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ASIAN ECONOMIC OBSERVATORY NETWORK

A Proposal on Data-Driven Modeling of
Asian Economies

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Econophys-Kolkata VIII | 14–17 Mar 2014 | Kolkata, India

Nanyang Technological University

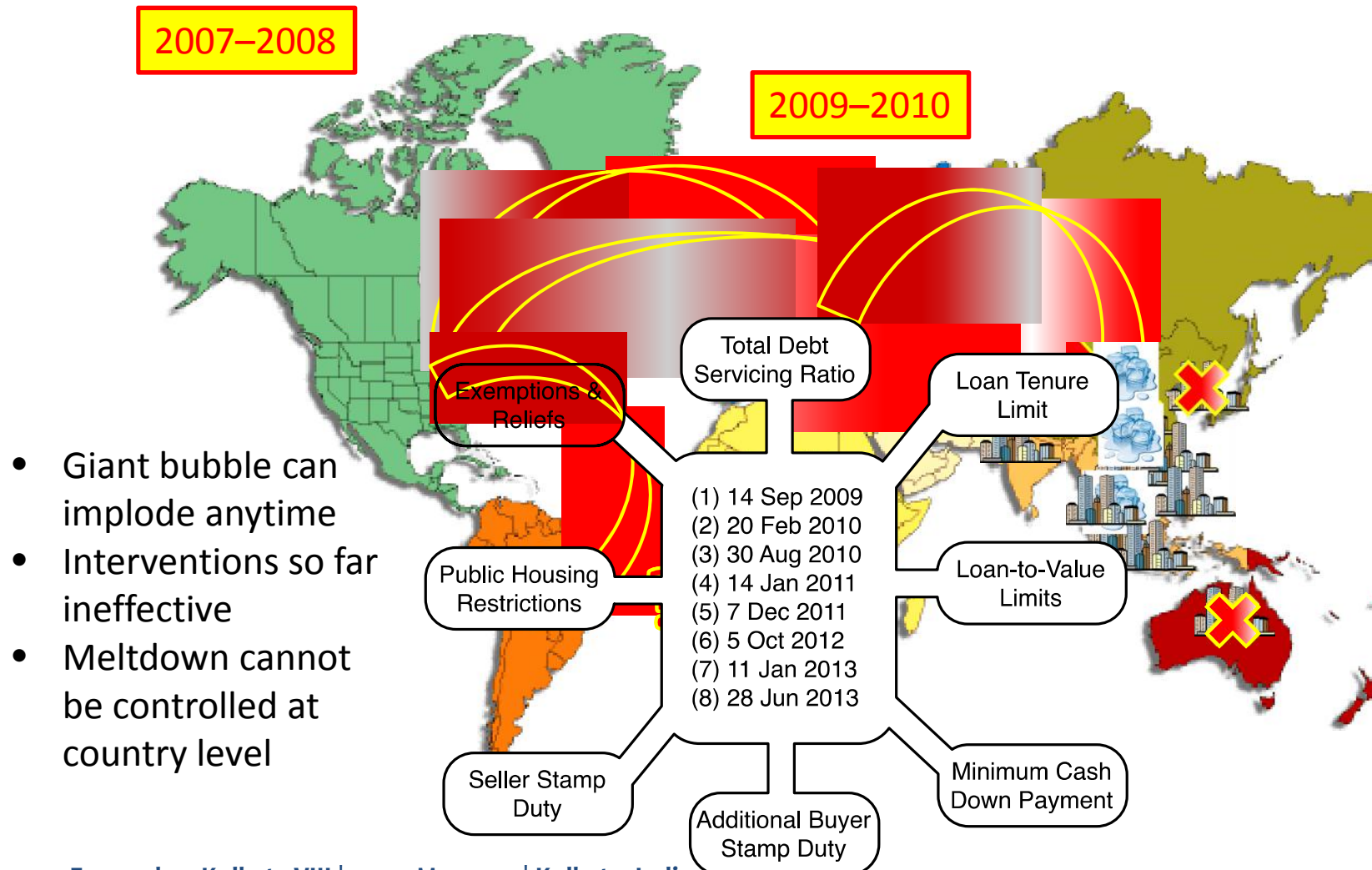


Nanyang
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(1991–)



School of Physical and Mathematical Sciences

The Asian Property Bubble



Learning From the Impending Crisis

- After so many market crashes, markets still crash
 - Did we learn nothing?
 - Inevitable?
- No coordinated research in Asia by economists or econophysicists
 - Set up regional network of teams
 - Asian Economic Observatory Network (AEON)
- Aim to understand and control crisis
 - What knowledge and tools do we need?

Economics

- From theory-driven → data-driven → Big Data
 - Not overhaul, but upgrade
 - Still aggregate data
 - Raw data available for hypothesis testing
- Policy-driven economics
 - Policy problems hard, generally avoided
 - Involve policy from the get go
 - Measurements + milestones
 - Development of tools + evidence-based intervention

The Need for a Network of Observers

(b)

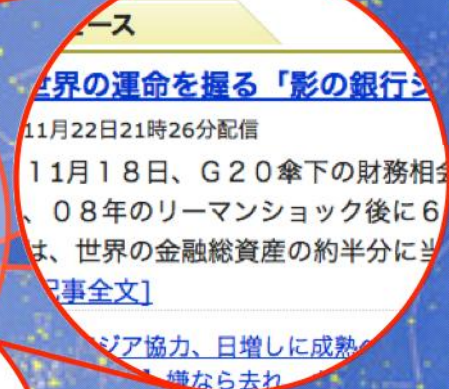
Each observatory sees a difficult cultural facet of Asian economy



Each observatory sees a different facet of night sky



Difficult & unethical to perform experiments



Financial Crisis

Latest news on the financial crisis, as of 2008.

