# Revenue forecast (in)accuracy amidst economic recovery

*Prepared for a presentation to a joint informational briefing of legislative finance committees, Hawaii State Capitol*

January 5, 2010

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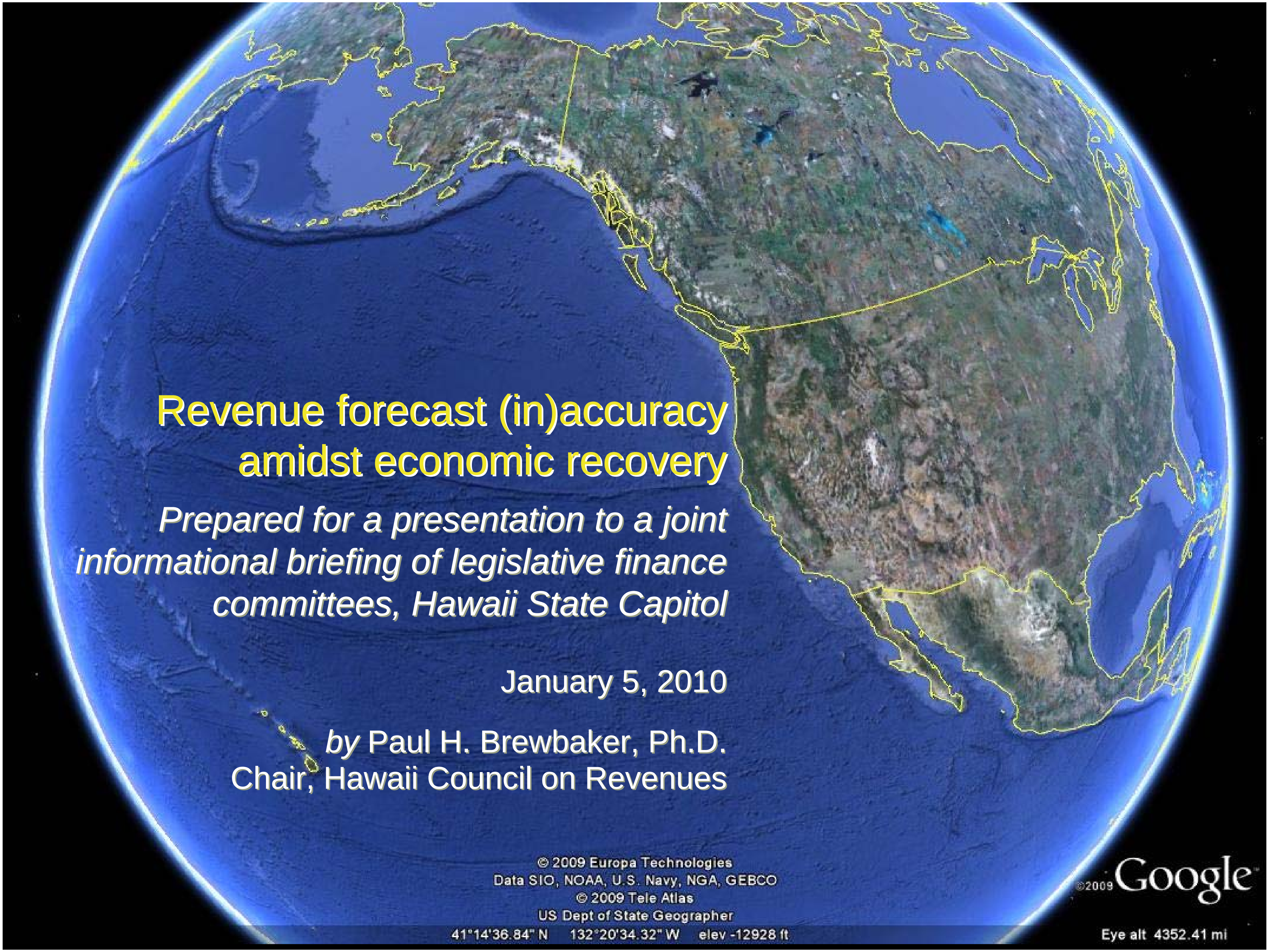
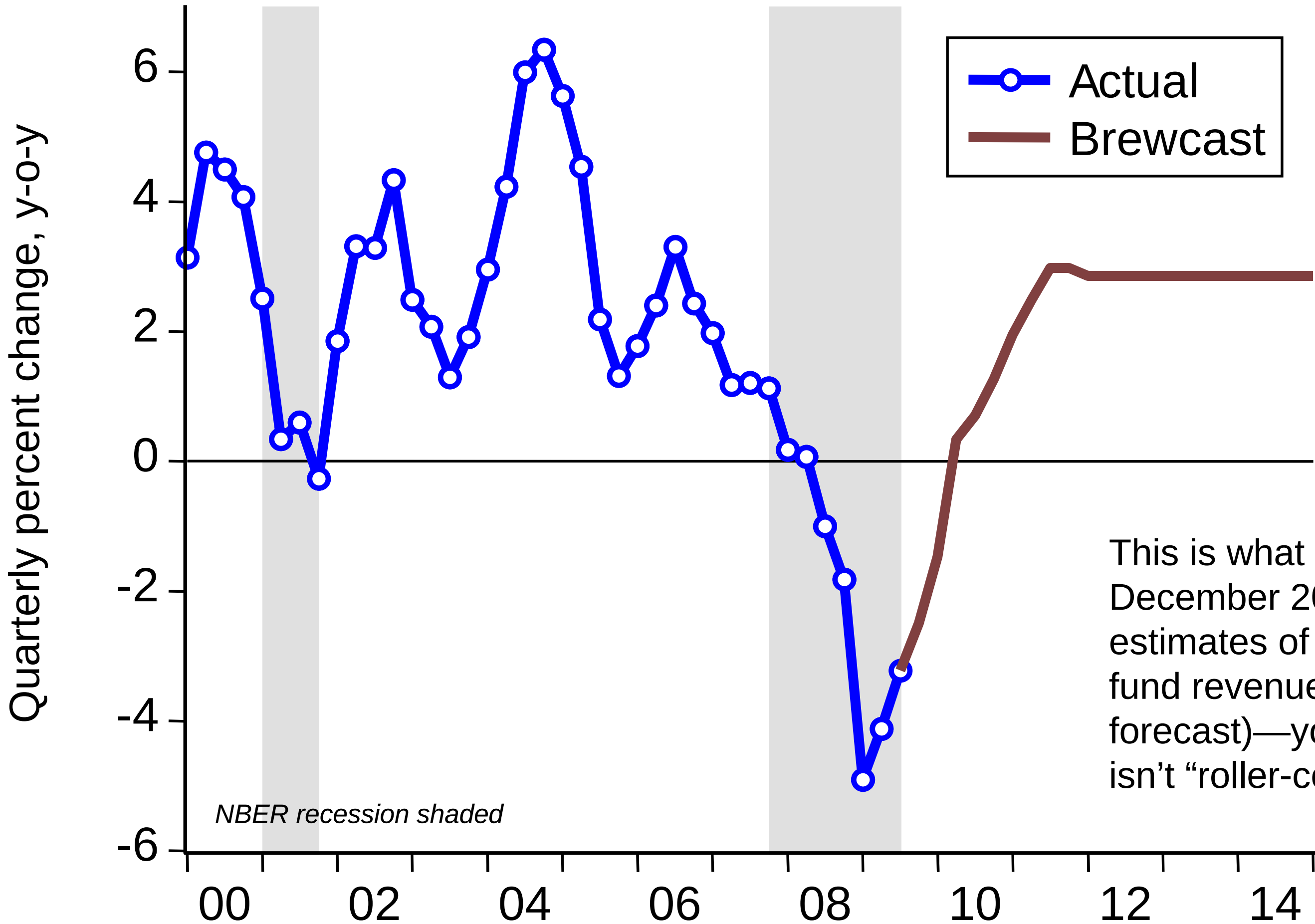
Chair, Hawaii Council on Revenues



# 1. Macroeconomic forecasts for 2010

# One Hawaii real personal income growth forecast

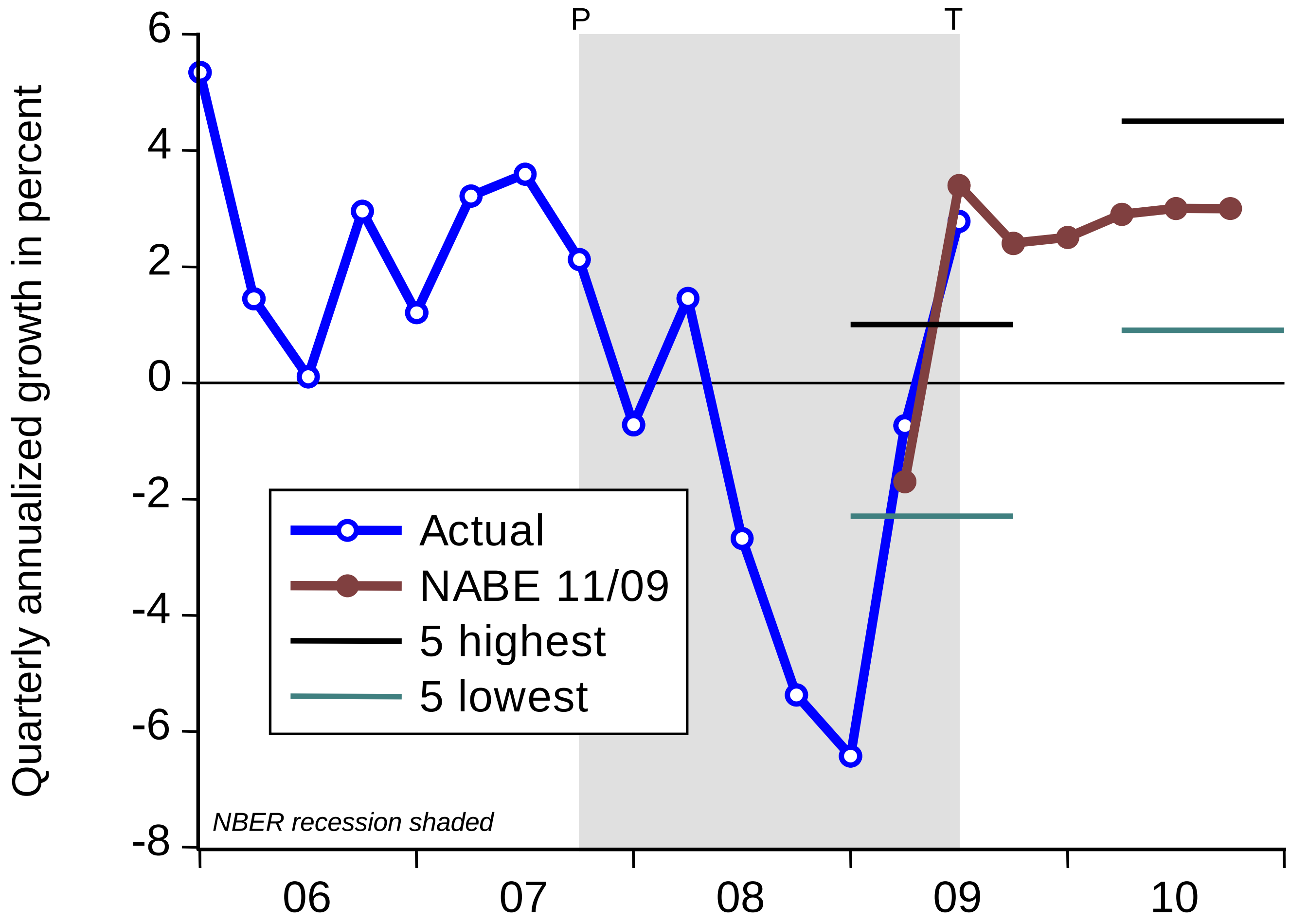



This is what I used for my own December 2009 forecast estimates of Hawaii real general fund revenues (plus an inflation forecast)—you can see that it isn't "roller-coastery" enough



*Source*: Bureau of Economic Analysis; TZ Economics

# Recent U.S. real GDP forecasts fairly optimistic



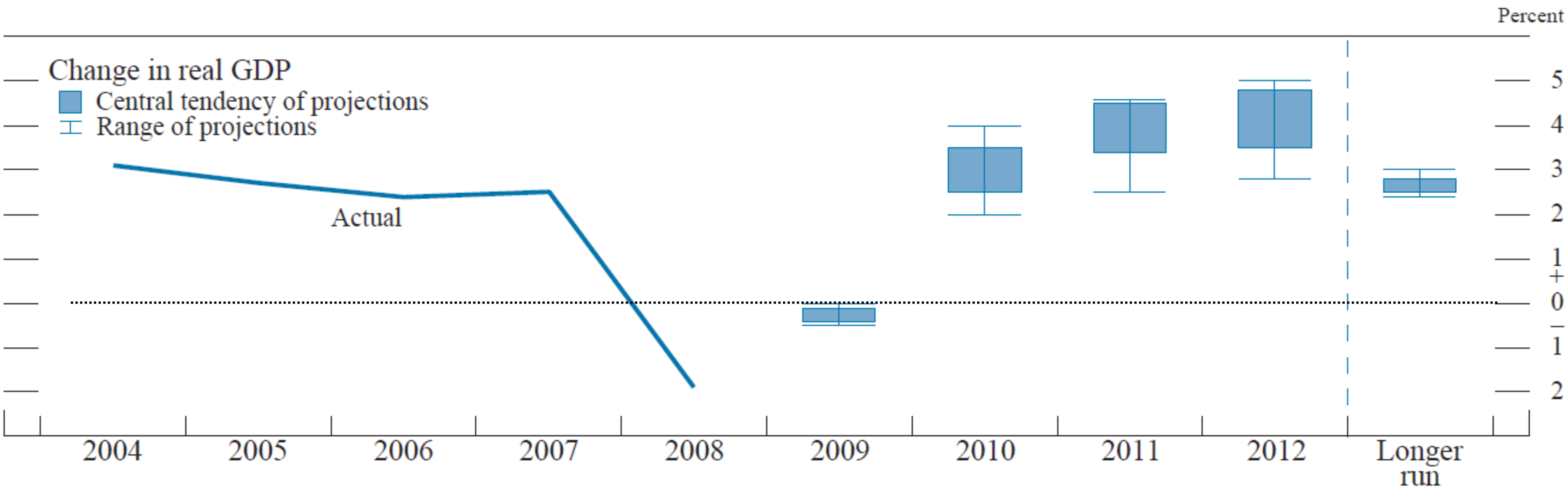

U.S. real economic growth forecasts anticipate real U.S. GDP growth in 2010 at around its long-term potential trend growth rate, following a deep 2008-09 recession



*Source*: Bureau of Economic Analysis, National Association for Business Economics

# Federal Reserve real GDP growth forecasts

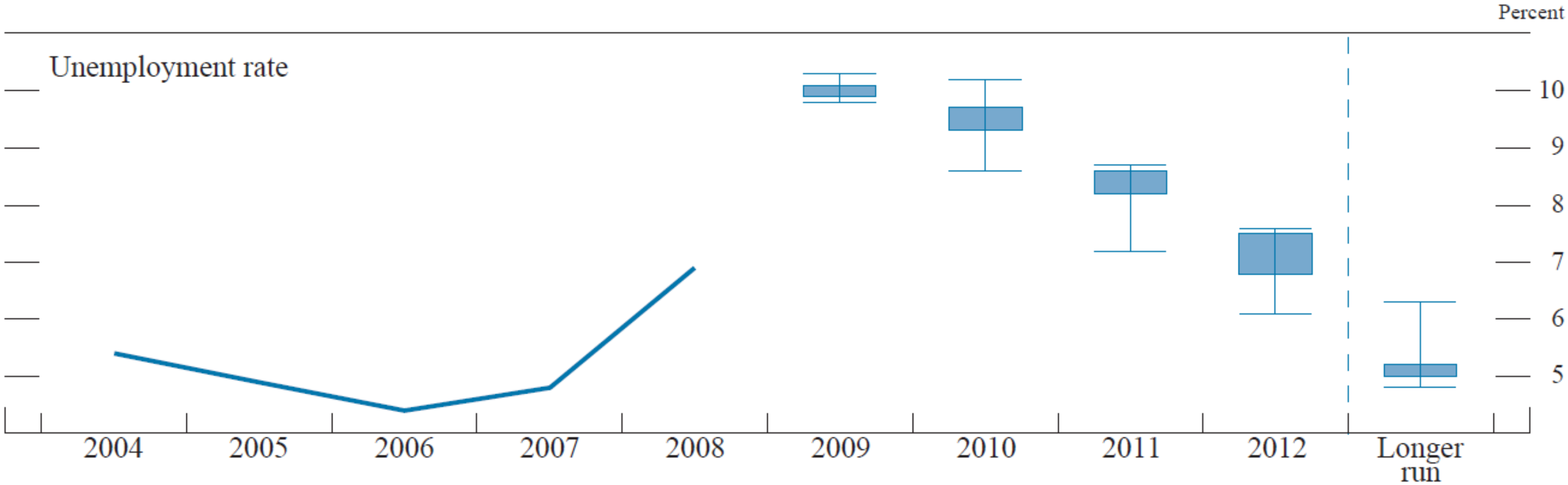
Figure 1. Central tendencies and ranges of economic projections, 2009–12 and over the longer run






Source: Minutes of the November 3-4, 2009 meeting of the Federal Open market Committee (http://www.federalreserve.gov/monetarypolicy/files/fomcminutes20091104.pdf)

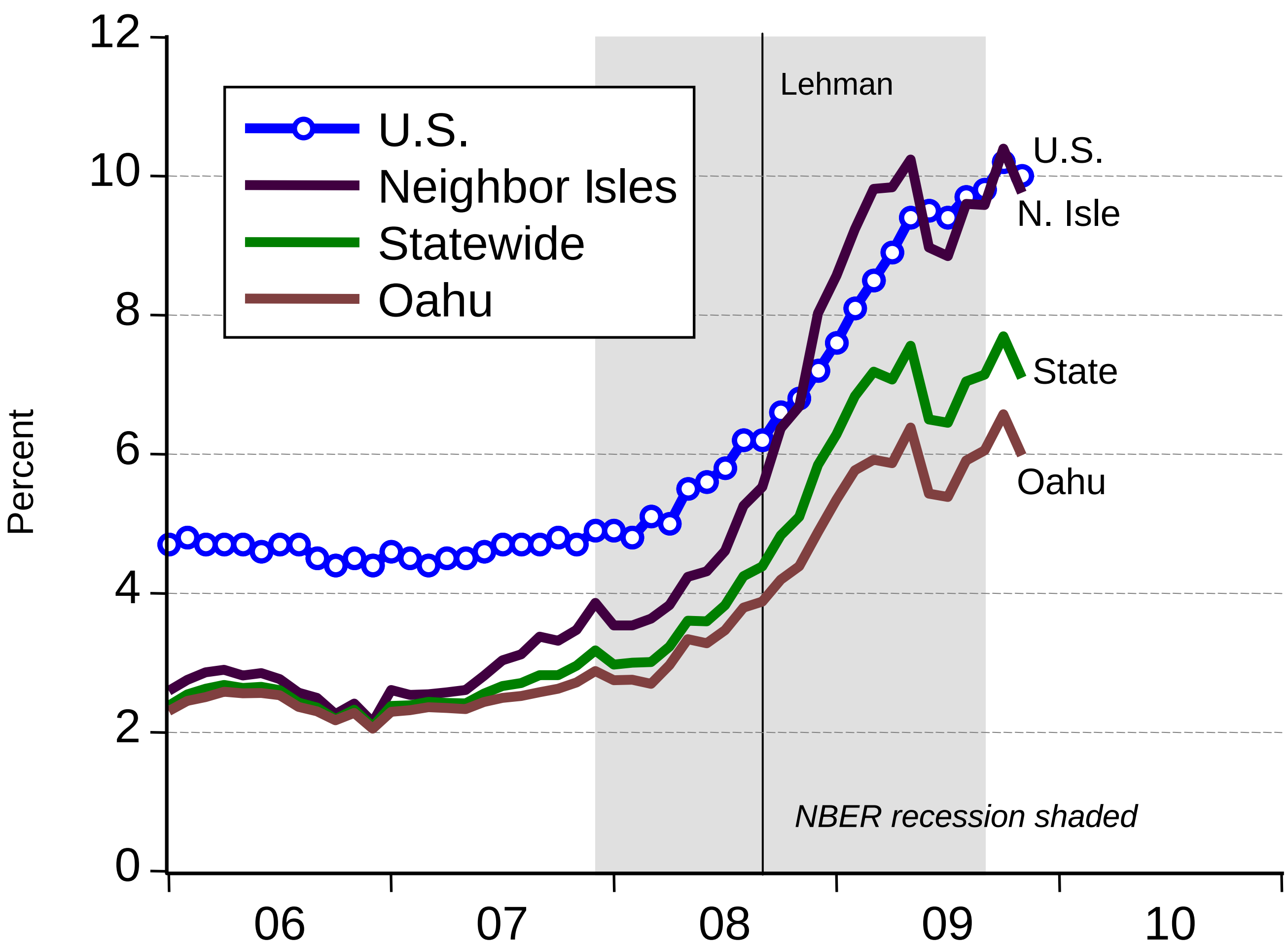
# Federal Reserve unemployment rate forecasts






Source: Minutes of the November 3-4, 2009 meeting of the Federal Open market Committee (http://www.federalreserve.gov/monetarypolicy/files/fomcminutes20091104.pdf)

# Hawaii unemployment rates stabilized

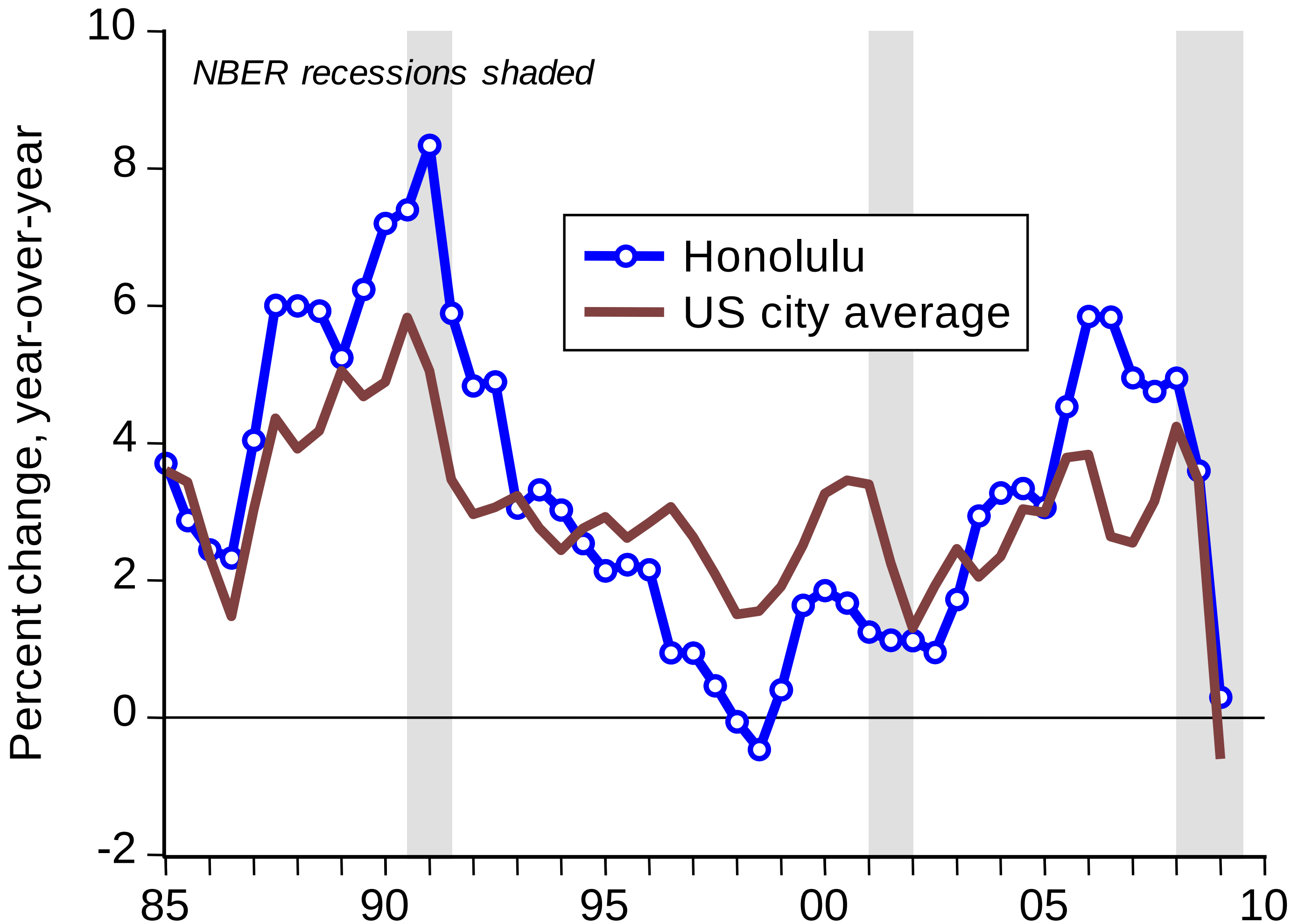



Hawaii did not lag, it *led* going into this recession. Neighbor Islands' economies went from matching Oahu (for the first time in history) to worse than the nation. Oahu has among the lowest unemployment rates nationwide.



*Sources*: Hawaii DLIR; calculations by TZE

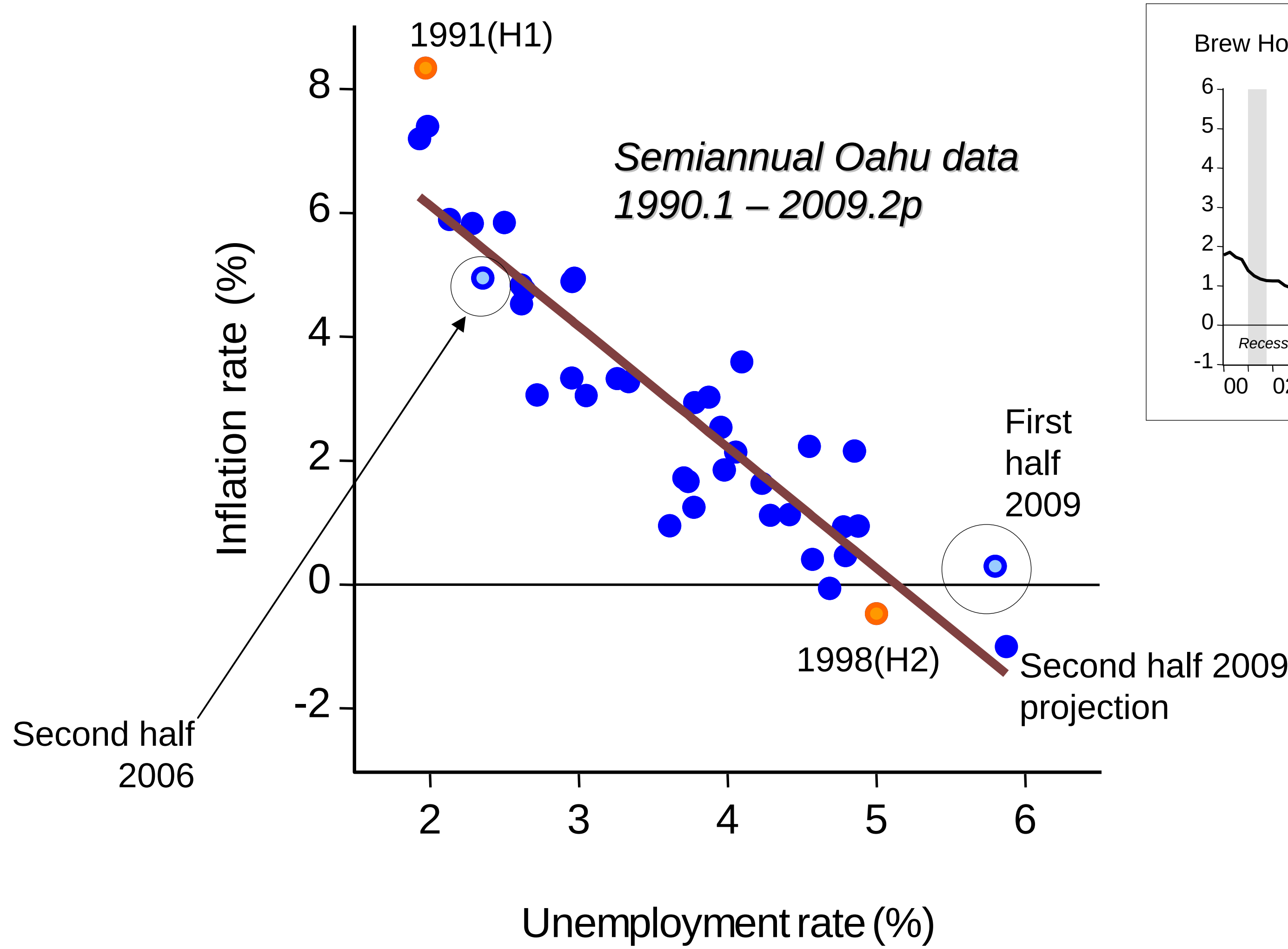
# Inflation dropped hard and fast; no threat

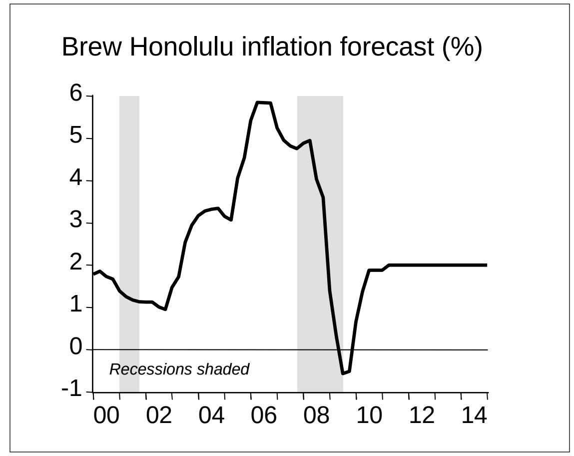



Slide copyright TZ Economics

*Source*: Bureau of Labor Statistics; Honolulu is a semi-annual index these data include August 14, 2009 release

# Hawaii inflation vs. unemployment trade-off



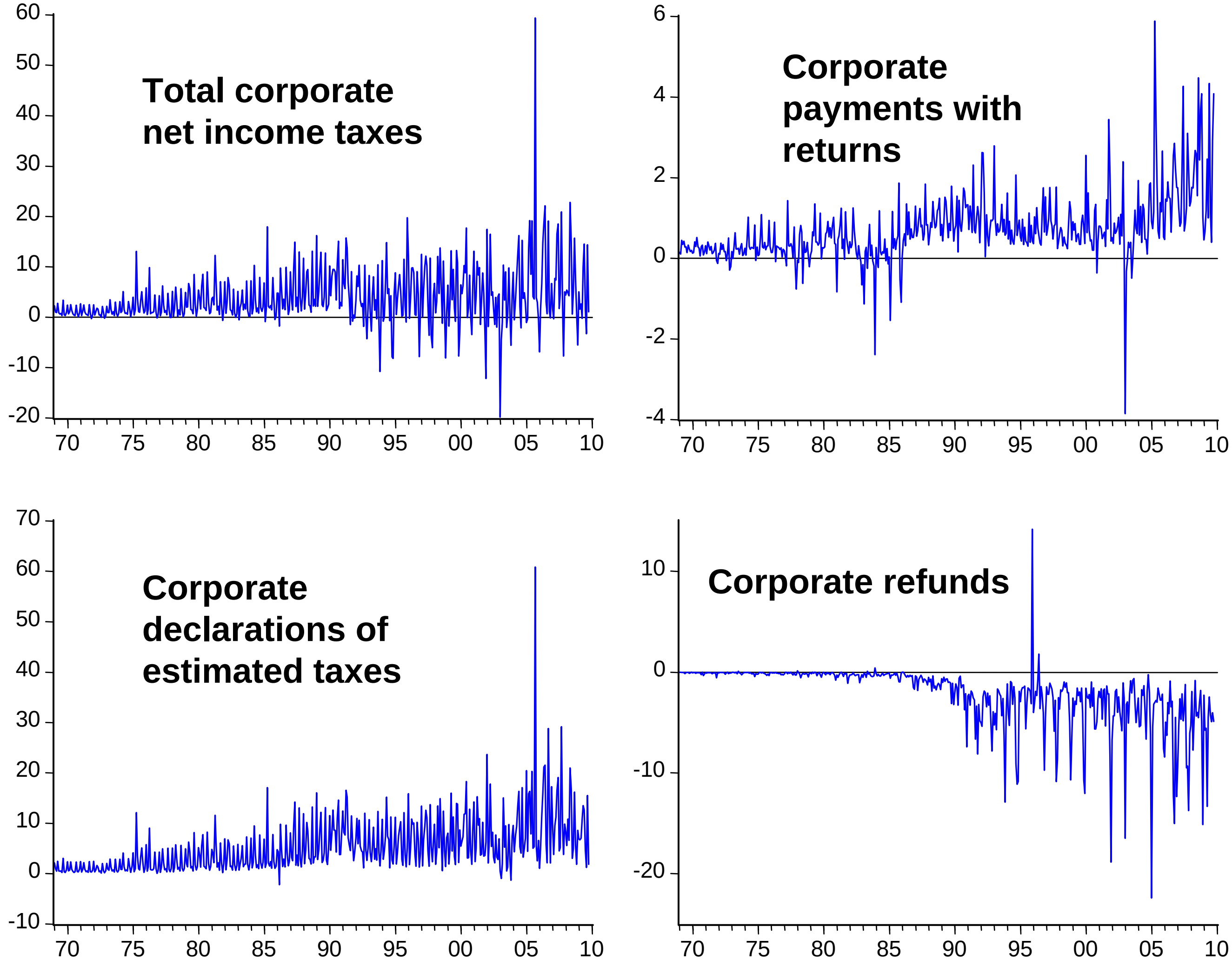



*Source*: Bureau of Labor Statistics, U.S. Department of Labor; seasonal adjustment by TZE

