# Money and Velocity During Financial Crises: The Great Depression and the Great Recession

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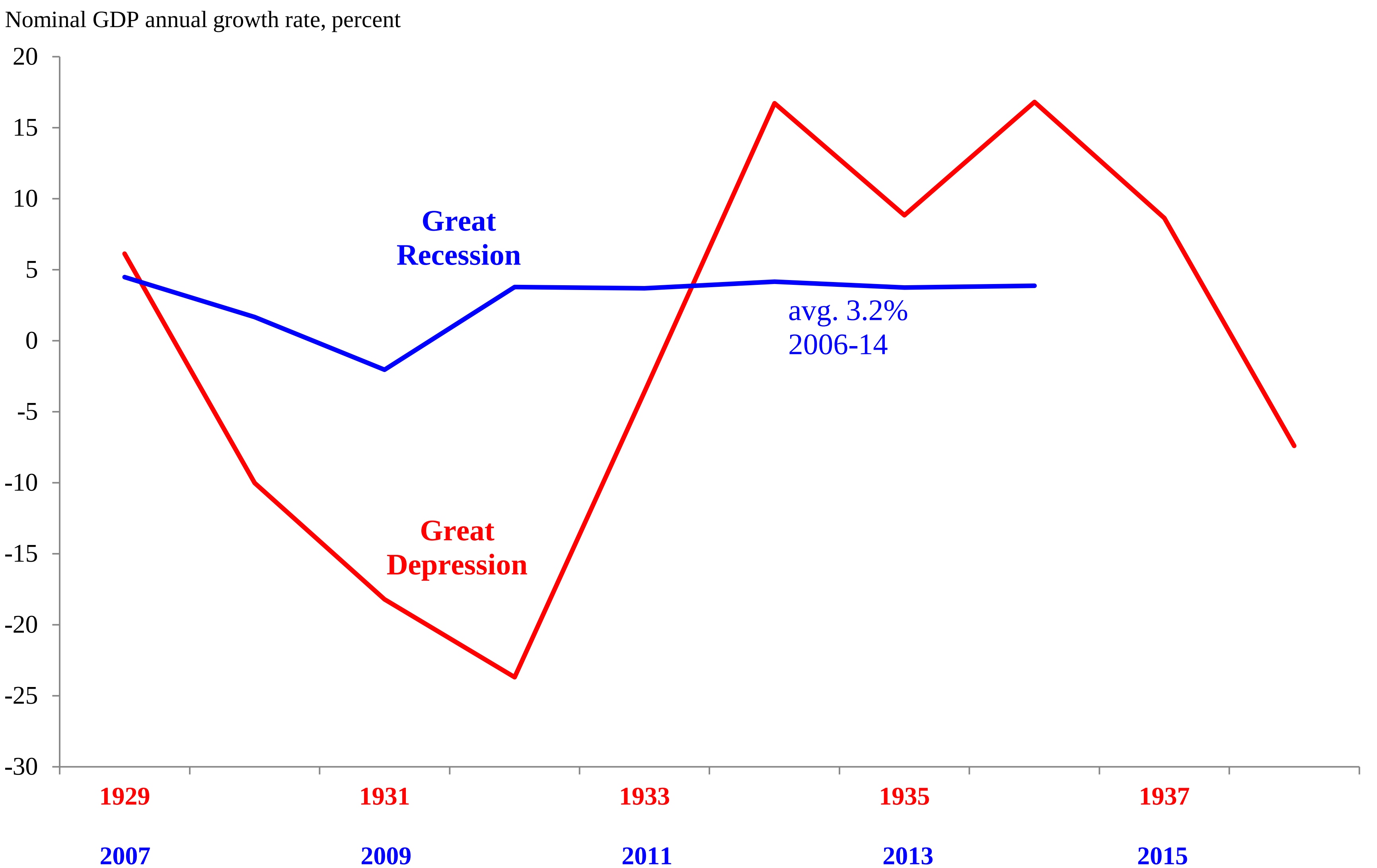
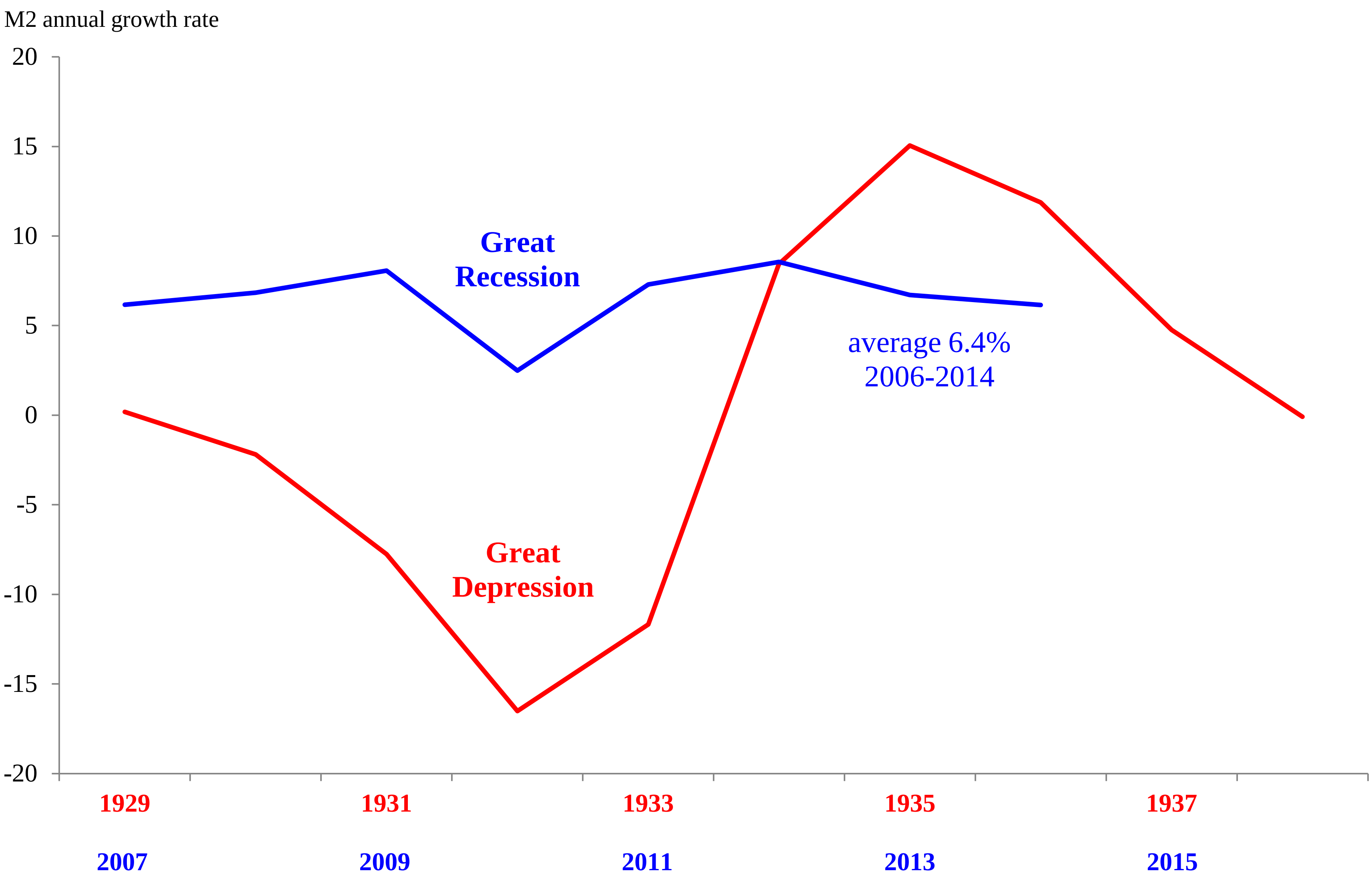
# Introduction

- The Fed better prevented deflation and quelled high unemployment during the Great Recession than in the Great Depression.
- Nevertheless, high unemployment during the Great Recession reflects a shortfall of its full employment goal.
- This partly reflected a shortfall in nominal demand (GDP) growth that does not just simply reflect M2 growth.  The demand for money surged more than its growth rate, indicating a need to better understand money demand and velocity.

# Figure 5: Fed Better−But Imperfectly−Stabilized Nominal GDP Growth in the Great Recession than in the Great Depression



## Figure 6: M2 Declined in the Great Depression, But, Except in 2010, Rose Solidly in the Great Recession



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- Comparing the Great Depression and the Great Recession may help us better understand how money demand swings during financial crises and their aftermaths.

# Outline

- Why track M2 and its demand (velocity) to compare the Great Depression and Great Recession?
- Why financial innovation and shifts in risk premia affect the demand for M2
- Framework and data used to model M2 demand
- Empirical findings
- Conclusion

# Outline

- Why track M2 and its demand (velocity) to compare the Great Depression and Great Recession?

# Why Track A Gauge of Liquidity (M2) to Compare the Great Depression and Great Recession?

- Two basic ways of tracking monetary policy: interest rates adjusted for expected inflation and money supply. Direct measures of expected inflation only available in recent decades, so it is hard to directly gauge real interest rates in the Great Depression (and to consistently account for QE policy).
- Broad money (M2) is a good consistent proxy measure of liquidity (vs 5 years experience with QE) since 1929. Problem: M2's link with nominal GDP shifts from shifts in money demand owing to financial innovation and also to how shifts in risk premia give rise to flights to safety (M2).
- Only if velocity growth is predictable can money growth imply what nominal GDP growth will be. This paper tracks and controls for these effects by modeling the demand for broad money (velocity).
- An overly simplistic view: Fed stabilized money base but let M2 fall in the Great Depression, but kept M2 growing in Great Recession by quadrupling the monetary base to offset massive declines in the money multiplier.

| | M2 | = money multiplier | x monetary base |
|---|---|---|---|
| **Great Depression:** | **(fell)** | **(fell)** | **(stable)** |
| **Great Recession:** | **(grew)** | **(fell)** | **(jumped)** |

# Why Track A Gauge of Liquidity (M2) to Compare the Great Depression and Great Recession (cont'd)

- Simplistic view overlooks that broad money's link to nom GDP changed in the Great Depression owing to a rise in money demand and fall in velocity:

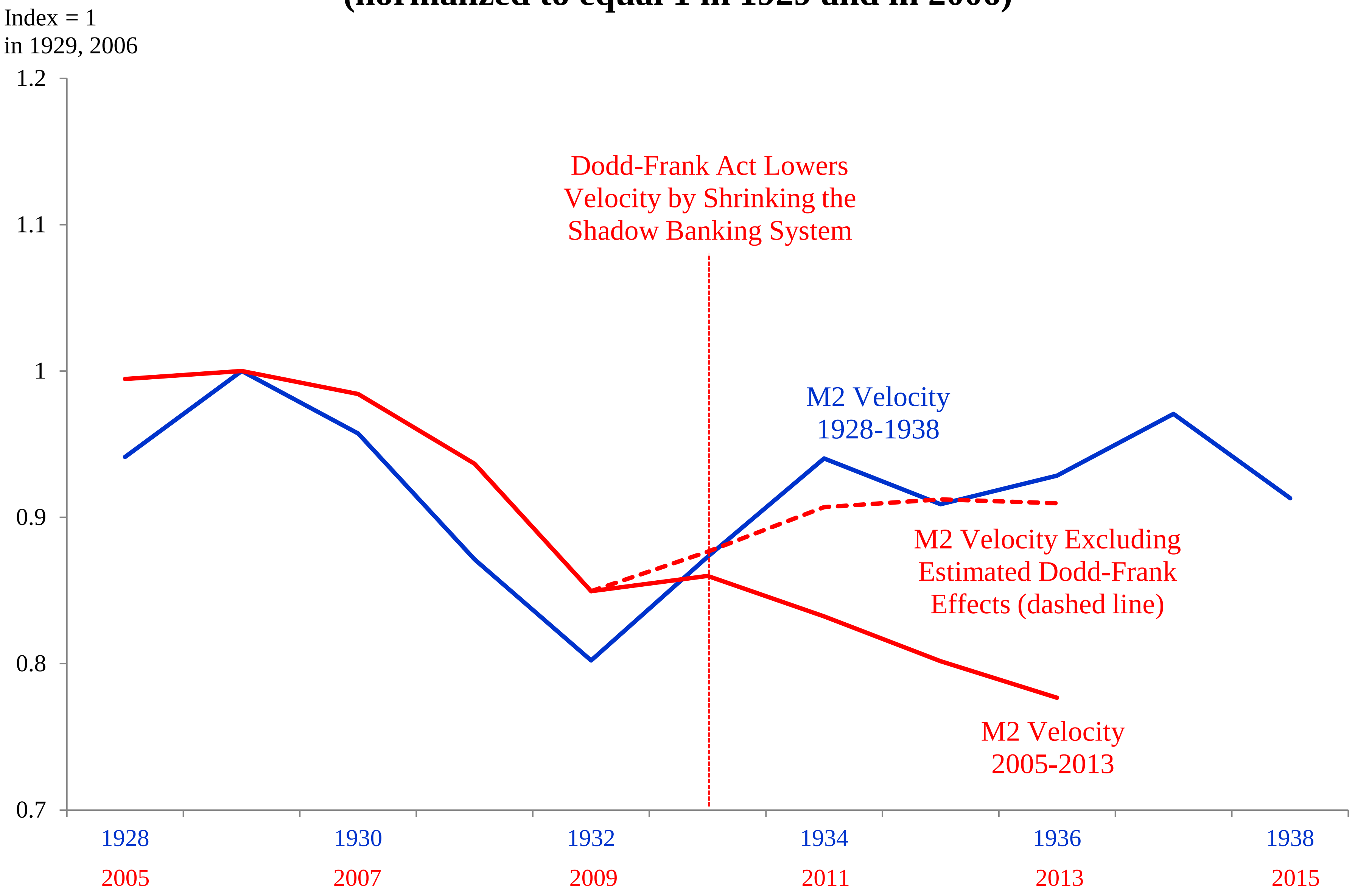
$$M \times V = P \times Y \text{ (nominal GDP)}$$

$$V \equiv (P \times Y)/M$$

  So a decline in V and M hurt nominal GDP in the Great Depression.

