

Newsletter – 2017 Predictions: Results

My name is Max Rudolph. I consult with institutional investors, companies, and individuals about enterprise risk management, asset-liability management and strategic planning topics. I also do research projects and read quite a bit about financial and historical topics. I try to find examples of history repeating itself. I am a private investor focused on individual stock selection and value investing techniques. I believe you can reduce risk and increase return simultaneously by investing against the herd. Recent interests include complexity theory and combining it with economics and neuroscience. These are also the topics I occasionally tweet about @maxrudolph. In addition to client work, I develop and present continuing education programs and am an adjunct professor teaching graduate level programs at Creighton University. I live in Omaha, Nebraska, USA, am credentialed as an actuary and hold a CFA charter. I write a monthly newsletter and each January post my predictions for the year. Late in the year I review and analyze what actually happened. Some topics are written at a high level, dealing with the general economy. Some are more detailed, covering specific topics like incentives or modeling financial assets. Most cover issues that I am stewing over and need to do a brain dump. In March I update my intrinsic value calculation for Berkshire Hathaway and in the fall I update the scenarios I think should be tested by financial institutions. I am a lifelong learner, and that impacts how my current thinking evolves. My newsletters are educational in nature and do not constitute investment advice. They are released publicly at www.rudolph-financial.com with a delay of several months after they are released to subscribers.

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Predictions for 2017

These are not really predictions in the classic sense. Treat them more like scenarios that you can build resilience against to survive over the long term.

Disclosure - please remember that these predictions are for fun and to encourage deeper thinking across topics and a longer time horizon. If I really knew what was going to happen I would not share that information with you! You must make your own personal investment and risk decisions, consider your unique financial circumstances, and not hold others (especially me) responsible for your own financial planning or lack thereof. If you don't accept these conditions you should stop reading now. For those still with me, Enjoy!

General happenings

What a year of disruption! The rise of populism, and with it the electorate voting against the establishment in England, the US and Italy, was a great surprise to me. Brexit's win, and the lack of any major financial repercussions, set the stage for Donald Trump's victory in the fall. Last year was one where many economic truisms were shown to not be absolute. I believe that monetary policy doesn't work unless fiscal policy is somewhat in balance, which is not the case anywhere. Debt is too high everywhere, and resilience is nowhere. Reflation may be hoped for but I think will be short lived unless all hell breaks loose and we have hyperinflation. I find myself wondering if Mad Max is fiction or prophetic, and the same with Wall-E. This shows the level of volatility we are heading toward – which direction will we head? A post-apocalyptic era where food is scarce and weapons rule, or one where there is nothing to do and we all live in chaise lounge chairs because our abdominal muscles have lost their tone through lack of use?

Results: we are an invasive species on the earth and causing a rate of change too quick for anyone or anything to keep up through evolution. Unintended consequences are everywhere and the models seem to underrepresent the rate of change.

I try to lock this paper down in late January, with most of it written early in the month and then adjusted as the month plays out and others release their predictions. Robert Doll, now of Nuveen Asset Management, annually publishes his Ten Predictions. I like his labeling of 2017 as a year of transition, where we move from

- Economic stimulus driven by monetary policy
- A world progressing toward globalization
- Fears of stagnant growth and deflation
- Investors focusing on safety
- A “rising tide lifting all boats” market

To

- Stimulus driven by fiscal policy
- Rising nationalism, protectionism and isolationism
- Improving growth and rising inflation
- Higher appetites for risk amid rising volatility
- An environment where selectivity is critical

Results: so far Doll has been very accurate, but the last two have not yet happened; volatility remains low and all boats continue to rise.

While I would have included a comparison from climate awareness to carbon favored, and something about the likelihood of a salute to our Fuhrer, I think Doll captures the high points.

A side comment about these outside predictions – many refer to reasons why NATO and the European Union were formed, but none mention what I thought was the real reason.

They discuss a Russian threat, but I always thought it was a way to keep Germany on the same page as others in Europe so they would have no incentive for grand ambitions and conquests. Whether we worry about Russia or Germany, it is important to not ignore free trade and the importance of people working together to avoid conflict. (same goes in the US too – diverse people get along much better when they regularly interact)

Results: the German election and confusion in the aftermath is an opportunity for the far right to show how important they are.

