

# Knowledge Magazine

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## **THE ECONOMIC CRISIS AND MARKET STABILITY**

### **In This Issue:**

**Market Failure: Interdependence in Action**  
by Yaneer Bar-Yam

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**A Technical Report on the SEC's Pilot for the  
Repeal of the Uptick Rule**

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## Message from the President

As we begin the new year, I wanted to share with you important accomplishments of NECSI in 2008 and acknowledge those who make them possible. It is gratifying to see the increasing awareness of the scientific importance of complex systems and its application in large-scale problem solving.

In 2008 we continued our groundbreaking work on evolutionary dynamics, we informed policy on improving the healthcare industry, and we analyzed the systemic vulnerabilities that could lead to widespread social and ecological disasters. We continue to give presentations and write about the need for careful planning of global policy and scientific analysis.

In this issue we discuss something weighing heavily on the minds of many: the global economic crisis. Now more than ever we need research that takes into account the complex, interdependent nature of the global economy. At NECSI we believe this approach will lead us to better policies and stronger markets. With this in mind we look forward in hope to 2009.



Prof. Yaneer Bar-Yam, President of NECSI

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Yaneer Bar-Yam'.

Prof. Yaneer Bar-Yam  
President

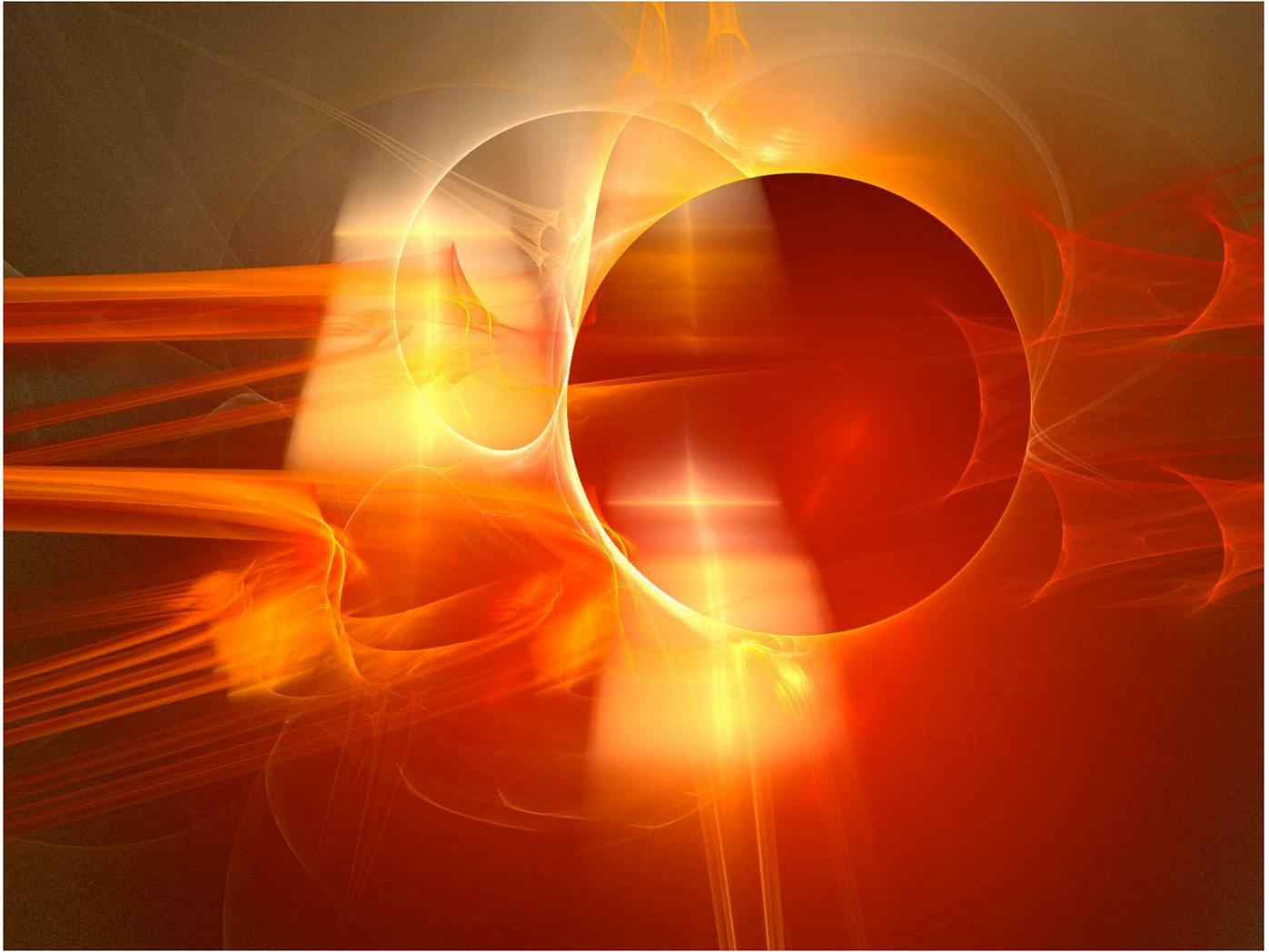


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## About NECSI

The New England Complex Systems Institute (NECSI) is an independent academic research and educational institution with students, postdoctoral fellows, and faculty. In addition to the in-house research team, NECSI has co-faculty, students and affiliates from MIT, Harvard, Brandeis, and other universities nationally and internationally.

NECSI has been instrumental in the development of complex systems science and its application to real world problems, including social policy matters. NECSI conducts classes, seminars, and conferences to assist students, faculty, and professionals in their understanding of complex systems. Additionally, NECSI sponsors postdoctoral fellows, provides research resources online, and hosts the International Conference on Complex Systems.



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**“Market Failure:  
Interdependence in  
Action”**

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Professor Yaneer Bar-Yam  
