

The
CRISIS
of
CROWDING

*Quant Copycats,
Ugly Models,
and the New
Crash Normal*

LUDWIG B.
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Towards a Theory of Crowding *Very Preliminary*

July 1, 2019

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WEAI ANNUAL CONFERENCE
TOPICS IN CROWDING PANEL
JULY 1, 2019

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- Thank you for coming. Thanks to the WEAI Conference. People associated with first **crowding** panel: **Teodor Dyakov**, Hao Jiang and Marno Verbeek, Wenqian Huang, Albert J. Menkveld, **Shihao Yu**, **Andy Vivian**, and **Ludwig Chincarini**.

1. Crowding Idea is Spreading

- *The Crisis of Crowding* by Ludwig Chincarini.
- A new academic literature on crowding has been burgeoning in the last six years.
- For more info, go to:
<http://ludwigbc.com/presentations/slides/>

2. Definition of Crowding

- Chincarini (1998), Stein (2009), Chincarini (2012), Chincarini (2017, 2018)
- Menkveld (2017), Tay et al. (2016)
- Investment Banks – Sanford Bernstein group, Bank of America group, JP Morgan Chase, Credit Suisse,

3. Elements of Crowding: What Model Should Explain

1. The process that generates the crowding
 - a. Copycat behavior of a good strategy (herding) (Chincarini (1998, 2012))
 - b. System Structure (e.g. VaR models, risk models, (Chincarini (2018), Menkveld (2017))
 - c. Regulation System (e.g. Basel II and Risk on home loans)

3. Elements of Crowding: What Model Should Explain

2. Explains the type of crowding

- a. Types of Holders. Are all traders the same type or are they of different types? How will they behave to different types of shocks?
- b. How is liquidity affected by the crowding?
- c. What is the leverage-adjusted saturation or crowding?

3. Elements of Crowding: What Model Should Explain

3. Specifies the Interdependence Between Holders and Relationship to Prices

- a. How do different holders affect each other in the system?
- b. How does investor Type A's actions affect investor Type B's actions?
- c. How does behavior affect liquidity and cascade effects?

3. Elements of Crowding: What Model Should Explain

3. Specifies the Interdependence Between Holders and Relationship to Prices - Examples

Table 1: Types of Crowded Spaces

Parameters	Verbal	Example
$N = 1, L = 1$	Only one type of holder with a similar trading strategy.	Retail investors buying PALM.
$N > 1, L = 1$	2 or more types of holders with similar trading strategy, but different motivations or risk appetites. Different behaviors.	Commercial banks banks and hedge funds making similar swap spread trade. Quant hedge fund long value stocks and short growth stocks, and multi-strategy fund focused on energy starting a new portfolio to do similar trade.
$N > 1, L > 1$	Different holders in terms of behavior and different trades, but despite being different trades lead to a crowding of the space.	A hedge fund long the swap spread (betting that spreads will widen, thus short swap rates and long Treasuries), and a commercial bank or macro hedge fund is long Treasuries. Although trades and motivations are different, they both lead to a rallying Treasury curve. The risk inherent in Treasuries is subject to the behavior of both groups. And both groups' positions are dependent on risk from the other group.

3. Elements of Crowding: What Model Should Explain

4. How is the total saturation or crowding measured in the model? How can we take it to the data?
 - a. The model should specify how one can measure the extent of crowding with full information and with partial information.
 - b. Should be implementable and testable with real data.

3. Elements of Crowding: What Model Should Explain

5. Empirical Findings on Crowding

- a. Crowding can occur from system structure (margin in clearing account, risk models in portfolio management). Chincarini et al (2018), Chincarini (2017), Menkveld (2017)
- b. Crowded mutual fund holdings (wrt liquidity) leads to factor returns not explained by Fama-French (i.e. short crowded securities, long uncrowded) Tay et al (2016) & Macquarie & Others
- c. Popular stocks or high concentration of hedge fund ownership leads to subsequent lower returns. Many studies.

