

# Mortgage Market Design

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EFA Conference

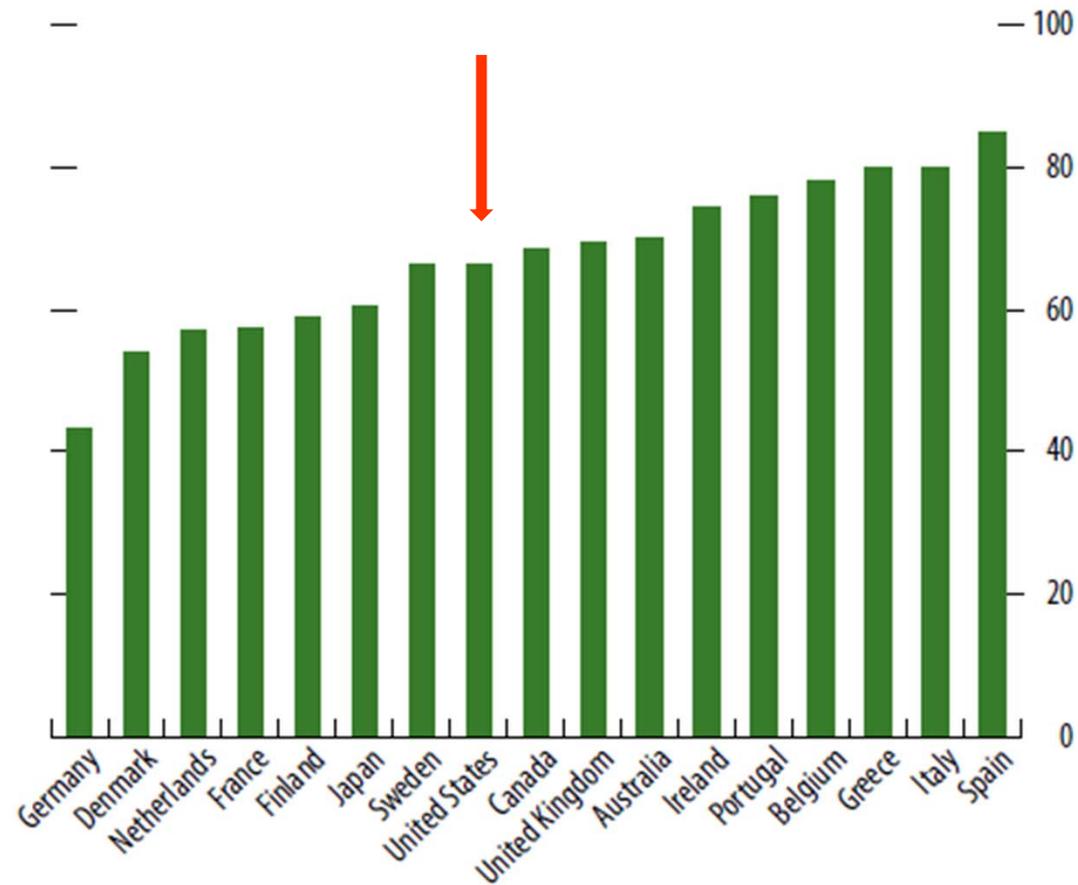
Stockholm, August 19, 2011

# The Importance of Mortgages

- Housing is the largest household asset, and mortgages the largest liability
- Mortgage markets vary considerably across countries
  - What are the causes of this variation?
  - What are the consequences?
  - International comparative household finance
- The US has much to learn from other countries

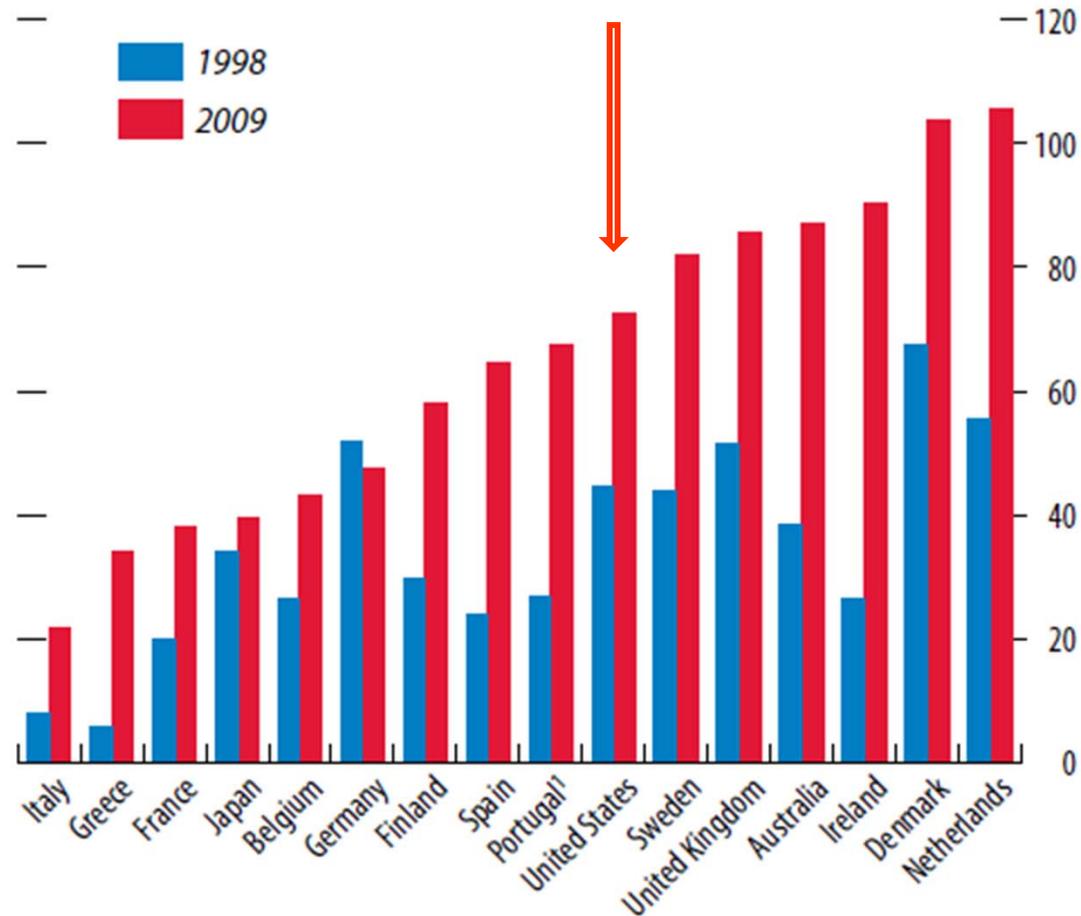
### Figure 3.5. Homeownership Rate

(In percent of total number of dwellings; latest available year)