- But a decline in V also hurt nominal GDP in the Great Recession, so even 6.4% average M2 growth did not prevent above 8% unemployment in Great Recession and inflation from generally falling below Fed's 2% goal

## Figure 2: M2 Velocity Circa Two Financial Crises (normalized to equal 1 in 1929 and in 2006)



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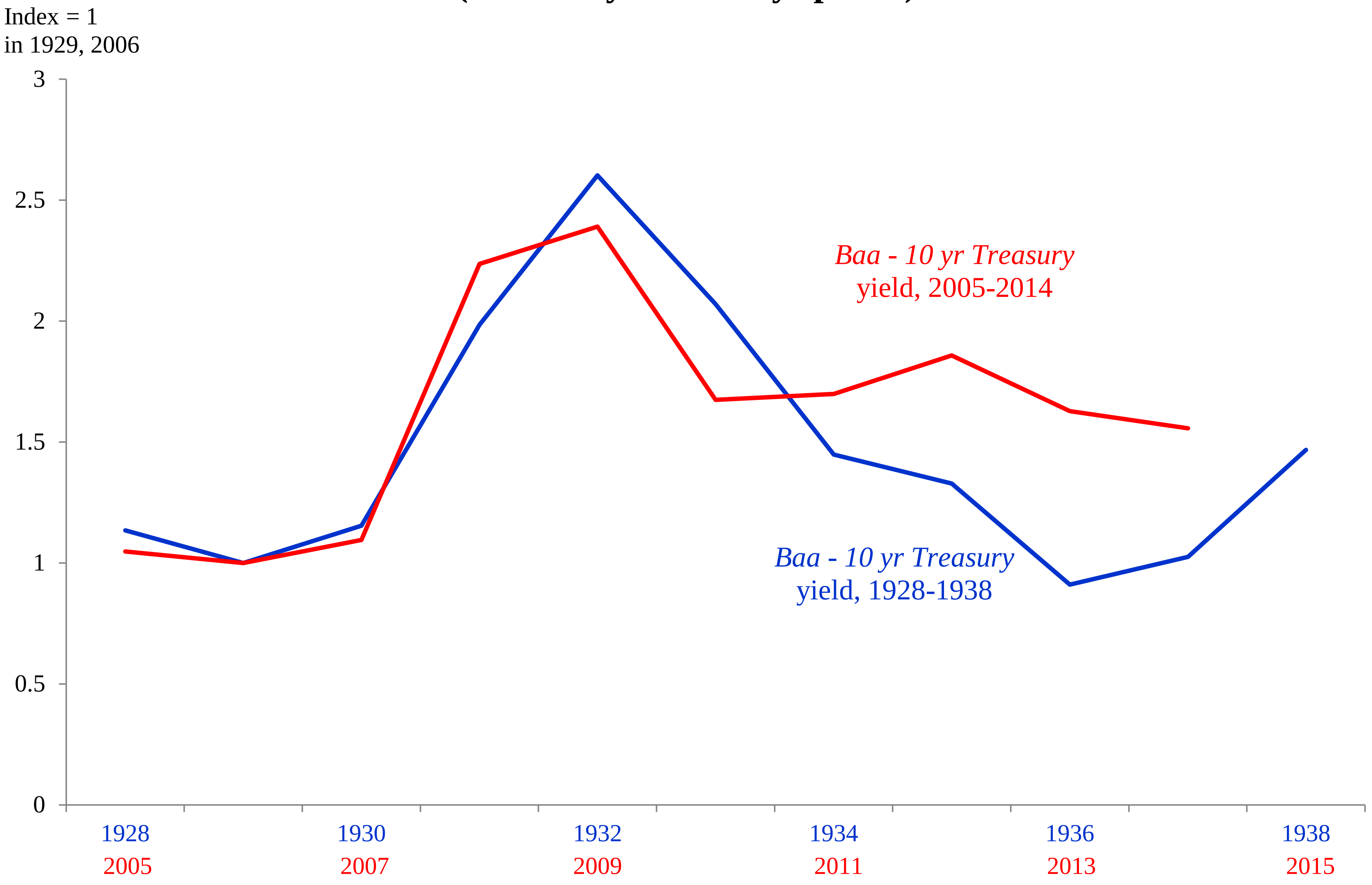
- Common factor lowering V (raising M demand) in both crises: upward shift in risk premia give rise to flights to safety or the liquidity of M2.

# Figure 1: Financial Market Risk Premium Circa Two Financial Crises
## (Baa - 10 yr Treasury spread)



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- Common factor lowering V (raising M demand) in both crises: upward shift in risk premia give rise to flights to safety or the liquidity of M2.
- One difference: Dodd-Frank (financial reform) Act shrinks the shadow bank sector, pushing increasing the relative role of commercial banks in providing credit and liquidity (money), thereby lowering V2 after 2010.

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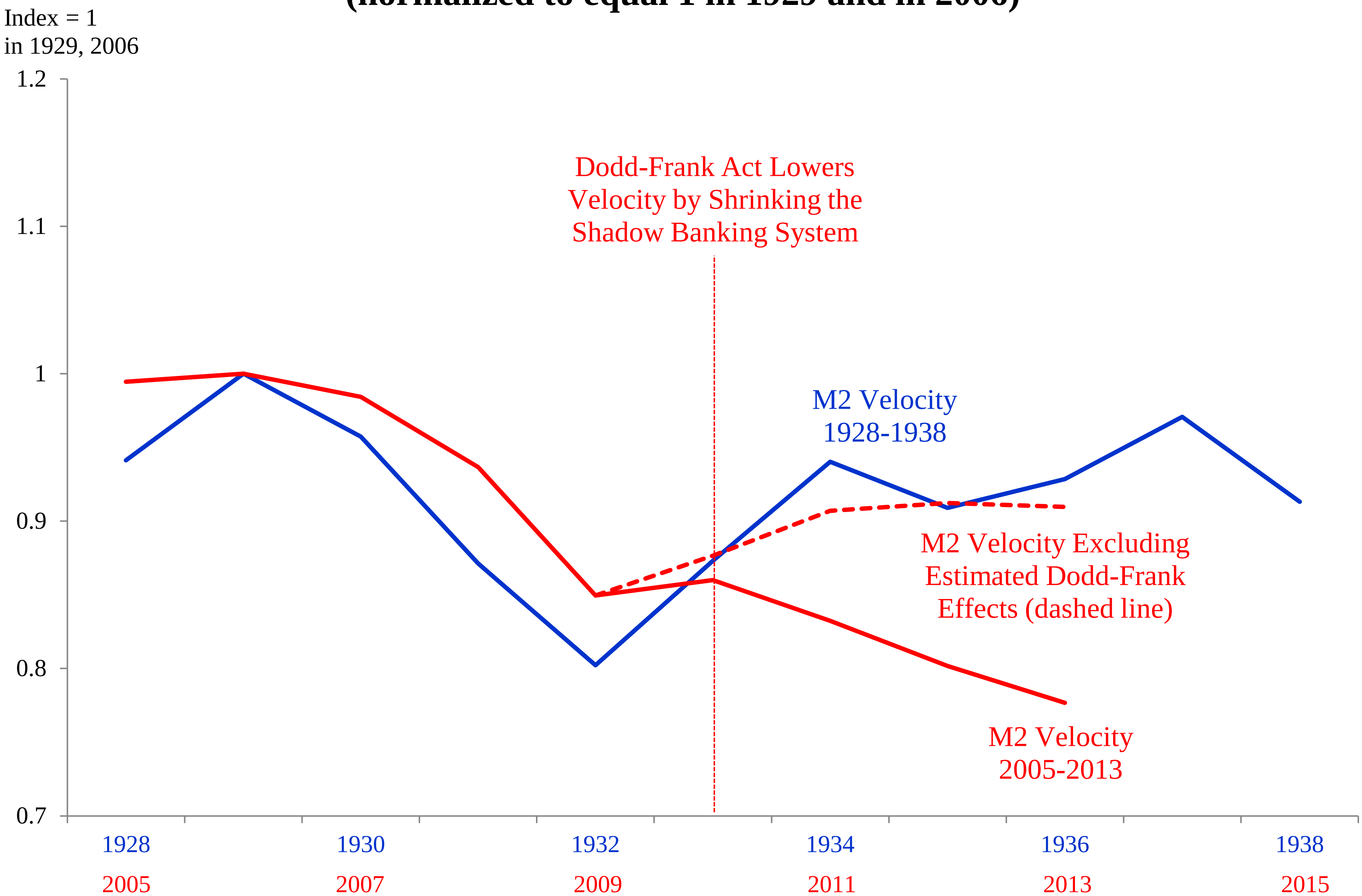

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- Why track M2 and its demand (velocity) to compare the Great Depression and Great Recession?
- Why financial innovation and shifts in risk premia affect the demand for M2

# How Modeling Velocity May Enable M2 Be Useful in Inferring Nominal GDP Growth

$$M \times V = P \times Y$$

Circa 1990, velocity a function of short-term T – M2 avg interest rate (*OC*) very limited substitution between money and nonTreasury bonds & stocks

$$M \times V(\mathit{OC}) = P \times Y$$

Circa 2000, velocity function of *OC* and asset transfer costs (mutual fund loads); lower loads increase the liquidity of stocks & bonds, inducing shifts out of M2

$$M \times V(\mathit{OC}, \mathit{Load}) = P \times Y$$

# Transfer Costs & Risk Premia Affect M2 Demand

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Lower transfer costs (↓loads) increase liquidity of stock and bond mutual funds => households shift from M2 to bonds or stocks ↓M2 demand => upshift in V (Brunner & Meltzer's generalization of the Baumol-Tobin model)

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(2)

Portfolio Effects from Risk Premia

- Asset portfolio shares in levels a function of risk premia scaled by asset transfer costs, Liu. 2004; Liu & Lowenstein 2002
- Lower transfer costs => V more sensitive to risk premia on nonM2 assets; => greater ↑ M2 demand and ↓ risky asset demand in crises. Transfer costs and risk premia separable in log specifications.

# How Modeling Velocity May Enable M2 Be Useful in Inferring Nominal GDP Growth

$$M \times V = P \times Y$$

Circa 1990, velocity a function of short-term T – M2 avg interest rate (*OC*) very limited substitution between money and nonTreasury bonds & stocks

$$M \times V(OC) = P \times Y$$

Circa 2000, velocity function of *OC* and asset transfer costs (mutual fund loads); lower loads increase the liquidity of stocks & bonds, inducing shifts out of M2

$$M \times V(OC, Load) = P \times Y$$

Circa 2013: post-2000 swings in risk premia (*Baa10Tr*) reveal other effects, the degree of portfolio substitution in levels depends on transfer costs (liquidity):

$$M \times V(\underset{(+)}{OC}, \underset{(-)}{Load}, \underset{(-)}{Baa10Tr}) = P \times Y$$

if V can be modeled M2 might provide information about how much extra liquidity central banks should provide in crises and whether they are adjusting it appropriately when unwinding monetary accommodation during an “exit”

# Outline

- Why track M2 and its demand (velocity) to compare the Great Depression and Great Recession?
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- Framework and data used to model M2 demand

# Basic Empirical Framework and Data

- Jointly estimate long-run (log-level) velocity and short-run movements (first differences).
- Long-run velocity (*V2*):

$$\ln V2_t^* = \alpha_0 + \alpha_1 \ln(load_t) + \alpha_2 \ln(Baa10TR_t) + \alpha_3 OC_t + \varepsilon_t \qquad (8)$$

(-) (-) (+)

where all variables are nonstationary and *OC* enters as a level since some negative readings (semi-log specification).