# 2. Forecasting Hawaii general fund revenue growth

# Components: corporate income taxes

All data monthly in million current dollars

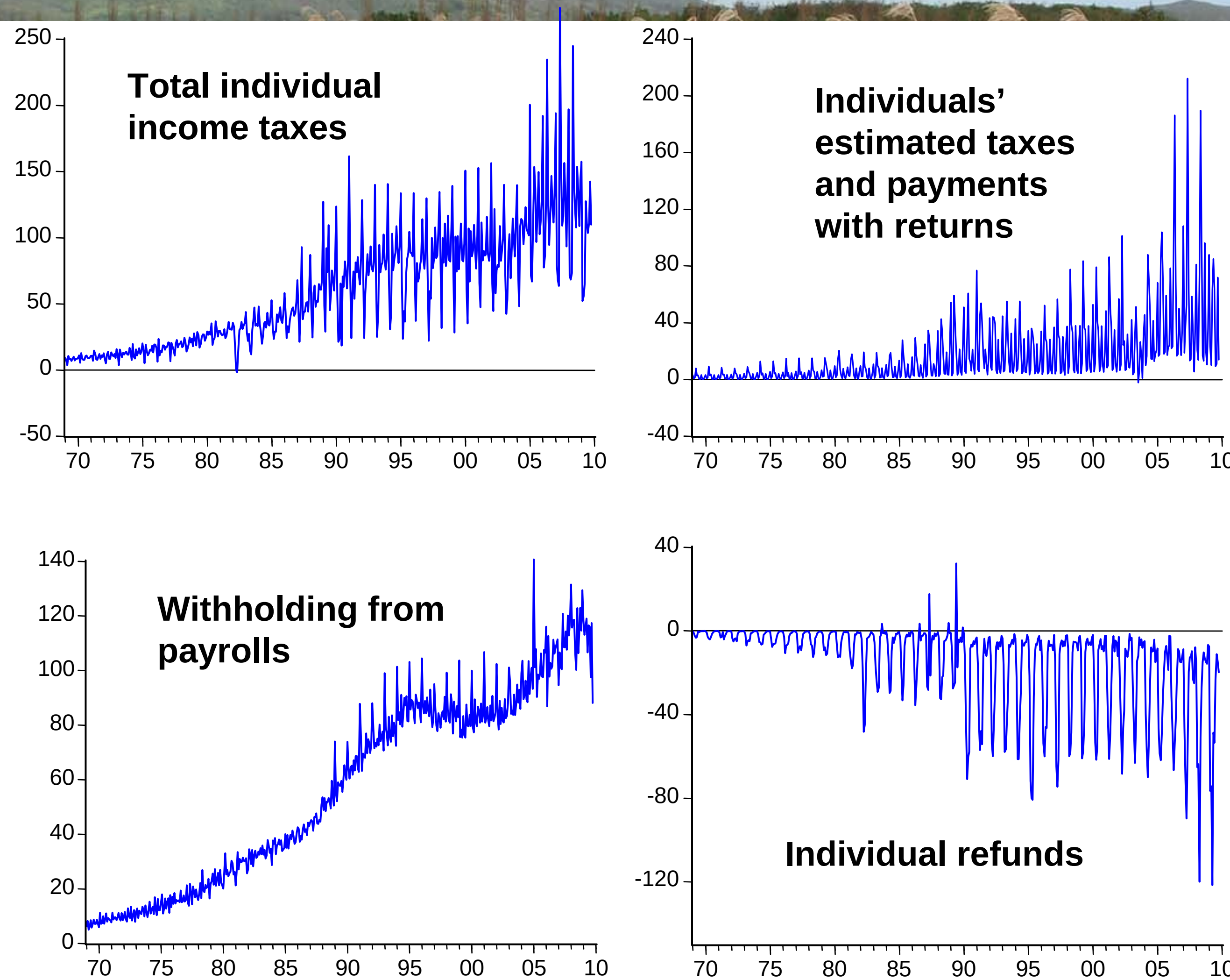





*Source*: Hawaii Department of Taxation, Hawaii DBEDT; TZ Economics

# Components: individual income taxes

All data monthly in million current dollars

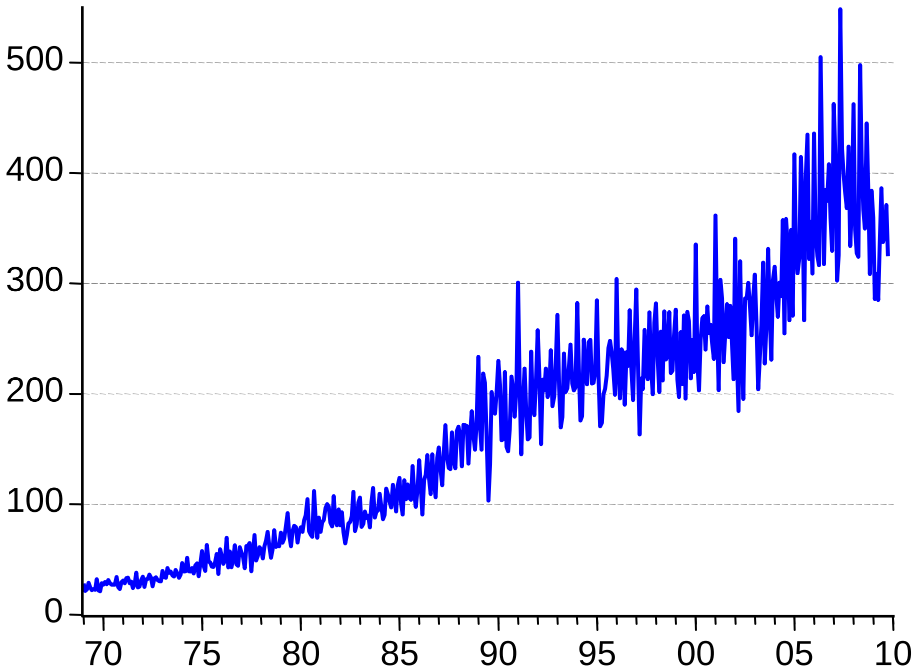




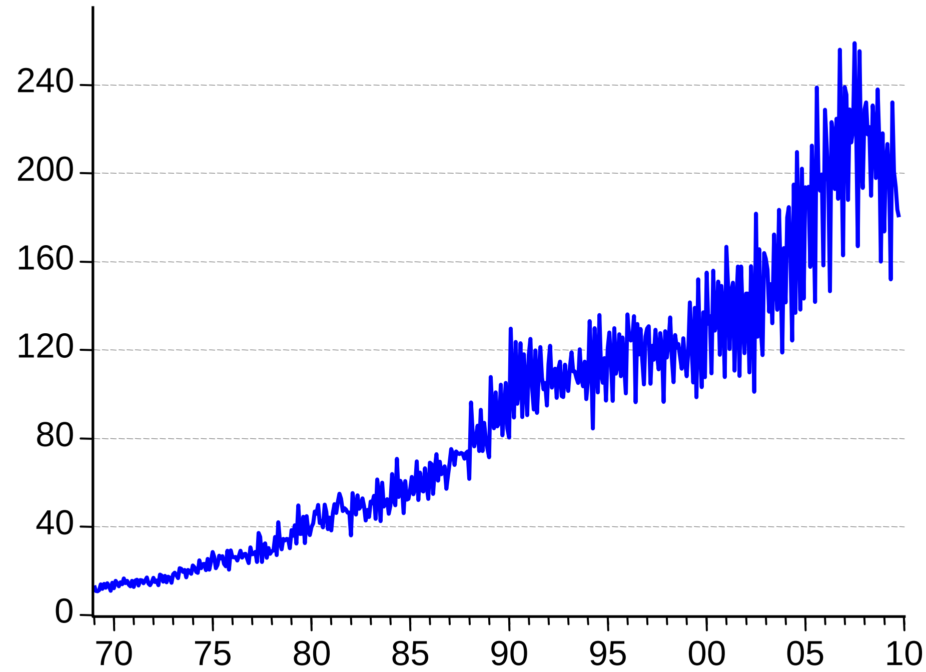

*Source*: Hawaii Department of Taxation, Hawaii DBEDT; TZ Economics

# Components: general fund, general excise taxes

All data monthly
in million current
dollars




Hawaii general fund revenues

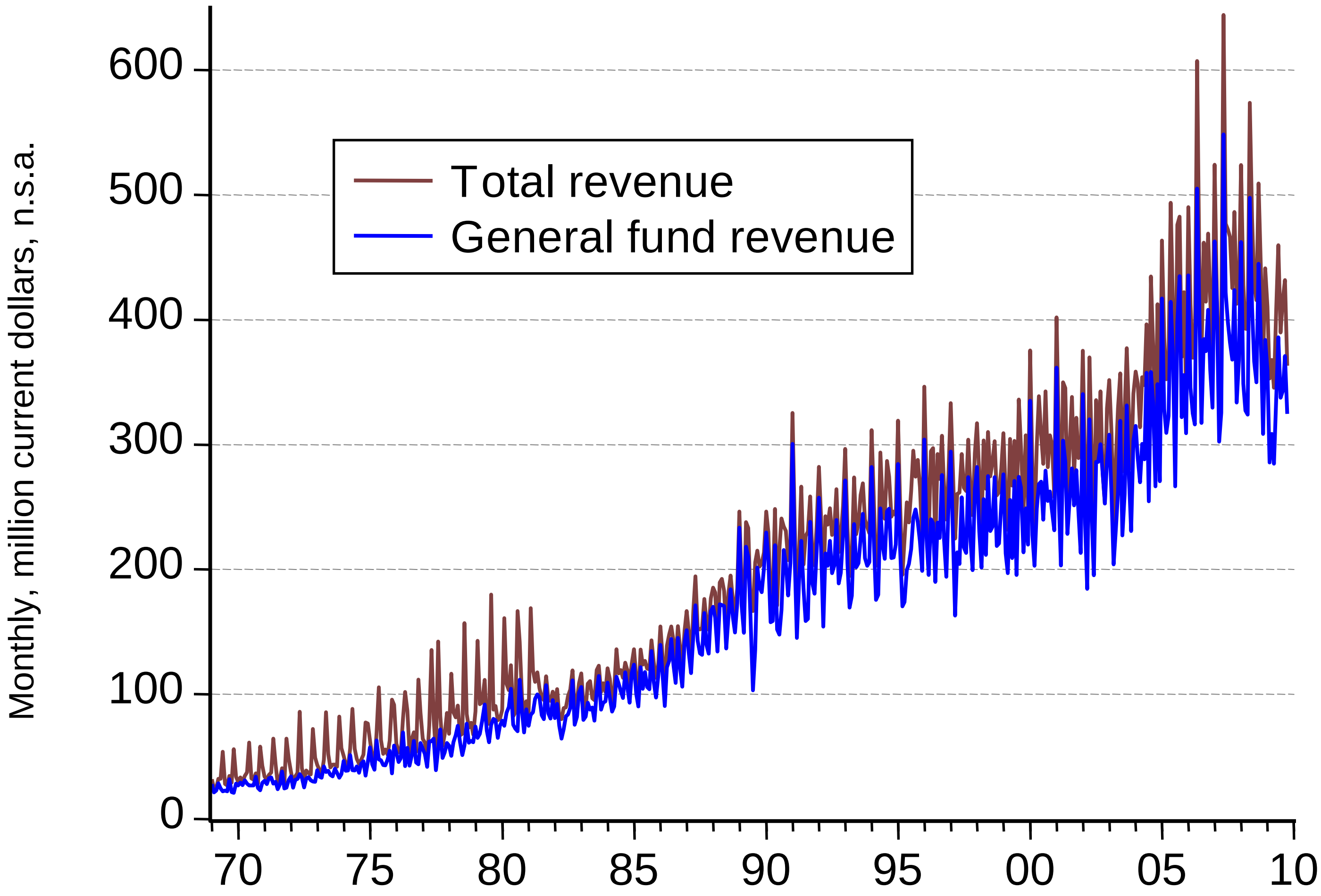



Hawaii general excise tax revenues



*Source*: Hawaii Department of Taxation, Hawaii DBEDT; TZ Economics

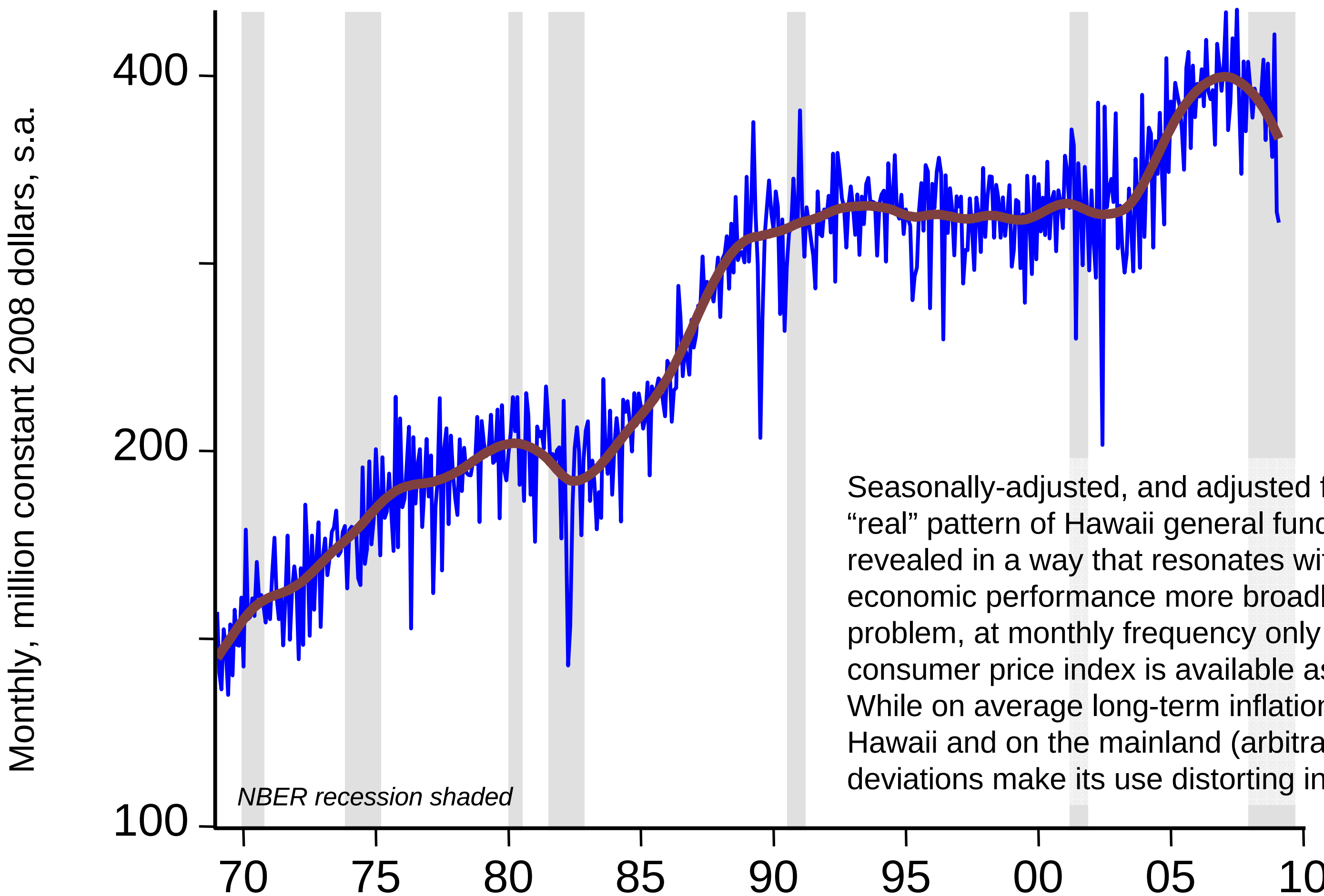
# Total taxes: c. $4.9 billion; general fund c. $4.2 billion






*Source*: Hawaii Department of Taxation, Hawaii DBEDT; TZ Economics

# Real general fund revenue, seasonally-adjusted

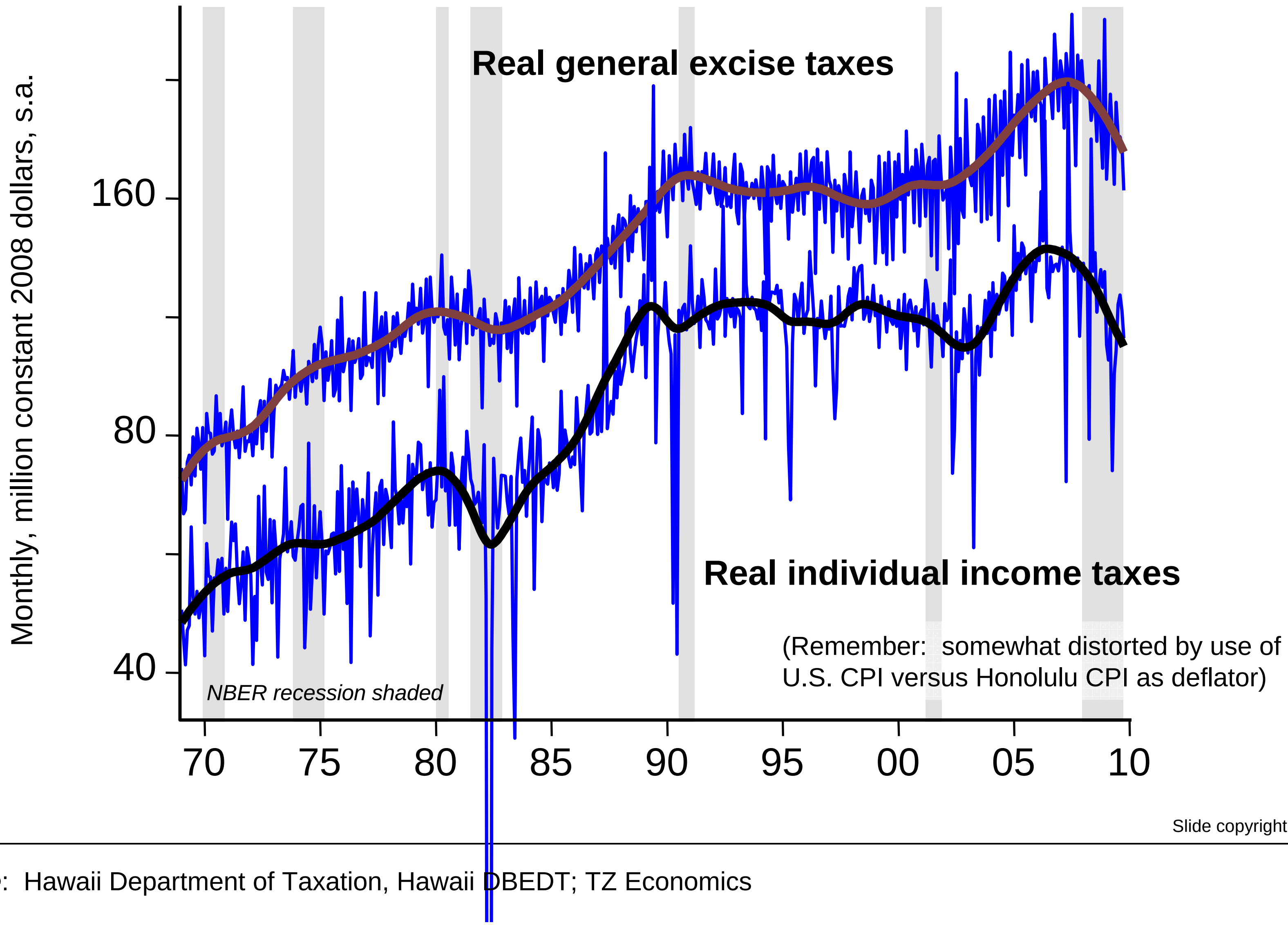



Seasonally-adjusted, and adjusted for inflation, the "real" pattern of Hawaii general fund revenues is revealed in a way that resonates with Hawaii economic performance more broadly. The problem, at monthly frequency only the U.S. consumer price index is available as a deflator. While on average long-term inflation is the same in Hawaii and on the mainland (arbitrage), short-term deviations make its use distorting in some periods.



*Source*: Hawaii Department of Taxation, Hawaii DBEDT; TZ Economics

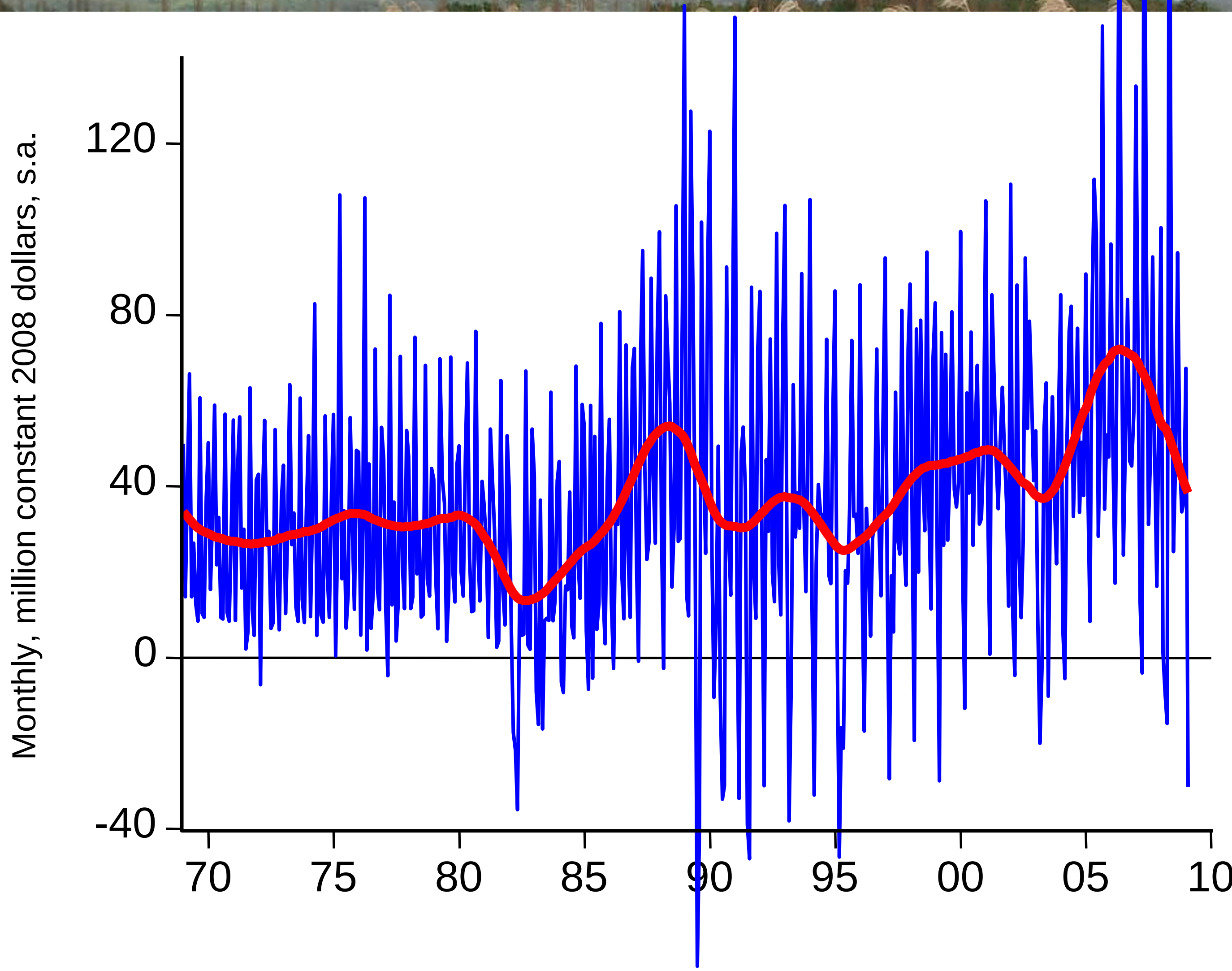
# Two components mostly move with economy






*Source*: Hawaii Department of Taxation, Hawaii DBEDT; TZ Economics

# Real general fund less GET and individual income taxes




The *residual*, after GE and individual income taxes, is where a *lot* of the volatility and cycle are concentrated.



*Source*: Hawaii Department of Taxation, Hawaii DBEDT; TZ Economics

# Fiscal year 2009 line-item revenue totals

| % | Source of revenue | $mil. | % | Source of revenue | $mil. |
|---|---|---|---|---|---|
| -9.5 | State General Fund | 4,202.3 | -2.1 | Insurance Premiums | 93.7 |
| -7.7 | General Excise & Use 2/ | 2,417.6 | -46.8 | Employment Security Contributions | 49.1 |
| 2.0 | WH Tax on Wages | 1,398.6 | 3.6 | Liquor and Permits | 47.2 |
| -39.0 | Decl. of Est. Ind. Inc.Taxes | 262.5 | 38.9 | Banks/Financial Corporations | 28.1 |
| -8.2 | TAT/TOT | 210.6 | -45.3 | Conveyance | 23.8 |
| -4.9 | Honolulu County Surcharge | 178.7 | 6.7 | Corp. Inc. Tax Payment W/Returns | 23.3 |
| -2.5 | Fuel | 165.7 | -6.2 | GE License/Fees | 0.5 |
| -24.5 | Ind. Inc. Tax Payment. W/Returns | 135.4 | 67.0 | Inheritance/Estate | 0.3 |
| -1.1 | Public Service Co. | 126.1 | -20.8 | All Others | 0.1 |
| 3.4 | Tobacco and Licenses | 108.2 | -19.0 | TAT/TOT Fees | 0.0 |
| -9.3 | Motor Vehicle Tax/Fees | 102.0 | -1.5 | Corporate Income Tax Refunds | -67.2 |
| -25.9 | Declarations of Est. Corp. Taxes | 97.5 | 5.1 | Individual Income Tax Refunds | -457.5 |
| | *Addendum:* | | | | |
| | Total tax collections FY2008 | 5,478.5 | | | |
| | Total tax collections FY2009 | 4,944.1 | | | |



*Source*: Hawaii Department of Taxation; TZ Economics

# Fiscal year 2009 line-item revenue *movers*

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| | | |
|---|---|---|
| | *Addendum:* | |
| | Total tax collections FY2008 | 5,478.5 |
| | Total tax collections FY2009 | 4,944.1 |

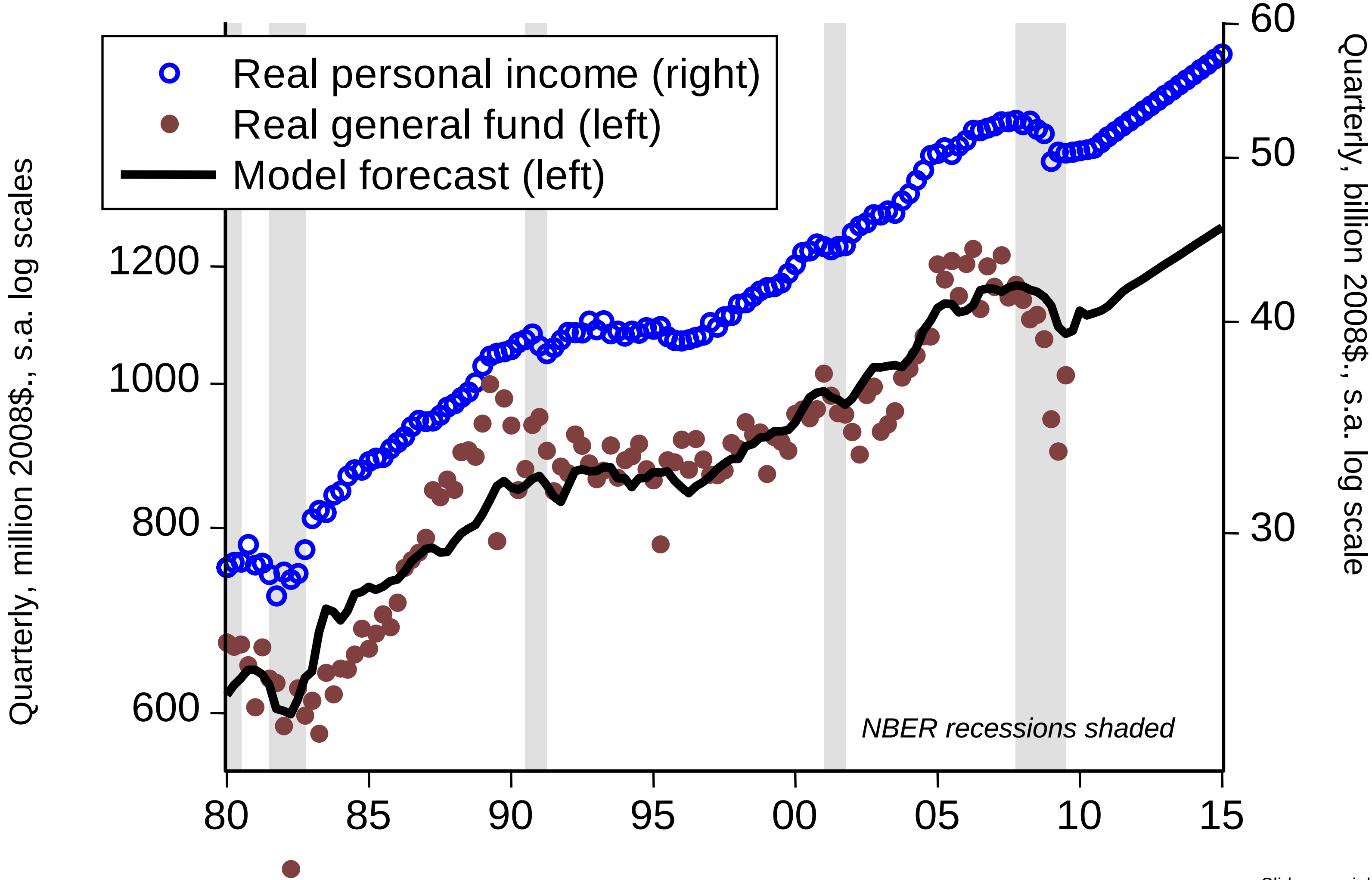


*Source*:  Hawaii Department of Taxation; TZ Economics

# Summarizing thus far

- Economic forecasts:  recovery to expansion, 2010 – 20-teens
- Hawaii tax revenue components are noisy (volatile)
- Extracting signal from noise is complicated
  - Seasonality
  - Problematic deflation
- Methodology is to aggregate up to quarterly or annual frequencies (remove seasonality) model from “top down” in response to economy-wide phenomena
- Risks to forecast always asymmetric: *adjust downward*
  - External risks (e.g. financial panic; biological events) abound
  - Intrinsic risks (behavior shifts, strategic “gaming”) compound
  - Confidence intervals *widen* under heightened uncertainty

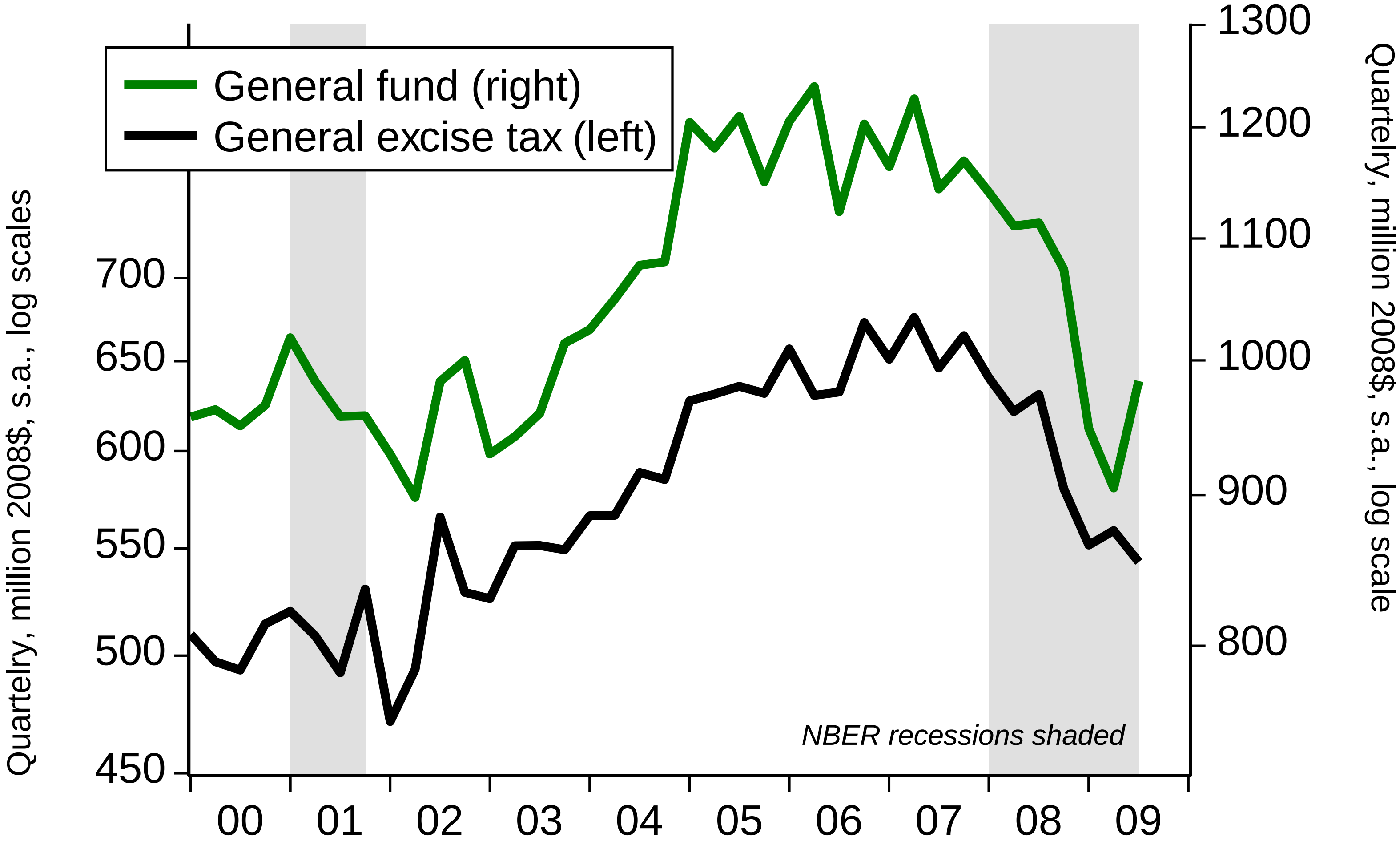
# Hawaii general fund revenues:  a forecast






*Sources*:  BEA, U.S. Department of Commerce, Hawaii Department of Taxation; calculations by TZE

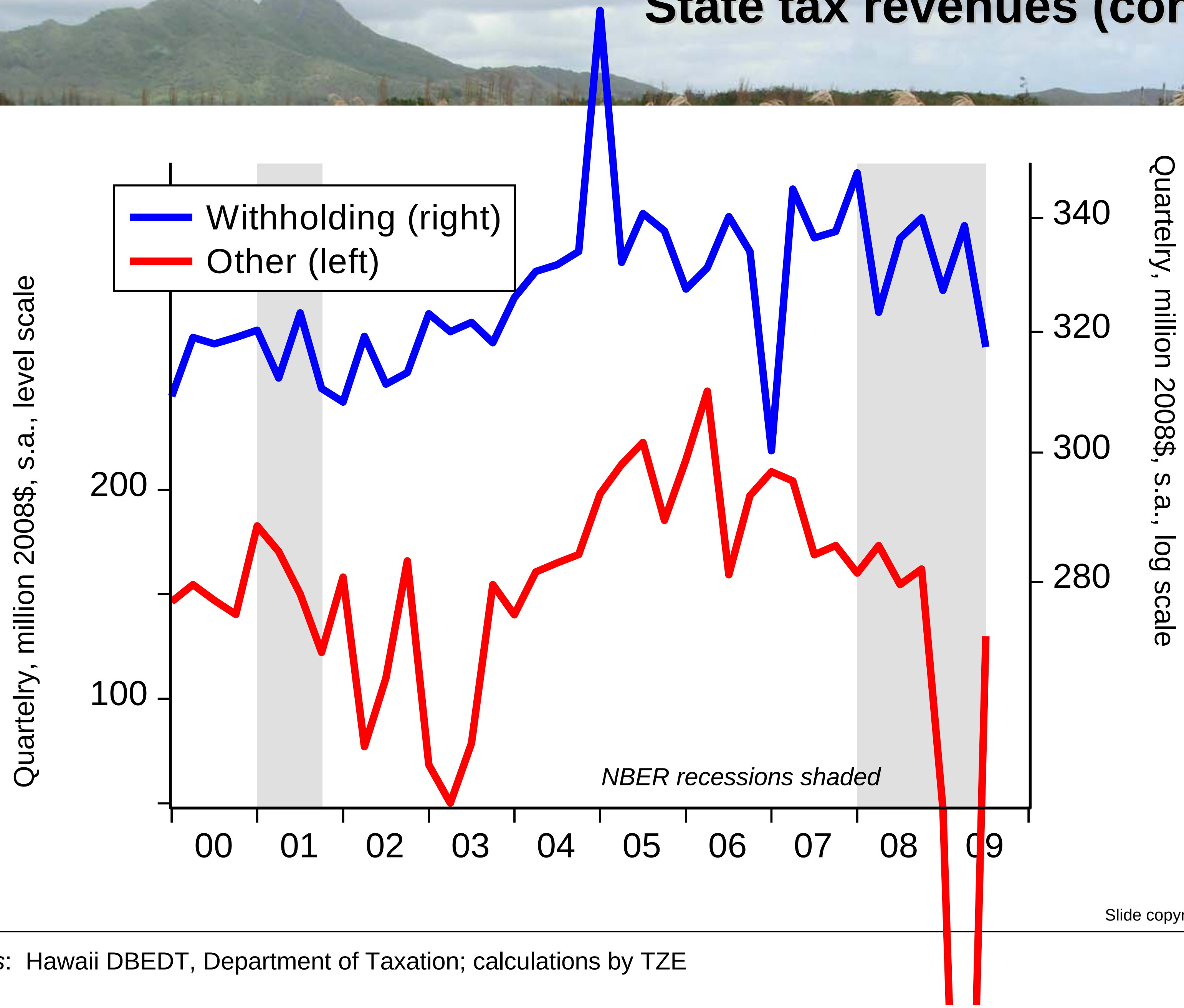
# Hawaii State tax revenues






*Sources*: Hawaii DBEDT, Department of Taxation; deflation, seasonal adjustment calculations by TZE

# State tax revenues (cont’d.)






*Sources*: Hawaii DBEDT, Department of Taxation; calculations by TZE

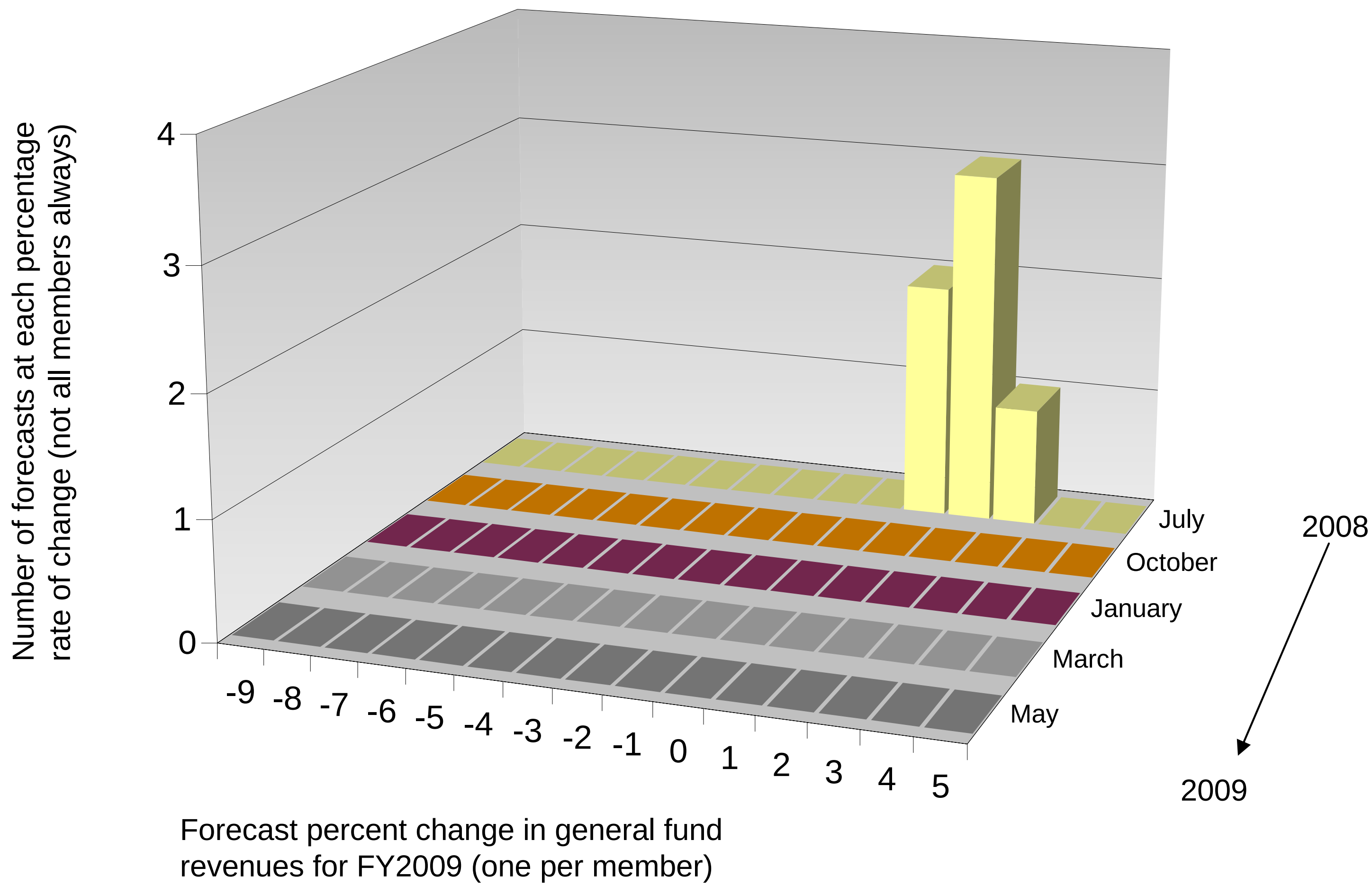
# 3. Elements of forecast uncertainty, accuracy

