

Financial Bubbles

Can They be Prevented?

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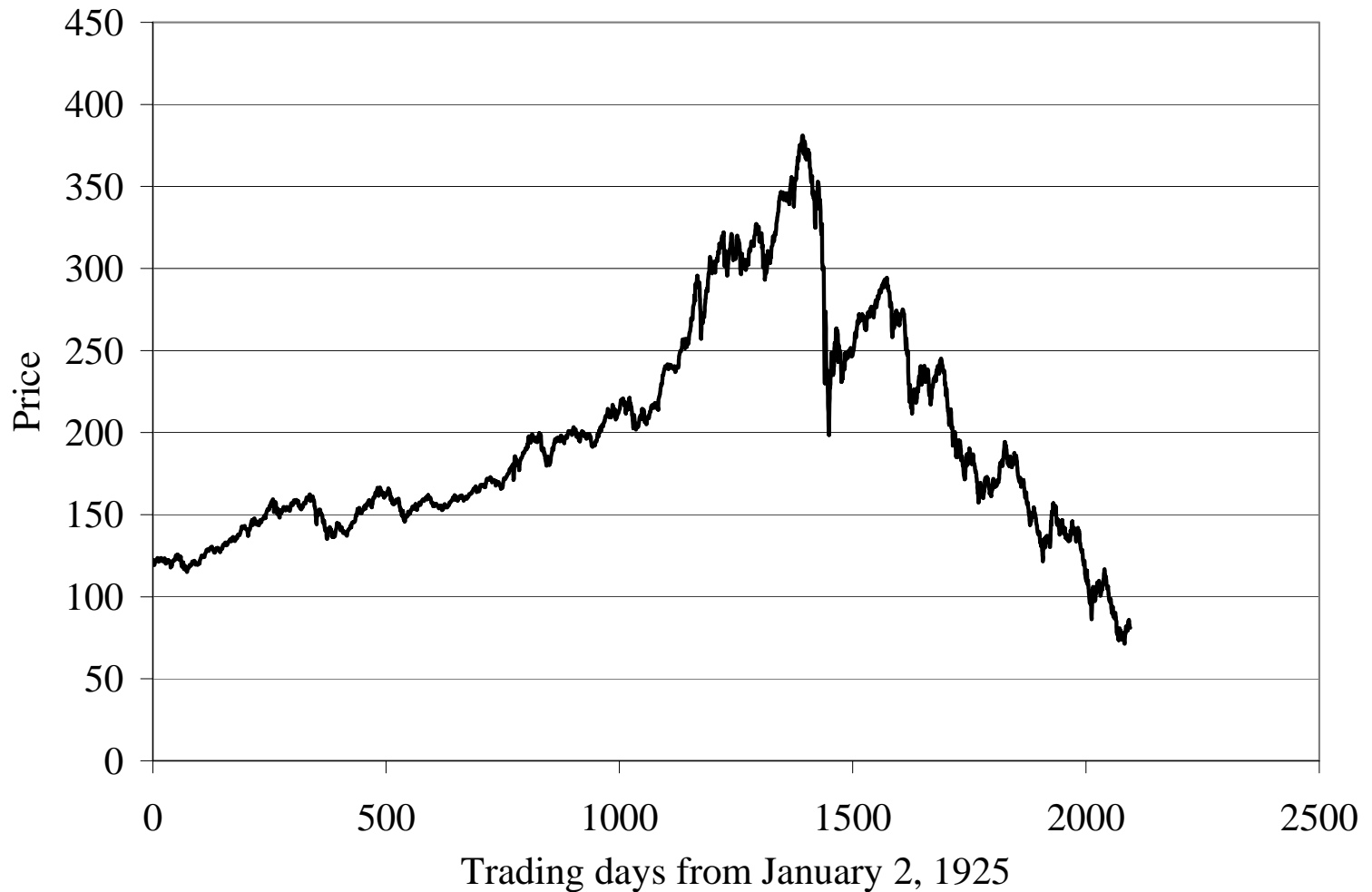
Issue

The Damage from the Collapse of a Major Financial Bubble is Pervasive. Hardships are generated Across All Industrial and Financial Systems.
Can Bubbles be Prevented or Mitigated?

Approach

Identify and Eliminate Root Cause.
The Technical Issue is “Can Bubbles be Predicted well in Advance of their Collapse?”

