


Dr. Christopher Cagan, "Mortgage Payment Reset"
Presentation at the Real Estate Research Council of Southern California
Quarterly Luncheon Meeting, Cal Poly University, May 30, 2007.


May 30, 2007



MORTGAGE PAYMENT RESET

The Issue and the Impact


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What Is The Issue Of Mortgage Payment Reset?

- Adjustable -rate mortgage payments are reset from low initial rates after their introductory periods expire.
- Borrowers may not be able to cope with large resets.
- If there is enough equity present, the borrower can refinance or sell.
- ***If*** there is not enough equity to enable refinance or sale ***and*** the borrower can't pay the higher payments, default is likely.
- It is the ***duality*** and interplay of equity and change of payment that defines the issue of mortgage reset.

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Data Sets And Methodology

The **duality** of the reset issue implies the use of **two** databases:

1. An **equity database** of 32 million Single Family Residences (SFRs) and condominiums/ townhouses in 694 counties, in 41 states and the District of Columbia
 - Each property was valued as of December 2006 using two Automated Valuation Models (AVMs)
 - First and second mortgage balances were subtracted to compute equity; all Home Equity Lines of Credit (HELOCs) assumed to be fully drawn
 - Other loan information was used: initial interest rate, introductory period, and adjustment rules
2. A **national database of first mortgages** from LoanPerformance™
 - Information about loan origination, balance, interest rate, etc.

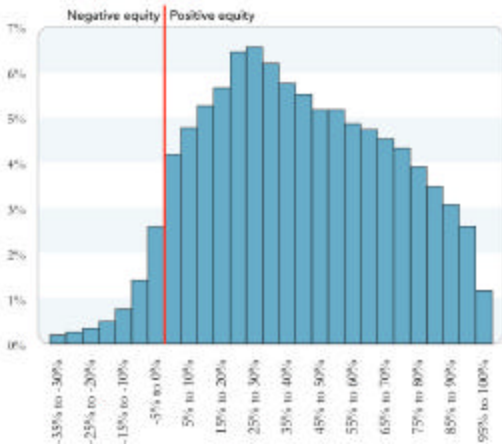
Weaving the two databases together will show how many mortgages are in safe or challenging situations and how much money is involved.

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Less Than 7% Of Residences Have Negative Equity


Equity	
Less than -10%	2.9%
Less than -5%	4.3%
Less than 0%	6.9%
Less than 5%	11.0%
Less than 10%	15.8%
Less than 15%	21.0%
Less than 20%	26.7%
Less than 25%	33.1%
Less than 30%	39.7%

Distribution of Equity



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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 1 / Figure 1



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**Almost All Who Bought Or Refinanced In 2003
 Or Earlier Have Positive Equity**


Equity Group	1990	1995	2002	2003	2004	2005	2006
Less than -35%	0.5%	0.6%	1.0%	0.7%	1.0%	1.0%	1.2%
Less than -30%	0.5%	0.8%	1.2%	0.9%	1.2%	1.2%	1.5%
Less than -25%	0.7%	0.9%	1.4%	1.1%	1.5%	1.5%	2.0%
Less than -20%	0.8%	1.1%	1.8%	1.3%	1.9%	1.9%	2.6%
Less than -15%	1.0%	1.4%	2.2%	1.7%	2.4%	2.6%	3.5%
Less than -10%	1.3%	1.7%	2.8%	2.3%	3.2%	3.6%	5.2%
Less than -5%	1.6%	2.1%	3.7%	3.2%	4.4%	5.4%	9.1%
Less than 0%	2.0%	2.6%	4.9%	4.5%	6.3%	9.0%	17.6%
Less than 5%	2.5%	3.3%	6.8%	6.7%	9.9%	16.2%	28.8%
Less than 10%	3.2%	4.1%	9.6%	9.9%	15.0%	25.4%	38.6%
Less than 15%	4.1%	5.2%	13.5%	14.1%	21.5%	35.2%	47.3%
Less than 20%	5.1%	6.5%	18.1%	19.1%	28.7%	44.8%	56.4%
Less than 25%	6.3%	8.2%	23.3%	24.7%	37.0%	55.3%	67.1%
Less than 30%	7.9%	10.6%	29.3%	31.4%	46.4%	65.7%	75.2%
Less than 35%	9.8%	13.8%	36.1%	38.9%	56.0%	74.2%	80.8%
Less than 40%	12.6%	17.8%	43.5%	46.9%	64.8%	80.4%	84.8%