I continue to believe that the underlying world economy never recovered from the imbalances built up prior to 2008, and that Chinese growth and fracking in the United States masked that reality. Low rates driven by monetary policy have changed incentives. Central banks, by keeping rates low and following quantitative easing programs, encouraged projects that were short term in nature as well as various financial engineering attempts to grow profit metrics. With the Federal Reserve starting to tighten there are many similarities to 1937, when the Great Depression was reenergized by the Fed and fascism gained momentum. Going forward it looks like the Fed will raise rates to offset fiscal policy, at least until the new administration gets enough of their people involved to dominate the votes. PE Trump complains that rates are too low, but he needs rates low to add GDP growth. I am consciously not predicting the Fed's actions this year. If both fiscal and monetary policies are loose, within 4 years I think we will have hyperinflation.

Results: everything to date in 2017 leads to loose policy as the tax bill increases the deficit and monetary policy slows the easing but does not eliminate it completely. When I think of how stressful the past year has been, what stands out is that this was during a relatively calm period geopolitically. If Trump gets his way, net immigration will become negative. This would be a disaster, similar to Japan but with debt owed to non-citizens.

Debt levels remain way too high, and much of Europe continues to see negative interest rates on government debt (note that I no longer refer to it as risk free). A number of European countries are looking for an exit from the common currency so they can devalue. Velocity of money continues to hit new lows, reflecting some trust remaining in the financial system but still a lot of concern. Oil prices are uncertain, but it is unlikely that OPEC will hold back production for long if US frackers pick up the slack. Beware of margin. Investors have been forced to be risk-on by the Fed, and many accepted risks they don't understand. I expect a lot of volatility and uncertainty over the next couple of years. The US continues to be in a good position relative to other countries, which isn't saying much, but this will give politicians an excuse to spend and blame the fallout on others. Active investment strategies will do better over the next few years than passive ones do, but only when value strategies are followed. Those running after last year's best performers will not do well.

Recent investment strategies have focused on passive strategies, but this likely highlights a shift back to a trader's market. Individuals have the ability to reduce expenses much below what a mutual fund or advisor can offer. Our personal investment expenses were less than .5 bp in 2016, well below the 8-10 bp offered by index funds.

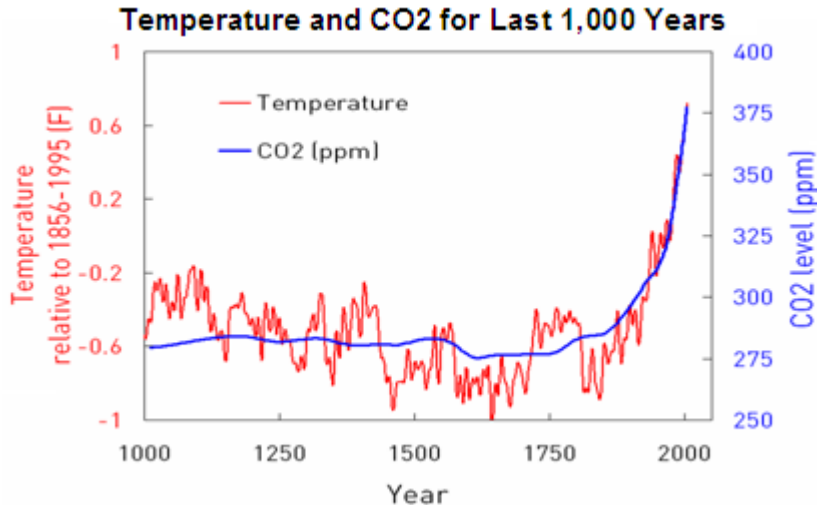
The US remains the reserve currency, mostly due to the ineptitude of others. There are rumors of a move to SDRs as the global currency following the next crisis, and China and Russia have bulked up their gold reserves so they have a seat at the table. The dollar should continue to rise, making it very hard for exporters to overcome retaliatory tariffs. The investments to look for are companies with US monopolies once imports are turned off. This should result in pure profit for them as prices can rise with no increase in quality or volume. Warren Buffett's Berkshire Hathaway should do well. ☺

Geopolitical tensions continue to be high throughout South America and Eurasia. Will a Trump-led America allow Russia to grow by force? Like many other topics, a Trump presidency increases uncertainty. In South America assets are leaving, helping to create a real estate bubble in south Florida. Assets in China are leaving so quickly that the government has imposed restrictions. Housing bubbles are growing everywhere, especially along the coasts. Venezuela is done (unfortunately) as a functioning society. Brazil is having one of its periodic periods of economic and political malaise. Argentina has turned the corner with the new regime. India and Venezuela eliminated large bills following Ken Rogoff's claims that it will reduce crime by moving to electronic cash (in his book *The Curse of Cash*). India included bills that were too small and did not get everyone an electronic account first, so those who had saved for large expenses like weddings were left holding lots of worthless cash.

