The Interest Rate Risk of Fannie Mae and Freddie Mac (F&F)

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Are Fannie and Freddie Adequately Disclosing What Investors Need?

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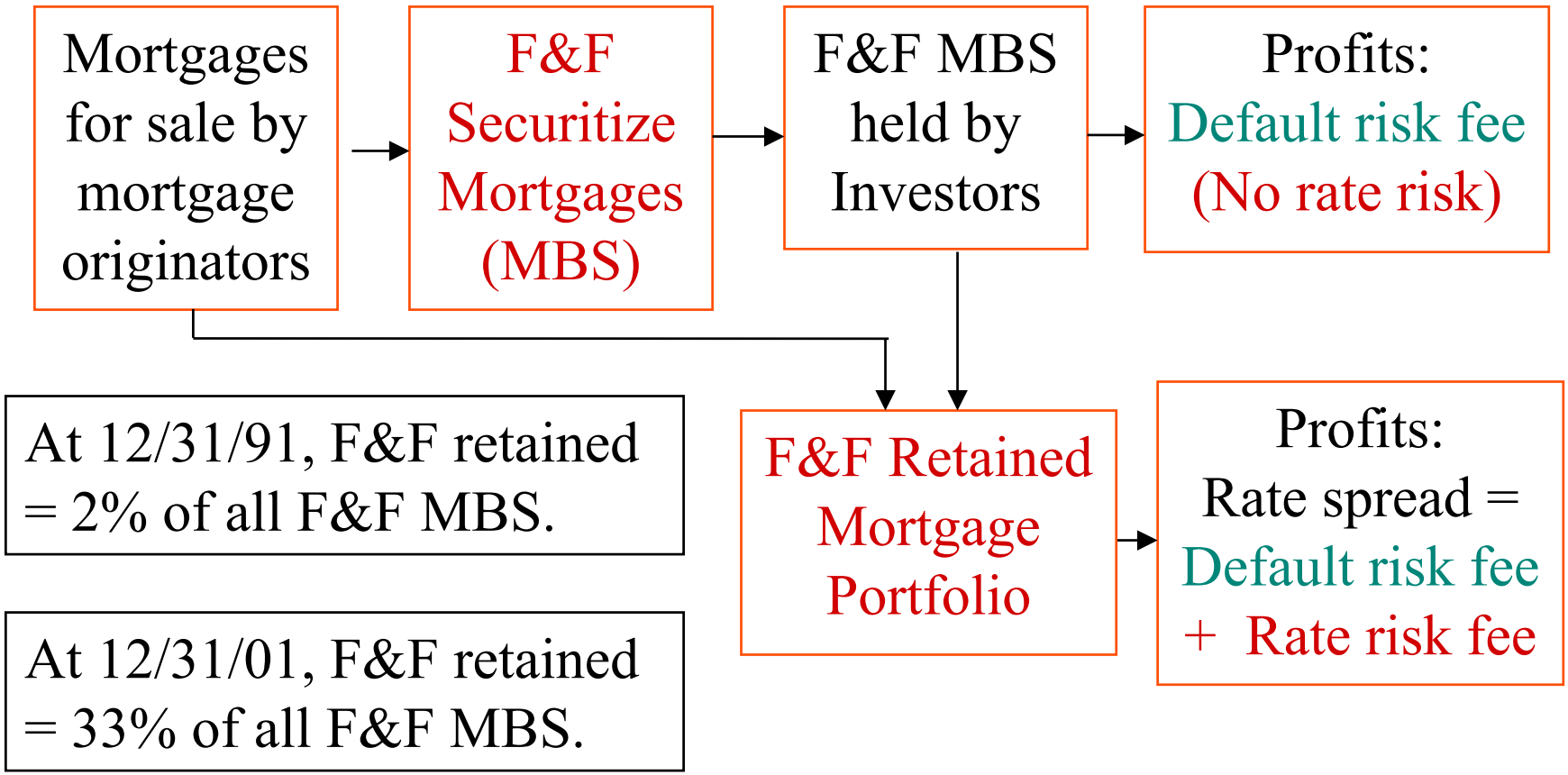
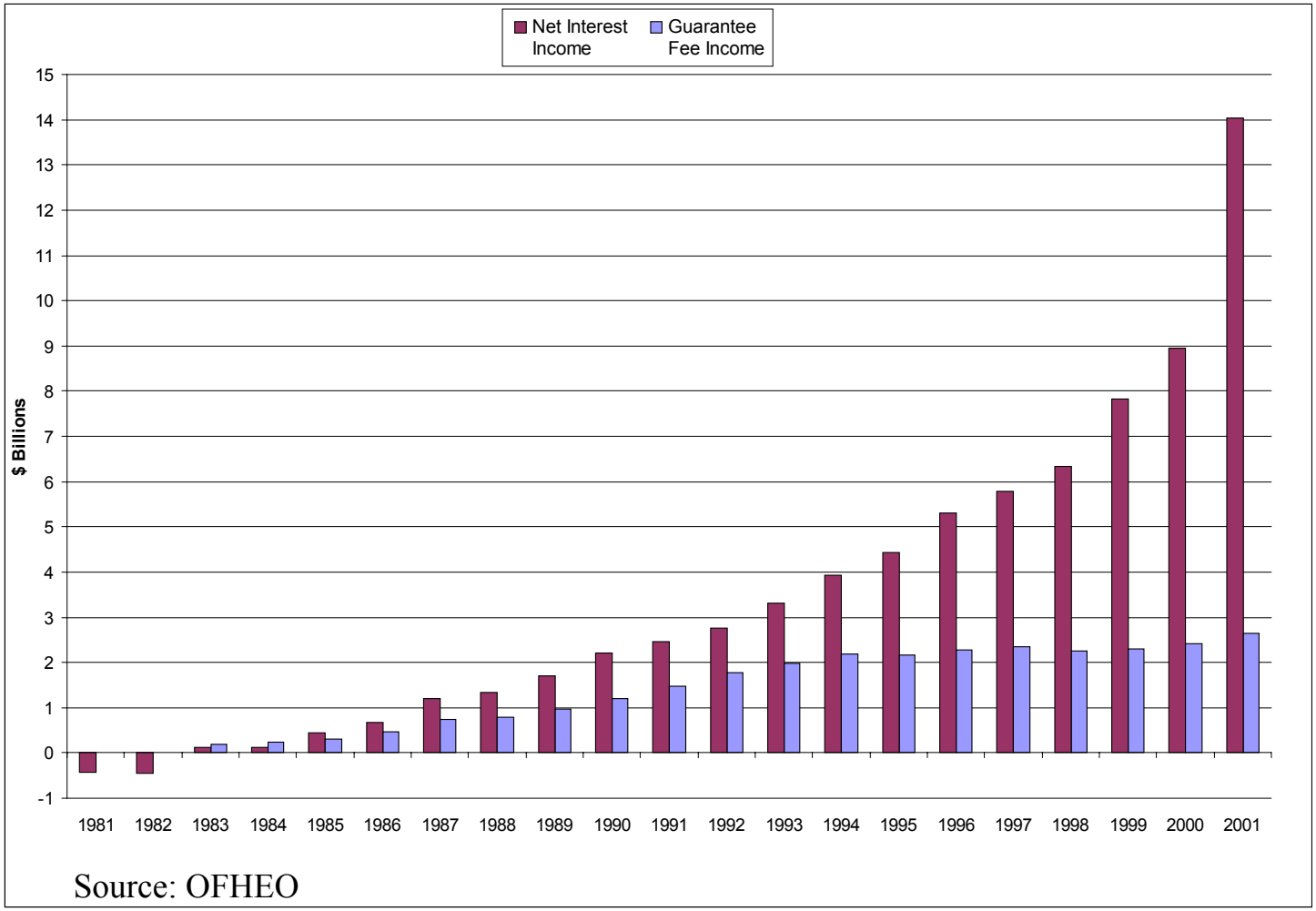
Agenda