- Increased dispersion among forecasters implies disagreement
- Dispersion is an *additional* source of information
- Confidence assigned to forecast decreases with dispersion
- First reported in January 2009 briefing:  January 2010 follow-up

- “Sudden stops,” “sunspots,” “rational speculative bubbles” all impart additional *jump*-risks (jumps down outweigh jumps up)
- Post-Lehman financial panic is bona fide “tail event”—Black Swan:  highly improbable, but perfectly plausible

- Also: tendency towards mean-reversion
- Consensus forecast will *systematically* be too low during economic expansions, too low during contractions

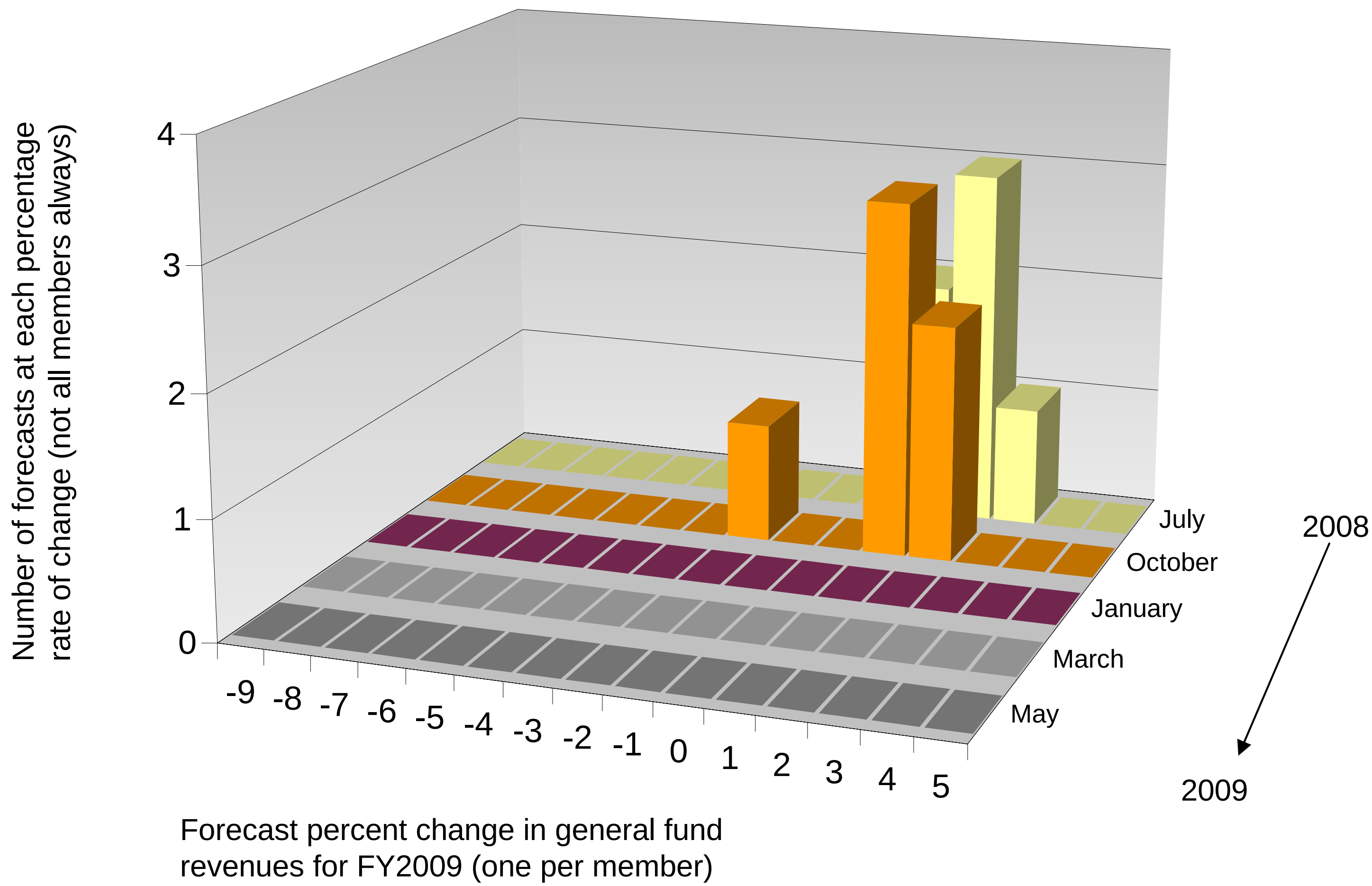
# FY2009 general fund forecasts during the year: "Pre-Lehman"






*Source*: Hawaii Department of Taxation, personal correspondence; TZ Economics

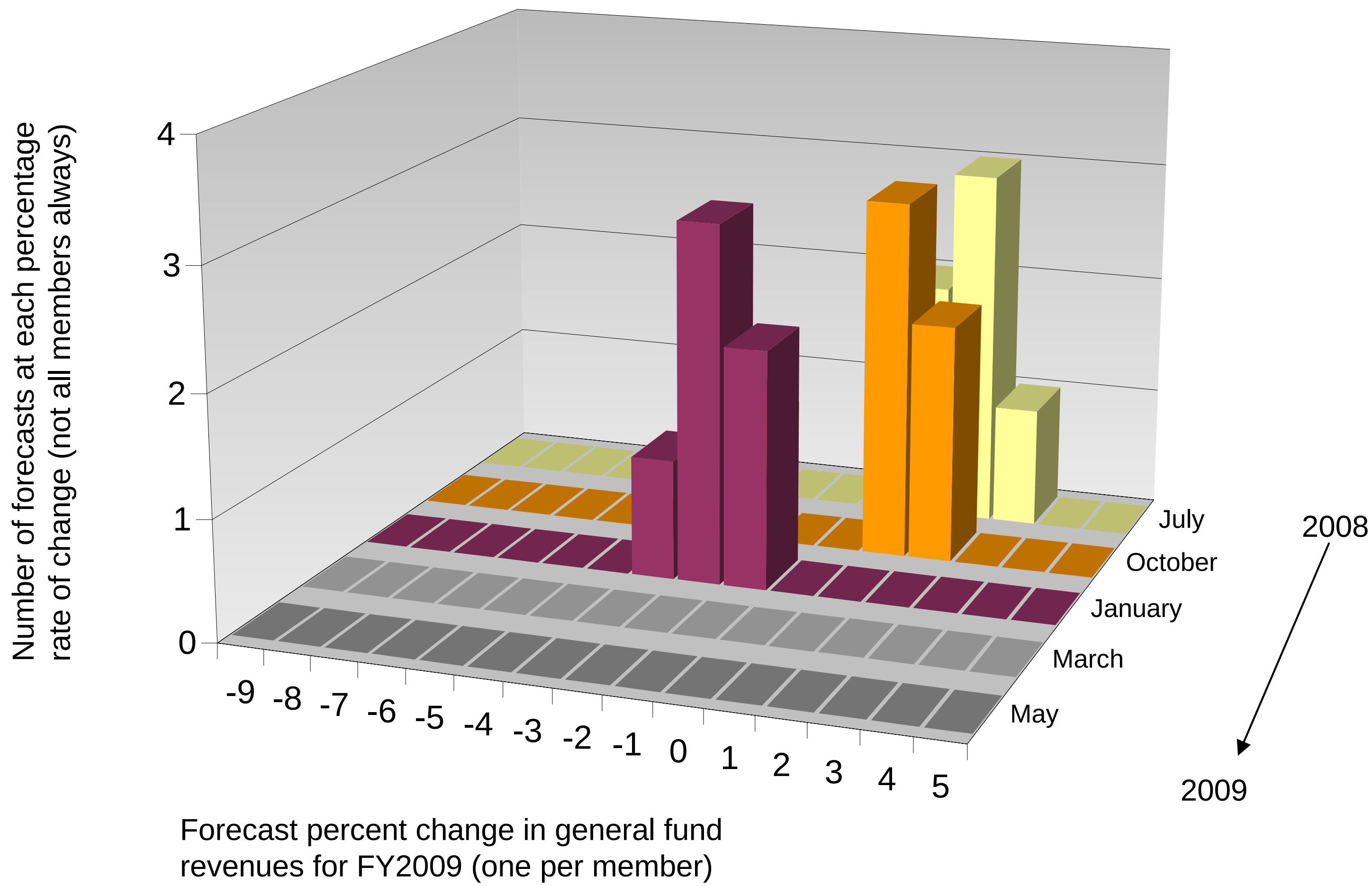
# FY2009 general fund forecasts during the year: "Post-Lehman"






*Source*: Hawaii Department of Taxation, personal correspondence; TZ Economics

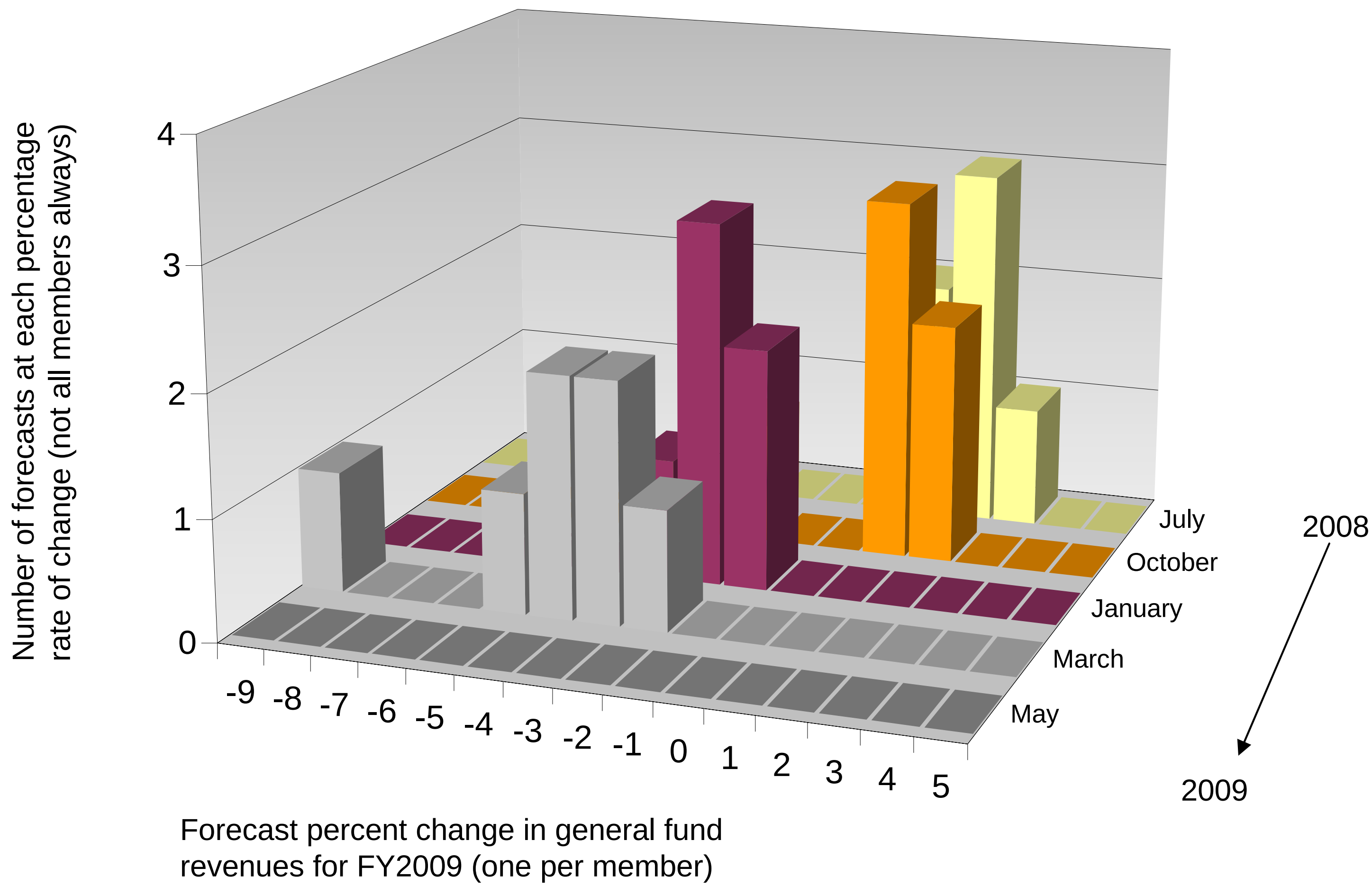
# FY2009 general fund forecasts during the year






*Source*: Hawaii Department of Taxation, personal correspondence; TZ Economics

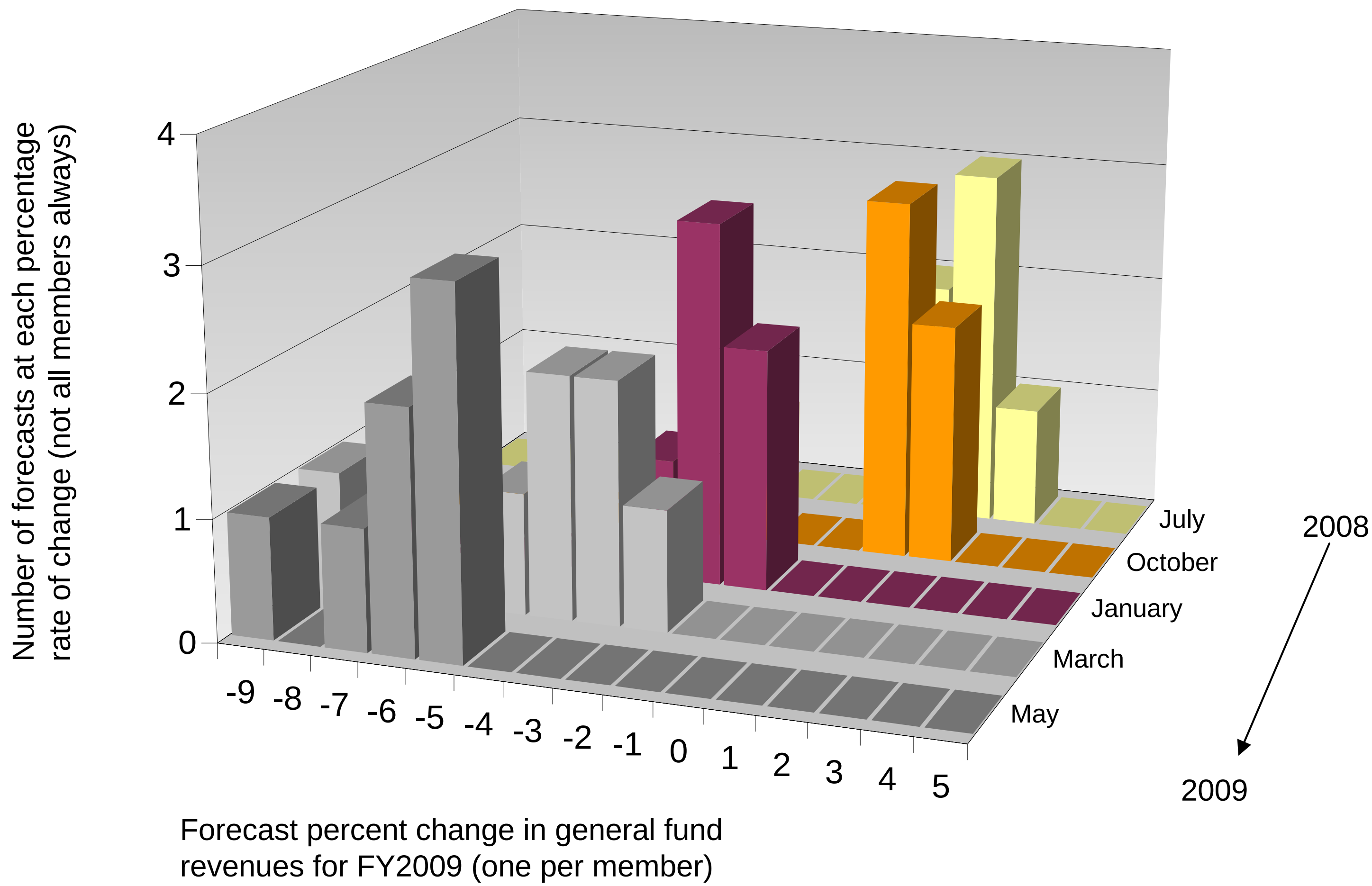
# FY2009 general fund forecasts during the year






*Source*: Hawaii Department of Taxation, personal correspondence; TZ Economics

# FY2009 general fund forecasts during the year

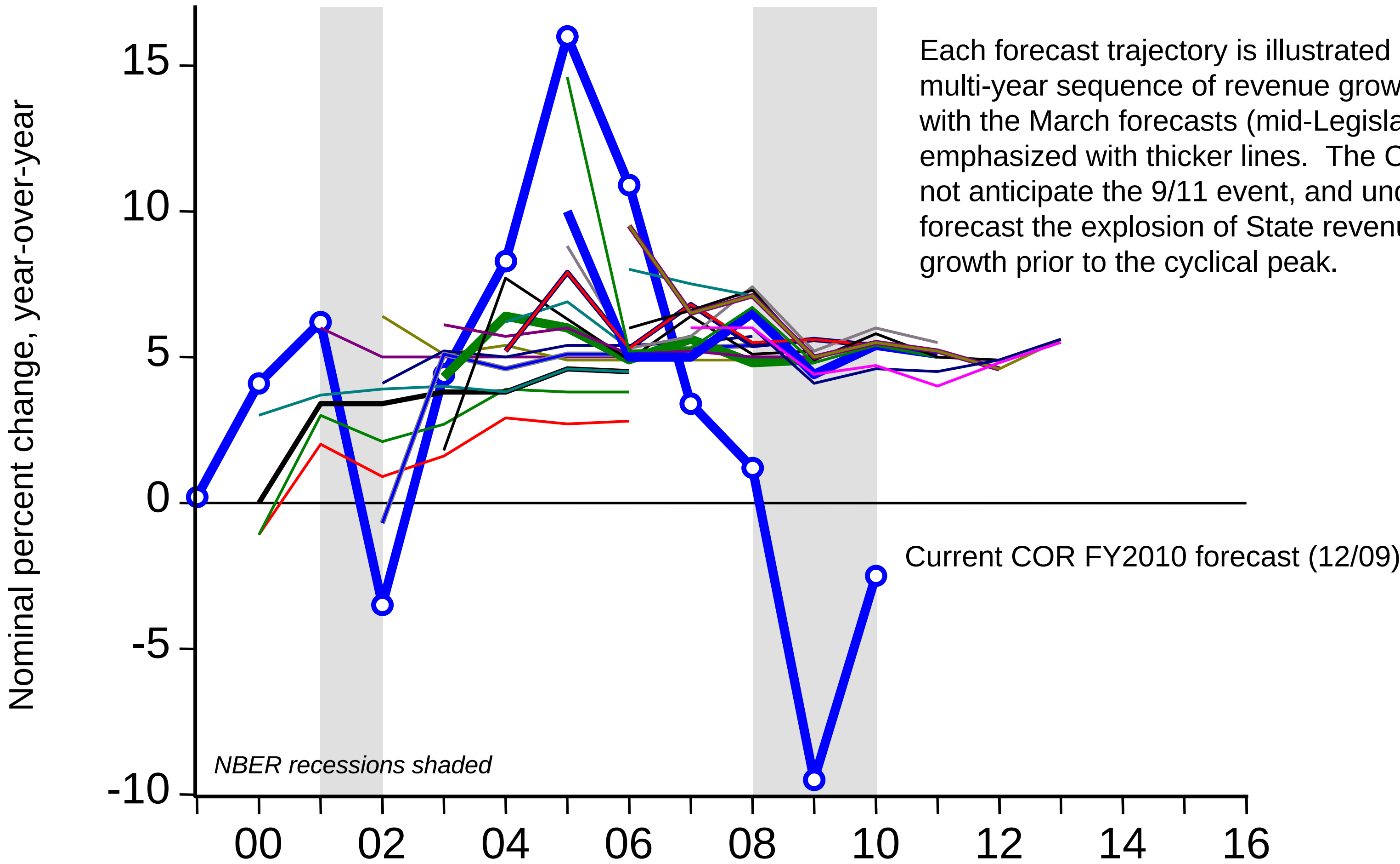





*Source*: Hawaii Department of Taxation, personal correspondence; TZ Economics

## COR annual general fund revenue growth forecasts by vintage—early 2000s vs. “after the peak” (2006)

# Council on Revenues forecasts through 2000-2006

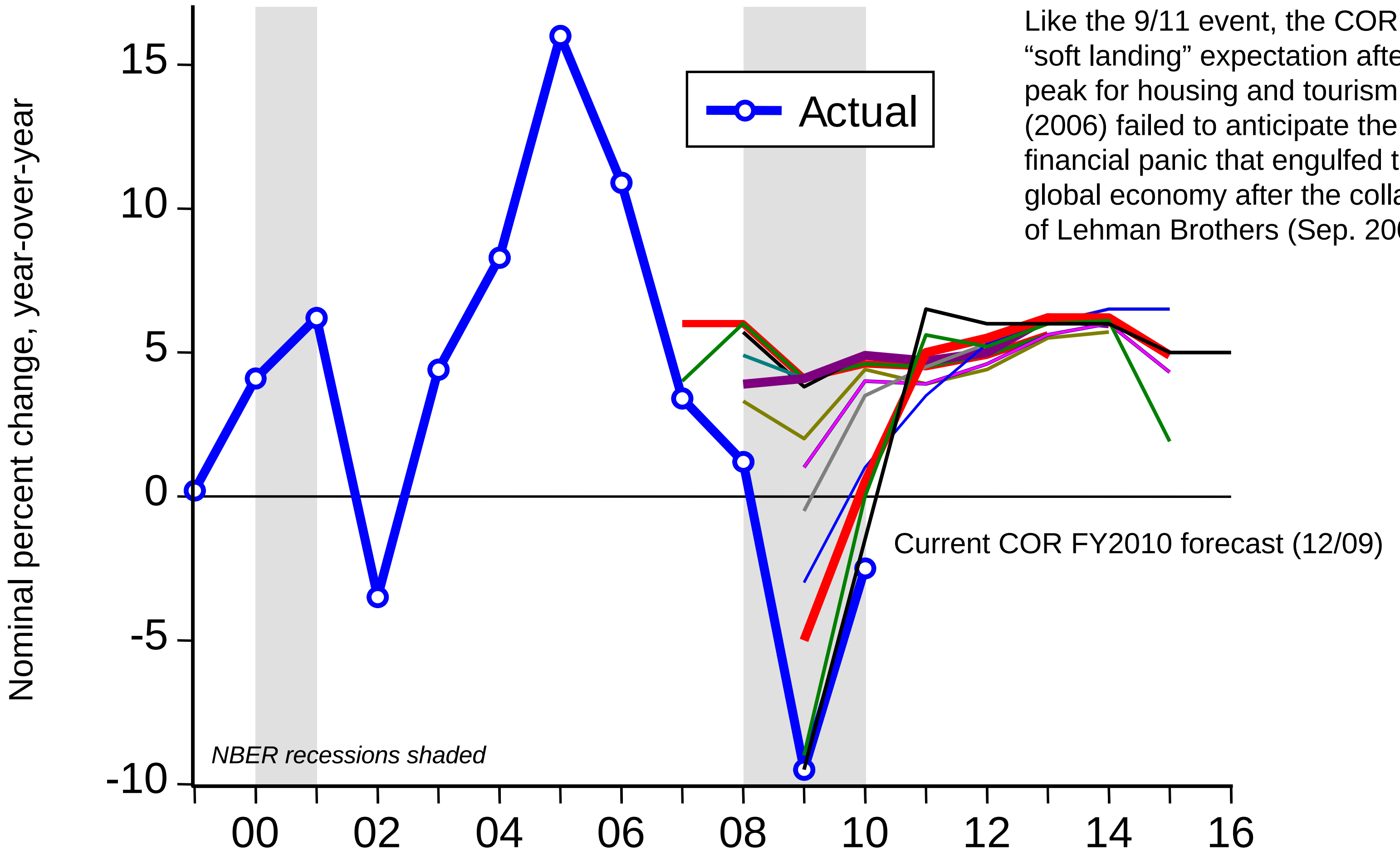



Each forecast trajectory is illustrated as a multi-year sequence of revenue growth rates, with the March forecasts (mid-Legislature) emphasized with thicker lines. The COR did not anticipate the 9/11 event, and under-forecast the explosion of State revenue growth prior to the cyclical peak.



*Source*: Hawaii Department of Taxation http://www.state.hi.us/tax/a9_1cor.htm (and archive); TZ Economics

# Council on Revenues forecasts through 2007-2009

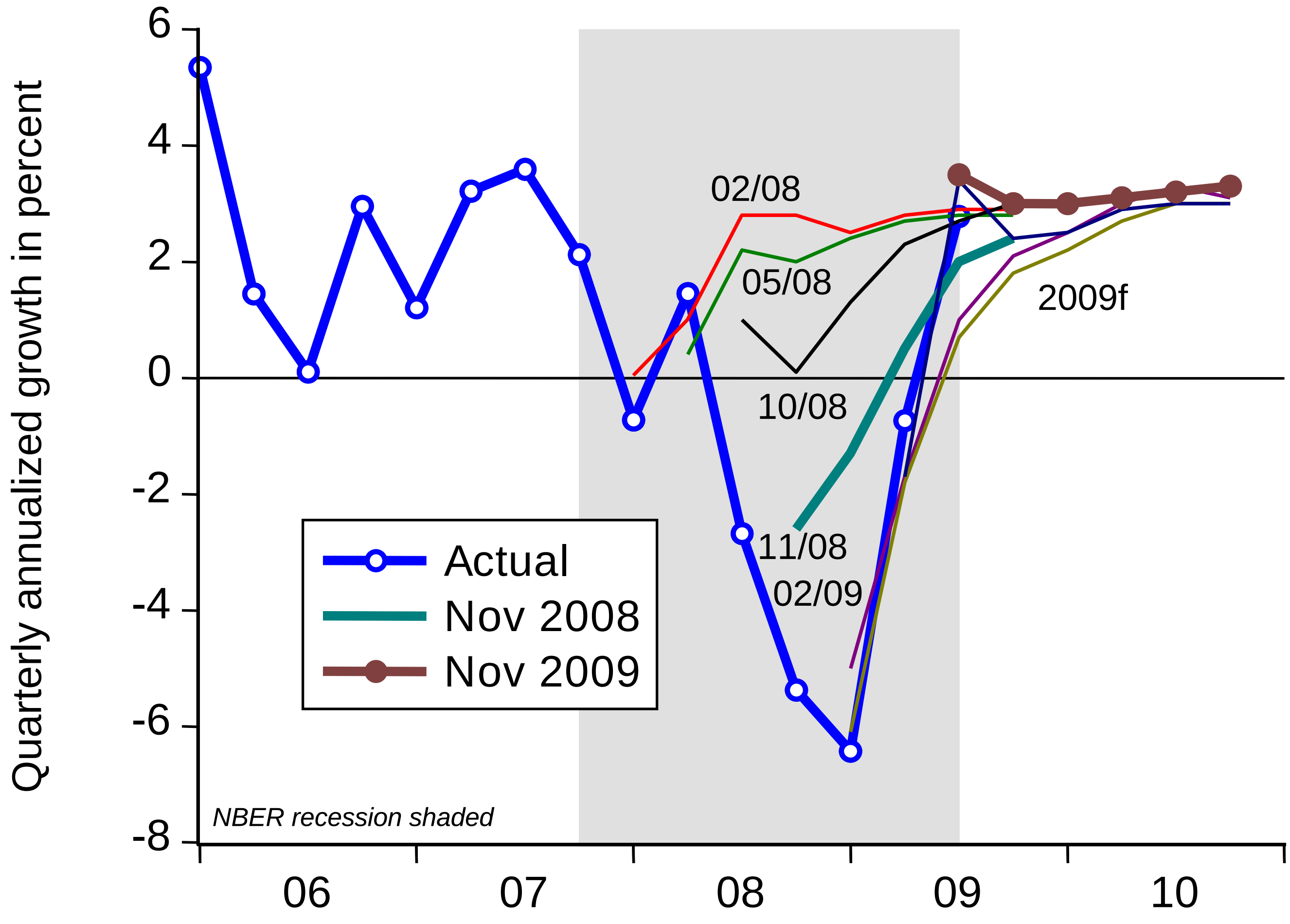



Like the 9/11 event, the COR's "soft landing" expectation after the peak for housing and tourism (2006) failed to anticipate the financial panic that engulfed the global economy after the collapse of Lehman Brothers (Sep. 2008).



*Source*: Hawaii Department of Taxation http://www.state.hi.us/tax/a9_1cor.htm (and archive); TZ Economics

# U.S. real GDP forecasts also were blown up post-Lehman

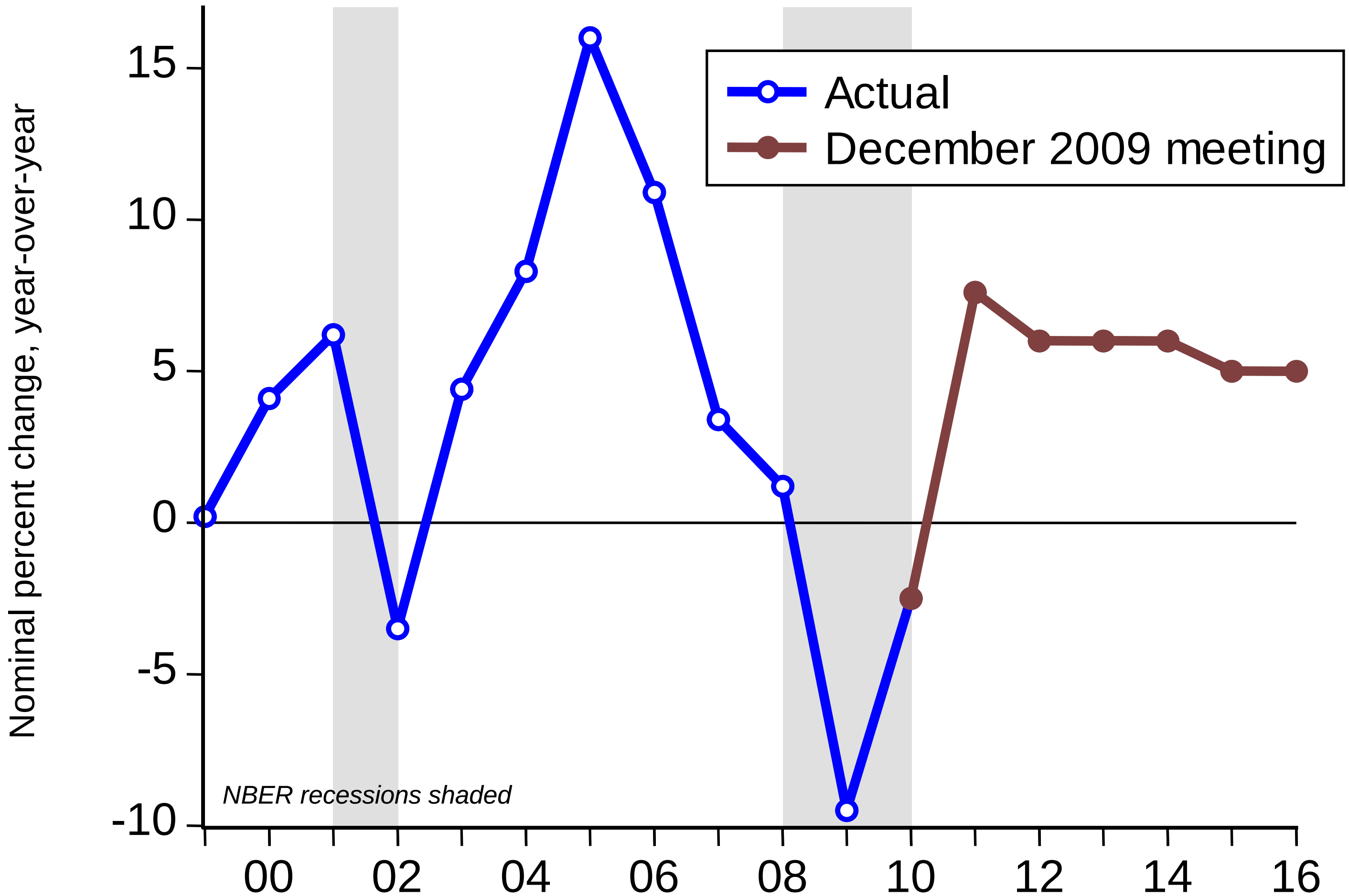



U.S. real economic growth forecasts were revised downward sharply in the post-Lehman environment but never really caught up, and were blind-sided by the financial panic of the fall of 2008.



*Source*: Bureau of Economic Analysis, National Association for Business Economics

# Council on Revenues current forecast out to FY2016





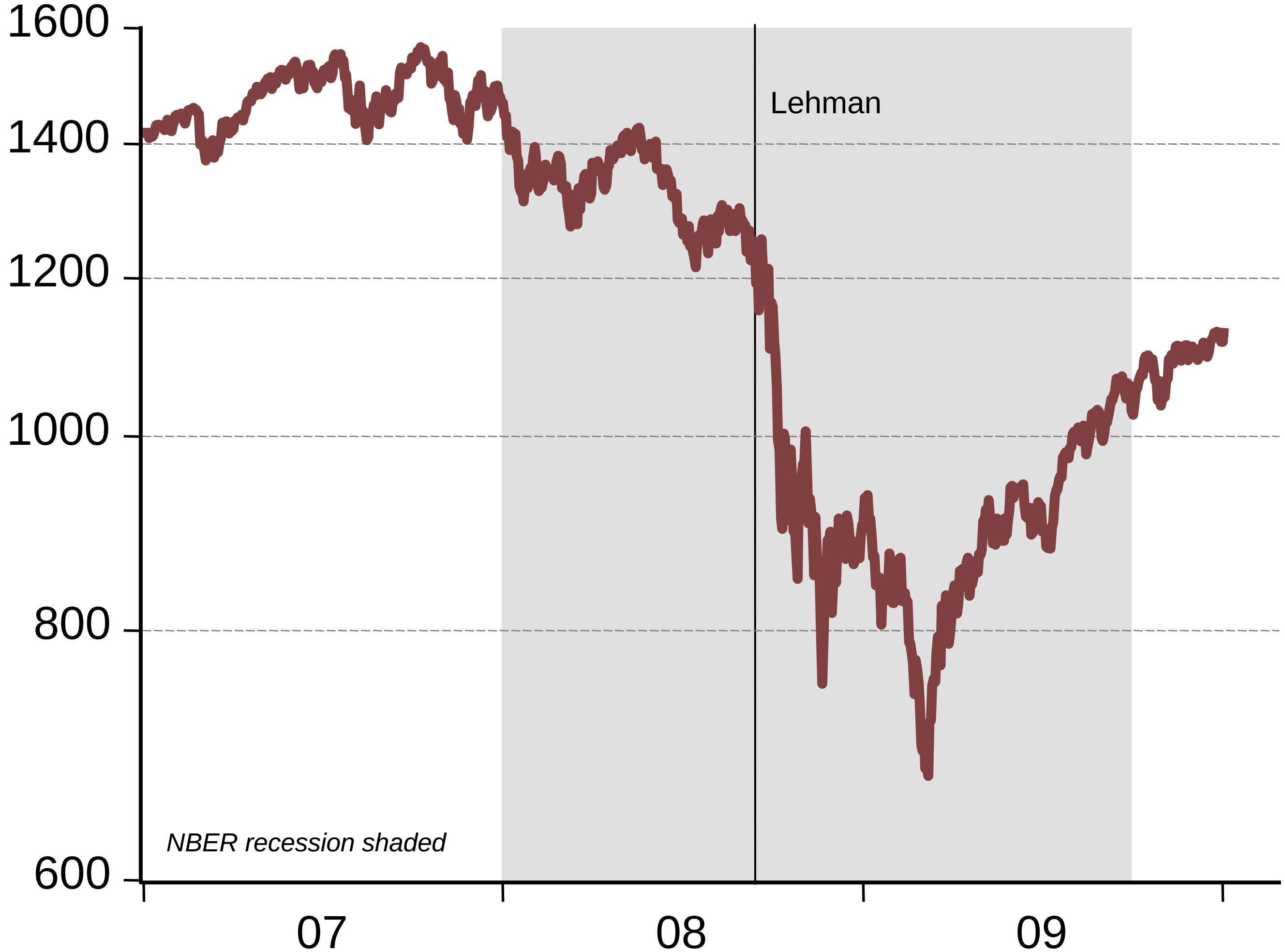

*Source*: Hawaii Department of Taxation http://www.state.hi.us/tax/a9_1cor.htm (and archive); TZ Economics

# Council on Revenues forecast

- The dilemma:  a better forecast model will never anticipate Black Swan events like the post-Lehman financial panic of fall 2008
- COR members advocated “better modeling” in response to the early-2000s under-forecast of revenue growth
- Tax Research and Planning deployed resources to expand its modeling portfolio, internal econometric modeling expertise
- Individual COR members challenged to come up with independent models—UHERO expanding its “portfolio”
- Costs of forecast errors are asymmetric:  “too high” more costly
- In current economic transition, durability of recovery uncertain
- Likelihood of under-forecasting 20-teens revenue growth (notion instinctively rejected by those clinging to “double-dips” etc.)