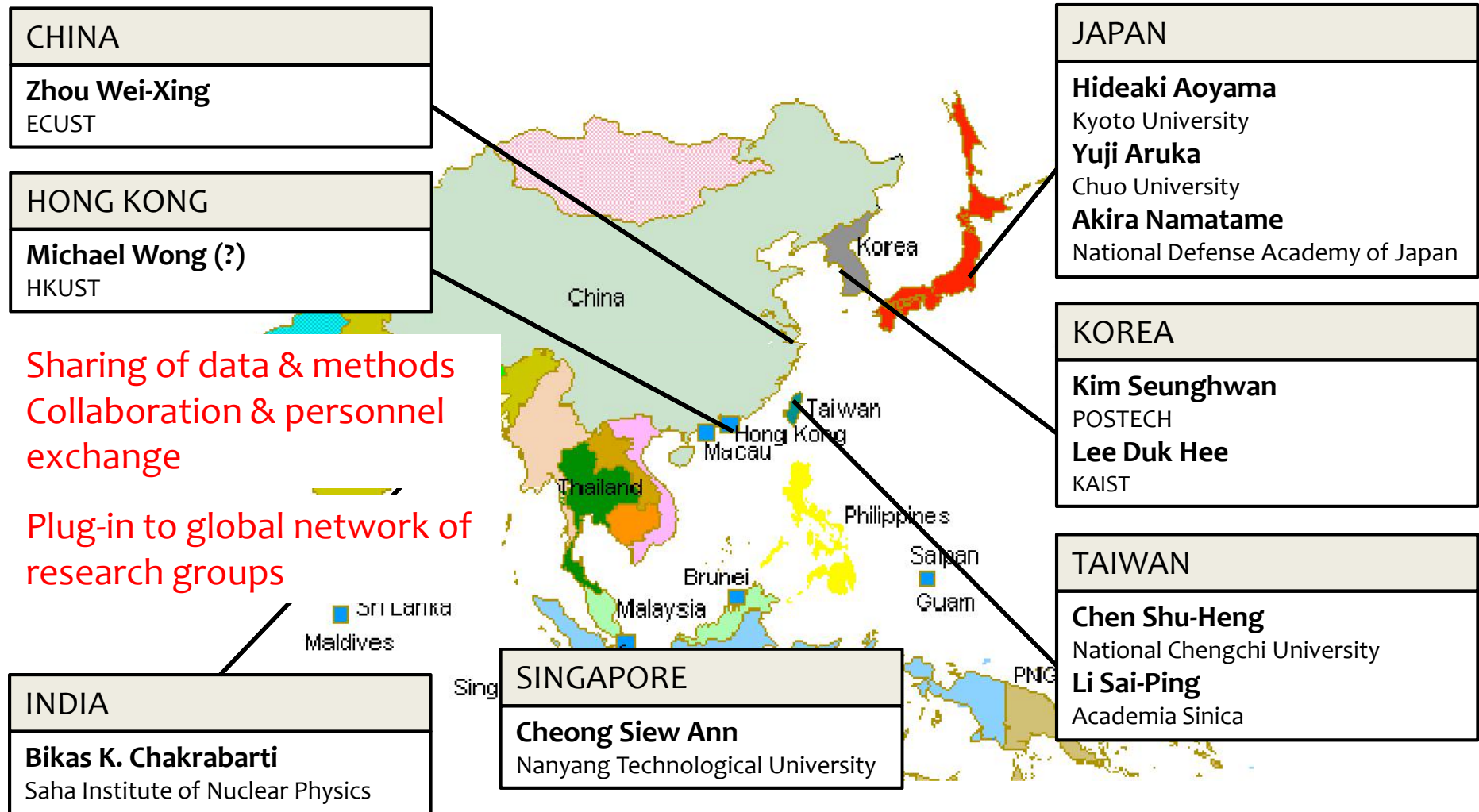
FINANCIAL CRISIS LATEST NEWS

EU Budget: EU talks fi live

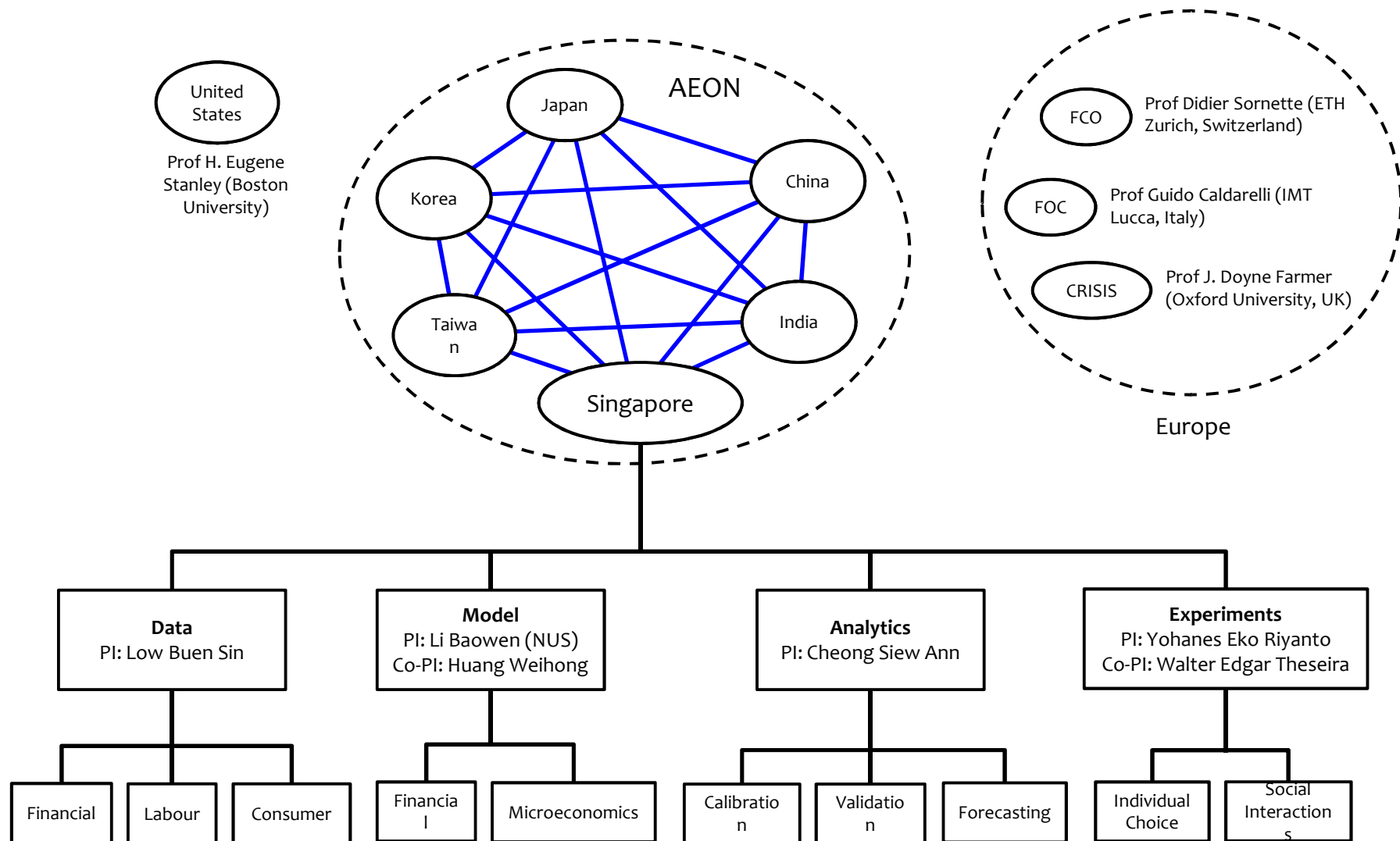


Impossible to perform experiments

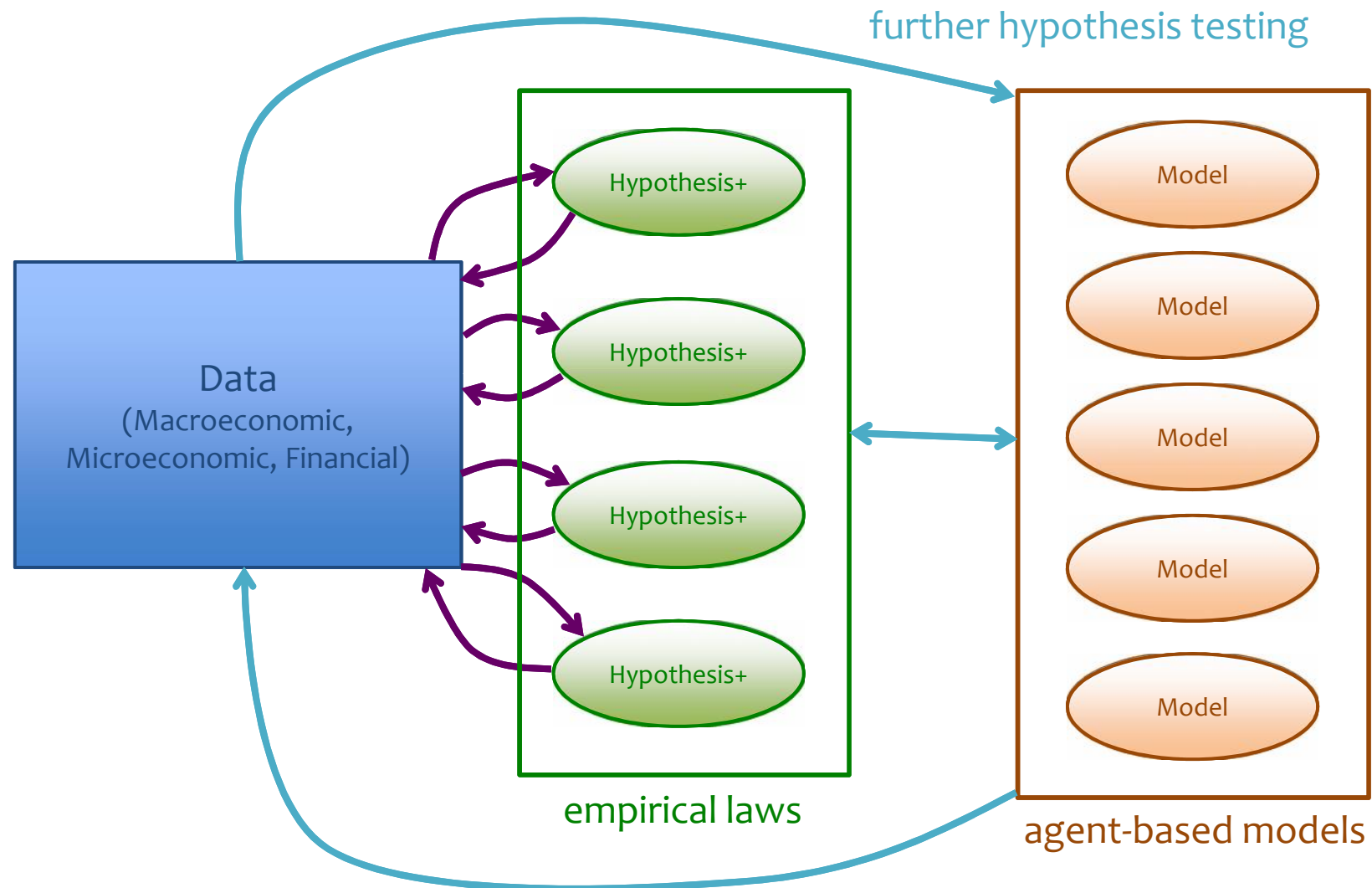
The AEON Proposal



The AEON Program



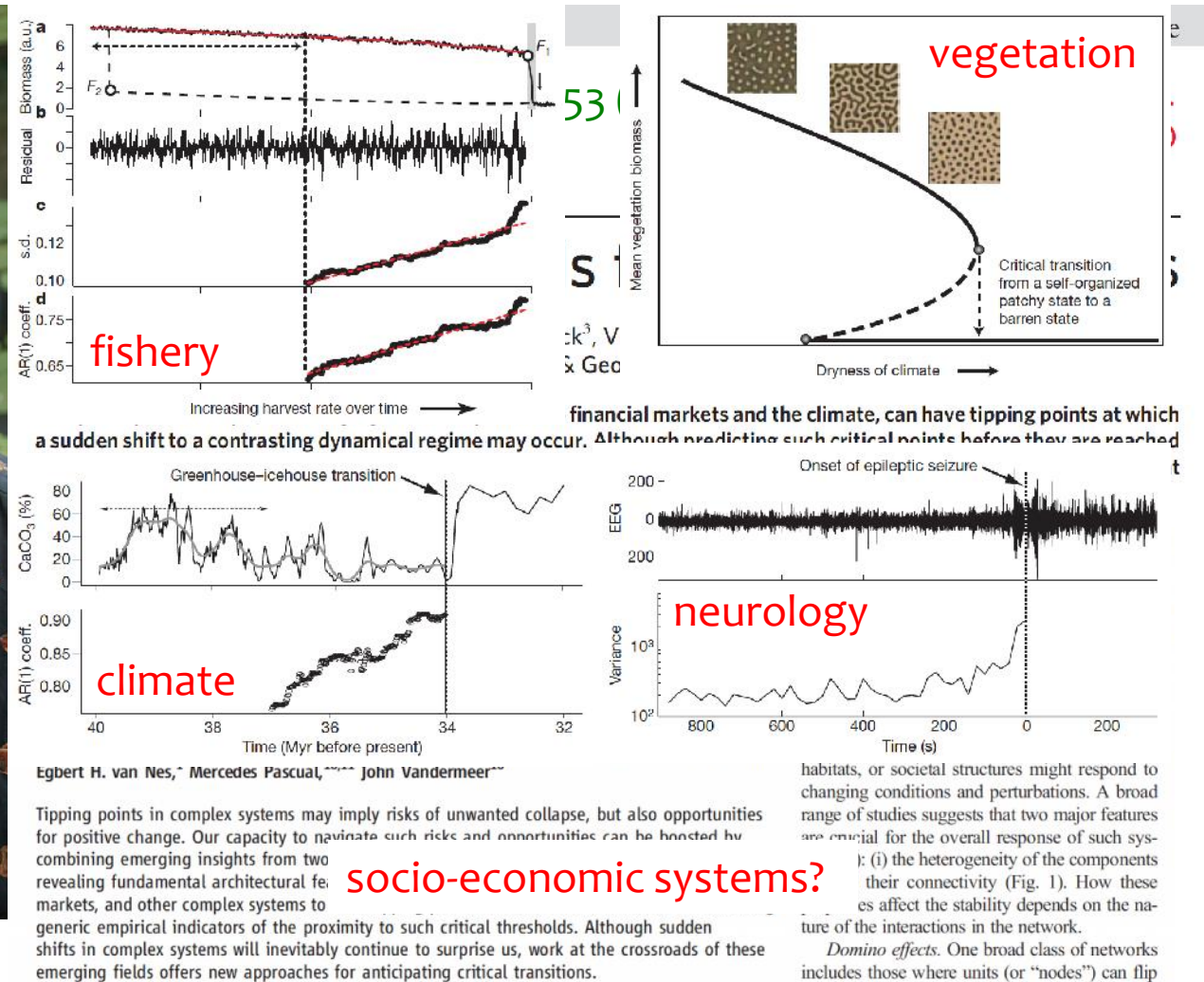
The AEON Approach



Challenges

- Data
 - Different availability conditions, reporting standards, data formats
 - Create standard data format?
- Model
 - No track records for very-large-scale ABM
 - Endorsements from European collaborators
- Government involvements
 - Different political priorities
 - Use each other as leverage