3. Elements of Crowding: What Model Should Explain

5. Empirical Findings on Crowding

d. Different types of equity factors might have different implications for crowding (some with natural anchors and some without). [Baltas \(2019\)](#)

e. Considering the “crowding” of a factor with a valuation metric leads to better investment outcomes. [Arnott, Beck, Kalesnik \(2016\)](#)

3. Elements of Crowding: What Model Should Explain

5. Empirical Findings on Crowding

f. Net positions are important because sometimes the net effect of different strategies is almost zero. (Blitz (2017))

g. Shifting positions amongst oil futures demand (crowding on one side of market) might lead to contango and tracking error of oil futures versus spot oil. (Chincarini & Moneta (2019))

4. Some Ideas and Tools for Models

1. The Swarm Literature (see references at end)
 - a. Mainly used to study insect swarms, but may have elements that are useful for financial and/or economic crowding.
 - b. A typical modeling strategy is to treat each individual as a moving particle whose velocity is influenced by social (interparticle) attractive and repulsive forces. In contrast, the exogenous forces describe an individual's reaction to the environment, for instance a response to gravity, wind, a chemical source, a light source, a food source, or a predator.

4. Some Ideas and Tools for Models

2. The Network Literature

- a. Since crowding affects prices and the interaction of holders is important, the network literature might offer some tools.

4. Some Ideas and Tools for Models

3. Conventional Finance Literature

- a. Mainly ideas on liquidity and leverage, but could be helpful to tie in.
- b. Some ideas of bubbles and bank runs might be useful.

4. Some Ideas and Tools for Models

4. Other Interesting Literature

- a. Liquidity simulation models could be adapted to work with crowding (Withanawasum, Whigham, and Crack (2013) (WWC) and Maslov (2000))
- b. OLG models might be useful in a context of lifecycle of investing.
- c. The herding of ants with two different food sources or “investment vehicles”.

4. Some Ideas and Tools for Models

5. Other Pieces and Thoughts on a Model

- a. Should have a measure of alpha and 1-alpha, where alpha is the concentration in dollars or saturation of the "crowding" group. In the case of multiple holders, various alpha1, alpha2, etc.
- b. Can crowding risk be hedged?
- c. Sometimes crowding is dangerous, sometimes it's just a zero-sum game. What is the distinguishing factor?
- d. What triggers exit? When is it endogenous When is it exogenous?
- e. Unlike typical herding – doesn't need everyone to exit – just a few players that exit can wreak havoc.