- Goal is to evaluate interest rate risk of F&F, and to propose modifications in their rate risk disclosures.
- Policy proposals based on perspective of a "representative" American citizen.
- I will review what is interest rate risk, how F&F manage it, and how we can measure the results.
- Proposals

What F&F Do and How they Make Money



F&F Income: Guarantee Fees versus Retained Portfolio Rate Spread



Source: OFHEO

F&F MBS Disclosures: A Short Digression

- MBS prices depend on their prepayment speeds, which depend on individual loan features, such as state location, borrower income, LTV, mortgage interest rate, etc.
- In competitive markets, much MSB info is disclosed.
- F&F know more than they disclose about their MBS.
- **Policy proposal**: F&F be required to provide MBS disclosures equivalent to those of competitive markets.

The Interest Rate Risk of Holding a Mortgage Portfolio

- A mortgage portfolio consists of mortgage assets and the bond liabilities and equity used to finance the assets.
- Interest rate risk arises when future changes in rates cause asset values to fall relative to liability values.
  - For mortgage portfolios with long maturities and prepayment options, rate risk often far exceeds default risk.
  - In early 1980s, S&L mortgage portfolios lost up to 25% of their value due to rising rates, bankrupting many firms.

A Perfect Hedge of Mortgage Portfolio Interest Rate Risk is Fully Practical

- To hedge the rate risk of mortgage portfolio perfectly:
  - the date and amount of each scheduled mortgage cash inflow must match with a corresponding liability cash outflow.
  - each optional mortgage cash inflow (i.e. prepayment) must match with an optional debt cash outflow (call option).
- F&F could readily achieve a perfect hedge by issuing a suitable array of long-term and callable bonds.
- Problem is that this is costly, reducing F&F profits:

How F&F (and other financial firms) Actually Hedge Interest Rate Risk

- Three techniques are usually combined in lieu of complete balance sheet hedging:
  1) Combine short-term debt with derivatives (rate swaps) to create synthetic long-term debt (instead of actual long debt)
  2) Use interest rate option derivatives--swaptions-- to hedge prepayment risk (instead of using callable bonds).
  3) Use dynamic hedging (in lieu of perfect gap hedging).
- These techniques save costs, but raise risks.
  - Profits based in part on status as GSE (with subsidy);
  - Risks are borne in part by US taxpayers;
  - No direct benefit to mortgage borrowers.

F&F Balance Sheet Hedging is Highly Incomplete

How Total Assets Are Financed Freddie Mac, as of 12/31/2001		
	$ billions	% of total
Debt, within 1 year	250	**40.55%**
Debt, after 1 year	312	50.48%
Other liabilities	40	6.48%
Stockholders' equity	15	2.49%
Total	617	100.00%
Memo:		
Callable debt	96	**15.63%**
Retained Mortgages	494	**80.06%**
FRA, Information Statement, 3/29/2002		

How Total Assets Are Financed Fannie Mae, as of 12/31/2001		
	$ billions	% of total
Debt, within 1 year	343	**42.95%**
Debt, after 1 year	420	52.51%
Other liabilities	18	2.28%
Stockholders' equity	18	2.27%
Total	800	100.00%
Memo:		
Callable debt	140	**17.50%**
Retained Mortgages	705	**88.17%**
FNM, Information Statement, 4/1/2002		

- Debt within 1 year much too high for balance sheet hedging.
- Callable debt much too low for balance sheet hedging.
- Places heavy burden on derivatives and dynamic hedging.

Lots of F&F Derivative Hedging

Freddie Mac Derivatives, $ billions as of 12/31/2001		
	Notional Amount	Net Fair Value
Interest-rate swaps	443	-6.0
Option-based	408	5.2
Other	201	0.0
Total	1,052	-0.8

Fannie Mae Derivatives, $ billions as of 12/31/2001		
	Notional Amount	Net Fair Value
Interest-rate swaps	300	-8.9
Option-based	220	6.3
Other	13	-1.5
Total	533	-4.1

- Rate swaps: short-term debt => "synthetic" long-term debt.
- Option based: hedge mortgage prepayment option risk.
- Freddie uses much more derivative hedging than Fannie.
- How to measure overall effectiveness of hedging programs?

