

TW Notes on

Mark Buchanan Forecast: What
Physics, Meteorology, and the Natural
Sciences Can Teach Us About Economics
Bloomsbury, 2013

Buchanan is a physicist and science
writer

Ch 1 "The Equilibrium Delusion"
"As humans, we're terrible at
imagining the likely consequences
of positive feedback" p 2

He starts with the Waddell and
Reed flash crash.

The SEC-CFTC report never
mentions feedback. One reason
he argues is that "The notion of
positive feedback is rarely, if ever,
considered in potential explanations
of economic happenings" p 7

"...most economists persist in the
belief that economic systems are
inherently stable and self-
regulating" ~~page~~ This really is a
crazy set of ~~affairs~~ affairs, something
more or less equivalent to physics
in the Middle Ages" p 8

He calls equilibrium "a nutty idea" p7
 The quant meltdown in August 2007
 was because high leverage tied the
 funds together in a positive feedback
 loop

He has an article on this in Nature in
 August 09

"I'm going to argue that economists
 and the theories they've developed
 bear a deeper and more profound
 responsibility for the crisis [than
 greedy bankers] p 12

Physicists recently have branched out to
 use its math tools to analyze
 a wide range of social behavior

"We need disequilibrium thinking
 to make intelligent policy" p 22

He notes the growth of behavioral
 economics but argues that

"most of the surprises in the social world,
 especially in markets, trace ~~to~~ back not
 to oddities in individual human behavior
 ... [but to] collective complexity, not
 individual complexity." p 109 and no
 study of individual behavior on its own can
 lead us to understand it" p 109

Ch 6 "Ecologies of Beliefs"

B3

Frank Knight saw the core task of Economics as "discovery and definition of values" p 113

"the cult of rationality" p 113

"the importance of expectations"

"[The rational expectations] assumption achieves the neat trick of wiping away uncertainty" p 113

He discusses Brian Arthur (Zhang & Challet)

In the bar and minority games, not all agents can be right at the same time

frustrated systems in physics

In these games behavior can flip suddenly

There's some predictability with small numbers but this goes away as

N increases. To get patterns the

players must be indifferent to it, i.e. it's a pattern not in its strategy set.

Once the strategy space is filled some one will begin taking advantage of any strategy and then destroy it. i.e. the market becomes crowded

The ~~and~~ need to look at markets from a systems perspective

Economists have envied the wrong kind of physics. "Most physics research ... cannot be wrapped up in a few equations and demands the understanding of myriad instabilities and feedbacks."

This generally implies lots of different mathematical models, and, -unavoidably- large scale computer simulations" p 128

"Proving infallible theorems probably isn't the basis for a lot of progress..." p 131

"... ~~most~~ markets and economies are among the most complex things in the universe" p 131

"No theory of markets will ever come to a final set of elegant equations, like one sometimes (but only sometimes) finds in physics" p 132

"An insight from many studies is that still a slight tendency for fundamentalists to act like charists during market surges - not wanting to be left behind or ~~losing~~ everyone they see profiting - can lead to sustained ~~bubbles~~ bubbles" p 138

He argues that received wisdom ~~to~~ believe that more complete markets and more leverage to allow more mispricings to be speculated away would increase the efficiency of financial markets. These views ~~spurred~~ spurred two decades of "unbreaked innovation and market deregulation".

... However, studies probing the dynamics of markets out of equilibrium suggest that these celebrated routes to efficiency are ~~both~~ booby-traps; they actually stir up fundamental instabilities and increase the potential for market collapse or disruption. ~~F~~

"The very pursuit of efficiency creates instability" p 137

Prior to the "quant meltdown" strategies had become less profitable while the market became more crowded

The simulations by Stefan Thurner, Dooyne Farmer, and John Geanakoplos find this

Batherson et al "Lessons Dangerousness"
Journal of Economic Dynamics and Control
2012 Looking at bank network
connectivity

"Clever people can propose multiple
explanations for almost any event" p150

John Cochrane puts the blame on the
08 meltdown on the change in
expectations about too big to fail
following Lehman

"Getting to generalizable causes
often means going beyond narrative
stories of how A led to B led to C..." p157

[Buchanan seems to focus on derivatives
too much as the primary ~~of~~
mechanism for connectedness
in the financial system

"Beware the 'Efficient' Frontier"

"There is nothing new in the idea
that pushing something too far
brings trouble..." 153

"I don't mean to imply - as it might
seem - that every insight coming from
equilibrium is wrong, or that disequilibrium
models ~~do~~ make it easier to settle
every question in economics" p154

Study by Frank Westerfield on effects of a Tobin tax. The results were highly sensitive to the size of the tax and whether it affected all markets. Below 0.1% the tax increased stability. Above 0.3% mispricings grow and bubbles can arise.