4. Some Ideas and Tools for Models

5. Other Pieces and Thoughts on a Model

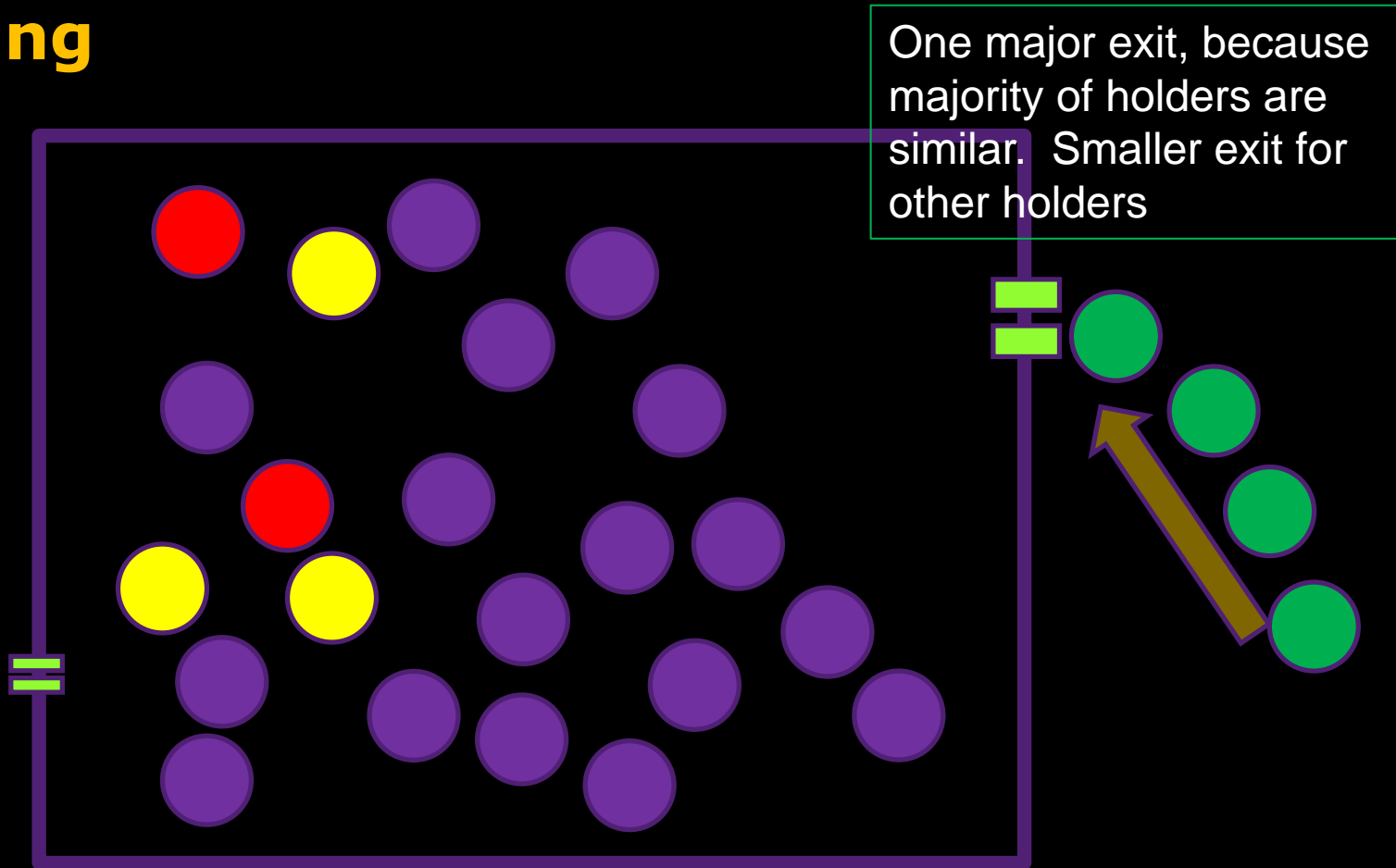
- e. How does leverage and liquidity play a role?
- f. Does crowding naturally cause correlation of trading strategies to move to 1. How and when?

