Collateral Analytics

Regional Price Bubbles and Implications for Credit Risk Management

Presentation to the May 2014 Meetings of the Weimer School
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Basis of Presentation

- Based upon 3 working papers for the Lincoln Institute of Land Policy that estimate models of house price growth during three different time frames and using various methods.
  - These are available at the LILP web site: http://www.lincolninst.edu/pubs/default.aspx?pub_type=3
  - Two were coauthored with Prof. Seth Giertz of the U of Nebraska http://cba.unl.edu/people/sgiertz/
- We also produced a Policy Focus Report entitled “Preventing House Price Bubbles: Lessons from the 2006-2012 Bust” (2013) which is available at: http://www.lincolninst.edu/pubs/2245_Preventing-House-Price-Bubbles.
- Used in a Webinar for FI Consulting in December http://www.ficonsulting.com/Regional-Price-Bubbles
- References New Credit Risk Model from Collateral Analytics http://collateralanalytics.com/key-drivers-of-variations-in-the-credit-risk-spread-among-markets/

Detecting Price Bubbles as They Develop

- **Key Conclusion #1:** Wide variations among markets even within large MSAs.
- **Key Conclusion #2:** Local housing market conditions play a substantial role in house price patterns.
- **Key Conclusion #3:** Hard to predict but we do know something. And we can debunk the notion of a national housing market.

Perspectives on Bubble Detection

Bubble definition: Persistent and *unsustainable* departure of market prices from prices dictated by fundamentals

Detection is inherently difficult because bubbles are extreme events

- Black Swan Blindness also plays a role

Local market conditions affect house price bubbles

- Housing markets contain a substantial local component, which may be hard to measure/capture
- These affect responses to national shocks
- Financial market analogy: S&P versus individual stocks

The role of momentum

Model and Estimation Approach

1st stage VEC to estimate deviations of the level of house prices from the amount suggested by the "fundamentals"

- P = f(employment, income per capita, 10 yr Treasury, 1 yr Treasury, MSA fixed effects)

3 equation VAR

- Dependent variables are the growth rates in Real house prices; Total employment; Real income per capita
- Right hand side variables: VEC residuals; 3 lags of each dependent variable; FE

Multiple Time Periods and MSA Groups

Simulation generates 500 paths per MSA per model

- Challenge is specifying key drivers
- Conduct our own "quasi" impulse response analysis

Model

$$\log\left(HP_{it}\right)=\alpha_i+\sum_{j=1}^{3}\beta_j\log\left(Income_{it}\right)+\sum_{j=1}^{3}\gamma_i\log\left(Emp_{it}\right)+$$

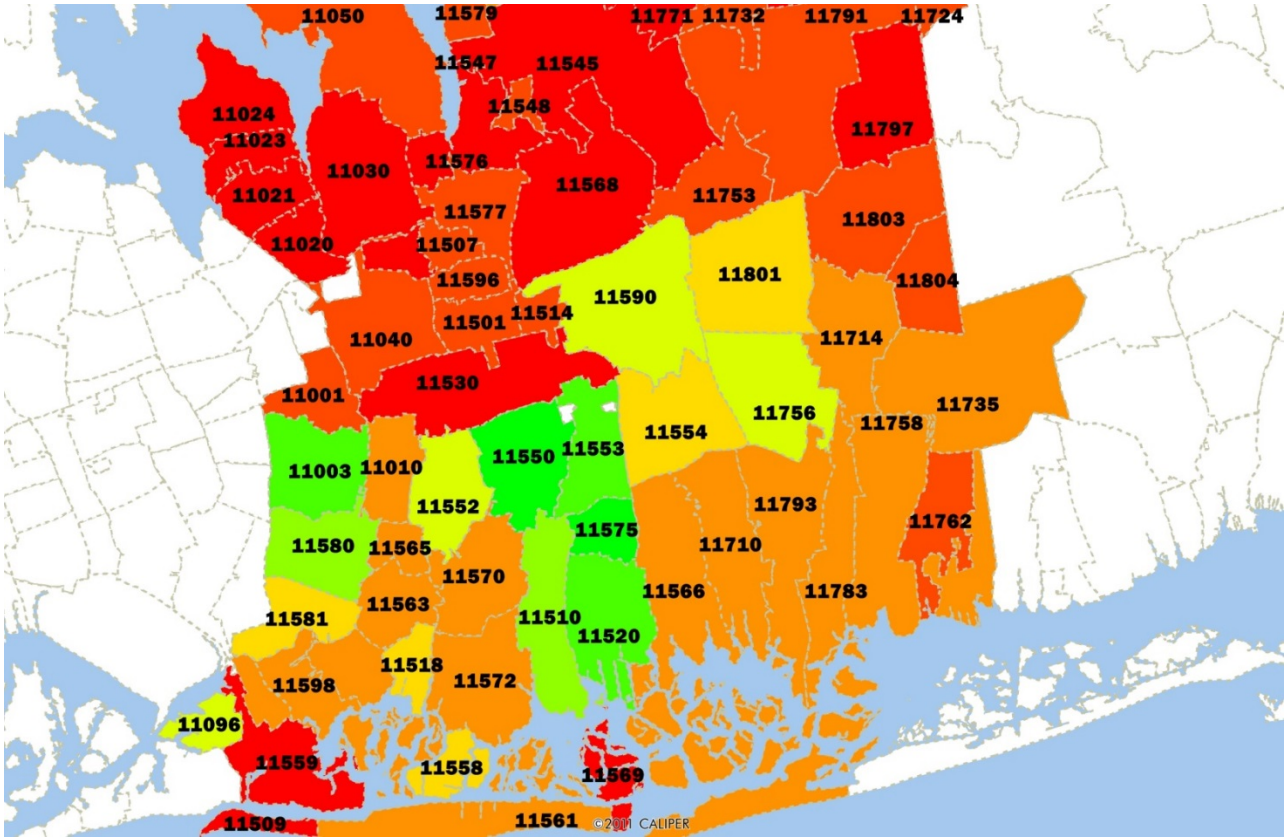
$$\delta_1(TB10_{t-1}-TB1_{t-1})+\delta_2 TB10_t+\varepsilon_{it}^{EC}.$$