He discussed the danger of high frequency computer trading. The fastest traders now go a $\frac{1}{1,000,000}$ th of a second.

In 2010 HFTs were from 2% of 20,000 active trading firms but 73% of the volume.

active versus passive algorithms

Neil Johnson

Speaker and fractals on less than 2 second time scale. At this time scale the distribution is "fatter than fat". The break is at around one second which is also our average minimum response time.

"machine dominated phase"

A good strategy can become bad if it becomes too popular. This is a problem for HFT.

"This is a beautiful example of how non-obvious insights can come from simple adaptive models of markets" 167

market micro structure

"principles of network engineering"
 "... "More interconnection, useful in normal times, can make matters worse in times of trouble" 173

"Clearly, equilibrium thinking of any kind is of little use in examining positive feedback and chains of amplification in ~~so~~ scenario of [network failure]" p 174

TW] Is this really true?

Sander van der Leeuw anthropologist
 "every human action upon the environment modifies the latter in many more ways than its human actors perceive, simply because the dimensionality of the environment is much higher than can be captured by the human mind" quoted p 176

"The metaphors of equilibrium economics have long contributed to a certain complacency and belief that the market will sort itself out. Yet this is an act of pure faith" p176

William Butler

"The typical graduate and monetary economic training ... during the past 30 years or so may have set back by decades serious investigation of aggregate economic behavior and economic policy-relevant understanding..

... Most mainstream macroeconomic theoretical innovations since the 1970s ... have turned out to be self-referential, inwards looking distractions at best"
Guardian p178

B refers to "a certain healthy aversion" among economists p178

"Macroeconomics and Micro confusion"
Butler "The Unfortunate Uselessness of Most 'State of the Art' Academic Monetary Economics" Financial Times, March 3, 2009

"It's the Lucas critique that has made the charge 'lack microfoundations so powerful in economics' p. 185

"Lucas not only demands microfoundations, but decries their only acceptable form as well ... fully rational planning over a long span of time. ..." 185

German physicist Tobias Preis et al looked at market price movements over a wide range of time scales. They found the same mathematical pattern of 'switching events' from positive to negative trends at all time scales.

They found a signature in the volume of trading. The volume of ~~the~~ individual trading increases as the switching point approaches.

Preis et al "Switching Process in Financial Markets PNAS 2012

The pattern suggests many following a trend then some become wary of a potential reversal. Their action leads others to follow suit and the trend reverses. This ~~is~~ B argues this seems to fit with Soros' view about how markets operate.

He discusses Minsky's B argues that historians have noted "that many financial bubbles pass through a period of 'financial distress,' just after the peak of the bubble, and before the crash, during which the market retreats uneasily, often for quite a long time" (198).

Such behavior emerges from fairly simple disequilibrium models with investors with different ways of thinking. Le Baron's work

While Krugman argues economics went astray by mistaking beauty for truth B argues

"The mathematics of economics, to be ~~too~~ honest, isn't really all that beautiful" p 200

Charles Goodhart on the DSGE approach "It excludes everything I'm interested in" p 201

Coates in The Hour Between Dog and Wolf B summarizes:

"Our bodies may well make us hard wired for episodes of financial boom and bust, fueled by testosterone on the way up and dampened by cortisol on the way down" 202

"In economics and finance, merely predicting what is possible and likely can be hugely valuable, giving us warnings of specific dangers" 211

"Being realistic about potential hazards and surprises is where equilibrium thinkers have been most damaging, as it has encouraged a deep complacency about the self-regulating properties of financial markets" 211

"Recognized ignorance is always preferable to deluded certainty" 211

"... crises often arise from a human propensity to deactivate safeguards just in time to let the next crisis happen" 218

Claude Trichet at ECB's 2010 Central Banking Conference

"Macro models failed to predict the crisis and seemed incapable of explaining what was happening to the economy in a convincing way. As a policy-maker during the crisis, I... felt abandoned by conventional tools"

"In exercising judgment, we were helped by one area of economic literature: historical analysis"

Trickett pointed to four areas to which he thought financial analysis needed to turn

- 1 go beyond rational maximizing agents
- 2 Take note of human learning
- 3 include financial markets in the models used by central banks
- 4 bring economic theories up to date with ideas coming from physics and other fields about the study of complex systems

Mark Buchanan "Meltdown
Modeling" Nature Aug 5, 2009

David Cutler, J

Buchanan fn 15 of ch 4 p 238

Mandelbrot found patterns of market returns looking the same at different time scales

Consistent with Levy distribution but it turns out only if exponent is between 0 & 2, but the recent evidence is that it's close to 3.

B calls the idea that the market moves the same over different time scales "quite preposterous."
[It] flies in the face of everything we know about markets"