



Thoughts from the FRONTLINE

John Mauldin's free weekly investment and economic newsletter

The QE Sandpile

By John Mauldin | May 3, 2013

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Sell in May and go away? What about "risk off?" And ever more QE? Today's letter is a quick note and a reprise of a popular letter from yesteryear (with a bit of new slant), as I am at my conference in Carlsbad.

But first, I thought I would shoot you a few quick, interesting notes that crossed my desk in the last week. It is almost a ritual for me to mention at this time of year the old investment saw, "Sell in May and go away." It has been surprisingly good advice in most years. My good friend Art Cashin is a curator (and prodigious progenitor) of investment wisdom. He offers these two insights from his research:

Tomorrow is the beginning of May, so a "Sell in May" review is in order. To avoid reinventing the wheel, let me plagiarize the veteran Jim Brown's synopsis yesterday.

Sell in May? We are at that time of year when investors have to decide if they want to take profits and move to cash for the summer or risk losing those profits in the next correction. The Stock Trader's Almanac has made the "Sell in May and go away" trade one of the most visible trends in the market. Because the markets normally decline in the summer, they came up with the best six-month trading system. If you had invested \$10,000 in the Dow in 1950 and only kept the money in stocks from November through April, you would have had \$684,073 as of the end of 2011. If you reversed the strategy and invested for the May-October period, you would have lost \$1,024 over the same 61-year period. That is a pretty telling statistic, and the cycle rarely fails to produce.

And Art followed up the next day with:

Mark Hulbert suggests it may be a much older multi-national phenomenon. The "sell in May" pattern also exists in other countries besides the US. Ben Jacobsen, a finance professor at Massey University in New Zealand, reached that conclusion after studying all available historical evidence from each of 108 separate stock markets around the world. For example, his statistical tests detected the seasonal pattern in the United Kingdom stock market as far back as 1694.

Jacobsen, in an interview, emphasized that the Halloween Indicator isn't merely the product of a shameless, after-the-fact data-mining exercise. He said that he found an article as long ago as 1935 – in the *Financial Times* – in which the "sell in May" pattern is referred to as something that was already well-known and followed.

Even though the pattern nearly 80 years ago already had a solid historical foundation, Jacobsen notes, since then the difference between the average returns in winter and summer has become even bigger.

This is a crucial point, he argues, since the all-too-usual tendency is for patterns to begin to evaporate once investors become aware of them and try to exploit them."

China's PMI came in this week at barely above 50 and has been clearly falling for the last year. Despite what you read, China's economic growth is slowing, which is NOT good for commodity metals and products (different from the "softs" like grains, cattle, etc.). GaveKal argues that the commodity price fall that we have been seeing of late is possibly structural in nature. Yet the bond market rises, gold is rising, stocks are rising. (Clearly, the market did not listen to my friend Nouriel Roubini this morning – Dr. Doom indeed! After his speech, no one at this conference can call me pessimistic. Although he prefers the term *realistic*.) Seemingly everything is levitating.

"Where is risk off?" I ask aloud back in the green room as I write this.

Paul McCulley quips to me, "Never get in a contest with a man who buys ink by the barrel." The clear implication is that this levitation is all central bank-induced. The Fed, Japan, and the ECB are all in full gear, and England is only waiting for Mark Carney to arrive from Canada with the North American printing technology employed so well by his friend Ben Bernanke.

The question I am asking at the conference is, "What will happen when quantitative easing has to end? What does that look like?" I will report next week on what I am learning here, but right now let's return to what has proven to be the most popular piece I have written over the last 13 years. And as you read it, think not just of sand piles but of the analogous pile of electrons of quantitative easing as it mounts up toward criticality.

Friedrich Nietzsche knew just how the troubling unknown grips our imaginations and compels us to look for answers:

"To trace something unknown back to something known is alleviating, soothing, gratifying, and gives moreover a feeling of power. Danger, disquiet, anxiety attend the unknown – the first instinct is to eliminate these distressing states. First principle: any explanation is better than none.... The cause-creating drive is thus conditioned and excited by the feeling of fear...." –Friedrich Nietzsche

"Any explanation is better than none." And the simpler, it seems in the investment game, the better. "The markets went up because oil went down," we are told. Then the next day the opposite relationship occurs. Then there is another reason for the movement of the markets. But we all

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intuitively know that things are far more complicated than that. As Nietzsche notes, dealing with the unknown can be disturbing, so we look for the simple explanation.