Freddie Mac's PMVS: Portfolio Market Value Sensitivity

	Loss in Market Value of Equity Percent			Loss in Market Value of Equity $ Millions		
As of 12/31	PMVS-L 50 bp	PMVS-L 100 bp	PMVS-YC 25 bp	PMVS-L 50 bp	PMVS-L 100 bp	PMVS-YC 25 bp
2001	2.2%	8.8%	0.3%	262	1,031	36
2000	2.5%	8.5%	n/a	272	924	n/a
1999	0.8%	2.9%	n/a	102	366	n/a
1998	3.9%	14.0%	n/a	362	1,300	n/a
FRE Information Statement, 3/29/02, Table 16						

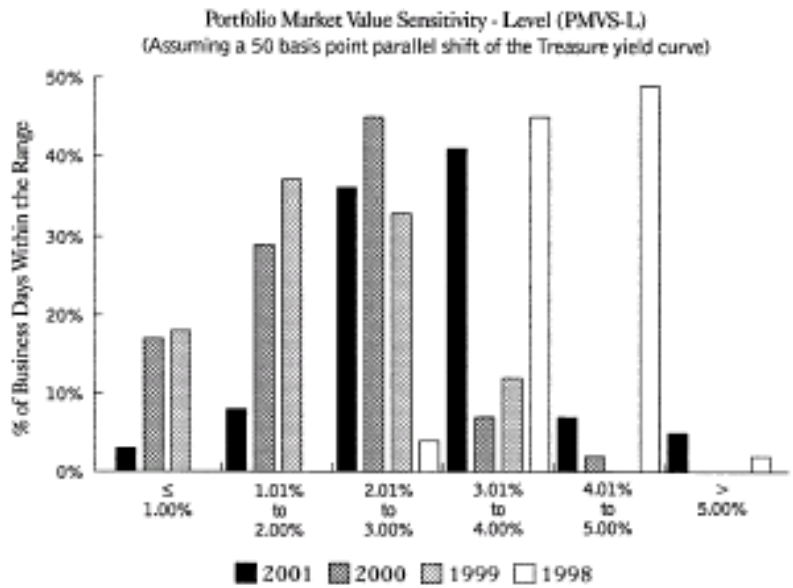
- PVMS measures most adverse change in market value of equity resulting from rate change (up or down):
- PMVS-L: 50/100 basis point parallel yield curve change
  - 100 bp covers **> 97% of 1 month** changes; but **< 50% of 1 year** changes.
- PMVS-YC: 25 bp steeping/flattening in yield curve in 1-10 year range
  - covers **> 80% of 1 month** changes; but **< 25% of 1 year changes**.
- **Convexity effect**: (impact of 100 bp) >> 2 (impact of 50 bp).

More Freddie Mac Sensitivity Data

PMVS-L 100 bp	Before Derivatives	Derivative Benefit	After Derivatives
31-Mar-02	28.51%	19.54%	8.97%
31 Dec 01	28.90%	18.61%	10.29%
31-Mar-01	23.52%	11.99%	11.53%

Freddie Mac uses derivatives to offset its large amount of rate risk

EXHIBIT 2—RISK MANAGEMENT RESULTS



Freddie Mac computes PMVS daily to manage its rate risk; publishes distribution of daily results for 50 bp shift

Fannie Mae: 3 Alternative Measures of Interest Rate Sensitivity

FNM	Loss in Market Value of Equity Percent	
	100 bp	
As of 12/31	rate rise	rate fall
2001	9%	23%
2000	2%	28%

	Loss in Market Value of Equity $ Million	
	100 bp	
	rate rise	rate fall
	2168	5288
	473	5855

Net Interest Income Percent Lost During Year 1		
	100 bp	
As of 12/31	rate rise	rate fall
2001	10%	-1%
2000	2%	2%