shares his thoughts on the  
current financial crisis.

# News Update



**The Economy in the Balance.** The sub-prime mortgage crisis is just one of the many factors involved in the current financial crisis.

## Market Failure: Interdependence in Action by Yaneer Bar-Yam

Today we wake up to remarkable uncertainty--market crash or market recovery. How is it that the seemingly unstoppable economic engine of the US is so susceptible to uncertainty and failure? The instruments of oversight, such as the Federal Reserve, the SEC, and now Congress, are inventing new ways to save the system overnight, every night.

The source for these problems is in interdependence--the increasingly strong web of

connections between people and organizations. Everyone knows that we are connected to each other, locally and globally. It is surprising, therefore, that this is not part of our economic policy, planning, or investment.

Remarkably enough, investors decide how to invest by considering the risk of each investment separately and adding together the total risk. But, since things are connected to each other, they cannot be evaluated

independently.

Much of the economy works through positive feedback--if people buy more, more workers

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Interesting Fact



# 2009

The "uptick" rule was first implemented after the stock market crash of 1929. It stood until the SEC repealed it in 2007.

are hired, who in turn work more and earn more money to buy more goods. The problem with positive feedback loops is that they can run in the opposite direction: if people buy less, fewer workers are needed, which means lower earnings and less buying. What stabilizes these loops has to do with the many different ways and places people

**Free markets are a good thing, but when they are too free then markets self-destruct.**

can work, buy and sell, and interact with the market. More variety creates greater stability in the system as a whole.

Danger arises when too many people are doing the same thing-- as when too many investors buy certain stocks creating a stock market bubble; or when too many invest in mortgage-backed securities, leading to the bubble we have just experienced.

This is the old paradox of having too much of a good thing. Mortgages are a good idea, but making them too easy to get, or too hard to get, is not.

Having too much of a good thing is a common economic problem, but regulators often fail to recognize it. Free markets are a good thing, but when they are unregulated (too free) then markets self-destruct.