Sharing Data & Methods: Example 1



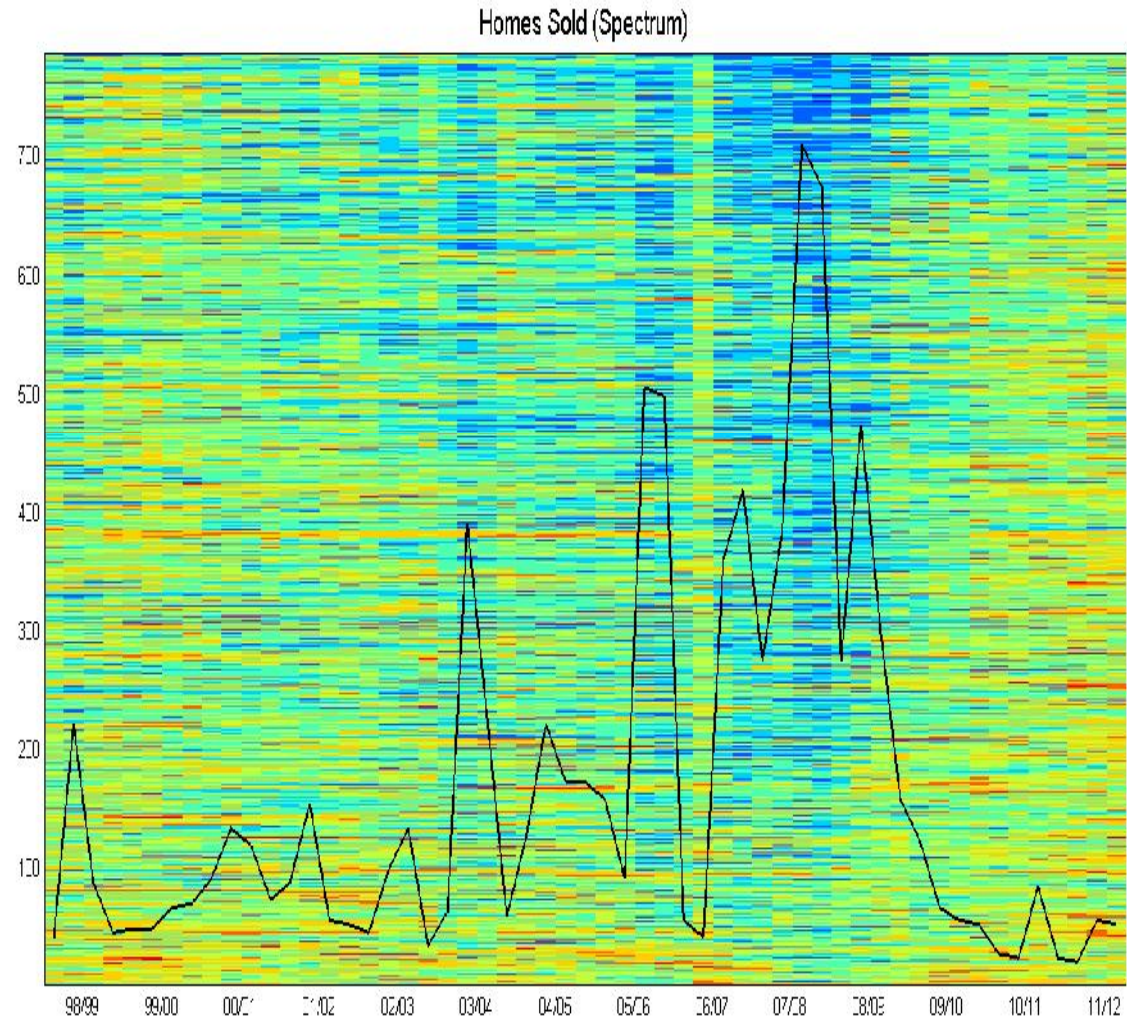
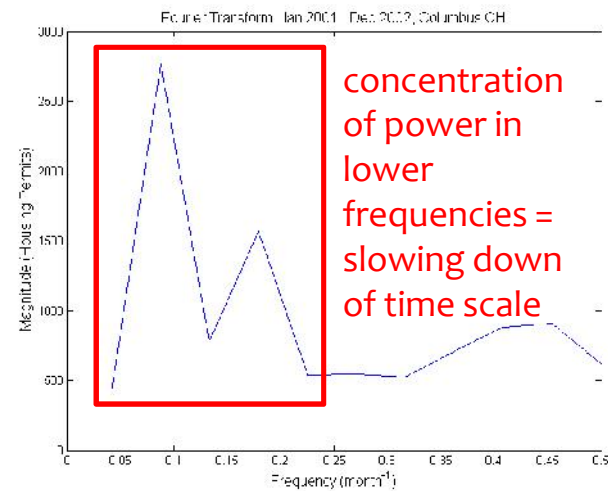
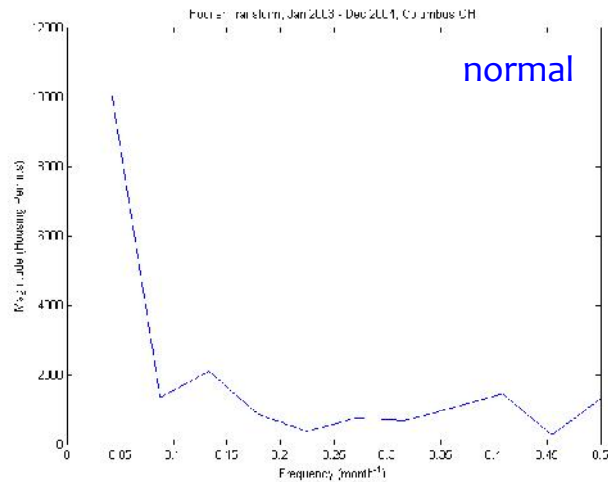
The Subprime Crisis (2007–2008)

- Triggered by subprime loan defaults
 - Credit default swaps (CDS) sold in tranches by big banks
 - Bought by many funds in US & Europe
- What is a prime loan?
 - Given to borrowers with good credit ratings
 - Good income & middle class
 - Consistent history in paying back car & personal loans
- What is a subprime loan?
 - Given to borrowers with poor credit ratings
 - Low income, poor job stability
 - No history of loans or history of delinquency & defaults
 - 2.5% or 4.0% teaser rate for first 2–3 years
 - ~10% adjustable rate subsequently
- Will Scheffer's universal early warning indicators work?