"Ah," we tell ourselves, "I know why that happened." With an explanation firmly in hand, we now feel we know something. And the behavioral psychologists note that this state actually releases chemicals in our brain that make us feel good. We literally become addicted to the simple explanation. The fact that what we "know" (the explanation for the unknowable) is irrelevant or even wrong is not important to the chemical release. And so we look for reasons.

That is why some people get so angry when you challenge their beliefs. You are literally taking away the source of their good feeling, like drugs from a junkie or a boyfriend from a teenage girl.

Thus we may reason that the NASDAQ bubble happened because of Greenspan. Or was a collective mania. Or was due to any number of things – pick your favorite belief. My favorite: just as the proverbial butterfly flapping its wings in the Amazon triggers a storm in Europe, maybe a borrower in Las Vegas triggered the subprime crash.

Crazy? Maybe not. Today we will look at what complexity theory tells us about the reasons for earthquakes, disasters, and the movements of markets. Then we'll look at how New Zealand, Fed policy, gold, oil, and an investor in St. Louis can all be tied together in a critical state. Of course, *how critical* and *what state* are the questions here.

Ubiquity, Complexity Theory, and Sandpiles

We are going to start our explorations with excerpts from a very important book by Mark Buchanan, called [Ubiquity: Why Catastrophes Happen](#). I HIGHLY recommend it to those of you who, like me, are trying to understand the complexity of the markets. Not directly about investing, although he touches on it, it is about chaos theory, complexity theory and critical states. It is written in a manner any layman can understand. There are no equations, just easy to grasp, well-written stories and analogies.

As kids, we all had the fun of going to the beach and playing in the sand. Remember taking your plastic buckets and making sand piles? Slowly pouring the sand into an ever bigger pile, until one side of the pile started an avalanche?

Imagine, Buchanan says, dropping one grain of sand after another onto a table. A pile soon develops. Eventually, just one grain starts an avalanche. Most of the time it is a small one, but sometimes it builds on itself and it seems like one whole side of the pile slides down to the bottom.

Well, in 1987 three physicists, named Per Bak, Chao Tang, and Kurt Weisenfeld began to play the sandpile game in their lab at Brookhaven National Laboratory in New York. Now, actually piling up one grain of sand at a time is a slow process, so they wrote a computer program to do it. Not as much fun, but a whole lot faster. Not that they really cared about sandpiles. They were more interested in what are called nonequilibrium systems.

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They learned some interesting things. What is the typical size of an avalanche? After a huge number of tests with millions of grains of sand, they found that there is no typical number. "Some involved a single grain; others, ten, a hundred or a thousand. Still others were pile-wide cataclysms involving millions that brought nearly the whole mountain down. At any time, literally anything, it seemed, might be just about to occur."

The piles were indeed completely chaotic in their unpredictability. Now, let's read this next paragraph from Buchanan slowly. It is important, as it creates a mental image that may help us understand the organization of the financial markets and the world economy. (emphasis mine)

"To find out why [such unpredictability] should show up in their sandpile game, Bak and colleagues next played a trick with their computer. Imagine peering down on the pile from above, and coloring it in according to its steepness. Where it is relatively flat and stable, color it green; where steep and, in avalanche terms, 'ready to go,' color it red. What do you see? They found that at the outset the pile looked mostly green, but that, as the pile grew, the green became infiltrated with ever more red. With more grains, the scattering of red danger spots grew until a dense skeleton of instability ran through the pile. **Here then was a clue to its peculiar behavior: a grain falling on a red spot can, by domino-like action, cause sliding at other nearby red spots.** If the red network was sparse, and all trouble spots were well isolated one from the other, then a single grain could have only limited repercussions. But when the red spots come to riddle the pile, the consequences of the next grain become fiendishly unpredictable. It might trigger only a few tumblings, or it might instead set off a cataclysmic chain reaction involving millions. The sandpile seemed to have configured itself into a hypersensitive and peculiarly unstable condition in which the next falling grain could trigger a response of any size whatsoever."