***load*** **=** average front-end and 1 yr. backend load stock mutual funds (sample of large stock funds extend Duca and Anderson & Duca)

***Baa10TR*** = Moodys Baa corporate bond yield – 10 yr. Treasury yield

***OC*** = 3 mo. Treasury bill rate – average pecuniary yield on M2 (Board of Governors, St. Louis Fed, and our pre-1952 calculations)

# Basic Empirical Framework and Data: Framework and Long-Run Variables

- Jointly estimate long-run (log-level) velocity and short-run movements (first differences).
- We estimate an error-correction model:

$$\ln V2^*_t \equiv \alpha_0 + \alpha_1 \ln load t + \alpha_2 \ln(Baa10TR_t) + \alpha_3 OC_t + \varepsilon_t \qquad (9a)$$

$$\Delta \ln V2_t = \beta_0 + \beta_1(V2_{t-1} - V2^*_{t-1}) + \beta_{2i}\Delta V2_{t-I} + \beta_{3i}\Delta load_{t-i} + \beta_{3i}\Delta BaaTR10_{t-i}$$
$$+ \text{Short-run controls} \qquad (9b)$$

where level variables are nonstationary, *OC* enters as a level since some negative readings (semi-log specification) and the long-run variables are:

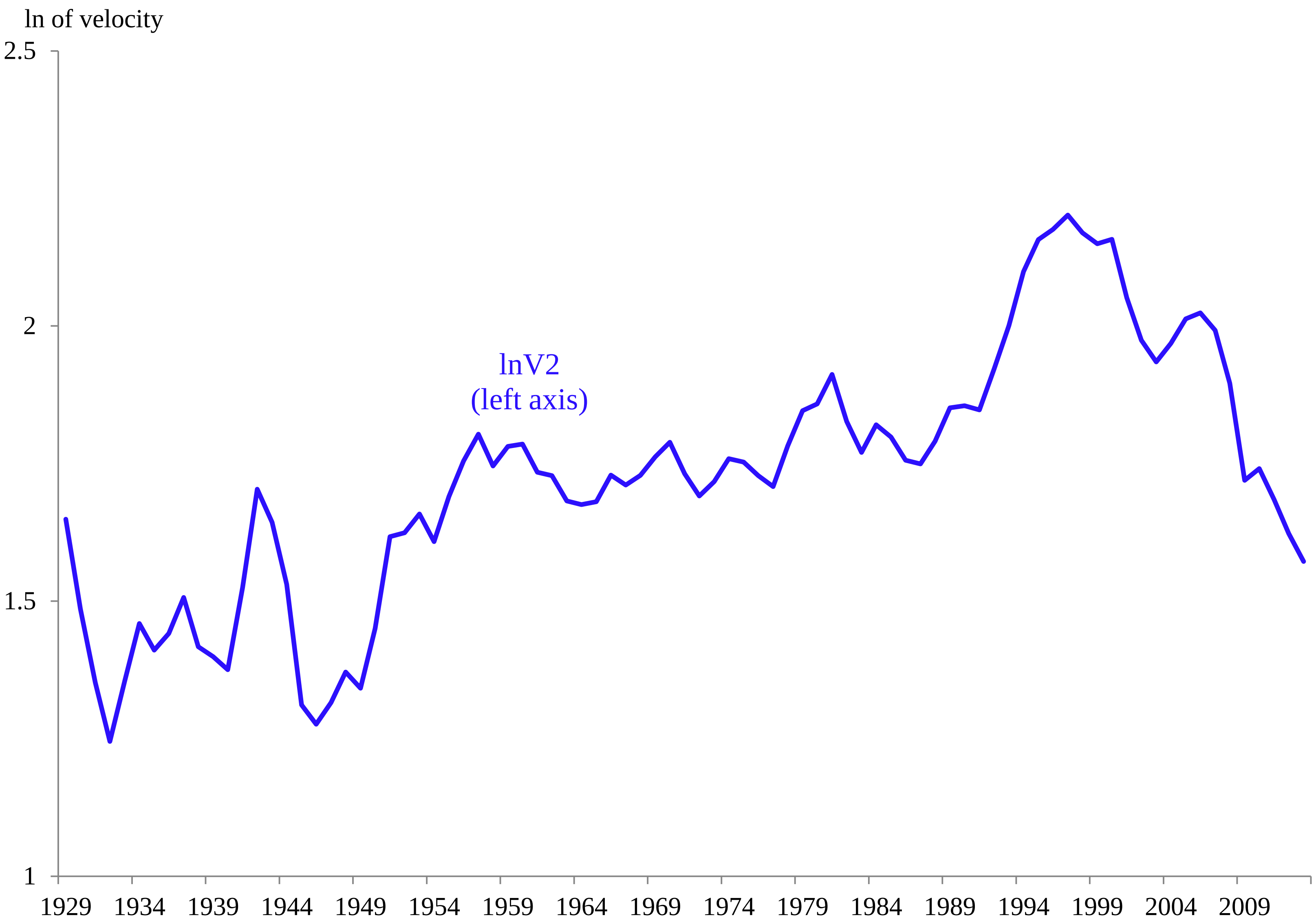
***load*** **=** average front-end and 1 yr. backend load stock mutual funds (sample of large stock funds extend Duca and Anderson & Duca)

***Baa10TR*** = Moodys Baa corporate bond yield – 10 yr. Treasury yield

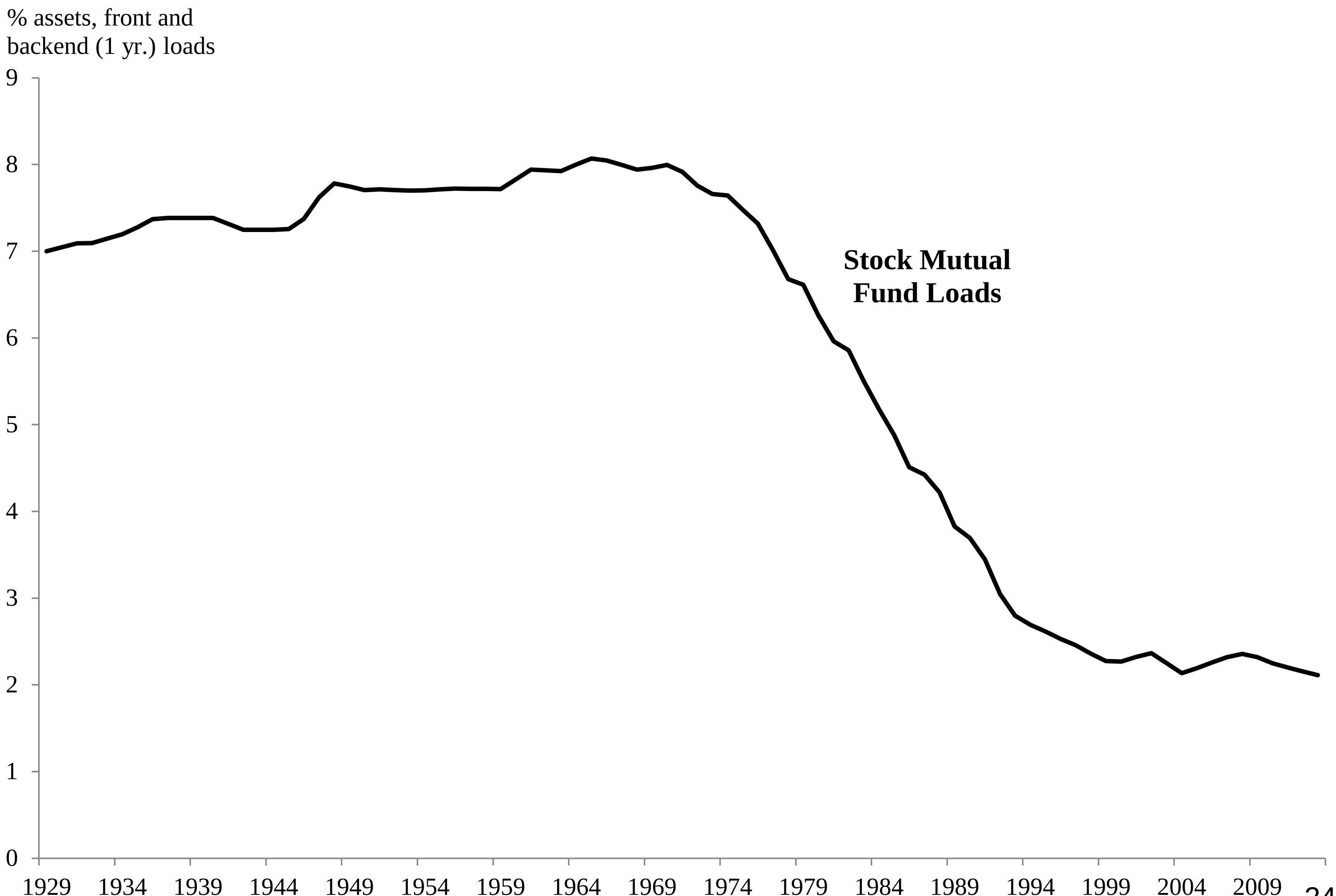
(helps control for risk premia common to private bonds and stocks)

***OC*** = 3 mo. Treasury bill rate – average pecuniary yield on M2 (Board of Governors, St. Louis Fed, and our pre-1952 calculations)

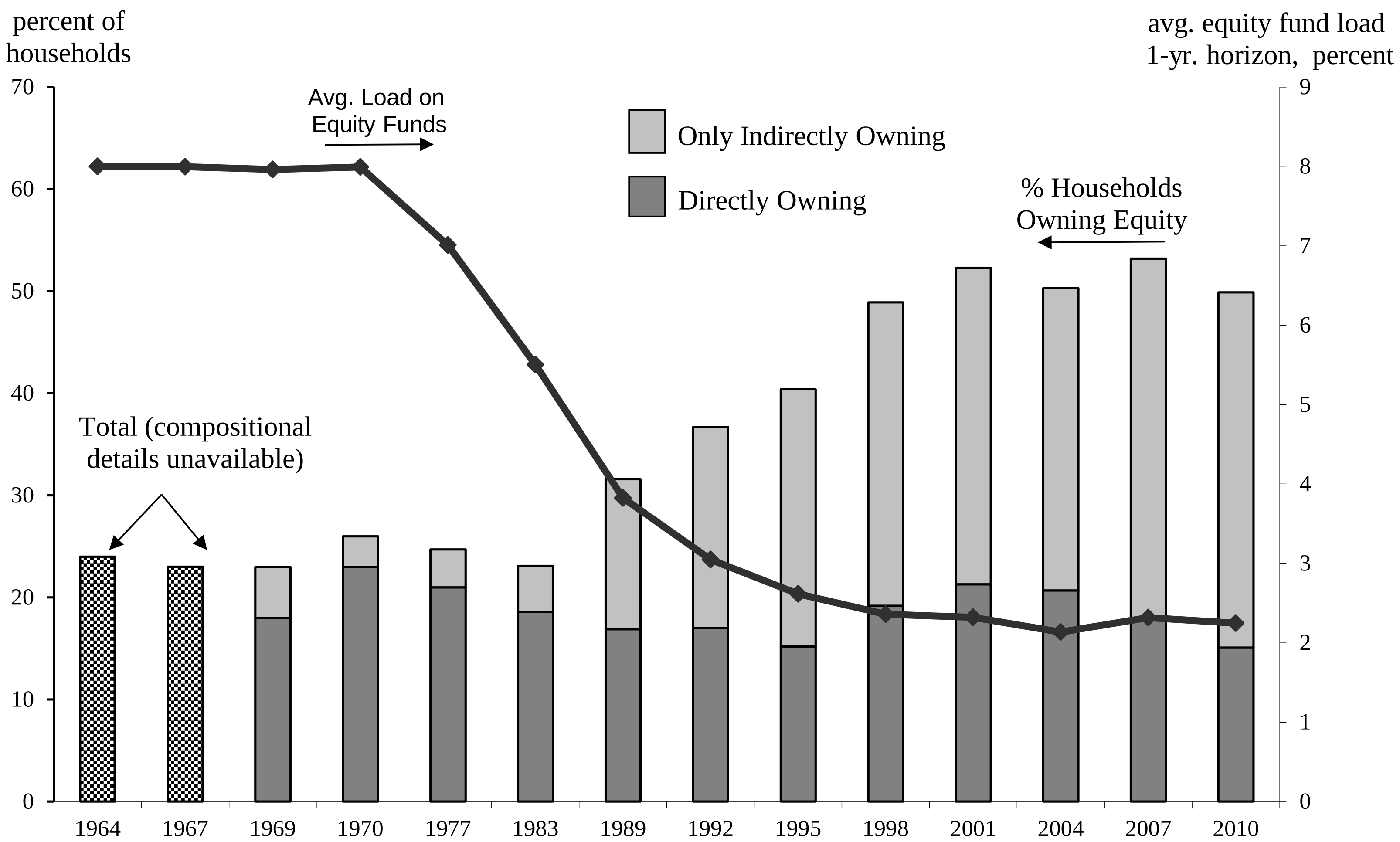
## Figure 4: M2 Velocity Distorted By World War II