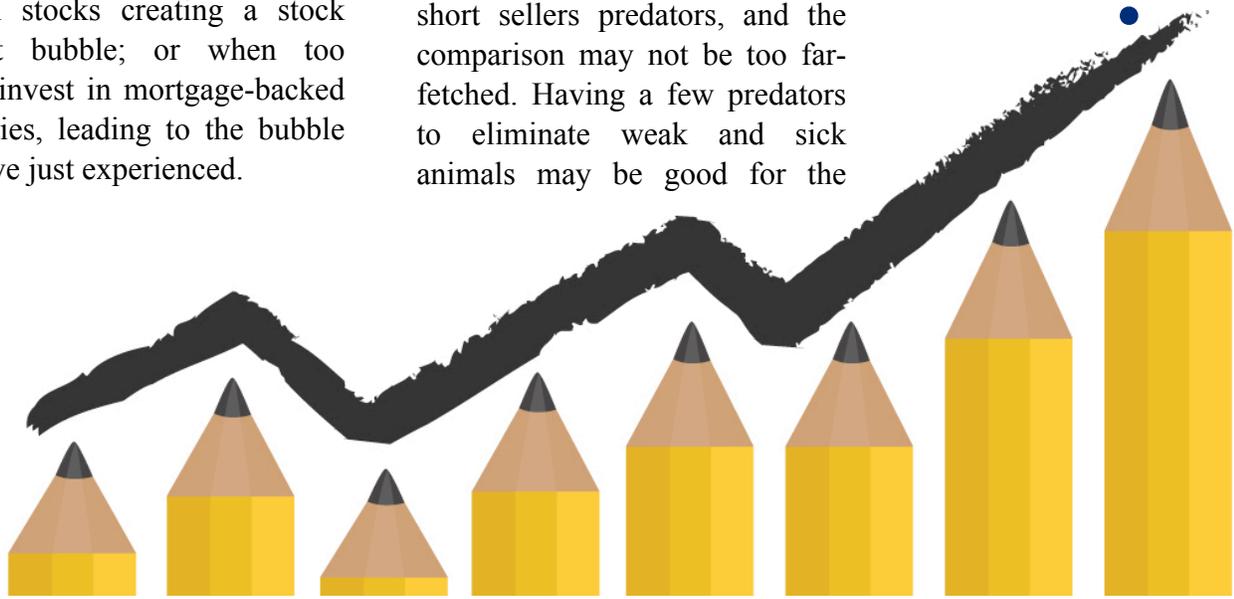
There is a significant example in policies of today that may very well be contributing to the current crisis. The SEC supports policies enabling short selling because, among other things, it can help weed out the weak corporations and avoid market bubbles. This is fine as long as there aren't too many short sellers. Even a strong corporation can't survive if too many short sellers gang up on it. When there is an overabundance of short sellers, they kill off one company after another. Some people call short sellers predators, and the comparison may not be too far-fetched. Having a few predators to eliminate weak and sick animals may be good for the

herd, but too many and you have an extinction.

In the current panicky conditions, the SEC has realized there is a problem and restricted shorting on financial stocks. So what should we expect the short sellers to do? Are they going to stop selling? No. They go where they can and short-sell non-financial stocks increasing the risk to the rest of the market. Protecting some of the herd makes the rest more vulnerable to predation. Things are not independent.

If too much of anything is not good, how do we prevent it?

Moderation is considered a personal virtue. Moderation is also an essential economic principle. What is bad for markets is when one player, or a coordinated group, controls the movement of prices. Regulations can restrict the extent of short selling, or rapid buying, rather than forbid or allow it.





# Report on the SEC Uptick Repeal Pilot

by dion harmon and yaneer bar-yam

The rapid decline of value of individual corporations and the stock market as a whole in 2008 has been variously blamed on changes in fundamental value or selling of borrowed securities (short selling) exaggerating the loss of value of mortgage-backed securities. Here we reanalyze the decision of the Securities and Exchange Commission (SEC) to repeal a rule constraining short selling (the “uptick rule”) in July of 2007. This rule was implemented in 1938 following the market crash of 1929 and the early 1930s. We find that a pilot study performed by the SEC prior to the repeal was

incorrectly analyzed and actually demonstrated n economically and statistically significant impact of the uptick rule consistent with the dramatic effects observed following its repeal. Our results suggest that the uptick rule should be restored.

The selling of securities on the New York Stock Exchange (NYSE) from 1938 till June, 2007 was regulated by the "uptick rule." This rule allows the selling of borrowed securities only after an increase in price (on an "uptick"). The SEC's repeal of the uptick rule on July 3, 2007 [1] was largely based on the

findings of a pilot study conducted over a 6-month period starting in May of 2005.[2] The study compared pilot stocks for which the uptick rule was removed and control stocks for which it was not. In this report we show that during the pilot unregulated stocks had statistically and economically significantly lower returns. We also note the significance of extreme price movements reported by the SEC. Moreover, we compare periods before and after the uptick rule repeal and find many more stocks with very large single day drops after the repeal. This provides evidence

Table 1: Cumulative six month returns of pilot (unregulated) and control (regulated) stocks from the SEC pilot study. NYSE listed and NASDAQ (unlisted) securities are separated (1).

