	3.12	5.87	12.28	18.74	8.40	0.95
(4, 8]	2.03	3.10	6.77	12.72	20.21	8.83	1.07
(8, 12]	2.21	3.34	7.13	13.00	21.24	9.55	1.26
(12, 20]	2.39	3.42	7.60	13.77	22.90	10.94	1.14
>20	2.90	4.30	8.78	14.72	25.14	13.93	1.81



# Raw sample

Table: Median Overpayment in Percentages By Decile

Deciles	Loan Acquisition Year						
	2003	2004	2005	2006	2007	2008	2009
00%-10%	-15	-16	-16	-17	-20	-30	-30
10%-20%	-6	-8	-8	-10	-12	-18	-16
20%-30%	-2	-4	-4	-6	-8	-12	-10
30%-40%	1	-1	-1	-3	-5	-7	-5
40%-50%	4	2	1	-1	-2	-4	-1
50%-60%	7	4	4	2	1	0	2
60%-70%	11	7	7	4	3	3	5
70%-80%	15	11	10	8	6	6	9
80%-90%	21	17	16	12	11	11	15
90%-100%	34	31	28	23	22	23	26
40%-60%	3.5	3	2.5	0.5	-0.5	-2	0.5

# Raw sample

Table: Average Default Rate in Basis Point By Decile

Deciles	Loan Acquisition Year						
	2003	2004	2005	2006	2007	2008	2009
00%-10%	84	116	291	703	940	462	104
10%-20%	62	127	310	752	999	450	110
20%-30%	63	125	318	698	910	444	107
30%-40%	54	131	369	751	880	417	91
40%-50%	50	121	401	701	904	384	117
50%-60%	52	129	402	758	806	357	94
60%-70%	60	134	465	759	845	377	70
70%-80%	51	143	518	796	864	366	126
80%-90%	52	140	559	846	894	492	109
90%-100%	85	184	691	866	1000	746	185

# Raw sample

Table: Average **Predicted** Default Rate in Basis Point

Deciles	Acquisition Year						
	2003	2004	2005	2006	2007	2008	2009
00%-10%	89	157	406	803	1072	579	156
10%-20%	74	143	406	777	1013	562	130
20%-30%	68	141	409	770	974	490	119
30%-40%	61	131	419	766	929	448	108
40%-50%	64	130	417	761	890	402	106
50%-60%	57	132	420	756	869	401	96
60%-70%	54	125	443	753	860	380	96
70%-80%	52	128	455	755	827	383	97
80%-90%	51	124	476	754	843	423	96
90%-100%	55	130	487	742	846	454	102

# Propensity Score Matching

for each acquisition year,

- run regression to predict risk using all factors other than the overpayment
- for each decile, select loans that have similar risk.
- in the end, each decile will have the same number of loans,
- and more importantly, have the similar distribution of predicted risk

Difference in actual default rate  $\leq$  difference in overpayment

# Matched sample

Table: Average **Predicted** Default Rate in Basis Point

Deciles	Acquisition Year						
	2003	2004	2005	2006	2007	2008	2009
00%-10%	52	117	398	693	807	386	90
10%-20%	51	116	403	702	804	385	89
20%-30%	50	117	399	709	806	379	88
30%-40%	50	119	397	705	801	381	90
40%-50%	50	118	399	706	804	392	92
50%-60%	51	119	396	712	813	391	94
60%-70%	54	123	391	705	814	400	95
70%-80%	53	122	392	703	831	405	95
80%-90%	54	121	390	715	821	386	95
90%-100%	52	120	389	707	818	385	95

# Matched sample

Table: Average Default Rate in Basis Point By Decile

Deciles	Acquisition Year						
	2003	2004	2005	2006	2007	2008	2009
00%-10%	56	88	291	631	745	336	67
10%-20%	28	106	310	684	838	322	79
20%-30%	46	118	308	662	760	381	85
30%-40%	43	120	352	699	761	374	79
40%-50%	33	117	384	657	825	376	88
50%-60%	48	106	386	707	748	368	92
60%-70%	60	140	415	713	801	401	76
70%-80%	51	128	459	743	860	403	130
80%-90%	59	139	489	798	872	456	110
90%-100%	87	166	597	836	977	654	175