4 Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 2 

Comparing Equity Distributions By Type Of Mortgages

Percent Equity	2004		2005		2006	
	Fixed	Adjustable	Fixed	Adjustable	Fixed	Adjustable
Less than -15%	2.2%	2.7%	2.3%	2.9%	2.8%	4.1%
Less than -10%	2.8%	3.7%	3.2%	4.1%	3.9%	6.3%
Less than -5%	3.9%	5.2%	4.6%	6.4%	5.9%	12.1%
Less than 0%	5.5%	7.6%	7.3%	11.1%	10.3%	23.9%
Less than 5%	8.5%	12.1%	12.9%	20.7%	18.3%	37.5%
Less than 10%	12.9%	18.6%	19.9%	32.4%	26.8%	48.9%
Less than 15%	18.7%	26.5%	27.9%	44.5%	35.1%	58.8%
Less than 20%	25.1%	35.4%	36.2%	55.9%	43.7%	68.6%
Less than 25%	32.5%	45.6%	46.0%	67.2%	54.1%	78.4%
Less than 30%	41.3%	56.8%	56.8%	77.4%	63.6%	85.2%

- Includes purchases and refinances by year of first mortgage origination
 - ✓ Remember both 1st and 2nd loans included for equity computation
- The equity situation is more challenged for adjustable loans
- If prices change, move up or down in the table
 - ✓ If prices go up 5%, many properties are pulled out of negative equity
 - ✓ If prices go down 5%, many properties are pushed into negative equity

5 Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 3 

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Active First Mortgages Originated 2004-2006 National Data Set Provided By LoanPerformance™

Initial Interest Rate	N of Loans	Balance in Millions
Below 2%	1,123,595	\$451,018
From 2% to 3%	132,427	\$41,267
From 3% to 4%	174,651	\$48,705
From 4.0% to 4.5%	293,195	\$88,339
From 4.5% to 5.0%	607,090	\$176,104
From 5.0% to 5.5%	897,065	\$269,387
From 5.5% to 6.0%	1,056,880	\$317,401
From 6.0% to 6.5%	952,623	\$273,513
From 6.5% to 7.0%	896,898	\$225,146
From 7.0% to 7.5%	553,895	\$117,762
From 7.5% to 8.0%	389,086	\$113,518
From 8.0% to 8.5%	345,431	\$60,660
From 8.5% to 9.0%	335,176	\$54,160
From 9.0% to 9.5%	164,074	\$24,559
From 9.5% to 10.0%	139,373	\$19,500
From 10.0% to 10.5%	57,543	\$7,367
From 10.5% to 11.0%	42,834	\$5,165
From 11.0% to 11.5%	17,761	\$1,932
From 11.5% to 12.0%	12,926	\$1,297
Total adjustable	8,572,523	\$2,276,380
Percent adjustable	32.3%	
Total fixed	17,562,609	\$5,400,882
Percent fixed	67.7%	
Total 2004-2006	25,935,132	\$5,377,262

We will focus on the 8.37 million adjustable mortgages, with total balances over \$2.2 trillion.

6 Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 5

Grouping Adjustable Loans By Initial Interest Rate

Rate Group	Initial Interest Rate	Monthly Payment, \$300,000 loan	Possible Reset	After/Before Payment Ratio
Red	1.0%	\$964.92	1.0% to 6.5%	1.97
Red	1.5%	\$1,035.36		
Red	2.0%	\$1,109.86		
Red	2.5%	\$1,185.36		
Red	3.0%	\$1,264.81		
Red	3.5%	\$1,347.13		
Yellow	4.0%	\$1,432.25		
Yellow	4.5%	\$1,520.06	4.5% to 7.0%	1.31
Yellow	5.0%	\$1,610.46		
Yellow	5.5%	\$1,703.37		
Yellow	6.0%	\$1,798.65		
Orange	6.5%	\$1,896.20		
Orange	7.0%	\$1,995.91	7.0% to 9.5%	1.26
Orange	7.5%	\$2,097.64		
Orange	8.0%	\$2,201.29		
Orange	8.5%	\$2,306.74		
Orange	9.0%	\$2,414.87		
Orange	9.5%	\$2,524.56		
Orange	10.0%	\$2,635.71		
Orange	10.5%	\$2,749.22		
Orange	11.0%	\$2,865.07		
Orange	11.5%	\$2,973.87		
Orange	12.0%	\$3,085.84		

Red Loans = Teaser Rate
 97% payment increase after reset from 30% of income to 59%; very difficult to pay

