

MAY 2017 ISSUE



TECHNICALLY SPEAKING



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THE MYTH OF SHOCKS

AN EXCERPT FROM CHAPTER 1 OF *THE SOCIONOMIC THEORY OF FINANCE*

ROBERT PRECHTER

Editor's note: This is an excerpt from Robert Prechter's recently published book, *The Socionomic Theory of Finance*.

Few people find a new theory accessible until they first see errors in the old way of thinking. Part I of this book challenges the universally accepted paradigm under which humans' rational reactions to exogenous (external, or externally generated) causes purportedly account for financial market behavior. The current chapter explores whether dramatic news events affect financial markets.

Testing Financial-Market Reaction under Perfect Conditions

In the physical world of mechanics, action is followed by reaction. When a bat strikes a ball, the ball changes course.

Most financial analysts, economists, historians, sociologists and futurists believe that society works the same way. They typically say, "Because so-and-so has happened, it will cause such-and-such reaction." This mechanics paradigm is ubiquitous in financial commentary. The news headlines in Figure 1 reflect what economists tell reporters: Good economic news makes the stock market go up; bad economic news makes it go down. But is it true?



Figure 1

In the second half of the 1990s, a popular book made a case for buying and holding stocks forever. In March 2004, after several terrorist attacks had occurred, the author told a reporter, "Clearly, the risk of terror is the major reason why the markets have come down. We can't quantify these risks; it's not like flipping a coin and knowing your odds are 50-50 that an attack won't occur."¹

In other words, he accepts the mechanics paradigm of exogenous cause and effect with respect to the stock market but says he cannot predict a major cause part of the equation. The first question is, if one cannot predict causes, then how can one write a book predicting effects? A second question is far more important: Is there any evidence that dramatic news events that make headlines, including terrorist attacks, political events, wars, natural disasters and other crises, are causal to stock market movement?

Suppose the devil were to offer you historic news a day in advance, no strings attached. “What’s more,” he says, “you can hold a position in the stock market for as little as a single trading day after the event or as long as you like.” It sounds foolproof, so you accept.

His first offer: “The president will be assassinated tomorrow.” You can’t believe it. You are the only person in the world who knows it’s going to happen.

The devil transports you back to November 22, 1963. You quickly take a short position in the stock market in order to profit when prices fall on the bad news you know is coming. Do you make money?

Figure 2 shows the DJIA around the time when President John F. Kennedy was shot. First of all, can you tell by looking at the graph exactly when that event occurred? Maybe before that big drop on the left? Maybe at some other peak, causing a selloff?

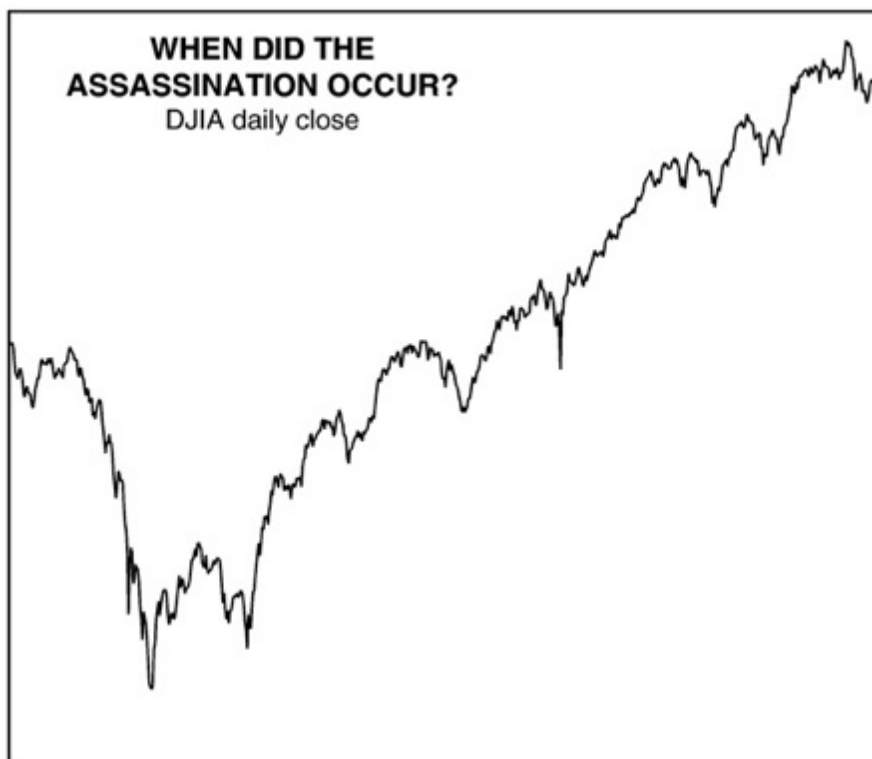


Figure 2



Figure 3

The first arrow in Figure 3 shows the timing of the assassination. The market initially fell, but by the close of the next trading day, it was above where it was at the moment of the event, as you can see by the position of the second arrow. The devil had said that you could hold as briefly as one trading day after the event, but not less. You can't cover your short sales until the following day's up close. You lose money.

You aren't really angry because, after all, the devil delivered on his promise. Your only error was to believe that a presidential assassination would dictate the course of stock prices. So, you vow to bet only on things that will directly affect the economy.

The devil pops up again, and you explain what you want. "I've got just the thing," he says, and announces, "The biggest electrical blackout in the history of North America will occur tomorrow." Wow. Billions of dollars of lost production. People stranded in subways and elevators. The last time a blackout occurred, there was a riot in New York City, causing extensive property damage. "Sold!" you cry. The devil transports you back to August 2003.



Figure 4

The arrow in Figure 5 shows the timing of that event. Not only did the market fail to collapse, it gapped up the next morning. You sit all day with your short sales and cover the following day with another loss.

“Third time’s the charm,” says the devil. “Forget it,” you reply. “I don’t understand why the market isn’t reacting to these causes. Maybe these events you’re giving me just aren’t strong enough. What I need is a real shock.”

The devil leans into your ear and whispers, “Terrorists will detonate two bombs in London, leveling landmark buildings and killing 3,000 people. Another bomb planted at Parliament will misfire, merely blowing the

Figure 4 shows the DJIA around the time of the blackout. Does the history of stock prices make it evident when that event occurred? After all, if market prices change due to action and reaction, then this surprise economic loss should show up unmistakably, shouldn’t it? There are two big drops on the graph. Maybe it happened just before one of them.

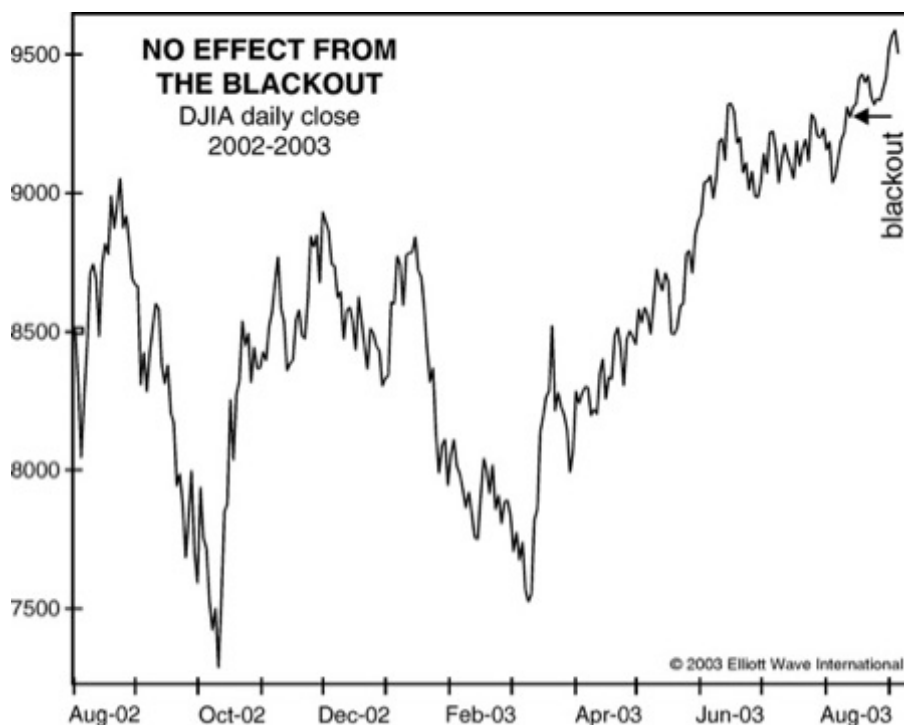


Figure 5

side off the building. The planners will vow to continue their attacks until England is wiped off the map.” He promises that you can sell short on the London Stock Exchange ten minutes before it happens and even offers to remove the one-day holding restriction. “Cover whenever you like,” he says. You agree. The devil then transports you to a parallel universe where New York is London, the Pentagon is Parliament and the DJIA is the LSE. It’s a replay of September 11, 2001.

Figure 6 shows the DJIA around that time. Study it carefully. Can you find an anomaly on the graph? Is there an obvious time when the shocking events of 9/11 show up? If markets react to exogenous shocks, as baseballs do, there would be something obviously different on the graph at that time, wouldn’t there? But there isn’t.



Figure 6

Authorities closed the stock market for four and a half trading days after the 9/11 attack, and it stayed closed over the following weekend. Was it certain that the market would re-open on the downside? No. Some popular radio talk-show hosts and administration officials advocated buying stocks on the opening just to “show ‘em.” You sit with your short position, and you are nervous. But you are also lucky. The market opens down, continuing a decline that had already been in force for 17 weeks. You cheer. You’re making money now! Well, you do for five days, anyway. Then the market leaps higher, and somewhere between one and six months later (see Figure 7) you become disgusted and confused and finally cover your shorts at a loss.

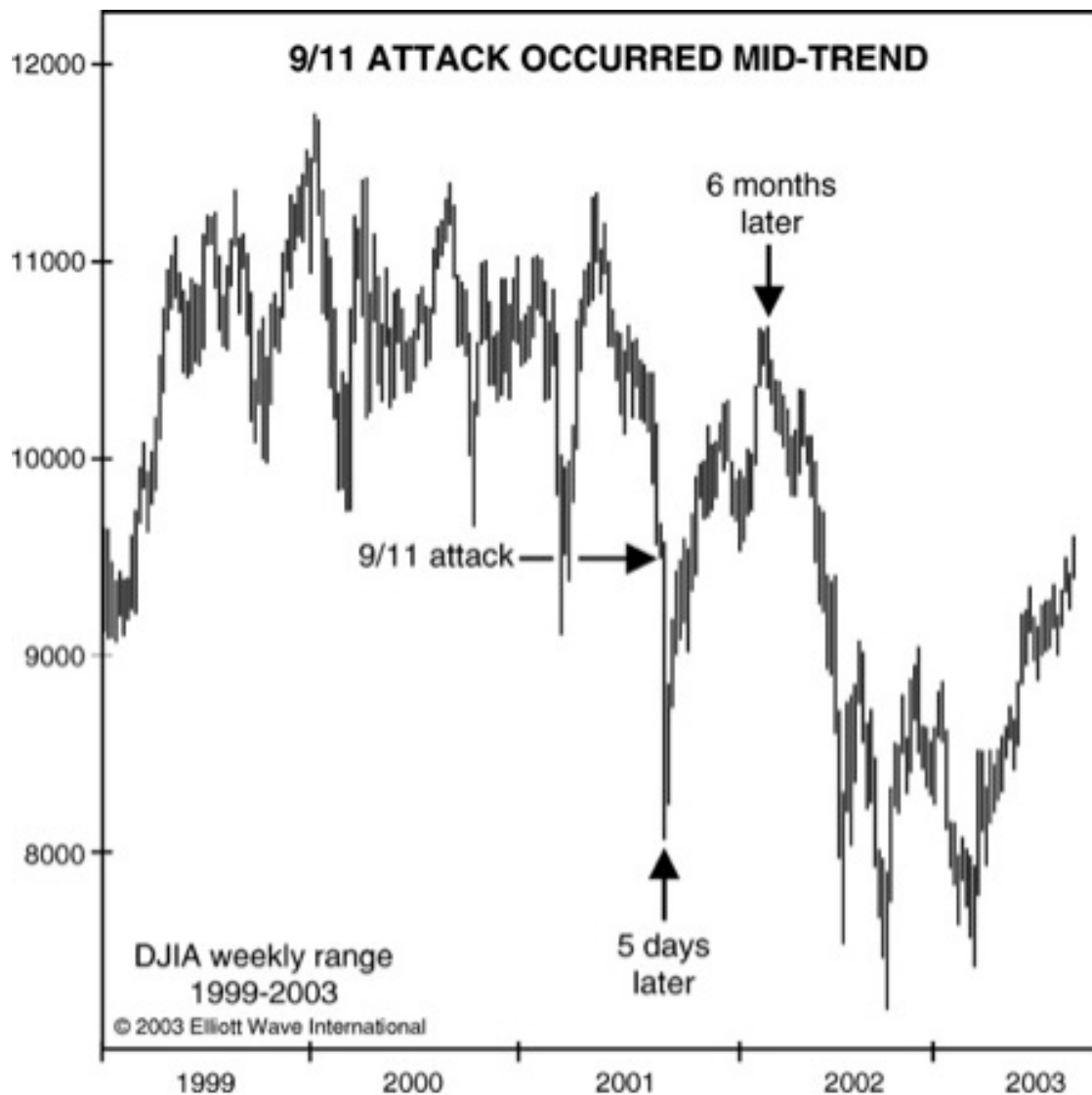


Figure 7

The devil spreads his hands in apology. “Wait! You saw how it worked for a few days! I can’t help it if you held on too long.” You start to walk away. He gives it one last shot. “I know. You need something that’s going to work long term. How would you like to take a long term trade that’s guaranteed in print?”

You hesitate. He says, “I happen to know of a devastating event that future historians will describe as ‘the costliest natural disaster in the history of the United States.’² Does that sound promising?” You’re not sure. “Where is it going to hit?” “New Orleans will get the worst of it.” “Forget it. I can’t short New Orleans.” The devil smiles slyly. “No, but you can buy oil futures contracts. Hang on. Just read this future description of the effects of the event, which will be available on the Internet ten years after the fact.” He hands you this report:

Katrina shut down 95% of crude production and 88% of natural gas output in the Gulf of Mexico. This amounted to a quarter of total U.S. output. About 735 oil and natural gas rigs and platforms had been evacuated due to the hurricane. The price of oil fluctuated greatly. According to [a spokesman on the scene], “half billion dollars a day of oil and gas is unavailable. Hurricane Katrina will impact oil and gas infrastructure, not just short term but long term as well.” The storm interrupted oil production, importation, and refining in the Gulf, thus having a major effect on fuel prices.³

“C’mon!” he says. “You can’t get a better guarantee than that!”