# 4. Aspects of the economic recovery scenario

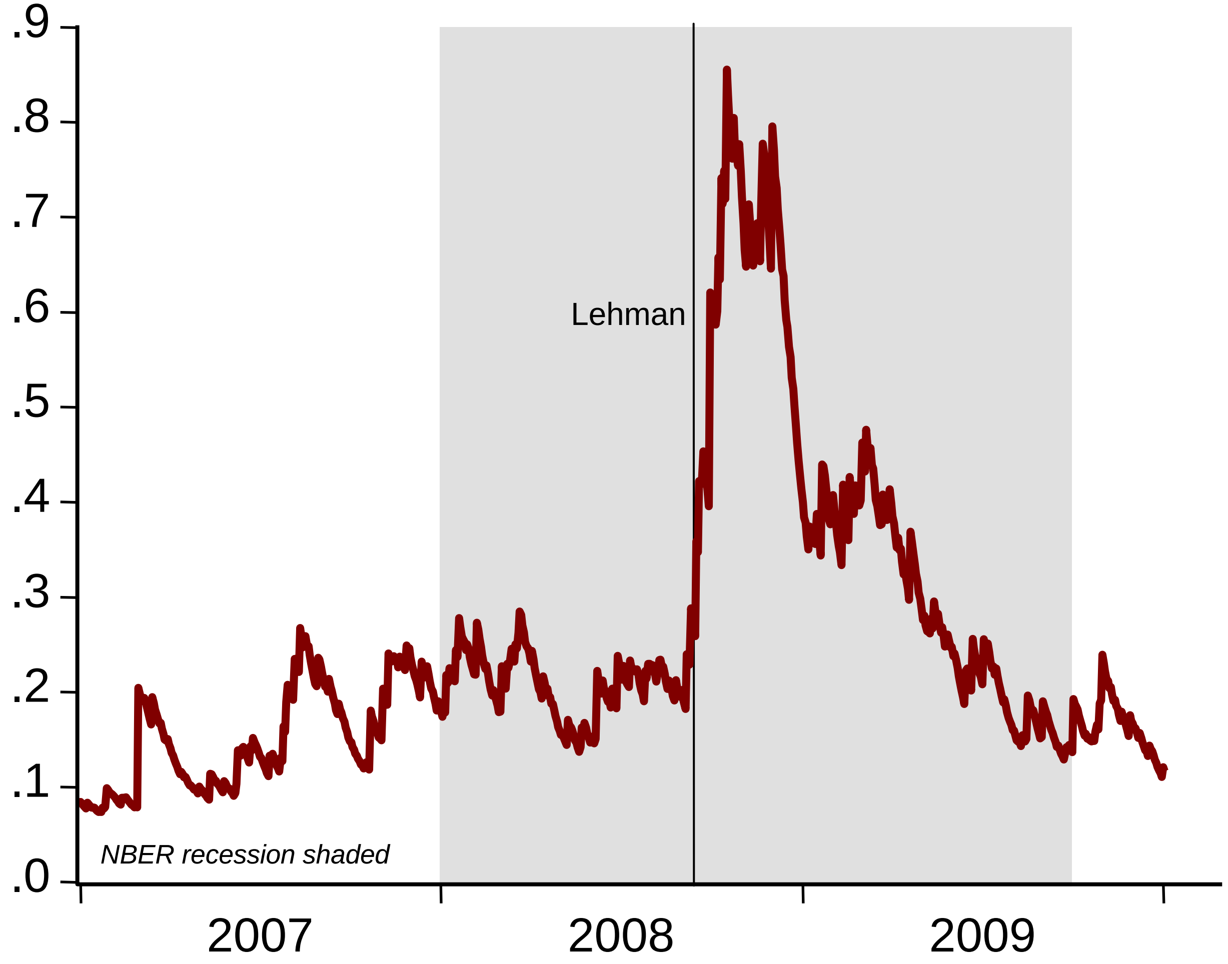
# So, a year ago you *expected* the stock market to rebound in 2009? Standard & Poor's 500 Index






*Source*: Standard & Poor's, e-Trade; graphic by TZ Economics

# Conditional daily volatility of the S&P 500 Index

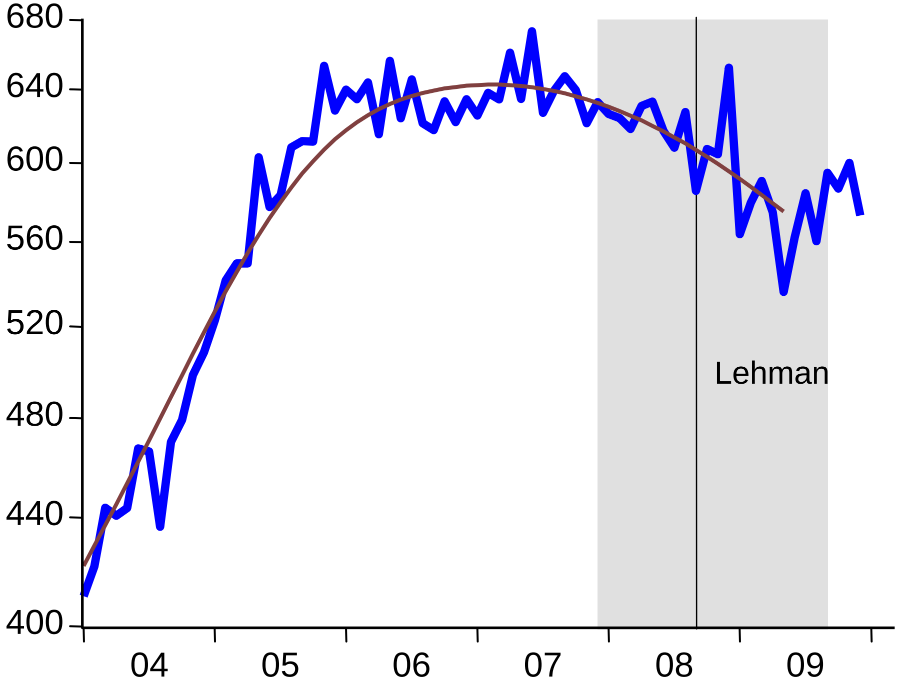





*Source*: Standard & Poor's, e-Trade; graphic and calculatino by TZ Economics—annualized volatility is standard deviation from generalized autoregressive conditional heteroskedasticity model of daily SPX log changes

# Oahu existing home prices through 2009: not falling

000$, s.a.,
log scales

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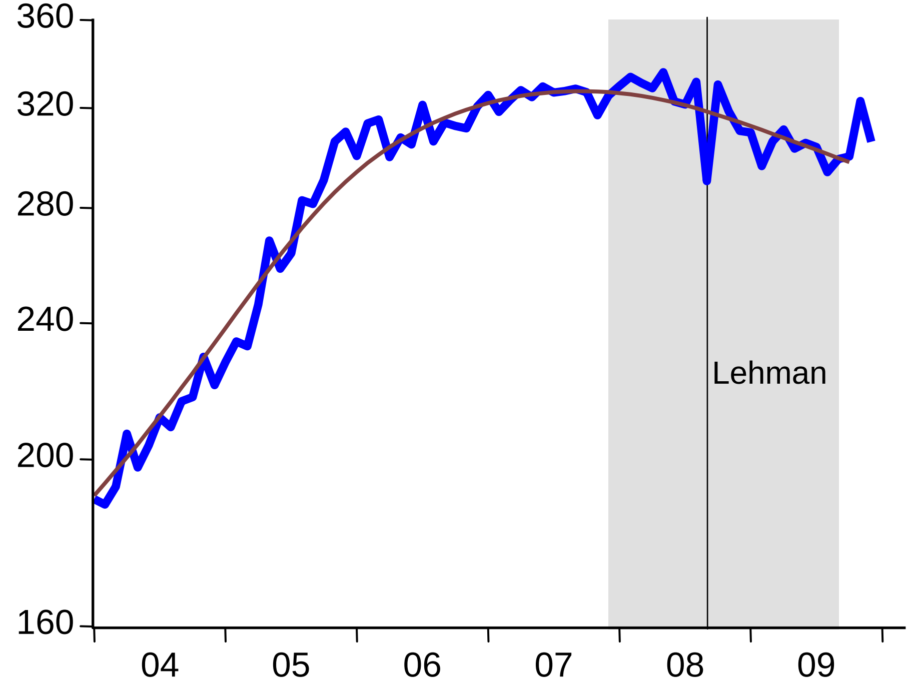
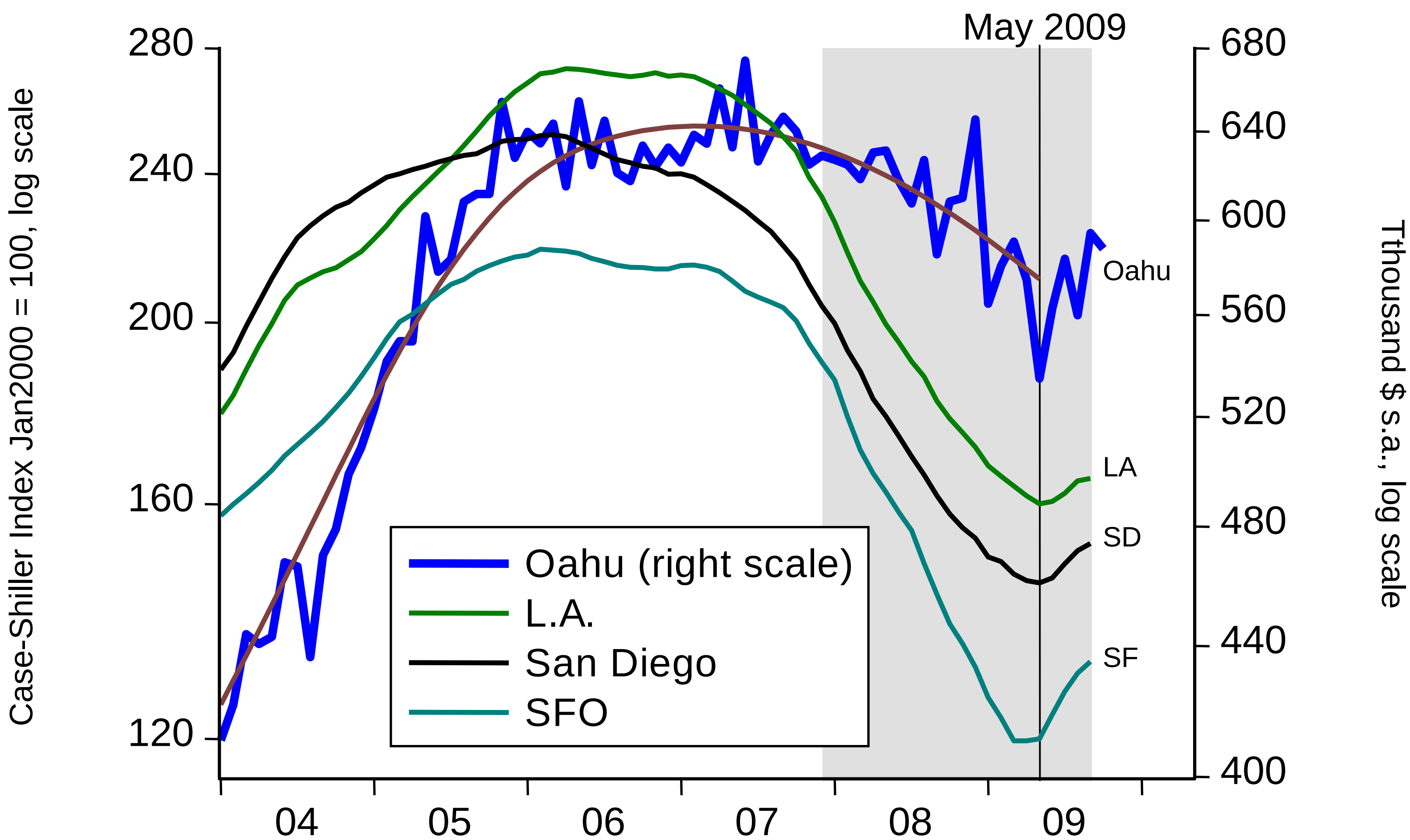



Condominium



*Source*: Honolulu Board of Realtors; seasonal-adjustment and Hodrick-Prescott filter trend by TZE

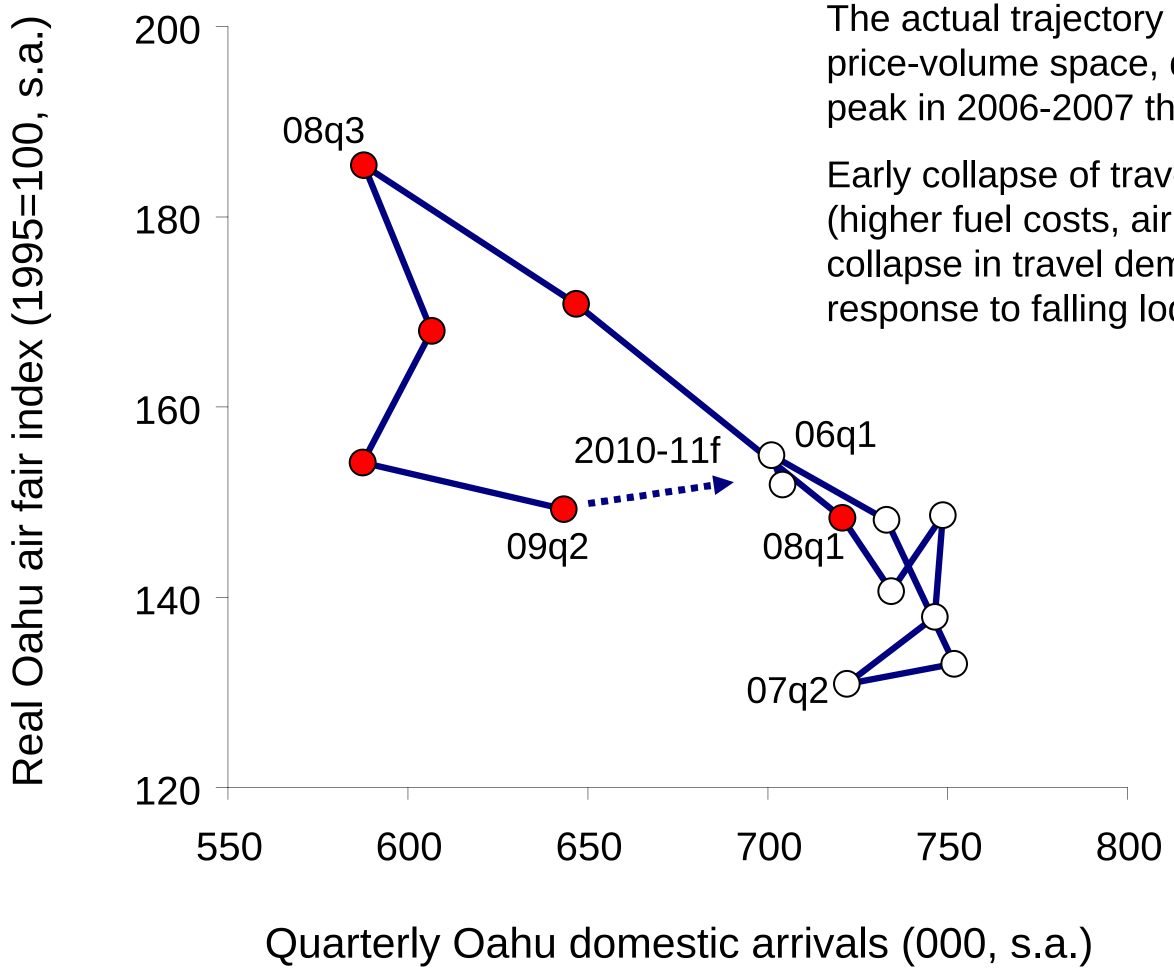
# California and Hawaii SF monthly home prices




Slide copyright TZ Economics

*Source*: Standard & Poor's, Honolulu Board of Realtors; seasonal adjustment, Hodrick-Prescott filter by TZE

# Oahu visitors, peak to trough, in “price-quantity” space



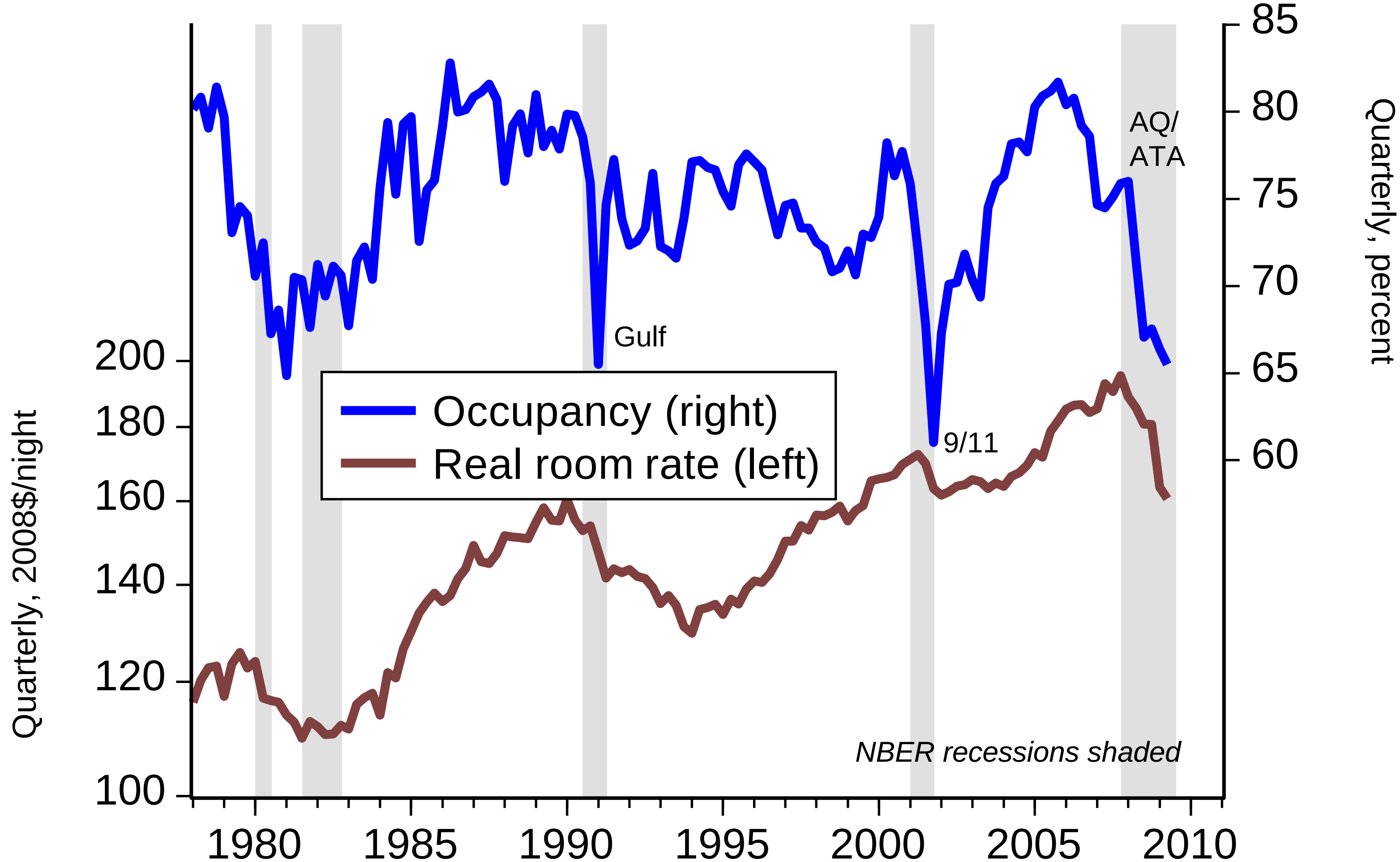

The actual trajectory traced out in (P, V)-space, price-volume space, quarterly from the volume peak in 2006-2007 through mid-2009

Early collapse of travel was *supply contraction* (higher fuel costs, airline shutdowns) followed by collapse in travel demand, later substitution response to falling lodging costs, etc.



*Source*: Bureau of Transportation Statistics, U.S. Department of Labor; Bureau of Economic Analysis, U.S. Department of Commerce; Federal Reserve Bank of St. Louis; Hawaii DBEDT; calculations by TZE

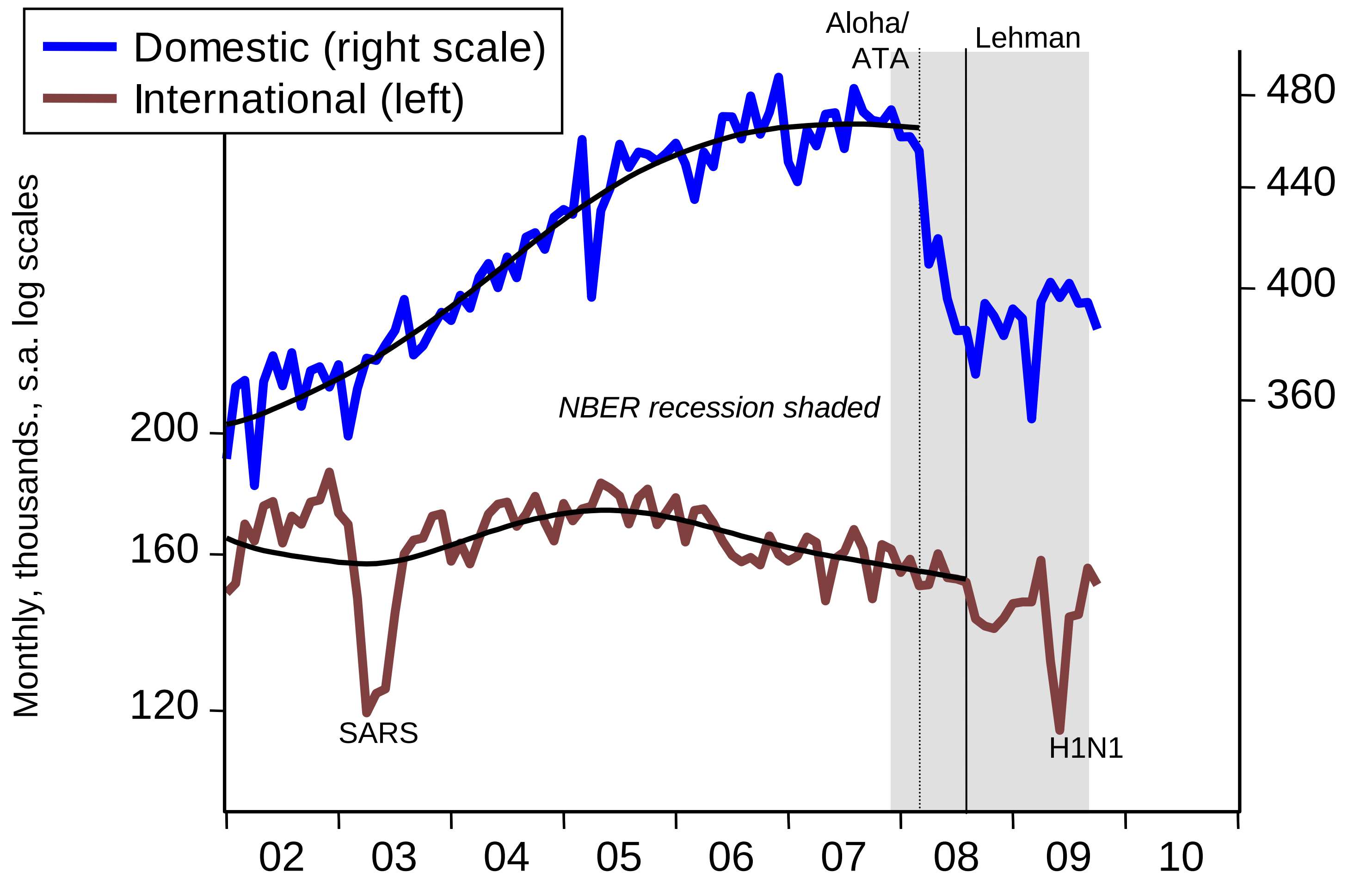
# Hawaii hotels at lower bound of performance range






*Sources*: Hospitality Advisors, LLC; seasonal adjustment calculations, deflation by TZE

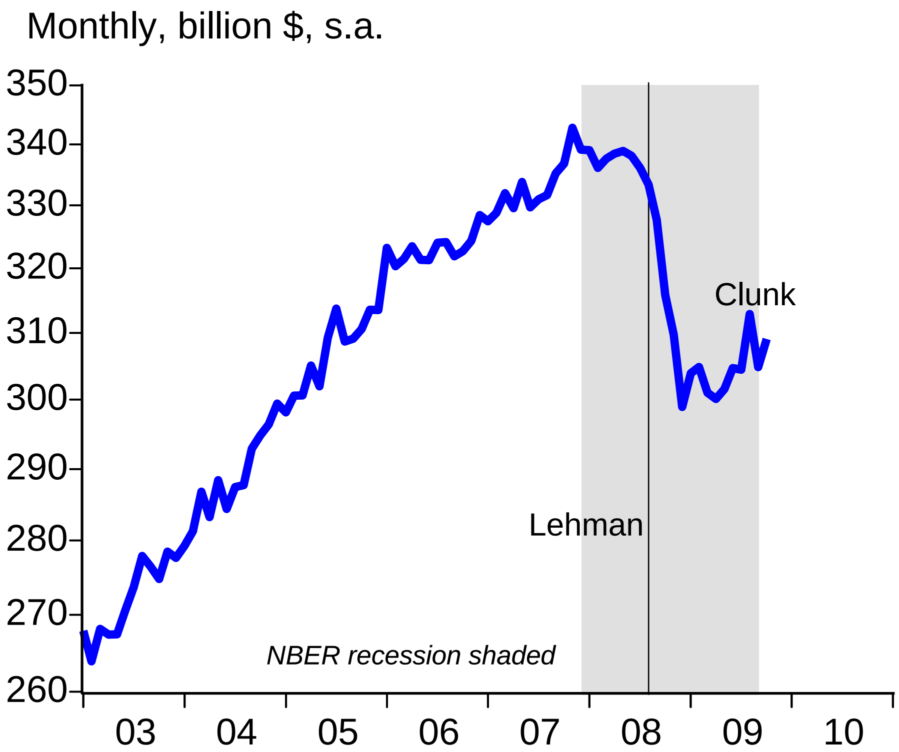
# Hawaii tourism:  stabilized; traction depends on *lift*



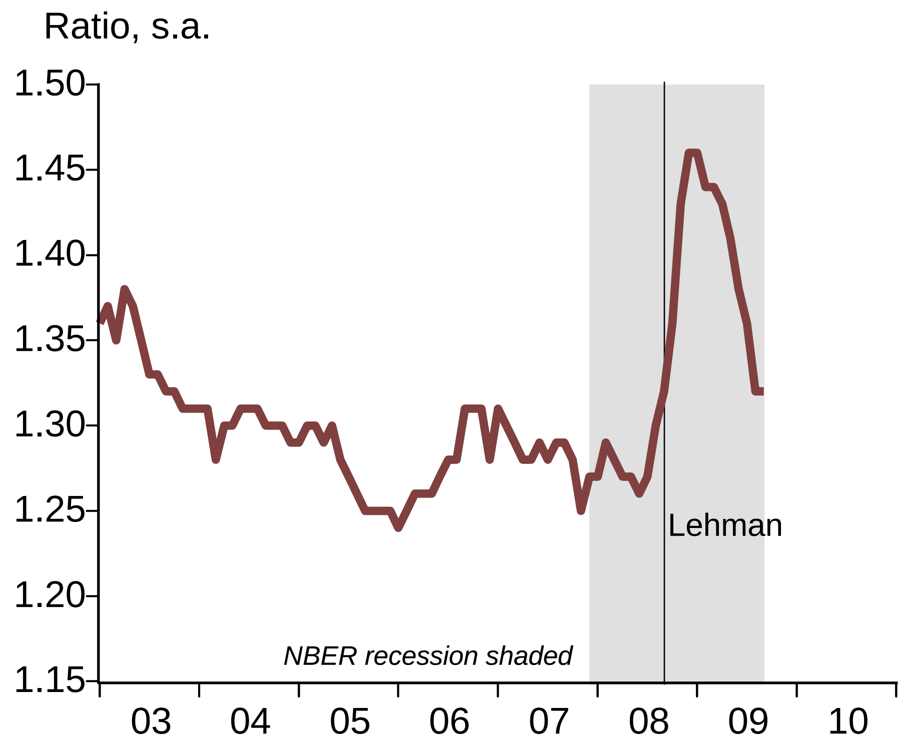



*Sources*:  Hawaii DBEDT; seasonal adjustment by TZE

# U.S. consumer behavior shift accelerated post-Lehman




U.S. retail sales,
excluding food services

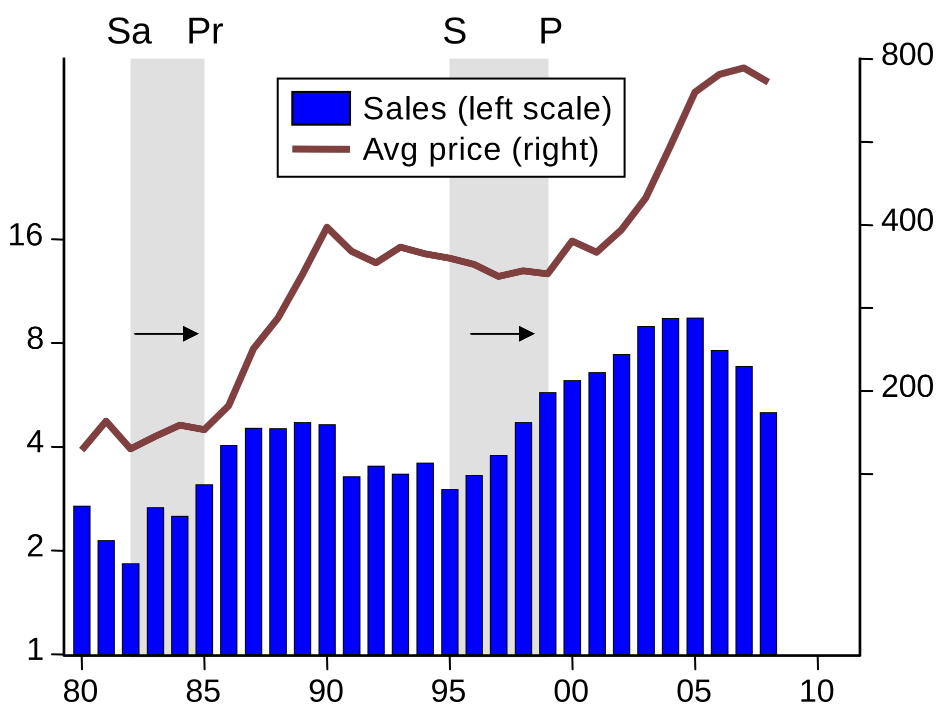



U.S. overall business
inventory-to-sales ratio



*Sources*: Bureau of the Census, U.S. Department of Commerce; Federal Reserve Bank of St. Louis

# Hawaii housing:  sales lead prices by 3 years at trough

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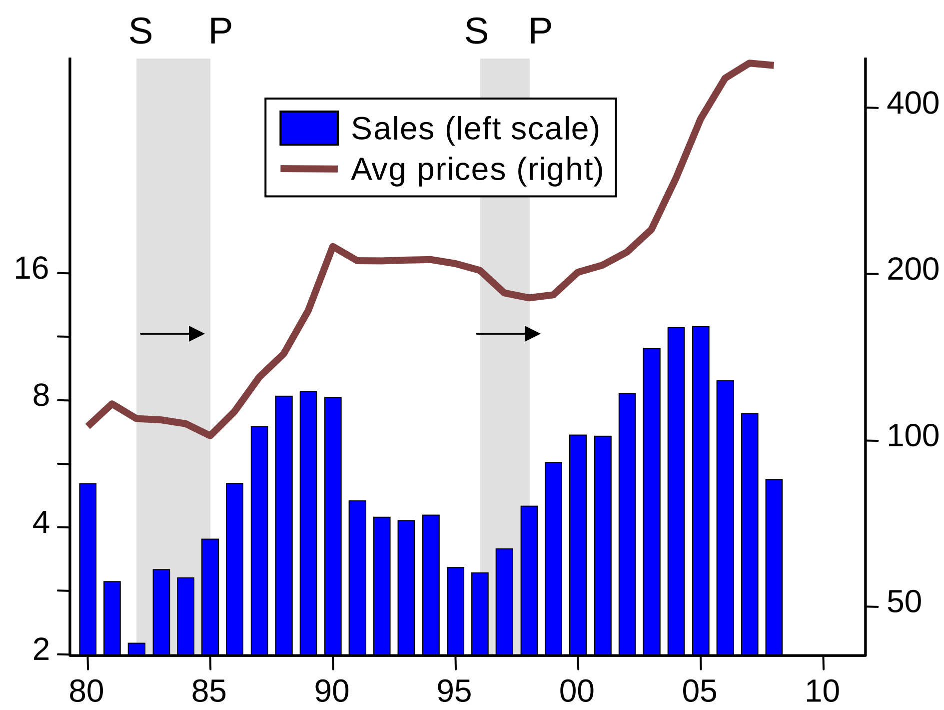



Condominium

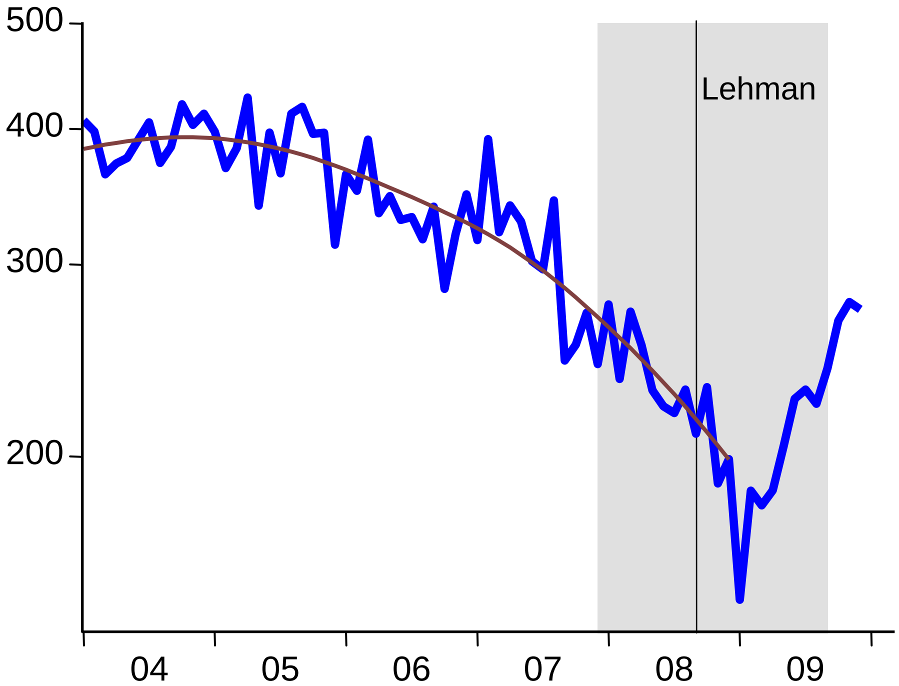
Statewide home sales volumes in thousands; mean prices in thousand current dollars, logarithmic scales