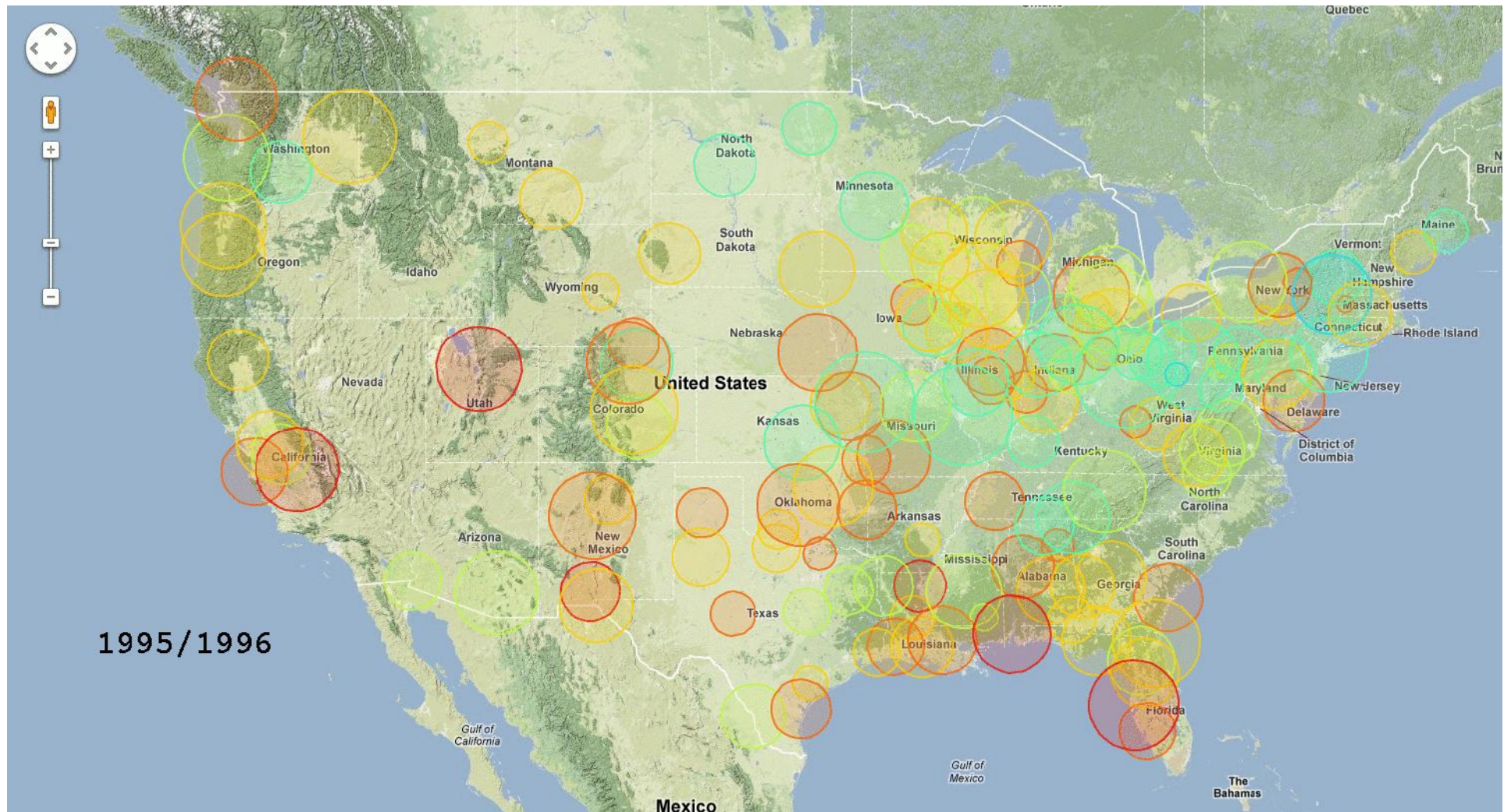
US Housing Market Data

- **US Census Bureau**
 - <http://www.census.gov/construction/bps/>
 - 158 metropolitan statistical areas (MSAs)
 - Jan 1995 to Nov 2012
 - monthly housing permit
- **Zillow.com**
 - <http://www.zillowblog.com/research/data/>
 - about 3000 US cities
 - Sep 1997 to Dec 2012
 - home sold, median sale price, % of homes sold for profit