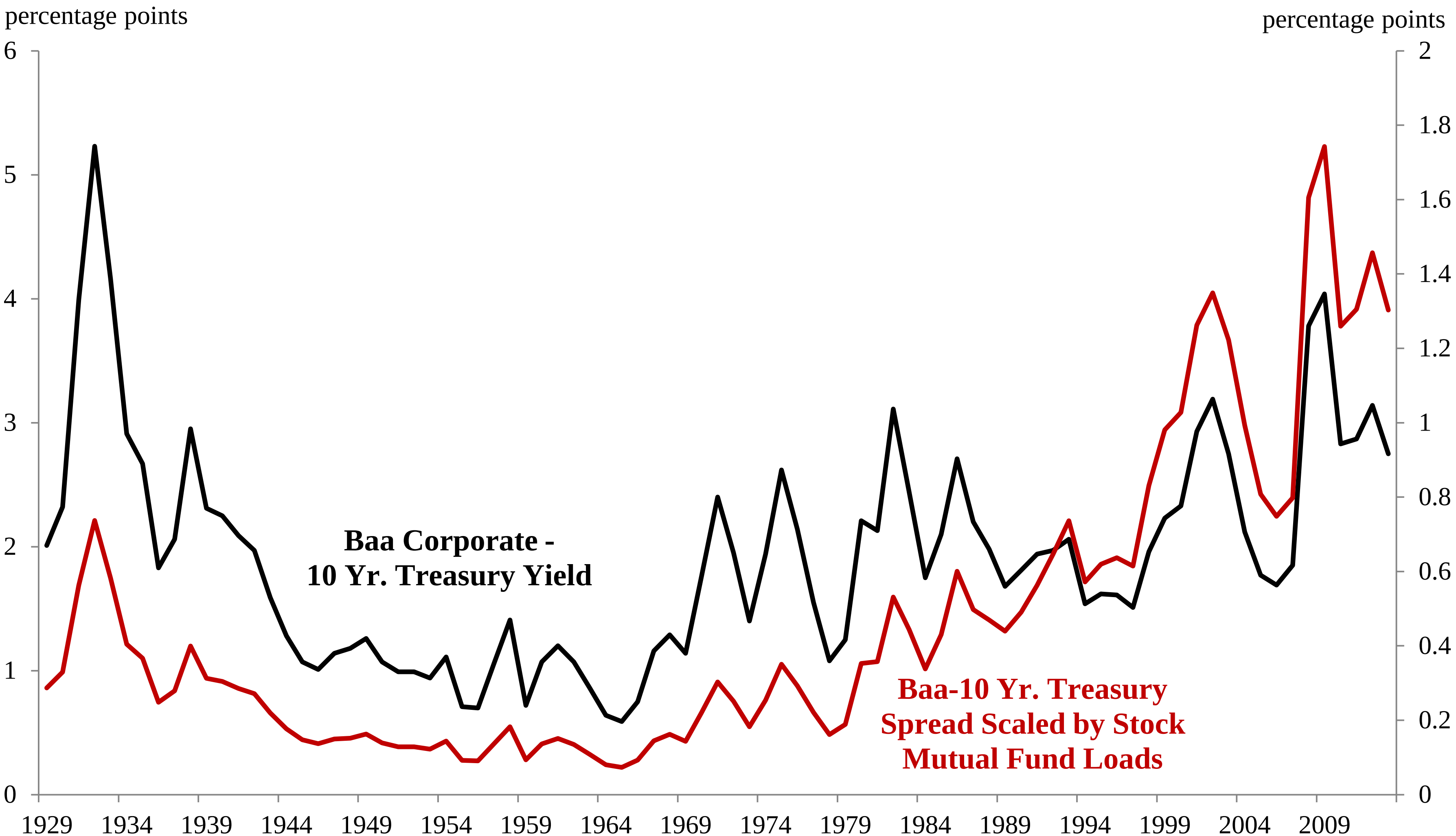
# Figure 6: Stock Mutual Fund Loads Shift in the Last Several Decades



# Figure 5: Equity Fund Loads Fall and Stock Ownership Rates Rise

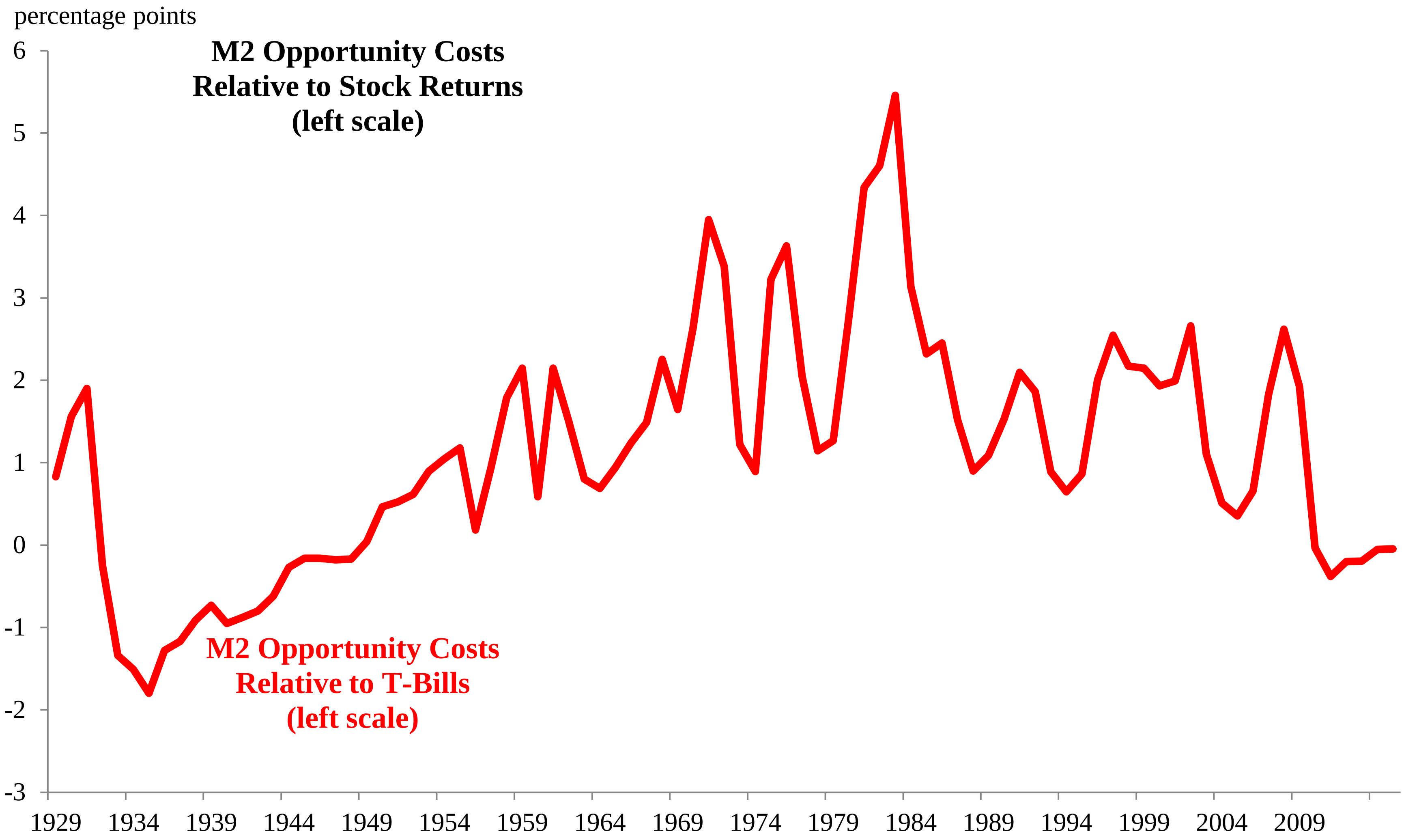


## Figure 7: The Spread Between Baa Corporate and 10 Yr. Treasury Yields Trends, Especially When Scaled by Mutual Fund Transfer Costs




Spread equals Moodys' Baa corporate bond yield minus a Treasury yield series from splicing three time series on U.S. government bond yields. Spread scaled by loads uses the average front-end and back-end load on stock mutual funds at a one year horizon.

## Figure 8: M2 Opportunity Costs Relative to T-Bill Rates Have Trends, But Relative to Stock Returns Are Volatile




Opportunity cost terms use authors' calculations of M2 own rates of return, a spliced 3 month Treasury Bill rate series, and Shiller's (2014) data on annual ex post stock returns.

# Basic Empirical Framework and Data: Short-Run Control Variables

$\Delta \ln V2_t = \beta_0 + \beta_1(V2_{t-1} - V2^*_{t-1}) + \beta_{2i}\Delta V2_{t-I} + \beta_{3i}\Delta load_{t-i} + \beta_{3i}\Delta BaaTR10_{t-i}$
+ Short-run controls (9b)

In short-run, velocity should fall if last period it were above long-run equilibrium, so the coefficient on error-correction term EC≡($V2_{t-1}$-$V2^*_{t-1}$) should be negative: β1<0

Short-Run Controls (excluding lagged differences of V2 and V2* components

***Set of Year Dummies 1941-46***: to control for WWII rationing, then unwound.

***OCST* (+):** Volatile stock returns (incl. cap. gains) minus M2 yields to control for stock returns vs. money pecuniary returns. Shiller and M2 own rate data.

***DeflationPCE* (-)**: deflation dummy = 1 when PCE prices fell (↑$M^d$ => ↓*V2* )

***DFA* (-):** Dodd-Frank dummy = .25 in 2010, 1 2011-13 (3-1/3 year transition) DFA reduces non-commercial bank role in financial system, shifts financial intermediation toward banks that use M2 for funds, ↓ V2

***YC*** (+?) : steeper Treas. yield curve may induce shifts from M to T bonds.

**Event/Regulatory Events: *BankHoliday* (+)** ↓ deposit liquidity ↓$M^d$ and ↑V2

***DumAccord* (-)** restore Fed independence, lowered inflation risk, ↑$M^d$ => ↓*V2*

***DMMDA* (-)** allowed variable int. rate bank accounts, ↑$M^d$ => ↓*V2*

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# Econometric Results in Table 2

- Table 2: 8 annual models differing w.r.t. samples and variables, all include the WWII rationing dummies, 5 models include all 3 long-run V variables.
- First 6 models use GDP to define V2, with models 7 and 8 using GDI (grew slightly faster recently). I will just show models 1-6 to save our eyesight.
- In models with all 3 long-run variables:
  - Robust, expected long-run results. Significant, long-run unique (cointegrating) long-run relationships found, with stock loads and the bond risk spread significantly lowering velocity. Consistent with view that higher transfer costs or higher risk ↓ liquidity of nonM2 assets and ↑$M^d$ => ↓*V2* . Since loads have fallen this effect tended to boost V2.
  - Conventional ***OC*** positive and significant in 4/5 full models, marginally for sample end '98
  - Error-correction significantly negative, sensible speed of adjustment (30% per year).
  - Full model robust estimated until 2013 or 2006, results not simply due to Great Recession..
- In Model 4 that omits mutual fund loads, no significant long-run relationship found. In model 5 which omits the risk premium and loads, a significant long-run relationship exists but it is not as significant as the full model alternatives and the EC term is 1/3 the size, l-run part adds less information.

# Table 2: Models 1-6 of V2 (GDP)

| Models: Controls: | **Full Model 1932-2013** | **Full Model 1932-2006 (omits DFA)** | **Model ex. fin. and reg. event risks 1932-2013** | **Full short-run controls, model omits *Sload* 1932-2013** | **Full short-run controls, omits *Sload* & *BaaTr* 1932-2013** | **Full Model 1932-1998 (omits DFA)** |
|---|---|---|---|---|---|---|
| Constant | 0.854 | 0.854 | 0.850 | 0.542 | 0.491 | 0.870 |
| *OC* | $0.033^{**}$ (3.54) | $0.033^{**}$ (3.20) | $0.032^{*}$ (2.59) | 0.022 (0.66) | 0.042 (1.42) | $0.025^{+}$ (1.78) |
| *Sload* | $-0.183^{**}$ (11.37) | $-0.186^{**}$ (9.35) | $-0.175^{**}$ (8.11) | | | $-0.187^{**}$ (2.86) |
| *BaaTR* | $-0.091^{**}$ (3.88) | $-0.094^{**}$ (3.68) | $-0.105^{**}$ (3.36) | -0.053 (0.53) | | $-0.091^{**}$ (2.75) |
| **Unique, Sign. Cointegrating Vector?** | **Yes**$^{**}$ | **Yes**$^{**}$ | **Yes**$^{**}$ | **No** | **Yes**$^{*}$ | **Yes**$^{**}$ |
| $EC_{t-1}$ | $-0.315^{**}$ (5.31) | $-0.316^{**}$ (4.98) | $-0.281^{**}$ (4.68) | $-0.096^{**}$ (3.61) | $-0.102^{**}$ (3.37) | $-0.288^{**}$ (4.65) |
| $R^2$ (adj.) | 0.754 | 0.724 | 0.698 | 0.705 | 0.697 | 0.752 |
| S. E. X 100 | 2.157 | 2.275 | 2.392 | 2.365 | 2.395 | 2.203 |