$$\log\left(Y_{it}\right)=\alpha_t+\alpha_{group}+\alpha_{EC}\hat{\varepsilon}_{it}^{EC}+\sum_{j=1}^{3}\beta_j\log\left(\frac{HP_{it-j}}{HP_{it-1-j}}\right)+\sum_{j=1}^{3}\gamma_j\log\left(\frac{Emp_{it-j}}{Emp_{it-1-j}}\right)+$$

$$+\sum_{j=1}^{3}\theta_j\log\left(\frac{Income_{it-j}}{Income_{it-1-j}}\right)+\varepsilon_{it}.$$

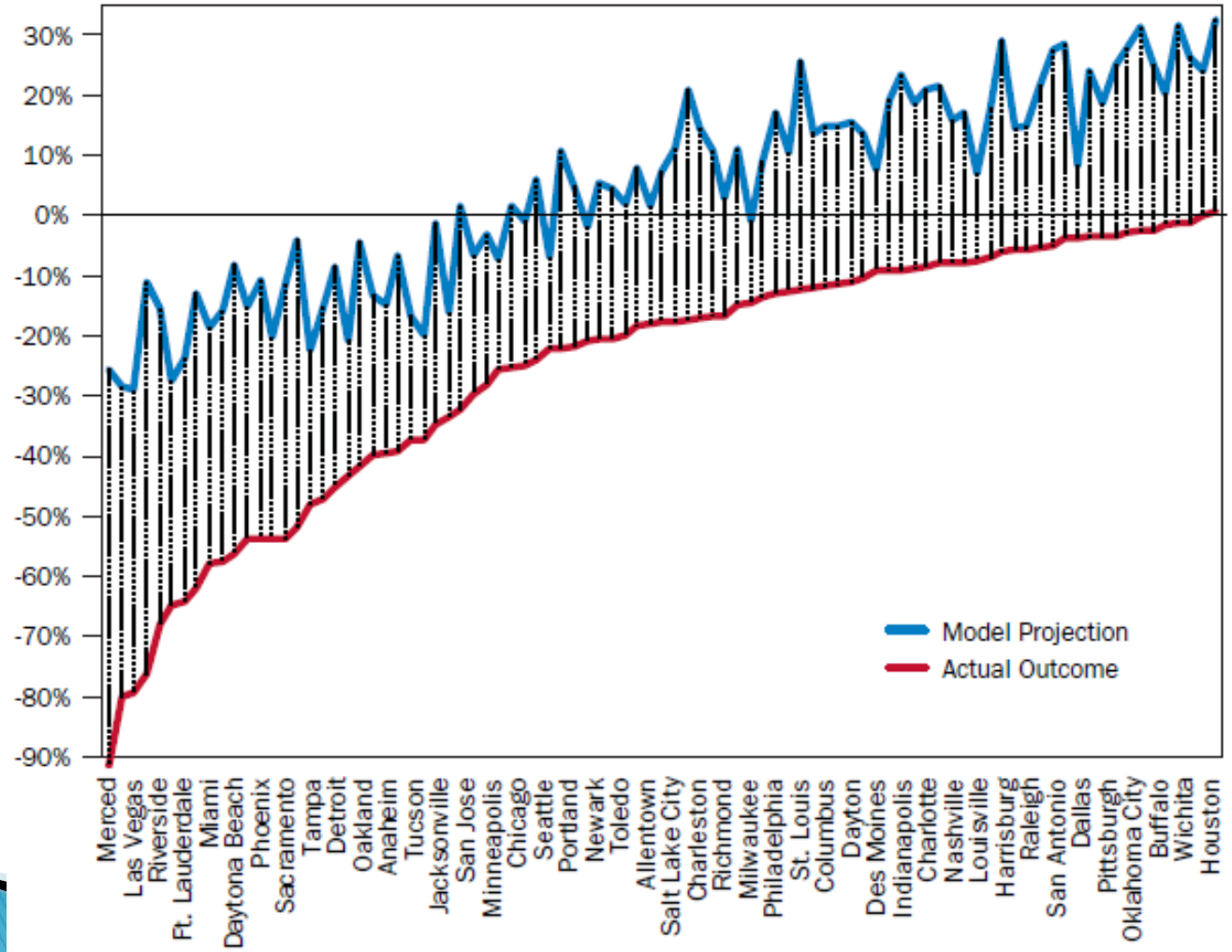
Share of Residences with Negative Equity