The Zika virus will continue to expand in 2017, and bird flu, MERS, etc. etc. etc. will continue to cause problems. China is very fragile right now as politics are driving economics. The US needs a backup plan if Saudi Arabia falls. Africa is the next migration problem, leaving many to question the efforts of philanthropists there. Climate change and other sustainability issues are making water and other resources the driving force behind regional conflicts. This will only get worse, and an isolationist US is not going to help. An attempt to shut down the free and reputable press will end up in the courts if Trump continues to bait legitimate journalists.

Climate change is real, and it amazes me how many deniers appear to have read the famous *How to Lie with Statistics* text and know how to use it. The data on global temperature clearly shows an upward pattern, with a very high reading tied to the 1998 el Nino year. First they used this single point to say there was no issue because later temperatures were lower. On Inauguration Day 2017, as I am wrapping up this paper @housescience, the House Committee on Science, Space, and Technology is making a big deal out of saying that it only beat 1998 by a little bit that is not statistically significant. Look at the graph, with all the data points, and use some common sense. There is a clear correlation, and scientists have shown causation, between global temperatures and CO₂ levels in the atmosphere. This does not mean that it will never get cold in New York City, which apparently is the only place that matters to some deniers, or that there won't be places on earth (e.g., Antarctica) that might get colder or get more snow. The problem is the rate of change. This impacts biodiversity (plants and animals can't evolve quickly enough to survive) and realists should review the Malthus arguments. Note that current CO₂ levels have risen to 406 and that the last time

temperatures were this warm ocean levels were at least 30 feet higher than they are now. All those living on the coasts today will need to move inland which will create lots of unintended consequences along the way.



El Nino has ended, so the next several years will trend to lower temperatures than 2015-6. This does not mean the earth is not continuing to warm, and individuals should look at the total data set graphically whenever possible. The climate deniers are expert at cherry picking data. Recent research is saying that sunspots are not the key driver of heat trends. Keep posted. Water needs to be priced appropriately to allow market forces to adjust. Financially the signs continue to point toward both deflation and inflation. Malthus only needs to be right once. We need a ratchet for food production. Current methods are unsustainable.

President Obama is the first president in my voting lifetime to make it through a second term without a major controversy. You may not agree with his positions, but his family life has been exemplary. The Republicans now own issues like gun control, women's rights, climate change, and health care and should be held accountable. Moderates are unfortunately nowhere in sight. At each election, ask if your representative has voted for you or for lobbyists who fill their pockets with cash.

One of the few topics I agree with the populists on is my fear of "Davos man" and their desire to do what is "best" for everyone else. Creative destruction can't work if you don't let it. This means individuals and investors should have credit risk. Including banks.

We are now reliant on senators like John McCain and Ben Sasse to slow dictatorial urges of the executive branch. I hope that insider trading cases tied to Trump tweets and press conferences are examined closely. I expect a number of senior officials and family members to end up in jail. The question is only whether this happens before democrats return to the White House.

Europe is a mess, led by immigration, Italy, and France. Brexit will work out fine for the UK, much to my surprise and keeping them off my prioritized list. I don't see how the EU stays intact as a formal union, and the German vote in 2017 may be a bellwether for that. The Middle East is hard to read, but little is positive. Climate change is reducing fresh water, oil is volatile, and there is little interest in democratization or manufacturing. I believe Iran ends up as a regional power. Trump could take North Korea off his monitor list by warning China that a strike on Hawaii will result in immediate reprisals. China will worry about stray warheads and deal with it for him.

China's need for its fleet to have an exit to the Pacific will make it tense in Asia for the immediate future. The recent overtures from the Philippines to China are worrisome, but perhaps higher risk to the Philippines as it would become a puppet state under China. With the increase in direct hit cyclones and the election of Duterte this will be a hotspot for a long time.

Some scenarios are completely discounted by the public but have probabilities over the next decade or so that are material. Extreme events happen every year. They are rarely identified in advance. Weather and seismic events continued to be present in 2016, with a combination of El Nino and jet stream adjustments leading to heavy flooding in the US and Europe, drought in California and typhoons in Asia. In a short period of time Hurricane Matthew barreled up the east coast, dumping heavy rain in the Carolinas, and was almost immediately followed by forest fires fed by years of drought conditions.