You think, “He’s right. It’s there in black and white: ‘a long term impact... a major effect on fuel prices.’” This is the trade you’ve been looking for. You agree to go for it. The devil transports you back to the early morning of August 29, 2005, the day Hurricane Katrina hit shore. As soon as the market opens, you buy an armload of oil futures contracts. You sit back and wait for the outcome future historians had described.

Figure 8 shows the day you placed your all-out bullish bet: August 29, 2005, right at a top in oil prices and just before a three-month slide of over 20%. You are stunned. A record-breaking, surprise disruption in the supply of oil failed to make oil prices zoom. On the chart, it even looks as if somehow the event made prices fall. You are bewildered. You took Econ 101 in college, and the market’s reaction makes no sense. You finally sell out, taking a loss.

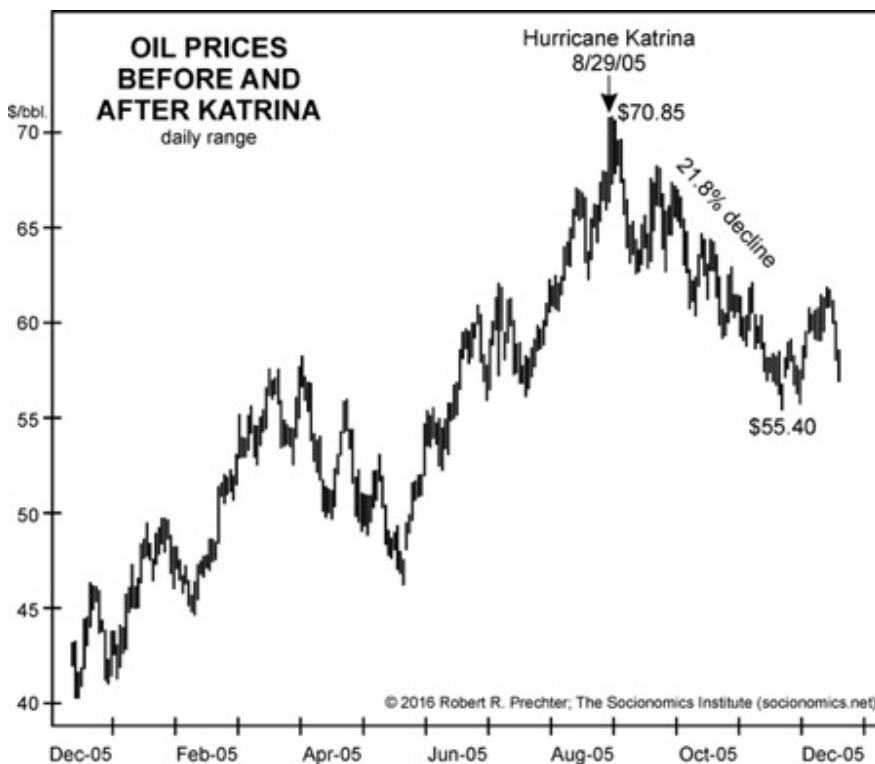


Figure 8

You look into the history of the matter and come across a footnote on Wikipedia saying that President G.W. Bush had released oil from the U.S. Strategic Petroleum Reserve in the wake of Katrina. Maybe that was the devil’s secret! But, no. The U.S. was consuming 21 million barrels of oil a day at the time,⁴ and the Reserve over a period of weeks released only half a day’s worth.⁵

You pull out a historical chart of oil and discover that even in late August 2007, two years after the event, its price was exactly the same as it was on the day you had bought, even though oil was in the middle of a monstrous bull market in which its price soared over 1300% from 1998 to 2008. Somehow your purchase caught one of the few setbacks within it.

You do a Google search, and there it is—the passage the devil had read. The historians lied. They must have figured that a disaster of such magnitude simply had to have a major effect on oil prices, so they just said it did. Their devotion to exogenous-cause logic obscured their perception of history.

You take a day off to do some research and come across an exhaustive, 40-year study of the impact of 177 large earthquakes on the returns of stock market indices in 35 different countries from January 1973 to August 2013. You read that despite limiting the earthquakes under study to those causing at least 1,000 fatalities or a minimum of \$25 million in property damage, the authors were able to identify “No systematic effect of earthquakes on aggregate stock market indices, either directly or through the control variables.”⁶ Then you realize: This must go for assassinations, blackouts, terrorist attacks and hurricanes, too.

If you are an everyday thoughtful person, you decide that events are irrelevant to markets and begin a long process of educating yourself on why markets move as they do. If you are a conventional economist, you don’t bother.

Now think about this: In real life, you don’t get to know about dramatic events in advance. Investors who sold stocks upon hearing of the various events cited above did so because they believed that events cause changes in stock values. They all sold the lows or bought the highs. I chose bad news for these exercises because it tends to be more dramatic, but the same irrelevance attaches to good news.

Exogenous-Cause Claims Lead to Perverse Conclusions

Economists often say that an unexpected “shock” would cause them to re-evaluate their bullish stock market forecasts. It does seem logical that a scary event such as a destructive terrorist attack, particularly one that implies more attacks to come, would be bearish for stock prices.

Take a moment to study Figure 6 again. Surely all of those exceptionally dramatic swings in the DJIA must have been caused by equally dramatic news: bad news at each of the peaks and good news at each of the bottoms. At least that’s what the exogenous-cause model would have us believe.

As it happens, there was a lot of scary news during this time. Aside from the 9/11 terrorist attack on the World Trade Center and the Pentagon, there was also a slew of mailings of deadly anthrax bacteria, which killed several people, prompted Congress to evacuate a session and wreaked havoc lasting months. Where on the graph of stock prices in Figure 6 would you guess the anthrax mailings happened?

If you guessed, “the very day of a rally high and all through a four-month stock-price collapse,” befitting exogenous-cause theory, Figure 9 would vindicate you. It shows that the first anthrax attack occurred precisely on the top day of a rocketing advance that appeared destined to take the Dow to a new all-time high. The stock market reversed sharply and then fell throughout the period of attacks. When the attacks stopped, the decline stopped, and the market turned on a dime and soared. Good for you and exogenous cause theory!

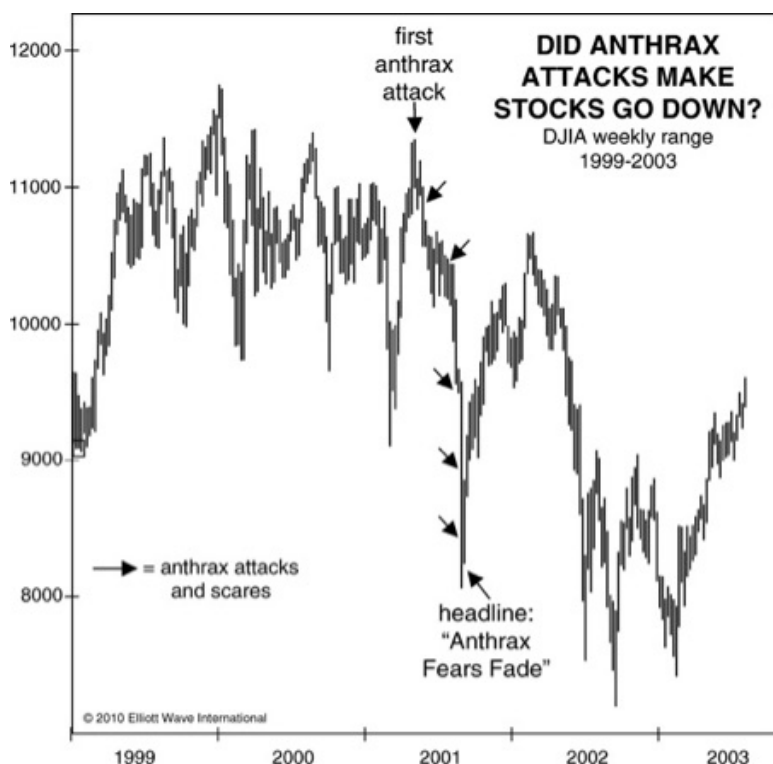


Figure 9

Figures 7 and 10 reveal an irrefutable fact: *Terrorist attacks do not make the stock market go down.* The assumption behind economists’ repeated implications that terrorist attacks would constitute an “exogenous shock” that would serve to drive down stock prices is simply wrong.

Since even possessing advance secret knowledge of highly dramatic, surprise events provides no advantage for speculating, guessing about coming events is an utter

The only problem with your case is that Figure 9 is a lie.

Figure 10 tells the truth. The first anthrax attack actually occurred on the very day of the low for the year, after a dramatic, 18-month decline in the Dow. Afterward, despite six more attacks and public concern that more were in the works, the stock market rallied for six months. These attacks, deaths and scares, moreover, occurred *throughout the strongest rally on the entire graph*. To put it more starkly, the market bottomed the day the attacks started and topped out as soon as people realized they were over.

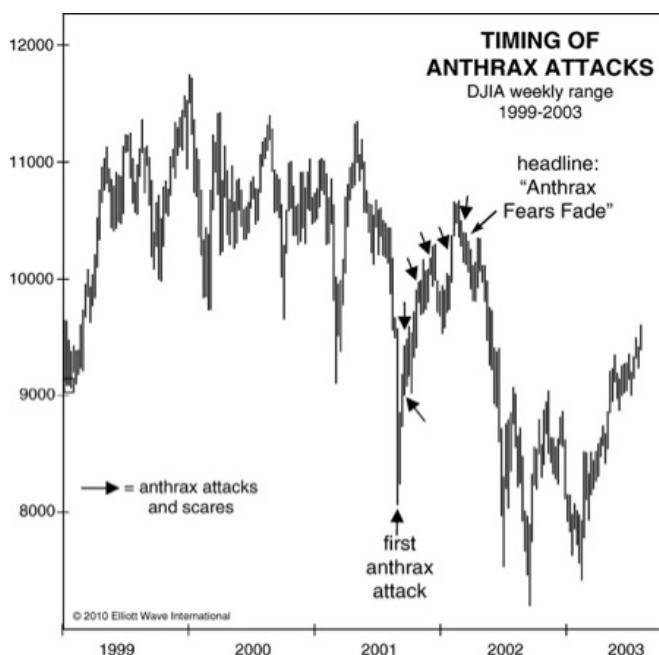


Figure 10

It gets worse. From the viewpoint of exogenous cause, Figures 3, 5, 7, 8 and 10 make it appear as if the assassination of President Kennedy was bullish, the New York City blackout contributed to a rally, Hurricane Katrina caused oil prices to drop, and terrorist attacks made stock prices soar. These conclusions are discordant and perverse.

People object, “You can’t tell me news doesn’t move the market. I see it happen every day!” But they don’t see any such thing, and it takes careful study to reveal that they don’t. Consider: If the market’s moves and the tenor of news were independently random, the two types of events would still fit each other half the time, wouldn’t they? That’s more or less what people see, and they expand those coincidences into what they think they see.

As this chapter shows, the notion that exogenous shocks change market trends is highly suspect. Chapter 2 will broaden the scope of our investigation. As we will discover, a fundamentally different theory of social causality accounts for the chronology so as to turn discordant perversity into harmonic compatibility.

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3 Wikipedia, “Strategic Petroleum Reserve.”

4 “United States Crude Oil Production and Consumption by Year,” Index Mundi, indexmundi.com.

5 Wikipedia, “Strategic Petroleum Reserve (United States).”

6 Ferreira, Susana and Berna Karali, “An Assessment of the Impact of Earthquakes on Global Capital Markets,” Annual Meeting of the Agricultural and Applied Economics Association. Minneapolis, MN. July 27-29, 2014.

The above text is excerpted from Robert Prechter’s new book, *The Socionomic Theory of Finance*. For MTA members only, the publisher is offering hardback copies of the book for half price (\$39) through the end of May. For details, visit <http://www.elliottwave.com/wave/STFMTA>

INTERMARKET ANALYSIS: A CLASSIC OVERVIEW

BENJAMIN UPWARD, CMT

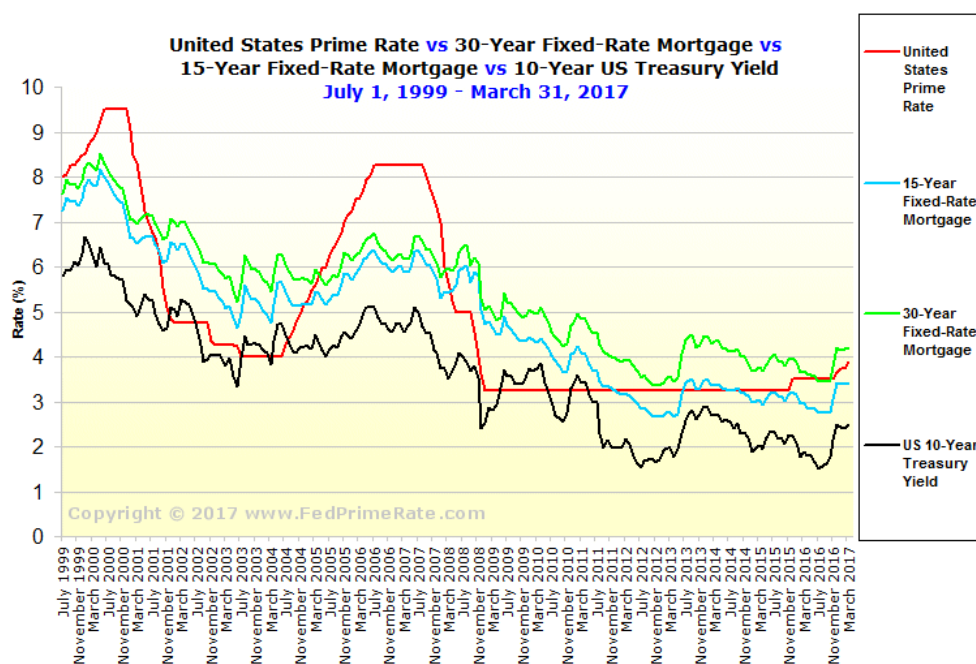
Editor's note: This was originally published as a series of posts at SynchronicityFutures.com. The original posts are available [here](#).