# Using Original AVM as benchmark

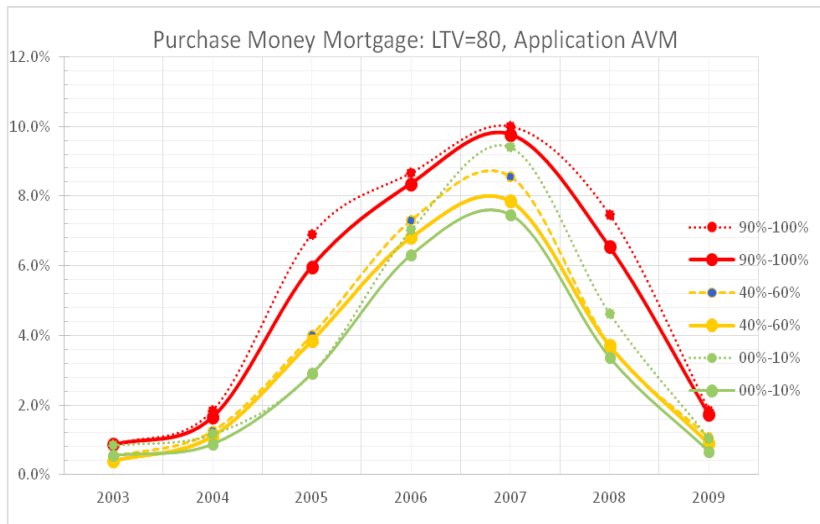


Figure: Overpay => More Defaults

# Using Contemporaneous MTM as benchmark

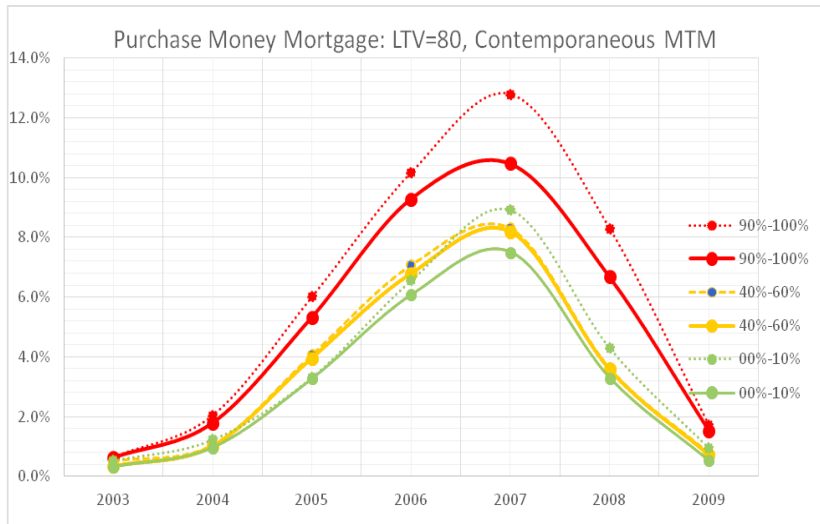


Figure: Overpay => More Defaults



# Using Acquisition AVM as benchmark

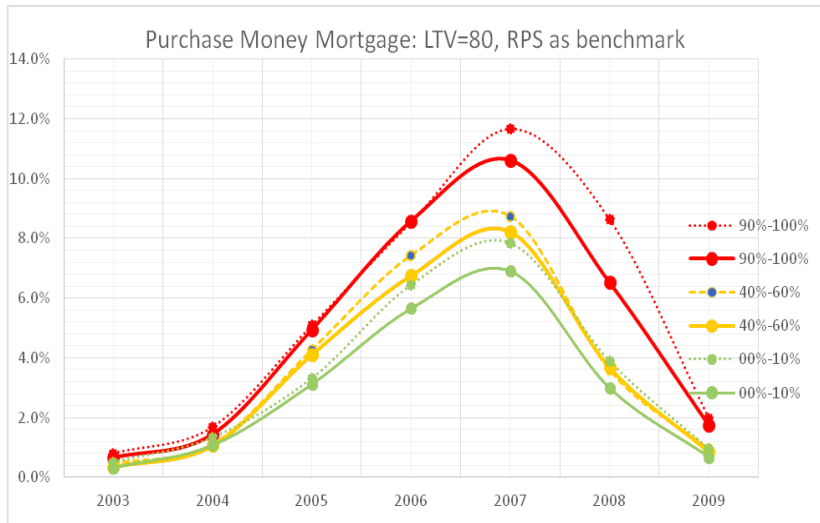


Figure: Overpay => More Defaults

# Using Ex Post MTM as benchmark

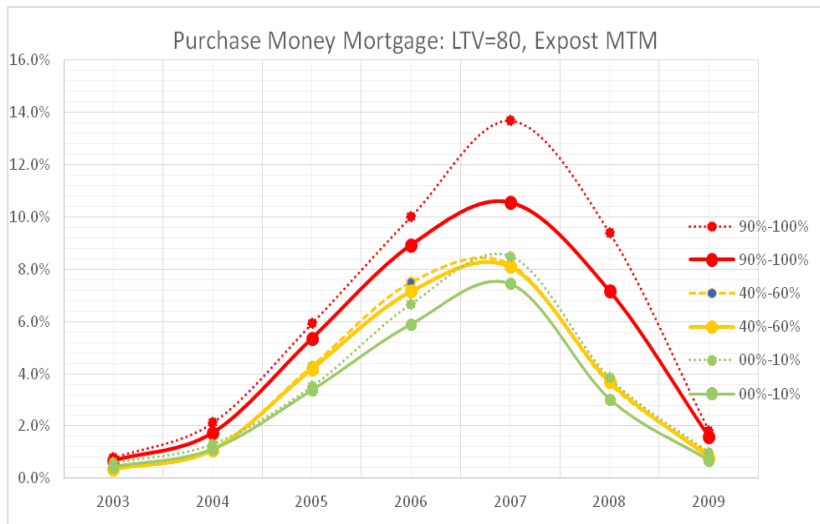


Figure: Overpay => More Defaults

# All LTVs, and Using Origination AVM as benchmark

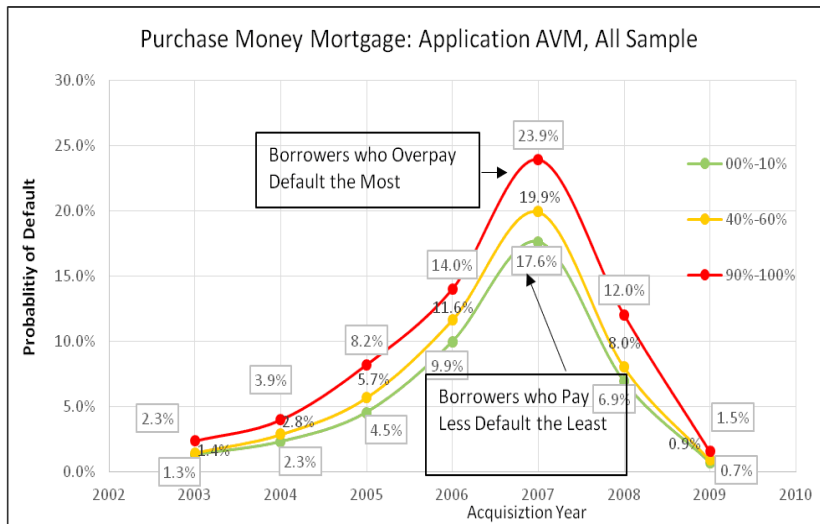


Figure: Overpay  $\Rightarrow$  More Defaults

# Next time the house is sold?

- find loans that we know they were sold as a arms length transaction