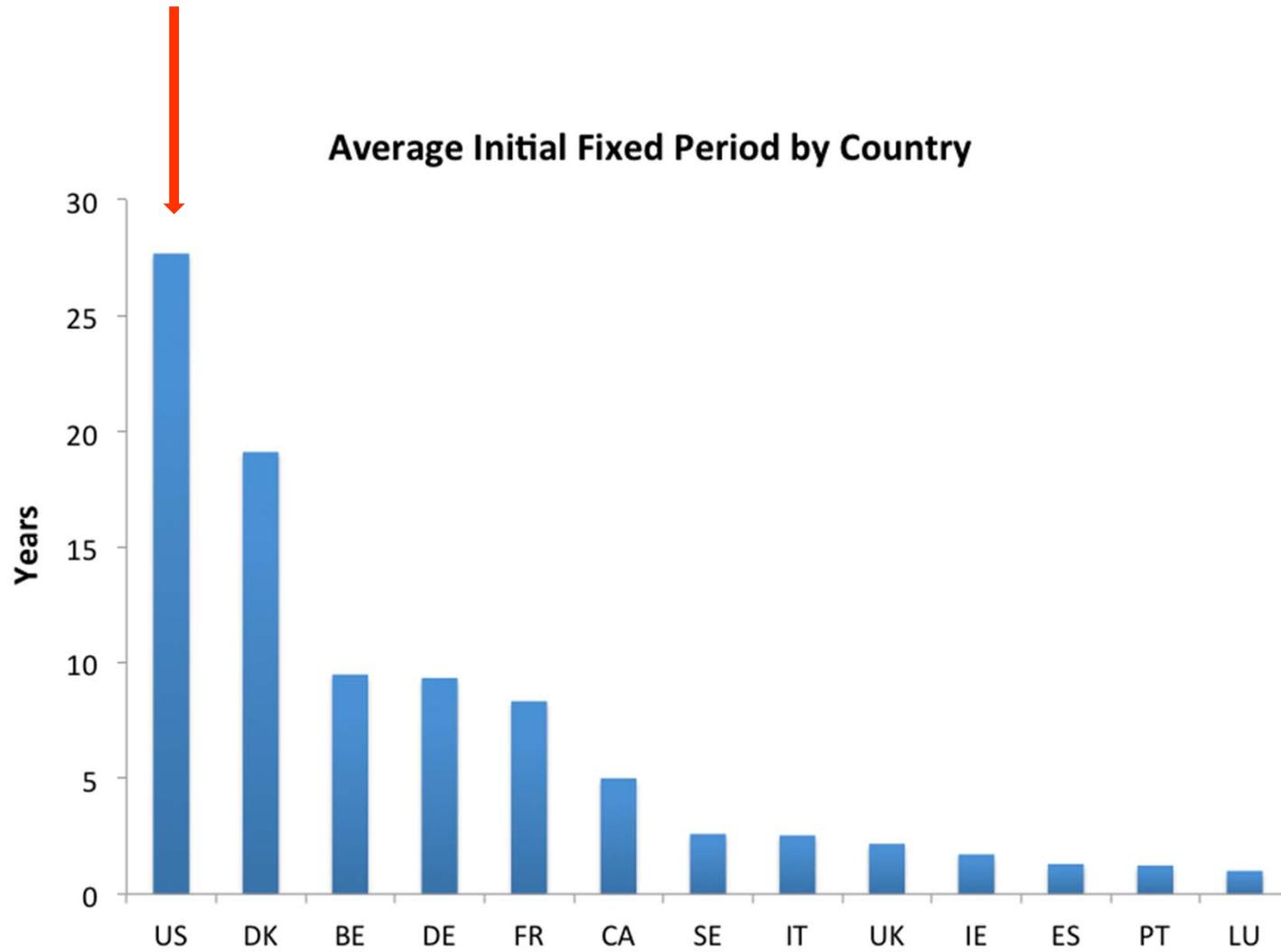
IMF Global Financial Stability Report, Ch. 3, April 2011

**Figure 3.6. Residential Mortgage-Debt-to-GDP Ratio:  
Advanced Economies**  
*(In percent)*



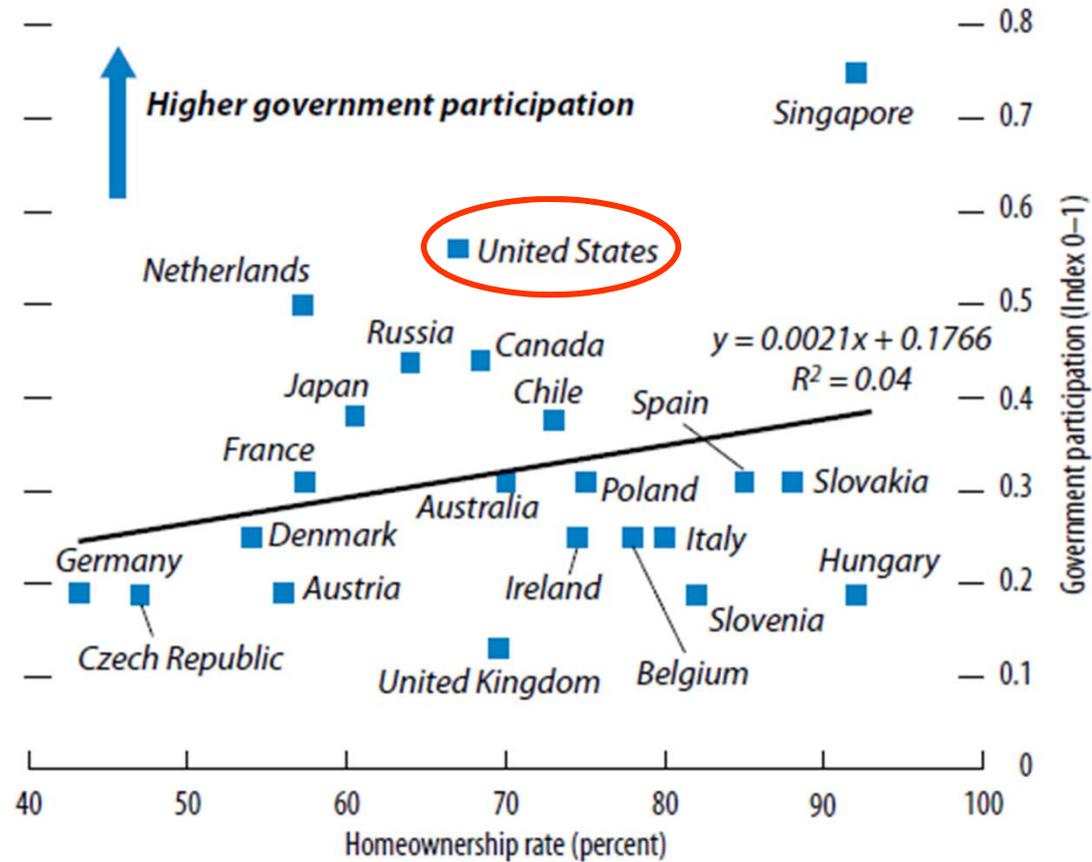
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**Average Initial Fixed Period by Country**