5. Esoteric Thoughts on Crowding Modelling

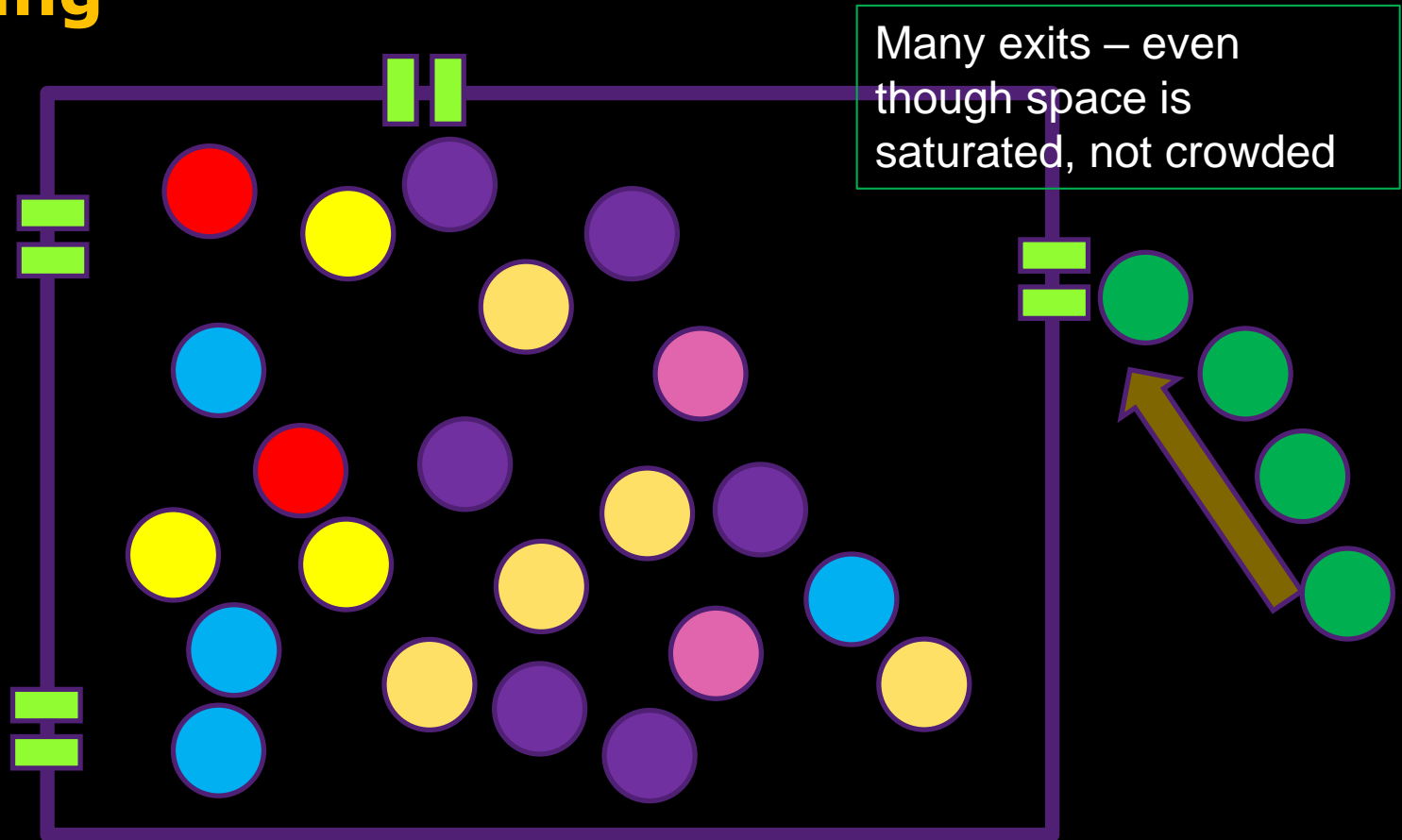
1. Crowding as a Enclosed Space

Crowding in a square. As it gets denser, harder to get out with 1 door, easier with multiple doors. Multiple doors could represent multiple types of holders. One door is one type of holder.

5. Esoteric Thoughts on Crowding Modelling



5. Esoteric Thoughts on Crowding Modelling



5. Esoteric Thoughts on Crowding Modelling

1. Crowding as a Enclosed Space

How is herding different? You can have herding even if people are all entering a massive field. No threat on liquidity, but maybe threat on valuation.

Open Discussion for all Participants

1. TBA

Thank you

- Dr. Ludwig Chincarini , CFA
- University of San Francisco
- United States Commodity Funds