Red is low (<8%) and Green in high share (>27%)

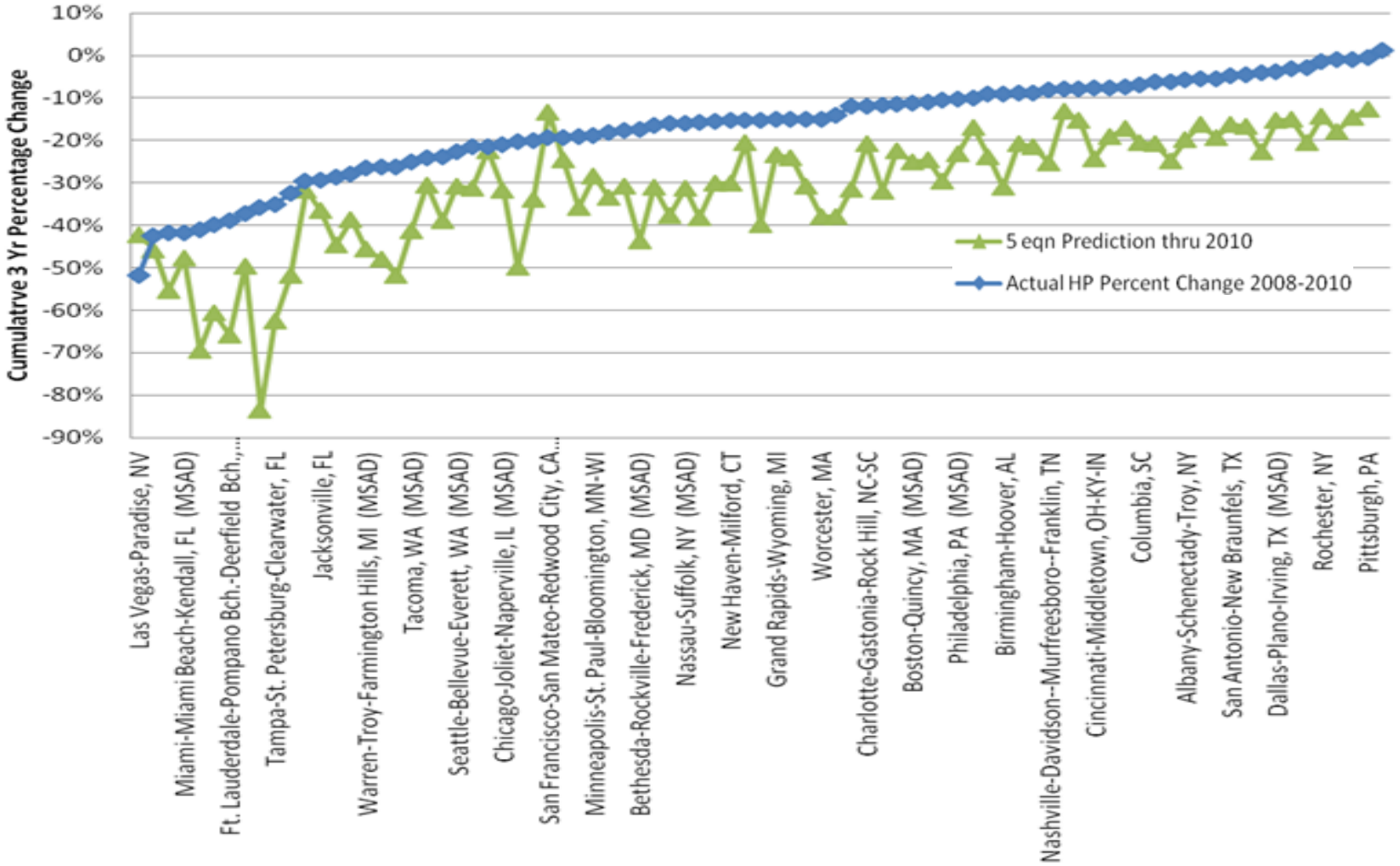