The Critical State

Something only a math nerd could love? Scientists refer to this as a critical state. The term critical state can mean the point at which water would go to ice or steam, or the moment that critical mass induces a nuclear reaction, etc. It is the point at which something triggers a change in the basic nature or character of the object or group. Thus, (and very casually for all you physicists) we refer to something being in a critical state (or use the term critical mass) when there is the opportunity for significant change.

"But to physicists, [the critical state] has always been seen as a kind of theoretical freak and sideshow, a devilishly unstable and unusual condition that arises only under the most exceptional circumstances [in highly controlled experiments]... In the sandpile game, however, a critical state seemed to arise naturally through the mindless sprinkling of grains."

Thus, they asked themselves, could this phenomenon show up elsewhere? In the earth's crust triggering earthquakes, or as wholesale changes in an ecosystem – or as a stock market crash? "Could the special organization of the critical state explain why the world at large seems so

susceptible to unpredictable upheavals?" Could it help us understand not just earthquakes, but why cartoons in a third rate paper in Denmark could cause world-wide riots?

Buchanan concludes in his opening chapter: "There are many subtleties and twists in the story ... but the basic message, roughly speaking, is simple: The peculiar and exceptionally unstable organization of the critical state does indeed seem to be ubiquitous in our world. Researchers in the past few years have found its mathematical fingerprints in the workings of all the upheavals I've mentioned so far [earthquakes, eco-disasters, market crashes], as well as in the spreading of epidemics, the flaring of traffic jams, the patterns by which instructions trickle down from managers to workers in the office, and in many other things. At the heart of our story, then, lies the discovery that networks of things of all kinds – atoms, molecules, species, people, and even ideas – have a marked tendency to organize themselves along similar lines. On the basis of this insight, scientists are finally beginning to fathom what lies behind tumultuous events of all sorts, and to see patterns at work where they have never seen them before."

Now, let's think about this for a moment. Going back to the sandpile game, you find that as you double the number of grains of sand involved in an avalanche, the probability of an avalanche becomes 2.14 times more likely. We find something similar in earthquakes. In terms of energy, the data indicate that earthquakes become four times less likely each time you double the energy they release. Mathematicians refer to this as a "power law," a special mathematical pattern that stands out in contrast to the overall complexity of the earthquake process.

Fingers of Instability

So what happens in our game? "...after the pile evolves into a critical state, many grains rest just on the verge of tumbling, and these grains link up into 'fingers of instability' of all possible lengths. While many are short, others slice through the pile from one end to the other. So the chain reaction triggered by a single grain might lead to an avalanche of any size whatsoever, depending on whether that grain fell on a short, intermediate or long finger of instability."

Now, we come to a critical point in our discussion of the critical state. Again, read this with the markets in mind (again, emphasis mine):

"In this simplified setting of the sandpile, the power law also points to something else: the surprising conclusion that even the greatest of events have no special or exceptional causes. **After all, every avalanche large or small starts out the same way, when a single grain falls and makes the pile just slightly too steep at one point.** What makes one avalanche much larger than another has nothing to do with its original cause, and nothing to do with some special situation in the pile just before it starts. **Rather, it has to do with the perpetually unstable organization of the critical state, which makes it always possible for the next grain to trigger an avalanche of any size.**"

Now, let's couple this idea with a few other concepts. First, Hyman Minsky (who should have been a Nobel laureate) points out that stability leads to instability. The more comfortable we get with a given condition or trend, the longer it will persist and then when the trend fails, the more dramatic the correction. The problem with long term macroeconomic stability is that it tends to produce unstable financial arrangements. If we believe that tomorrow and next year will be the same as last week and last year, we are more willing to add debt or postpone savings in favor of current consumption. Thus, says Minsky, the longer the period of stability, the higher the potential risk for even greater instability when market participants must change their behavior.

Relating this to our sandpile, the longer that a critical state builds up in an economy, or in other words, the more "fingers of instability" that are allowed to develop a connection to other fingers of instability, the greater the potential for a serious "avalanche."