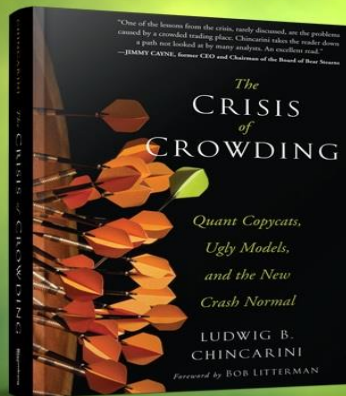
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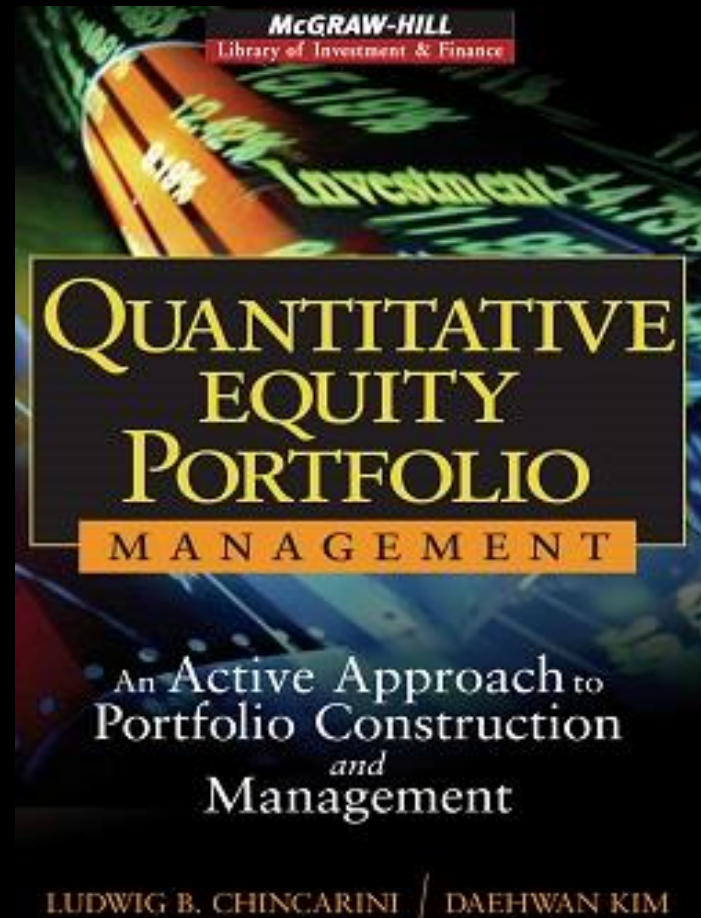
A unique blend of storytelling and sound quantitative analysis, *The Crisis of Crowding* explores the circle of greed from homeowners to real estate agents to politicians to Wall Street.

Linking the 2008 financial crisis back to the 1998 crisis of LTCM, *The Crisis of Crowding* shows how banks, hedge funds, and other market participants repeated the sins of the past and how the collapse of Lehman Brothers led to market insanity thanks to the irrational behaviors of buyers and sellers in the crowded space.

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Thanks

1. I would like to thank everyone for participating in perhaps the first panel on crowding.

Appendix A: Miscellaneous Academic References on Crowding

- A. "The Failure of LTCM," Chincarini (1998)
- B. "Sophisticated Investors and Market Strategy," Stein (2009)
- C. *The Crisis of Crowding*, Chincarini (2012)
- D. "The Externalities of Crowded Trades," Blocher (2013)
- E. "Standing out from the Crowd. Measuring Crowding in Quantitative Strategies," Cahan and Luo (2013)
- F. "Stock portfolio structure of individual investors infers future trading behavior," Bohlin and Rosvall (2014)

Appendix A: Miscellaneous Academic References on Crowding

G. "Dimensions of Popularity," Ibbotson and Idsorek (2014).

H. "Crowded Trades: An Overlooked Systemic Risk for Central Clearing Counterparties," Menkveld (2014)

I. "The Effects of Short Sales and Leverage Constraints on Market Efficiency," Yan (2014).

J. "Omitted Risks or Crowded Strategies: Why Mutual Fund Comovement Predicts Future Performance," Chue (2015).

K. "Fire, Fire. Is Low Volatility a Crowded Trade," Marmar (2015)

L. "Days to Cover and Short Interest," Hong et al. (2015)

Appendix A: Miscellaneous Academic References on Crowding

M. "Portfolio Construction and Crowding" Bruno, Chincarini, Davis, and Ohara (2018).

N. "Transaction Costs and Crowding" Chincarini (2017)

O. "Mutual Fund Crowding and Stock Returns," Tay et al. (2016)

P. "Hedge fund crowds and mispricing," Sias et al. (2016)

R. "Individual stock Crowded Trades, Individual Stock Investor Sentiment, and Excess Returns," Yang and Zhou (2016)

Appendix B: Swarm Literature

A. "Crowding Factor In Evolutionary Multi-Agent System For Multiobjective Optimization" Kisiel-Dorohinicki, and Socha (2001)

B. "A Primer of Swarm Equilibria" Bernoff, and Topaz (2010)

C. "Swarming Behavior Of Multi-agent Systems" Shi, Wang, and Chu (2004)

Appendix C: Network Literature

- A. "Learning from neighbors" Bala, and Goyal (1998).
- B. "Bargaining in a network of buyers and sellers" Corominas-Bosch (2003)
- C. "Bargaining and Network Structure: An Experiment" Charness, Corominas-Bosch, and Frechette (2005)
- D. "Digraphs Theory, Algorithms and Applications" Bang-Jensen, and Gutin (2007)
- E. "Discrete Choice with Social Interactions" Brock, and Durlauf (2000)
- F. "Economic Properties of Social Networks" Kakade et al. (2004)