Source: Collateral Analytics

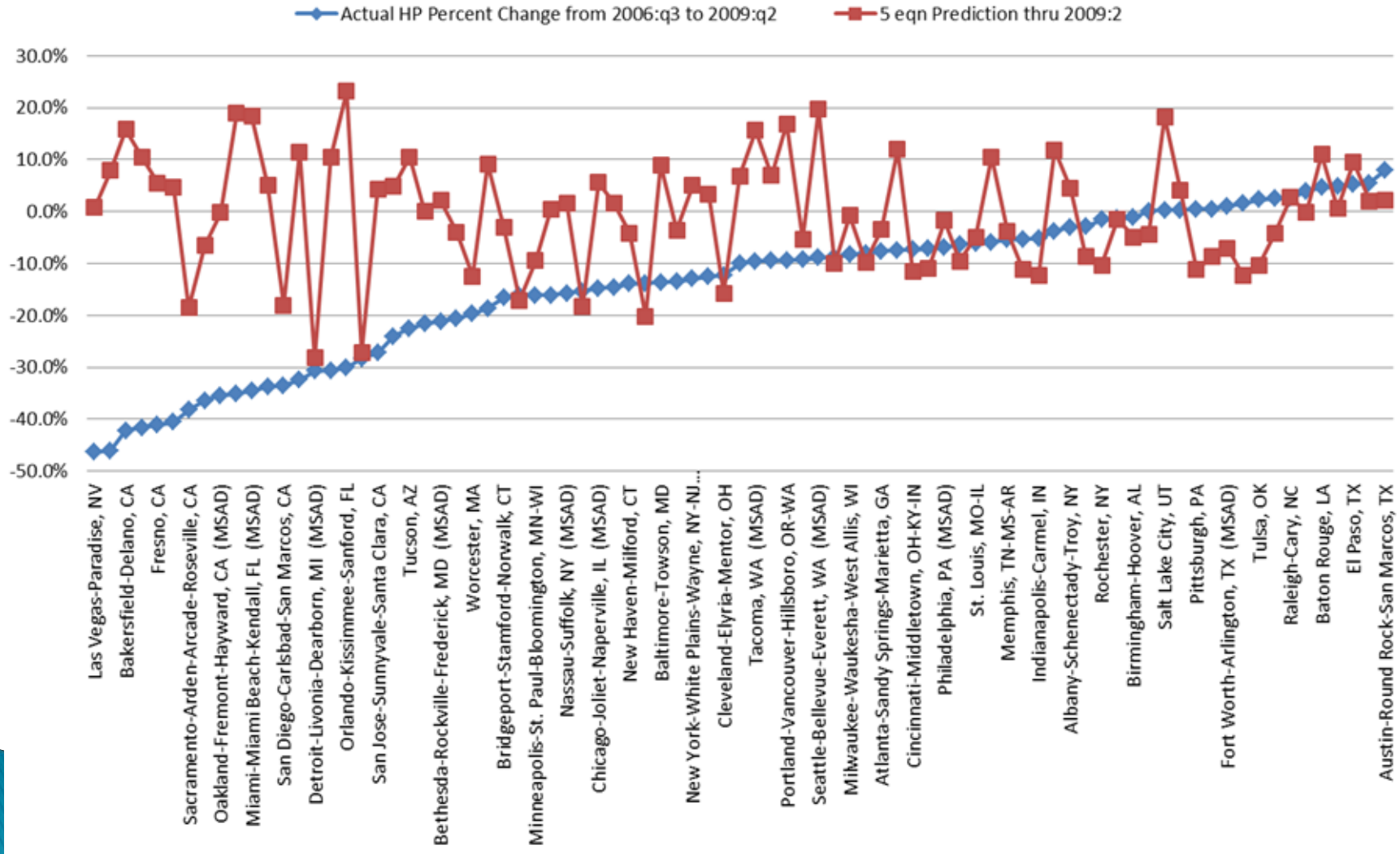
Model Projections vs. Actual Outcomes 2008-10