*Source*:   UHERO; graphics by TZE

# Oahu existing home sales rising throughout 2009

Monthly units, s.a.,
log scale

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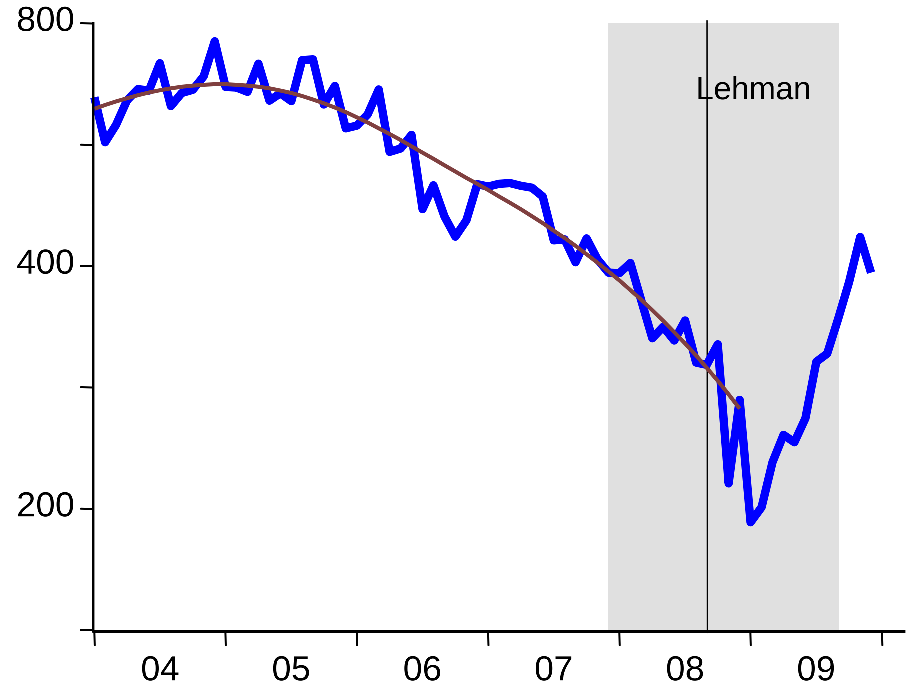



Condominium



*Source*: Honolulu Board of Realtors; seasonal-adjustment and Hodrick-Prescott filter trend by TZE

# Challenges and risks, but recovery is makeable

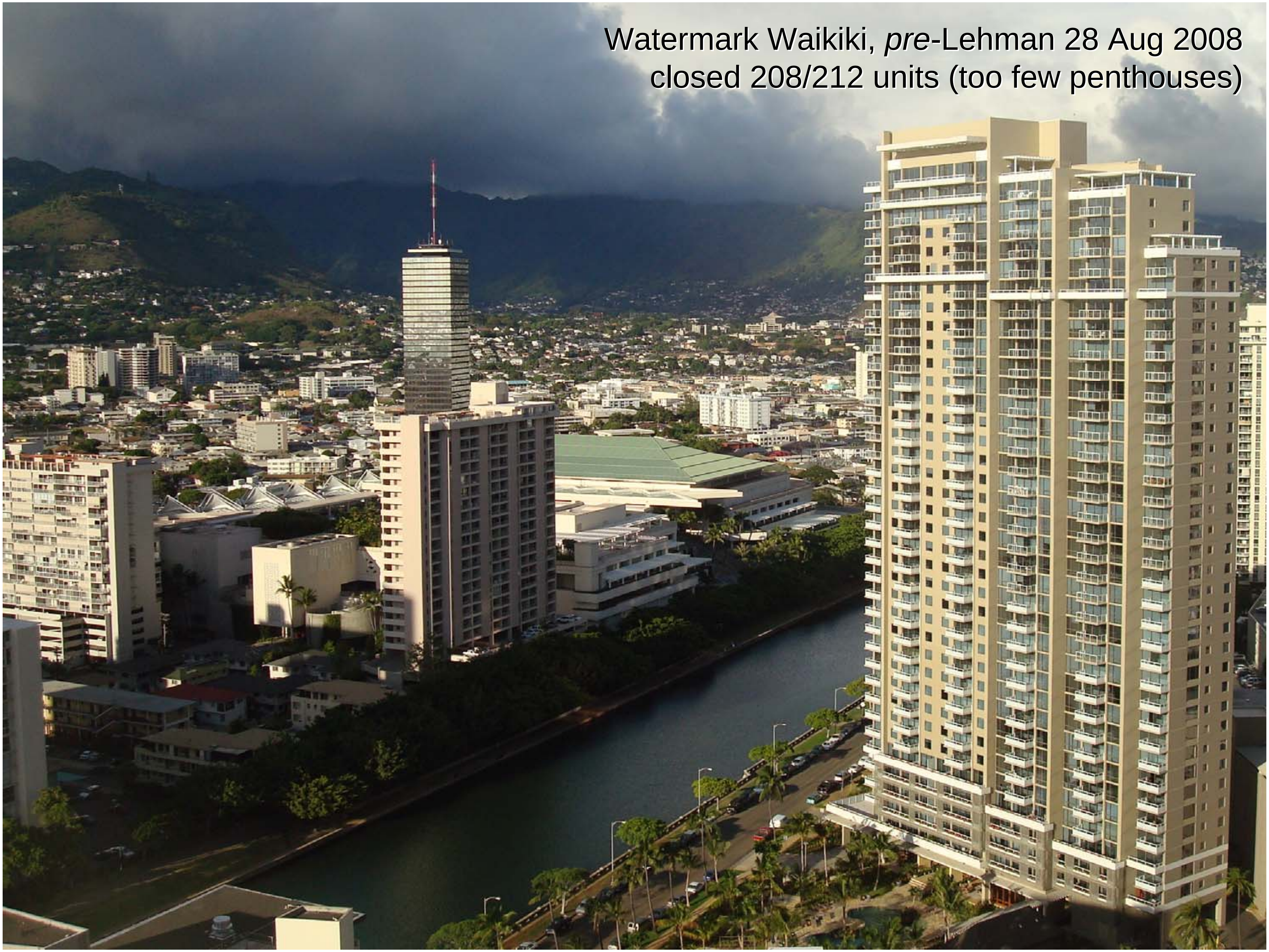
- Seriously, nobody saw wealth restoration in 2009 (they’re lying)
- Stocks rebound, home prices are supposed to be falling
- Double-dip?  My name has enough Ws thank you very much
- Inventory draw-down good for people who manufacture stuff
- Hawaii produces information- and destination-services
- Discretionary consumables will be recovery laggards
- Destination Hawaii is lift-constrained
- Stealth Stimulus—from the state where 160 school days ‘nuff eh?
- Lucky you not Class of 2011 (good luck with the Stanford app)

**Boulder, CO**


PUTTING AMERICA TO WORK
PROJECT FUNDED BY THE
American Recovery and Reinvestment Act
USDOT
TIGER
DOT
GOVERNOR BILL RITTER, JR.

## Seen a lot of these in Hawaii lately?
## Rocky Mountain National Park in early-October

Are we there yet?


Watermark Waikiki, *pre*-Lehman 28 Aug 2008
closed 208/212 units (too few penthouses)

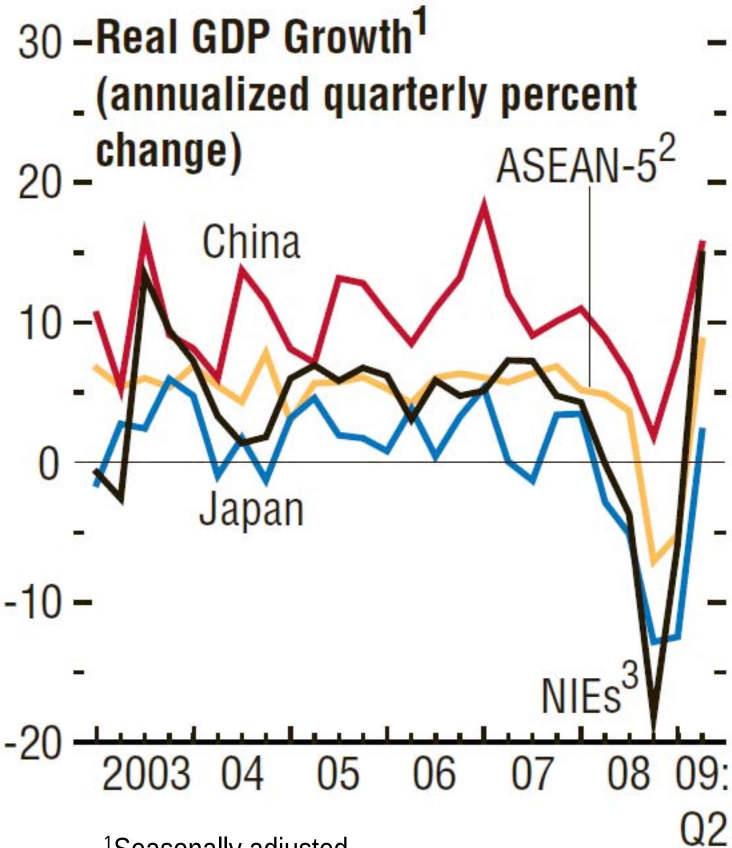
Trump International Waikiki, now open:  too late for the last cycle? too early for the next?

# Pau

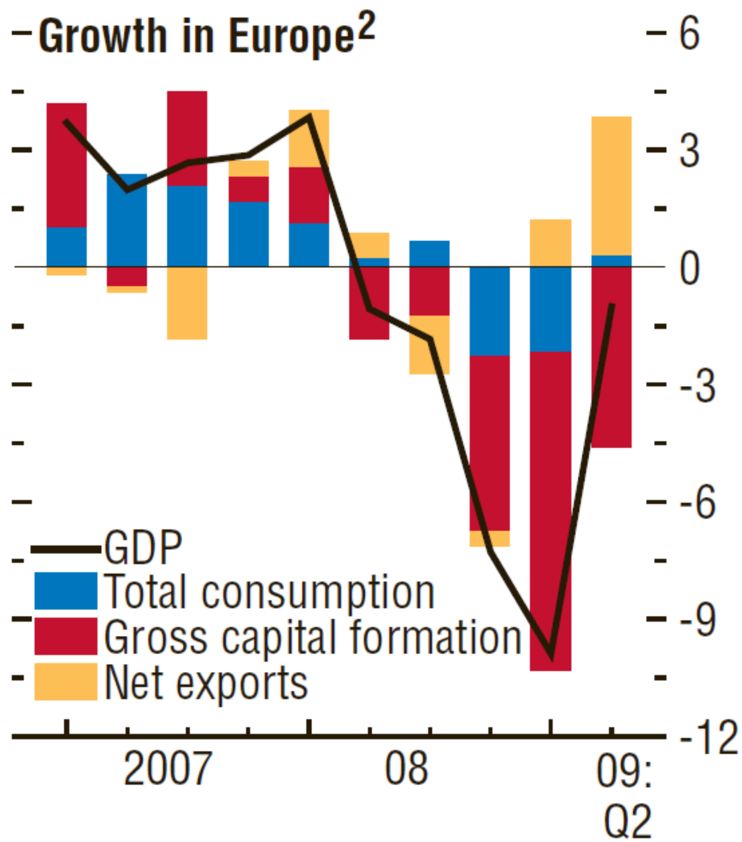
# Appendix 1:  patterns of global economic recovery

- Asian and Emerging Markets economies in rebound
- Eurozone maybe more sluggish
- U.S. recovery reasonably solid
- Inventory drawdown spurs production restart:  manufacturing
- Boon to exporters
- U.S. consumer leading in 2009 (after freaking in 2008)
- Capital spending, esp. technology, will lead in 2010
- Investment in structures more challenging (housing slow)

# Asian and European Economies




[1]Seasonally adjusted
5[2]Excluding Vietnam
[3]Newly industrialized Asian economics (NIEs)
Hong Kong, Korea, Singapore, Taiwan

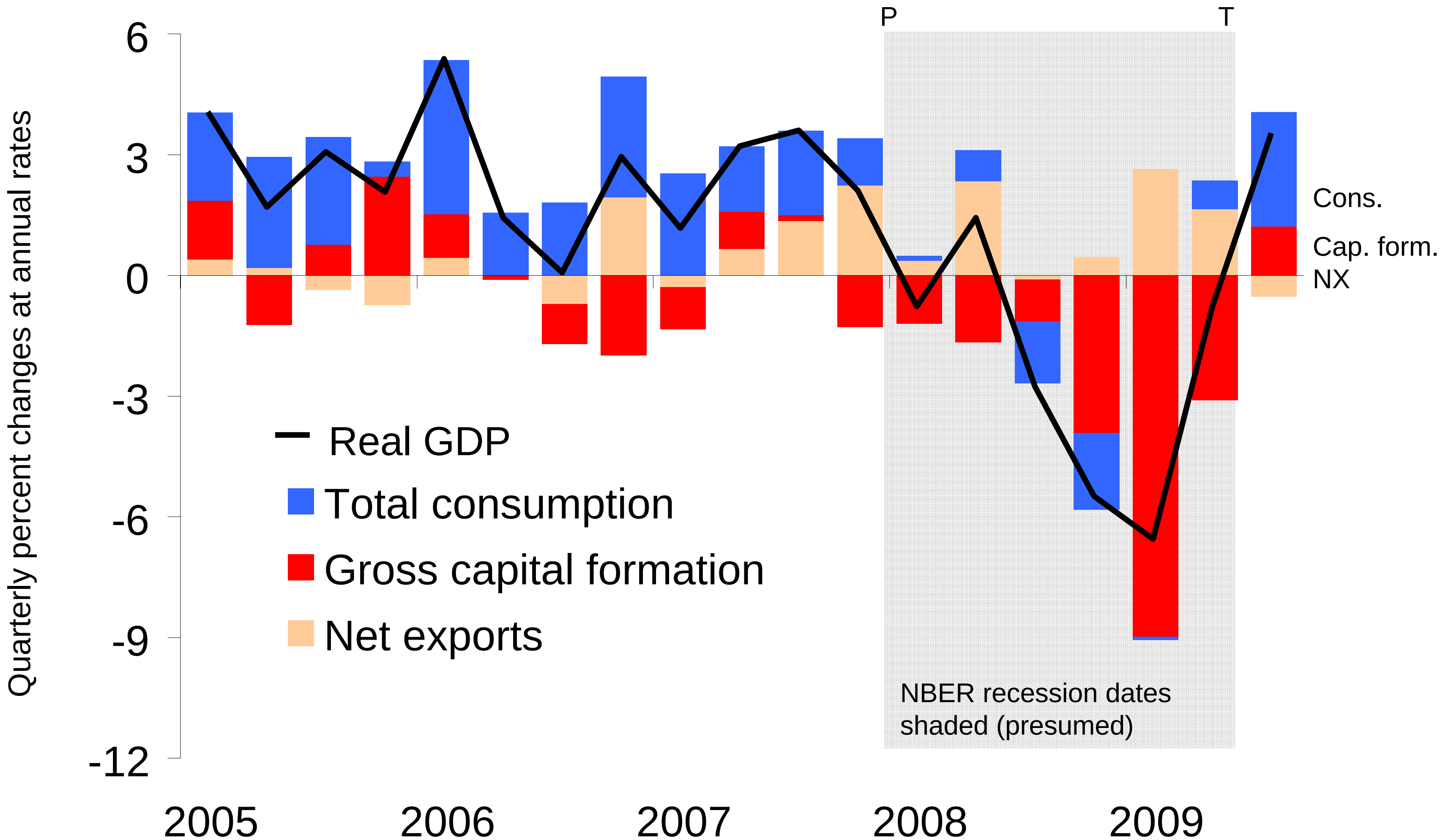



[2]Annualized quarterly contributions to real GDP growth



*Source*: International Monetary Fund, World Economic Report (October 2009)
http://www.imf.org/external/pubs/ft/weo/2009/02/c2/fig2_2.pdf (and /fig2_3.pdf)

# U.S. macroeconomic growth components






*Source*: Bureau of Economic Analysis, U.S. Department of Commerce, graphic and calculations by TZE

# Appendix 2:  November 2009 NABE forecast details

# NABE U.S. economic forecasts

| | GDP % change, annual rate | | Unemployment Rate % | | Nonfarm Employment in thousands, average monthly change | | PCE Price Index, ex Food & Energy % change, annual rate | |
|---|---|---|---|---|---|---|---|---|
| Survey: | 10/09 | 11/09 | 10/09 | 11/09 | 10/09 | 11/09 | 10/09 | 11/09 |
| Q1-09 | -6.4 | -6.4 | 8.1 | 8.1 | -691 | -691 | 1.1 | 1.1 |
| Q2-09 | -0.7 | -0.7 | 9.3 | 9.3 | -428 | -428 | 2.0 | 2.0 |
| Q3-09 | 3.4 | 3.5 | 9.6 | 9.6 | -256 | -256 | 1.4 | 1.4 |
| Q4-09 | 2.4 | 3.0 | 10.0 | 10.0 | -103 | -141 | 1.1 | 1.4 |
| Q1-10 | 2.5 | 3.0 | 10.0 | 10.0 | 12 | 0 | 1.3 | 1.4 |
| Q2-10 | 2.9 | 3.1 | 9.9 | 10.0 | 98 | 115 | 1.4 | 1.4 |
| Q3-10 | 3.0 | 3.2 | 9.7 | 9.8 | 138 | 151 | 1.7 | 1.6 |
| Q4-10 | 3.0 | 3.3 | 9.5 | 9.6 | 195 | 200 | 1.6 | 1.7 |



*Source*: National Association for Business Economics (November 2009)

# NABE forecast ranges

| | 2009 Forecast | | | 2010 Forecast | | |
|---|---|---|---|---|---|---|
| | Median | Five Lowest | Five Highest | Median | Five Lowest | Five Highest |
| Real Gross Domestic Product, % change, Q4/Q4 | -0.2 | -2.3 | 1.0 | 3.2 | 0.9 | 4.5 |
| Consumer Price Index, % change, Q4/Q4 | 1.2 | -0.1 | 2.4 | 1.5 | 0.6 | 3.2 |
| Personal Consumption Expenditures (PCE) Price Index less food & energy, % change, Q4/Q4 | 1.5 | 0.0 | 2.0 | 1.5 | -0.4 | 2.9 |
| Civilian Unemployment Rate, % annual average | 9.2 | 9.0 | 9.5 | 9.8 | 8.4 | 10.5 |
| Federal Funds Target, % year-end | 0.125 | 0.100 | 0.220 | 1.000 | 0.175 | 2.450 |
| 10-Year Treasury Note Yield, % year-end | 3.50 | 3.27 | 3.81 | 4.15 | 3.68 | 4.97 |
| Foreign Exchange Rate, US$ per Euro, December average | 1.48 | 1.38 | 1.54 | 1.47 | 1.22 | 1.63 |
| Housing Starts, millions of units | 0.58 | 0.56 | 0.69 | 0.79 | 0.63 | 1.02 |
| Home Prices, FHFA, % change, Q4/Q4 | -3.4 | -7.8 | 2.5 | 2.0 | -5.0 | 5.0 |
| Oil Prices, $ per barrel, December average | 76 | 61 | 83 | 80 | 62 | 95 |
| S&P 500 Index, December 31 | 1095 | 1015 | 1216 | 1199 | 1080 | 1436 |



*Source*: National Association for Business Economics (November 2009)

# NABE forecast survey panel

Michael R. Englund, Action Economics, LLC

Thomas Kevin Swift, American Chemistry Council

James W. Kleckley, Bureau of Business Research, East Carolina University

Justin Garosi, California Legislative Analyst's Office

Jonathan Oxborrow, Caterpillar Inc.

Bill Watkins / Dan Hamilton, Center for Economic Research and Forecasting, California Lutheran University

Constantine G. Soras, CGS Economic Consulting, Inc

Esmael Adibi, Chapman University

Jan Reid, Coast Economic Consulting

Robert Fry, DuPont

Jim Meil, Eaton Corporation

Douglas Lee, Ecnomics from Washington

Susan M. Sterne, Economic Analysis Associates, Inc.

Anne Ramstetter Wenzel, Econosystems

Doug Duncan, Fannie Mae

Michael Paslawskyj, Federal Deposit Insurance Corporation

Brian S. Wesbury / Robert Stein, First Trust Advisors

Emily Kolinski Morris / Ellen Hughes-Cromwick, Ford Motor Company

Rajeev Dhawan, Georgia State University

Gary Ciminero, GLC Financial Economics

J. Paul Horne, Independent Market Economist

Margaret McCarthy / Jeffrey Werling, Inforum, Univ. of Maryland

John Pope, Investment Economics

Richard Rippe, ISI Group

Bill Cheney, John Hancock Financial Services

Sandy Batten / Robert Mellman, JP Morgan

Jim Glassman, JPMorganChase

Jack Kleinhenz, Kleinhenz and Associates

Brian R. Horrigan, Loomis, Sayles, & Co, LP

Chris Varvares, Macroeconomic Advisers

Parul Jain, MacroFin Analytics

Diane C. Swonk, Mesirow Financial

Albert E. DePrince, Middle Tennessee State University

Mark Zandi, Moody's Economy.com

Richard Berner / David Greenlaw, Morgan Stanley

Joel L. Naroff, Naroff Economic Advisors

William Dunkelberg, National Federation of Independent Business

J F Smith, Parsec Financial

Lynn Reaser, Point Loma Nazarene University

Stephen Gallagher, Societe Generale

David Wyss, Standard & Poor's

Kurt Karl, Swiss Re

Jeff Thredgold, Thredgold Economic Associates

Sean M Snaith, University of Central Florida

Charles Devlin, University of Pittsburgh Medical Center

John Silvia, Wells Fargo

Richard J. DeKaser, Woodley Park Research

Jay Woodworth, Woodworth Holdings, Ltd.

*Source*: National Association for Business Economics (November 2009)

# Appendix 3:  from Tax Research and Planning

## High Technology Business Investment Tax Credit

*Annual reported amounts in million current dollars*

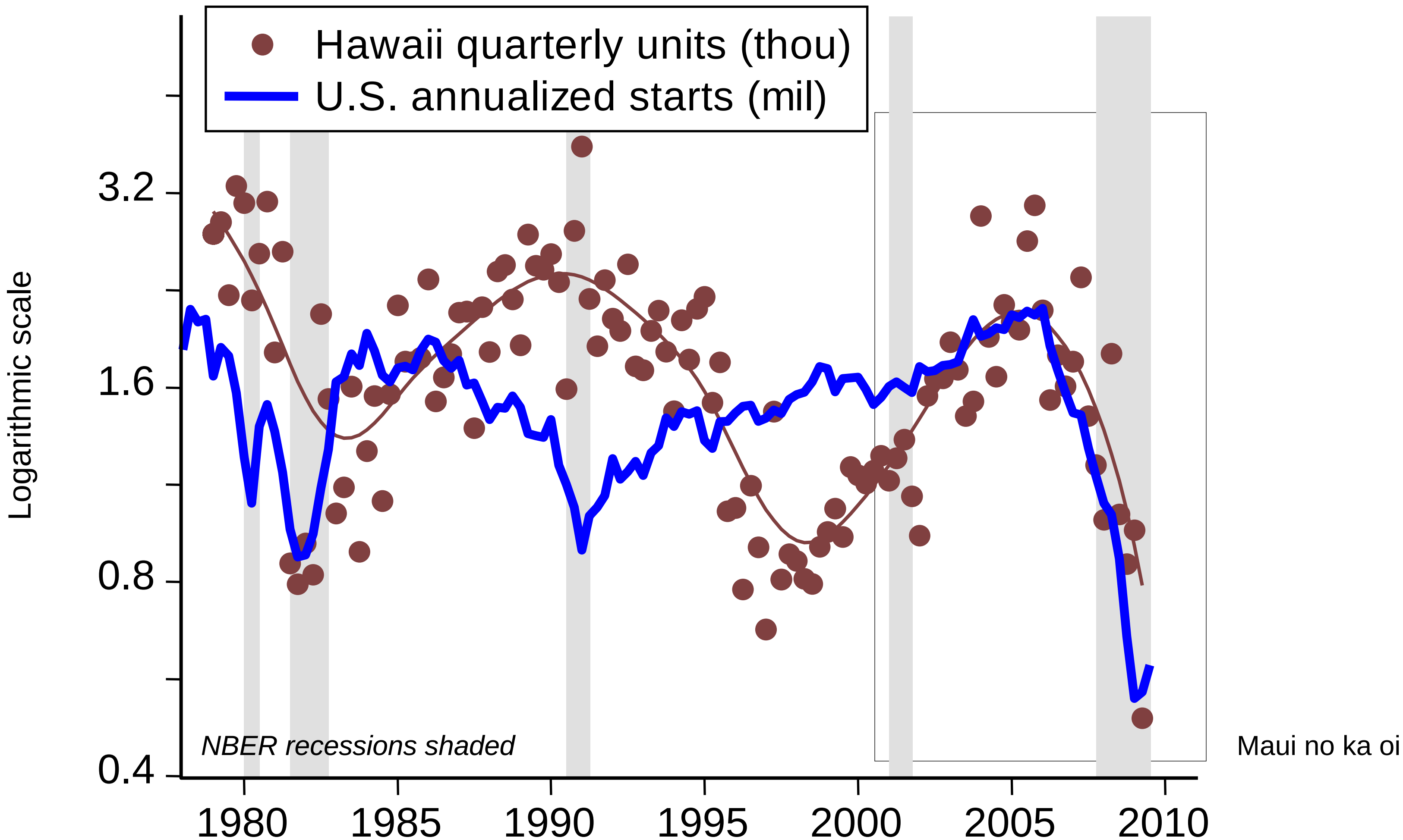
| Actual credits claimed | | Estimated by Department of Taxation | |
|---|---|---|---|
| FY 2001 | 0.30 | FY 2008e | 132.20 |
| FY 2002 | 9.60 | FY 2009e | 141.30 |
| FY 2003 | 26.20 | FY 2010e | 144.30 |
| FY 2004 | 38.90 | FY 2011e | 141.00 |
| FY 2005 | 50.50 | FY 2012e | 81.30 |
| FY 2006 | 70.00 | FY 2013e | 50.00 |
| FY 2007 | 105.40 | FY 2014e | 25.00 |
| | | FY 2015e | 12.50 |

*Source:*

Letter from Paul Brewbaker, Chair, Hawaii Council on Revenues to Senator Donna Kim, Chair, Senate Committee on Ways and Means Representative Marcus Oshiro Chair, House Finance Committee (January 20, 2009)

# Appendix 4: what part of “no glut” means “glut?”

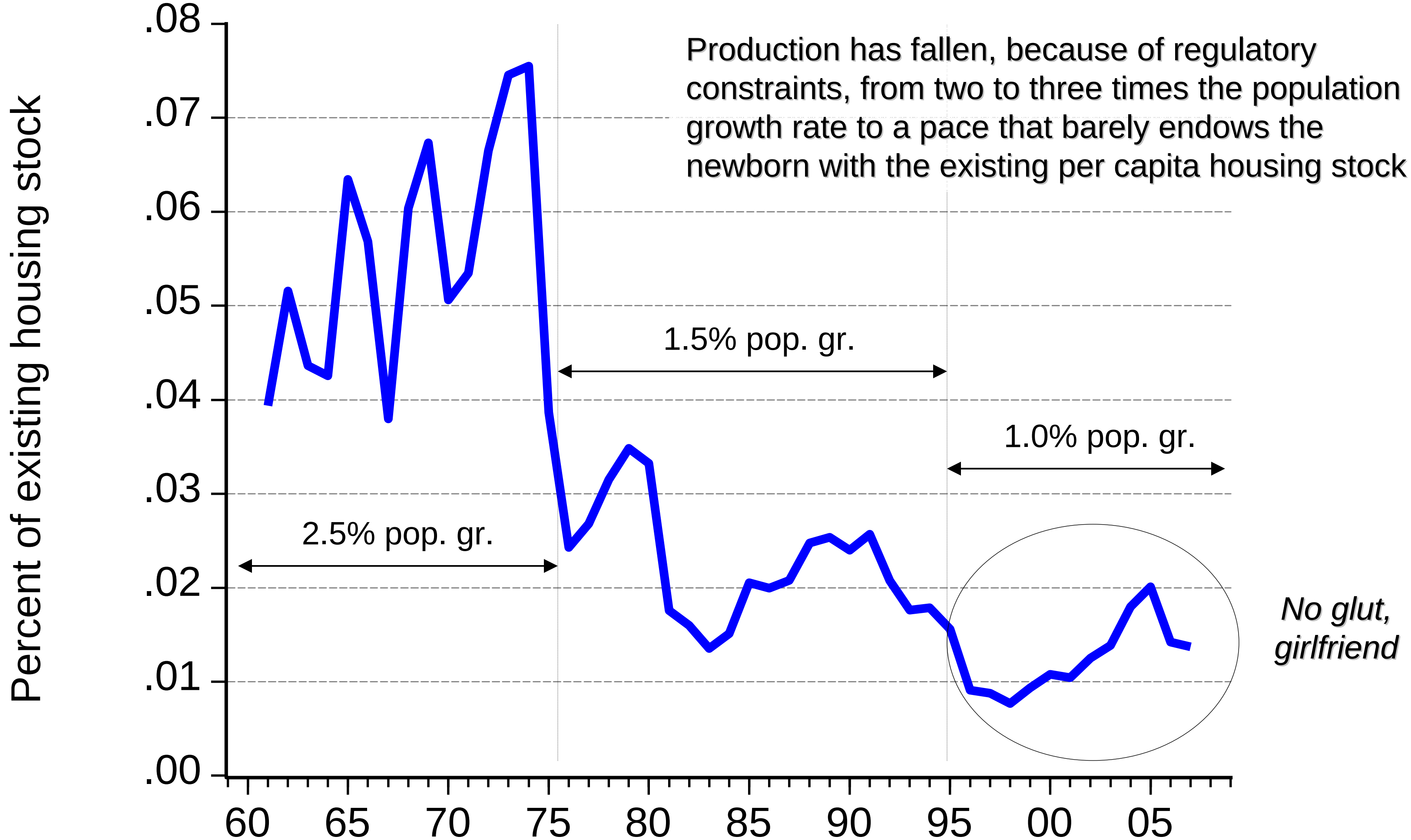
# Hawaii and U.S. homebuilding cycles in-phase






*Sources*: Federal Reserve Bank of St. Louis (from U.S. Census Bureau), Hawaii DBEDT; seasonal adjustment of Hawaii data and H-P filter trend calculations by TZE

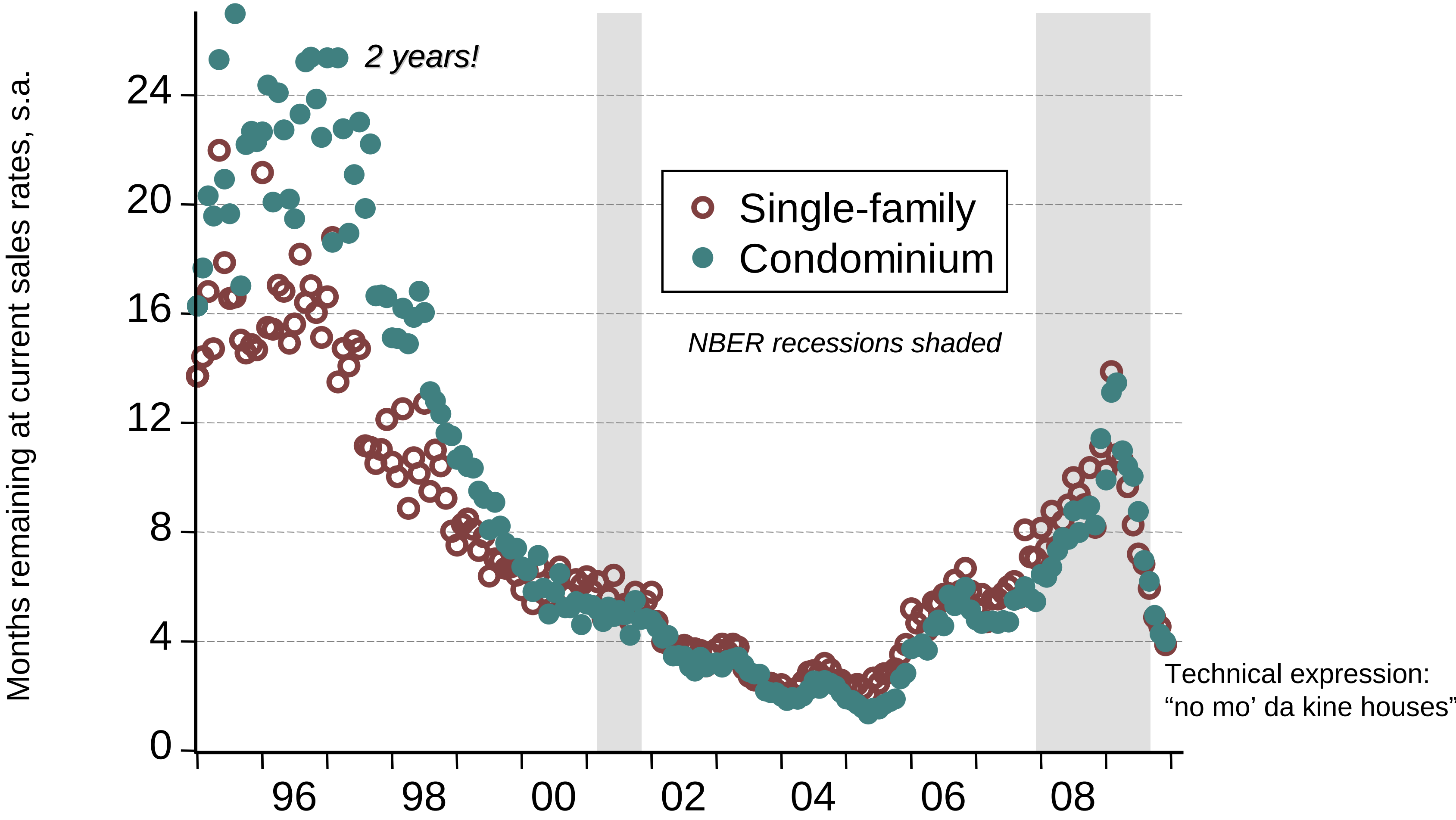
# Hawaii new housing units / existing inventory: $(I_t / K_t)$ low production rates leave less overbuilding






Sources: County Building Departments; Bank of Hawaii; U.S. Bureau of the Census; Hawaii DBEDT; TZE

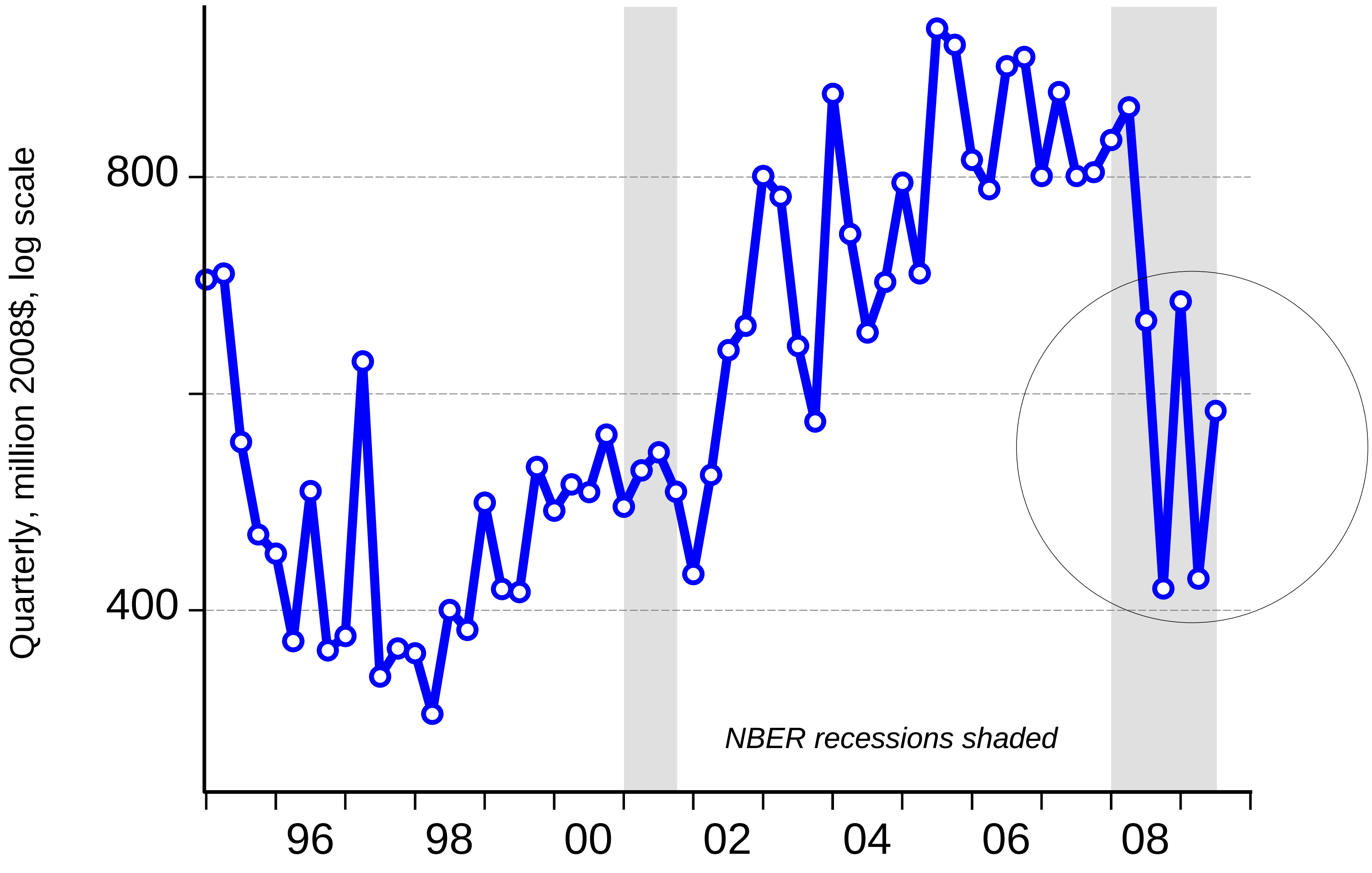
# Oahu months of existing home inventory remaining