Net Interest Income Percent Lost During Years 1 to 4	
100 bp	
rate rise	rate fall
10%	3%
5%	9%

Source: Fannie Mae Information Statement, April 1, 2002

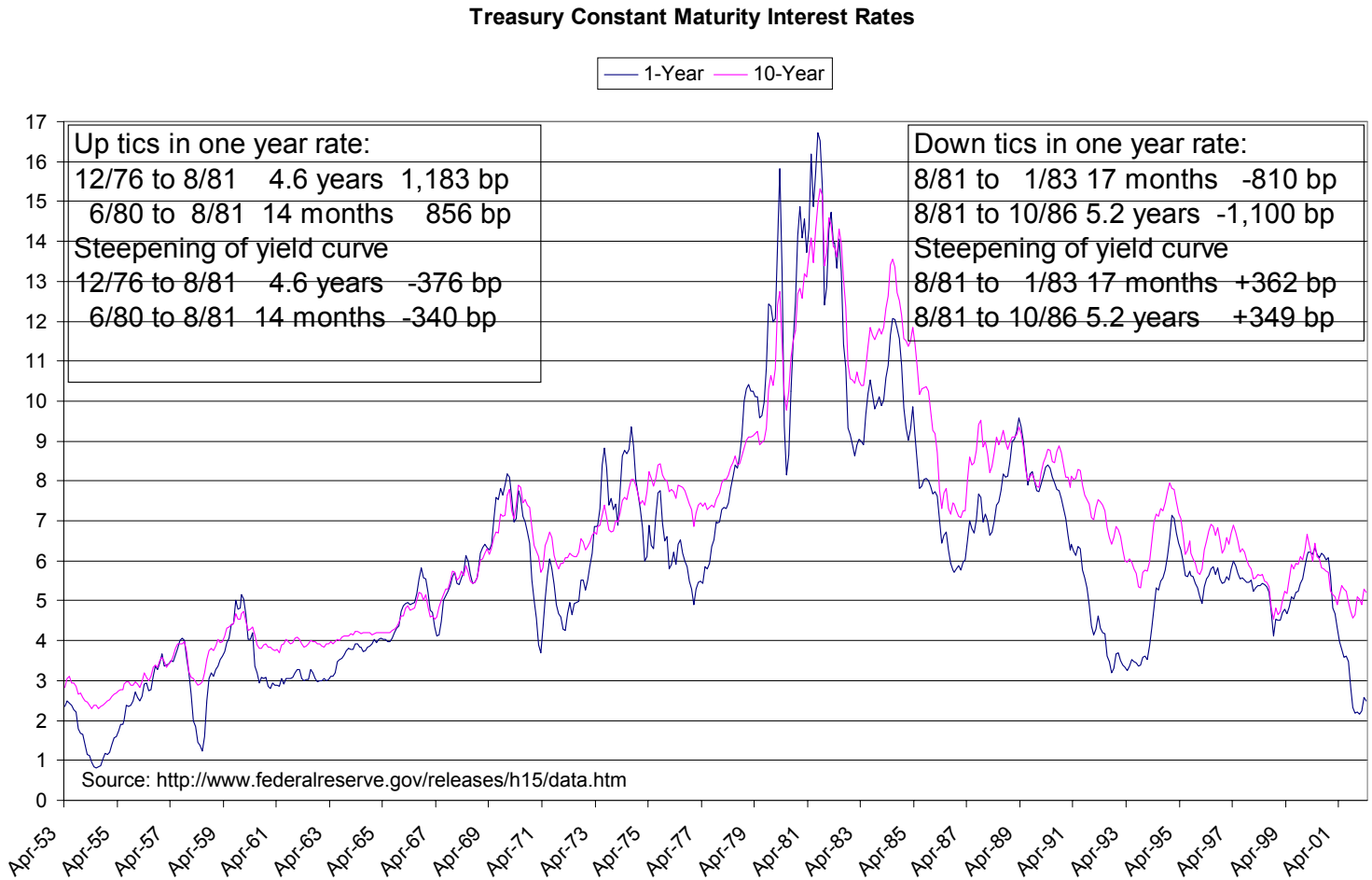
FNM	Effective Duration Gap (months)
2001-4	5
2001-3	-1
2001-2	5
2001-1	1
2000-4	-3
2000-3	2
2000-2	4
2000-1	5

- Market value: shows up/down, includes change of guaranty fees.
- Fannie also measures duration and effect on net interest income.