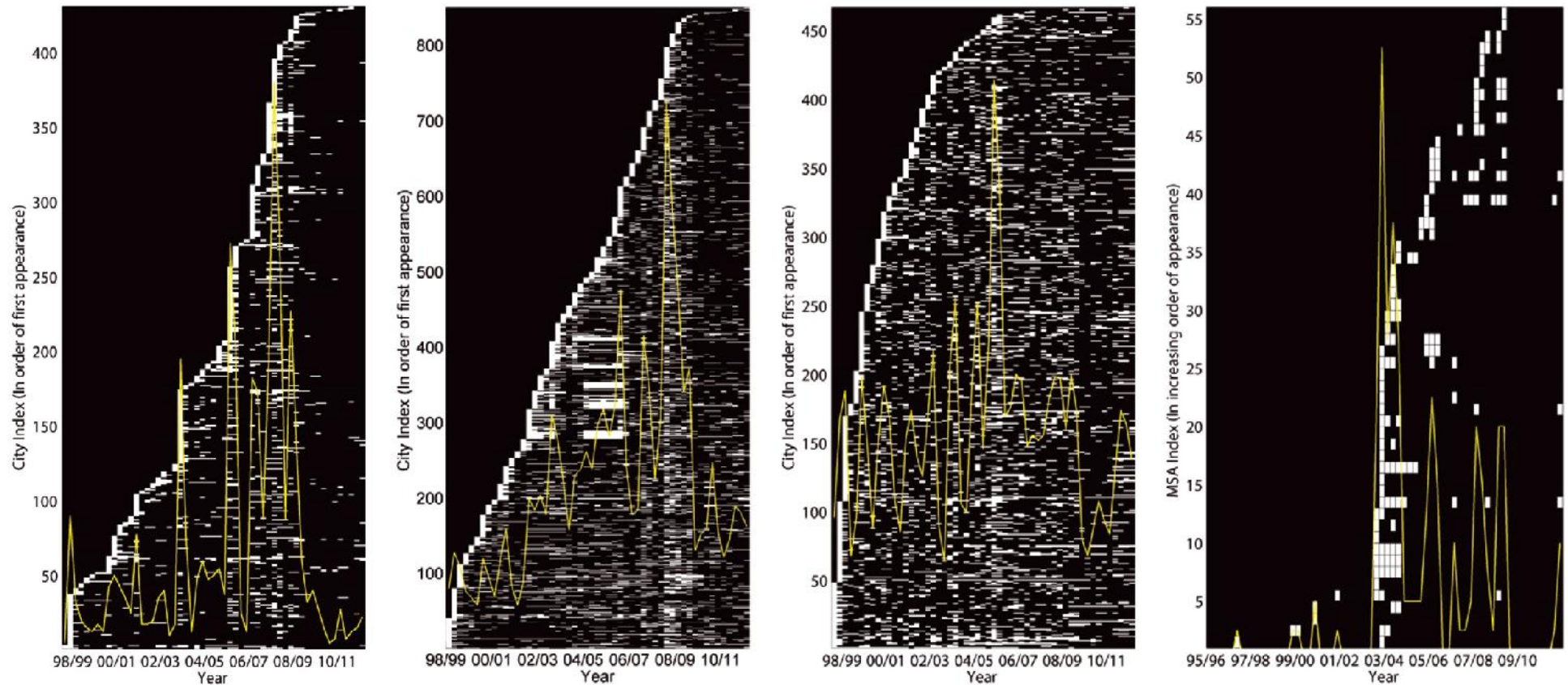
Red Shift in Power Spectrum



Spatio-Temporal Dynamics



Transition Cross Sections

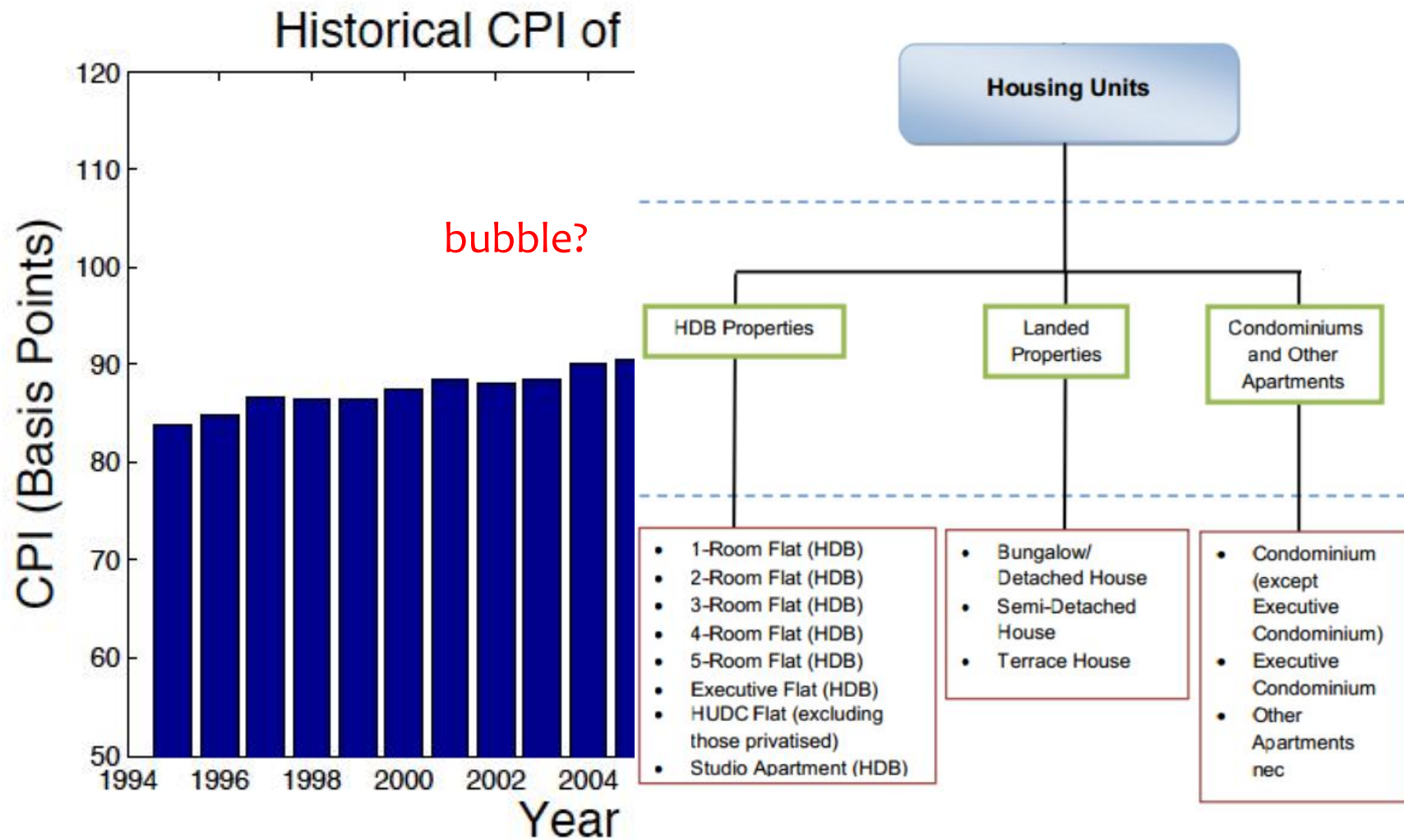


Tan & Cheong, *Eur. Phys. J. B* **87**, 38 (2014)

Not able to find data and collaborators for comparative study!

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Sharing Data & Methods: Example 2



Singapore Housing Market Data

- Urban Redevelopment Authority (URA)
 - Real Estate Information System (REALIS)
 - Individual transactions Jan 1995 to Dec 2012