What a run...US Treasuries

10 Year US Treasury Notes – why do we care?

- Foreign countries own quite a bit of our debt – <http://ticdata.treasury.gov/Publish/mfh.txt>
- The Fed owns quite a bit of our debt – <https://fred.stlouisfed.org/series/TREAST>
- Domestic institutions own quite a bit of our debt (mutual funds, banking institutions, insurance companies, state and local governments, and pension funds) – SIFMA

Although not a perfect correlation, the 10 year rate does have some effect on certain fixed mortgage rates.



And mortgage rates have some effect on home prices (though other variable like wage growth and inflation have a say as well)



So, treasuries are important because:

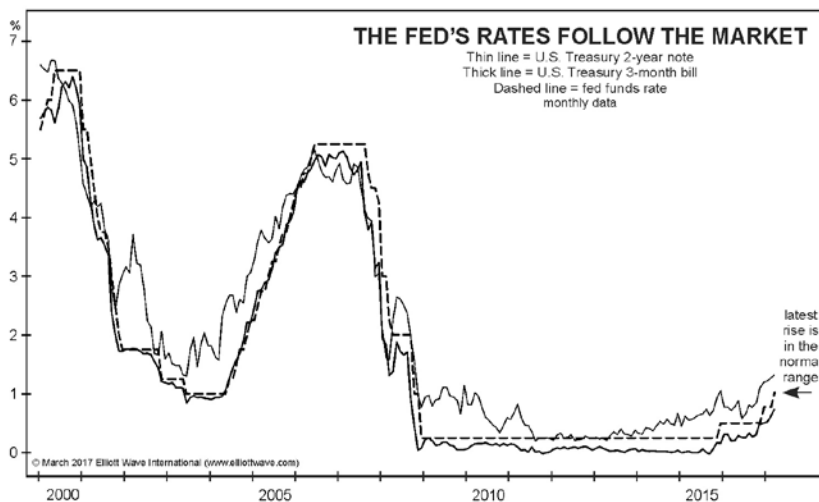
- We have huge players that own a ton of treasuries and
- Treasuries have an important impact on the housing market.

Let's look, then, at a long-term vista of the 10 Year Treasury Rate using a monthly chart that ranges from the mid-1960's to the present:



So, what can we take away?

- Rates have been going down since 1981.
- It was a great time to use leverage through the mortgage vehicle as you could keep refinancing as rates went lower and home prices went higher.
- Yield made a lower low while the momentum in the lower panels made higher lows (see thick white lines) – momentum is slowing
- The blue descending trend lines have kept the yield in their channel since the late 1980s.
- We just made a big move up in yields (bond sell-off) that challenged that upper blue trend line at 2.62% and is now taking a break.



Narratives:

It's popular to say that the Fed doesn't know what it's doing; there are many different assumptions baked into that statement but those aside, on a long enough time scale, I'm not sure it matters. The Fed can force participants into certain asset classes for fairly long periods of time (see previous posts), but not forever. At some point, the market is

bigger. And to that end, the Fed is doing now [raising rates], what it always does, following (click the image below to enlarge):

Here is one more chart to look at – the inverse of the 10 Year Rate – the 10 Year Note Futures Price – monthly chart ranging from 2001 to the present:



The 120-121 level in Price is major support – and you don't want to see it break back through that level anytime soon. At the bottom of the chart is the Commitment of Traders (COT) weekly data. The blue line is large speculators – you can see large speculators were uber-long very recently which probably helped to make the bond sell-off (rate rise) that much more savage. In the weeks since that record long position, large speculators have significantly decreased their net long positions.

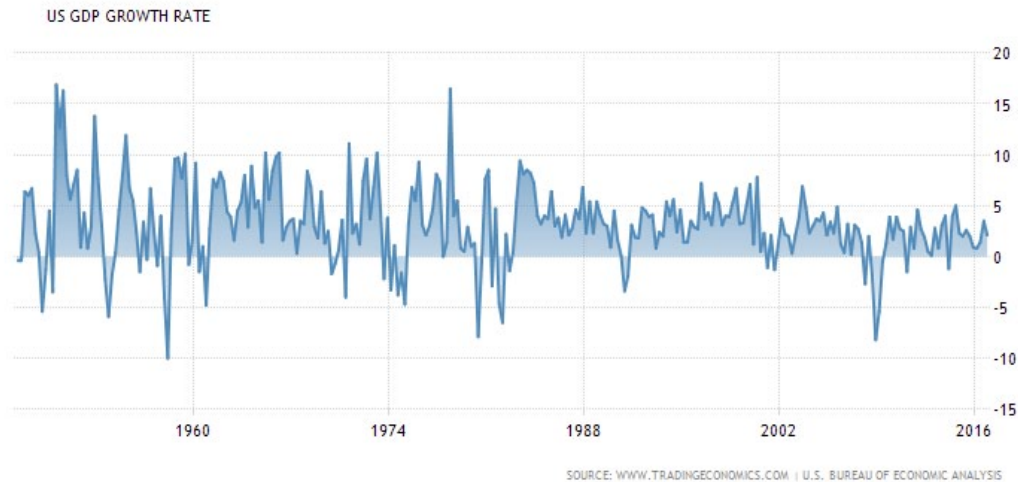
Conclusion:

- Short term – Over the last 5 weeks, we've had quite a run up in price (falling yields). We may have a little farther to go to the upside but I would be warier of a potentially sharp sell-off in prices in the near term.
- Intermediate to Long-Term – Intermediate-term is pretty tricky in here so I think it makes more sense to tackle the long-term. Let's keep this very simple, I think we have a very big problem if we break the 120-121 area in price, 2.62%+ in yield. I know that seems pretty obvious but we need to keep in mind the positioning of major players who are still long massive amounts of 10 Year futures and the impact rising rates have on our housing market. Even though rates are historically low, large percent changes off of low bases do matter, that's why we use percentages to measure most things. So, the major risk is still to the downside in price (upside in yields) but also consider over the next few months:
 - should stocks finally crack their uptrend and undergo a real sell-off, there very well could be a large 'flight-to-quality' move into US Treasuries bidding up prices and lowering yields.
 - should Italian, and other European, sovereign debt continue to sell-off (rising yields), participants may sell that peripheral debt and put the proceeds in US Treasuries that they consider a safer place to be bidding up prices and lowering yields.

Does it get any better than this?...The S&P 500 Index

Fundamentalists and technicians alike have few answers for this index other than 'Don't Fight the Fed.' This monster uptrend has left many a bear in its wake. Much like we did for the US Dollar and Commodities, let's step back and see if we can gain some perspective. Here is what we "know"...

- The economy as measured by GDP is not showing any strength – click on image to the right to enlarge – <http://www.tradingeconomics.com/united-states/gdp-growth>



- Wage growth has recovered since 2009 but has flat-lined recently settling right on a multi-decade declining average trend – click on image to the right to enlarge - TradingEconomics.com



Okay, the economy is so-so, how are valuations? Not exactly cheap according to the Shiller CAPE ratio.

In the midst of a so-so economy and stretched valuations, the questions on everyone's mind are a) how does this stock market keep going up? and b) how much farther can it go?



To answer these questions, as we often do here at Synchronicity, we like to take a large step back to survey the long term picture and put the short term narratives supplied by the 24-hour-365-days-a-year media into perspective. This is a monthly chart of the S&P 500 going back to the late 1960s.



So What can we take away?

- Stocks are not for the faint of heart. And, the last 8 years have been the absolute best case scenario recovery from the Housing Crash – a truly great run.
- The yellow lines drawn on the bottom RSI (relative strength) panel and on the main price chart show that price acceleration (aka momentum) has slowed while price continues higher before the last two tops and is doing so again. On a monthly chart such as this, these signals are blunt as you can see – sometimes you get a quick warning in the case of the Housing Top, sometimes it is very drawn out like the .COM Top.
- Currently, RSI (momentum) made it's last high in December of 2013, over 4 years ago.

Narratives:

When you look at a chart of this magnitude it really drowns out any of the near-term narratives you hear on TV. The fact is, the Fed and other Central Banks bought a lot of assets and stock markets went virtually straight up since 2009.

Technicals

So, these are very long-term views and here is what I will say: This is a very difficult index to analyze (stay objective) because there is so much information and personal bias to how one thinks about stocks and the world in general.

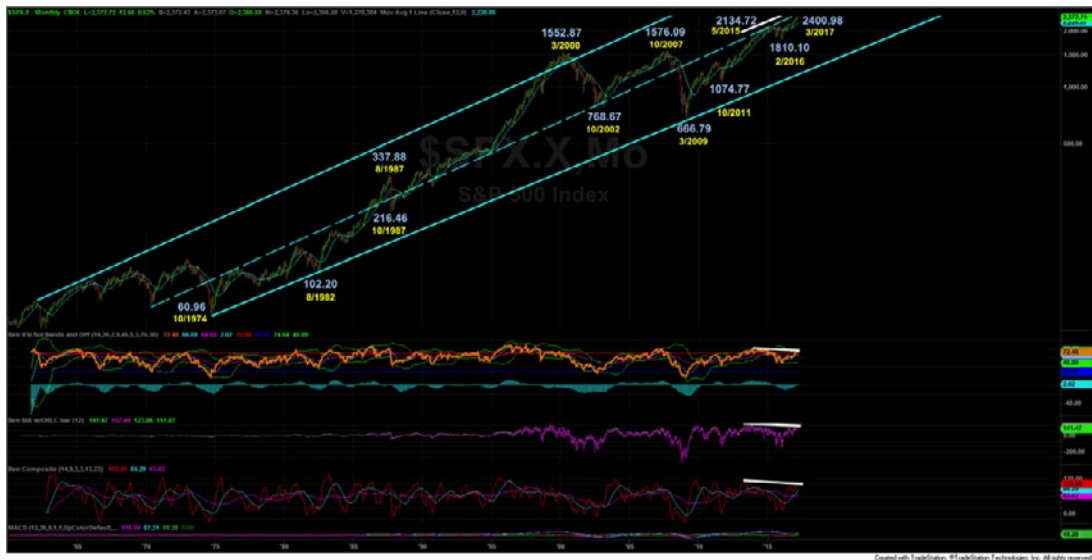
- Bull case: On the upside, using very rough targeting i could see the S&P reaching 2700 or 2750 sometime in the next year, maybe two. This would be about 12-14% above the March high. Pick your catalyst – perhaps Trump gets a surprise health care victory or the anti-EU political parties suffer some setbacks in France and Germany.
- Bear case: On the downside I think 2085 to 1900 (Brexit futures low) is the first real area of support – the middle of that range, right around 2000 is just a 23% retracement of the entire move up from 2009. This range would be roughly minus 13-21% from the March high of this year. There are other indicators that I follow that suggest after rallying off of initial support, prices could move lower still. Keep in mind, this is a very long-term, multi-year analysis so these events, IF they happen, could take quite a lot of time. Catalysts are numerous – Europe/Euro/Eurozone, Trump having more difficulty getting his agenda through, subprime auto debt, student loan debt, more rate increases hurting the housing market, an emerging commodity bull market and a declining dollar (see previous posts [here](#) and [here](#)).

Conclusion:

- Short term – I would tell you that, due to some shorter-term momentum work not shown, my best guess is that we get at least one more high above 2400 sometime this year, probably sooner rather than later – but not anything very material. That said, there are a number of studies not shown in this piece that suggest short- and intermediate-term trend breakage is within 5% or less below current levels.
- Intermediate to Long-Term – Despite the ‘trend is your friend’ mantra, I think what this basic chart shows is that we’ve had a great run and there is more risk to the downside than to missing out on the upside at this point. Momentum is slowing and if we get some short-term weakness and break 2200, I think we have a major problem.

I’ll leave you with one more chart that illustrates the magnitude of correction that is possible without doing that much damage to the long-term view.

To that end, let’s look below at a monthly semi-log chart of the S&P 500 index going back to 1960. Semi log means the chart is scaled in percent terms, so a move from 10 to 20 looks the same as a move from 100 to 200.



Opposites? Commodities [and the US Dollar]

As we mentioned in our exploration of the long-term characteristics of the US Dollar Index last week, the direction of the US Dollar will have serious ripple effects throughout other markets. Nowhere is that more evident than the commodity sector. Commodities are a very diverse asset class with an enormous amount of variation between individual markets (that’s why we find commodities so interesting both individually and as an asset class). That said, we believe there is still a lot of value in examining commodities together. To that end, the Bloomberg Commodity Index is pictured below.

Group	Commodity	Ticker	2017 Target Weight	2016 Target Weight
Energy	Natural Gas	NG	7.9765050%	8.4488420%
	Brent Crude Oil	CO	7.8218610%	7.5302370%
	WTI Crude Oil	CL	7.1781390%	7.4697630%
	ULS Diesel	HO	3.8295210%	3.8290390%
	Unleaded Gasoline	XB	3.7645450%	3.7478780%
			30.57%	31.03%
Grains	Corn	C	7.4103730%	7.3587030%
	Soybeans	S	5.8387700%	5.7038300%
	Wheat	W	3.3174200%	3.3268340%
	Soybean Oil	BO	2.8074440%	2.8375480%
	Soybean Meal	SM	2.9015200%	2.8446630%
	HRW Wheat	KW	1.1834590%	1.1531400%
			23.46%	23.22%
Industrial Metals	Copper	HG	7.5907620%	7.6272480%
	Aluminum	LA	4.5682530%	4.5987080%
	Zinc	LX	2.6893410%	2.5276320%
	Nickel	LN	2.5409170%	2.3593750%
			17.39%	17.11%
Precious Metals	Gold	GC	11.1715570%	11.3798610%
	Silver	SI	4.1152560%	4.2131830%
			15.29%	15.59%
Softs	Sugar	SB	3.3978760%	3.6272510%
	Coffee	KC	2.3774300%	2.2943230%
	Cotton	CT	1.4478190%	1.4931910%
			7.22%	7.41%
Livestock	Live Cattle	LC	3.9771090%	3.5666190%
	Lean Hogs	LH	2.0941230%	2.0621330%
			6.07%	5.63%

Source: Bloomberg

The chart below is a linear (regular) monthly candle chart of the Bloomberg Commodity Index starting in 1991 and running through to present time. Let's use the same template we utilized for the US Dollar analysis (go back and read the US Dollar post 1st, will help from a comparison standpoint):

- Commodities **BOTTOMED** (2/1999) just a few years before the Dollar and made a second, slightly higher **BOTTOM** at the exact same time the Dollar peaked in 2001.
- Commodities **RALLIED** from that point in 2001 all the way to July of 2008 stopping at \$238.52 having **GAINED** 221% over that time period.
- From July of 2008, just about 8 years **DOWN** into the \$72.33 **LOW** registered 1 year ago in January. -69.7% from that **HIGH** in 2008!
- A few other features of the Bloomberg Commodity Index on this Monthly chart:
- Commodities topped in 2008 and have since made a 3 wave movement to the downside, A-B-C. Very interesting to note that the declining legs A and C are almost identical in percentage of value lost at -57.5% and -58.8% respectively.
- Very important multi-year resistance at \$90.31 (green dashed horizontal line). There is an internal channel line (thick blue) at that same spot (\$90.31) where commodities failed the first 3 months of this year.
- Although not as clean as the Dollar Index, there is a divergence between price of the Bloomberg Commodity Index making that lower low in 1/2016 and momentum making higher lows (slowing – see thick white lines in bottom panels).