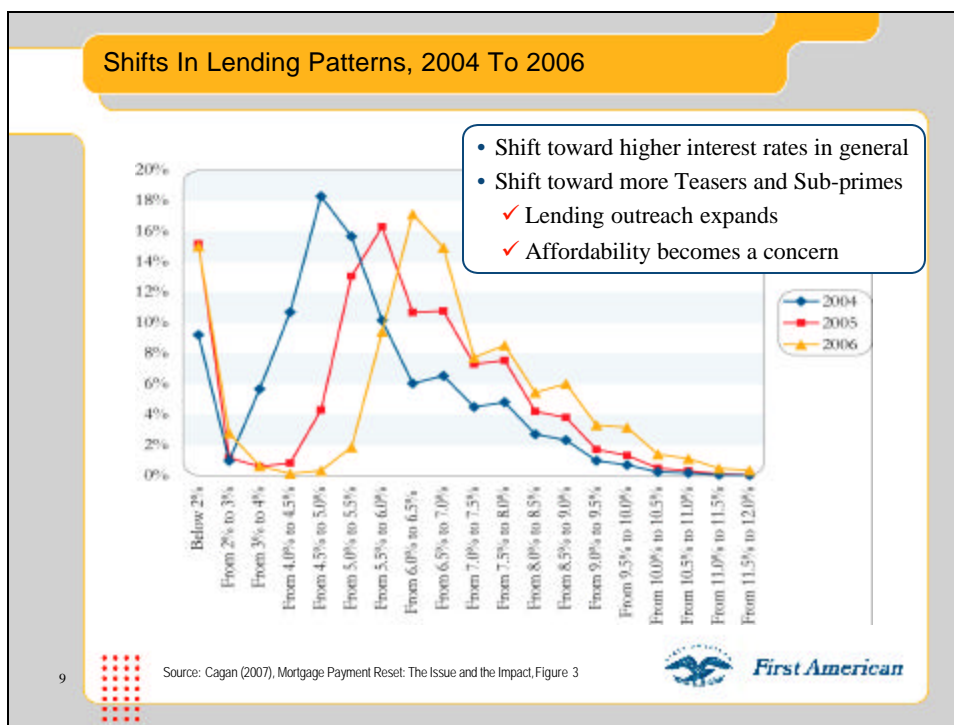
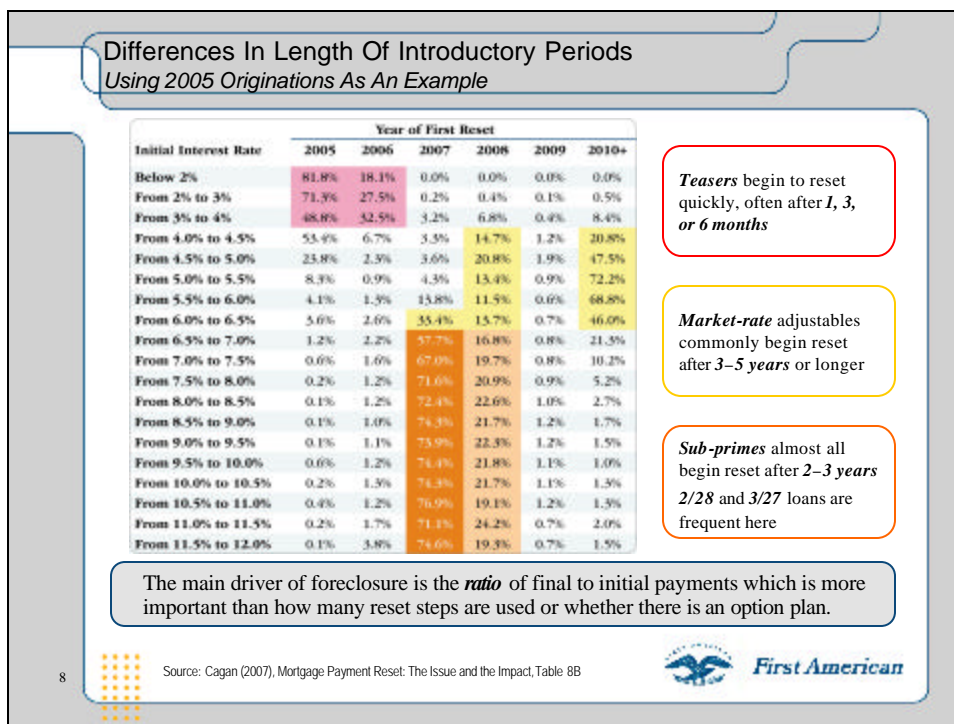
Yellow Loans = Market-rate
 31% payment increase after reset from 30% of income to 39%; bearable in most cases

Orange Loans = Sub-prime
 26% payment increase after reset from 30% of income to 38%; but these borrowers are already under strain

The main driver of foreclosure is the *ratio* of final to initial payments, which is more important than how many reset steps are used or whether there is an option plan.

7 Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 4

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Defining Reset Impact Groups

Knowing a loan's initial rate, the index used as a basis, and the margin above the index, we can use the current index rate to project the monthly payment after full adjustment and compare it with the initial payment. Imagine payments that are initially 30% of borrower income.


The adjustable-rate first mortgages are classified into four reset groups:

- Group A – increase 25% or less (to 37.5% or less of income); almost always bearable
- Group B – increase 26% to 50% (to 37.5% to 45% of income); harder to bear
- Group C – increase 51% to 99% (to 45% to 60% of income); likely un-support able
- Group D – increase 100% or more (to 60% or more of income); clearly unendurable

I will assign *reset difficulty probabilities* to the four groups as follows:

- Group A – 10% (seldom subject to reset strain pushing towards default)
- Group B – 40% (often subject to reset strain pushing towards default)
- Group C – 70% (mostly subject to reset strain pushing towards default)
- Group D – 100% (always subject to reset strain pushing towards default)

If reset strain occurs *and* there is insufficient equity to enable a sale or refinance, default is likely.