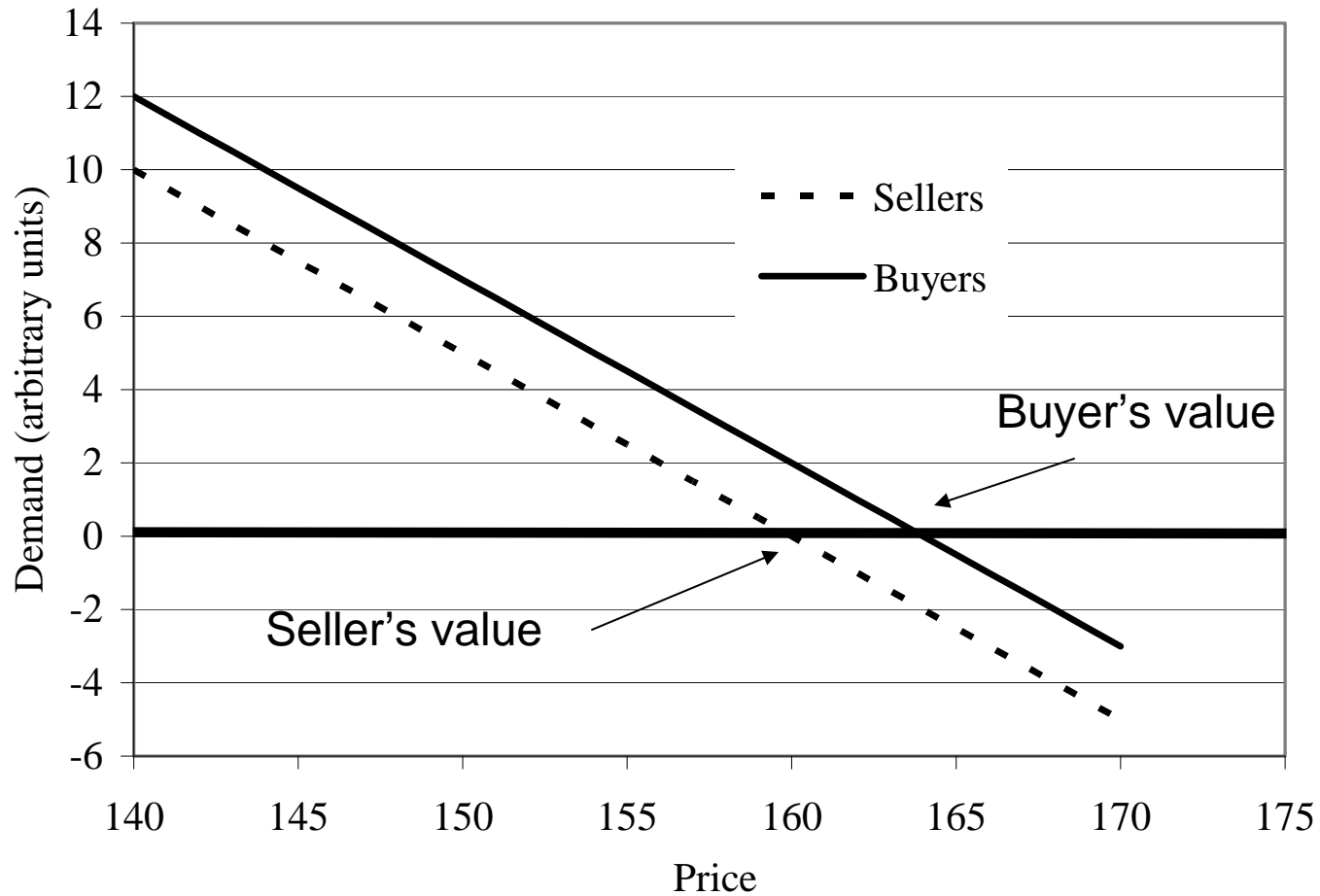
1928 – 1929 DJI Bubble



Stock Market Models

- Value-Based Phenomenological (VBP)
 - *Baja & Goldman (1980); Chiarella (1992); ...*
- Agent-based Artificial Market using G.A.
 - *Arthur, Holland, LeBaron, ... (1997)*
- Log-periodic Critical Behavior
 - *Feigenbaum & Freund (1996); Sornette & Johansen (1996); ...*

Dual Buyer-Seller VBP Model



Demand

Speculative value

$$D_i = K \left[V_{0,i} + c \frac{\delta P}{\delta t} \Big|_{t^*} - P \right]$$

Intrinsic value

The "Invisible Hand"