We Are Managing Uncertainty

Or, maybe a series of smaller shocks lessens the long reach of the fingers of instability, giving a paradoxical rise to even more apparent stability. As the late Hunt Taylor wrote:

"Let us start with what we know. First, these markets look nothing like anything I've ever encountered before. Their stunning complexity, the staggering number of tradable instruments and their interconnectedness, the light-speed at which information moves, the degree to which the movement of one instrument triggers nonlinear reactions along chains of related derivatives, and the requisite level of mathematics necessary to price them speak to the reality that we are now sailing in uncharted waters....

"I've had 30-plus years of learning experiences in markets, all of which tell me that technology and telecommunications will not do away with human greed and ignorance. I think we will drive the car faster and faster until something bad happens. And I think it will come, like a comet, from that part of the night sky where we least expect it. This is something old.

"I think shocks will come, but they will be shallower, shorter. They will be harder to predict, because we are not really managing risk anymore. **We are managing uncertainty** – too many new variables, plus leverage on a scale we have never encountered (something borrowed). And, when the inevitable occurs, the buying opportunities that result will be won by the technologically enabled swift."

Another way to think about it is the way Didier Sornette, a French geophysicist, has described financial crashes in his wonderful book *Why Stock Markets Crash* (the math, though, was far beyond me!). He wrote, "[T]he specific manner by which prices collapsed is not the most important problem: a crash occurs because the market has entered an unstable phase and any small disturbance or process may have triggered the instability. Think of a ruler held up vertically on your finger: this very unstable position will lead eventually to its collapse, as a result of a small (or an absence of adequate) motion of your hand or due to any tiny whiff of air. The collapse is fundamentally due to the unstable position; the instantaneous cause of the collapse is secondary."

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When things are unstable, it isn't the last grain of sand that causes the pile to collapse or the slight breeze that causes the ruler on your fingertip to fall. Those are the "proximate" causes. They're the closest reasons at hand for the collapse. The real reason, though, is the "remote" cause, the farthest reason. The farthest reason is the underlying instability of the system itself.

A fundamentally unstable system is exactly what we saw in the recent credit crisis. Consumers all through the world's largest economies borrowed money for all sorts of things, because times were good. Home prices would always go up and the stock market was back to its old trick of making 15% a year. And borrowing money was relatively cheap. You could get 2% short-term loans on homes, which seemingly rose in value 15% a year, so why not buy now and sell a few years down the road?

Greed took over. Those risky loans were sold to investors by the tens and hundreds of billions of dollars, all over the world. And as with all debt sandpiles, the fault lines started to appear. Maybe it *was* that one loan in Las Vegas that was the critical piece of sand; we don't know, but the avalanche was triggered.

You may not remember this, but I was writing about the problems with subprime debt way back in 2005 and 2006. But as the problem actually emerged, respected people like Ben Bernanke (the chairman of the Fed) said that the problem was not all that big and that the fallout would be "contained." (I bet he wishes he could have that statement back!)

But it wasn't contained. It caused banks to realize that what they thought was AAA credit was actually a total loss. And as banks looked at what was on their books, they wondered about their fellow banks. How bad were they? Who knew? Since no one did, they stopped lending to each other. Credit simply froze. They stopped taking each other's letters of credit, and that hurt world trade. Because banks were losing money, they stopped lending to smaller businesses. Commercial paper dried up. All those "safe" off-balance-sheet funds that banks created were now folding (what my friend Paul McCulley first labeled as the Shadow Banking System). Everyone sold what they could, not what they wanted to, to cover their debts. It was a true panic. Businesses started laying off people, who in turn stopped spending as much.

As I read through this again, I think I have an insight. It is one of the reasons we get "fat tails." In theory, returns on investment should look like a smooth bell curve, with the ends tapering off into nothing. According to the theoretical distribution, events that deviate from the mean by five or more standard deviations ("5-sigma events") are extremely rare, with 10 or more sigma being practically impossible – at least in theory. However, under certain circumstances, such events are more common than expected; 15-sigma or even rarer events have happened in the world of investments. Examples of such unlikely events include Long Term Capital in the late '90s and any of a dozen bubbles in history. Because the real-world commonality of high-sigma events is much greater than in theory, the distribution is "fatter" at the extremes ("tails") than a truly normal one.