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Looking At Reset Size, All Adjustables 2004-06

Reset Increase Group	Percent
A 25% OR LESS	41.09%
B 26% TO 50%	40.35%
C 51% TO 99%	9.83%
D 100% OR MORE	8.73%

Most adjustables fall into groups A and B


Over 18% of them are in groups C and D

Interest Rate Group	Average Reset Ratio	Average Percent Increase
RED	2.14	114%
YELLOW	1.30	30%
ORANGE	1.28	28%
ALL	1.38	38%

Teasers have large resets

Market-rate loans tend to have much smaller resets

Sub-primes tend to have even smaller resets, but borrowers are less able to bear the change

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 11 / Table 12

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Estimating Payment Increases
Assuming All Loans Reach Full Reset In the Future & All Remain Active

Initial Interest Rate Group	Number of Loans	Balance (millions)	Monthly Payment Before Reset (millions)	Monthly Payment After Reset (millions)	Increase in Monthly Payment (millions)	Average Increase in Monthly Payment Per Loan
RED	1,430,673	\$520,990	\$1,828.28	\$3,991.43	\$2,163.15	\$1,511.98
YELLOW	3,786,853	\$1,124,544	\$6,375.88	\$8,241.73	\$1,865.85	\$492.72
ORANGE	3,154,997	\$630,846	\$4,472.54	\$5,755.59	\$1,283.04	\$406.67
TOTAL	8,372,523	\$2,276,380	\$12,676.70	\$17,988.74	\$5,312.03	\$634.46

- **Teasers** face large increases in monthly payments
- **Market-rate loans** have much smaller, more bearable payment increases
- **Sub-primes** have even smaller increases, but fewer financial resources

12  Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 20 



Estimated National Impact

Initial Interest Rate Group	Number of Loans	Balance (millions)	Monthly Payment Before Reset (millions)	Monthly Payment After Reset (millions)	Increase in Monthly Payment (millions)	Average Increase in Monthly Payment Per Loan
RED	1,430,673	\$520,990	\$1,828.28	\$3,991.43	\$2,163.15	\$1,511.98
YELLOW	3,786,853	\$1,124,544	\$6,375.88	\$8,241.73	\$1,865.85	\$492.72
ORANGE	3,154,997	\$630,846	\$4,472.54	\$5,755.59	\$1,283.04	\$406.67
TOTAL	8,372,523	\$2,276,380	\$12,676.70	\$17,988.74	\$5,312.03	\$634.46

These loans will not all be resetting, or even active, at the same time. By the time all loans reach full reset, some will have been paid off through refinance or sale, and some will be written off through default.

Estimate

- Total payment rise at the time of greatest increase to be about two-thirds of \$5.3 billion per month – about \$3.5 billion per month, or \$42 billion per year.
- This is not enough to break our \$12 trillion economy, but will affect the subset that experiences the impact, particularly teaser and sub-prime loans.

13  Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 20 

Equity By Year Of First Reset: The Two For One Rule

Equity	Year of First Reset						
	2004	2005	2006	2007	2008	2009	2010+
Less than -20%	2.3%	2.2%	2.7%	2.1%	2.6%	1.9%	1.7%
Less than -15%	3.1%	3.0%	3.8%	3.1%	4.0%	2.7%	2.3%
Less than -10%	4.5%	4.5%	5.6%	4.6%	6.5%	4.0%	3.4%
Less than -5%	6.7%	7.2%	9.0%	7.4%	12.7%	7.1%	6.3%
Less than 0%	10.0%	11.8%	15.1%	12.9%	25.4%	13.0%	12.7%
Less than 5%	15.1%	19.6%	25.5%	23.3%	40.1%	20.5%	21.7%
Less than 10%	21.7%	30.9%	38.8%	35.2%	51.3%	27.8%	31.6%
Less than 15%	30.2%	43.8%	51.2%	46.8%	60.8%	35.4%	41.9%
Less than 20%	40.0%	57.3%	63.1%	57.3%	69.5%	43.9%	52.7%
Less than 25%	51.3%	69.9%	72.9%	67.5%	79.0%	53.6%	64.1%
Less than 30%	62.7%	80.0%	80.8%	77.1%	86.2%	63.3%	74.0%

2008 is the year of the highest percentages with low equity

- **The two for one rule: a 5% shift in prices changes equity numbers by 10%**
 - ✓ 2006 resets: 5% price drop means 25.5% in negative equity (10.4% more than 15.1%)
 - ✓ 2007 resets: 5% price drop means 23.3% in negative equity (10.4% more than 12.9%)