So what can we take away?

- 8 years **DOWN** into January of last year, -69.7% from peak to trough is a very large move for the



Bloomberg Commodity Index.

- Momentum is slowing and price already took out the \$74.21 low from 2/1999.
- The stock market can go up in periods of commodity strength AND weakness but, more importantly, is sensitive to changes in direction of the Commodity Index. Changes in direction of the Commodity Index often lead changes in the direction of stocks. Currently, from a long-term view, we have a rising stock market with a strong dollar and weak commodities.

Fundamentals?

We know the Fed usually lags/plays catch-up, it's a CYA game for them – they can't be out in front from a political standpoint (that's always been the case) and now they have to protect their balance sheet – but, they have finally started tightening because Treasuries had a large sell off – were Treasuries reacting (much sooner than stocks, as usual) to the slight uptick in Commodities?

Another fundamental question; how can you expect a Commodity Index that is 30% weighted toward energy to go higher when the world is awash in Oil? We can say the COT (Commitment of Traders) data showed speculators were way offside carrying monstrous net long positions. We can also say the over-supply theme has been in the market for many many months. Maybe these two factors are priced in now that we've dropped back down into the \$40s, but maybe not. We don't know the answers to all of these fundamental questions but, like we say, we can look at the chart and evaluate probabilities and risk and it seems to us there is much more risk to the upside for Commodities in the medium- to long-term.

Technicals?

Could we make another LOW (below \$72.33)? Yes. The oil and grain complexes are doing their best to drive us down in that direction. We see now a near-term divergence with the Dollar weakening and the oil and grain complex ignoring what would normally be a nice upward boost for them. The Bloomberg Commodity Index is trading at \$84.44 today, down now 6.5% from that \$90.31 resistance high. There is a recent low, \$81.78, about 3.1% below current levels, that it might need to take out before it can slow its descent and reevaluate. \$72.33 is just over 14% lower from current levels.

Conclusion:

- Near term (next few months): Given that we're still closer to \$90.31 than \$72.33 but that the near-term momentum is bearish, we'll call it a 50-50 chance that we take out the low. Based on some other factors we wouldn't give it much more than another 5% below that low so let's round up and say there is a 50% chance for a -20% move. On the upside, our first main resistance is at \$101.46 (red horizontal dashed line) which is also then a 50% chance for a +20% move. Expected value is equal (0) here in the near term at the current price of \$84.44.
- Long term (next few years): Let's keep our same math on the downside but look at just a 38% retracement of the entire move down from 2008 (\$238.52 to \$72.33) on the upside. That level is \$135.81. So, you've now got a 50% chance for a possible +61% move and a 50% chance for a possible -20% move. Expected value is $[(.5 \times -.2) + (.5 \times .61)] = +20.5\%$ for a long position in our estimation on this longer time frame. (Expected value is just a tool for applying probability to quantify outcomes – this is not a price target or forecast of gain – it simply tells us if our inputs of risk and return are correct, a long position is warranted for the long term). Again, this is a longer-term vista so these price levels could take some time to play out. \$90.31 is the level to watch.

Remember, IF we do get that UPTURN, the ripple effects may be very pronounced given that

rising Commodity prices are usually very bearish for Bond prices and can cause rates to rise quite quickly. Rising rates and rising commodity prices in a less-than-vibrant economy may be too much for stocks. An environment then where you have declining stock and bond markets and rising commodity prices is a very real possibility.



The final message for stock exposure is this: Whether we get a correction in the next year or two or not, and whether it is sizeable or not, or whether we get a 12% rally above March highs; given the large gains in the index and slowing momentum, it seems wise to figure out NOW what your risk tolerance is to a potential correction. Maybe you don't care, you can take the pain IF we get a downturn. Or, maybe, you figure out some hedging ideas or ways to diversify your portfolio to try and mitigate some of that risk. The point is, despite sizeable Central Bank intervention designed to lift asset prices, treat the stock market like any other market, take a step back and assess your risks.

US Dollar Index – Time to take a step back?



Sometimes with all of the rhetoric on currency manipulation, strong dollar policies, weak dollar policies, devaluation, etc., etc., it can be informative to take a step back and look to see if the price itself can cut through the crossfire. There is more than one way to study the US dollar, but a decent benchmark is the US Dollar Index which is composed of 57.6% Euro (EURUSD), 13.6% Yen (USDJPY), 11.9% Sterling (GBPUSD), 9.1% Canadian \$ (USDCAD), 4.2% Swedish Krona (USDSEK), 3.6% Swiss Franc (USDCHF).

The chart above is a linear (regular) monthly candle chart of the US Dollar Index starting in 1987 and running through to present time. There are a few things to point out:

- We start in the middle of the chart. You can see the Dollar peaked at 121 in 2001 – this was right about the time the equity market finally broke down as the dotcom bubble finally imploded for good.
- The Dollar sold off/weakened from that point in 2001 all the way to March of 2008 stopping at 70.70 and having lost 41.5% of its value over that time.
- Roughly 7 years down, then, from March of 2008, just about 9 years up into the 103.82 high registered two months ago in January. +46.8% from that low in 2008!
- As we zoom in to the past few years we've seen a series of peaks in price connected by the thick white trend line. While price was punching out slightly higher highs, the momentum (shown in the panels in the bottom half of the graphic) was sporting lower highs marked with the same thick white trend lines – not confirming those price highs.
- Finally, there is a big trend line below the price series shown in red. When you look at the current price you can see it's trapped between the red supporting trend line and the white resistance trend line that connects those recent price peaks. There is also strong, multi-year resistance denoted by the thick dashed red horizontal line that crosses right at the recent highs.

So, what can we take away?

- 9 years up into January of this year, +46.8% from trough to peak is a very large move for the US Dollar
- Momentum is slowing and price is running out of room to the upside in the wedge formation (white and red trend lines).

The stock market can go up in a period of dollar weakness (2003-2007) AND strength (1995-2000, 2009-2017). So the stock market likes a trending dollar, not one that changes directions. Currently we have a rising stock market with a strong dollar.

With the Fed in the initial phases of a tightening cycle, Trump implementing protectionist policies and championing a strong dollar stance, and anti-EU political fever in Europe threatening to torpedo the Euro, it would seem unthinkable to back off a bullish dollar position. And to that point, an informal read of sentiment on my part reveals an almost religious belief in the bull run continuing. It's hard to argue any of the fundamental points but like any market, in the end, it's a game of positioning. Sometimes we have to take a step back and see what price is telling us, and what we know after looking at this Dollar chart is there is some real vulnerability here.

Could we make another high (above 103.82), yes. To that end, the dollar has weakened fairly substantially since the ECB rate comments last week and may be due for a short-term bounce. That said, I think the bigger, long-term risk is to the downside. Keep in mind we're working with a monthly time frame so we are not focusing here on 3-5% moves but those 5%+ moves that have real impact on portfolios and markets.

100.00 (+/- 20 cents), for reasons other than a round number/psychological barrier, is going to be pretty important near term (currently trading 100.22). I think if it has trouble holding that level we see a test of the 98 level which is where it should hold if it's going to avoid breaking down. Again, this is a longer-term vista so these price levels could take some time to play out even though they are not too far from current levels.

Remember, IF we do get that downturn, the ripple effects may be very pronounced given the Dollar's reserve currency role in pricing a multitude of financial and physical assets and heavily impacting export-based economies. And finally, remember the stock market also dislikes changes in the direction of the dollar.



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STOCK MARKET YEARS ENDING IN ‘7’

LARRY MCMILLIAN

Editor's note: Larry McMillan was a featured speaker at the recent MTA Annual Symposium. This article was originally published by Proactive Advisor Magazine. Free subscriptions are available to qualified professionals. To learn more, please click [here](#).

Long-term cycle charts are interesting to look at, but I'm not sure how much they help one's trading or strategy. In any case, www.seasonalcharts.com has an interesting 10-year cycle chart of the Dow Jones Industrial Average. The data for the Dow is accumulated by year and then published in a way that shows the pattern of each year of the decade—going back to 1897 in this case.

Stock market years ending in “7” have had some very interesting drama. Many of us remember the Crash of ‘87, of course. Up through August, 1987 had been a wonderful year, as prices surged ahead. There were problems moving forward in September and October, and then a torrent of selling was unleashed beginning on Oct. 14, culminating with the Crash on Oct. 19. The market fell 22% in that one day.

Market historians may also remember the Panic of 1907—which turned out to be very important in the grand scheme of things. In this Panic, the NYSE Index fell almost 50% in a three-week period in October 1907. The NYSE approached J. P. Morgan to round up his friends and provide liquidity to the markets. He had done this before—effectively acting as a Federal Reserve Bank would (but in those days there wasn't a Fed). He grudgingly did so, and the Panic was contained, but only after some scary moments for Morgan and friends. At that point, he said he wouldn't be doing this anymore and that the United States needed a Federal Reserve Bank. The Fed was subsequently created in 1913.

1917 wasn't pretty, either. Despite a booming economy, the Dow lost 33% from November 1916 to November 1917.

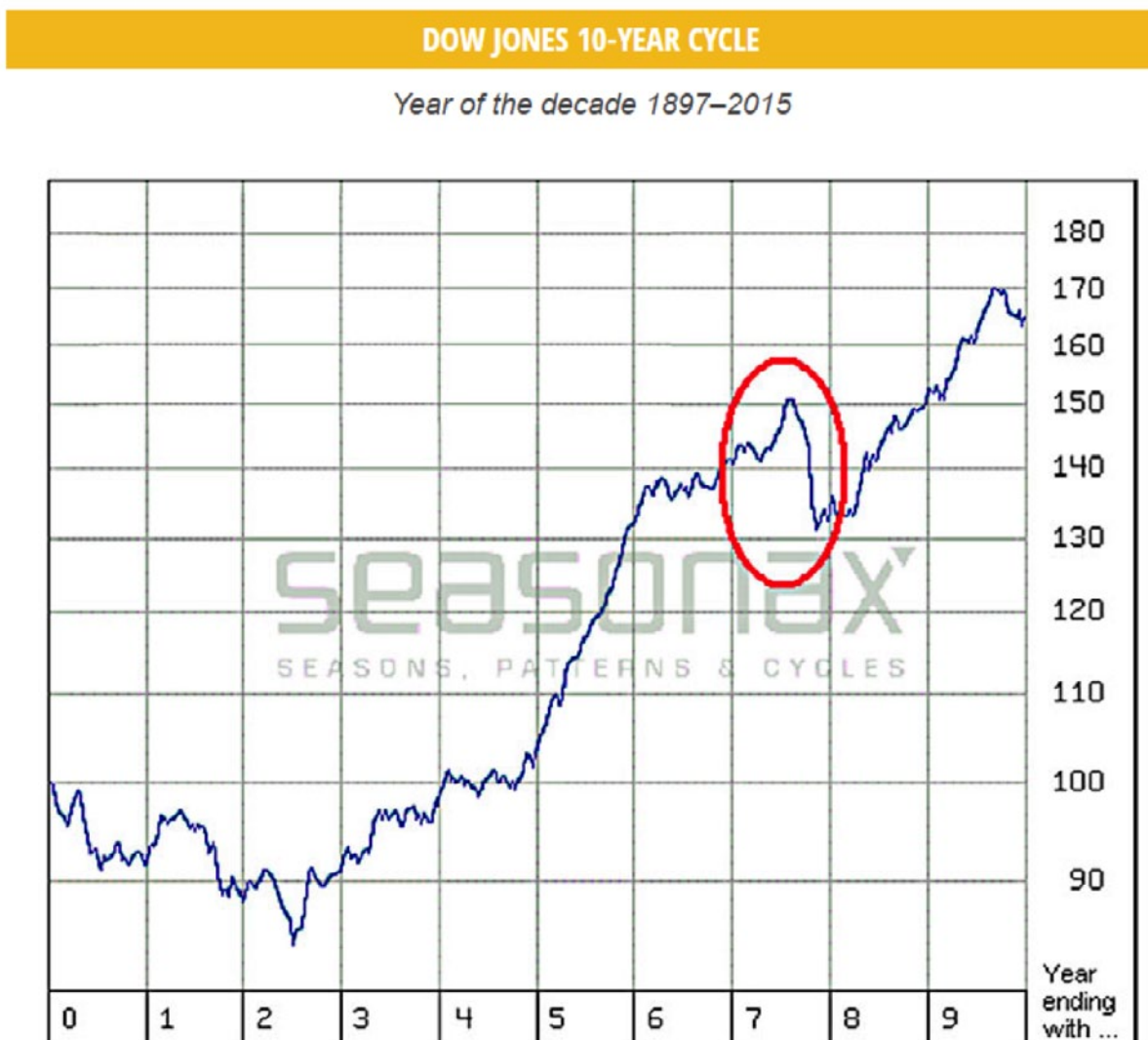
1937 was another ugly year, as the Dow lost 22% in the last three months of the year. We've written about this time period before. In short, the economy was trying to come out of the

Depression, but the Fed raised interest rates too early, sending a secondary shock through the system. The economy plunged, but—not wanting to panic people by using the word “depression” again—the word “recession” was invented. The smoke and mirrors probably didn’t help people too much, though, as the unemployment rate rose to 19%.