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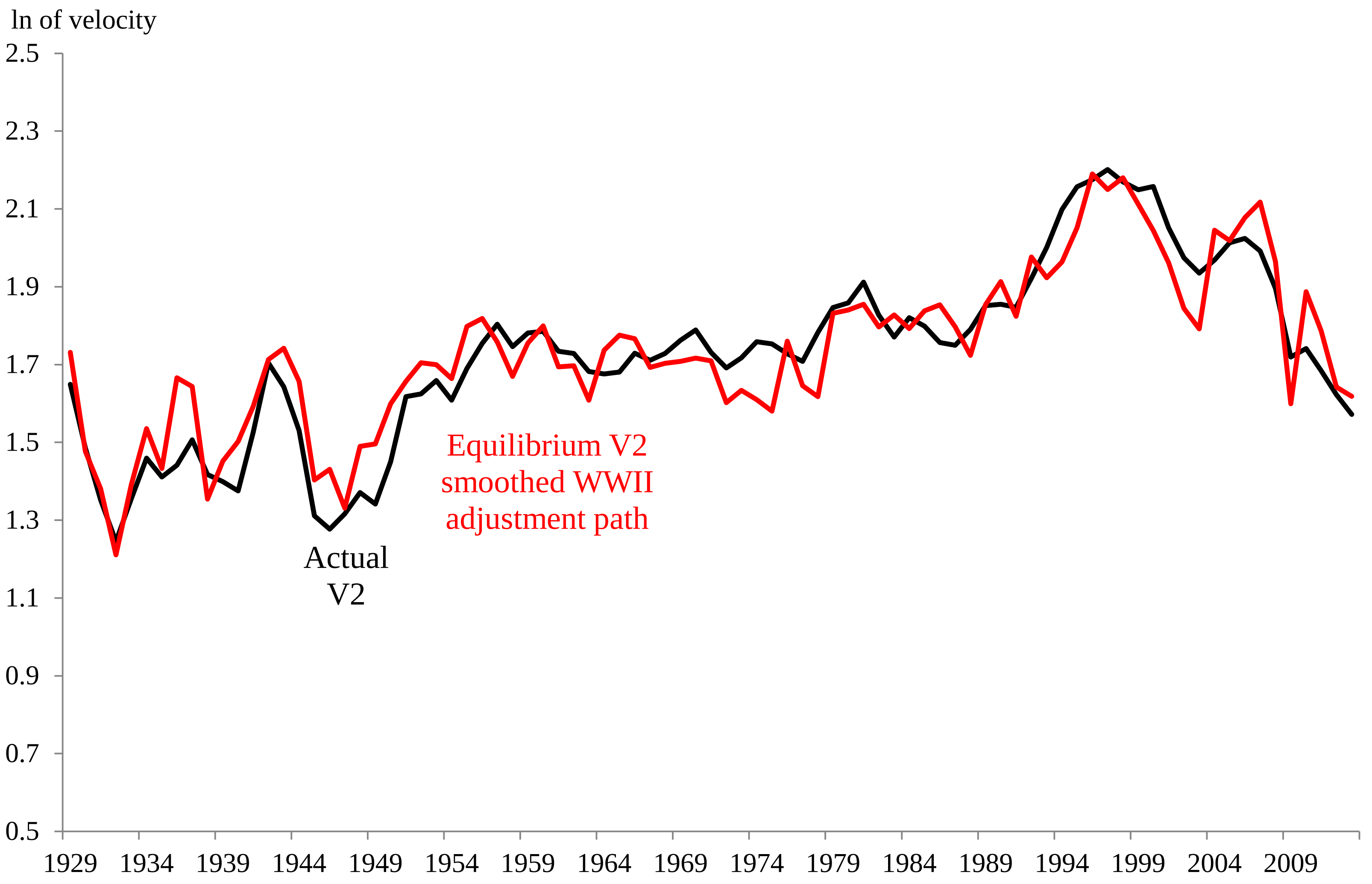
| Constant | 0.854 | 0.854 | 0.850 | 0.542 | 0.491 | 0.870 |
| *OC* | $0.033^{**}$ (3.54) | $0.033^{**}$ (3.20) | $0.032^{*}$ (2.59) | 0.022 (0.66) | 0.042 (1.42) | $0.025^{+}$ (1.78) |
| *Sload* | $-0.183^{**}$ (11.37) | $-0.186^{**}$ (9.35) | $-0.175^{**}$ (8.11) | | | $-0.187^{**}$ (2.86) |
| *BaaTR* | $-0.091^{**}$ (3.88) | $-0.094^{**}$ (3.68) | $-0.105^{**}$ (3.36) | -0.053 (0.53) | | $-0.091^{**}$ (2.75) |
| **Unique, Sign. Cointegrating Vector?** | **Yes**$^{**}$ | **Yes**$^{**}$ | **Yes**$^{**}$ | **No** | **Yes**$^{*}$ | **Yes**$^{**}$ |
| $EC_{t-1}$ | $-0.315^{**}$ (5.31) | $-0.316^{**}$ (4.98) | $-0.281^{**}$ (4.68) | $-0.096^{**}$ (3.61) | $-0.102^{**}$ (3.37) | $-0.288^{**}$ (4.65) |
| $R^2$ (adj.) | 0.754 | 0.724 | 0.698 | 0.705 | 0.697 | 0.752 |
| S. E. X 100 | 2.157 | 2.275 | 2.392 | 2.365 | 2.395 | 2.203 |

# Econometric Results in Table 1 (continued)

- Short-run financial and regulatory event risk variables significant with expected signs:
  - ***OCST* (+)** : higher stock vs. M2 returns lowers M2 and raises velocity
  - ***YC* (+, but insign.)** : steeper Treas. yield curve may induce shifts from M to T bonds.
  - ***DeflationPCE* (-)** : M2 demand rises and V2 falls when deflation occurs
  - ***BankHoliday* (+)** ↓ deposit liquidity ↓$M^d$ and ↑V2
  - ***DumAccord* (-)** restore Fed independence, lowered inflation risk, ↑$M^d$ => ↓*V2*
  - ***DMMDA* (-)** allowed variable int. rate bank accounts, ↑$M^d$ => ↓*V2*
- ***DFA* (-)**
  - Significant, including raises $R^2$ by .075 or by 10 percent.
  - DFA reduces non-commercial bank role in financial system, shifts financial intermediation toward banks that use M2 for funds, by shifting the relative issuance of liabilities (and investment in credit assets) from nonbank debt to deposits, this increases money and ↓ V2
  - Really a long-run variable but hard to test for cointegration because it occurs at end of sample: = .25 in 2010, 1 in 2011-13
  - Divide by EC term and treat as cumulative effect on long-run equilibrium
- l-run equilibrium $V2^*$ adjusted for WWII and DFA lines up well with actual

## Figure 3: M2 Velocity Tracked by Model Incorporationg Financial Innovation and Risk Premia



# Implications: Why Robust—but not Rapid—M2 growth Has Not Induced a Rise in Inflation

6-½ % M2 growth 2006-14 suggests PY growth faster than seen:

$$M \times V = P \times Y$$

Why? Velocity has fallen V = (PY/M).

Think of M as a form of liquidity. When risk in financial markets rises, other assets (stocks, bonds) become less liquid—less reliable stores of value that can readily be changed into money at par value. In crises people shift from nonM2 assets into M2—this portfolio shift does not fuel inflation.

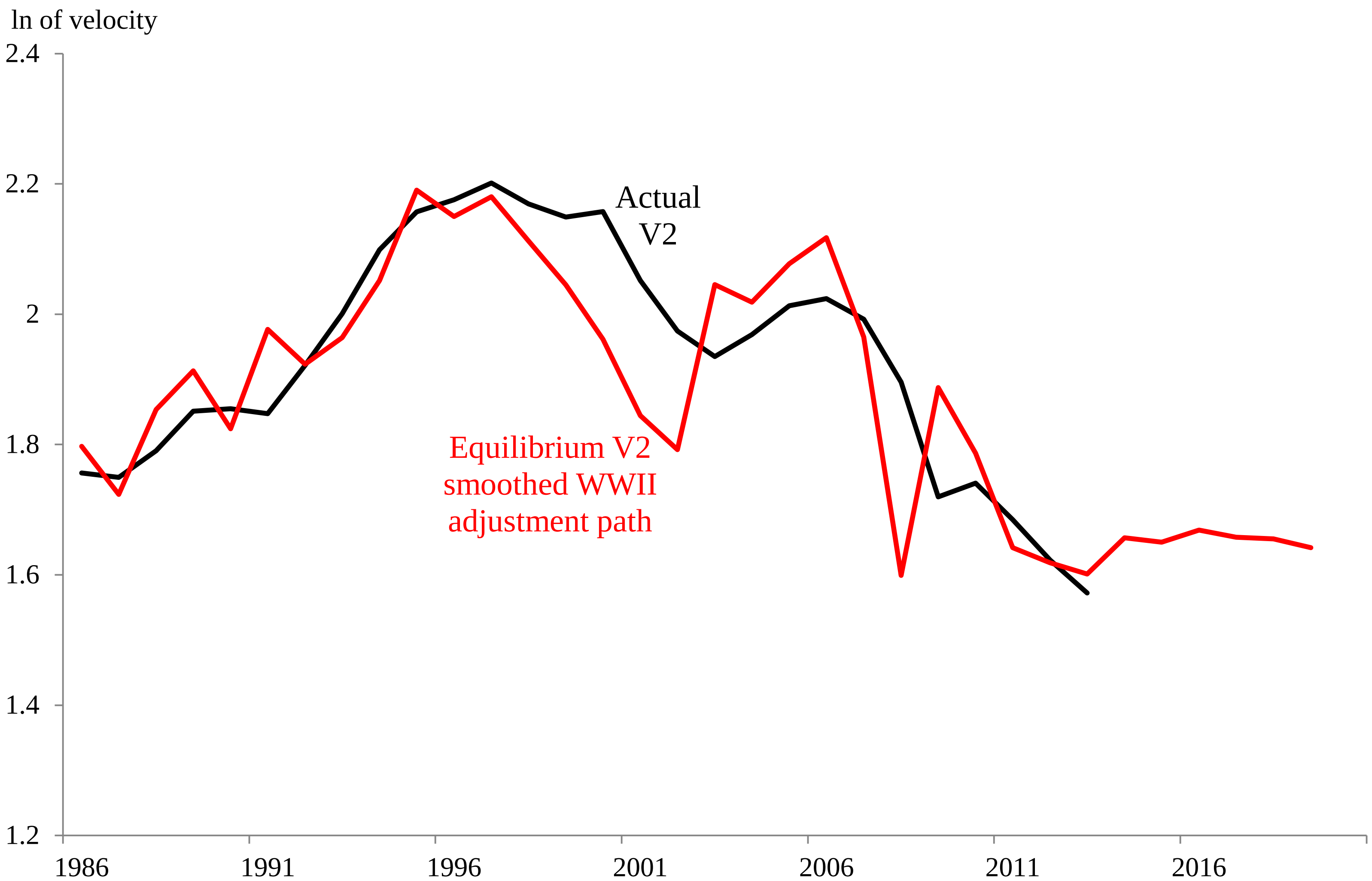
Finanical Innovation affects money demand (velocity that is money relative to nominal GDP) by changing the liquidity of assets that compete with M2 and by making it easier to shift in and out of M2.

Post-Lehman fall in M2 velocity owes to a flight to quality enhanced by financial innovations making it easier to flee securities for M2

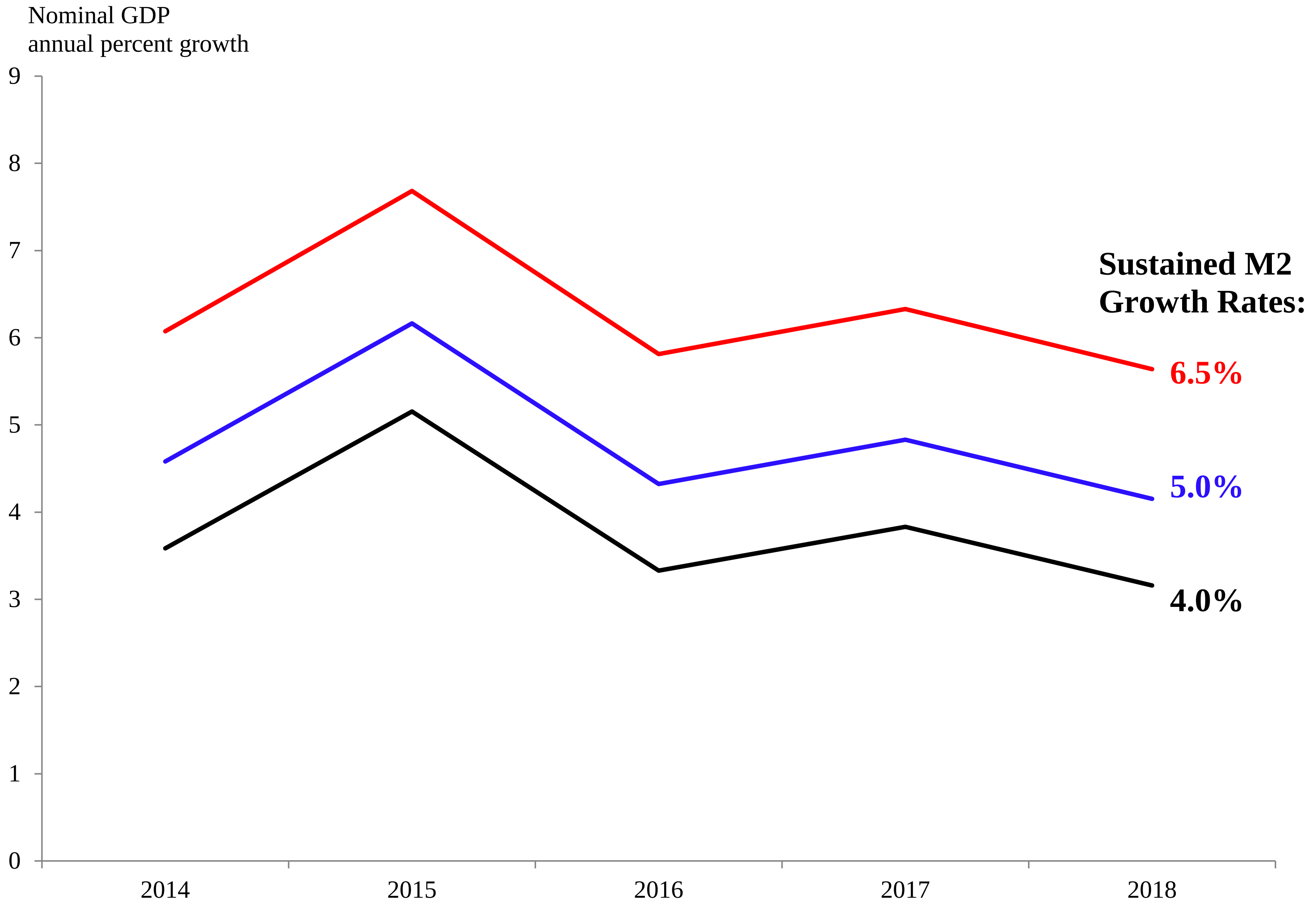
Risk is not just that M may rise as banks lend more excess reserves and push up money multiplier. As risk premia retreat, velocity will rise as people shift out of M2 and back to more normal holdings of stocks and bonds.