The two for one rule is approximate but highly useful

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 29



Equity Distributions By Reset Size

Equity	Reset Size Group			
	A 25% OR LESS	B 26% TO 50%	C 51% TO 99%	D 100% OR MORE
Less than -20%	2.1%	2.1%	2.0%	2.3%
Less than -15%	3.0%	3.0%	2.9%	3.3%
Less than -10%	4.5%	4.7%	4.5%	5.2%
Less than -5%	8.0%	8.4%	7.6%	8.8%
Less than 0%	15.5%	15.8%	13.6%	15.2%
Less than 5%	25.9%	25.8%	23.6%	25.8%
Less than 10%	36.7%	35.3%	34.9%	40.0%
Less than 15%	47.2%	44.8%	46.2%	54.0%
Less than 20%	57.7%	54.2%	56.8%	67.6%
Less than 25%	68.8%	64.2%	66.8%	78.7%
Less than 30%	77.8%	73.7%	75.8%	86.4%

The columns are similar, but teasers are more likely to be under 10% / 20% equity

- **The two for one rule: a 5% shift in prices changes equity numbers by 10%**
 - ✓ Group A – 5% drop in prices means 25.9% in negative equity (10.4% more than 15.5%)
 - ✓ Group B – 5% drop in prices means 25.8% in negative equity (10.0% more than 15.8%)
 - ✓ Group C – 5% drop in prices means 23.6% in negative equity (10.0% more than 13.6%)
 - ✓ Group D – 5% drop in prices means 25.8% in negative equity (10.6% more than 15.2%)

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 31



Equity Distributions By Initial Rate Group

Equity	Initial Rate Group		
	RED	YELLOW	ORANGE
Less than -20%	2.2%	1.5%	2.7%
Less than -15%	3.2%	2.0%	4.0%
Less than -10%	4.9%	2.9%	6.2%
Less than -5%	8.2%	4.8%	11.6%
Less than 0%	14.1%	8.6%	22.4%
Less than 5%	23.9%	15.5%	36.0%
Less than 10%	36.7%	24.5%	47.7%
Less than 15%	49.7%	34.7%	57.9%
Less than 20%	62.4%	45.4%	67.3%
Less than 25%	73.3%	56.8%	76.8%
Less than 30%	81.3%	67.5%	84.6%

Teasers: Second-highest percentages with low equity levels

Market-rate Adjustables: Lowest (best) percentages with low equity levels

Sub-primes: Highest (worst) percentages with low equity levels

The two for one rule: a 5% shift in prices changes equity numbers by 10%

- Red: 5% drop in prices means 23.9% in negative equity (9.8% more than 14.1%)
- Yellow: 5% drop in prices means 15.5% in negative equity (6.9% more than 8.6%)
- Orange: 5% drop in prices means 36.0% in negative equity (13.6% more than 22.4%)

✓ **The orange loans are the most sensitive to a drop in prices**

For all three groups, the two for one rule also holds well if a further 5% drop in prices is imagined, comparing the 5% and 10% equity levels

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 30

The Important First-Reset Year Of 2008

Initial Interest Rate Group	N of Loans	Millions
RED	3,413	\$1,012
YELLOW	287,312	\$87,436
ORANGE	881,988	\$179,156
Total	1,172,713	\$267,604

The first-resets of 2008 are dominated by **sub-prime** loans


- Many of these are 2/28 loans originated in 2006, or 3/27 loans from 2005
- This group of almost 900,000 loans (\$179 billion) is important
 - ✓ It has already been seen that **equity** is an issue for many in this group
 - ✓ Sub-prime borrowers are less able to cope with **payment reset**

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 27/2008

Defining Equity Risk Groups

1. Properties with **15% or more equity** are assigned to **Equity Risk Group 1**, with **Very Low** equity strain. With this much equity, market-rate borrowers faced with reset should almost always be able to refinance (whether into another adjustable loan or into a fixed loan; whether with their current lender or another lender) or even to sell.
2. Properties with **5% to 15% equity** are assigned to **Equity Risk Group 2**, with **Low** equity strain. Even after allowing a 5% margin for the costs of refinance or sale, market-rate borrowers should probably be able to refinance or sell.
3. Properties from **-5% to 5% equity** are assigned to **Equity Risk Group 3**, with **Medium** equity strain. For market-rate borrowers, the refinance or sale of such a home must be considered a toss-up. Perhaps they can find a lender who will work with them, or perhaps they can reallocate money from savings, relatives, or elsewhere to make a cash payment and enable refinance or sale. But it is also possible to envision them being unable to do this.
4. Properties from **-15% to -5% equity** are assigned to **Equity Risk Group 4**, with **High** equity strain. It is likely that a default will occur under reset strain, although perhaps money could be supplied or the loan could be renegotiated with the current lender or another lender.
5. Properties with **below -15% equity** (more than 15% negative equity) are assigned to **Equity Risk Group 5**, with **Very High** equity strain. If there is a large reset, default is almost certain.