Proposals for Modifications in Interest Rate Risk Disclosures

- For F&F (these are modifications, not changes in kind)
  1) Market value results: show changes in both directions (FRE);
  2) Market value results: with and without guarantee fee (FNM);
  3) Market value results: with and without derivatives (FNM);
  4) Provide maturity gap data to measure A/L mismatch (both);
  5) Show wider span of rate shocks (including convexity, both);
  6) All data released on at least monthly basis (both),
- For OFHEO (in line with Basel and Fed Workgroup):
  1) Suggest standardized disclosures, to facilitate comparison;
  2) Random checks (shocks & dates) to stop window dressing;
  3) Validation of valuation models on continuing basis;
  4) Explicit strategy for responding to new problems (not ad hoc)

F&F Hedging Strategy Pitfall: Large, Rapid, Rate Shocks Do Occur



The Pros and Cons of Dynamic Hedging

- Dynamic hedging means:
  - Only keep full hedges against short-term, likely, shocks;
  - But keep adjusting hedges as the unlikely becomes likely.
- Motivation for dynamic hedging is to reduce costs.
- But the Risks of dynamic hedging include:
  - You are caught by large and rapid shock--creating big losses.
  - You are caught by series of shocks--creating series of losses.
- Such F&F risk bearing raises basic policy issue:
  - F&F profit from GSE status; taxpayers bear part of rate risks
  - No direct benefit to mortgage borrowers

F&F Hedging Strategy: Going Short Volatility is Risky

- F&F are short volatility--they sell liquidity to market.
  - If rates are stable, they do well;
  - If rate are volatile (either way), they tend to lose money;
  - Due to convexity, losses rise rapidly with volatility.
- Motivation for shorting volatility is expected profits.
- The major risk of shorting volatility is liquidity crisis:
  - F&F can sustain liquidity crisis for several months, but…
  - F&F must roll > $500 billion of new debt and large book of derivatives each year; what if few takers & rates sky rocket?
  - Think Long-Term Capital Management.

The OFHEO Stress Test: Good Start, Bit Further to Go

- Subjects F&F to 600 bp rate shock, for 10 year period.
  - Major wave of mortgage defaults is also included.
  - No dynamic hedging is allowed.
  - This is right way to allay dynamic hedging concerns.
- But….
  - 1,000 bp shocks do occur (‘76 to ‘81 and ‘81 to ‘86).
  - Possibility of window dressing is not addressed.
  - A continuing liquidity crisis is not covered.
  - What action does OFHEO take if F&F fail the test one day (not all that unlikely).

Policy Proposal for F&F Interest Rate Risk Management

- Principle is that F&F, not US taxpayers, should bear the risks/costs created by imperfect rate risk hedging.
  - Imperfect hedging provides no benefit to mortgage market.
  - The expected profits of imperfect hedging accrue to F&F.
  - F&F liquidity crisis creates systemic risk for the financial system, which seems highly inappropriate for a GSE.
- The remedy is to set F&F rate risk exposure standards…

Implementing Interest Rate Risk Standards for F&F

- Congress set F&F credit risk standards (80% loans, etc), but not rate risk standards. I presume this is oversight.
- Perfect balance sheet hedging is feasible, but very costly.
- Alternative is to require full hedge, or capital protection, for all rate risks up to 1% value-at-risk event probability.
- OFHEO to extend current stress tests and market value sensitivity measures to monitor adherence to the standards:
  - Greater rate shocks, to replicate 1976 to 1986 experience;
  - Random testing (shock sizes and dates) to avoid window dressing;
  - Validation of both F&F and OFHEO valuation models;
  - Planned remedies if standards are violated.