Projections vs. Outcomes for the Largest MSAs

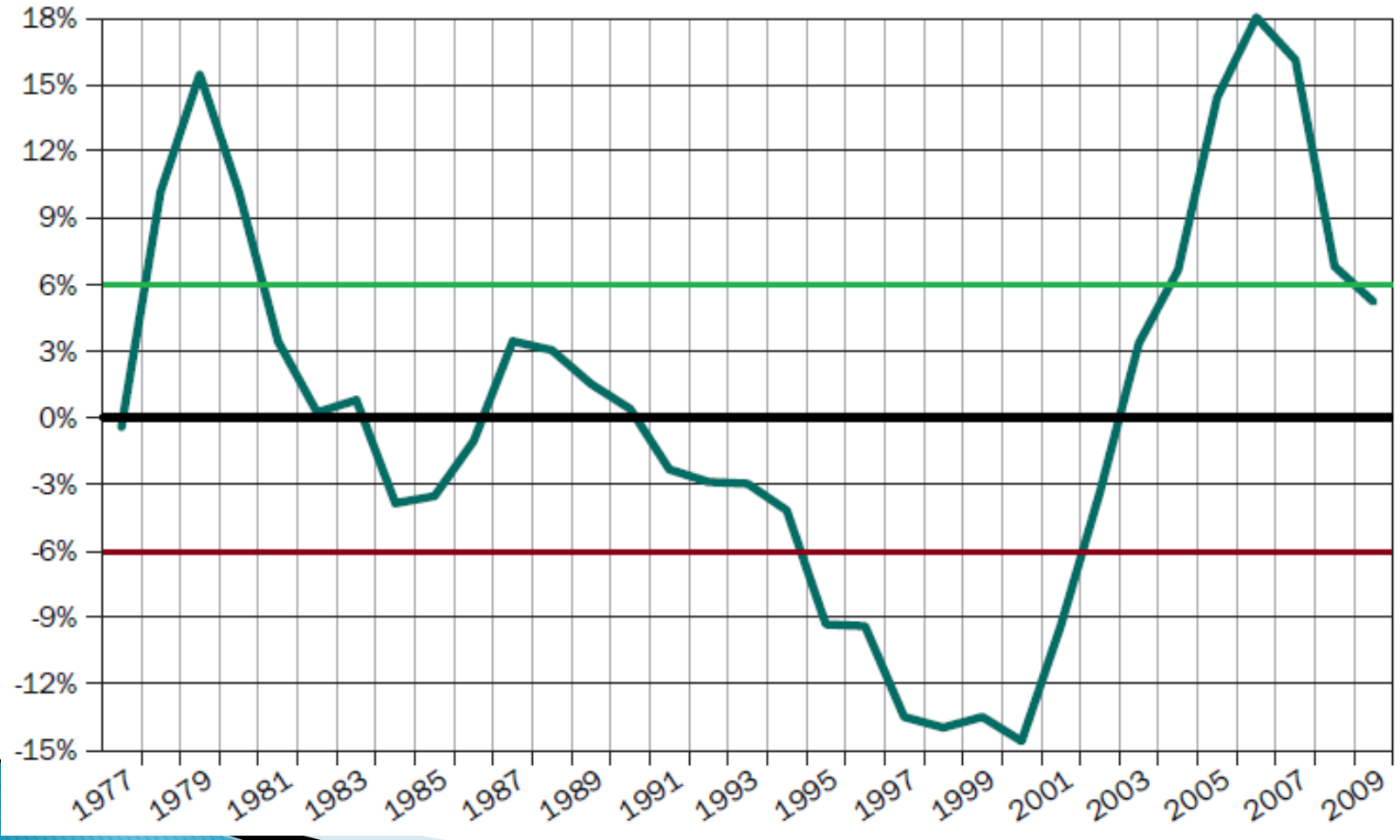


Model Projections vs. Actual Outcomes 2006-09



Predictive Power of the Bubble Indicator:

Difference Between Actual Prices and Predicted Levels



Key Conclusions on Bubble Detection

- **Key Conclusion #1:** The models provided some indication that a bubble was emerging.
- **Key Conclusion #2:** The evidence was stronger for some markets than for others, and the predictions were sensitive to the specific models used and time periods covered.
- **Key Conclusion #3:** While not perfect, the results revealed information that may have been helpful to policy makers as they developed programs in mid-crisis and as they now consider options for preventing new house price bubbles from forming.