We show how to model factors driving M2 velocity, integrating finance.

## Figure 9: M2 Velocity Likely to Stabilize According to Static Simulations



## Figure 10: Nominal GDP Growth Paths Under Different M2 Growth Scenarios

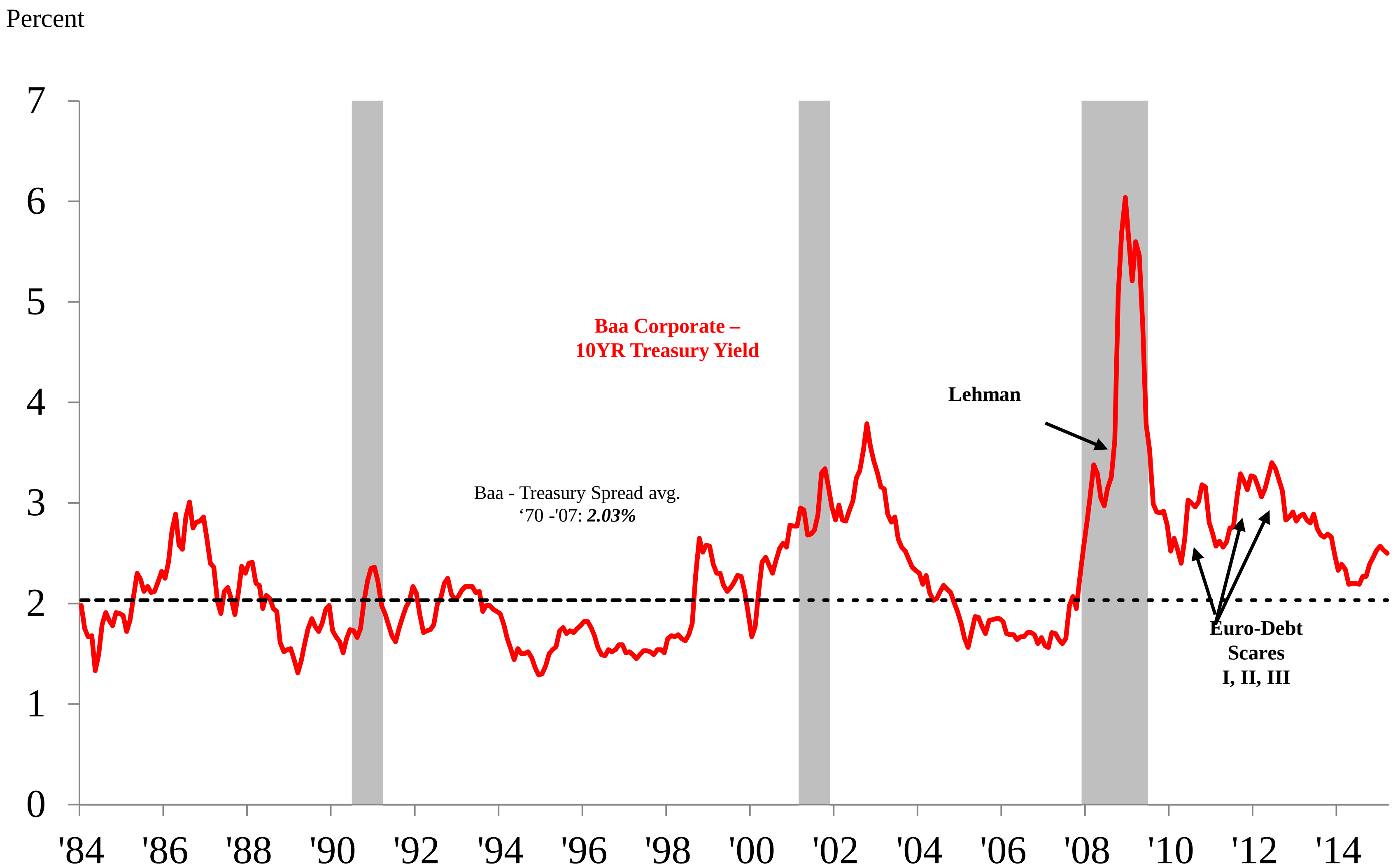


# Conclusion

- Limited history with QE policy, shifting risk premia and the zero lower-bound make it difficult to assess with real interest rates whether a central bank is supplying enough liquidity in a crisis and its aftermath.
- By finding a reasonably stable money demand function, we provide a framework for assessing whether liquidity, in the form of M2 balances, is being appropriately supplied. Our money demand/velocity results imply that central banks need to account not just for how relative rates of return affect liquidity demand, but also for how financial innovations, shifts in liquidity premia, and financial reforms alter the demand for liquidity.
- In financial crises, central banks could stabilize nominal GDP by fully accommodating the higher demand for liquidity from traditional money, but also adjust liquidity supply during the unwinding of financial crises.

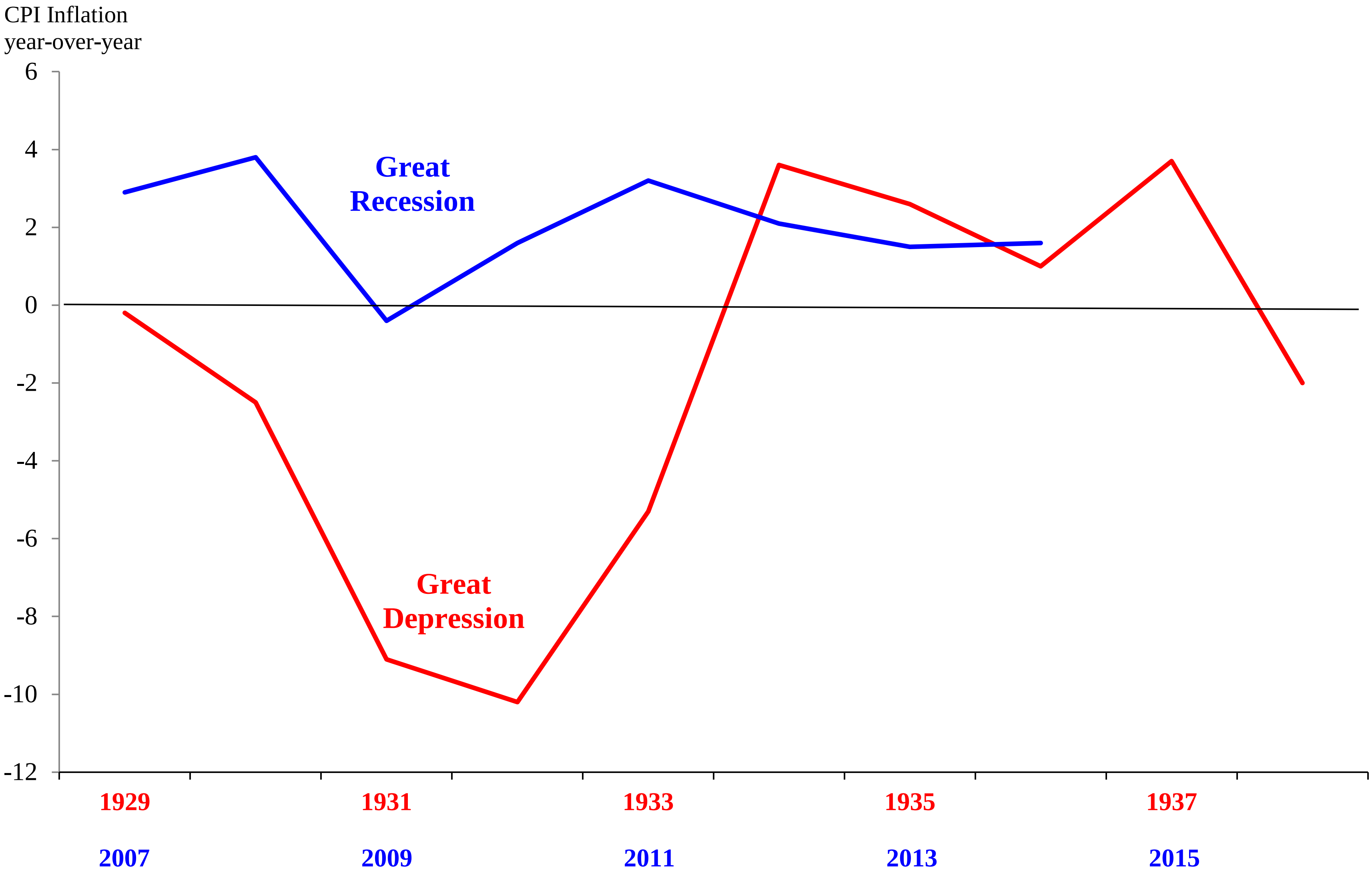
# Back-Up Slides

# Bond Risk Spreads Had Unwound by early 2010 from Depression Highs, Rise on Euro Fears, Now Near Normal

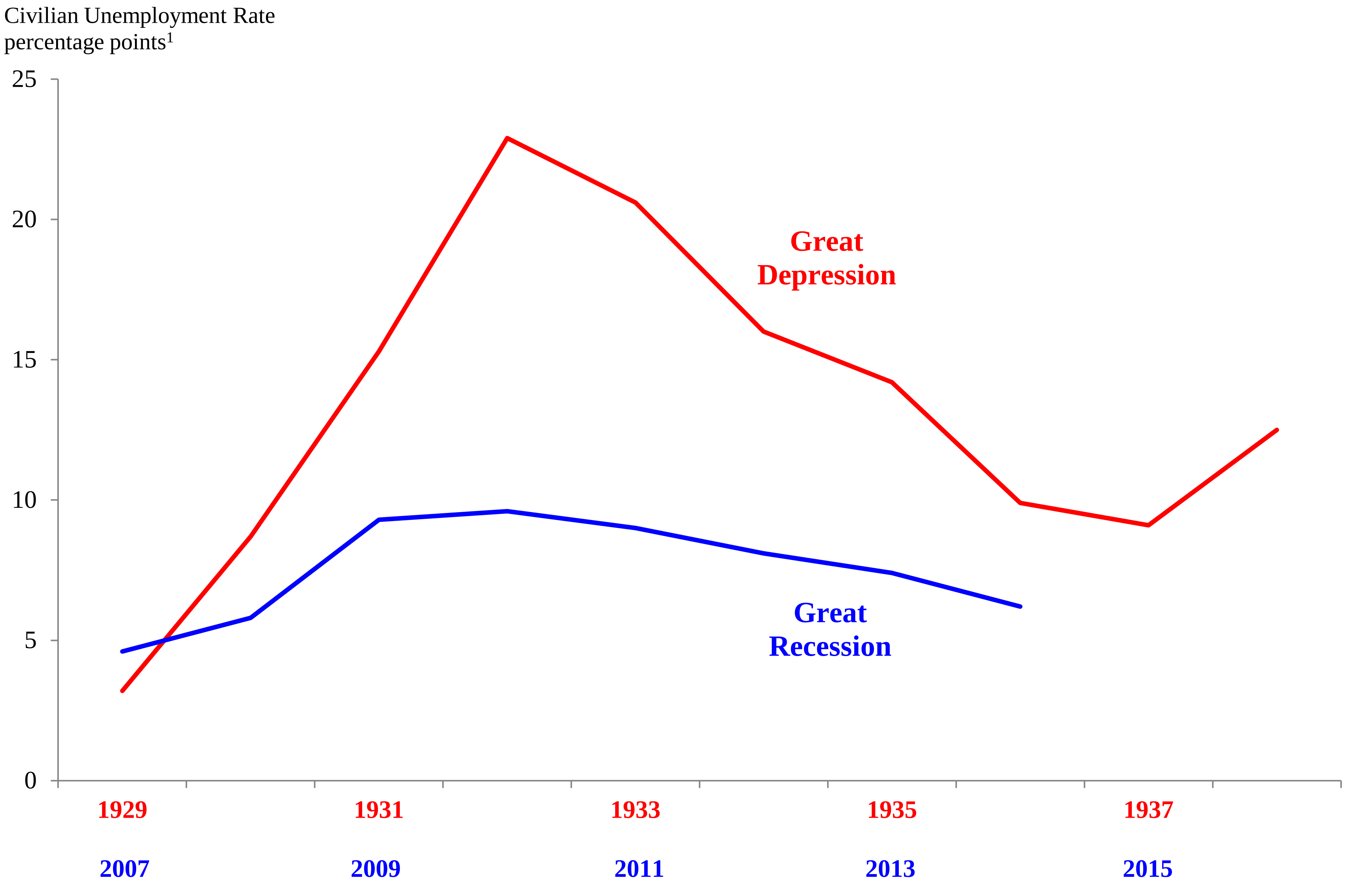



Sources: Federal Reserve and Moody's.