In looking at data from the Stock Trader’s Almanac, it is also interesting to note that \$SPX lost 14% in 1957 (I don’t remember that one), 11% in 1977 (I do remember that one), and 2007 was pretty scary, too, as that was the year we first learned what “subprime debt” was—and it led to a nasty summer decline. (See Related Article: [Understanding the \\$VIX futures term structure](#))

There were some positive years, most notably 1997 (+31% on \$SPX), but mostly they were subdued.

Every 20 years, the year ending in “7” is the first year of the four-year presidential cycle. Those are generally struggling years, as the new regime in power gets all of the “nasty” stuff out of the way early, in hopes that voters won’t remember it three years later.



Source: optionstrategist.com

The previous graph shows the entire 10-year cycle, with the years ending in “7” circled in red. From the chart, we can see that stock market years ending in “7” generally rally—even rally strongly—into the late summer. But then the wheels come off, and there is a precipitous drop late in the year. By year’s end, there is a loss. Surprisingly, this is not the only year of the decade that shows a loss (“0” and “1” do also).

So, take this as a vague warning of sorts. We will try to remember to revisit this data in the summer of 2017, just to remind ourselves of what has happened in the past.

Professional trader Lawrence G. McMillan is perhaps best known as the author of “Options as a Strategic Investment,” the best-selling work on stock and index options strategies, which has sold over 350,000 copies. An active trader of his own account, he also manages option-oriented accounts for clients. As president of McMillan Analysis Corporation, he edits and does research for the firm’s newsletter publications. optionstrategist.com



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DOES MARKET SENTIMENT HELP EXPLAIN MOMENTUM?

LARRY SWEDROE

Editor's note: This article was originally published at AlphaArchitect.com and is another example of recent behavioral finance research. To learn more, please visit AlphaArchitect.com.

Momentum is the tendency for assets that have performed well (poorly) in the recent past to continue to perform well (poorly) in the future, at least for a short period of time. In 1997, Mark Carhart, in his study “On Persistence in Mutual Fund Performance,” was the first academic to use momentum, together with the three Fama-French factors (market beta, size and value), to explain mutual fund returns. Robert Levy published one of the earliest formal studies on cross-sectional momentum in 1967, but the real academic interest for momentum (a form of technical analysis) was inspired by Narasimhan Jegadeesh and Sheridan Titman, authors of the 1993 study “Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency.”

The academic literature has investigated the existence and performance of two different types of momentum. The first is called cross-sectional momentum. This is the type of momentum that Jegadeesh and Titman, as well as Carhart, studied and is used in the four-factor model (beta, size, value and momentum). Cross-sectional momentum measures relative performance, comparing the return of an asset relative to the returns of other assets within the same asset class. Thus, in a given asset class, a cross-sectional momentum strategy may buy the 30 percent of assets with the best relative performance and short-sell those with the worst relative performance. Even if all the assets had risen in value, a cross-sectional momentum strategy would still short the assets with the lowest returns. Similarly, if all assets have fallen, the cross-sectional momentum strategy will go long assets with the smallest losses and go short assets with the largest losses.

The other type of momentum is called time-series momentum. It is also referred to as “trend-following” because it measures the trend of an asset with respect to its own performance. Unlike cross-sectional momentum, time-series momentum is defined by absolute performance. A time-series momentum strategy may purchase assets that have been rising in value and short-sell assets that have been falling. In contrast to cross-sectional momentum, if all assets rise in value, then none of them would be shorted.

The academic literature, which is summarized in the chapter about momentum in my new book, “Your Complete Guide to Factor-Based Investing,” which I co-authored with Andrew Berkin, the director of research at Bridgeway Capital Management, demonstrates that both types of momentum have delivered premiums that have been persistent over time, pervasive across both asset classes and geography, and robust to various definitions (see here for the Alpha Architect review of that book).

David Smith, Na Wang, Ying Wang and Edward Zychowicz contribute to the literature on momentum with their paper, “Sentiment and the Effectiveness of Technical Analysis: Evidence from the Hedge Fund Industry,” which was published in the December 2016 issue of the Journal of Financial and Quantitative Analysis. Their work examines how investor sentiment affects the effectiveness of technical analysis strategies (which include the use of moving averages as well as momentum) used by hedge funds (which are considered sophisticated investors).

The Theory Behind Sentiment and Momentum Strategies

The study was motivated by prior research that has focused on “investor sentiment,” which is the propensity of individuals to trade on noise and emotions rather than facts. Sentiment causes investors to have beliefs about future cash flows and investment risks that aren’t justified. Two researchers, Malcolm Baker and Jeffrey Wurgler, constructed an investor sentiment index based on six measures: trading volume as measured by NYSE turnover; the dividend premium (the difference between the average market-to-book ratio of dividend-payers and non-payers); the closed-end fund discount; the number and first-day returns of IPOs; and the equity share in new issues. Data is available through Wurgler and New York University.

Baker, Wurgler and Yu Yuan, authors of the May 2012 study, “Global, Local, and Contagious Investor Sentiment,” were the first to investigate the effect of global and local components of investor sentiment on major stock markets, at the level of both the country average and the time series of the cross-section of stock returns.

The authors concluded:

Global sentiment is a statistically and economically significant contrarian predictor of market returns. Both global and local components of sentiment help to predict the time series of the cross-section; namely, they predict the returns on high sentiment-beta portfolios such as those including high volatility stocks or stocks of small, distressed, and growth companies.

Their findings help to explain the poor performance of individual investors who, on average, are noise-chasers. Following the crowd, like sheep to the slaughter, some investors tend to rush into whatever is the latest, new thing, be it the “tronic” era of the ’60s, the nifty-fifty era of the ’70s, the biotech era of the ’80s or the dot.com era of the ’90s, driving prices to levels that predict low future returns.

Research has also found that, during periods of high sentiment, the optimistic views of not-fully-rational investors tend to drive security overpricing. Rational investors can't eliminate this overpricing due to impediments to short selling—there are limits to arbitrage that prevent rational investors from exploiting the anomaly.

For example:

- Many institutional investors (such as pension plans, endowments and mutual funds) are prohibited by their charters from taking short positions.
- Investors are unwilling to accept the risks of shorting because of the potential for unlimited losses. Even traders who believe that a stock's price is too high know that they can be correct (indeed, the price may eventually fall) but still face the risk that the price will go up before it goes down. Such a price move, requiring additional capital, can force the traders to liquidate at a loss.
- Shorting can be expensive. Traders have to borrow a stock to go short and many stocks are costly to borrow because the supply available from institutional investors is low (overvalued stocks tend to be overweighted by individual investors and underweighted by institutional investors, who are the lenders of shares). The largest anomalies tend to occur in small stocks, which are costly to trade in large quantity (both long and especially short). The volume of such shares available to borrow is limited (because they tend to be owned by individual investors) and borrowing costs are often high.

While these limits to arbitrage can prevent sophisticated investors from fully correcting mispricings during periods of high sentiment, during periods of low sentiment, the views of not-fully-rational investors may not be reflected as underpricing because sophisticated investors can simply hold long positions. The result is that high-sentiment overpricing is more prevalent than low-sentiment underpricing.

Empirical Tests on Sentiment and Momentum Investing

To test the hypothesis that technical analysis would be more powerful in high-sentiment environments, Smith and his co-authors used a sample of hedge funds that are self-reported users of momentum strategies (about one in five hedge funds). The sentiment index they employ is the aforementioned one created by Baker and Wurgler. Their sample covered the period from 1994 through 2010. The authors found that during high-sentiment periods, users of technical analysis strategies on average significantly outperformed nonusers—by 5.3 percent per annum in terms of average returns (44.5 bps/month), by 1.4 percent per annum relative to a four-factor model (11.3 bps/month), and by 1.3 percent per annum relative to a seven-factor hedge fund model (10.7 bps/month). However, during periods of low sentiment, technical analysis usage was found to be less valuable and even counterproductive. The differences in performance were statistically significant. (see the table below for details).

TABLE 2

Use of Technical Analysis and Hedge Fund Performance by Investor Sentiment Periods

The table compares the performance (in percentage) of technical analysis users and nonusers among our sample hedge funds in high and low sentiment periods as well as the full sample period of 1994-2010. Performance is measured by the average monthly return (Ave Ret), Carhart (1997) four-factor alpha (Alpha4), and Fung and Hsieh (2004) seven-factor alpha (Alpha7), respectively. High (low) sentiment periods refer to those months when the beginning-of-month Baker and Wurgler (2006) sentiment index is above (below) the sample median value. t-diff is the *t*-statistic from the test of whether the difference in means is zero, and p-diff is the associated *p*-value.

	Entire Period, 1994-2010				High Sentiment Periods				Low Sentiment Periods			
	Obs	Ave Ret	Alpha4	Alpha7	Obs	Ave Ret	Alpha4	Alpha7	Obs	Ave Ret	Alpha4	Alpha7
Users	981	0.529	0.169	0.230	816	0.386	-0.010	0.212	836	0.781	0.236	0.390
Nonusers	4,154	0.447	0.124	0.164	3,199	-0.060	-0.123	0.105	3,677	0.980	0.428	0.447
Difference		0.082	0.046	0.066		0.445	0.113	0.107		-0.198	-0.192	-0.057
t-diff		2.702	1.535	2.056		8.311	2.704	2.387		-4.534	-4.794	-1.293
p-diff		0.007	0.125	0.040		0.000	0.007	0.017		0.000	0.000	0.196

The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. Indexes are unmanaged, do not reflect management or trading fees, and one cannot invest directly in an index.

They also found that these strategies reduced risk, including downside risk, particularly during periods of high sentiment. Additionally, they found that during periods of high sentiment technical analysis users exhibited better market-timing ability than nonusers. Their results were robust to a variety of controls, including fund characteristics and sub-period analysis.

There was another interesting finding. Hedge funds that report using fundamental analysis tend to underperform nonusers during periods of high sentiment. Conversely, the authors did find some evidence that fundamental analysis users outperform nonusers during periods of low sentiment. In periods of low sentiment, sophisticated fundamental investors are not confronted with limits to arbitrage that prevent them from fully expressing their views, thus market prices are more rational. The explanation for the superior performance of technical analysis in high-sentiment periods is that the slow diffusion of information creates momentum.

Concluding Thoughts

One quibble with the paper is they did not investigate alternative investment sentiment measures. For example, in the paper, "Investor Sentiment Aligned: A Powerful Predictor of Stock Returns," the authors highlight that the Baker Wurgler sentiment methodology can be improved along several dimensions (that article is summarized here by Alpha Architect). Adding a set of robustness tests using this alternative would add to the paper and help alleviate concerns that the results are driven by a particular measure for sentiment.

Quibbles aside, this is a compelling paper that improves our understanding of financial markets. The authors do a good job explaining the behavioral mechanisms behind how and why momentum strategies work, and is part of the growing body of work in the field of behavioral finance, specifically on how sentiment drives prices and allows anomalies to persist.

RULES FOR DRAWINGS AND ANALYZING TRENDLINES

JEFFREY S. WEISS, CMT

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Article Highlights

- Trendlines can offer insights in assessing buying power or selling pressure, with significant breaks often foreshadowing a continued move in the direction of the break.
- Using both bar and line graphs can offer confirmation of whether a trendline break is actually occurring.
- The keys in drawing include identifying the peaks and troughs to originate the trendlines from, the length of time they cover and how many points lie along/around the line, and what constitutes a break of the trend.

Perhaps no other aspect of technical analysis lends itself to as many varied interpretations as trendlines—an analytical tool with the potential to enhance your investment performance while simultaneously offering a risk management component.

How much you weight this analytical gauge in your analysis is, of course, up to you. You must be comfortable and confident with any approach, but personally I can't invest without utilizing trendline analysis.

Before we go any further, I'd like to stress that no matter what your investment discipline is, perhaps the key question it needs to answer is "does it address market risk and emphasize capital preservation considerations?"

Unlike other market gauges that have "overbought" and "oversold" (two terms I don't use and which can be misleading) parameters to assist investors in determining a course of investment action, trendlines usually aren't as straightforward. In fact, if you give the exact same chart to a group of market observers and ask them to draw what they consider to be important trendlines, there's a good chance that no two charts will look exactly alike. That's because trendlines contain a more artistic element than many basic oscillators. I refrain from using the terms "overbought" and "oversold" in my market analysis because a market that gets rapidly

“overbought” and stays in that condition can be a bullish development, just as an “oversold” market can remain in that condition for quite some time and claim your capital even as it appears to possess rally potential. Varying markets demand differing interpretations of these terms.

Rather, I prefer to speak in the language of risk management—the key investment variable that needs to be regularly addressed in any investment program, whether it is fundamental or technical in nature. One of the reasons I spend so much time drawing trendlines is because of their potential risk management value. Trendlines can assist an investor in discerning underlying trends, since

these lines can remain in effect for months or even years (in the case of longer-term lines). They can also potentially help determine, as part of a broader strategy, whether a rally that appears convincing on the surface is simply a bounce within a downtrend or a genuine northerly move. Similarly, trendline analysis can also assist you in deciphering whether a decline is the start of a potentially prolonged downtrend or simply a correction in an ongoing uptrend.

Trendlines offer an investment tool that’s well suited to shorter-term, intermediate-term or longer-term trend analysis. They can offer valuable insights in assessing the extent of buying power or selling pressure, since significant breaks often foreshadow a continued move in the direction of the trendline’s penetration. Trendlines have nothing to do with what analysts are saying or what reporters are writing or what people are thinking but, most importantly, are based on what investors are doing—as reflected by monetary inflows or outflows of capital. That’s what technical analysis tries to measure, and one of its guiding principles is that actions speak louder than words. It separates a mere opinion from a view backed by capital.

The only way to get a feel for trendlines is to practice drawing them—until your fingers are ready to separate from your hands if you’re printing them out and using a pencil/pen and a ruler. You can also utilize one of the many popular computer programs available these days, although even after four decades in this business, I prefer to use both. These are among my “technical” tools, coupled with a respect for the market and a belief that its movements speak louder than any analyst or commentator on the face of the earth.

The toughest part of discussing trendlines here is to try and put some parameters and an analytical framework on a largely artistic endeavor, a tough task given that each of you has your own individual investment approach culled from a seemingly infinite reservoir of research possibilities. I personally only use technical analysis. Having said that, let’s delve into the world of trendlines, starting with their definition and two specific chart types I’ll be focusing on.