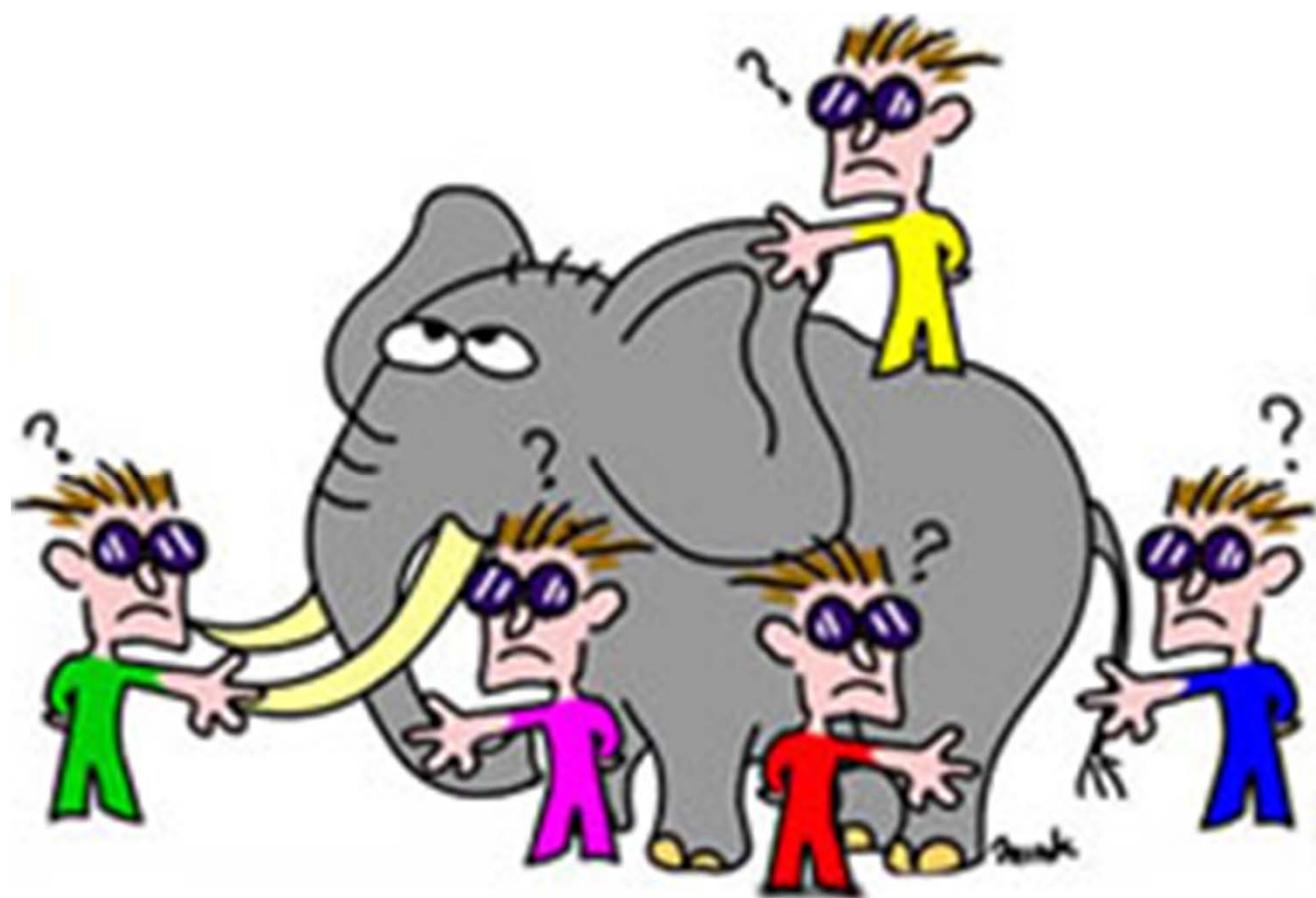
Sources: European Mortgage Federation, U.S. Census Statistical Abstract

**Figure 3.4. Homeownership Rate and Government Participation in Housing Finance**



# Mortgage Perspectives

- **Urban economics**
  - Externalities (homeownership, foreclosures)
- **Asset pricing**
  - Risksharing, default
- **Behavioral finance**
  - Consumer heterogeneity, protection
- **Financial intermediation**
  - Financial stability, liquidity
- **Macroeconomics**
  - Monetary policy, political economy



# Urban Economics



# Homeownership Externalities

- Externalities from homeownership
  - Political (positive: property-owning democracy)
  - Demographic (positive: family formation)
  - Environmental (negative: housing sprawl)
- US politicians have emphasized the positive and have promoted homeownership

# Maintenance and Value

- Houses are fragile assets, need maintenance
- Misalignment of incentives in foreclosure destroys value
  - Foreclosed houses sell for 27% less than comparable houses (Campbell, Giglio, and Pathak, *AER* 2011)
  - The effect is stronger for cheap houses in bad neighborhoods, suggesting the mechanism may be crime or vandalism
  - Also value destruction from distress before disclosure (Melzer 2011)

# Foreclosure Externalities

- Neighboring houses are also affected
  - Campbell, Giglio, and Pathak estimate 1% effect per foreclosure at a distance of 0.05 mile
  - This is a negative foreclosure externality
  - The effect is worse in bad neighborhoods, and is long-lasting
  - There is also direct evidence that foreclosures encourage local crime (Ellen, Lacoë, and Sharygin 2011)