Thus, the build-up of critical states, those fingers of instability, is perpetuated even as, and precisely because, we hedge risks. We try to "stabilize" the risks we see, shoring them up with derivatives, emergency plans, insurance, and all manner of risk-control procedures. And by doing so, the economic system can absorb body blows that would have been severe only a few decades ago. We distribute the risks and the effects of the risk throughout the system.

Yet as we reduce the known risks, we sow the seeds for the next 10-sigma event. It is the improbable risks that we do not yet see that will create the next real crisis. It is not that the fingers of instability have been removed from the equation, it is that they are in different places and are not yet visible.

A second related concept is from game theory. The **Nash equilibrium** (named after John Nash, he of *The Beautiful Mind*) is a kind of optimal strategy for games involving two or more players, whereby the players reach an outcome to mutual advantage. If there is a set of strategies for a game with the property that no player can benefit by changing his strategy while (if) the other players keep their strategies unchanged, then that set of strategies and the corresponding payoffs constitute a Nash equilibrium.

A Stable Disequilibrium

So we end up in a critical state of what Paul McCulley calls a "stable disequilibrium." We have "players" of this game from all over the world tied inextricably together in a vast dance through investment, debt, derivatives, trade, globalization, international business, and finance. Each player works hard to maximize their own personal outcome and to reduce their exposure to "fingers of instability."

But the longer we go on, asserts Minsky, the more likely and violent an "avalanche" is. The more the fingers of instability can build. The more that state of stable disequilibrium can go critical on us.

Go back to 1997. Thailand began to experience trouble. The debt explosion in Asia began to unravel. Russia was defaulting on its bonds. (Astounding. Was it less than ten years ago? Now Russian is awash in capital. Who could anticipate such a dramatic turn of events?) Things on the periphery, small fingers of instability, began to impinge on fault lines in the major world economies. Something that had not been seen before happened: the historically sound and logical relationship between 29- and 30-year bonds broke down. Then country after country suddenly and inexplicably saw that relationship in their bonds begin to correlate, an unheard-of event. A diversified pool of debt was suddenly no longer diversified.

The fingers of instability reached into Long Term Capital Management and nearly brought the financial world to its knees.

If it were not for the fact that we are coming to the closing innings of the Debt Supercycle, we would already be in a robust recovery. But we are not. And sadly, we have a long way to go with this deleveraging process. It will take years.

You can't borrow your way out of a debt crisis, whether you are a family or a nation. And, as too many families are finding out today, if you lose your job you can lose your home. People who were once very creditworthy are now filing for bankruptcy and walking away from homes. All those subprime loans going bad put huge numbers of homes back onto the market, which caused

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prices to fall on all homes, which caused an entire home-construction industry to collapse, which hurt all sorts of ancillary businesses, which caused more people to lose their jobs and give up their homes, and on and on. The connections in the housing part of the sandpile were long and deep.

It's all connected. We built a very unstable sand pile and it came crashing down, and now we have to dig out from the problem. And the problem was too much debt. It will take years, as banks write off home loans and commercial real estate and more, and we get down to a more reasonable level of debt as a country and as a world.

And, bringing this tale of instability up to date, we find that Ben Bernanke and his central bank colleagues worldwide have taken much of the burden of sovereign debt upon their mighty shoulders. But as they push their Sisyphean, quantitative easing boulders up the ever-steepling sandpile of the global economy, which side of the pile will collapse first? Will it be the European side, already dangerously unstable? Or the Japanese side, where the QE boulder is about to grow into a real whopper? Or could it happen over on the China slope, which is riddled with fiscal and financial crevasses?

And lest we be complacent here in the US, we only need Niall Ferguson to remind us, as he did here at the conference this morning, that the US may be in the grip of a profound structural malaise that neither easing nor austerity can relieve. I'll have much more to say about Niall's presentation and those of our other speakers in coming weeks. We were treated to some world-class thinking and synthesizing of views here today, with much more to come tomorrow! And I'll keep on asking everyone who comes to the stage, "But what about Japan?"