	Market	Pilot	Control	Difference
Return	NYSE	9.18%	11.56%	-2.38%
Return	NASDAQ	14.21%	16.30%	-2.09%
Market-Adjusted Return	NYSE	-2.10%	0.00%	-2.07%
Market-Adjusted Return	NASDAQ	2.26%	4.01%	-1.74%

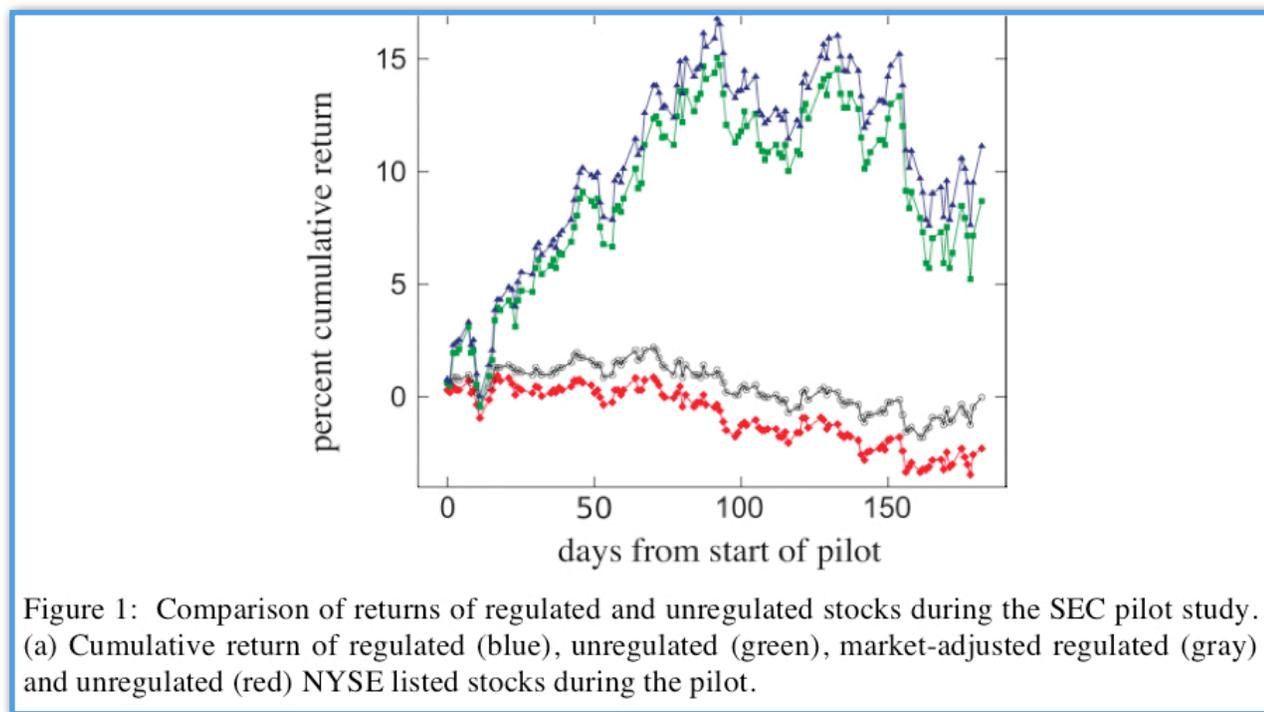
for increased numbers of "bear raids"—when short sellers rapidly sell stock in the hope of triggering margin calls or driving other investors to sell due to fear of losses. Preventing such manipulations was a key motivation for implementing the uptick rule in 1938. Our findings suggest that the uptick rule has been key to the historical stability of the markets and should be reinstated.

We focus on three key results:

NASDAQ stocks regulated by a similar rule. We reevaluated the statistical and economic significance of this result:

a. The statistical significance of the six-month return difference is evaluated by comparing the result with a standard error estimated from the distribution of returns of individual stocks. We also conducted additional tests based upon daily returns obtained from the cumulative returns shown in Fig. 1. We found that each of the following tests gave statistical

stocks to obtain the standard deviation, (4) removing 0.5% outliers (7 stocks) of NYSE stocks with over 100% six month returns. b. The 2.38% decrease in average return found by the SEC represents an economically significant decline in return on investment. On average, stocks have appreciated annually in the range of 6 to 7% since World War II.[3] Extending the pilot results for one year gives a 4.8% reduction, which would eliminate over two thirds of the average