Implications for Credit Risk for Regulators - Countercyclical Capital Policies

Glimpse of policy debate

- Shared conclusion with Greenspan – Monetary Policy not the primary culprit. Much more complex set of factors and wide ranging outcomes among markets
- Flip side of this conclusion: Neither is it very effective in combatting bubbles owing to the large variations among markets

Key issues

- How to predict prices
- How to define a bubble

Implications for Credit Risk Management for Financial Institutions

- Incorporate local market conditions in loan pricing and capital allocation, and work harder to price the risk in your local market. Banks must do a better job of pricing in “their own backyard.”
- Note on Concentrations in CA White Paper about Fed Guidance

Option 1: Simple, Transparent and Rules Based

- FHFA Paper by Smith and Weiher entitled “Countercyclical Capital Regime: A Proposed Design and Empirical Evaluation”

  http://www.fhfa.gov/webfiles/24538/countercyclicalcapitalregime122.pdf

- Focuses upon trends at the state level in house prices
- Substantial deviations above trend would trigger an increase in capital
- Substantial deviations below trend would trigger capital reductions

Option 2: Use Predictions of Econometric Models

- This would be more complex, less transparent, and likely less rules-based
- Judgments of model builders would play a role
- Econometric models of the type estimated by Follain and Giertz fit this type.
- Examples of the output of our first model regarding the size of stress scenarios are in Table 2

5th Percentile Forecasts for Three Time Periods

MSA	1996-1998	2001-2003	2008-2010
Austin-Round Rock-San Marcos	-2.9%	1.4%	1.8%
Birmingham-Hoover	-3.0%	-11.9%	0.1%
Cambridge-Newton-Framingham	3.6%	7.7%	-15.3%
Chicago-Joliet-Naperville	-12.8%	-10.6%	-15.1%
Columbus	-13.3%	-10.8%	-7.4%
Detroit-Livonia-Dearborn	-14.7%	-21.7%	-25.5%
Ft. Lauderdale-Pompano Bch.	-11.1%	-9.5%	-41.5%
Indianapolis-Carmel	-7.3%	-7.2%	-2.5%
Las Vegas-Paradise	-9.3%	-9.2%	-33.5%
Memphis	-0.3%	-8.7%	2.1%
Minneapolis-St. Paul-Bloomingto	-3.7%	-5.1%	-23.2%
New York-White Plains-Wayne	-2.5%	-0.8%	-19.4%
Oklahoma City	3.3%	3.3%	12.2%
Phoenix-Mesa-Glendale	-2.2%	-8.4%	-30.3%
Providence-New Bedford-Fall R	-9.0%	3.6%	-23.8%
Riverside-San Bernardino-Ontari	-32.8%	-6.1%	-44.9%
Salt Lake City	-14.6%	-30.2%	-1.4%
San Francisco-San Mateo-Redw	-12.4%	8.1%	-17.3%
Seattle-Bellevue-Everett	-25.6%	-19.5%	-12.8%
Tucson	-10.7%	-14.8%	-21.6%
Washington-Arlington-Alexandria	-17.3%	1.7%	-27.3%
Mean	-9.1%	-4.5%	-15.0%
Median	-8.5%	-4.8%	-15.1%
Max	3.6%	16.0%	12.2%
Min	-32.8%	-30.2%	-44.9%
Std. Dev.	8.3%	9.2%	14.5%

How This Would Work In Practice

- Follain and Sklarz 2005 provide example of pricing credit risk among MSAs that differ in terms of their potential for a bubble.
- We recently announced a new Credit Risk Model at Collateral Analytics that expands upon these ideas and make use of the enormous amount of data and AVM products produced by CA
  - We use nonagency mortgage data assembled from Lewtan to estimate models of default and prepayment at the MSA level.
  - The model incorporates CA generated house price scenarios specific to each MSA.
  - CLTV is updated at the zip code level in most cases
  - It also relies upon REO Discount estimates at the zip level
  - Our focus has been on the 20 CBSAs in the Case-Shiller Index