$i = B, S$

Prior time $t-\Delta$

Price

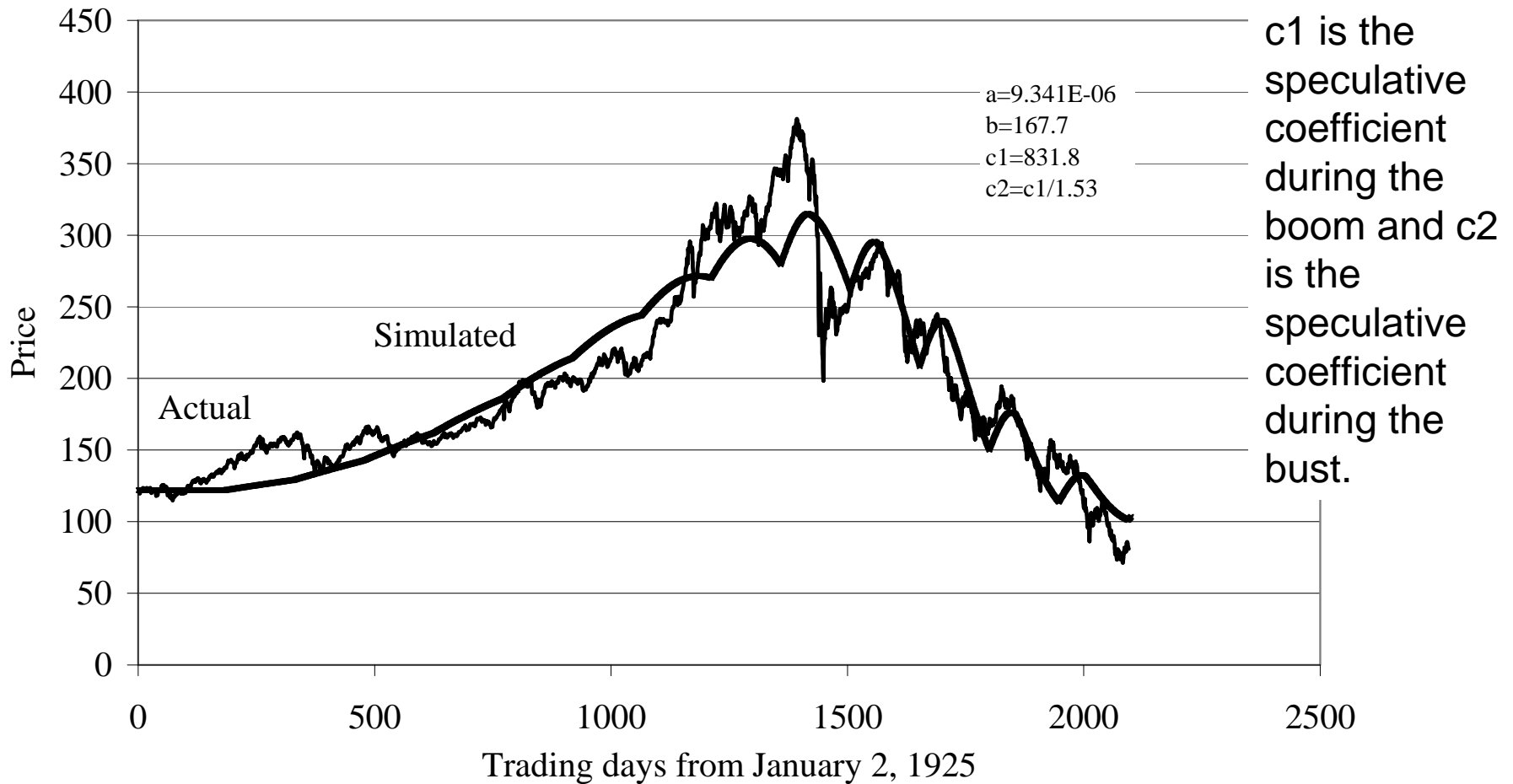
$$P(t + \delta t) - P(t) = a' P(t) \delta t [D_S + D_B] / N_{SH}$$

$$= aP(t) \delta t \left[\bar{V} + c \frac{\delta P}{\delta t} \Big|_{t^*} - P(t) \right]$$