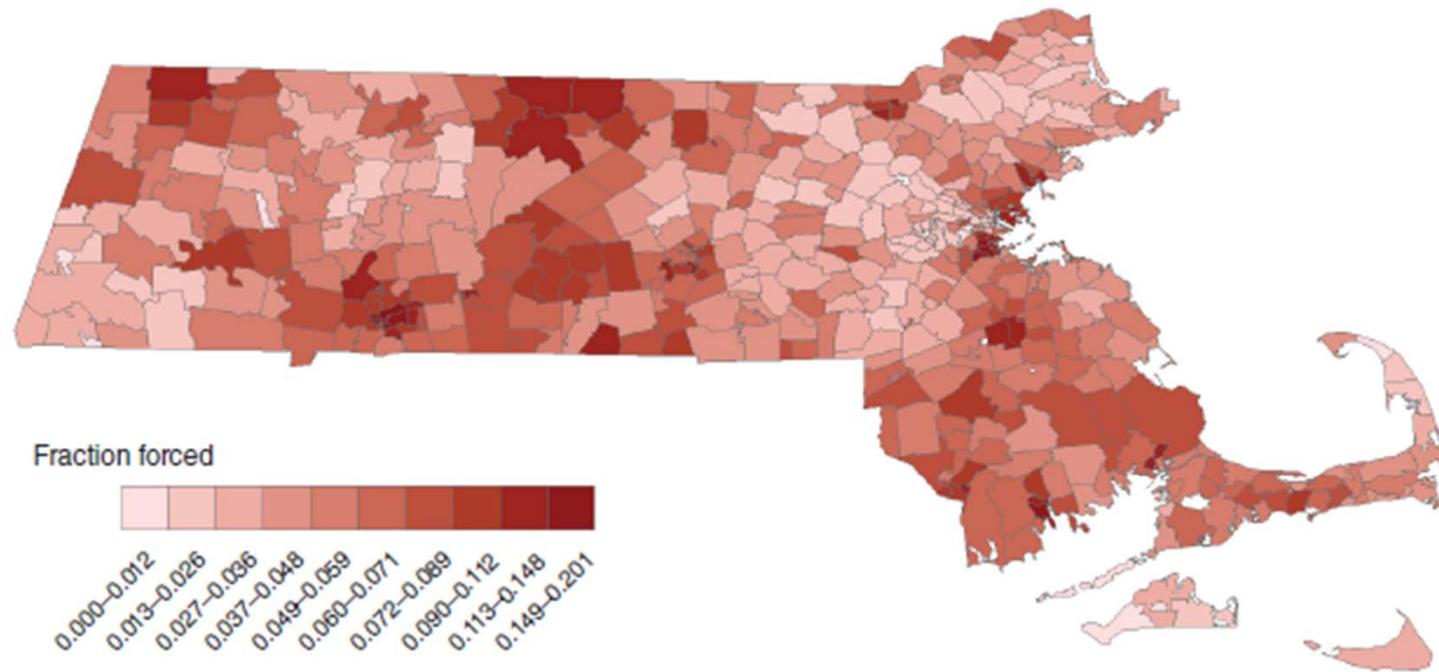


FIGURE 1. GEOGRAPHIC DISTRIBUTION OF PERCENTAGE OF HOUSING TRANSACTIONS THAT ARE FORCED SALES BY ZIP CODE

Campbell, Giglio, and Pathak, *AER* August 2011

TABLE 2—PRICE DISCOUNT FOR FORCED SALES

	Full sample		Single family		Multifamily		Condominium	
	Estimate (1)	Std err (2)	Estimate (3)	Std err (4)	Estimate (5)	Std err (6)	Estimate (7)	Std err (8)
<i>Panel A. All forced transactions</i>								
Forced (−3 years; +3 years)	−0.197	(0.002)	−0.159	(0.002)	−0.236	(0.004)	−0.224	(0.005)
<i>Panel B. Forced transactions by type</i>								
Death, young seller (−3; +3)	−0.053	(0.005)	−0.068	(0.006)	−0.027	(0.014)	−0.012	(0.012)
Death, old seller (−3; +3)	−0.069	(0.002)	−0.082	(0.003)	−0.062	(0.007)	−0.017	(0.006)
Bankruptcy (−3; +3)	−0.035	(0.003)	−0.042	(0.003)	−0.020	(0.008)	−0.033	(0.007)
Foreclosure	−0.314	(0.003)	−0.260	(0.003)	−0.344	(0.005)	−0.308	(0.006)
<i>Panel C. Forced transactions by number of sellers</i>								
One seller								
Death, young seller (−3; +3)	−0.083	(0.010)	−0.093	(0.012)	−0.057	(0.026)	0.007	(0.018)
Death, old seller (−3; +3)	−0.097	(0.004)	−0.107	(0.005)	−0.099	(0.013)	−0.025	(0.011)
Bankruptcy (−3; +3)	−0.064	(0.005)	−0.073	(0.006)	−0.024	(0.012)	−0.051	(0.010)
Two sellers								
Death, young seller (−3; +3)	−0.038	(0.006)	−0.056	(0.007)	−0.009	(0.016)	−0.022	(0.015)
Death, old seller (−3; +3)	−0.053	(0.003)	−0.070	(0.003)	−0.041	(0.008)	−0.013	(0.008)
Bankruptcy −3; +3)	−0.017	(0.004)	−0.025	(0.004)	−0.016	(0.011)	−0.014	(0.010)
Number of observations	1,831,393		1,187,645		202,123		441,625	

TABLE 5—SPILLOVER ESTIMATES OF FORECLOSURES

	Using only foreclosures before transaction: Before [ $\delta_{F,B}$ and $\delta_{C,B}$ ]		Estimated difference in coefficients: Before–after [[ $\delta_{F,B} - \delta_{F,A}$ ] and $(\delta_{C,B} - \delta_{C,A})$ ]	
	(1)	(2)	(3)	(4)
Slope: far ( $\delta_F$ )	-0.017 (0.001)	-0.011 (0.001)	-0.006 (0.005)	-0.003 (0.001)
Slope: close ( $\delta_C$ )	-0.087 (0.003)	-0.072 (0.003)	-0.020 (0.001)	-0.017 (0.003)

Campbell, Giglio, and Pathak, *AER* August 2011

# Foreclosure Policy

- These results can justify public policy to reduce reliance on foreclosures
- An example of a poor system: 5-year balloon mortgages (US until Great Depression)
  - Require frequent refinancing, which becomes impossible when homeowners' credit status deteriorates and/or credit market conditions tighten
  - High foreclosure rate in economic downturn