Trendlines: Some Rules, Chart Types and Thoughts on Selling

Trendlines are an analytical tool that seek to address one of investing’s key objectives: gauging the market’s underlying trends. Each and every market day, millions of these lines are drawn by multitudes of traders and investors seeking insight into the market’s direction. Whether you draw your own trendlines or depend on the advice of seasoned professionals who do so, it’s helpful to review some of the basics—starting with uptrend and downtrend lines. While there are exceptions to every rule, an uptrend line connects price lows over time and a downtrend

line connects price peaks over time. The keys are which peaks and troughs to originate your trendlines from, what length of time they cover, how many points lie along/ around the line and what constitutes a break of that gauge. Again, please remember that technical analysis is an art and not a science, so investors will each have their own varying rules for buying or selling when it comes to interpreting these gauges. Generally speaking, the longer a trendline has been in effect, the more importance may be assigned to it. There are also horizontal lines.

Trendlines can be drawn on daily, weekly and monthly charts, as well as other time frames of both longer-term (such as quarterly) and shorter-term (such as intraday) durations. I cover daily and weekly charts in this article. You may also use them for other time periods. Trendline analysis may be applied to stocks, markets or sectors (industry groups).

For our purposes here, I analyze charts of both the “bar” and “line” variety. The former illustrates a stock’s high and low (known as the “range”) for the period in question. Thus, a daily bar chart would display five bars for a week of trading, whereas a weekly chart would contain just one bar. The monthly chart would illustrate the range for the whole month of trading on a single bar. The top of the bar indicates the high for the period in question, while the bottom of the bar indicates the low. The closing price is indicated by a dot next to the bar or a dash extending from the bar. This closing price may be of use in interpreting potential technical formations, but does not factor into trendline construction.

A line chart illustrates a different look, analyzing only the stock’s closing price for the period in question. Thus, a daily line chart would only plot the closing stock price once each trading day. The weekly line chart would include only the closing share price on Friday (or Thursday, if it’s the final session of the week). The individual day’s closing quotes are not considered on a weekly line chart. And as for the monthly closing graph, it’s updated only once per month (at month’s end), for a total of just a dozen times each year. Remember, updates on line charts do not become official until the periods in question end, whereas bar charts include any and all prices attained during those periods. Basically, when attempting to find trendlines of import on line charts, you are connecting the dots.

Bar and line graphs offer differing market looks. I use a combination of both, finding the latter useful in confirming the action of the former. That’s because what looks like a trendline break on the bar chart for the period in question may not be confirmed from a closing price standpoint for that analytical period. The flip side of this equation is that waiting for a closing price break before acting can cost you additional capital since you’re waiting until the close (or at least near the close if a break looks obvious) before acting. This wait doesn’t entail as much potential risk on a daily closing basis (where you may be waiting several hours for confirmation of an intraday trendline break) as it does for weekly closing or monthly closing spans. Let’s face it, waiting for an entire week’s action for confirmation of a daily closing break that occurs on a Monday or Tuesday in volatile markets is risky, and all the more so when monthly closing prices are used. Factors such as the size of your position relative to your portfolio worth, or whether you’re focused on a shorter-term or longer-term time frame, are among the variables that can enter into the decision-making process.

While these factors apply to buying and selling, my investment discipline demands that we put greater emphasis on the downside part of the equation. I'd also like to say that buying and selling stocks is not an all or nothing event, and that partial position purchases and sales (which I refer to as "phase investing") is a strategy that can be utilized. It emphasizes multiple stops/sales on the southerly end, as I believe that one shouldn't reward bad stock behavior by continually funneling additional capital into it on the way down.

Speaking of the downside, when it comes time to sell a stock I always refer to do so "at the market" and not try to get that extra several cents. Sure, you'll receive that extra bit sometimes, but risking your hard-earned capital for such a risky and dangerous (guessing game) maneuver makes no sense to me. Remember, it's your money, so don't try to be too cute when it comes time to sell. Get your capital back ASAP! Personally, I wouldn't be afraid to sell on the way down if a stock has had a serious technical break. Some of my best sales in this regard certainly didn't seem so at the time, but in retrospect proved to be quite timely. And if the stock still doesn't act properly thereafter, I'll continue to sell it. The bottom line is that I don't reward a stock for acting poorly by buying more, no matter how cheap it looks! Just like one wouldn't want to become increasingly involved in a worsening relationship with their boyfriend or girlfriend.

Drawing the Lines: Art or Science?

Drawing trendlines is more art than science but, as I've noted, so is technical analysis in general. Finding the lines that stand the test of time isn't easy, but when you find them it gives you added confidence in both taking the appropriate market action and in setting your risk management parameters. As I mentioned earlier, the keys in drawing trendlines include which peaks and troughs to originate your trendlines from, what length of time they cover, how many areas lie along around the line, and what constitutes a break of the gauge.

Keep in mind that the more trendlines you can draw, the better. Some charts will contain more than one line, often forming a price pattern. (There are books galore on price formations.) For starters, look at a bunch of graphs of varying types and lengths, grab a ruler and pen or your computer mouse, and start to connect varying highs and lows—over and over and over again. Analyze stocks, sectors, indexes and markets. You'll need to gain enough of a comfort level to be able to invest your hard-earned capital based upon your findings (if that's one of the methods you'll be employing).

I'll draw my lines from several different angles. I do not simply extend them from a stock's or market's major high or major low. I've seen that done too frequently; it can cause a trader or investor to get whipsawed. What I'll often do is extend my trendlines from a secondary peak or secondary trough following major highs or lows. In some cases, I may even go back to a low preceding a major low or a peak preceding a major peak. Obviously, you never want to place your capital at risk based on only one or two indicators, but finding a long-standing trendline that has stood the test of time is an indicator worth having in your investment corner. Keep in mind that the line need not be perfect to be of value; temporary, minor violations of a well-defined uptrend or downtrend line can occur. It's when a line is re-violated (especially on the downside) convincingly that I become more concerned.

The trader who is trying to sell the final portion of his or her position may decide to simply act on a bar chart break or wait until just before the close to act if a daily closing decision is the preference. Someone with a larger position can act on the bar chart violation, wait for the final few minutes of the session before acting on a closing basis, or sell part of the position on the bar chart violation and await the close to determine whether to take action on another portion (or the remainder) of the position. Another option is to sell a portion of the position every day the shares are about to finish below their trendline(s) on a daily closing basis, while giving the stock a chance to successfully hold its weekly closing basis trendline locations. These are just some of the many possibilities.

For purely illustrative purposes, let's proceed to a discussion of several different trendlines on a daily closing, weekly closing and weekly bar chart basis.

Figure 1 is a weekly closing basis graph of the S&P 500 index. Weekly closes along/around the down-trending line dating back to the week ending July 17, 2015, are boxed, including the trio of weekly finishes from May 27 to June 10, 2016. Following the S&P 500's clear weekly close above the line back in July 2016, note the successful test of that gauge in the week ending November 4, 2016, (arrowed) from where a substantial rally ensued. One of the rules about trendlines is that, when bettered on the way up, they transform into potential areas of support (where declines may hold) on the southerly end. The same is true when trendlines are clearly violated on the downside; they become potential regions of resistance (where rallies may fail) on the way up.

Figure 1. Weekly Closing Basis Chart of the S&P 500 With a Down-Trending Line

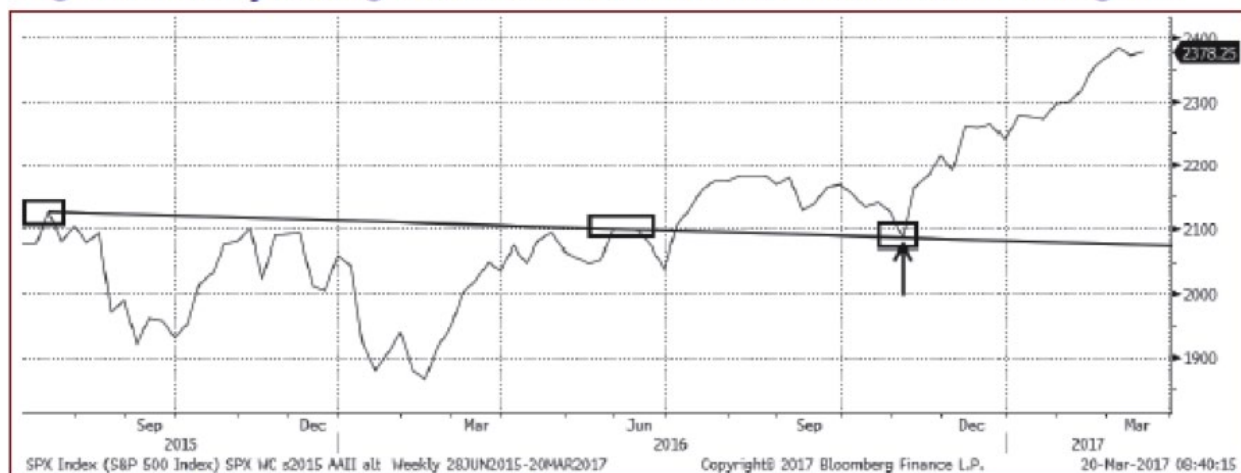


Chart courtesy of Bloomberg, L.P.; Annotations by author

Figure 2 also charts the S&P 500, but from a daily closing basis angle. Note the dashed trendline stretching back to August 2015, along/around which three peak regions are marked by solid arrows. The index's ability to clear that line by a visible margin transforms it into one of potential support on the southerly end. On a shorter-term basis, however, a higher zone of potential daily closing basis support is evident in the vicinity of the solidly drawn trendline stretching back to August 15, 2016, indicated by the middle solid arrow. Dotted arrows indicate the December 13,

2016, and January 25, January 26 and February 9, 2017, closes along/around that trendline. Like its dashed counterpart, the 500's ability to visibly better it transforms the line into a potential support zone. Convincingly violating it on a daily close basis should increase the chances for a potential test of the dashed trendline vicinity, but that has yet to occur as of late March 2017.

Figure 2. Daily Closing Basis Chart of the S&P 500 With an Up-Trending Line

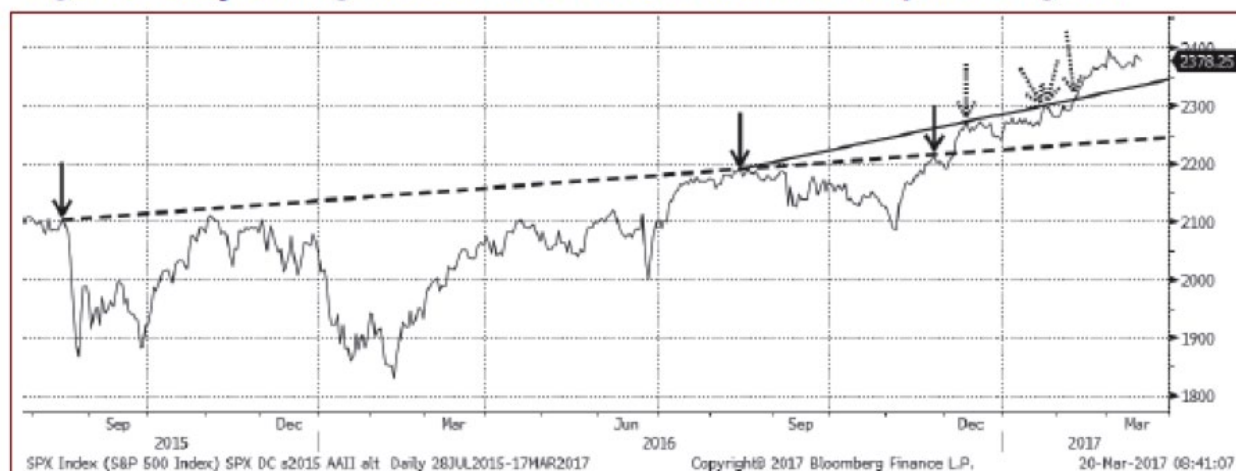


Chart courtesy of Bloomberg, L.P.; Annotations by author

Sandwiched in between the two daily closing basis trendline locations in Figure 2, Figure 3 shows a weekly closing basis trendline on the S&P 500 index dating back to the week ending July 17, 2015. Three weekly closing peaks along/around the line are marked with solid arrows, with a recently successful test of that gauge in the week ended January 20, 2017 (indicated by the dotted arrow). This action suggests that the lined region offers a potential intermediate-term support area.

Figure 3. Weekly Closing Basis Chart of the S&P 500 With an Up-Trending Line

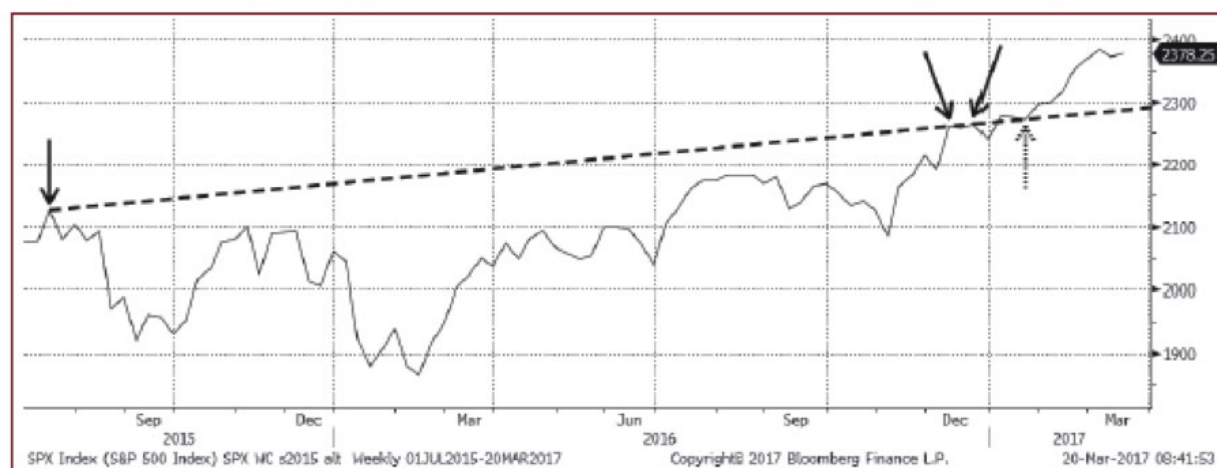


Chart courtesy of Bloomberg, L.P.; Annotations by author

Note that numerous resistance regions are bettered in a primary bull market and multiple support zones are violated in a major bear market. That's why attempting to gauge the market's major trend is so important for those who incorporate technical analysis into their trading strategies.