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Adjustments To The Equity Risk Group Definitions


- Assign a **5% time penalty to all loans with first reset in 2008 or later**
 - ✓ to allow for uncertainties in future market prices
- Assign a **5% loan type penalty to all teaser and sub-prime loans**
 - ✓ to allow for possible future negative amortization for teasers; past negative amortization is already calculated in
 - ✓ to allow for likely challenges for sub-prime loans, possibly including less generous lending guidelines in the future

Equity Risk Group 1 requires **15% or more** equity for **market-level loans resetting in 2007 or earlier** (as already defined)

- Equity Risk Group 1 requires **20% or more** equity for **market-level loans resetting in 2008 or later (5% time penalty)**
- Equity Risk Group 1 requires **20% or more** equity for **teaser or sub-prime loans resetting in 2007 or earlier (5% loan type penalty)**
- Equity Risk Group 1 requires **25% or more** equity for **teaser or sub-prime loans resetting in 2008 or later (two penalties)**

Apply the same reasoning to all five equity risk groups

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Assigning Probabilities Of Equity Risk Strain

- Group 1: 10%, "very low, hardly ever" probability of equity strain
- Group 2: 30%, "low, probably not" probability of equity strain
- Group 3: 50%, "medium, toss-up" probability of equity strain
- Group 4: 70%, "high, likely" probability of equity strain
- Group 5: 90%, "very high, almost certain" probability of equity strain

The probabilities are 20% apart and the equity bands are 10% apart

- This follows the spirit of the two for one rule!
- This spacing arrangement will make it possible to analyze alternative scenarios involving rising or falling market values

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Combining Reset Analysis With Equity Analysis

Estimating Default Probabilities

<i>Equity Risk Group</i>	<i>Probability of Equity Difficulty</i>	Reset Size Group			
		A	B	C	D
		25% OR LESS	26% TO 50%	51% TO 99%	100% OR MORE
		<i>Probability of Reset Difficulty</i>			
		10%	40%	70%	100%
1 VERY LOW	10%	1%	4%	7%	10%
2 LOW	30%	3%	12%	21%	30%
3 MEDIUM	50%	5%	20%	35%	50%
4 HIGH	70%	7%	28%	49%	70%
5 VERY HIGH	90%	9%	36%	63%	90%

Equity Risk Group 1, Reset Group B
 estimated probability of default = 10% times 40% = 4%

- Equity Risk Group 5, Reset Group C
 estimated probability of default = 90% times 70% = 63%

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Projected Foreclosures For Two Reset Years

First Reset Year 2006

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed
RED	540,615	\$212,775	204,937	\$81,082
YELLOW	150,303	\$38,870	16,476	\$3,991
ORANGE	461,987	\$77,480	45,413	\$7,098
TOTAL	1,152,905	\$329,124	266,826	\$92,171

First Reset 2006

- Losses almost all come from *teasers*
- These loans are already resetting

First Reset 2008

- Losses mostly come from *sub-primes*
- Results will develop into 2009–2010

First Reset Year 2008

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed
RED	3,413	\$1,012	916	\$289
YELLOW	287,312	\$87,436	33,732	\$10,344
ORANGE	881,988	\$179,156	141,182	\$30,218
TOTAL	1,172,713	\$267,604	175,831	\$40,852

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 35/2006 / Table 35/2008

Loss Analysis, All Years Using Cautionary Foreclosure Discounts For Resale Prices

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	1,432,356	\$521,441	460,996	\$171,681	32.2%	57.5%	\$64,380
YELLOW	3,786,853	\$1,124,544	264,184	\$76,908	7.0%	25.0%	\$19,227
ORANGE	3,154,997	\$630,846	385,524	\$77,090	12.2%	37.5%	\$28,909
TOTAL	8,374,186	\$2,276,831	1,110,704	\$325,679	13.3%		\$112,516

- Estimated 1.1 million reset-based foreclosures, representing \$326 billion of first-mortgage money
- Estimated foreclosure discounts from author's research, assuming conservative conditions: 20% market-rate, 30% teasers and sub-primes
- Estimating first mortgages as 80% of total, these losses are calculated as 25% for market-rate, 37.5% for teasers and sub-primes
- Total non-recovered losses estimated as \$112.5 billion over several years

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 36

Dr. Christopher Cagan, “Mortgage Payment Reset”
 Presentation at the Real Estate Research Council of Southern California
 Quarterly Luncheon Meeting, Cal Poly University, May 30, 2007.