Characteristics of Model

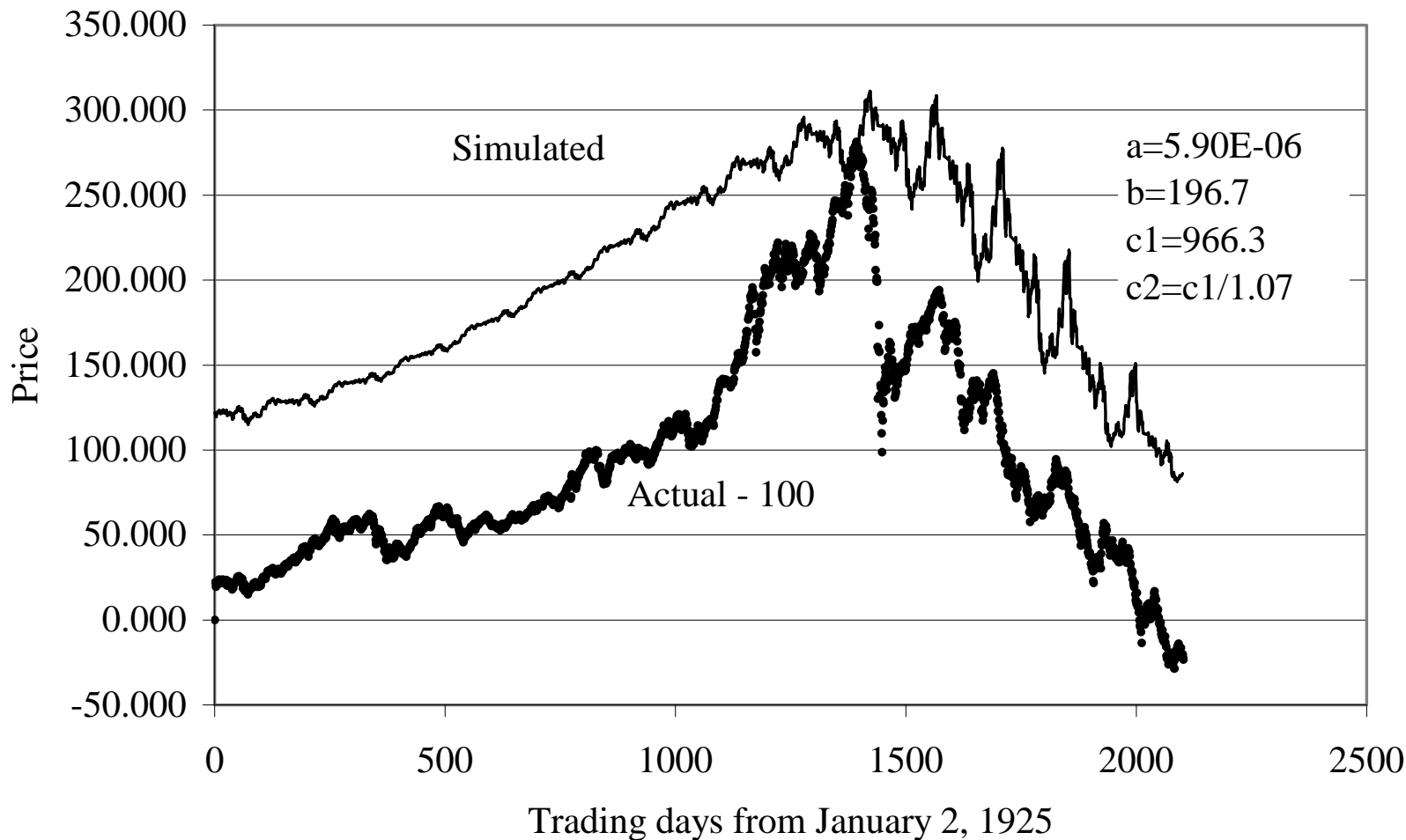
- Simple
- Visual Results
- Quantifies human behavior toward market:
 - Intrinsic value V of asset
 - Speculative value coefficients for boom and bust
 - Prior time $t^* = t - \Delta$ for assessing price trend
- Predicts “lambda shape” for bubbles