The weekly bar chart for the Russell 2000 (Figure 4) illustrates a line extending all the back to December 2007 (arrowed). Boxed peaks lie along/around the line, which presently offers a respectable potential investment resistance zone. The most recent rally failure in the vicinity of the line occurred in early March 2017.

Figure 4. Weekly Bar Chart of the Russell 2000



Chart courtesy of Bloomberg, L.P.; Annotations by author

A weekly line chart for the Russell 2000 over the same time period is shown in Figure 5. A trendline here offers potential investment resistance on a weekly closing basis. The most recent failure in the vicinity of that line is marked with an arrow. The length of time these trendlines have been in force suggests that they have potential investment importance from a technical analysis standpoint.

Conclusion

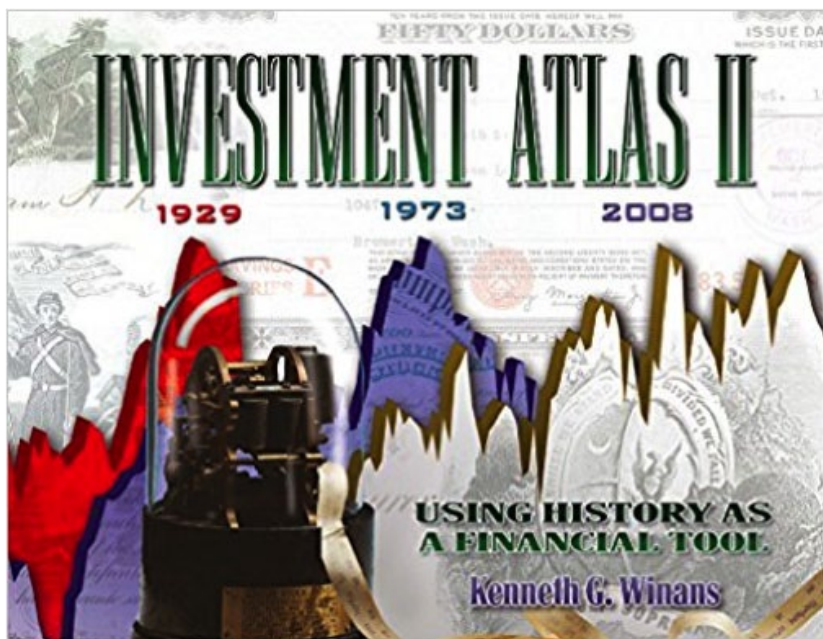
Obviously there's much, much more to the art of trendlines, including the important topic of pattern recognition (using multiple trendlines to search for price formations). Space doesn't allow for a discussion of that topic here, but I hope I've at least given you a comprehensible introductory lesson on trendlines.

Jeffrey Weiss, CMT, is chief technical analyst at Clearview Trading Advisors in New York City. His new book is "Relationship Investing: Stock Market Therapy for Your Money," (Skyhorse Publishing, 2017). Find out more about the author at www.aai.com/authors/jeffrey-weiss. Weiss will speak at the AAI Investor Conference this fall in Orlando, Florida.

INVESTMENT ATLAS RECOGNIZED WITH LITERARY HONOR

Investment Atlas II, Using History as a Financial Tool was awarded the Bronze Medal in the competitive “Finance/Investment/Economics” category of the Independent Publisher Book Awards. An artistic and colorful reference book that offers useful information about the performance and characteristics of stocks, bonds, commodities, and real estate since the 1800s. Using much of his proprietary research, Ken Winans, CMT, examines past bull and bear markets within the various investment groups to show how they differ as well as the tools investors can use to navigate the changes in long-term trends.

“Investment Atlas II, Using History as a Financial Tool” is available in print and Ebook formats on Amazon.com.



WHY HAVE ASSET PRICE PROPERTIES CHANGED SO LITTLE IN 200 YEARS

JEAN-PHILIPPE BOUCHARD AND DAMIEN CHALLET

Editor's note: This paper was originally published at <https://arxiv.org/pdf/1605.00634.pdf>. It is reprinted here as an example of recent work in behavioral finance

Abstract: We first review empirical evidence that asset prices have had episodes of large fluctuations and been inefficient for at least 200 years. We briefly review recent theoretical results as well as the neurological basis of trend following and finally argue that these asset price properties can be attributed to two fundamental mechanisms that have not changed for many centuries: an innate preference for trend following and the collective tendency to exploit as much as possible detectable price arbitrage, which leads to destabilizing feedback loops.

1 Introduction

According to mainstream economics, financial markets should be both efficient and stable. Efficiency means that the current asset price is an unbiased estimator of its fundamental value (aka “right”, “fair” or “true”) price. As a consequence, no trading strategy may yield statistically abnormal profits based on public information. Stability implies that all price jumps can only be due to external news.

Real-world price returns have surprisingly regular properties, in particular fat-tailed price returns and lasting high- and low- volatility periods. The question is therefore how to conciliate these statistical properties, both non-trivial and universally observed across markets and centuries, with the efficient market hypothesis.

The alternative hypothesis is that financial markets are intrinsically and chronically unstable. Accordingly, the interactions between traders and prices inevitably lead to price biases, speculative bubbles and instabilities that originate from feedback loops. This would go a long way in explaining market crises, both fast (liquidity crises, flash crashes) and slow (bubbles and trust crises). This would also explain why crashes did not wait for the advent of modern HFT to occur: whereas the May 6 2010 flash crash is well known, the one of May 28 1962, of comparable intensity but with only human traders, is much less known.

The debate about the real nature of financial market is of fundamental importance. As recalled above, efficient markets provide prices that are unbiased, informative estimators of the value of

assets. The efficient market hypothesis is not only intellectually enticing, but also very reassuring for individual investors, who can buy stock shares without risking being outsmarted by more savvy investors.

This contribution starts by reviewing 200 years of stylized facts and price predictability. Then, gathering evidence from Experimental Psychology, Neuroscience and agent-based modelling, it outlines a coherent picture of the basic and persistent mechanisms at play in financial markets, which are at the root of destabilizing feedback loops.

2 Market Anomalies

Among the many asset price anomalies documented in the economic literature since the 1980s (Schwert [2003]), two of them stand out:

1. The Momentum Puzzle: price returns are persistent, i.e., past positive (negative) returns predict future positive (negative) returns.
2. The Excess Volatility Puzzle: asset price volatility is much larger than that of fundamental quantities

These two effects are not compatible with the efficient market hypothesis and suggest that financial market dynamics is influenced by other factors than fundamental quantities. Other puzzles, such as the “low-volatility” and “quality” anomalies, are also very striking, but we will not discuss them here – see Ang et al. [2009], Baker et al. [2011], Ciliberti et al. [2016], Bouchaud et al. [2016] for recent reviews.

2.1 Trends and bubbles

In blatant contradiction with the efficient market hypothesis, trend-following strategies have been successful on all asset classes for a very long time. Figure 1 shows for example a backtest of such strategy since 1800 (Lempérière et al. [2014]). The regularity of its returns over 200 years implies the presence of a permanent mechanism that makes price returns persistent.

Why have asset price properties changed so little in 200 years

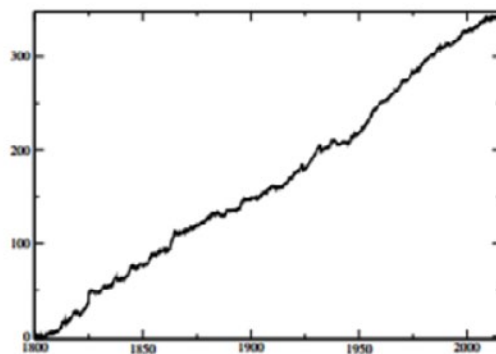


Fig. 1 Aggregate performance of all sectors of a trend-following strategy with the trend computed over the last six-month moving window, from year 1800 to 2013. T-statistics of excess returns is 9.8. From Lempérière et al. [2014]. Note that the performance in the last 2 years since that study (2014-2015) has been strongly positive.

Indeed, the propensity to follow past trends is a universal effect, which most likely originates from a behavioral bias: when faced with an uncertain outcome, one is tempted to reuse a simple strategy that seemed to be successful in the past (Gigerenzer and Goldstein [1996]). The relevance of behavioural biases to financial dynamics, discussed by many authors, among whom Kahneman and Shiller, has been confirmed in many experiments on artificial markets (Smith et al. [1988]), surveys (Shiller [2000], Menkhoff [2011], Greenwood and Shleifer [2013]), etc. which we summarize in Section 3.

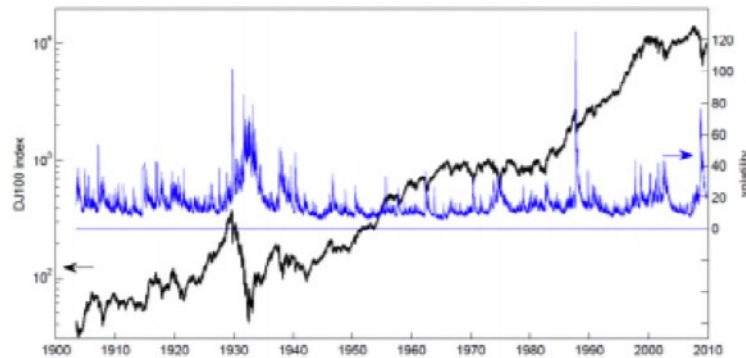


Fig. 2 Evolution of the Dow-Jones Industrial Average index and its volatility over a century. See Zumbach and Finger [2010].

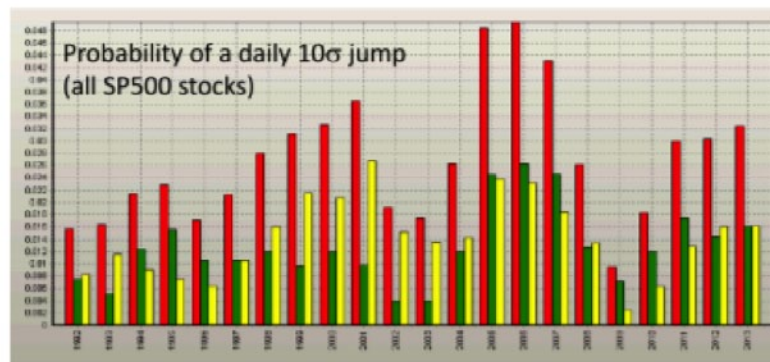


Fig. 3 Yearly evolution of the probability of the occurrence of 10σ price jump for a given day for assets in the S&P500 since 1991. Yellow bars: positive jumps; green bars: negative jumps; red bars: both of them. These probabilities do vary statistically from year to year, but far less than the volatility itself. This suggests that probability distributions of returns, normalized by their volatility, is universal, even in the tails (cf. also Fig. 2). Note that the jumps probability has not increased since 1991, despite the emergence of High Frequency Trading (source: Stefano Ciliberti).

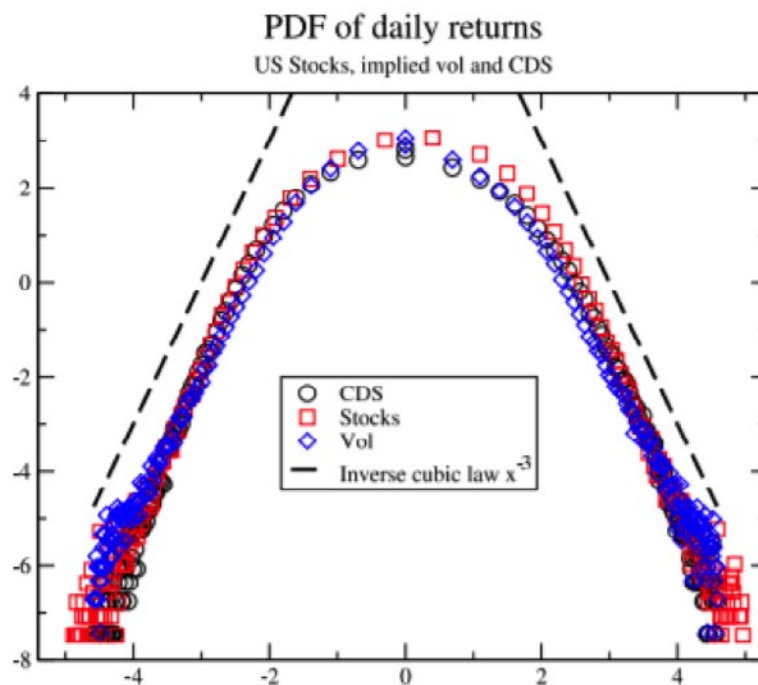
2.2 Short-term price dynamics: jumps and endogenous dynamics

2.2.1 Jump statistics

Figure 4 shows the empirical price return distributions of assets from three totally different assets classes. The distributions are remarkably similar (see also Zumbach [2015]): the probability of extreme return are all $P(x) \sim |x|^{-1-\mu}$, where the exponent μ is close to 3 (Stanley et al. [2008]). The same law holds for other markets (raw materials, currencies, interest rates). This implies

that crises of all sizes occur and result into both positive and negative jumps, from fairly small crises to centennial crises.

In addition, and quite remarkably, the probability of the occurrence of price jumps is much more stable than volatility (see also Zumbach and Finger [2010]). Figure 3 illustrates this stability by plotting the 10- σ price jump probability as a function of time.



2.2.2 The endogenous nature of price jumps

What causes these jumps? Far from being rare events, they are part of the daily routine of markets: every day, at least one 5- σ event occurs for one of the S&P500 components! According to the Efficient Market Hypothesis, only some very significant pieces of information may cause large jumps, i.e., may substantially change the fundamental value of a given asset. This logical connection is disproved by empirical studies which match news sources with price returns: only a small fraction of jumps can be related to news and thus defined as an exogenous shock (Cutler et al. [1998], Fair [2002], Joulin et al. [2008], Cornell [2013]).