Remarks And Interpretation, Part 1

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	1,432,336	\$521,441	460,996	\$171,681	32.2%	57.5%	\$64,380
YELLOW	3,786,853	\$1,124,544	264,184	\$76,908	7.0%	25.0%	\$19,227
ORANGE	3,154,997	\$630,846	385,524	\$77,090	12.2%	37.5%	\$28,909
TOTAL	8,374,186	\$2,276,831	1,110,704	\$325,679	13.3%		\$112,516

- We have a \$12 trillion per year national economy
- Total mortgage lending is about \$2 trillion per year
- Losses of \$112 billion over 5–6 years (about \$20–22 billion per year) are about 1% of total lending
- Reset will not break the economy or the mortgage industry
- But reset will affect the subset of borrowers, lenders and investors who are exposed
- Impact will fall first upon remaining equity, then upon junior lenders, and only then upon first mortgage lenders

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 36

Remarks And Interpretation, Part 2

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	1,432,336	\$521,441	460,996	\$171,681	32.2%	57.5%	\$64,380
YELLOW	3,786,853	\$1,124,544	264,184	\$76,908	7.0%	25.0%	\$19,227
ORANGE	3,154,997	\$630,846	385,524	\$77,090	12.2%	37.5%	\$28,909
TOTAL	8,374,186	\$2,276,831	1,110,704	\$325,679	13.3%		\$112,516

- 32% of teaser** loans projected to default
- 7% of market-rate** adjustable loans projected to default
- 12% of sub-prime** adjustable loans projected to default

Even if there is *outside* remediation, this will come only *after* impact has fallen upon the leading edge of exposure:

- Currently existing Teasers and Sub-primes (especially 2/28 and 3/27)**

Therefore, it is the *marketplace of lenders and investors* that must deal with the issue – fortunately, this marketplace remediation is already occurring, as borrowers and lenders negotiate refinances.

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Source: Cagan (2007), Mortgage Payment Reset: The Issue and the Impact, Table 36

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Estimate Losses Under Alternate Scenarios
Using Roll-Up Averages And The Two For One Rule

In the event of a national **10% price drop** we estimate the probabilities of equity risk to **increase by 20%** for all reset size groups.
Note: After some averaging and rounding.

Reset Size Group	Defined Probability of Reset Risk	Average Probability of Equity Risk	Projected Probability of Loss	N of Loans	Projected N of Foreclosures
A 25% OR LESS	10%	55%	5.5%	3,035,124	166,822
B 26% TO 50%	40%	54%	21.6%	5,282,854	769,092
C 51% TO 99%	70%	51%	35.7%	839,230	299,605
D 100% OR MORE	100%	56%	56.0%	1,216,679	681,340
				Total	8,571,866
				Percent Foreclosures	22.2%

This is a little oversimplified, but has the advantage of being simple!

Sensitivity to prices: 700,000 more foreclosures
 Approximately 70,000 more foreclosures per 1% price drop

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Estimate Losses Under Alternate Scenarios
Using Roll-Up Averages And The Two For One Rule

In the event of a national **10% price rise** we estimate the probabilities of equity risk to **decrease by 20%** for all reset size groups.
Note: After some averaging and rounding.

Reset Size Group	Defined Probability of Reset Risk	Average Probability of Equity Risk	Projected Probability of Loss	N of Loans	Projected N of Foreclosures
A 25% OR LESS	10%	15%	1.5%	3,035,124	45,497
B 26% TO 50%	40%	14%	5.6%	5,282,854	183,839
C 51% TO 99%	70%	11%	7.7%	839,230	64,621
D 100% OR MORE	100%	16%	16.0%	1,216,679	194,669
				Total	488,625
				Percent Foreclosures	5.8%

This is a little oversimplified, but has the advantage of being simple!

Sensitivity to prices: 700,000 fewer foreclosures
 Approximately 70,000 fewer foreclosures per 1% price rise

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Dr. Christopher Cagan, "Mortgage Payment Reset"
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Loss Analysis, All Years, Los Angeles County
Using Cautionary Foreclosure Discounts For Resale Prices

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	123,194	\$59,705	36,687	\$17,780	29.8%	37.5%	\$6,668
YELLOW	195,195	\$86,937	13,995	\$6,233	7.2%	25.0%	\$1,558
ORANGE	93,861	\$37,001	12,925	\$5,095	13.8%	37.5%	\$1,911
TOTAL	412,250	\$183,643	63,607	\$29,109			\$10,137

- Estimated 63,600 reset-based foreclosures, representing \$29 billion
- Total non-recovered losses estimated as \$10.1 billion over several years
- The county has a \$350 billion annual GDP; reset will not break the economy, but will affect the subset which is exposed
- Each 1% of price movement from December 2006 corresponds to 4,500 more or fewer foreclosure losses


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Loss Analysis, All Years, Orange County
Using Cautionary Foreclosure Discounts For Resale Prices

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	52,999	\$50,292	16,048	\$9,172	30.3%	37.5%	\$5,440
YELLOW	91,706	\$46,411	6,447	\$3,263	7.0%	25.0%	\$816
ORANGE	24,626	\$12,105	3,406	\$1,674	13.8%	37.5%	\$628
TOTAL	169,331	\$88,808	25,901	\$14,109			\$4,883