1928 – 1929 DJI Bubble Actual vs. Simulation

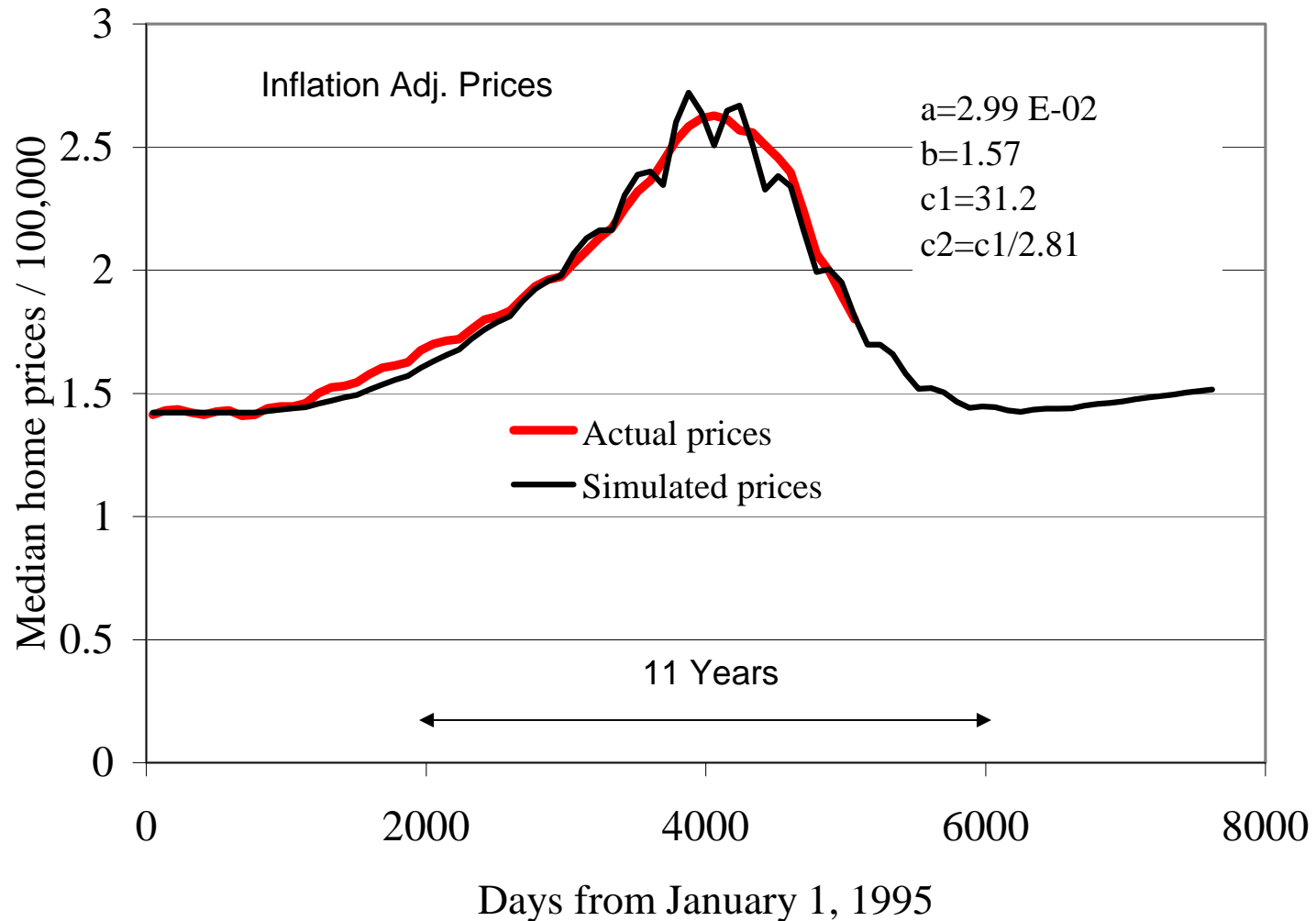


1928 – 1929 DJI Bubble

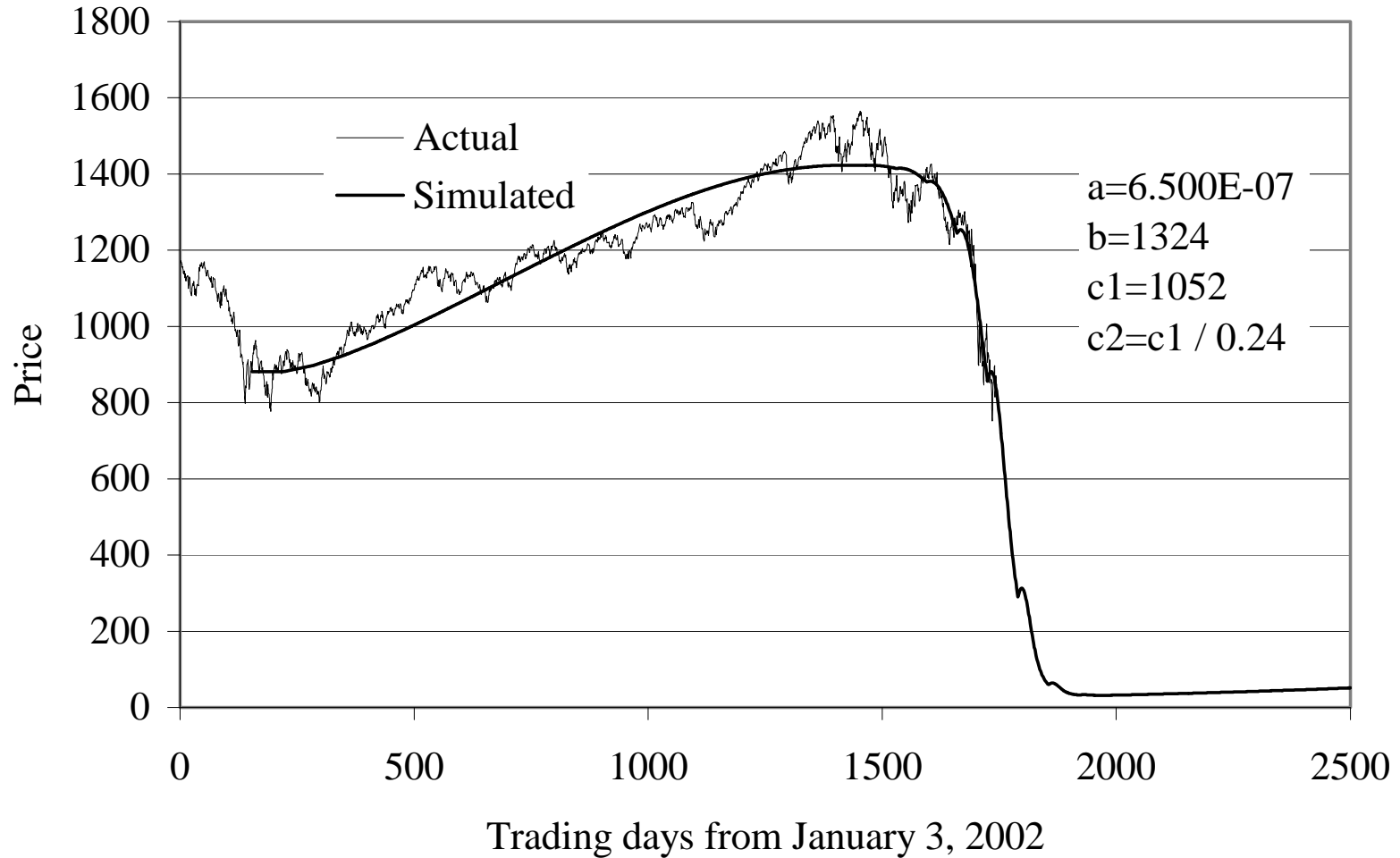
Simulation Seeded with Initial Real Price Fluctuations