- Data fields

Property Name	Transacted Price (\$)	Tenure	Postal Sector
Address	Unit Price (\$/m ²)	Completion Date	Postal Code
No. of Units	Unit Price (\$/ft ²)	Type of Sale	Planning Region
Area (m ²)	Contract Date	Purchaser Addresser Indicator	Planning Area
Type of Area	Property Type	Postal District	

Log CDF of Home Prices



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Physica A 299 (2001) 213–221

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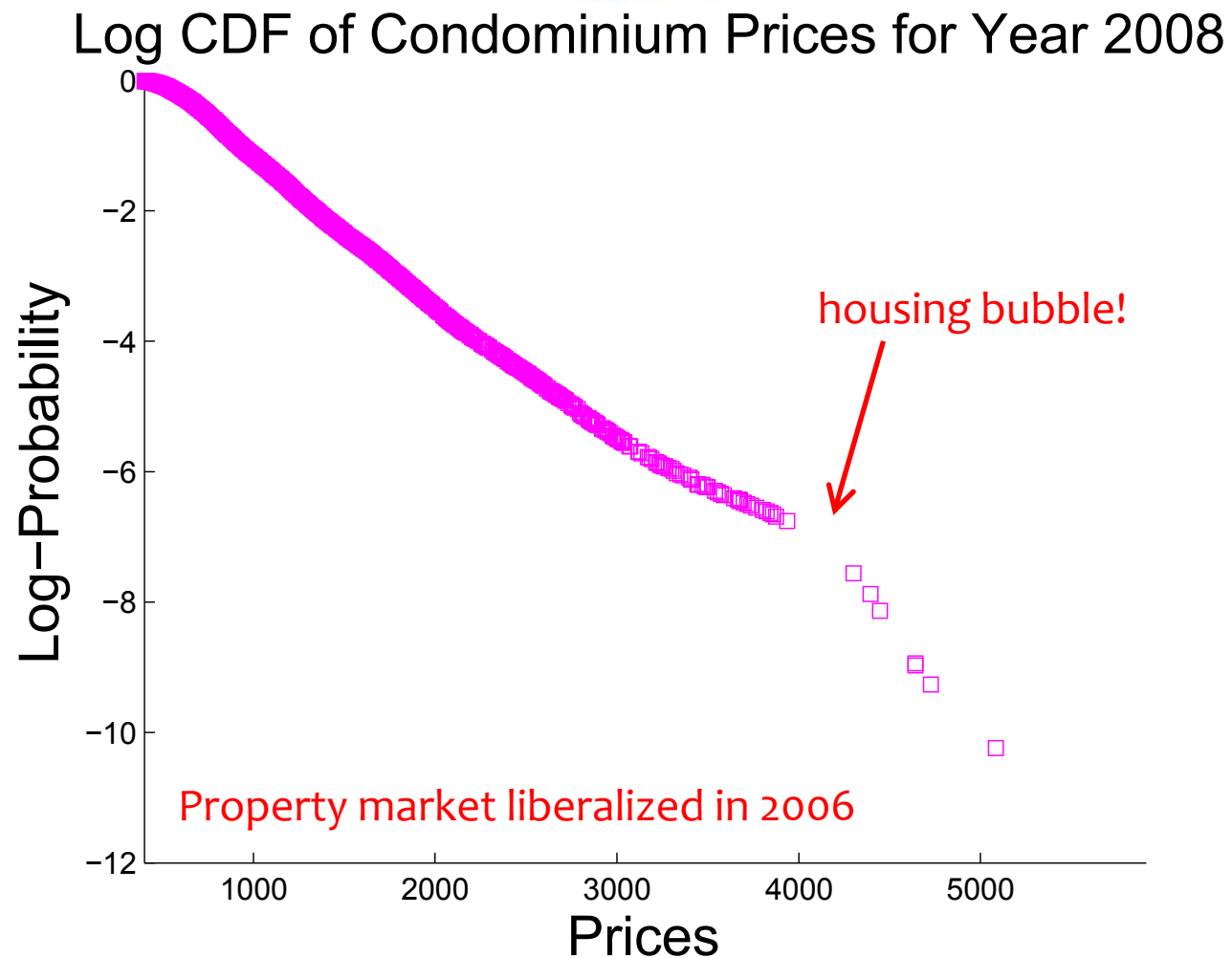
www.elsevier.com/locate/physa