*Source*: Honolulu Board of Realtors; seasonal-adjustment and Hodrick-Prescott filter trend by TZE

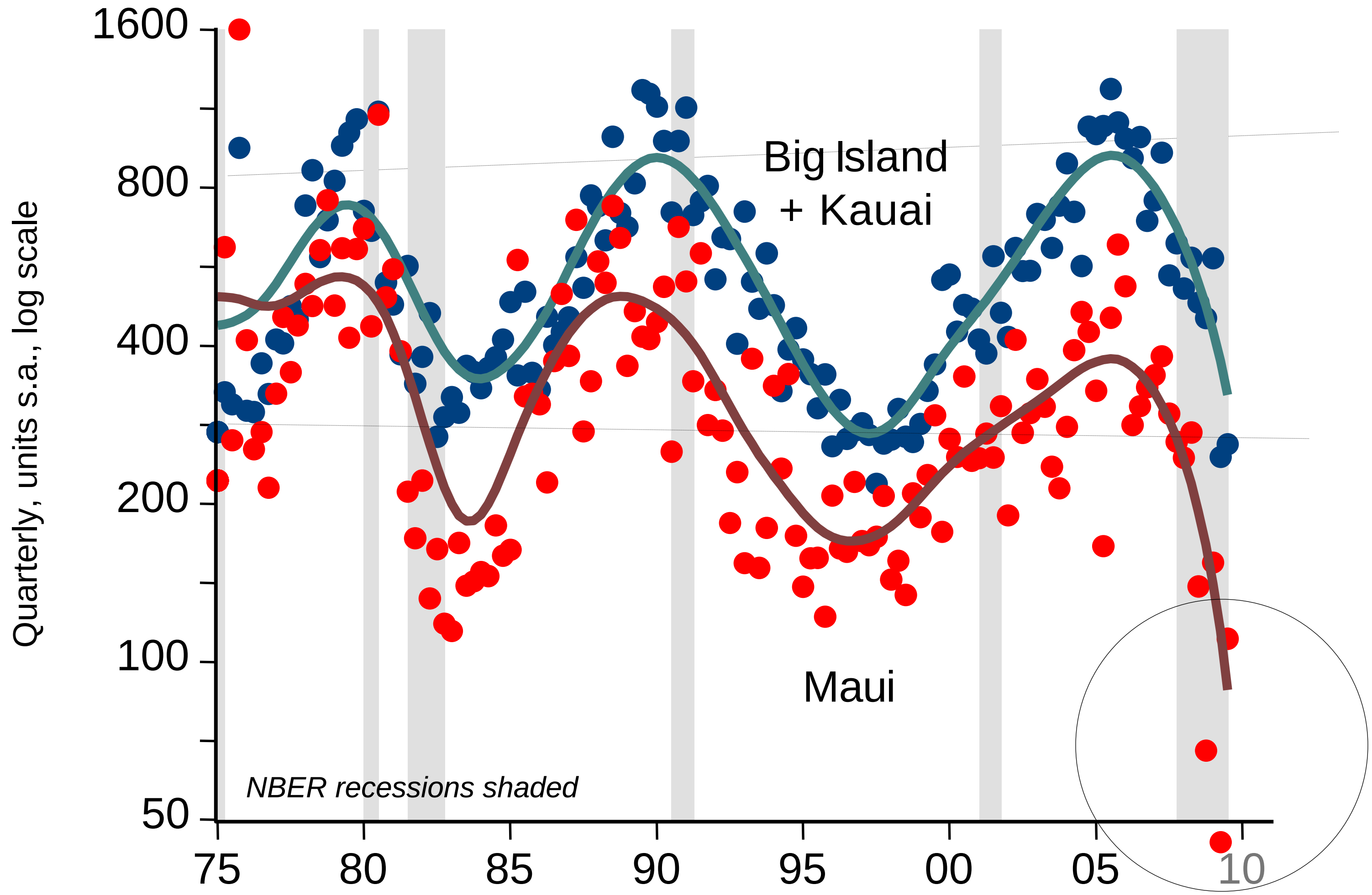
# Credit crunch or regulatory crush?
# Hawaii statewide real private building permits






*Sources*: Hawaii DBEDT; deflation and seasonal adjustment by TZE; log scale

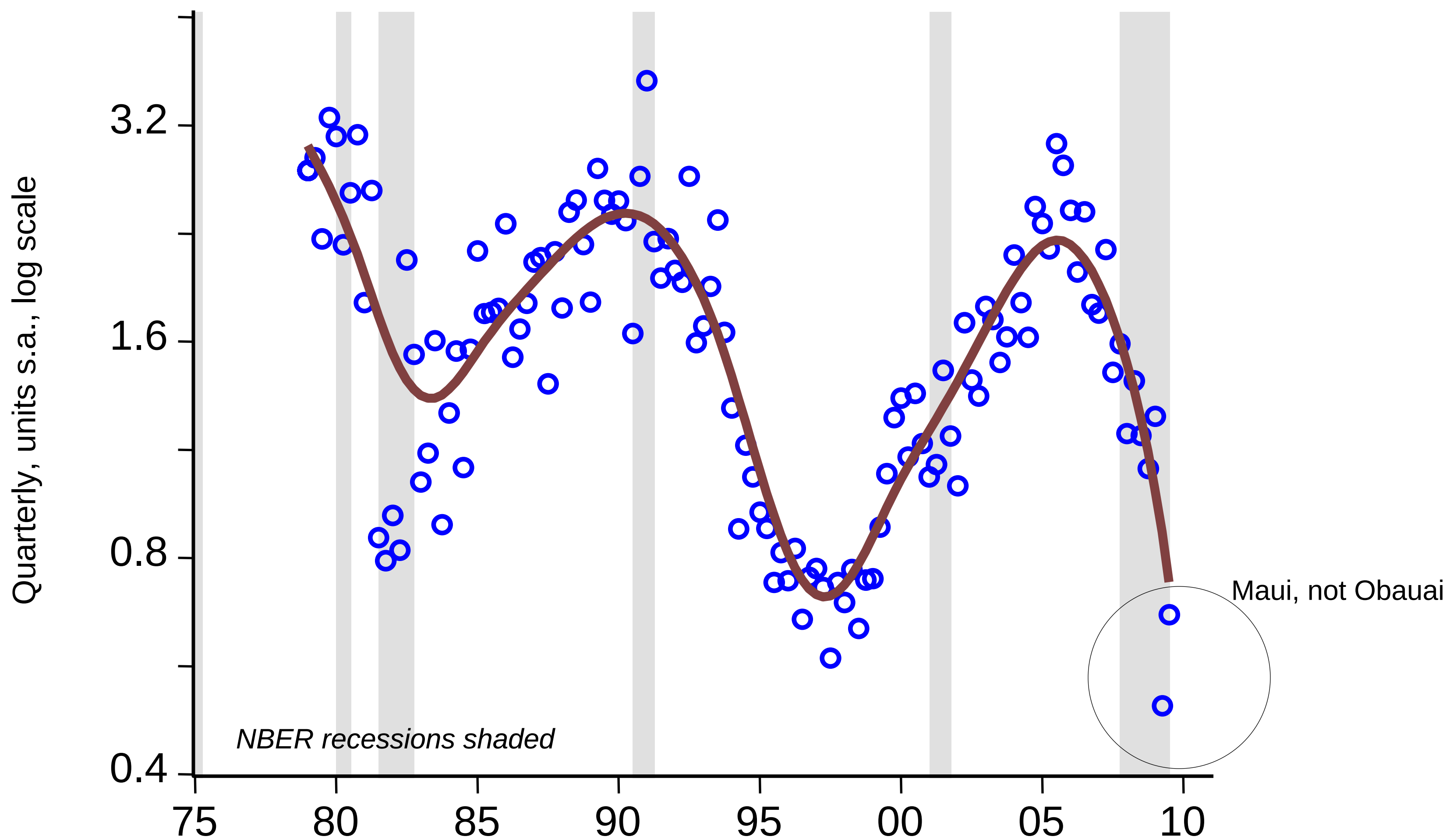
# Neighbor Island housing construction authorizations






*Sources*: Hawaii DBEDT, TZE; seasonal adjustment and Hodrick-Prescott filter trend calculations by TZE

# Statewide housing unit authorizations

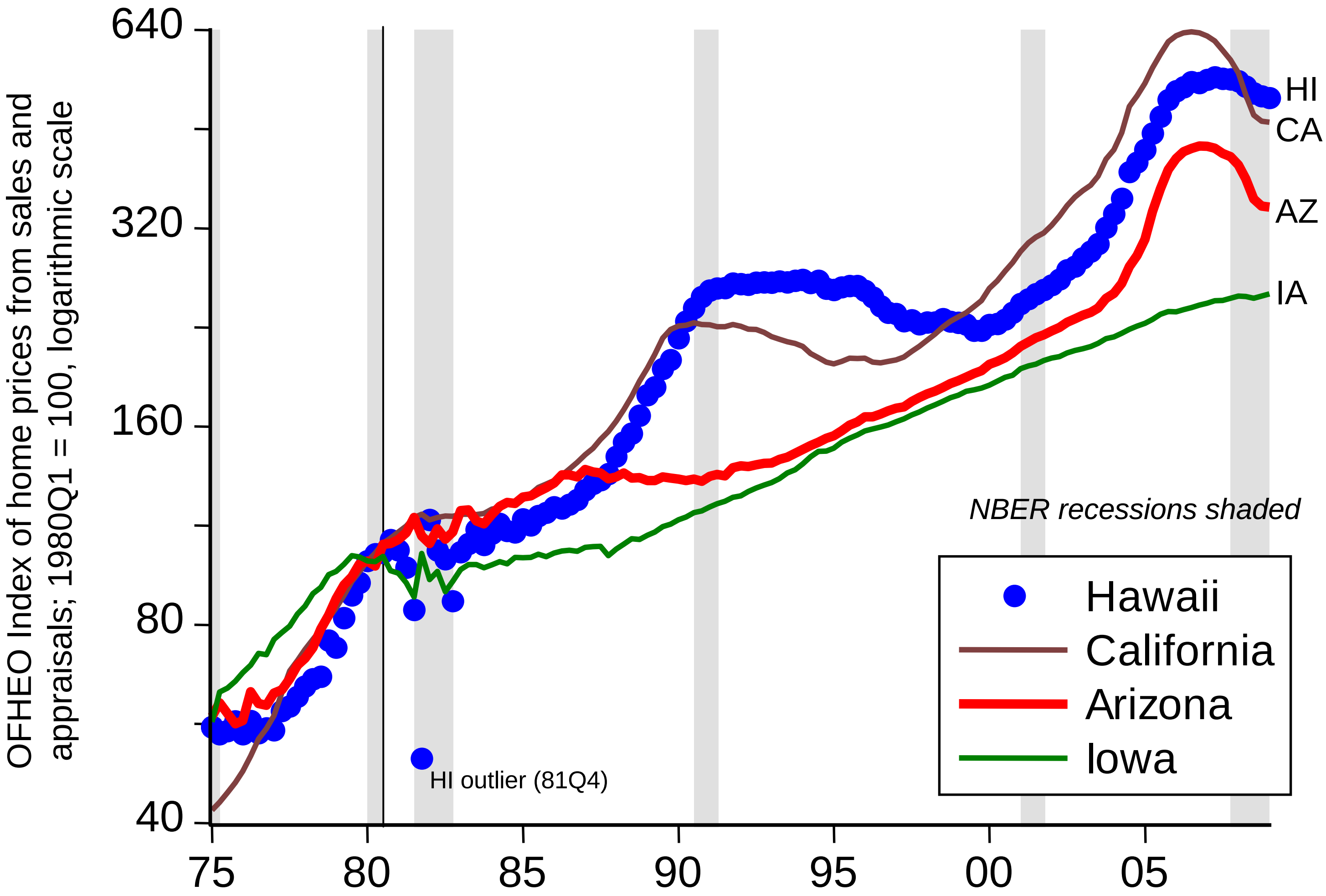





*Sources*: Hawaii DBEDT, TZE; seasonal adjustment and Hodrick-Prescott filter trend calculations by TZE

# Appendix 5:  a cycle is not a bubble

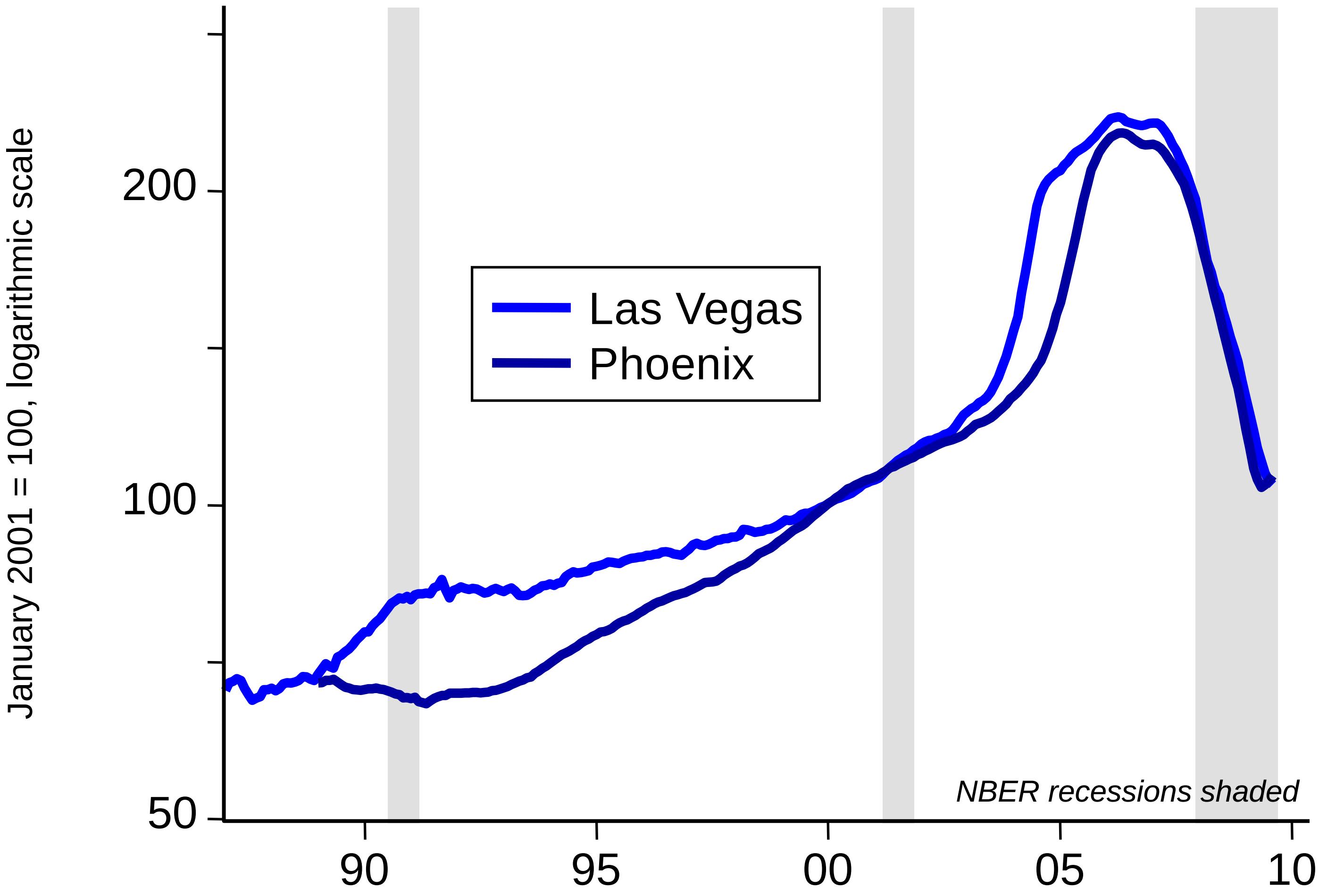
# Some markets less prone to housing price cycles became bubblicious in the recent one (but not Iowa)




Slide copyright TZ Economics

*Source*: Federal Housing Finance Administration

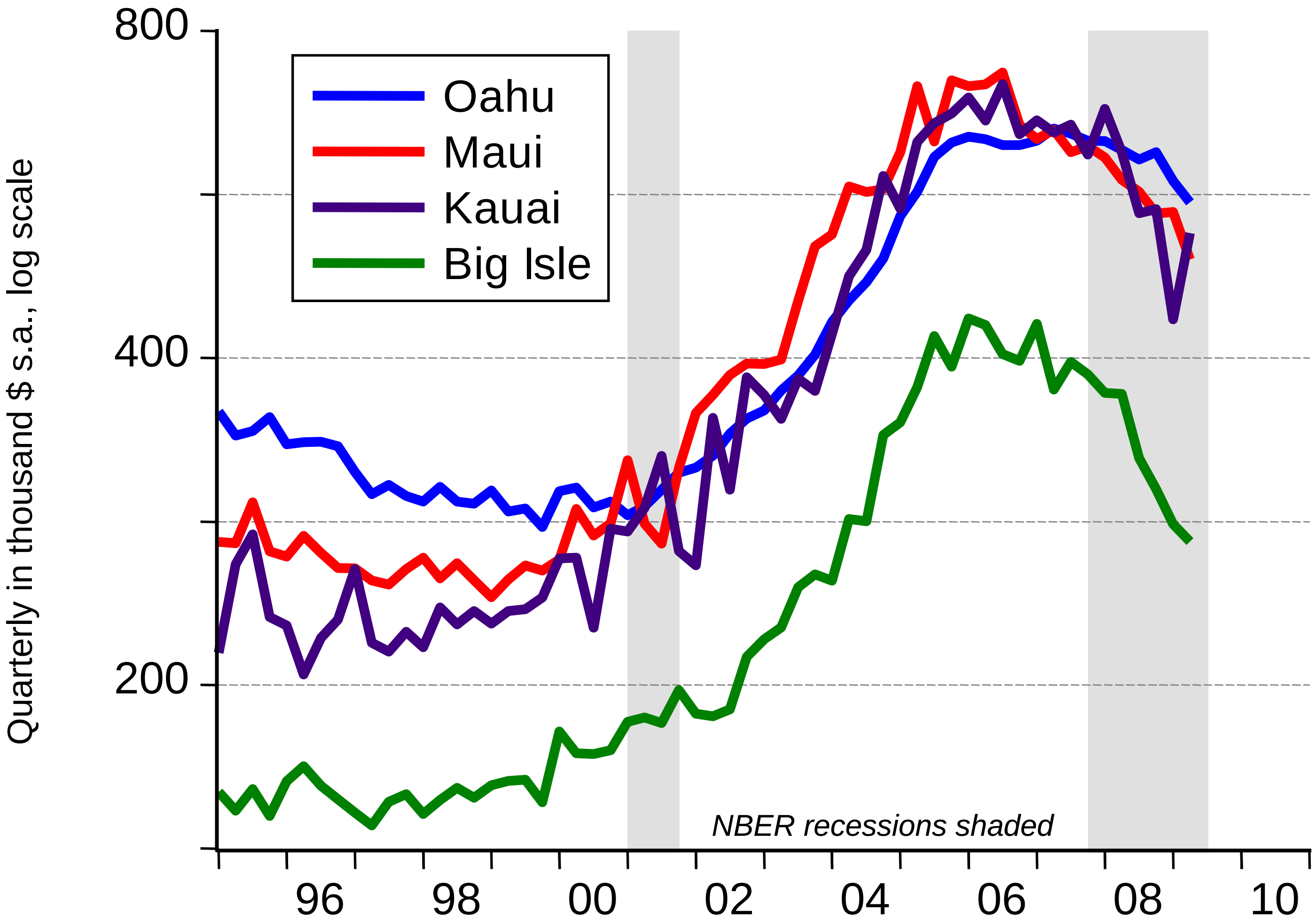
# Case-Shiller prices for two markets whose bubbles clearly were “sub-prime” event-related (demand)






*Source*: Standard & Poor’s; TZE

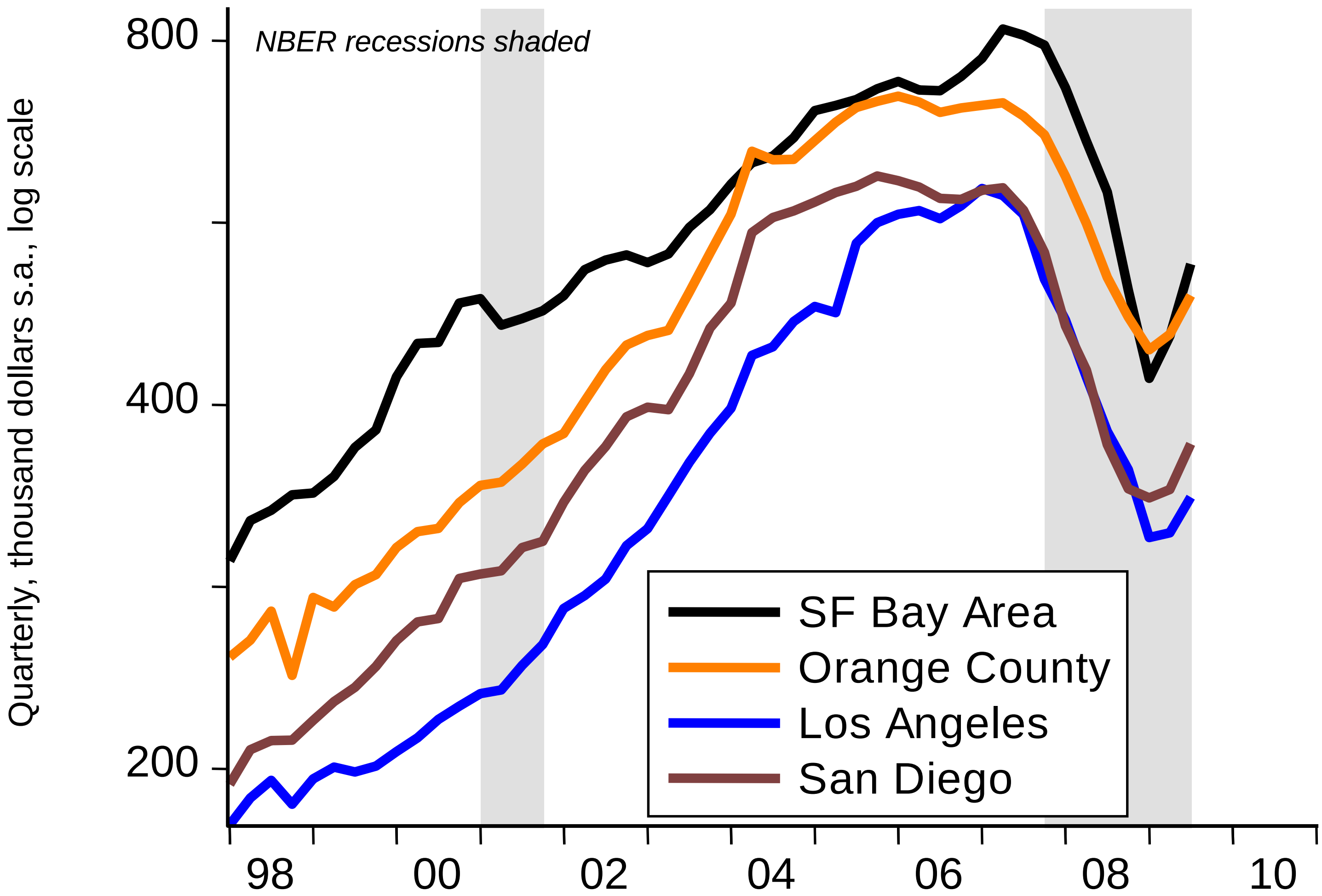
# Median Hawaii existing single-family home prices






*Source*: UHERO; seasonal adjustment by TZE (data only through second quarter 2009)

# All California comps rebounded in 2009: median single-family home prices (NAR)

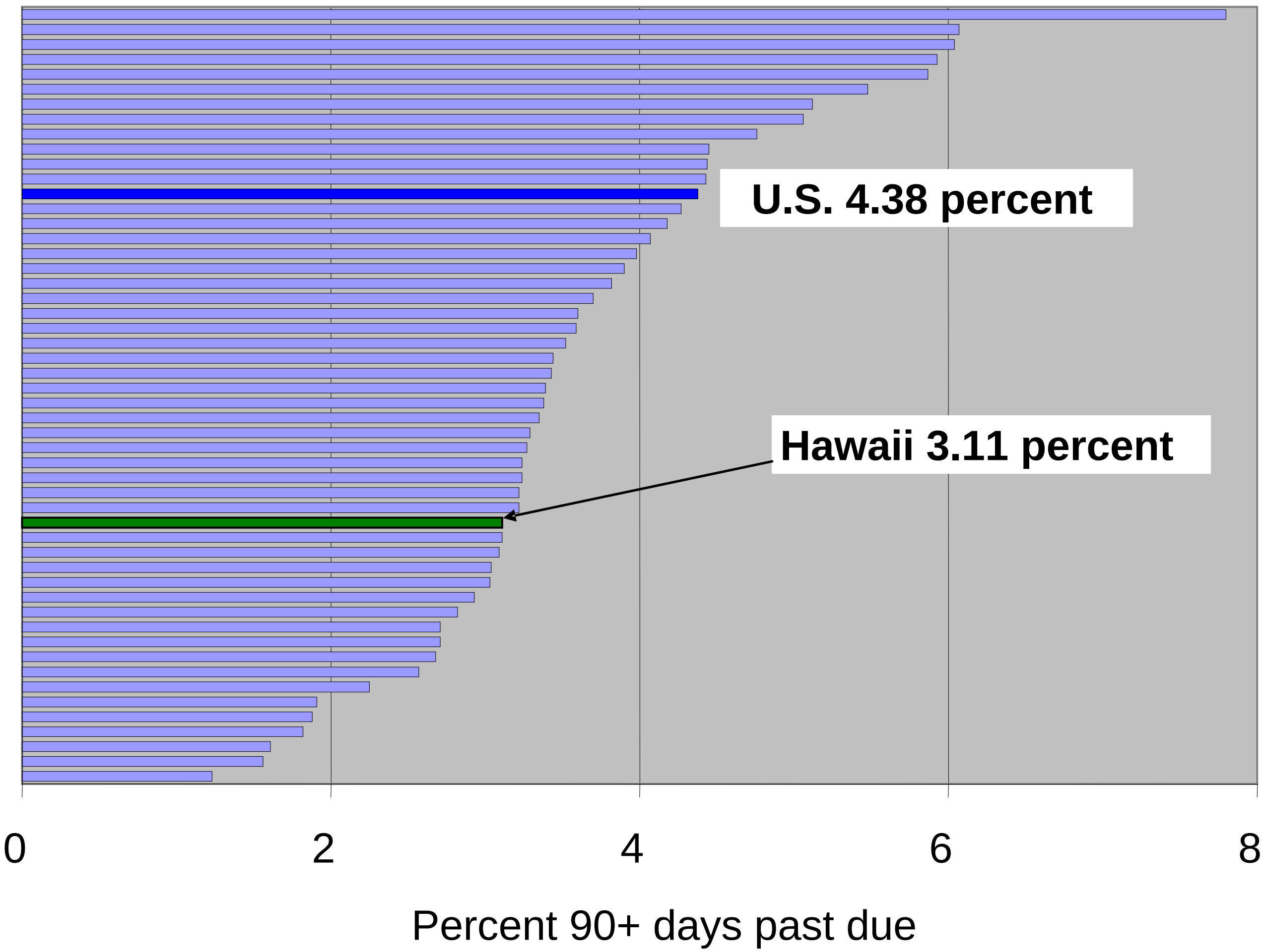





*Sources*: National Association of Realtors; data are seasonally-adjusted by TZE through third quarter 2009

# Appendix 6: mortgage delinquency

# 90+ days past due mortgage delinquency




| | | |
|---|---|---|
| 1 | Nevada | 7.80 |
| 2 | Florida | 6.07 |
| 3 | Arizona | 6.04 |
| 4 | Michigan | 5.93 |
| 5 | California | 5.87 |
| 6 | Mississippi | 5.48 |
| 7 | Georgia | 5.12 |
| 8 | Indiana | 5.06 |
| 9 | Illinois | 4.76 |
| 10 | Rhode Island | 4.45 |
| 11 | Ohio | 4.44 |
| 12 | Maryland | 4.43 |
| 13 | Tennessee | 4.27 |
| 14 | Massachusetts | 4.18 |
| 15 | Alabama | 4.07 |

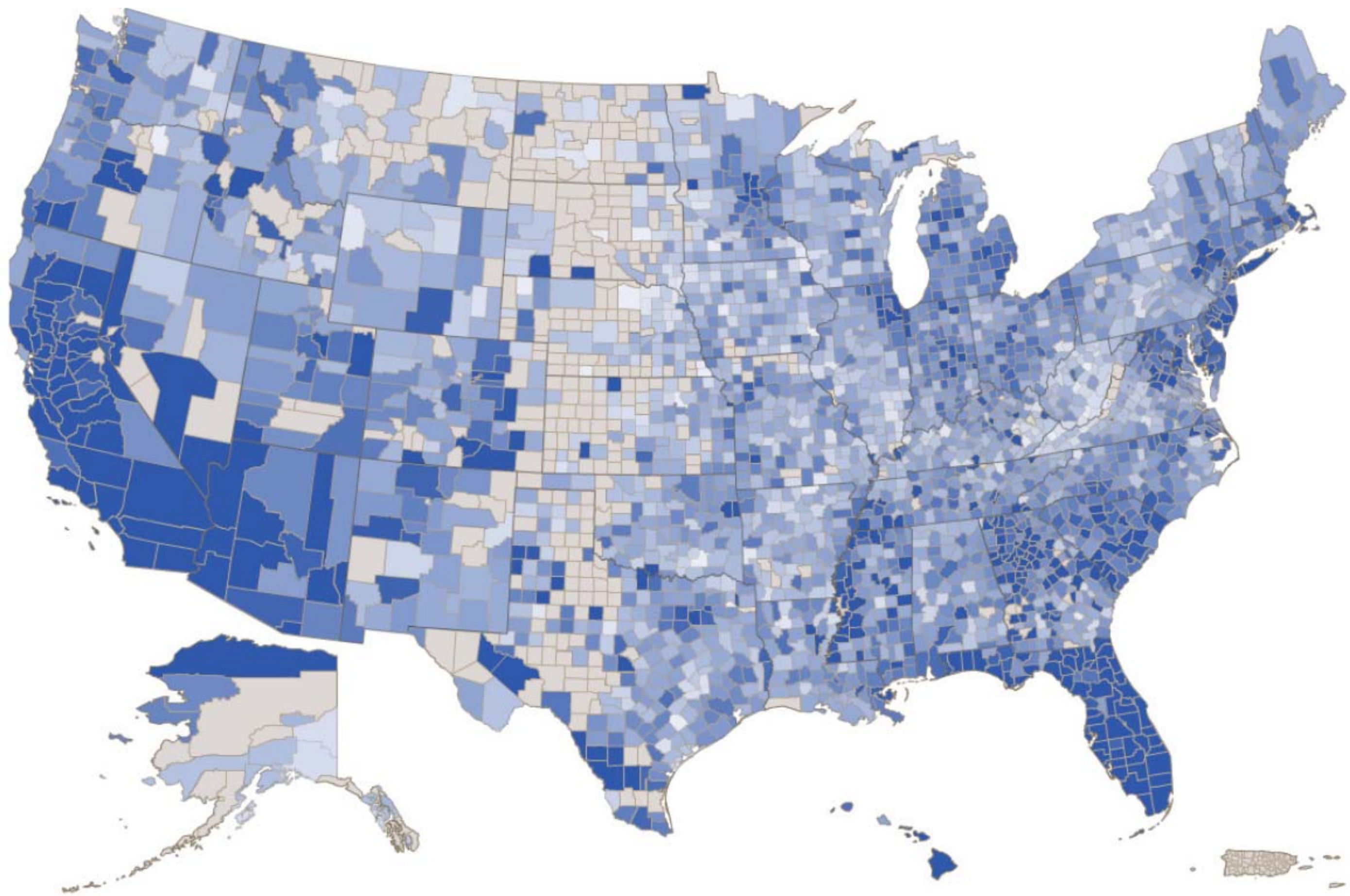


*Source*: Mortgage Bankers Association (third quarter 2009)

# 90+ days mortgage delinquency by county

Selected Counties:
(percent of loans)

| | |
|---|---|
| Dade, FL | 20.08 |
| Riverside, CA | 14.72 |
| Clark, NV | 14.70 |
| Maui, HI | 7.36 |
| Hawaii, HI | 6.48 |
| Kauai, HI | 4.52 |
| Honolulu, HI | 2.83 |

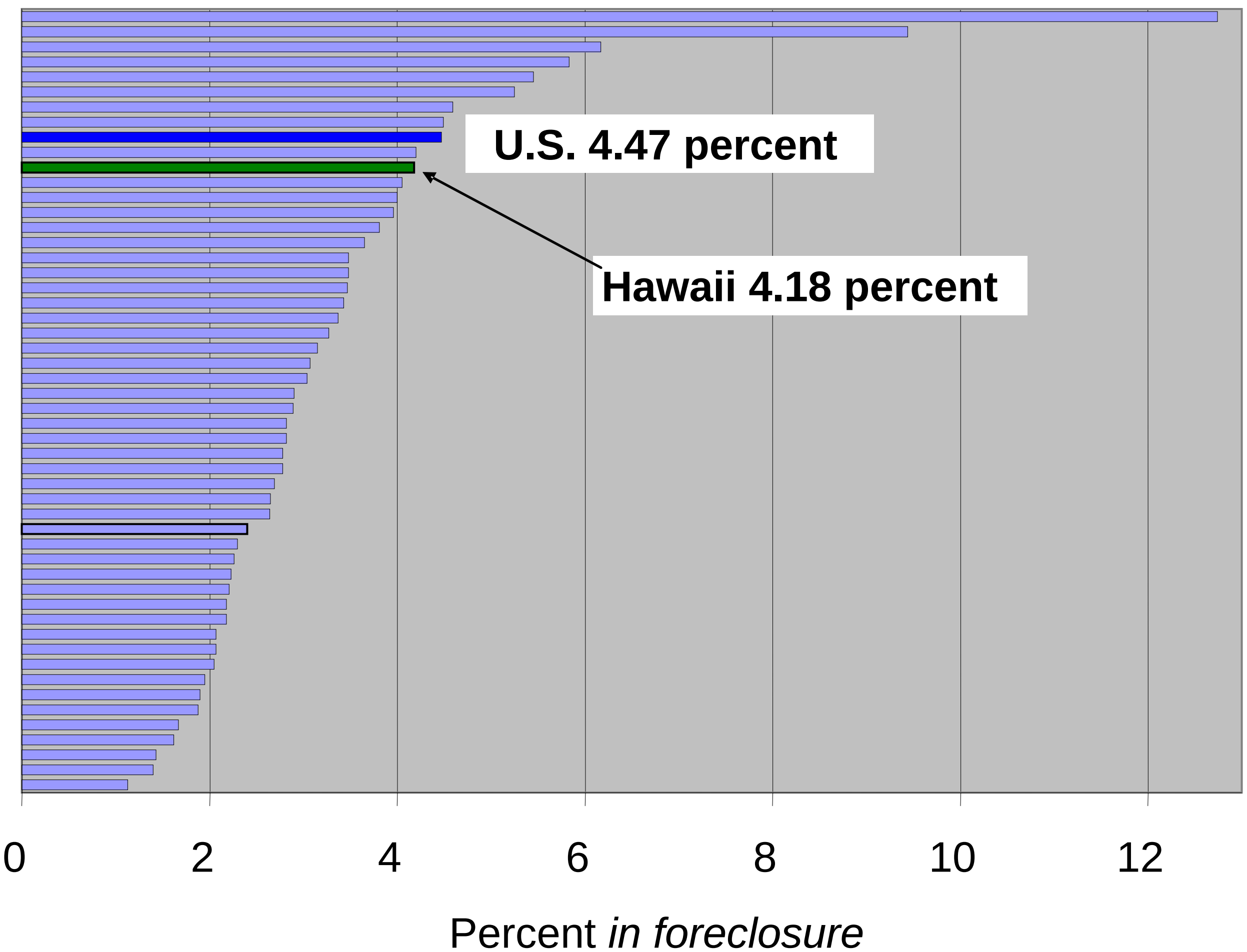


Despite local differences, *correlated* rise in delinquency is a *systemic* problem



*Source*: data for third quarter 2009, Federal Reserve Bank of New York http://data.newyorkfed.org/creditconditions/

# Foreclosure inventory as percent of loans, end-2009Q3



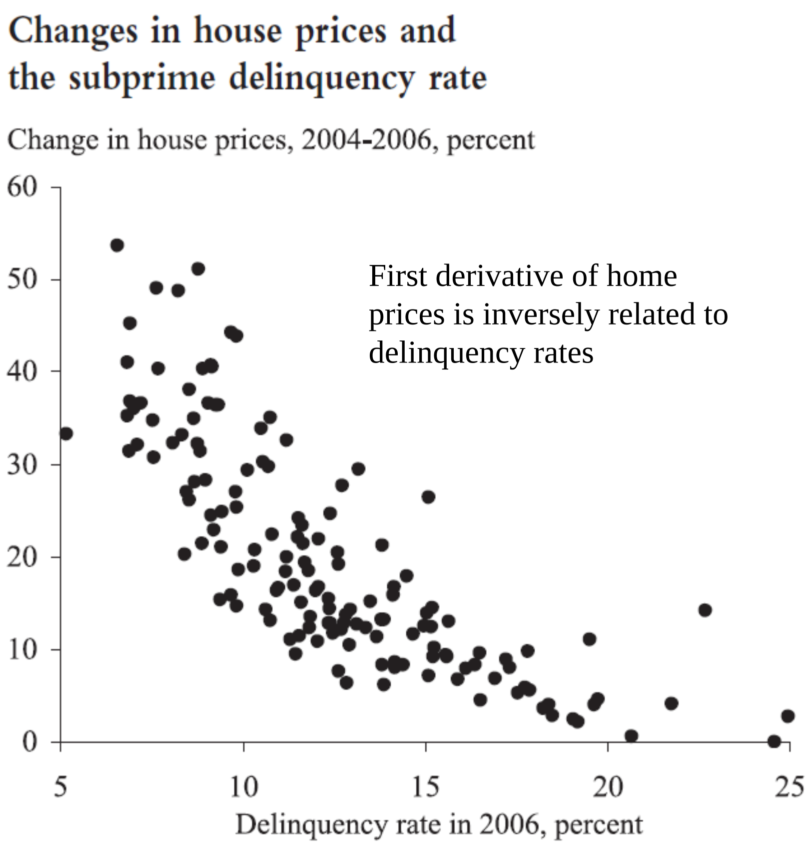

| | | |
|---|---|---|
| 1 | Florida | 12.74 |
| 2 | Nevada | 9.44 |
| 3 | Arizona | 6.17 |
| 4 | California | 5.83 |
| 5 | Rhode Island | 5.45 |
| 6 | Illinois | 5.25 |
| 7 | Ohio | 4.59 |
| 8 | Michigan | 4.49 |
| 9 | Maine | 4.20 |
| 10 | *Hawaii* | *4.18* |
| 11 | Rhode Island | 4.05 |
| 12 | Indiana | 4.00 |
| 13 | New York | 3.96 |
| 14 | Maryland | 3.81 |
| 15 | Wisconsin | 3.65 |

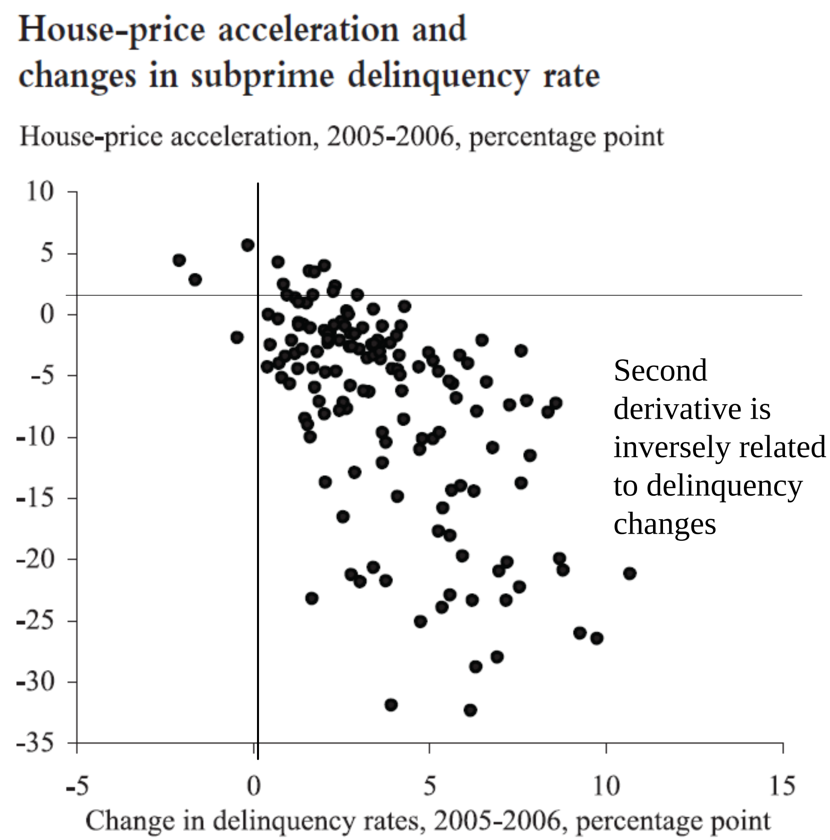


*Source*: Mortgage Bankers Association (third quarter 2009)

# Relationship between price movements and delinquency

Recent literature suggests that high sub-prime delinquency rates are associated low rates of home price appreciation, and increases in delinquencies are associated with home price deceleration.