Exhibit 1: CRS by CBSA

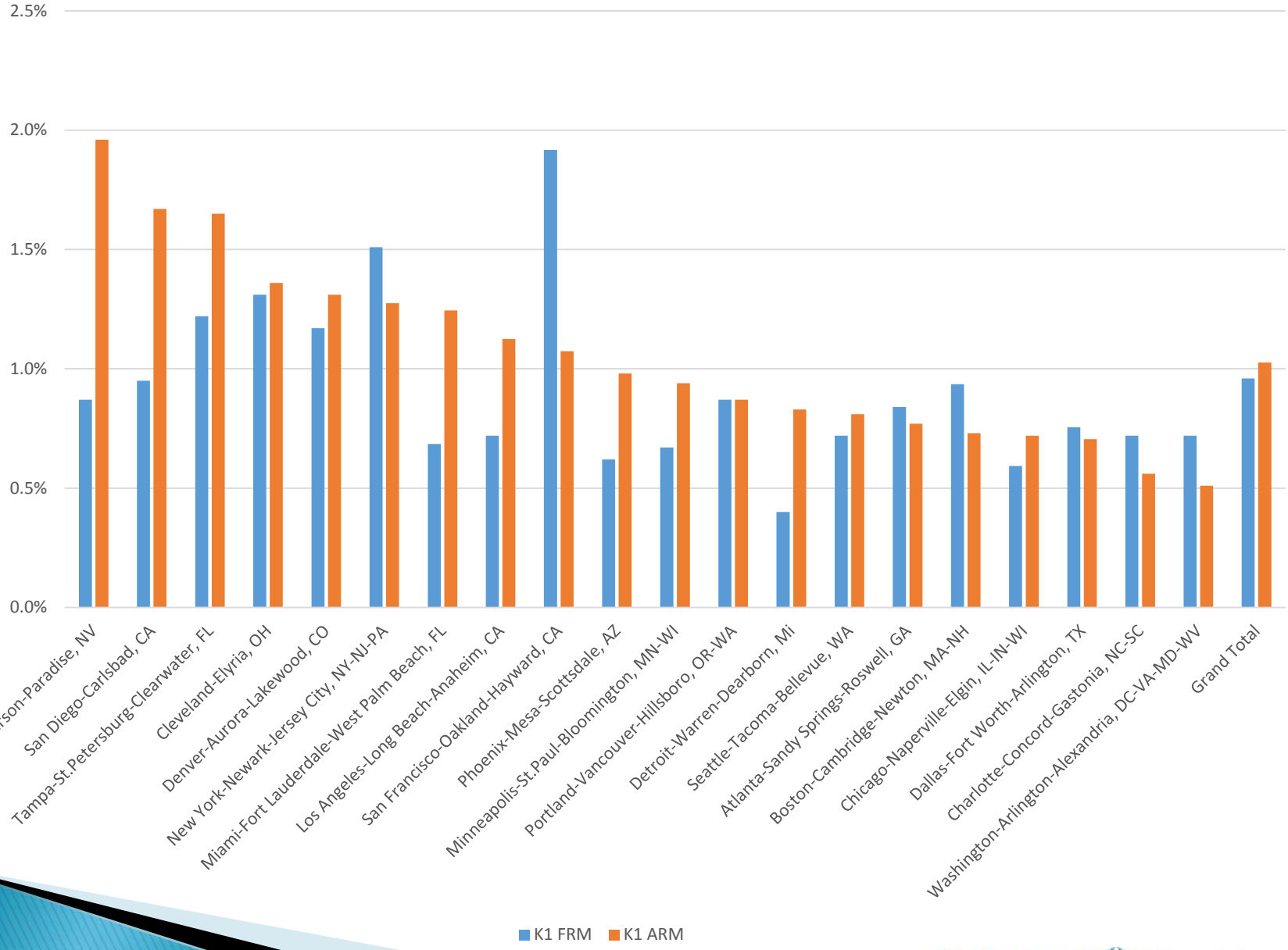
- Exhibit 1 contains estimates of the Credit Risk Spread for 20 CBSA.
- The CRS = EL + (r –risk free rate)*Capital
- CRS 1 uses CBSA specific HP scenarios and default and prepayment equations
- CRS 3 uses the same default/prepayment equations based upon a pooled model and CBSA specific HP scenarios
- They are distinguished by FRM vs ARMs
- These apply to a 80/740 Prime Mortgage but we can generate these for any combination and other mortgage traits