# Asset Pricing



# Asset Pricing Perspective

- Mortgage contracts share risk between mortgage lenders and borrowers
- Long-term mortgages protect borrowers against deteriorations in their own creditworthiness or credit market conditions
- Remaining questions concern real interest rate, inflation, and house price risks
- Start by assuming rational borrowers who neither default nor move, then allow default, moving, suboptimal behavior

# FRM Risks

- Nominal fixed-rate mortgages (FRMs) stabilize required payments in nominal terms, but not in real terms
  - Borrowers win if inflation increases (1970s-1980s)
  - Borrowers' downside risk is deflation with prepayment penalties or falling house prices that prevent refinancing
  - Mortgage rate charges for balance of upside and downside risk

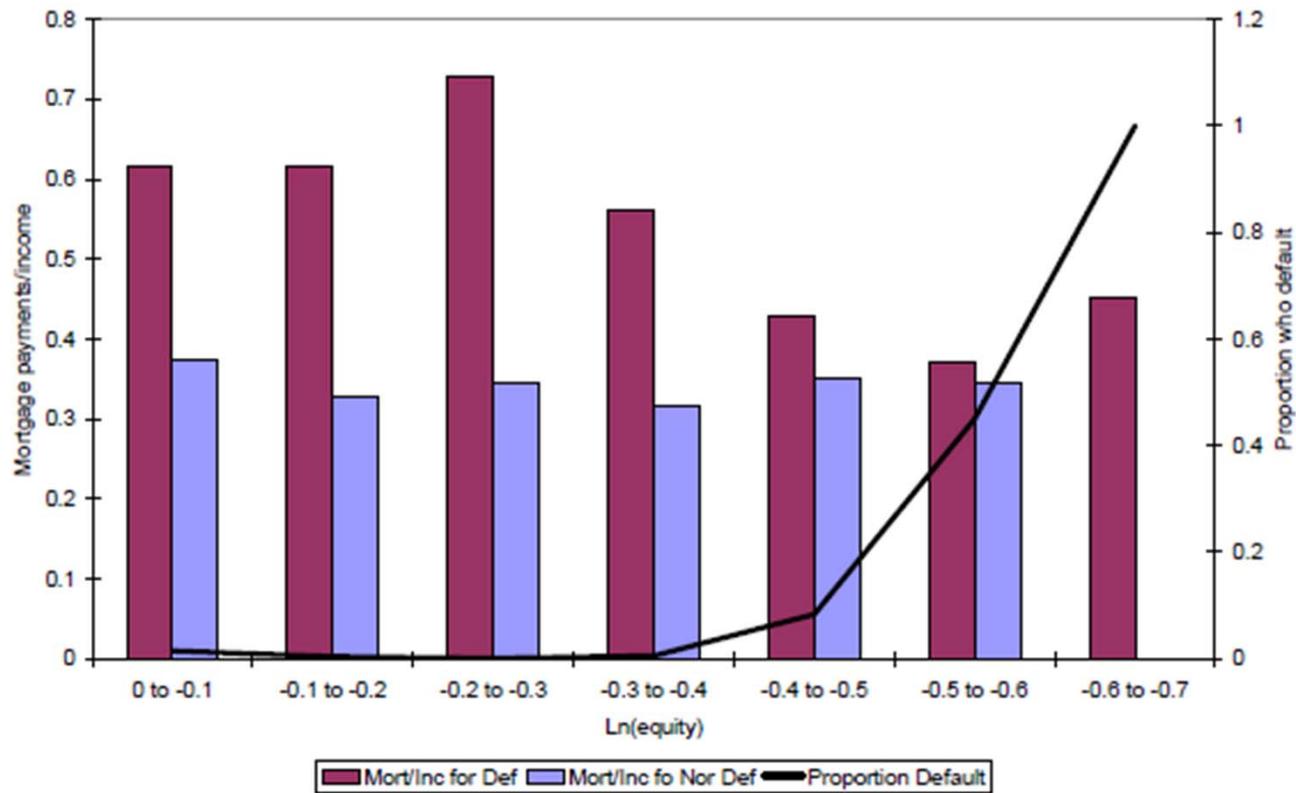
# ARM Risks

- Adjustable-rate mortgages (ARMs) stabilize real principal value but not required real payments
  - Borrowers' risk 1: Rising real interest rates
  - Borrowers' risk 2: Rising inflation that accelerates required real payment schedule, together with constraints that prevent borrowing to compensate
- Initial interest rate typically lower
- Current borrowing constraints lead borrowers to prefer ARMs, risk of future borrowing constraints leads them to prefer FRMs (Campbell and Cocco 2003, Johnson and Li 2011)

# Default

- Can households use default to manage downside risks?
  - Recourse vs. non-recourse mortgages
  - Default as a real options problem (Campbell and Cocco 2011)
  - Default has immediate benefits (relieves pressure on consumption today), but long-run costs (lost access to credit markets, need to rent housing)
  - Rational default occurs at a threshold level of negative home equity that varies with the tightness of borrowing constraints (“dual-trigger” model, Elul et al 2010, Bhutta, Dokko, and Shan 2010)

Alternative Figure 4: Mortgage payments to household income by default decision and proportion of defaults as a function of the logarithm of home equity for negative home equity.