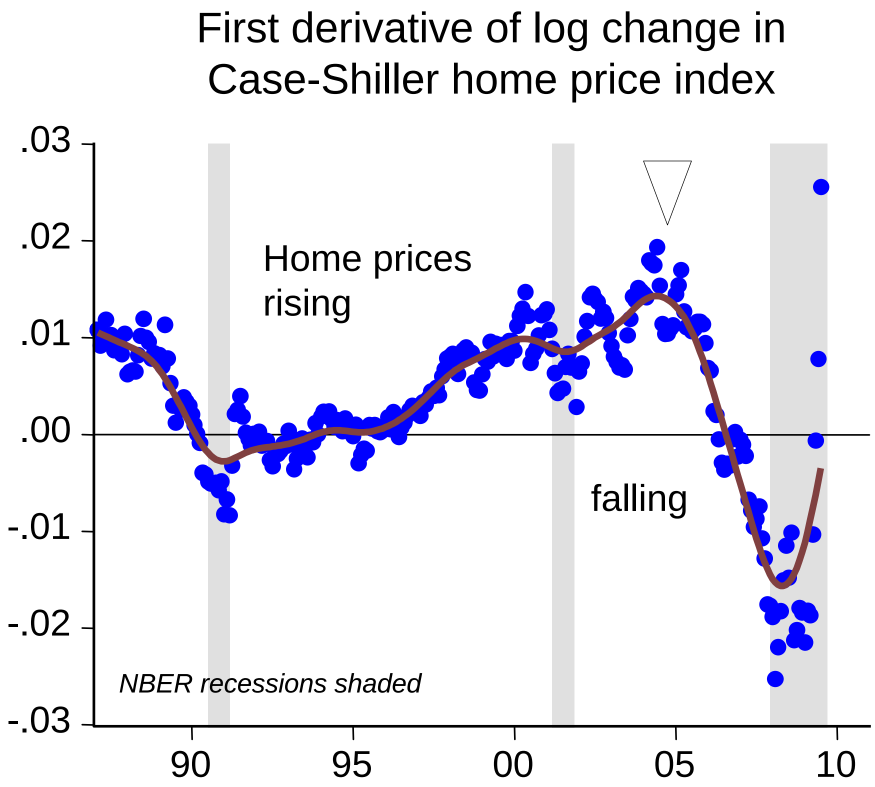


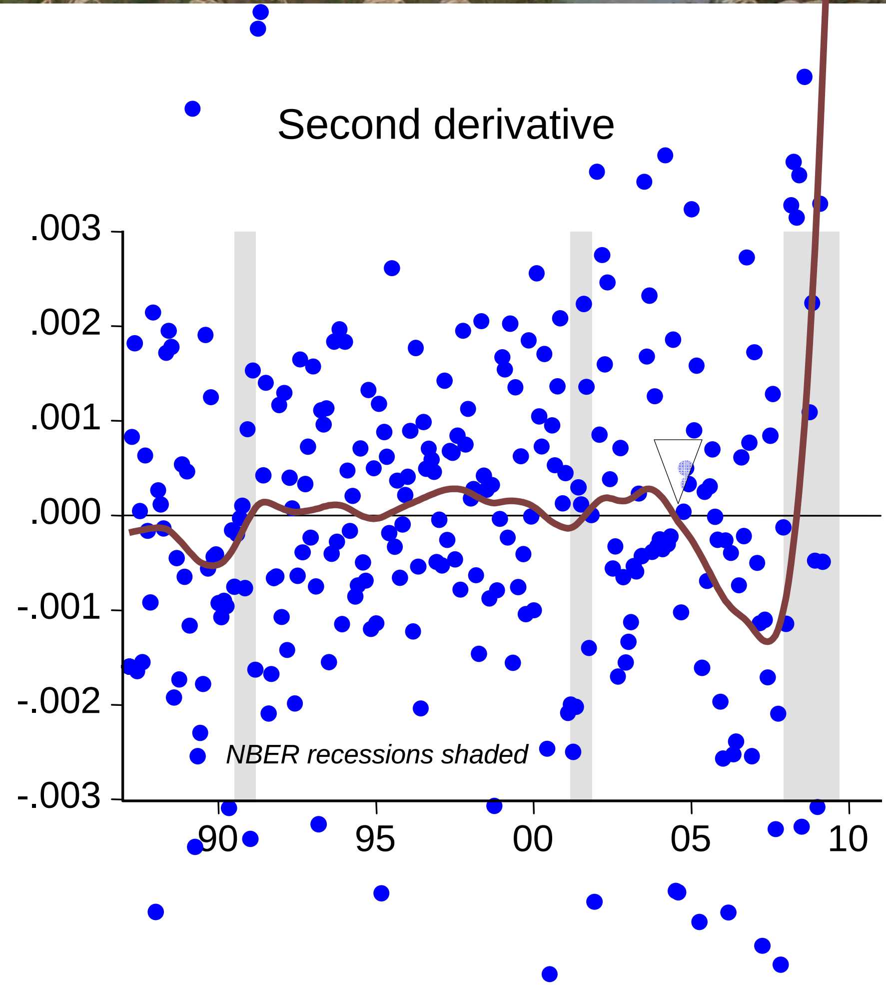






*Source*: Mark Doms, Frederick Furlong, and John Krainer, "House Prices and Subprime Mortgage Delinquencies," *FRBSF Economic Letter* **2007-14** (June 8, 2007); www.frbsf.org/publications/economics/letter/2007/el2007-14.html

# Home price velocity and acceleration ("increasing at decreasing rate")

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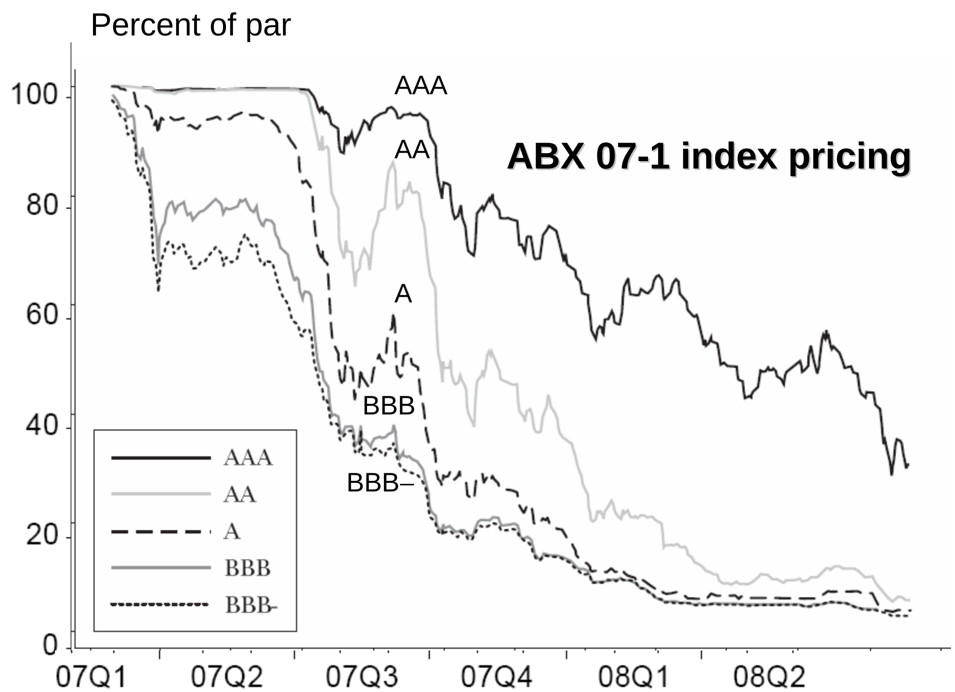
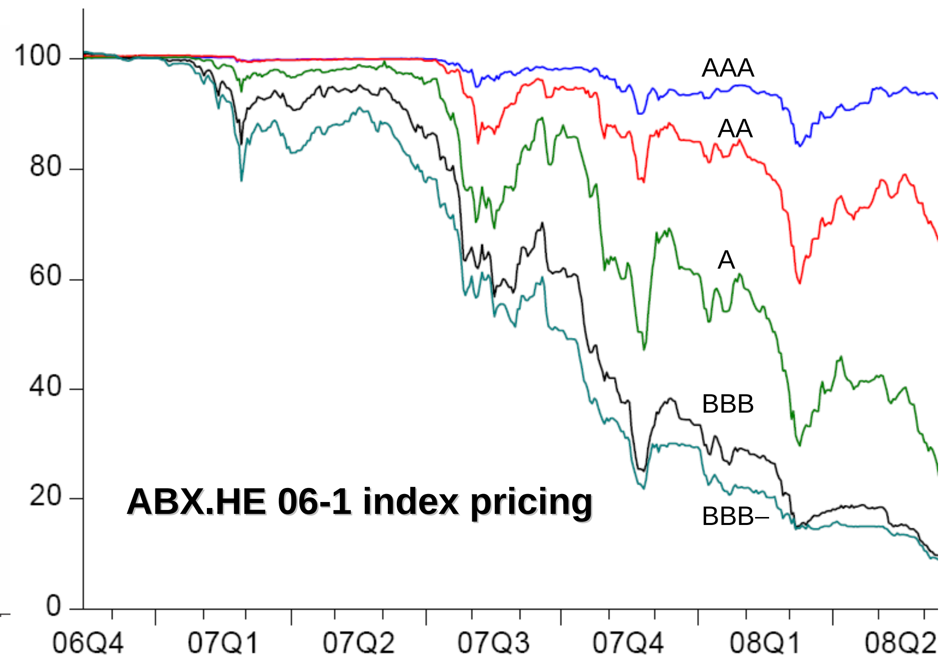
*Source*: calculations by TZE

# Sub-prime mortgage-related risk pricing



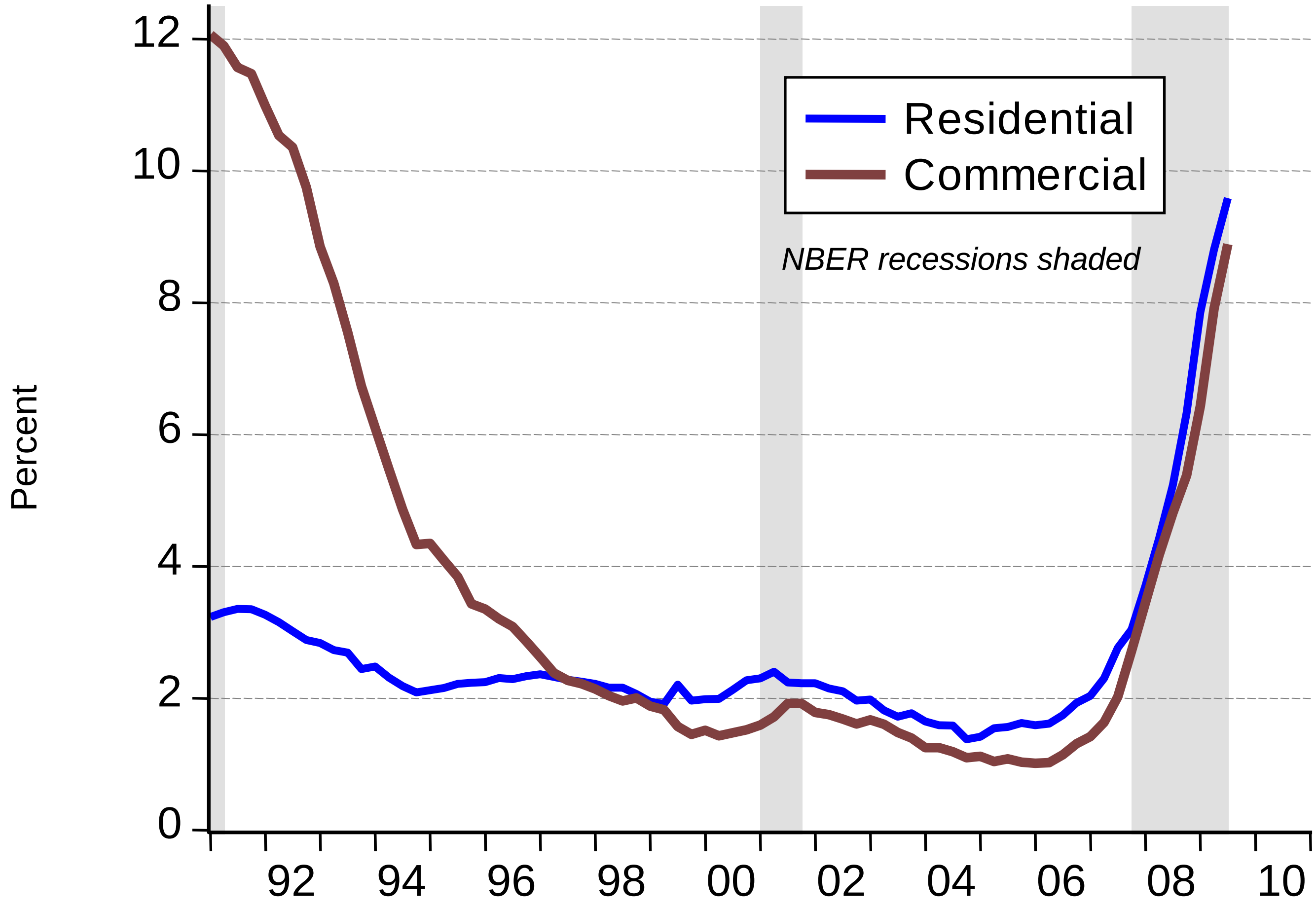

Based on baskets of 20 CDS-referencing asset-backed securities containing sub-prime mortgages and home equity loans of different ratings; after initiation, fee (spread) that buyer pays is (100 – ABX price), plus, the upfront fee that previous sellers pay rises if ABX falls

*Sources*: Graph on left based on data from Markit, via Lehman Live, as published in Markus Brunnermeier, "Deciphering the Liquidity and Credit Crunch 2007-2008, "*Journal of Economic Perspectives,* Vol. **23** No. 1 (Winter 2009) pages 77-100; graph on right is Chart 3. in Ingo Fender and Martin Scheicher, "The pricing of subprime mortgage risk in good times and bad: evidence from the ABX.HE indices," *Bank for International Settlements Working Papers No. 279* (March 2009), page 38.



*Note*: Time (horizontal) scales are slightly different, as in originals

# U.S. commercial bank loan delinquency rates






*Source*: Federal Reserve Board; seasonal adjustment, chart by TZE

# The “no sound bite” view of commercial real estate

- “Looking at the composition of real estate loans in banks’ portfolios, it is hard to argue concentration in commercial real estate loans poses…immediate concern.”
- “Relative share of commercial real estate loans has been stable while the increase in banks’ exposure to real estate has been driven by an increased share of residential real estate loans.”
- Best predictors for commercial real estate loan delinquencies are vacancy rates and economy-wide performance (e.g. GDP) rather than mortgage interest rates and disposable income, which are better predictors for residential real estate loan delinquency (along with employment conditions and credit availability)
- Accumulated responses of commercial real estate delinquency to commercial real estate prices were *negative* (defaults are strategic)
- “Shadow banking system” embedded in securitization channels was more vulnerable than traditional banking channels during the recent crisis
- Rehabilitation of securitization could parallel CMBS refi wave

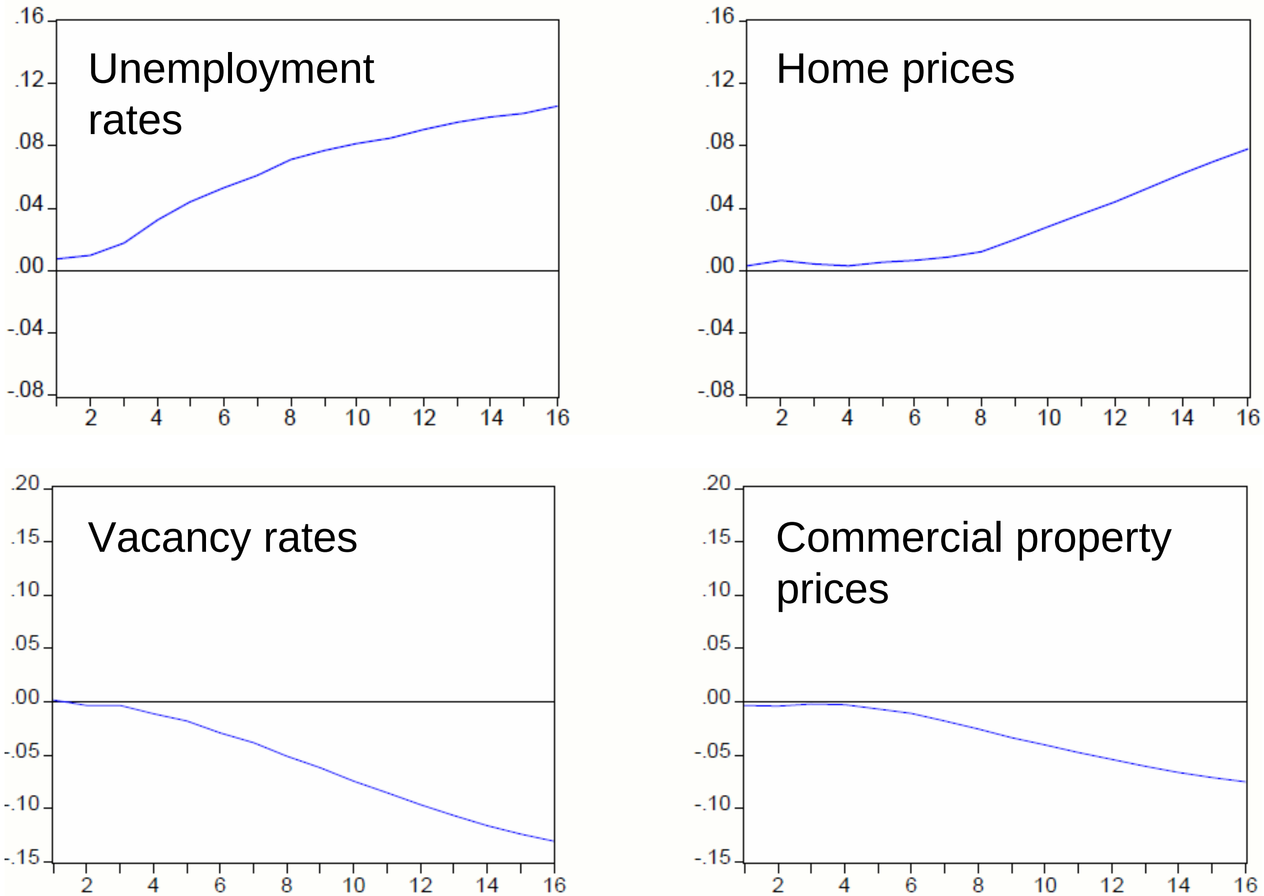
*Source*: Deniz Igan and Marcelo Pinheiro, “Exposure to Real Estate Losses: Evidence from the U.S. Banks,” *IMF Working Paper* **WP/09/79** (April 2009) http://www.imf.org/external/pubs/ft/wp/2009/wp0979.pdf

# Dynamic cumulative delinquency responses

Impulse responses in a vector error-correction model suggest that:

Residential loan delinquency is cumulatively most sensitive over time to…

Commercial real estate loan delinquency is cumulatively most sensitive over time to…



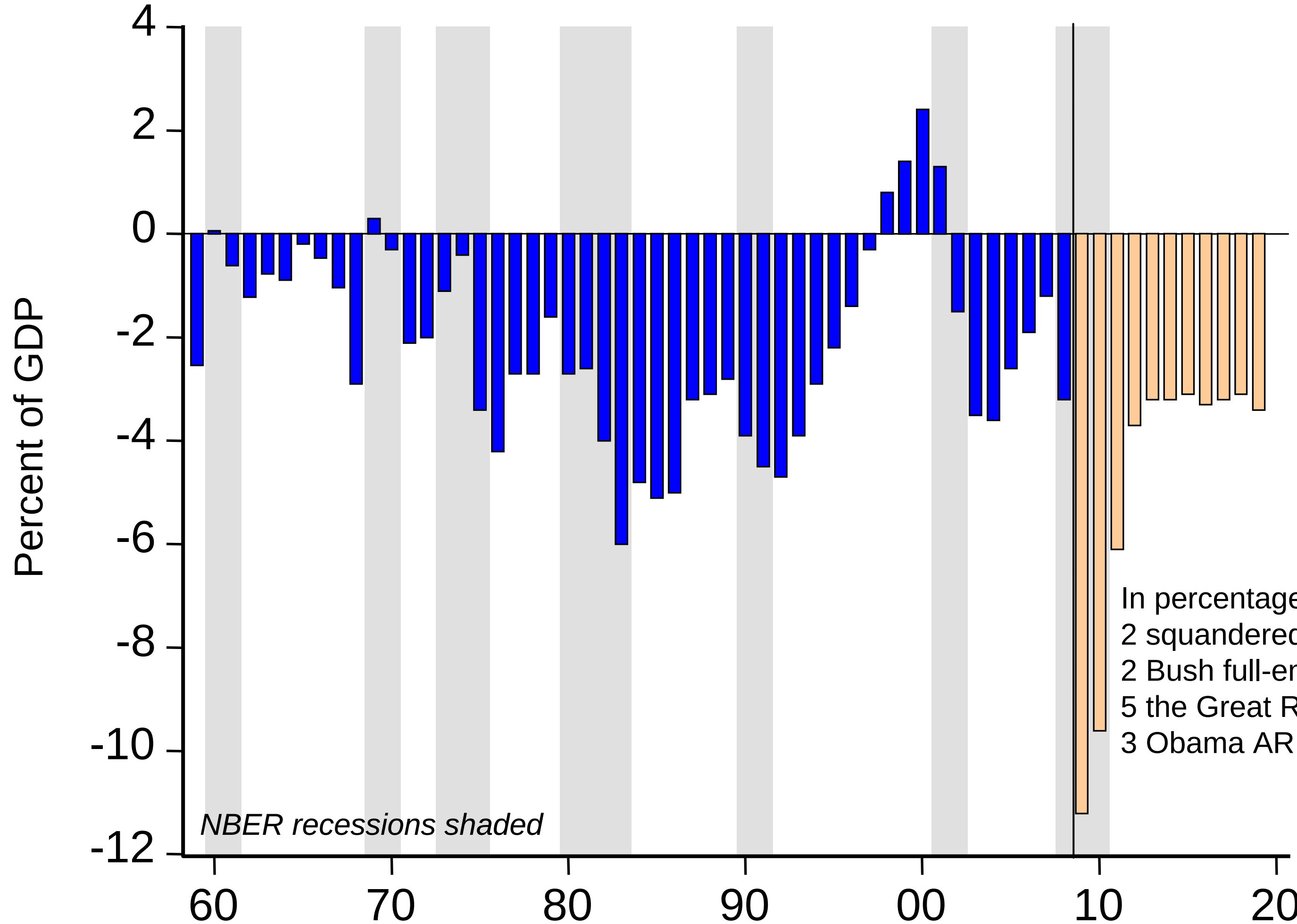



*Source*: Deniz Igan and Marcelo Pinheiro, "Exposure to Real Estate Losses: Evidence from the U.S. Banks," *IMF Working Paper* **WP/09/79** (April 2009) http://www.imf.org/external/pubs/ft/wp/2009/wp0979.pdf

# Appendix 3:  fiscal and monetary policy

- Traditional tools of monetary policy used up after Lehman
- Shift to “quantitative easing” (Bernanke:  “credit-easing”)
- Go beyond ordinary to *extra*ordinary funding facilities (TAF)
- Re-establish secondary market channels for credit (TALF)
- Massive Fed balance sheet expansion satisfies “liquidity preference”
- Obamanomics:  large fiscal stimulus (3-4 percent of GDP)

# U.S. federal budget deficit as a percent of GDP






*Source*: Congressional Budget Office (August 2009)

# Genesis of ARRA

- Christina Romer (Obama CEA) on ARRA stimulus
  - Twice the size of the New Deal (1934); 3% vs. 1½% of GDP
  - ¾ of stimulus spend out in 18 months (CBO)
  - Tax cuts (+AMT), support to states, infrastructure, energy, education
  - Romer$^2$ research:  tax cut multiplier $\approx$ 1.0; spending multiplier $\approx$ 1.6*
  - "Estimates almost surely more likely to [be] biased downward"
  - Inherited deficit $\Rightarrow$ need for credible long-run fiscal solutions

- Doug Holtz-Eakin (ex-CBO):  "missing an exit strategy"
  - Fiscal stimulus is something you "turn on" *and* "turn off"
  - "Temporary" interventions will simply not unwind on their own
  - Eventually "very high degree of difficulty 180$^o$ pirouette…made 'in public'"
  - People believe Washington and Wall Street failed, want bums out
  - Legacy of the "Rick Santelli 'revolution'":  good solutions not popular

Romer link: http://www.whitehouse.gov/administration/eop/cea/speeches_testimony/03032009/  Holtz-Eakin speech viewable on-line, link at "Opposing View":  http://www.nabe.com/video.html.  On financial crises see also Carmen Reinhart and Kenneth Rogoff (http://www.economics.harvard.edu/files/faculty/51_Aftermath.pdf and http://www.economics.harvard.edu/faculty/rogoff/files/Is_The_US_Subprime_Crisis_So_Different.pdf, as well as slideshow at http://nabe.com/pc09/documents/Reinhart.pdf.  Governor Kohn reports multipliers "around 2" if stimulus is expected to be temporary and monetary policy holds short-term interest rates at the zero lower bound including crowding-out effects (http://www.federalreserve.gov/newsevents/speech/kohn20090523a.htm).



*Source*:  NABE Spring 2009 Policy Conference, Federal Reserve Board

# Turn to fiscal policy and budget deficit consequences

- William Gale (Brookings) on fiscal policy and the economic crisis
  - Convert “vicious” to “virtuous” circle; raise confidence and prevent deflation
  - Fiscal policy required since monetary and financial interventions not enough
  - Policy options inevitably create inequities and moral hazard
  - $787 bil ARRA:  $185 bil (2009), $399 bil (2010), $134 bil (2011)
  - “Bangs for bucks” have long lags; tax cuts more likely saved than spent
  - 2/3 of deficit attributable to policy change; 1/3 to forecasting errors
- Mark Zandi (Moody’s Economy.com) on future fiscal priorities (gasp)
  - Extend UI benefits, food stamps, COBRA to end-2010 ($75 bil)
  - Increase FNMA, Freddie Mac conforming loan limits to end-2010 ($2 bil)
  - Extend first-time homebuyer credit to mid-2010 ($10 bil)
  - Extend accelerated depreciation, NOL carryback to end-2010 ($15 bil)
  - Aid to stressed jurisdictions ($75 bil)
  - Mortgage modification (from existing TARP $30 bil)
  - Expand SBA loan guarantees ($10 bil)
  - Job tax credit for 2010 ($12 bil)



*Source*: NABE Spring 2009 Policy Conference, http://www.nabe.com/mem/pc09/gale.pdf ; NABE Fall 2009 Annual Meeting, http://www.nabe.com/mem/am09/zandi.pdf.

# Fiscal policy at the zero bound is not the same

- “Microfounded” New Keynesian dynamic stochastic general equilibrium model (DSGE) under “zero bound” for nominal interest rates
- Labor income tax cut causes deflationary pressure—lower marginal cost of firms increases the real interest rate, which Fed can’t offset with *lower* rate (it’s zero)
- Tax cut on capital income is incentive to save, not spend—by reducing spending, and therefore income, it paradoxically reduces households’ *ability* to save!
- Temporary sales tax cuts and investment tax credits are effective, boost demand
- Government should be spending on imperfect substitutes for private consumption (infrastructure or military spending)
- *Don’t increase aggregate supply when goal is to increase aggregate demand*

| *One percent changes:* | Labor tax multiplier | Government spending multiplier |
|---|---|---|
| Positive interest rate | 0.096 | 0.32 |
| Zero interest rate | –0.81 | 2.27 |

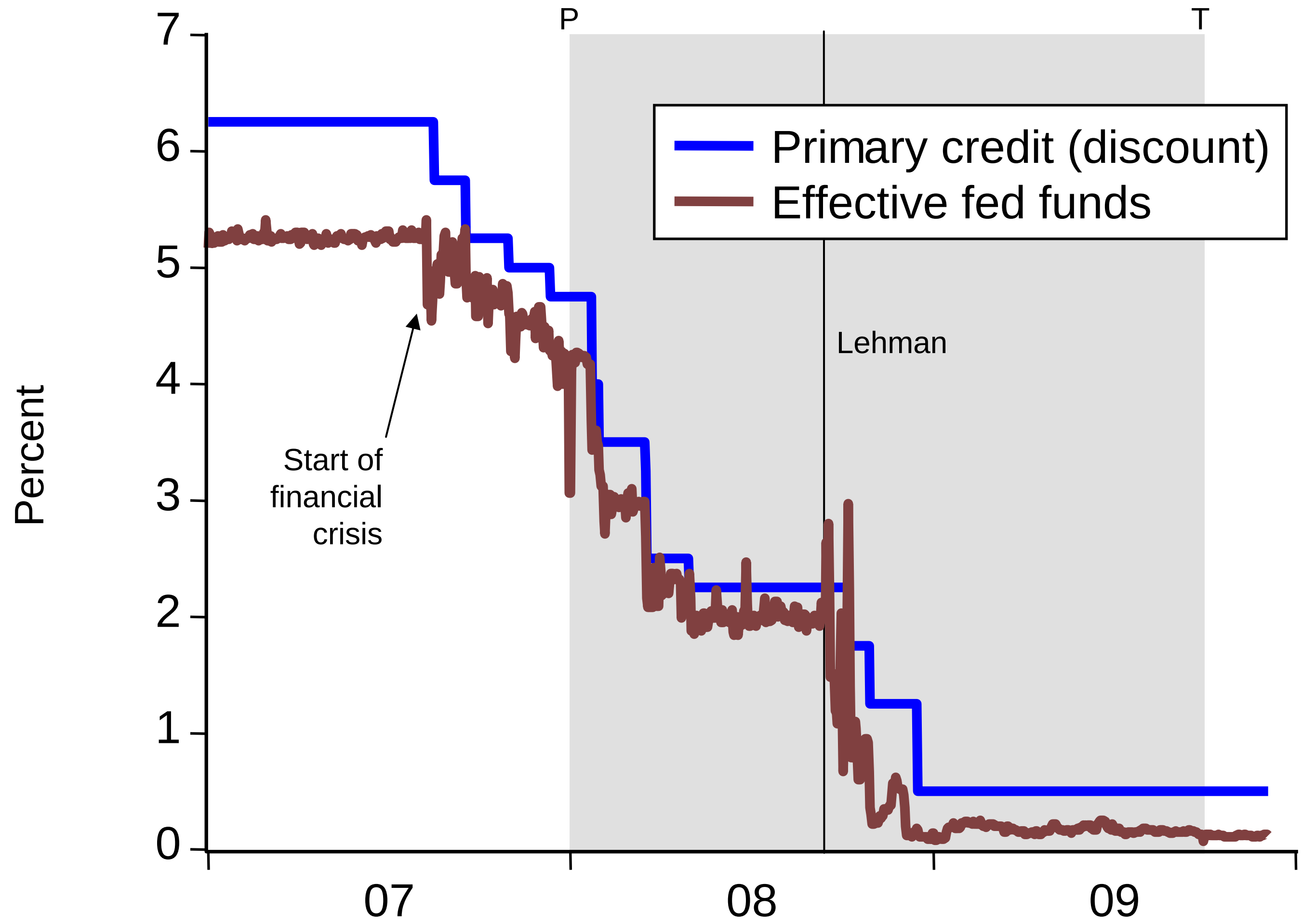


*Source*: Gauti B. Eggertsson, “What Fiscal Policy is Effective at Zero Interest Rates? *Federal Reserve Bank of New York Staff Reports*, no. 402 (November 2009)

# Macroeconomic exit strategy

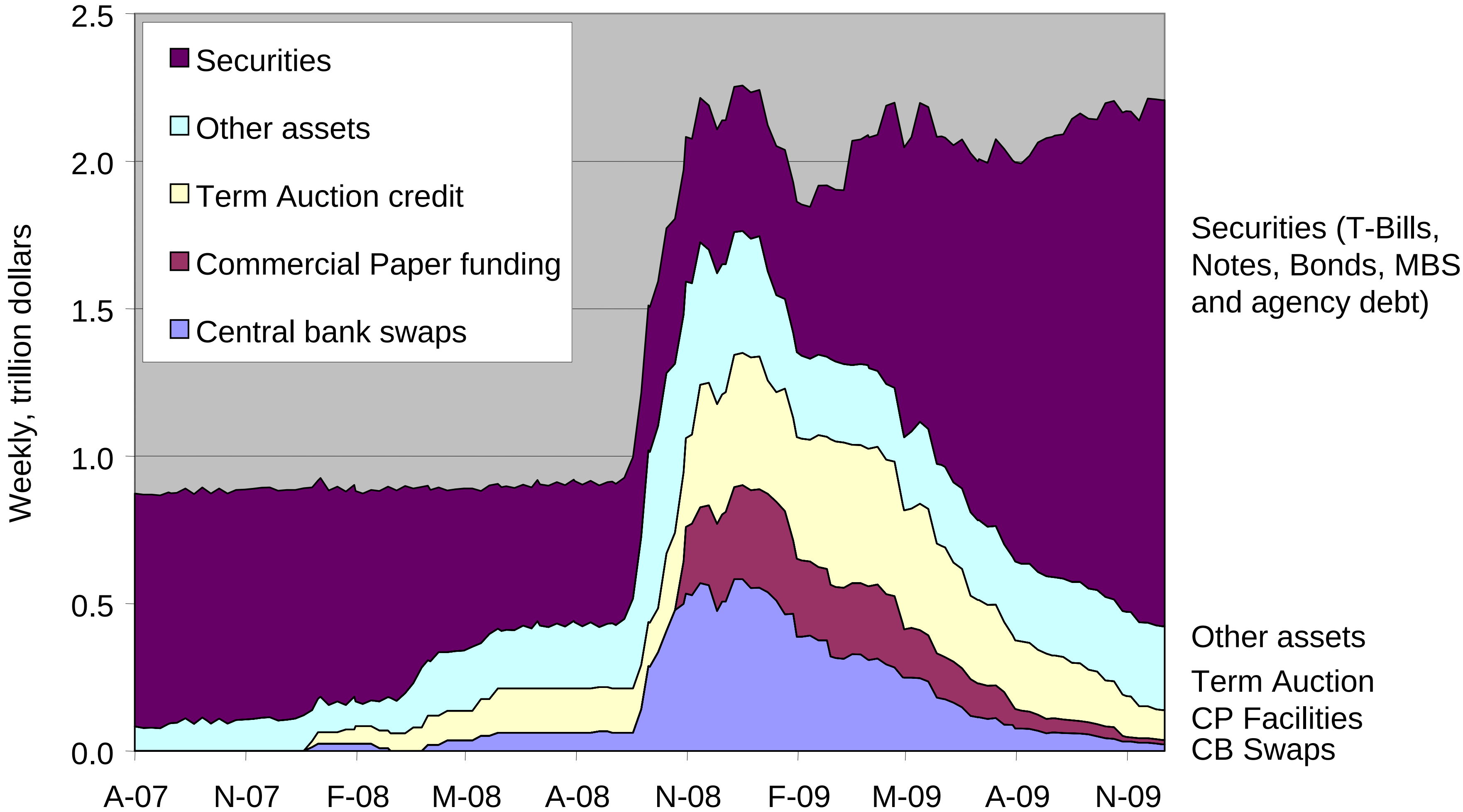
- Low interest rates will revert in 2010-11
- Quantitative easing also will be withdrawn gradually
- Obamanomics will have to switch to deficit-reduction
- Opportunistic fiscal policy:  TARP paid off, now, spend it (no!)
- Razor’s Edge:
  - Monetary reversion—too fast aborts the recovery
  - Monetary reversion—too slow risks inflation
  - Failure to reduce deficit implies higher real interest rates
- Lesson from 2003-04:  don’t wait too long or go too slowly

# Federal Reserve interest rates




*Source*: Federal Reserve Board

# Composition of Federal Reserve assets






*Sources*: Federal Reserve Board through week of December 2, 2009; calculations by author

# Fed "exit strategy" September 23, 2009

- "Economic activity has picked up following its severe downturn."
- "…policy actions to stabilize financial markets and institutions, fiscal and monetary stimulus, and market forces will support a strengthening of economic growth and a gradual return to higher levels of resource utilization in a context of price stability."
- "With substantial resource slack likely to continue to dampen cost pressures and with longer-term inflation expectations stable, the Committee expects that inflation will remain subdued for some time."
- The Fed will "gradually slow the pace of purchases [of agency mortgage-backed securities and agency debt] to promote a smooth transition in markets...by the end of the first quarter of 2010. As previously announced…purchases of Treasury securities will be completed by the end of October 2009."