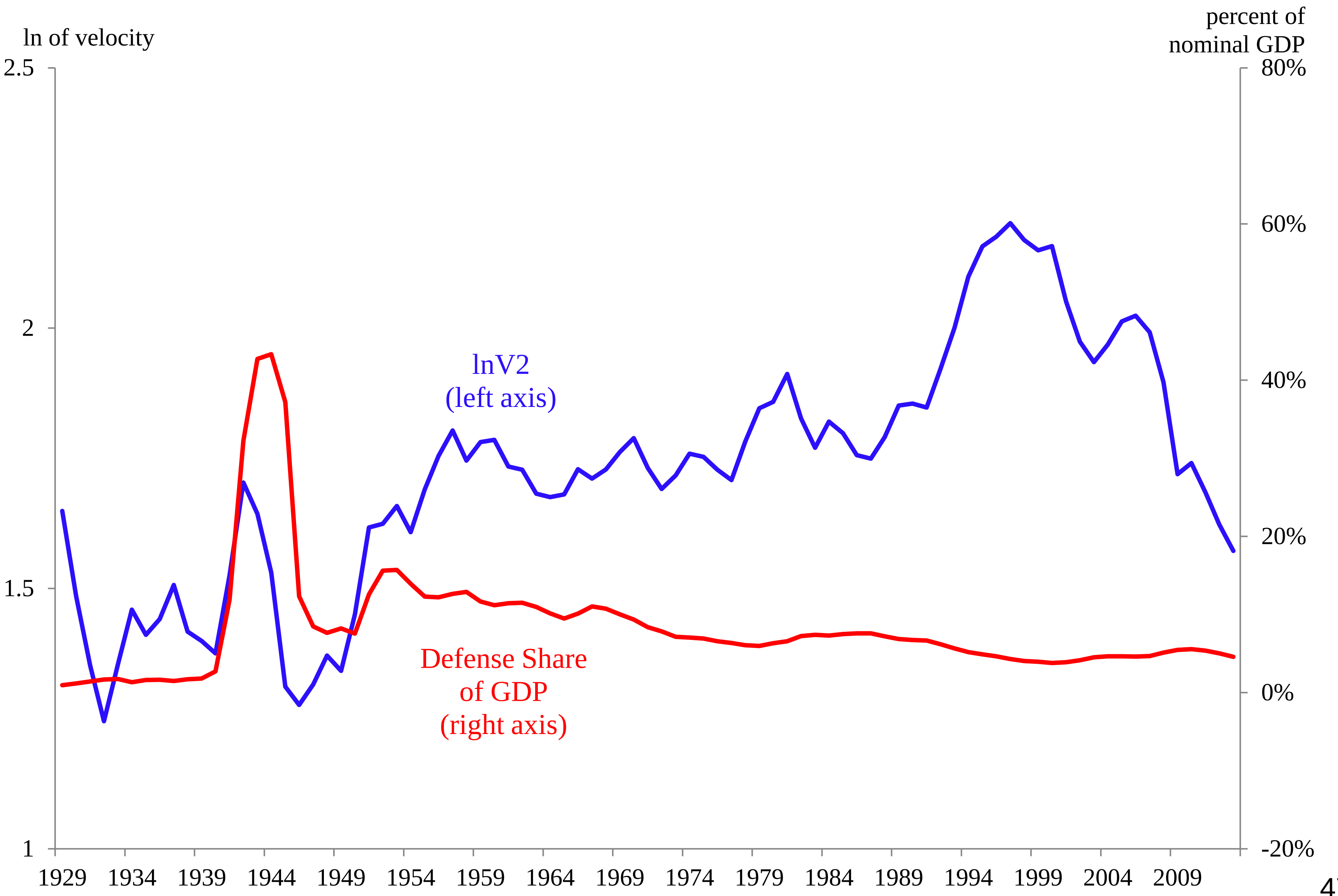
# Figure 3: In Contrast to the Great Depression, the Fed Prevents Substantial Deflation in the Great Recession



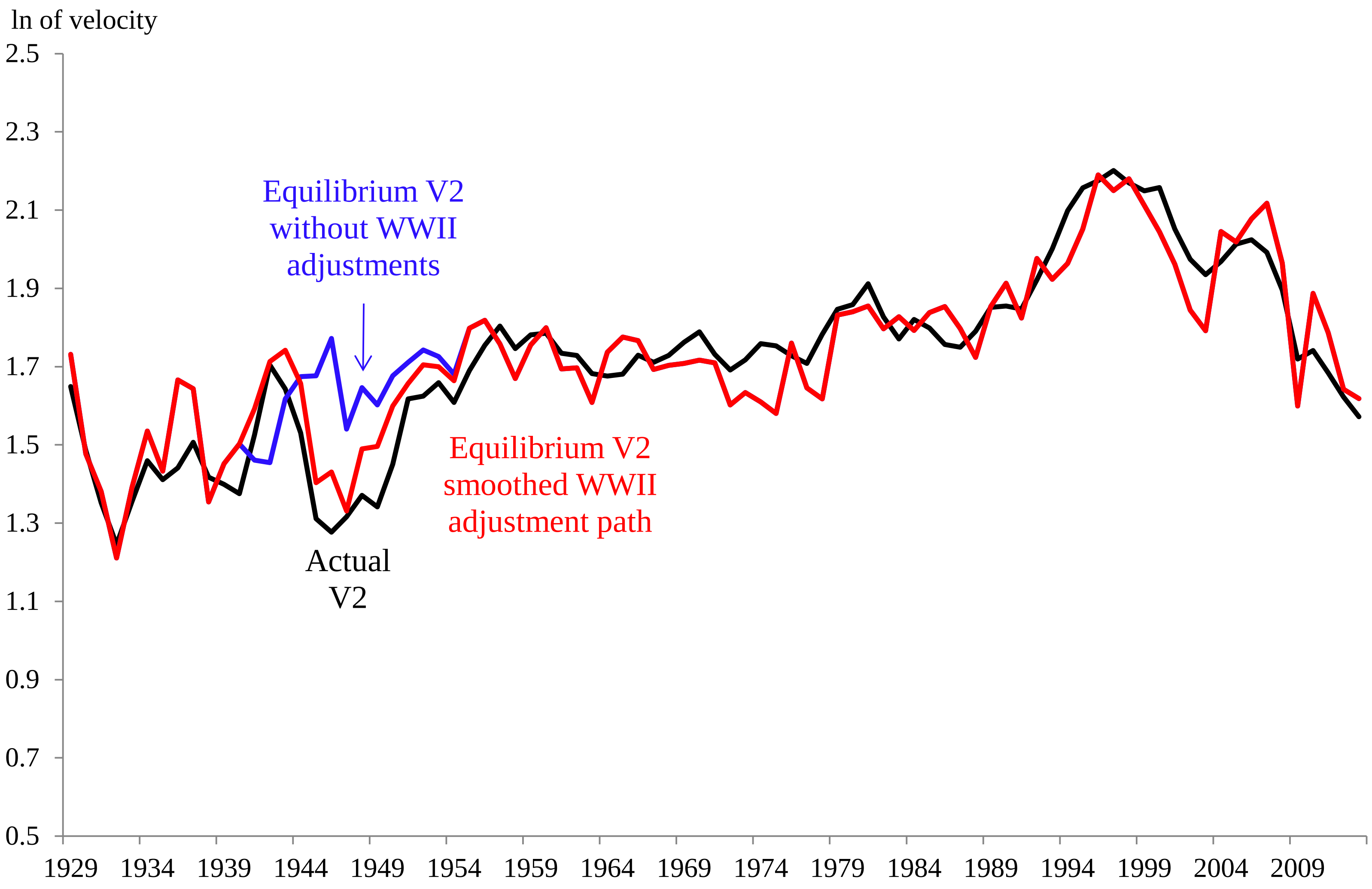
# Figure 4: Unemployment in the Great Depression Rose Far More than in the Great Recession



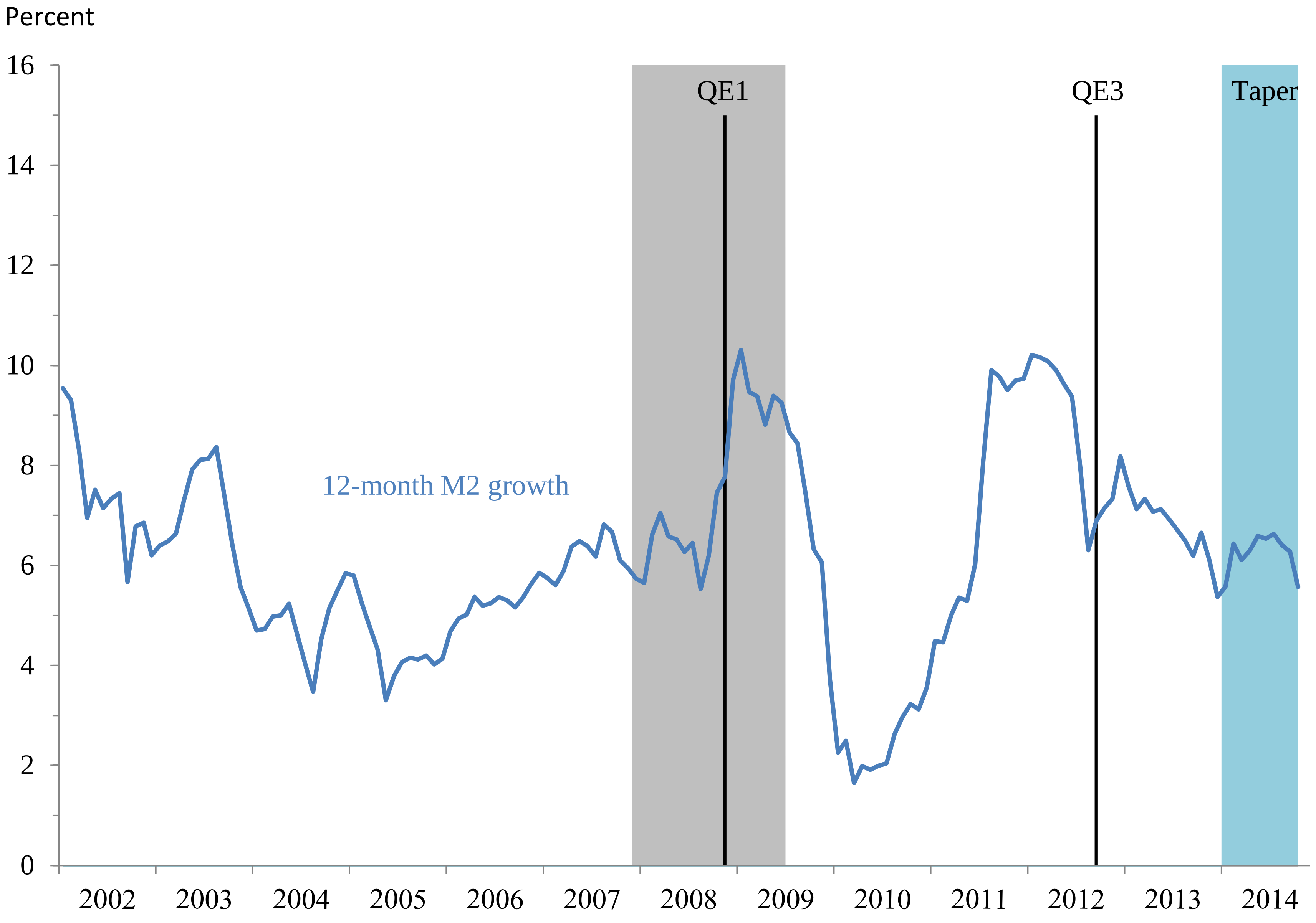
# Figure 4:  M2 Velocity Distorted By World War II



## Figure 3: M2 Velocity Tracked by Model Incorporationg Financial Innovation and Risk Premia



# M2 Growth Decelerating Toward 5 Percent?



# Conclusions

1. There is important substitution between M2 and non-M2 assets (bond and equity mutual funds). Lower mutual fund costs shifted the mean of V2 and raised its sensitivity to risk premia. Time-varying effects on V2 can be reasonably modeled.