- regroup them and divide them into 10 deciles according to the overpayment
- compute the expected profit which is the neighborhood price change
- do a propensity score matching, using the expected profit as the propensity score
- compare the actual profit across overpayment deciles in the matched sample

# Matched Sample

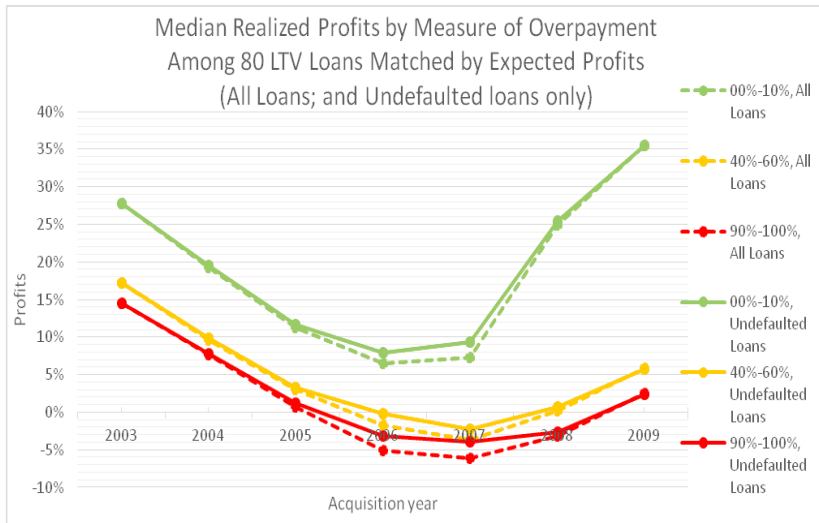


Figure: Overpay => Less Profits

# Conclusion

Empirically we demonstrate that compared to different AVMs, borrowers who overpay

- 1 are more likely to serious default in the future
- 2 and are also more likely to receive less profit from home ownership.