*Source*: Federal Reserve Board, Federal Open Market Committee; http://www.federalreserve.gov/newsevents/press/monetary/20090923a.htm

# Fed “exit strategy” November 4, 2009

- “Information received since…September suggests that economic activity has continued to pick up.”
- “…policy actions [same as September].”
- “With substantial resource slack [same as September].”
- The Fed “will purchase a total of $1.25 trillion of agency mortgage-backed securities and about $175 billion of agency debt.  The amount of agency debt purchases, while somewhat less than the previously announced maximum of $200 billion, is consistent with the recent path of purchases and reflects the limited availability of agency debt.”
- The Fed will “gradually slow the pace of purchases of both agency debt and agency mortgage-backed securities and anticipates that these transactions will be executed by the end of first quarter of 2010.”



*Source*: Federal Reserve Board, Federal Open Market Committee; http://www.federalreserve.gov/newsevents/press/monetary/20091104a.htm

# Appendix 7:  outlook for interest rates

# FOMC forecast

| Variable | Central tendency[1] | | | |
|---|---|---|---|---|
| | 2009 | 2010 | 2011 | Longer run |
| Change in real GDP. . . . . . | -1.5 to -1.0 | 2.1 to 3.3 | 3.8 to 4.6 | 2.5 to 2.7 |
| April projection. . . . . . | -2.0 to -1.3 | 2.0 to 3.0 | 3.5 to 4.8 | 2.5 to 2.7 |
| Unemployment rate. . . . . . | 9.8 to 10.1 | 9.5 to 9.8 | 8.4 to 8.8 | 4.8 to 5.0 |
| April projection. . . . . . | 9.2 to 9.6 | 9.0 to 9.5 | 7.7 to 8.5 | 4.8 to 5.0 |
| PCE inflation. . . . . . . . . . . | 1.0 to 1.4 | 1.2 to 1.8 | 1.1 to 2.0 | 1.7 to 2.0 |
| April projection. . . . . . | 0.6 to 0.9 | 1.0 to 1.6 | 1.0 to 1.9 | 1.7 to 2.0 |
| Core PCE inflation[3]. . . . . . | 1.3 to 1.6 | 1.0 to 1.5 | 0.9 to 1.7 | |
| April projection. . . . . . | 1.0 to 1.5 | 0.7 to 1.3 | 0.8 to 1.6 | |

1. The central tendency excludes the three highest and three lowest projections for each variable in each year.
2. The range for a variable in a given year consists of all participants' projections, from lowest to highest, for that variable in that year.
3. Longer-run projections for core PCE inflation are not collected.

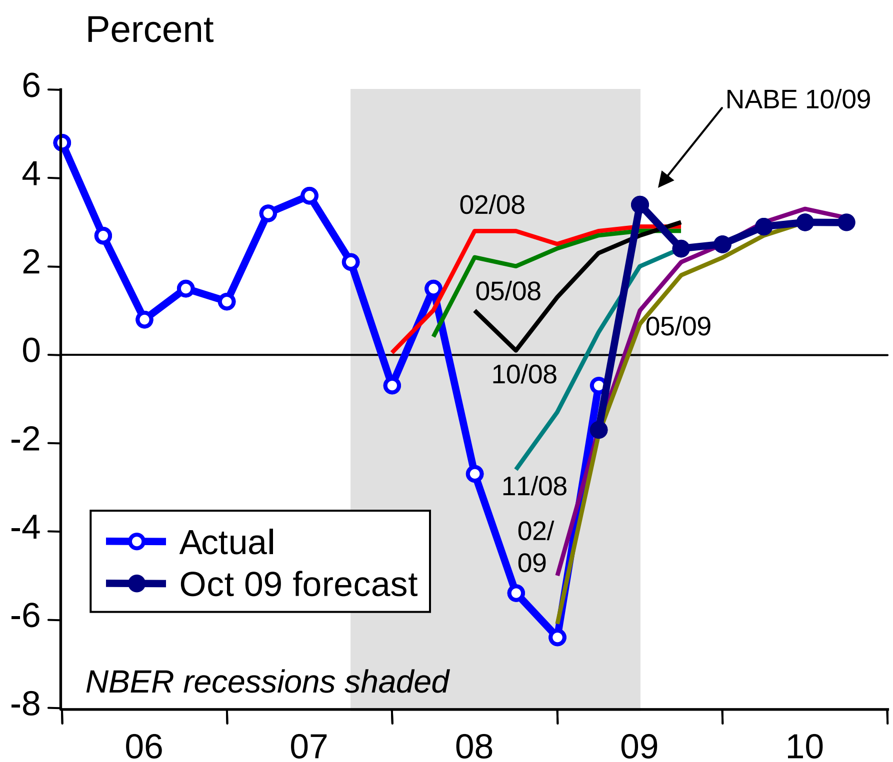


*Source*: Federal Reserve Open Market Committee minutes of June 23-24, 2009 meeting
http://www.federalreserve.gov/newsevents/press/monetary/20090715a.htm

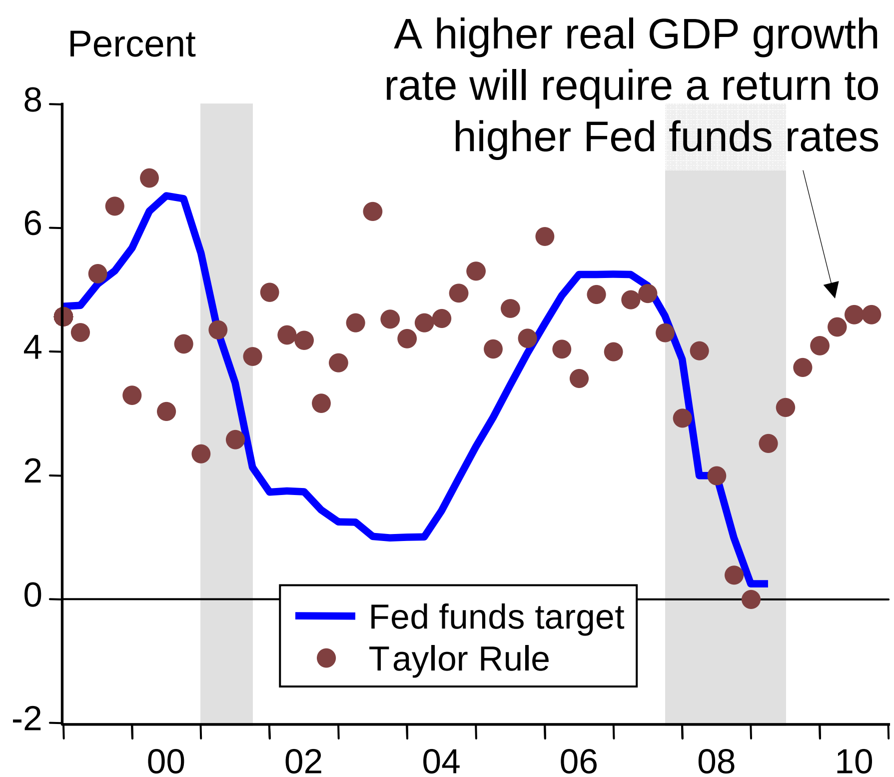
Target Fed Funds as f[inflation gap, output (growth) gap]:
r* = [4.5 + (0.5)(p - p*) + (0.5)(y - y*)]

r = Fed Funds rate
p = increase in the core CPI [p* =2 (target)]
y = real GDP growth rate [y* = potential GDP growth]

# Applying Taylor's Rule




U.S. real GDP growth forecasts (NABE)

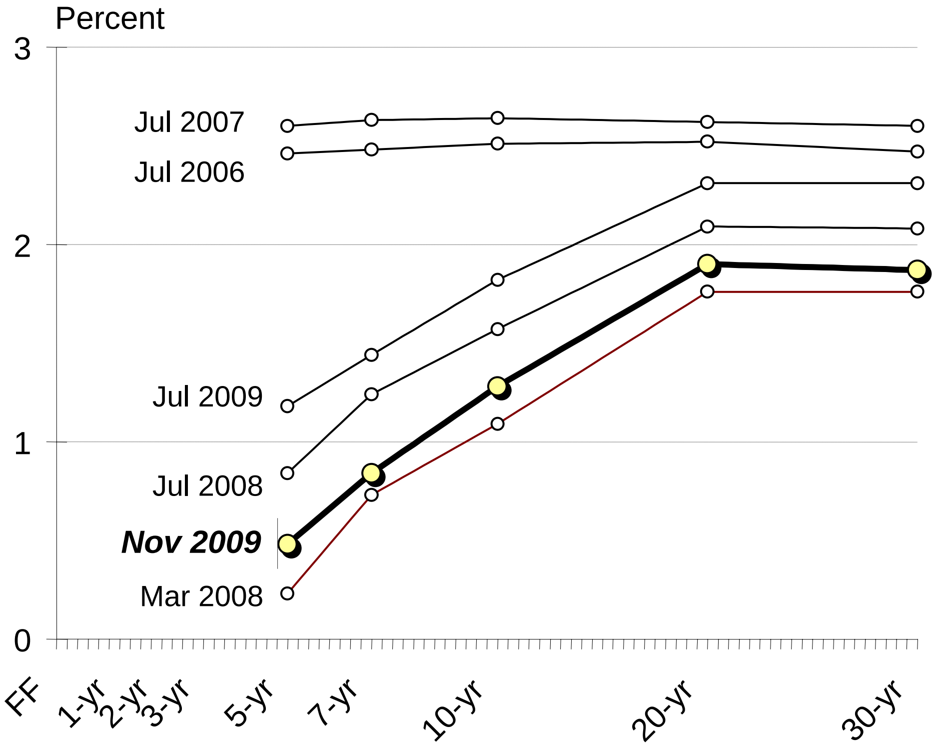



Fed funds target under Taylor Rule

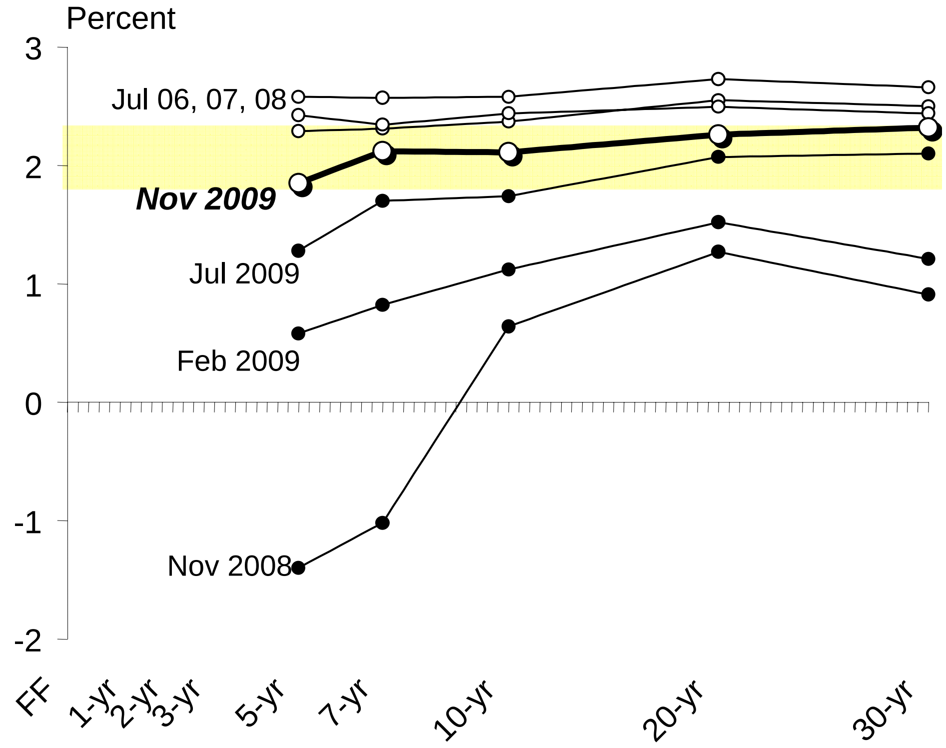


*Source*: Bureau of Economic Analysis, National Association for Business Economics, Federal Reserve Board; Taylor Rule calculation by TZ Economics

# Term structure of real yields and inflation expectations




U.S. Treasury Inflation Protected Securities real yield curve

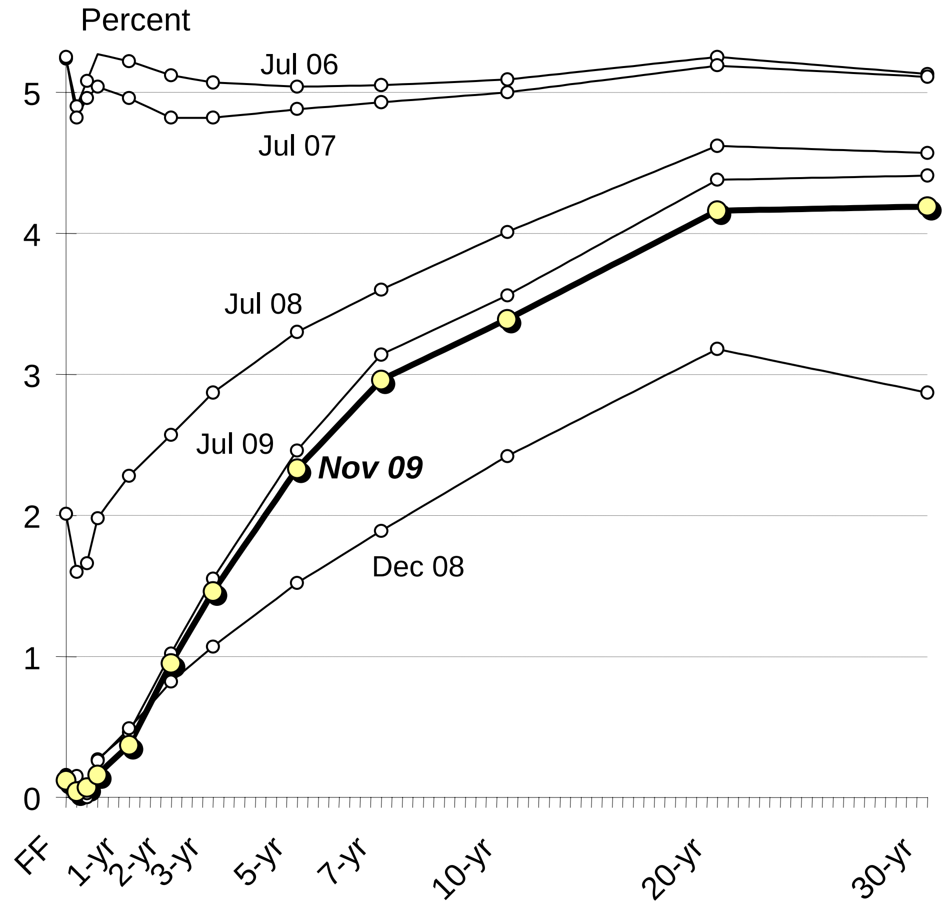



Long-term inflation expectation implied by TIPS yields

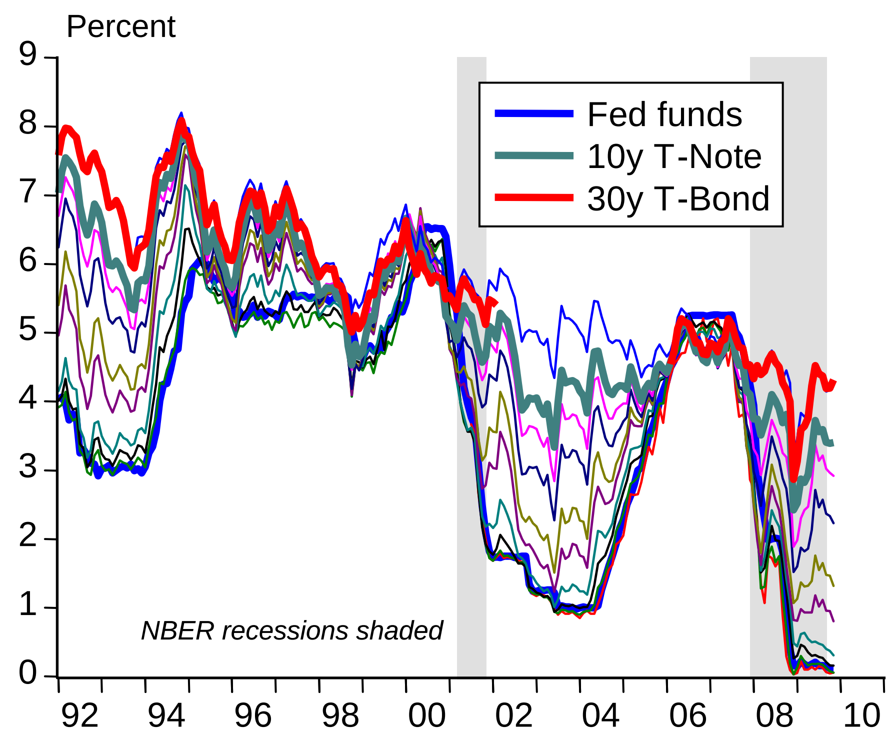


*Sources*: Federal Reserve Board; inflation expectations calculated by TZE (up to an inflation risk premium and a liquidity risk premium)

# Nominal risk-free yields and transitions




U.S. Treasury yield curve

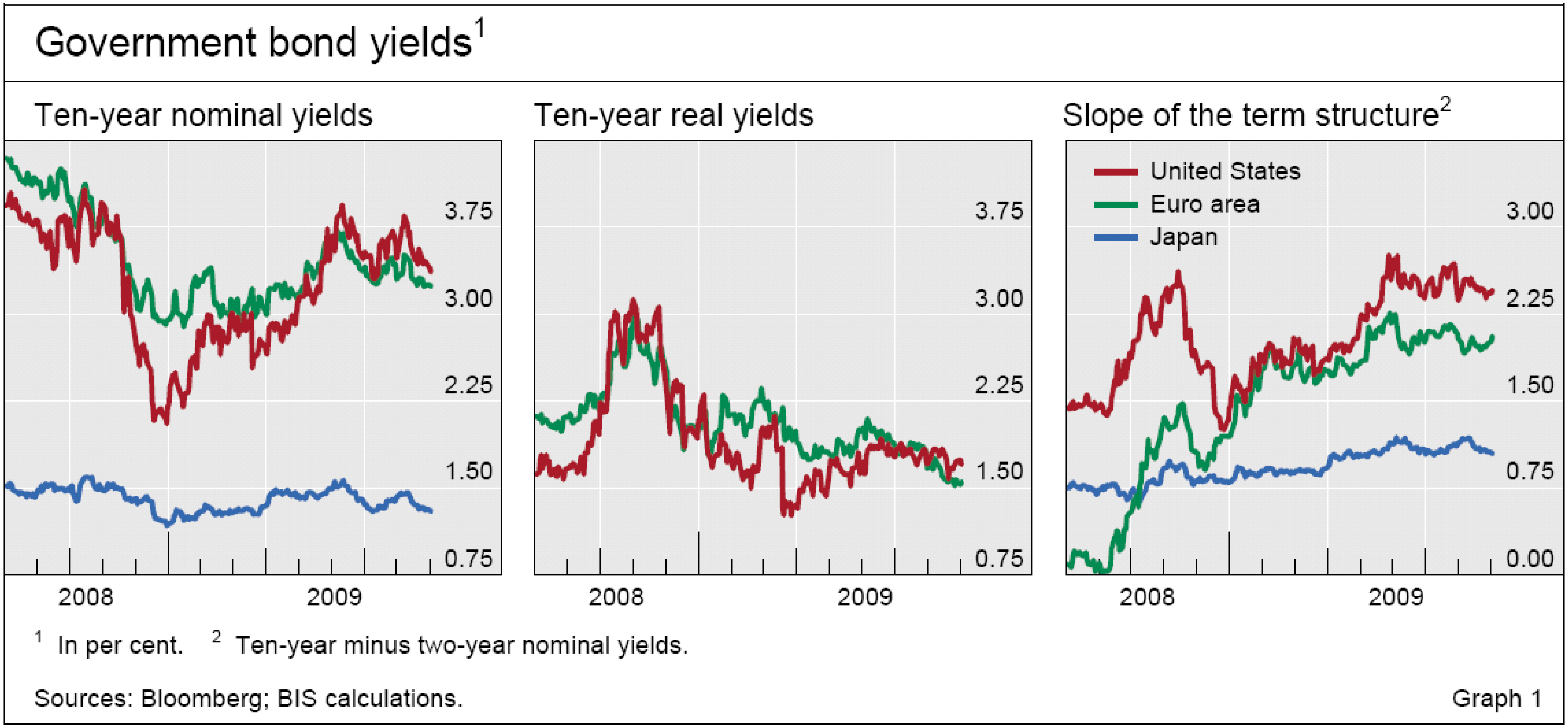



Term spreads and cycles



*Sources*: Federal Reserve Board, Federal Reserve Bank of St. Louis; TZ Economics

# Major market interest rate benchmarks stabilized

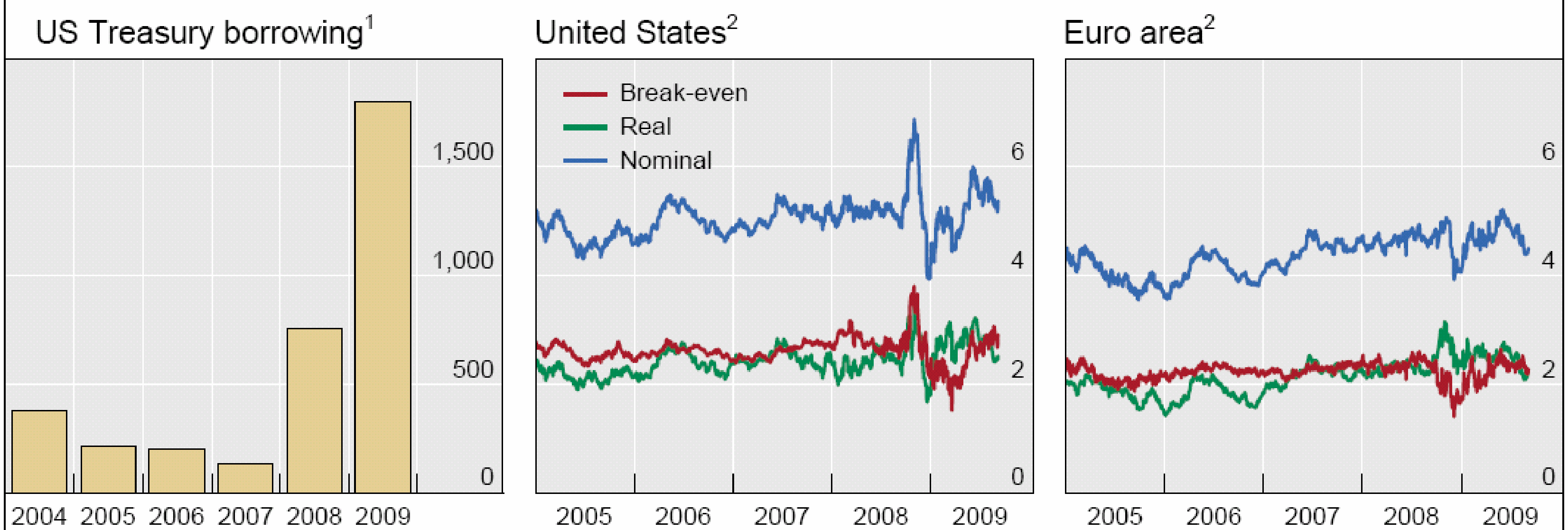





Source: Bank for International Settlements *BIS Quarterly Review* (September 2009)
http://www.bis.org/publ/qtrpdf/r_qt0909a.pdf

# Bigger deficits, bigger borrowing, higher rates?

## US government borrowing and implied five-year-ahead five-year forward rates



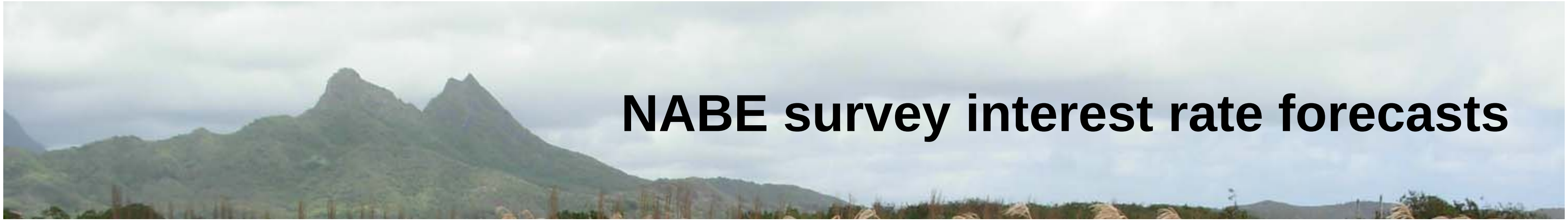

[1] Marketable borrowing in billions of US dollars. The years on the horizontal axis refer to fiscal years (October–September), and the value for 2009 includes a forecast for the fourth fiscal quarter by the US Treasury's Office of Debt Management. [2] Based on zero coupon real and nominal rates calculated using the Nelson-Siegel-Svensson method on nominal and index-linked government bond prices, in per cent.

Sources: Bloomberg; US Treasury's Office of Debt Management; BIS calculations.

Graph 4



Source: Bank for International Settlements *BIS Quarterly Review* (September 2009)
http://www.bis.org/publ/qtrpdf/r_qt0909a.pdf



# NABE survey interest rate forecasts

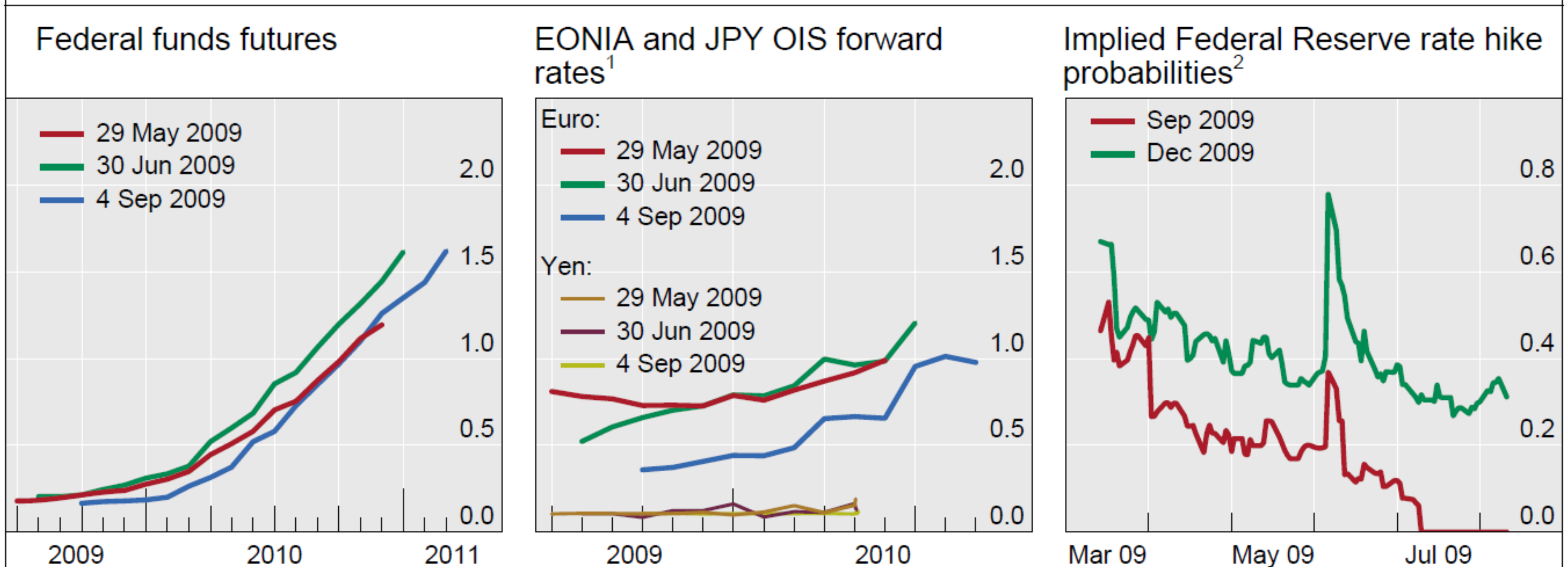
| | Fed Funds Target % quarter-end | | 10-Year Treasury Note Yield % quarter-end | |
|---|---|---|---|---|
| **Survey:** | **10/09** | **11/09** | **10/09** | **11/09** |
| Q1-09 | 0.125 | 0.125 | 2.71 | 2.71 |
| Q2-09 | 0.125 | 0.125 | 3.53 | 3.53 |
| Q3-09 | 0.125 | 0.125 | 3.31 | 3.31 |
| Q4-09 | 0.125 | 0.125 | 3.70 | 3.50 |
| Q1-10 | 0.125 | 0.125 | 3.80 | 3.65 |
| Q2-10 | 0.163 | 0.225 | 4.00 | 3.78 |
| Q3-10 | 0.500 | 0.500 | 4.20 | 4.00 |
| Q4-10 | 1.000 | 1.000 | 4.30 | 4.18 |



*Source*: National Association for Business Economics (November 2009)

# What markets say about future Fed policy

## Monetary policy expectations




[1] One-month rates implied by overnight index swaps, in per cent. [2] Option-implied probabilities that the Federal Reserve would raise the fed funds target above the 0 to 0.25% range following the FOMC meeting in the indicated month.

Sources: Bloomberg; BIS calculations.

Graph 3

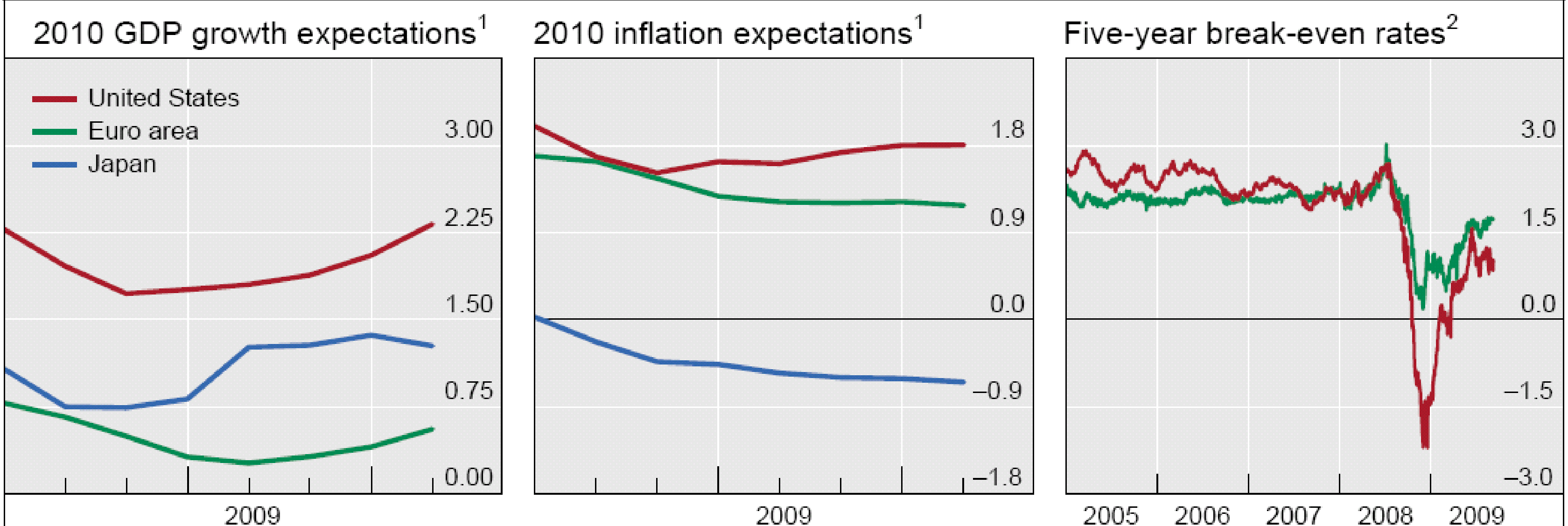


*Source*: Bank for International Settlements *Quarterly Review* (September 2009), http://www.bis.org/publ/qtrpdf/r_qt0909.htm

# Macroeconomic forecasts settle into a groove

## Macroeconomic expectations and break-even inflation

In per cent




[1] Forecasts published by Consensus Economics; observations are positioned in the month in which the forecast was made. [2] Based on zero coupon real and nominal rates calculated using the Nelson-Siegel-Svensson method on nominal and index-linked government bond prices.

Sources: © Consensus Economics; BIS calculations. Graph 2



Source: Bank for International Settlements *BIS Quarterly Review* (September 2009)
http://www.bis.org/publ/qtrpdf/r_qt0909a.pdf

# G-20 St. Andrews Communiqué (7 November 2009)

- Commitment to continued support for economic recovery and new consultative mutual assessment process for policy evaluation
- Transition from crisis response to sustainable growth, manage withdrawal from extraordinary macroeconomic and financial support
- Transnational institutions: “representation and governance reforms” (IMF allocation, World Bank capital; IDA resourcing; energy subsidies)
- Financial Stabilization Board (formerly FS Forum (April 2009))
  - Stronger Basel standards by end-2010, implementation by end-2012 emphasizing greater profit retention “to build capital to support lending”
  - Alignment of compensation policies with stability, long-term value creation
  - Systemically-important institutions: reduce moral hazard, develop international recovery and resolution tools with financial sector contribution
  - Progress towards tax transparency, possible multilateral instrument, take on non-cooperative jurisdictions (NCJs)
- Commitment to tackle the threat of climate change within UN convention



Yikes! I forgot to log the source!