Appendix C: Network Literature Continued

G. "The Economics of Social Networks" Jackson (2005)

H. "Learning About a New Technology: Pineapple in Ghana" Conley, and Udry (2005)

I. "Maximizing the Spread of Influence through a Social Network" Kempe, Kleinberg, and Tardos (2003)

J. "Mining the Network Value of Customers" Domingos, and Richardson (2001)

K. "The spread of innovations in social networks" Montanari, and Saberi (2010)

M. "Network Games" Galeotti et al. (2008)

Appendix C: Network Literature Continued

N. "The Network Challenge; Strategy Profit, and Risk in an Interlinked World" Kleindorfer, Wind, and Gunther (2009)

O. "Collective dynamics of 'small-world' networks" Watts, and Strogatz (1998)

P. "Epidemic Spreading in Scale-Free Networks" Pastor-Satorras and Vespignani (2016)

Appendix D: Conventional Finance Literature

A. "Liquidity and Asset Prices" Amihud, Mendelson, and Pedersen (2005).

B. "Price pressures" Hendershott, and Menkveld (2013)

C. "Financial Crises: Mechanisms, Prevention, and Management" Brunnermeier (2009)

D. "The dynamics of the leverage cycle" Aymanns, and Farmer (2014)

E. "Bank Runs, Deposit Insurance, and Liquidity" Diamond, and Dybvig (1983)

F. "Fire Sales in a Model of Complexity" Caballero, and Simsek (2012)

Appendix D: Conventional Finance Literature Continued

- G. "Liquidity and Fire Sales" Kelly, and LeRoy (2004)
- H. "Market Liquidity and Funding Liquidity" Brunnermeier, and Pedersen (2008)
- I. "Asset Pricing With Liquidity Risk" Acharya, and Pedersen (2004)
- J. "Noise Trader Risk in Financial Markets" De Long, Shleifer, Summers, and Waldmann (1990)
- K. "Predatory Trading" Brunnermeier, and Pedersen (2005)
- L. "Synchronization risk and delayed arbitrage" Abreu, and Brunnermeier (2002)
- M. "Financial Linkages, Transparency, and Systemic Risk" Ahnert, and Georg (2012)

Appendix E: Other Interesting Literature

A. "Measures of globalization based on cross-correlations of world financial indices" Maslov (2001).

B. "Characterising trader manipulation in a limit-order driven market" Withanawasam, Whigham, and Crack (2012)

C. "Clock Games: Theory and Experiments" Brunnermeier, and Morgan (2008)

D. "The equilibrium consequences of indexing" Bond, and Garcia (2018)

E. "Dynamics of crowded and active biological systems" Stefferson (2018)

F. "National Debt In A Neoclassical Growth Model" Diamond (1965)

Appendix E: Other Interesting Literature Continued

G. "Geographic Concentration in U.S. Manufacturing Industries: A Dartboard Approach" Ellison, and Glaeser (1997)

H. "The Disturbing Interaction Between Countercyclical Capital Requirements and Systemic Risk" Horvath, and Wagner (2012)

I. "Ants, Rationality, and Recruitment" Kirman (1993)

J. "Market Prices of Risk with Diverse Beliefs, Learning, and Catastrophes" Cogley, Sargent, and Tsyrennikov (2012)

K. "Noise Trader Risk in Financial Markets" De Long, Shleifer, Summers, and Waldmann (1990)

Appendix E: Other Interesting Literature Continued

L. "Opinion fluctuations and disagreement in social networks" Acemoglu, Como, Fagnani, and Ozdaglar (2012)

M. "Salience and Asset Prices" Bordalo, Gennaioli, and Shleifer (2013)

N. "The Maturity Rat Race" Brunnermeier and Oehmke (2013)

O. "Asset Bubbles and Overlapping Generations" Tirole (1985)