Exponential and power-law probability distributions of wealth and income in the United Kingdom and the United States

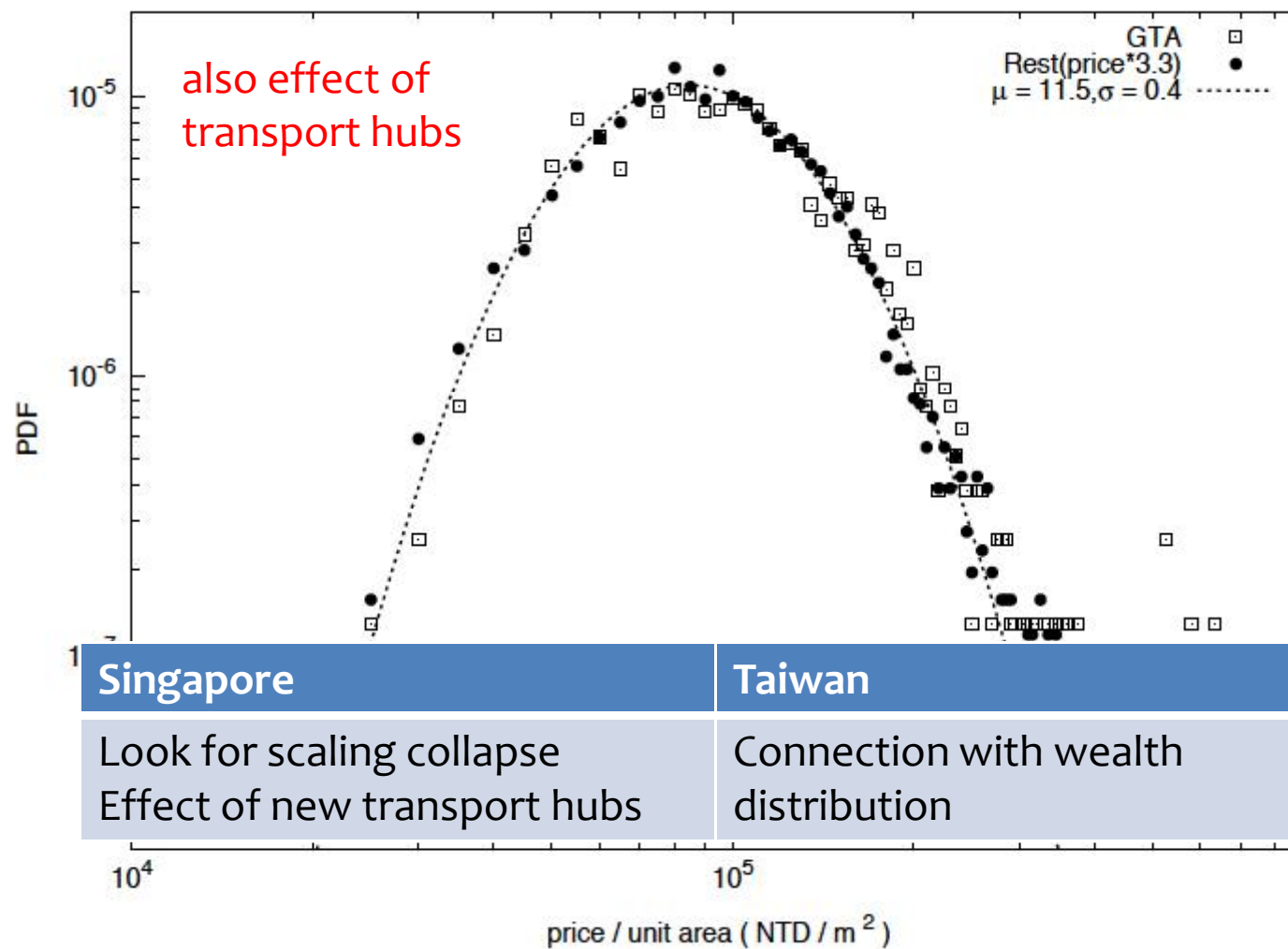
Adrian Drăgulescu, Victor M. Yakovenko^{*,1}

*Department of Physics, Center for Superconductivity Research, University of Maryland,
College Park, MD 20742-4111, USA*

The Singapore Housing Bubble



The Taiwan Housing Bubble



The Way Forward

- A team in each country
 - Japan has a large team already
 - Singapore building up
 - More efforts elsewhere
- Collaborations
 - Scale interesting local projects to much more interesting regional projects
 - Try each other's methods on data
 - Comparative approach to generate insights
- Endorsements
 - International collaborators
 - Governments