2. Consistent with new monetarist and financial engineering views, lower transfer costs raise the moneyness of nonmoney assets, but make them more sensitive to risk premia. In line with I-theories of money, shifts in risk premia and regulatory burden alter V.

3. Results relate to classic disagreement between Tobin's version of Keynes' speculative demand and Friedman. Friedman's view appears to be preferred during the high transfer cost (load) era [his time period]. Tobin's view more relevant now that transfer costs are lower, and portfolio substitution and flight-to-quality effects stronger.

4. If money demand properly accounts for asset transfer costs and refinancing, money might help forecast nominal GDP, a next step.

- Velocity could notably rise when risk premia return to normal
- If M2 growth does not slow, inflationary pressures may emerge
- Caution asset transfer costs could change in other ways, e.g., ETFs

# Basic Monetary Theory and Modeling M2

M2 is strictly dominated in rate of return by non-M2 assets

- Comparing M2-assets and non-M2 assets requires modeling relative liquidity and risk
- We study M2 by exploring the assets "nearest to M2"

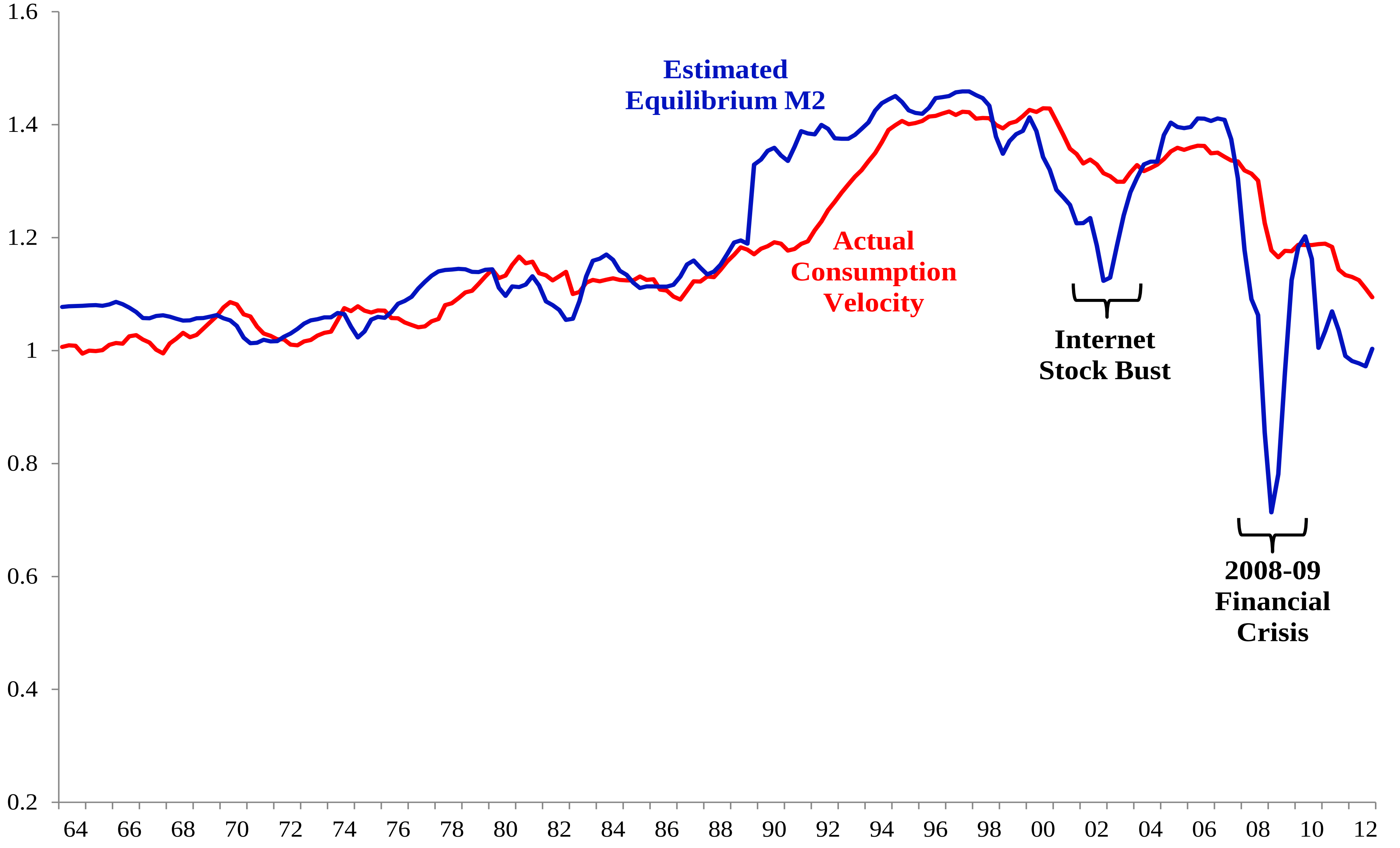
$\Rightarrow$ *transaction costs and uncertainty are paramount*

- M2 components, *with respect to each other*, have minimal transfer/conversion costs.
- Bond and equity mutual funds have higher transfer costs, but are the closest M2-substitute for most people
  - Account minimums allow for modest sized diversified portfolios of stocks or bonds
  - Readily purchased/sold, low default risk
  - Fairly easily understood, often part of larger mutual fund accounts allowing transfers across different funds, e.g., money market mutual funds (MMMFs)

# M2 versus Bond and Equity Mutual Funds

- Fixed costs ("loads") create *zones of inaction*
  - Projected holding period gain < adjustment cost
  - Zones of inaction reduce importance of bond and equity funds for M2 demand
- Width of inaction zone depends on:
  - mutual fund front-end and back-end loads
  - mutual fund net return after service fees
  - own rate of return on M2
- Fixed adjustment costs (mutual fund loads) have fallen steadily for many years
- Fixed adjustment costs are less important the higher is the difference in the rate of return
- Falling adjustment costs increase the importance of a given gap in stock/bond yields vs. money, and thereby increase the sensitivity of M2 to risk premia.

# Figure 9: Regulatory and Load-Adjusted Equilibrium Estimates Line Up Well with Actual Consumption Velocity



# Specifications: Implicit Assumptions

- V2 primarily household transaction driven.  M2 velocity scaled by consumption not GDP:
  - V2 (consumption) less volatile than V2 (GDP)
  - Consumption better tracks permanent income better, less vulnerable to Friedman’s concerns that current income overstated velocity’s volatility
- Long-run shifts in V2 from interaction of the evolution of the cost structure (financial architecture) of household portfolios and the actualization of movements in risk premia
- interactive short-run load terms allow economic-based evolution of term and corporate premia effects on V2

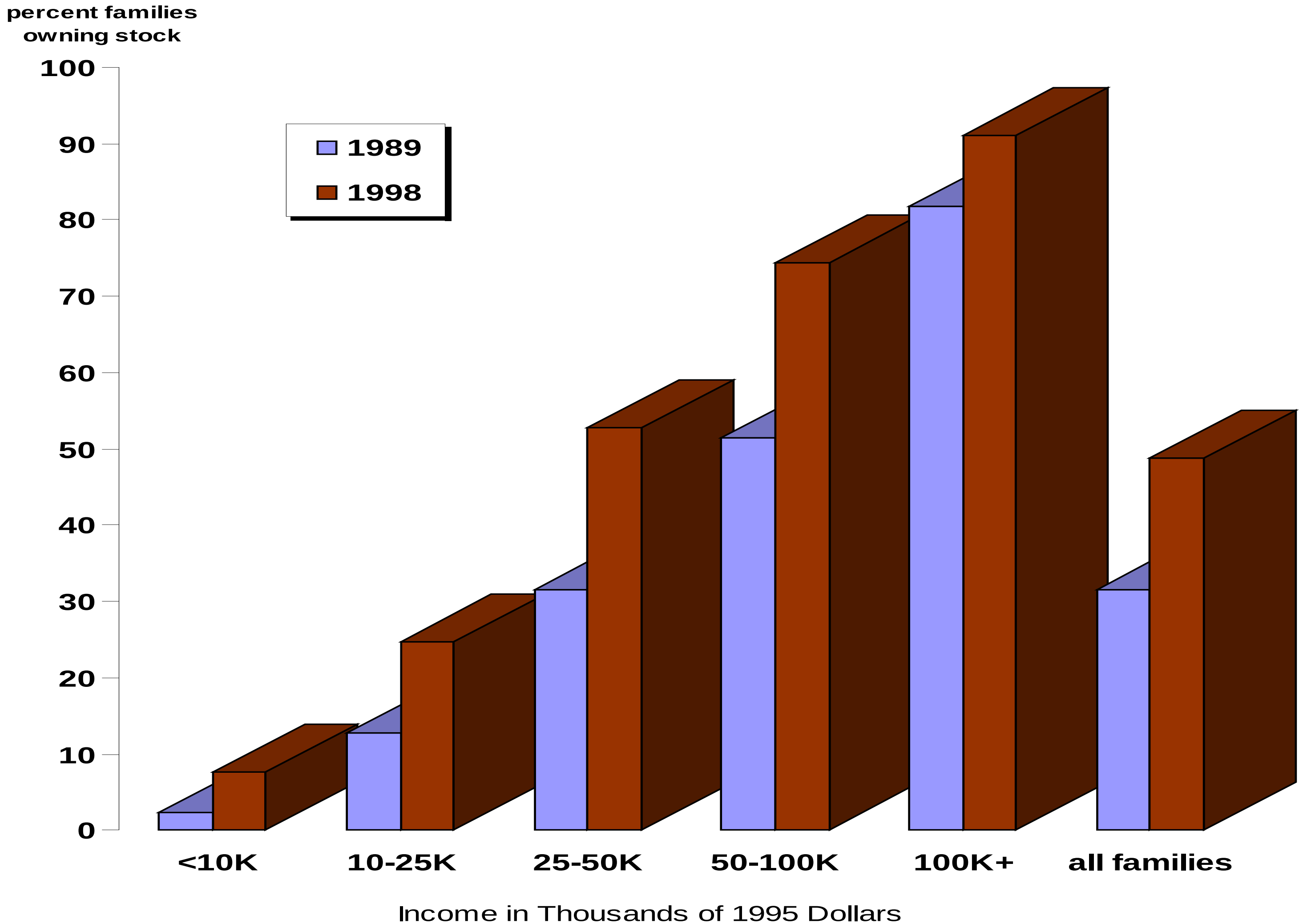
# Roadmap for Future Work

- Update and use direct refinancing effects on M2. More precision will likely raise speeds of adjustment and together with cleaner first differences of lnV2 may improve model estimates.
- Motivate empirical model with more theory and perhaps relate to emerging "new monetarist" and financial fragility literature
- Other diagnostic and robustness checks
  - Structural breaks (e.g., Bai-Perron)
  - Cusum tests, standardized residuals, etc…
  - Estimate recursively to assess parameter stability
- See if the impact of bond return volatility on money demand, a key feature of the Baba, Hendry, and Starr (1992), depends on transfer costs
- Forecast V2
- Try approach on MZM & M2-, likely weak direct load effects, stronger interactive as MZM's very limited as a store of value
- Try approach in a disaggregated M2 framework

# Why Loads May Theoretically Matter as Transfer Costs Affecting Long-Run Money Demand (Velocity)

- Brunner & Meltzer (1967) extension Baumol-Tobin model: proportional costs—not the fixed costs—of transfers matter, and the income elasticity of money demand is unity. Implication: absent changes in transfer costs, short-run velocity is driven by temporary changes in opportunity costs tracked by spreads between T-bill and own yields on M2.
- Proportional transfer costs create zones of portfolio inaction; economics literature: Liu and Lowenstein ('02), Zakamouline (2002); OR/Mgmt literature: Davis & Norman ('90, *Math. of O.R.*), Kamin ('75, *Mgmt. Science*). Implication: changes in transfer costs alter the impact of how the risks and returns on risky assets affect money demand. Lower transfer costs imply sharper reactions of V2 to swings in risk.
- Under CRRA preferences, Liu (2004) finds portfolio shares reflect approximately a negative linear tradeoff between expected return differentials and proportional asset transfer costs. Implies (1) that portfolio shares reflect expected rate differentials scaled by proportional asset transfer costs; and (2) that omitting information on large shifts in transfer costs may give rise to perceived shifts in money demand.

# Stock Ownership Rates Rise Most Sharply Among the Middle Class in the 1990s



# Some Issues about Modeling Financial Innovation

- Technology has produced an almost secular decrease in loads. But, for statistical work, is it better to assume a deterministic trend or a stochastic trend? The trouble with a stochastic trend, as a modeling assumption, is that the chart suggests a very long sequence of negative shocks, which might be implausible. The trouble with a time trend is that the decrease is not very smooth. So: Here is one of our challenges! Financial innovation produces observed data series that do not fit easily into economists' usual modeling practices. A choice must be made as to the best method of modeling the **observed** data.
- One might be tempted to use a Markov switching model to handle a shift up in V2 in the early 1990s and the recent downshift. But switches really don’t happen out of the blue. There were large increases in banking sector productivity that lead and are cointegrated with mutual fund loads. And the two asset bubbles of the 2000s had something to do with the run-up of the Baa-TR spread. Our paper implies that switching models are not needed to model V2 if the right variables and specifications are used.