1) The original pilot study stated that there was no statistically significant difference in returns between the regulated and unregulated stocks. The results of the pilot (reproduced here in Table 1) were a -2.38% cumulative 6-month return difference between unregulated and regulated NYSE stocks, and a -2.09% difference in

significance for the difference in returns of regulated and unregulated stocks at two standard deviations (95% confidence): (1) combining both the NYSE and NASDAQ data into a single test, (2) using daily average NYSE return differences (not market adjusted) as individual samples, (3) using a fitting to a normal distribution or the Full Width at Half Maximum for the NYSE

return. Such a difference would radically change the risk vs. reward of stocks compared to other investment opportunities and could be expected to motivate a dramatic change in investor behavior. 2) The pilot study[2] documented a statistically significant increase in extreme reversals in stock

valuation of unregulated stocks relative to regulated ones (see Table 2), but discounts this volatility based on the observation that increased numbers of reversals occur both upward and downward. However, the reduction in rapid movements in both directions due to the uptick rule is significant as it can impact the stability of the market in response to external events.

3) We performed a study of the number of stocks experiencing large declines in a single day both pre- and post-uptick repeal. These sharp declines serve as a proxy for bear raids. a. Our analysis shows a dramatic, statistically significant, increase in the number of stocks with drops of over 40% of their value in one day (see Table 3) between 2 pre-selected periods: 12 months following March 31, 2000 (pre-repeal), and 12 months following Sept 30, 2007 (post-repeal).

These periods both had overall similar market behaviors. There were no drops greater than 70% in the earlier period, but a total of 7 in the later period.

b. When considering all (rolling) 12-month periods starting in July 1999 up to October 2008, we found that the most recent period had 45 drops of over 40% while no prior interval had more than 27 such drops.

Taken together, this information strongly implicates the uptick rule repeal as a major contributor to, if not the outright cause of, the

current severe financial crisis—a crisis that is greater than any since the crash of 1929 and the subsequent turmoil of the early 1930s. The prevention of such conditions was the original motivation for the uptick rule.

## References

[1] Regulation SHO and Rule 10a-1, 17 CFR Parts 240 and 2423, Securities and Exchange Commission, Federal Register, 72, 36348, July 3, 2007, <http://www.sec.gov/rules/final/2007/34-55970.pdf>

[2] Economic Analysis of the Short Sale Price Restrictions Under the Regulation SHO Pilot, Office of Economic Analysis, U.S. Securities and Exchange Commission, Feb. 06, 2007.

[3] M. James, Inconsistent Reports of Long-Term Stock Returns, Jan 22, 2008, <http://michaeljamesmoney.blogspot.com/2008/01/inconsistent-reports-of-long-term-stock.html>

Table 2: Extreme movements measured by the number of reversals in stock price per 100,000 intervals as reported in the SEC pilot study.[2] A negative (positive) reversal was defined as a negative (positive) return immediately followed by a positive (negative) return. The reversal size was defined as the minimum absolute value of the two adjacent returns, normalized by the pre-pilot standard deviation of the stock's return over a four-month period, and the second return is computed as a percentage of the lagged price. Statistical significance relative to the control is denoted by \* and \*\* at the 5% and 1% levels, respectively.

Reversal Size	NYSE Stocks			
	Negative Reversals		Positive Reversals	
	Pilot	Control	Pilot	Control
>2	338.4**	281.3	339.1**	281.1
>3	76.7**	65.1	75.4**	63.5
>4	25.0**	20.4	24.4**	19.3
>5	10.0**	8.8	11.3**	8.4
>6	4.9	4.6	5.8**	4.8
>7	2.8	2.8	3.4	3.1
>8	1.7	1.8	2.0	2.2
>9	1.1	1.3	1.2(**)	1.7

Reversal Size	NASDAQ Stocks			
	Negative Reversals		Positive Reversals	
	Pilot	Control	Pilot	Control
>2	273.4**	257.4	284.1**	267.8
>3	71.9**	62.8	72.7**	67.0
>4	25.1**	22.4	27.6**	24.6
>5	10.5	9.1	13.2**	11.2
>6	5.3	4.2	6.9*	5.9
>7	3.0	2.2	3.6	3.6
>8	1.9	1.2	2.2	2.2
>9	1.2	0.6	1.6	1.4

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