Exhibit 1: Credit Risk Spreads from CA Credit Risk Model for a 80/740 Prime Mortgage (basis points)				
	FRM		ARM	
CBSA Name	CRS 1	CRS 3	CRS 1	CRS 3
Atlanta-Sandy Springs-Roswell, GA	28	32	19	44
Boston-Cambridge-Newton, MA-NH	23	34	19	53
Charlotte-Concord-Gastonia, NC-SC	23	29	18	50
Chicago-Naperville-Elgin, IL-IN-WI	18	29	20	46
Cleveland-Elyria, OH	34	30	35	46
Dallas-Fort Worth-Arlington, TX	24	28	21	47
Denver-Aurora-Lakewood, CO	36	15	34	31
Detroit-Warren-Dearborn, Mi	13	13	25	28
Las Vegas-Henderson-Paradise, NV	23	24	34	37
Los Angeles-Long Beach-Anaheim, CA	15	27	20	43
Miami-Fort Lauderdale-West Palm Beach, FL	16	24	26	39
Minneapolis-St.Paul-Bloomington, MN-WI	22	24	27	44
New York-Newark-Jersey City, NY-NJ-PA	38	43	35	64
Phoenix-Mesa-Scottsdale, AZ	17	25	21	37
Portland-Vancouver-Hillsboro, OR-WA	23	30	22	52
San Diego-Carlsbad, CA	20	32	28	53
San Francisco-Oakland-Hayward, CA	45	31	20	51
Seattle-Tacoma-Bellevue, WA	18	32	22	55
Tampa-St.Petersburg-Clearwater, FL	28	30	37	47
Washington-Arlington-Alexandria, DC-VA-MD-WV	15	31	9	52
Grand Total	**25**	**29**	**24**	**47**
CRS 1 uses CBSA def/prep eqns and MSA HP Scenarios				
CRS 3 uses pooled eqns and MSA HP Scenarios				

Exhibit 2: Capital Ratios by CBSA

- This plots the capital ratios by CBSA
- Ranked from the largest to the smallest capital ratios for ARMs
- Applies to a 740 credit score 80 LTV
- This is based upon CBSA specific HP Scenarios and Default/Prepayment Equations
- The range is substantial: .5 to 2 percent for ARMs and about the same for FRMs

Exhibit 2: Capital 1 by CBSA and ARM/FRm



Three Short Articles on CA Web Site about the CA Credit Risk Model

- Measuring Variations in Credit Risk among Markets
  - http://collateralanalytics.com/measuring-variations-in-credit-risk-among-markets-a-new-product-from-collateral-analytics-2/
- Drivers of Variations in the CRS among Markets
  - http://collateralanalytics.com/measuring-variations-in-credit-risk-among-markets-a-new-product-from-collateral-analytics-2/
- Regional Impacts of Credit Scores on CR Spreads
  - http://collateralanalytics.com/adjusting-mortgage-rates-to-lower-credit-scores-using-cas-credit-risk-model/
- We continue to make improvements and welcome any feedback that you may have

Similar Approach being Done with Robert Dunsky (FHFA) and Seth Giertz

- Same basic approach
- Use FHFA Default and Prepayment Model
- Use Representative Portfolios of GSE Mortgages
- Use Follain and Giertz HP Scenarios

Our Greatest Challenged and Opportunity

- Technically challenging but that's not all.
- The greatest challenge is whether decision makers would be able to implement tougher stress tests as a bubble is developing.
- Black Swan Blindness by Follain 2012.
- Counteracting these challenges is the extraordinary amounts of data available today to analyze the drivers of local housing markets.

Selected References

- "Countercyclical Capital Regime: A Proposed Design and Empirical Evaluation" by Scott Smith and Jesse Weiher (2012) is available at:
  - http://www.fhfa.gov/webfiles/24538/countercyclicalcapitalregime122.pdf
- "The Search for Capital Adequacy in the Mortgage Market: A Case of Black Swan Blindness" by James R. Follain (2013) is available at: http://www.emeraldinsight.com/journals.htm?articleid=17093104
- Preventing House Price Bubbles: Lessons from the 2006-2012 Bust by James R. Follain and Seth H. Giertz (2013) is available at: http://www.lincolninst.edu/pubs/2245_Preventing-House-Price-Bubbles
- The Lincoln Institute of Land Policy is a leading resource for key issues concerning the use, regulation, and taxation of land, find our more here: http://www.lincolninst.edu/aboutlincoln/
- Follain and Sklarz (2005), Mortgage Banking Magazine

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