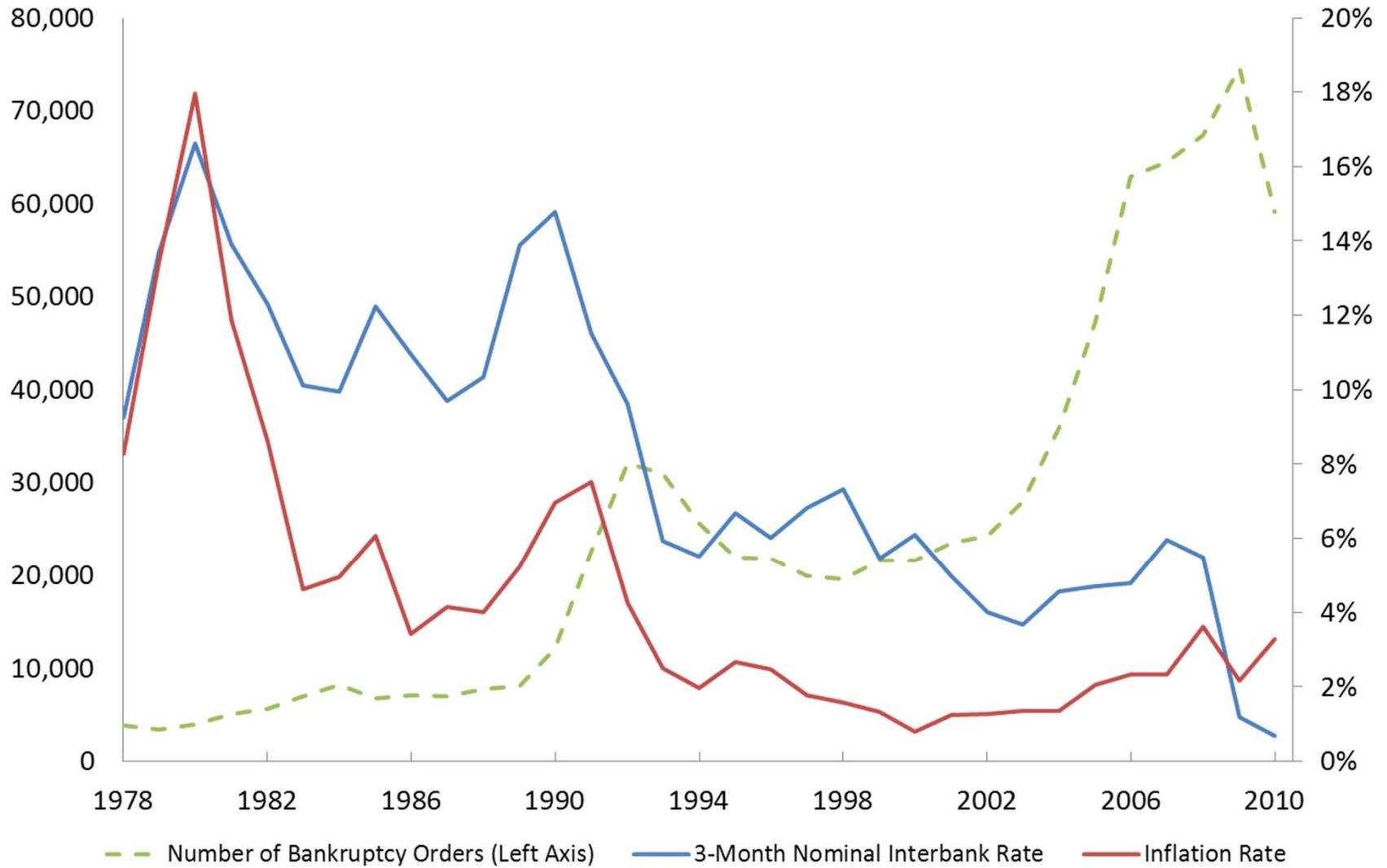


Campbell-Cocco, "A Model of Mortgage Default", 2011

# FRM vs. ARM Defaults

- Rational default model implies comparable default rates for FRMs and ARMs, but these defaults occur in different circumstances
- FRM defaults occur with low inflation and interest rates, ARM defaults with high inflation and interest rates
  - US ability to lower short rates has little effect on defaults because FRMs dominate
  - ARM systems generate defaults when a currency crisis occurs

# Bankruptcy Orders in England and Wales



# Behavioral Finance



# Behavioral Finance Perspective

- Consumer heterogeneity in
  - Moving propensity
  - Financial sophistication
  - Present-biased preferences

# Moving Propensity

- FRM systems may favor movers or stayers
- German system (prepayment penalties)
  - Movers win when rates fall (allowed to refinance)
- US system (no prepayment penalties)
  - Stayers win when rates rise (prepayment at face value creates “lock-in”)
- Danish system
  - Fixes this by allowing prepayment at either face value or market value

# Moving Propensity

Why does the treatment of movers matter?

- Distributional effects ex post
- Uncertainty about aggregate moving propensity
  - Worsens prepayment risk
- Asymmetry of information about individual moving propensity
  - Incentives to separate borrowers by their moving propensity (e.g. using points)
  - Can create liquidity problems in the secondary market

# Financial Sophistication

- Complex choices associated with excessive fees, especially for less educated borrowers (Woodward 2003)
- Many borrowers do not understand their mortgage terms (Bucks and Pence 2008)
- Some borrowers do not manage prepayment option efficiently (Miles Report 2004, Campbell 2006)
  - Main source of prepayment risk

# Equilibrium Implications

- Consumer mistakes create an artificial source of risk (prepayment risk) that must be managed
- Competitive market wastes profits in marketing costs, and/or cross-subsidizes sophisticated borrowers
- Financial innovation may be blocked, as simpler products cannot be profitably introduced
  - Shrouded equilibrium (Gabaix and Laibson 2006)
- Can justify a consumer protection agency like the US CFPB to regulate mortgages and promote constructive innovation

# Present-Biased Preferences

- Borrowers with present-biased preferences (Laibson 1997) succumb to temptation
- If they also have inertia, an FRM refinancing that reduces interest cost can also induce home equity extraction (Khandani, Lo, and Merton 2009)

# What's Wrong with Option ARMs?

- The above analysis can be used to understand the problems with option ARMs
- Option ARMs have low initial “teaser” rates, then high subsequent penalty rates
  - Creditworthy borrowers refinance at the end of the teaser period, leaving only less creditworthy borrowers to pay penalty rates
  - Problem 1: Naïve borrowers cross-subsidize sophisticated ones (Miles Report 2004)
  - Problem 2: The mechanism breaks down when house prices fall and credit conditions deteriorate (analogy with balloon mortgages in US Great Depression)

# Financial Intermediation



# Financial Intermediation Perspective

- Mortgages must be funded
- Whatever risks borrowers do not bear must be allocated to originators, end investors, or guarantee providers
- Different systems allocate different types of risks differently (credit, interest rates, prepayments)
- Risk allocation affects
  - Underwriting incentives and thus the risks that enter the system
  - Incentives to modify loans in a downturn

# Three Funding Systems

- Deposit-financed mortgage lending
- Securitization
- Covered bonds

# Deposit-Financed Lending

- Originators retain all risks
  - Incentives are initially aligned for both underwriting and loan modification
- Problems:
  - Mortgage supply limited by local availability of deposit funding
  - Maturity transformation, particularly in FRM systems, is a risky business model for originators
  - Originator losses create debt overhang and incentives then become misaligned (US savings and loan crisis)