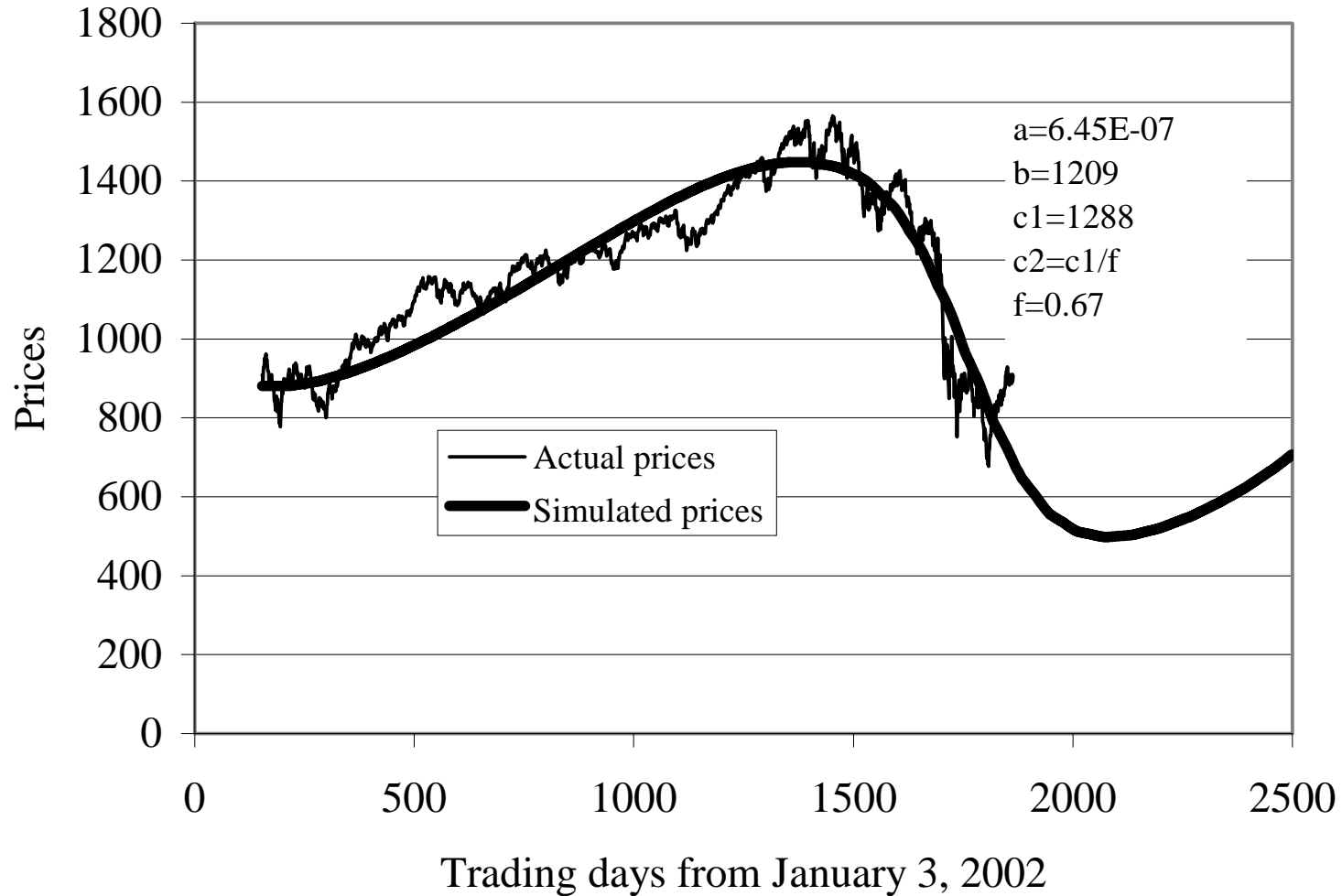
Current Housing Bubble Actual (4Q 2008) vs. Simulation