Our 10th Annual Strategic Investment Conference is definitely shaping up as our best ever. And with intellects like Niall Ferguson, Lacy Hunt, and Nouriel Roubini, as well as premier investment managers that include the entire partner team from GaveKal (Louis and Charles Gave and Anatole Kaletsky), Jeffrey Gundlach, Kyle Bass, and Mohamed El-Erian, how could it not be the best? In his afternoon presentation, Mohamed did a beautiful job of tying together the themes we focused on today – and he was introduced by his best friend (and early-morning walking and debating partner), the irrepressible and incorrigible Paul McCulley, who was also our keynote speaker last night.

The conference is turning out to be everything that my co-host, Altegris, and I hoped and expected it would be. We are already working hard to get the conference videos ready, in order to send them to the attendees and all Mauldin Circle members over the coming weeks. In the meantime, here is a great montage from last year's conference for you to enjoy. If you are not yet a Mauldin Circle member, let [this clip](#) remind you of the unique benefits offered to those who join my inner circle.



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The good news is that this program is completely free. The only restriction is that, because of securities regulations, you have to register and be vetted by one of my trusted partners, which in the United States is Altegris, before you can be added to the subscriber roster. This will be a quite painless process (I promise). I do not like limiting the letter to accredited investors, but those are the rules under which I work. This is not of my choosing, and I have worked in front of and behind the scenes to try to change what I think is a very unfair rule. (See important risk disclosures below. In this regard, I am president and a registered representative of Millennium Wave Securities, LLC, member FINRA.) Once you register, an Altegris representative will call you and establish access to the videos, presentations, and summaries from the speakers featured at our 2013 Strategic Investment Conference, as soon as they are ready.

Tulsa, Brussels, NYC, and Monaco

I am off to Tulsa in two weeks to "give away" my daughter Abigail Joy as she gets married on a Sunday. "Dad, do you have a tux?" came the call, as I think she might have noticed I am not wearing ties all that much these days. Actually, I had kind of planned to wear a tie at least one day here at the conference, but all my ties are still in storage, as are my shoes – I am down to one pair.

I was sitting outside during a break with Niall Ferguson and his wife, Ayaan Hirsi Ali, going over what she and I would cover when I did my Charlie Rose imitation and interviewed her at lunchtime. Mohamed came by and wished me well at the wedding. I paused for a second to think about which wedding he meant, and Niall gave me a hard time about not immediately getting the focus of his congratulations. "Aren't you involved?" he queried, and threw in a few other friendly jibes. I had to note my distraction over interviewing his wife in public (if you do not know the compelling story of Ayaan Hirsi Ali, Google her and then read her books, starting with her first one, *Infidel*. She is a powerful advocate for Muslim women, at great risk to her own life). While she is utterly charming and so gracious, she is also "formidable" (best said with a French accent), and I was intently focused on what we were going to discuss.

But trying to salvage my damaged reputation as a father, I immediately noted that Niall had clearly not gone through this process (though he and Ayaan do have a toddler at home). "The role of Dad," I said, "is to write a lot of checks and smile and show up at the wedding, walk down the aisle, smile, and hand off your precious jewel to some young kid – though you do get to dance with your daughter at the reception." (And you have to resist the impulse to grab her by the hand and run off, as you remember her bouncing on your knee, running to the door to greet you, and sharing a thousand other treasured father-daughter moments.) Ayaan smiled and agreed. Niall just put on that fierce Scottish grin of his as he thought about his own kids and the costs of future weddings. (And congratulations to Ayaan, as she is now a US citizen. This country needs more people of her caliber to remind us of the "why" of who we are.)

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The coming week starts another series of road trips – a day in Atlanta to attend the Galectin Therapeutics board meeting, followed by Nashville for Altegris, the weekend to Brussels and later the next week to Geneva, back to Dallas for a week, and then to Washington, DC, and New York.

It is not just time to hit the send button; as I close this, I also still need to finalize the PowerPoint of my brand-new presentation for tomorrow and host a reception on the lawn ... and then do a series of meetings and video shots with guests (which will hopefully show up in this space one day soon)!



John Mauldin

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