# Securitization

- Originators distribute securitized mortgage pools
  - Often with public credit guarantees
  - End investors bear interest rate and prepayment risk and remaining credit risk
  - Mortgages become liquid assets funded by global capital markets
- Ignorant end investors or mispriced guarantees erode incentives for proper underwriting
  - Public credit guarantees hard to price properly, vulnerable to political distortion
  - “Private gains, social losses”

# Securitization

- Originators may hold MBS for inventory or capital arbitrage, recreating the problems of deposit-financed lending
  - Northern Rock
- Once a downturn begins, further problems appear
  - Capital flight if public credit guarantees are not fully explicit or credible
  - Originators do not have the proper incentives to modify loans (Agarwal et al 2011, Piskorski, Seru, and Vig 2011)

# Covered Bonds

- Originators retain credit risk, transfer other risks
  - Covered bonds are claims on originators but are collateralized by mortgage pools that must be topped up when individual mortgages default
- Originators have the correct incentives for underwriting and loan modification
- System can be very effective if managed to limit maturity transformation

# Liquidity

- Both MBS and covered bond systems need liquidity
- Essential to minimize information asymmetries
  - Large, diversified mortgage pools
  - Mortgage design to limit demographic and behavioral uncertainties
  - Tranching
  - Credit guarantees
- The Danish system works well by emphasizing the first two

# Macroeconomics



# Monetary Policy

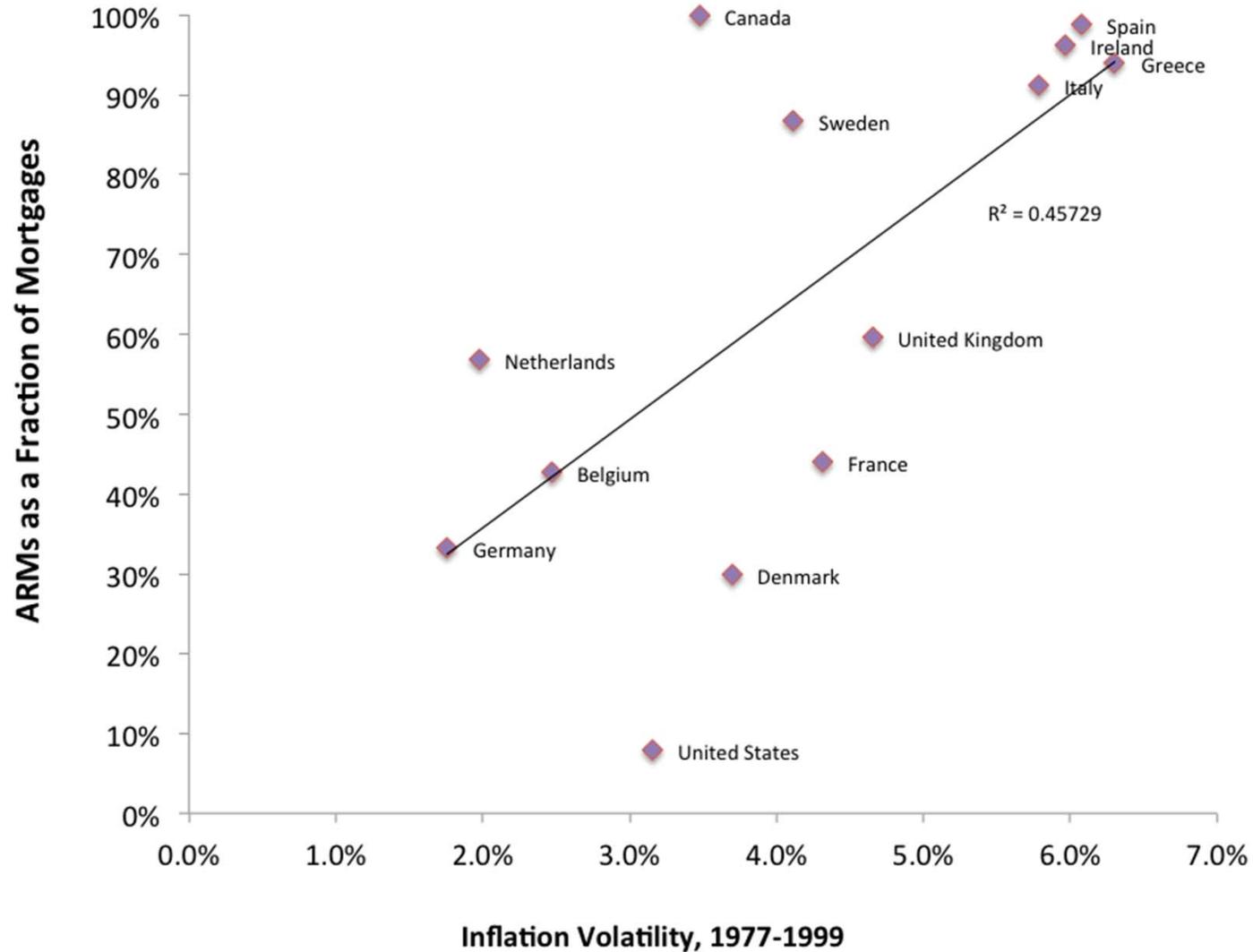
- In a FRM system, maturity transformation can inhibit central bank from raising interest rates
  - US in 1970s
- In an ARM system, rate increases affect all homeowners with strong consumption impact
  - Mid-2000s UK concern about euro membership (Miles Report)
  - Worsens the challenge of running a common eurozone monetary policy
  - Political salience of monetary policy

# Inflation Volatility

- Historical experience with inflation has a strong effect on a country's mortgage system
- In countries with volatile inflation, nominal FRMs with prepayment options are too risky for lenders and hence too expensive for borrowers
  - This explains much of the observed cross-sectional variation in mortgage systems
  - Need to measure pre-euro inflation volatility, reflecting inertia in mortgage systems