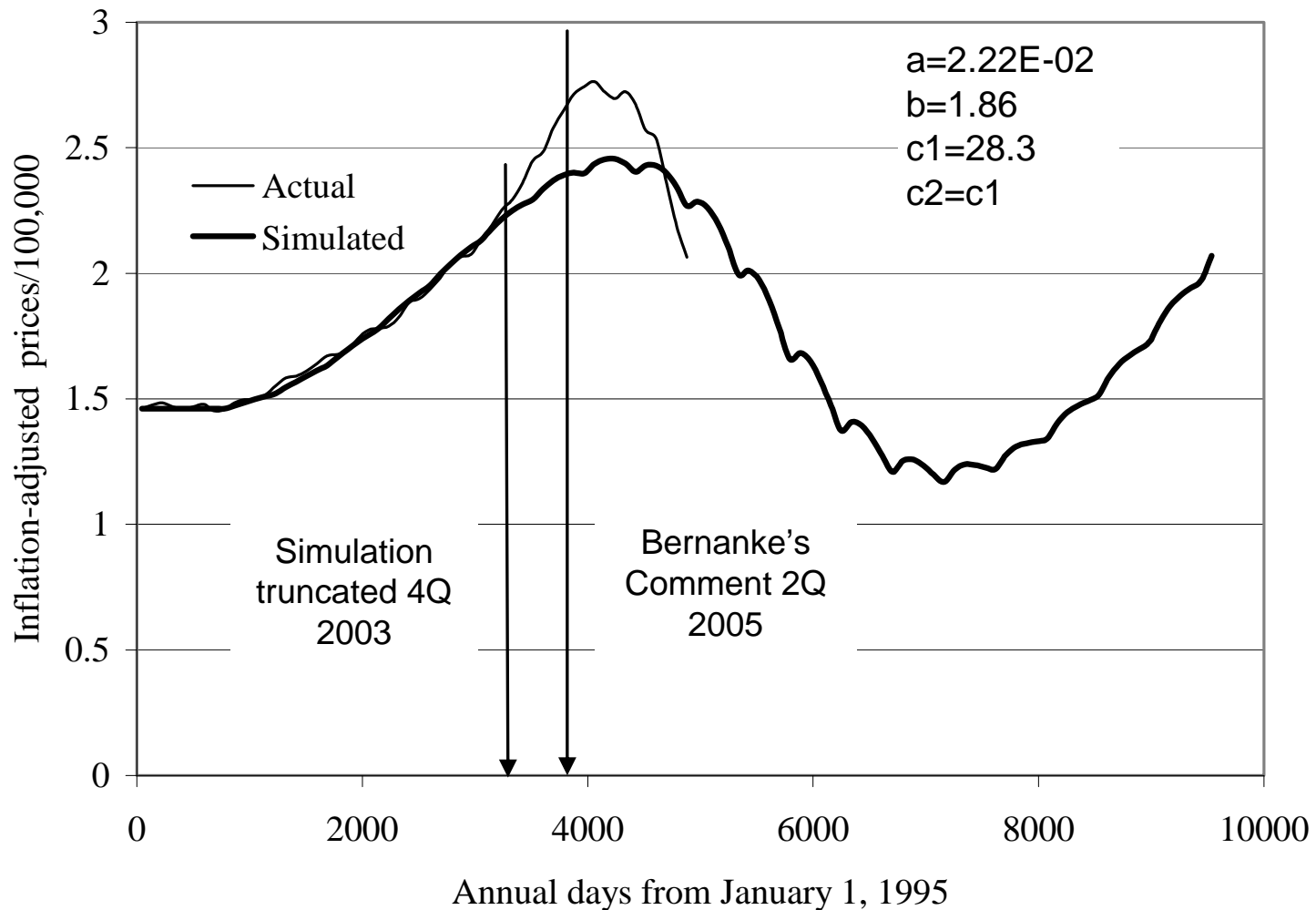
Current S&P 500 Bubble up to December 4, 2008