The inevitable conclusion is that most price jumps are self-inflicted, i.e., are endogenous. From a dynamical point of view, this means that feedback loops are so important that, at times, the state of market dynamics is near critical: small perturbations may cause very large price changes. Many different modelling frameworks yield essentially the same conclusion (Wyart et al. [2008], Marsili et al. [2009], Bacry et al. [2012], Hardiman et al. [2013], Chicheportiche and Bouchaud [2014]).

The relative importance of exogenous and endogenous shocks is then linked to the propensity of the financial markets to hover near critical or unstable points. The next step is therefore to find mechanisms that systematically tend to bring financial markets on the brink.

3 Fundamental market mechanisms: arbitrage, behavioural biases and feedback loops

In short, we argue below that greed and learning are two sufficient ingredients to explain the above stylized facts. There is no doubt that human traders have always tried to outsmart each other, and that the members of the homo sapiens sapiens clique have some learning abilities. Computers and High Frequency Finance then merely decrease the minimum reaction speed (Hardiman et al. [2013]) without modifying much the essence of the mechanisms at play.

In order to properly understand the nature of the interaction between investors in financial markets, one needs to keep two essential ingredients

1. Investor heterogeneity: the distribution of their wealth, trading frequency, computing power, etc. have heavy tails, which prevents a representative agent approach.
2. Asynchronism: the number of trades per agent in a given period is heavy-tailed, which implies that they do not trade synchronously. In addition, the continuous double auction mechanism implies sequential trading: only two orders may interact at any time.

One thus cannot assume that all the investors behave in the same way, nor that they can be split into two or three categories, which is nevertheless a common assumption when modelling or analyzing market behavior.

3.1 Speculation

Although the majority of trades are of algorithmic nature nowadays, most traders (human or artificial) use the same types of strategies. Algorithmic trading very often simply implements analysis and extrapolation rules that have been used by human traders since immemorial times, as they are deeply ingrained in human brains.

3.1.1 Trend following

Trend-following in essence consists in assuming that future price changes will be of the same sign as last past price changes. It is well-known that this type of strategy may destabilize prices by increasing the amplitude and duration of price excursions. Bubbles also last longer because of heavy-tailed trader heterogeneity. Neglecting new investors for the time being, the heavy-tailed nature of trader reaction times implies that some traders are much slower than others to take part to a nascent bubble. This causes a lasting positive volume imbalance that feeds a bubble for a long time. Finally, a bubble attracts new investors that may be under the impression that this bubble will grow further. The neuronal processes that contribute to the emergence and duration of bubbles are discussed in section 3.4.2

3.1.2 Contrarian behavior

Contrarian trading consists in betting on mean-reverting behavior: price excursions are deemed to be only temporary, i.e., that the price will return to some reference (“fundamental” or other) value. Given the heterogeneity of traders, one may assume that they do not all have the same reference value in mind. The dynamical effects of this type of strategies is to stabilize price (with respect to its perceived reference value).

3.1.3 Mixing trend followers and contrarians

In many simplified agent-based models (De Grauwe et al. [1993], Brock and Hommes [1998], Lux and Marchesi [1999]) both types of strategies are used by some fractions of the trader populations. A given trader may either always use the same kind of strategy (Frankel et al. [1986], Frankel and Froot [1990]), may switch depending on some other process (Kirman [1991]) or on the recent trading performance of the strategies (Brock and Hommes [1998], Wyart and Bouchaud [2007], Lux and Marchesi [1999]). In a real market, the relative importance of a given type of strategy is not constant, which influences the price dynamics.

Which type of trading strategy dominates can be measured in principle. Let us denote the price volatility measured over a single time step by σ_1 . If trend following dominates, the volatility of returns measured every T units of time, denoted by σ_T will be larger than $\sigma_1 \sqrt{T}$. Conversely, if mean-reverting dominates, $\sigma_T < \sigma_1 \sqrt{T}$. Variance-ratio tests, based on the quantity $\sigma_T / (\sigma_1 \sqrt{T})$, are suitable tools to assess the state of the market (see Charles and Darne [2009] for a review); see for example the PUCK concept, proposed by Mizuno et al. [2007].

When trend following dominates, trends and bubbles may last for a long time. The bursting of a bubble may be seen as mean-reversion taking (belatedly) over. This view is too simplistic, however, as it implicitly assumes that all the traders have the same calibration length and the same strategy parameters. In reality, the periods of calibration used by traders to extrapolate price trends are very heterogeneous. Thus, strategy heterogeneity and the fact that traders have to close their positions some time imply that a more complex analysis is needed.

3.2 Empirical studies

In order to study the behavior of individual investors, the financial literature makes use of several types of data

1. Surveys about individual strategies and anticipation of the market return over the coming year (Shiller [2000], Greenwood and Shleifer [2013]).
2. The daily investment flows in US securities of the sub-population of individual traders. The transactions of individual traders are labelled as such, without any information about the identity of the investor (Kaniel et al. [2008]).
3. The daily net investment fluxes of each investor in a given market. For example, Tumminello et al. [2012] use data about Nokia in the Finnish stock exchange.
4. Transactions of all individual investors of a given broker (Dorn et al. [2008], de Lachapelle and Challet [2010]). The representativity of such kind of data may be however questioned (cf. next item)
5. Transactions of all individual investors of all the brokers accessing a given market. Jackson [2004] shows that the behaviour of individual investors is the same provided that they use an on-line broker.

3.2.1 Trend follower vs contrarian

Many surveys show that institutional and individual investors' expectation about future market returns are trend-following (e.g. Greenwood and Shleifer [2013]), yet the analysis of the individual investors' trading flow at a given frequency (i.e. daily, weekly, monthly) invariably point out that their actual trading is dominantly contrarian as it is anti-correlated with previous price returns, while institutional trade flow is mostly uncorrelated with recent price changes on average (Grinblatt and Keloharju [2000], Jackson [2004], Dorn et al. [2008], Lillo et al. [2008], Challet and de Lachapelle [2013]), . In addition, the style of trading of a given investor only rarely changes (Lillo et al. [2008]).

Both findings are not as incompatible as it seems, because the latter behavior is consistent with price discount seeking. In this context, the contrarian nature of investment flows means that individual investors prefer to buy shares of an asset after a negative price return and to sell it after a positive price return, just to get a better price for their deal. If they neglect their own impact, i.e., if the current price is a good approximation of the realized transaction price, this makes sense. If their impact is not negligible, then the traders buy when their expected transaction price is smaller than the current price and conversely (Batista et al. [2015]).

3.2.2 Herding behavior

Lakonishok et al. [1992] define a statistical test of global herding. US mutual funds do not herd, while individual investors significantly do (Dorn et al. [2008]). Instead of defining global herding, Tumminello et al. [2012] define sub-groups of individual investors defined by the synchronization of their activity and inactivity, the rationale being that people that use the same way to analyze information are likely to act in the same fashion. This in fact defines herding at a much more microscopic level. The persistent presence of many sub-groups sheds a new light on herding. Using this method, Challet et al. [2016] show that synchronous sub-groups of institutional investors also exist.

3.2.3 Behavioral biases

Many behavioral biases have been reported in the literature. Whereas they are only relevant to human investors, i.e. to individual investors, most institutional funds are not (yet) fully automated and resort to human decisions. We will mention two of the most relevant biases.

Human beings react different to gains and to losses (see e.g. Prospect Theory Kahneman and Tversky [1979]) and prefer positively skewed returns to negatively skewed returns (aka the "lottery ticket" effect, see Lemperiere et al. [2016]). This has been linked to the disposition bias, which causes investors to close too early winning trades and too late losing ones (Shefrin and Statman [1985], Odean [1998], Boolell-Gunesh et al. [2009]) (see however Rangelova [2001], Barberis and Xiong [2009], Annaert et al. [2008]). An indisputable bias is overconfidence, which leads to an excess of trading activity, which diminishes the net performance Barber and Odean [2000], see also Batista et al. [2015] for a recent experiment eliciting this effect. This explains why male traders earn less than female trades Barber and Odean [2001]. Excess confidence is also found in individual portfolios, which are not sufficiently diversified. For example, individual traders trust too much their asset selection abilities (Goetzmann and Kumar [2005], Calvet et al. [2007]).

3.3 Learning and market instabilities

Financial markets force investors to be adaptive, even if they are not always aware of it (Farmer [1999], Zhang [1999], Lo [2004]). Indeed, strategy selection operates in two distinct ways

1. Implicit: assume that an investor always uses the same strategy and never recalibrates its parameters. The performance of this strategy modulates the wealth of the investor, hence its relative importance on markets. In the worst case, this investor and his strategy effectively disappears. This is the argument attributed to Milton Friedman according to which only rational investors are able to survive in the long run because the uninformed investors are weeded out.
2. Explicit: investors possess several strategies and use them in an adaptive way, according to their recent success. In this case, strategies might die (i.e., not being used), but investors may survive.

The neo-classical theory assumes the convergence of financial asset prices towards an equilibrium in which prices are no longer predictable. The rationale is that market participants are learning optimally such that this outcome is inevitable. A major problem with this approach is that learning requires a strong enough signal-to-noise ratio (Sharpe ratio); as the signal fades away, so does the efficiency of any learning scheme. As a consequence, reaching a perfectly efficient market state is impossible in finite time.

This a major cause of market instability. Patzelt and Pawelzik [2011] showed that optimal signal removal in presence of noise tends to converge to a critical state characterized by explosive and intermittent fluctuations, which precisely correspond to the stylized facts described in the first part of this paper. This is a completely generic result and directly applies to financial markets. Signal-to-noise mediated transitions to explosive volatility is found in agent-based models in which predictability is measurable, as in the Minority Game (Challet and Marsili [2003], Challet et al. [2005]) and more sophisticated models (Giardina and Bouchaud [2003]).

3.4 Experiments

3.4.1 Artificial assets

In their famous work, Smith et al. [1988] found that price bubbles emerged in most experimental sessions, even if only three or four agents were involved. This means that financial bubble do not need very many investors to appear. Interestingly, the more experienced the subjects, the less likely the emergence of a bubble.

More recently, Hommes et al. [2005] observed that in such experiments, the resulting price converges towards the rational price either very rapidly or very slowly or else with large oscillations. Anufriev and Hommes [2009] assume that the subjects dynamically use very simple linear price extrapolation rules (among which trend-following and mean-reverting rules),

3.4.2 Neurofinance

Neurofinance aims at studying the neuronal process involved in investment decisions (see Lo [2011] for an excellent review). One of the most salient result is that, expectedly, human beings

spontaneously prefer to follow perceived past trends.

Various hormones play a central role in the dynamics of risk perception and reward seeking, which are major sources of positive and negative feedback loops in Finance. Even better, hormone secretion by the body modifies the strength of feedback loops dynamically, and feedback loops interact between themselves. Some hormones have a feel-good effect, while other reinforce to risk aversion.

Coates and Herbert [2008] measured the cortisol (the “stress hormone”) concentration in saliva samples of real traders and found that it depends on the realized volatility of their portfolio. This means that a high volatility period durable increases the cortisol level of traders, which increases risk aversion and reduces activity and liquidity of markets, to the detriment of markets as a whole.

Reward-seeking of male traders is regulated by testosterone. The first winning round-trip leads to an increase of the level testosterone, which triggers the production of dopamine, a hormone related to reward-seeking, i.e. of another positive round-trip in this context. This motivates the trader to repeat or increase his pleasure by taking additional risk. At relatively small doses, this exposure to reward and reward-seeking has a positive effect. However, quite clearly, it corresponds to a destabilizing feedback loop and certainly reinforces speculative bubbles. Accordingly, the trading performance of investors is linked to their dopamine level, which is partly determined by genes (Lo et al. [2005], Sapra et al. [2012]).

Quite remarkably, the way various brain areas are activated during the successive phases of speculative bubbles has been investigated in detail. Lohrenz et al. [2007] suggest a neurological mechanism which motivates investors to try to ride a bubble: they correlate the activity of a brain area with how much gain opportunities a trader has missed since the start of a bubble. This triggers the production of dopamine, which in turn triggers risk taking, and therefore generates trades. In other words, regrets or “fear of missing out” lead to trend following.

After a while, dopamine, i.e., gut feelings, cannot sustain bubbles anymore as its effect fades. Another cerebral region takes over; quite ironically, it is one of the more rational ones: DeMartino et al. [2013] find a correlation between the activation level of an area known to compute a representation of the mental state of other people, and the propensity to invest in a pre-existing bubble. These authors conclude that investors make up a rational explanation about the existence of the bubble (“others cannot be wrong”) which justifies to further invest in the bubble. This is yet another neurological explanation of our human propensity to trend following.

3.5 Conclusion

Many theoretical arguments suggest that volatility bursts may be intimately related to the quasi-efficiency of financial markets, in the sense that predicting them is hard because the signal-to-noise ratio is very small (which does not imply that the prices are close to their “fundamental” values). Since the adaptive behaviour of investors tends to remove price predictability, which is the signal that traders try to learn, price dynamics becomes unstable as they then base their trading decision on noise only (Challet et al. [2005], Patzelt and Pawelzik [2011]). This is a purely endogenous phenomenon whose origin is the implicit or explicit learning of the value of trading

strategies, i.e., of the interaction between the strategies that investors use. This explains why these stylized facts have existed for at least as long as financial historical data exists. Before computers, traders used their strategies in the best way they could. Granted, they certainly could exploit less of the signal-to-noise ratio than we can today. This however does not matter at all: efficiency is only defined with respect to the set of strategies one has in one's bag. As time went on, the computational power increased tremendously, with the same result: unstable prices and bursts of volatility. This is why, unless exchange rules are dramatically changed, there is no reason to expect financial markets will behave any differently in the future.

Similarly, the way human beings learn also explains why speculative bubbles do not need rumor spreading on internet and social networks in order to exist. Looking at the chart of an asset price is enough for many investors to reach similar (and hasty) conclusions without the need for peer-to-peer communication devices (phones, emails, etc.). In short, the fear of missing out is a kind of indirect social contagion.

Human brains have most probably changed very little for the last two thousand years. This means that the neurological mechanisms responsible for the propensity to invest in bubbles are likely to influence the behavior of human investors for as long as they will be allowed to trade.

From a scientific point of view, the persistence of all the above mechanisms justifies the quest for the fundamental mechanisms of market dynamics. We believe that the above summary provides a coherent picture of how financial markets have worked for at least two centuries (Reinhart and Rogoff [2009]) and why they will probably continue to stutter in the future.

References available in the original at <https://arxiv.org/pdf/1605.00634.pdf>