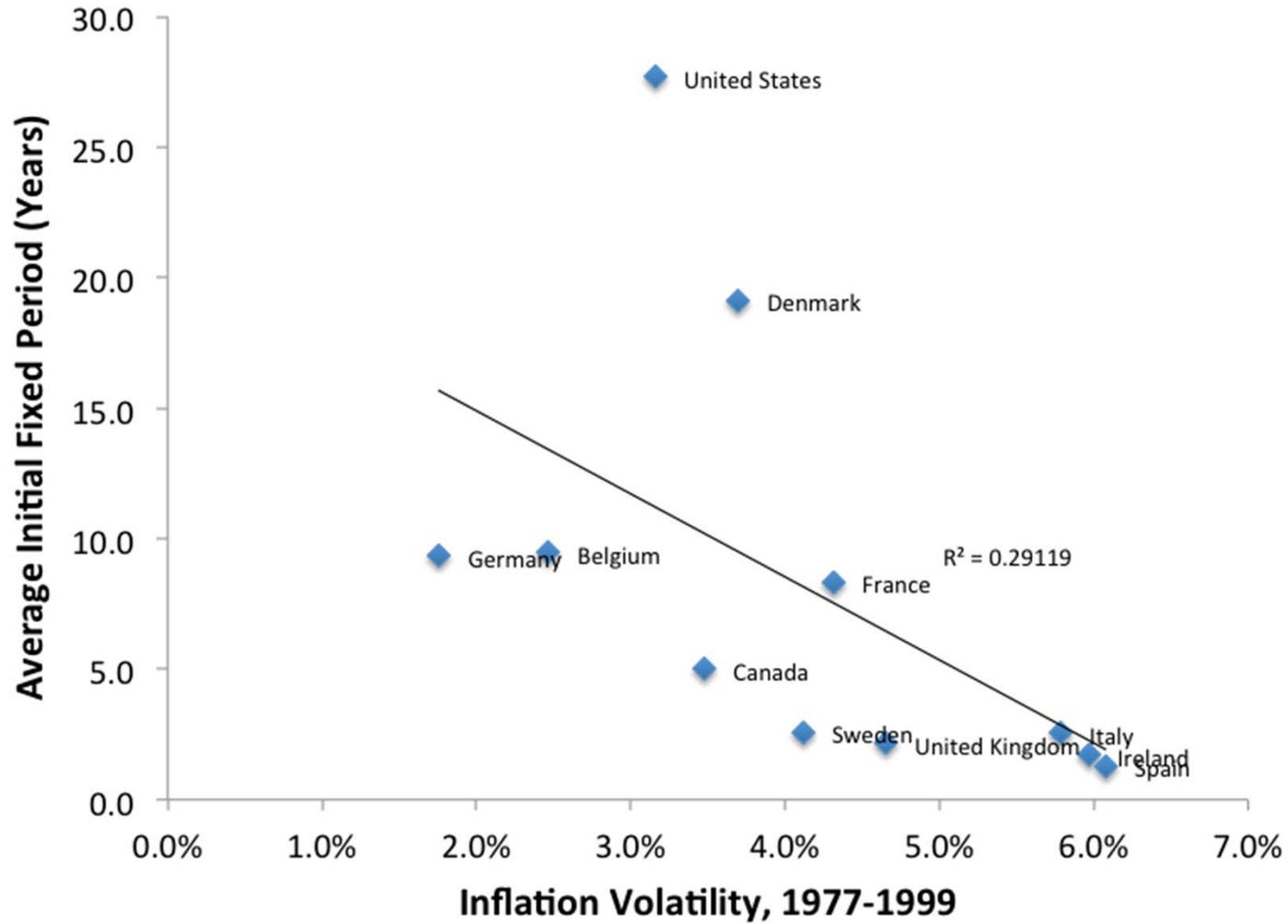
## Countries with inflation uncertainty use ARMs

(ARM = Initial fixed rate period does not exceed five years)

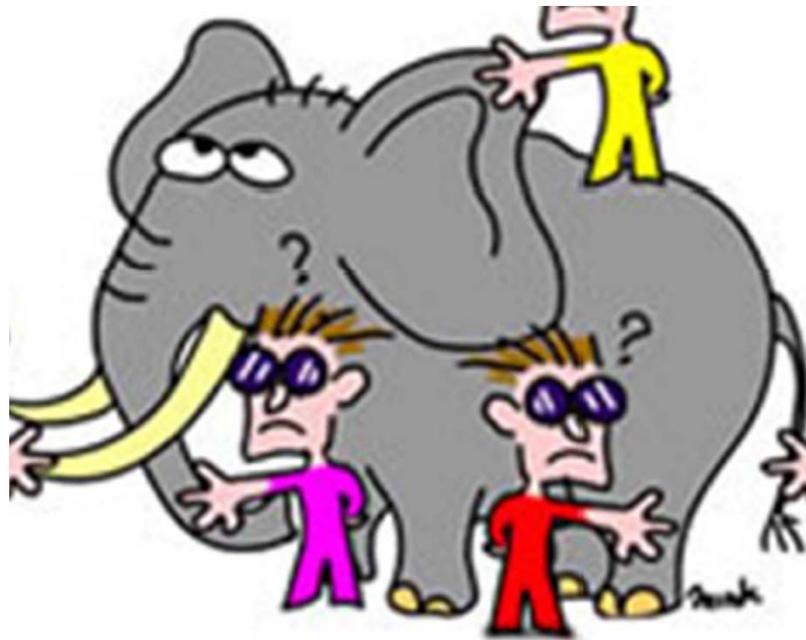


Sources: European Mortgage Federation, OECD, US Census Bureau

## Rates are fixed for shorter periods in countries with higher inflation uncertainty



# Conclusion



# Prospects for the US

- What will happen to the US mortgage system?  
What should happen?
- US strongly attached to long-term FRMs with minimal prepayment penalties
  - This system will survive unless there is a catastrophic increase in inflation volatility
- There is a critical need to reduce reliance on public funding
  - At a minimum, by winding down the GSEs' directly held mortgage portfolios
- How to restore private mortgage funding?

# The Danish Model

- Advantages of the Danish model:
  - Covered bonds, no maturity transformation
  - Option to prepay at market value eliminates lock-in and resultant prepayment uncertainty
  - Option to prepay at market value allows homeowners to supply liquidity in a crisis
  - Large, homogeneous mortgage pools are relatively liquid
  - Strict regulation, conservative underwriting, recourse mortgages
  - Avoids public credit guarantees

# Prospects for the US

- The US has had limited experience with covered bonds
  - WaMu covered bonds paid off in full
  - But FDIC has opposed them, fearing that covered bonds will increase the cost of providing deposit insurance
- The times call for experimentation
  - With covered bonds
  - With other features of the Danish system that can be adapted to the securitization model
  - With mortgage modification in bankruptcy

# Mortgage Innovation

- Are there even better alternatives?
  - Automatically refinancing FRMs
  - Inflation-indexed FRMs
  - Mortgages with principal linked to house price indexes
- A mission for the CFPB: promote helpful financial innovation in mortgages and other aspects of consumer credit