Current S&P 500 Bubble up to May 28, 2009



Bernanke's "No Bubble!" Comment on Housing Prices 2Q 2005

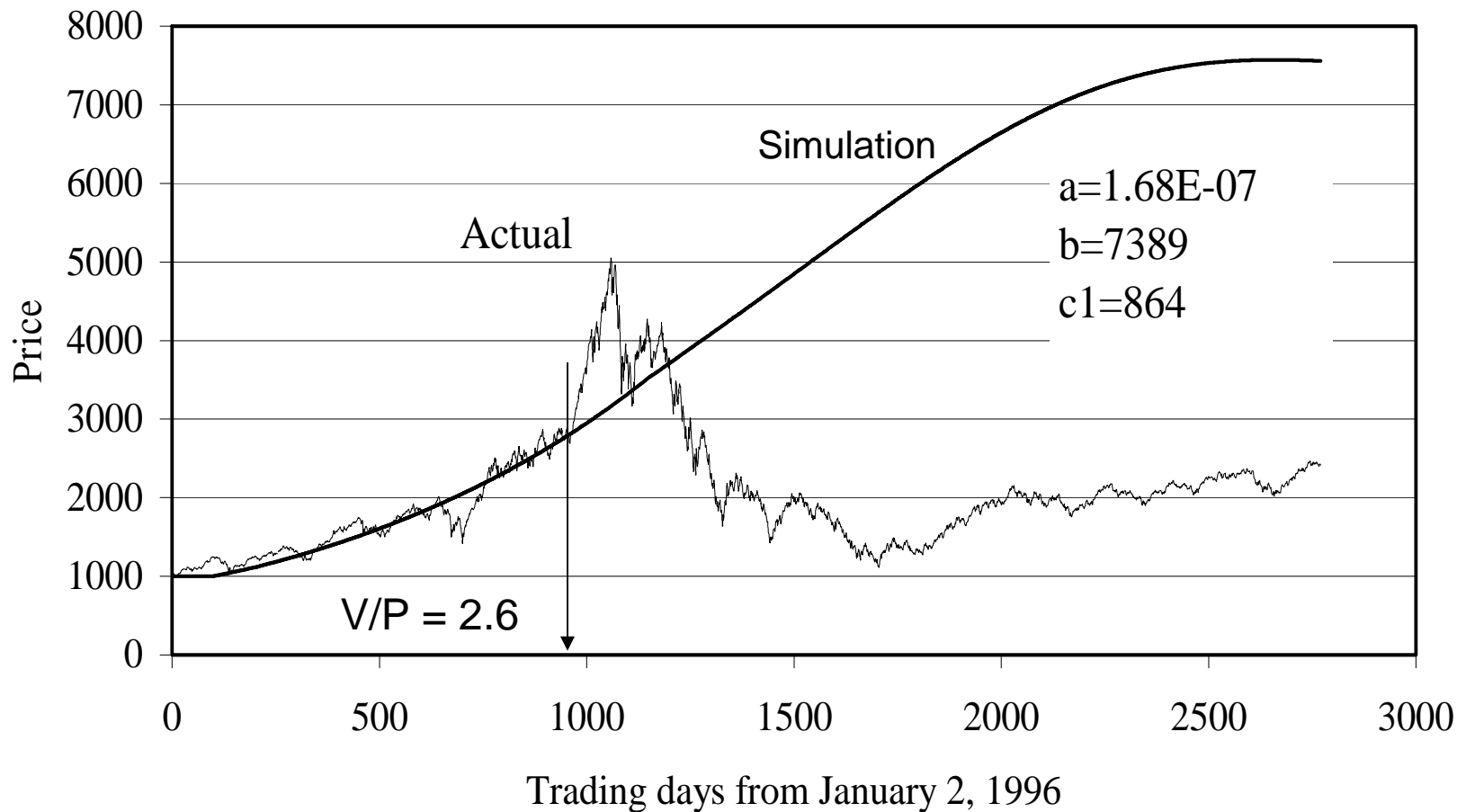


Bubbles Predicted using Price Range Truncated before Peak

- DJI truncated 193 trading days before peak on 9/23/1929.
- Housing truncated 9Q before peak in 1Q 2006
- S&P 500 truncated 54 trading days before peak on 10/9/2007
- DJI (dot.com) truncated over 300 trading days before peak in December 2000.

2000 Nasdaq dot.com Bubble Simulation Truncated at day 967

Bubble Not Predicted but High Value to Current Price Warning



High Value to Current Price Warnings found using Truncated Dual Buyer Seller Model

- $V/P = 2.6$ for 2000 Nasdaq Bubble
Truncated 157 Trading Days before Peak at
6/13/2000
- $V/P = 2.9$ for Taleb's "Black Swan"
Crash of DJI October 19, 1987
Truncated 133 Trading Days before Peak

Root Cause of Bubbles

Poorly Informed Investors

1. Price Appreciation used as Guide to Buy
2. Risk-taking (hold-off selling) when Faced with Loss
3. Assume that Financial Gurus give Good Advice (Hong *et. al.* analysis of dot.com bubble, 2008)

Attacking Root Cause

- 1. Monetary and Fiscal Policy do Not Attack Root Cause of Poorly Informed Investors
- 2. Robert Shiller has called for “Democratizing Finance” through Education of the Populace
- 3. Suggestion here: Form Not-for Profit Company whose mission is to 1) educate the populace, 2) establish a robust warning system for bubble formation using the full set of existing bubble models and 3) improve upon the robust model set.

Questions?