- Estimated 25,900 reset-based foreclosures, representing \$14 billion
- Total non-recovered losses estimated as \$4.9 billion over several years
- The county has a \$130 billion annual GDP; reset will not break the economy, but will affect the subset which is exposed
- Each 1% of price movement corresponds to 1,800 foreclosure losses
- Relatively few sub-primes in this affluent county

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Dr. Christopher Cagan, "Mortgage Payment Reset"
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Loss Analysis, All Years, Riverside/San Bernardino Counties
Using Cautionary Foreclosure Discounts For Resale Prices

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	73,296	\$25,882	24,657	\$8,707	33.6%	37.5%	\$3,265
YELLOW	117,978	\$37,359	10,653	\$3,574	9.0%	25.0%	\$843
ORANGE	83,055	\$25,281	13,089	\$3,984	15.8%	37.5%	\$1,494
TOTAL	274,329	\$88,522	48,400	\$16,065			\$5,603

- Estimated 48,400 reset-based foreclosures, representing \$16 billion
- Total non-recovered losses estimated as \$5.6 billion over several years
- Each 1% of price movement corresponds to 3,400 foreclosure losses
- Relatively more sub-primes in the Inland Empire
- Reset-based losses higher as compared to population or the economy


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Loss Analysis, All Years, San Diego County
Using Cautionary Foreclosure Discounts For Resale Prices

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	61,371	\$29,343	23,468	\$11,221	38.2%	37.5%	\$4,208
YELLOW	112,599	\$47,871	11,440	\$4,864	10.2%	25.0%	\$1,216
ORANGE	27,964	\$11,454	4,452	\$1,825	15.9%	37.5%	\$684
TOTAL	201,934	\$88,668	39,360	\$17,908			\$6,107

- Estimated 39,360 reset-based foreclosures, representing \$18 billion
- Total non-recovered losses estimated as \$6.1 billion over several years
- Each 1% of price movement corresponds to 2,800 foreclosure losses
- Many fewer sub-primes than in the Inland Empire
- Reset-based losses coming from teaser and even prime loans

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Dr. Christopher Cagan, "Mortgage Payment Reset"
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Loss Analysis, All Years, Ventura County
Using Cautionary Foreclosure Discounts For Resale Prices

All Years of First Reset Combined

Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	18,373	\$9,557	6,122	\$3,184	33.3%	37.5%	\$1,194
YELLOW	27,449	\$12,613	2,157	\$991	7.9%	25.0%	\$248
ORANGE	7,637	\$3,472	1,060	\$482	13.9%	37.5%	\$181
TOTAL	53,459	\$25,642	9,339	\$4,658			\$1,623

- Estimated 9,300 reset-based foreclosures, representing \$4.7 billion
- Total non-recovered losses estimated as \$1.6 billion over several years
- Each 1% of price movement up [or down] from December 2006 corresponds to 650 fewer [or more] foreclosure losses
- Reset-based losses coming primarily from teaser rather than sub-prime mortgages


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Loss Analysis, All Years, Six Southern California Counties
Using Cautionary Foreclosure Discounts For Resale Prices

All Years of First Reset Combined


Rate Group	N of loans	Millions	N of Foreclosures	Millions Foreclosed	Percent of Loans Foreclosed	Percent of Money Lost	Millions Lost
RED	529,233	\$154,779	106,982	\$50,064	20.0%	37.5%	\$18,774
YELLOW	544,927	\$251,192	44,693	\$18,725	8.2%	25.0%	\$4,681
ORANGE	237,143	\$89,313	34,932	\$13,059	14.7%	37.5%	\$4,897
TOTAL	1,111,303	\$475,283	186,607	\$81,848			\$28,352

- Estimated 187,000 reset-based foreclosures, representing \$82 billion of first-mortgage money
- These losses will be dispersed through several years
- Total non-recovered losses after foreclosure and REO resale estimated as \$28 billion
- Each 1% in price movement up [or down] from December 2006 corresponds to 13,000 fewer [or more] foreclosure losses

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Reset Summary And Conclusions

- Will **not** break the economy or the lending industry
- Will affect the slice of borrowers, lenders and investors who are exposed
- Impact is sensitive to price movements
- Old economic virtues are true after all
 - ✓ In normal markets, risky investments are less secure than conventional ones, and should be understood and valued as such
- It is the marketplace of lenders and investors, as well as borrowers, that must face the issue of reset
 - ✓ Marketplace remediation has already begun

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Mortgage Payment Reset: The Issue & The Impact
About The Author: Christopher L. Cagan, Ph.D.

- Dr. Christopher Cagan, director of research and analytics for First American, has more than a decade of experience in the areas of market research and competitive strategy for the real estate and financial services sector.
- Since joining First American in 2002, he has developed several patent-pending mathematical and algorithmic inventions, built multiple analytical products, and written numerous technical papers, presentations and studies.
- Dr. Cagan earned his bachelor's, master's and doctorate degrees in mathematics from the University of California at Los Angeles.

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