Much like weather, the economy is a complex adaptive system so short-term forecasts are unlikely to be accurate. Stocks have now risen for eight consecutive years, a record. There has been a Trump rally, but if it does not grow some supporting legs soon longer term downward trends will return, although this could be delayed into 2018 (when I lowered the tax rate in my Berkshire Hathaway model the intrinsic value increased by about 10%, so an increase much beyond this would not be sustainable without higher earnings). Winners are likely to be companies with domestic monopolies and small caps. The European model of private ownership of businesses would work well now in the US, and more firms will go private to reduce the hassle of dealing with the government. Exporters may struggle with a strong dollar and poor reputation of US firms. Few firms make it through my stock filter, and we currently have larger than normal cash positions. It would not surprise me to see stock prices down 20% or more this year, with a small chance for 50% drops over the next couple of years. The dollar remains the reserve currency, mainly due to a lack of acceptable substitutes. It should rise, making it hard for exporters. Treasury rates bottomed in the US but firms should not make the assumption that they will monotonically increase. I have heard comparisons to 1994, where a blip up did lots of damage to those who had leveraged bets (e.g., Orange County) but did not alter the long term trend down for interest rates. Demographics and slow growth could easily take them lower again. This is a big deal for savers, especially pension plans and insurers who each are required to guarantee positive nominal returns. The US\$ was volatile in 2016 but ended up near 120 yen, close to where it started. The renminbi continues to weaken despite calls for it to be named as a currency manipulator amid

China's attempts to prop it up. How long will it spend reserve currency (or gold) before it bails on the effort? We are not far from parity between the dollar and Euro.

Outlier (Qualitative) Scenarios

Here are some outlier scenarios I think are more likely to happen than consensus in the next several years (some may not happen for a decade or more). Due to the long-term nature of these scenarios, in some years they might not change or only slightly be tweaked.

- Cyber-terrorism impacts the banking system or shuts down the power grid
- Space junk knocks out a satellite used for public communications
- Atmospheric river hits California and dumps rain on San Francisco for a month (a small version occurred in early 2017 – tied to el Nino years?)
- A severe earthquake (or volcanic eruption) hits California, St. Louis or Seattle
- Super-volcano becomes active somewhere in the world (US option is Yellowstone NP)
- Fracking is declared illegal in the US or Canada due to environmental impact
- China erupts in civil war or regional conflict with a neighbor over resources – most likely fresh water or sea-going route
- Eurozone breaks apart – could be north/south, poor countries/rich countries or just kicking out individual members
- Venezuela erupts in violence, shutting down their oil industry and leaving South America a regional hot spot
- A virus develops drug resistance and becomes transmissible by air
- Antibiotics fail to work against a common bacterial infection
- Iran encourages regional conflict and becomes the Middle East's consolidating superpower (you may have sub-scenarios with alternative conclusions about how the Russia/US/Iran relationships play out)
- Water resources trigger a regional conflict (likely Himalayas, Middle East, or Europe)
- S&P500 down 30% from high point, combined with double recent bond defaults and real estate collapse in the largest US/Canadian coastal cities. GDP down for 3 consecutive years.
- Climate change leads south Florida to become unlivable and becomes a leading indicator for other changes (reduced biodiversity, sea level rise, increased strength of convective storms)

While I tweaked some of these, the major additions were antibiotics and climate change, but several are much closer (e.g., virus, Eurozone, Venezuela, cyber risk, China, Iran).

These predictions were made in January 2017.

- Politics and currency wars: Prediction – Donald Trump is a geopolitical disrupter. Either he will be popular and the Europeans will follow the populist path or he will scare voters and they will not. This is the most interesting issue on the table

as we start 2017. I expect the dollar to continue to strengthen, but not from a position of strength. The velocity of money will continue to drop. There is a lot of uncertainty about this, but I expect the Fed to increase rates multiple times to offset loose fiscal policy. Venezuela will be under new management by the end of the year. Saudi Arabia is at the end of its run but won't turn over this year. The UK may end up as the winner versus Europe as a hard Brexit allows them to avoid the harsh realities and uncertainty of a Euro breakup. China will drive the next currency blowup. This could have major consequences, everything from an internal revolt to a selloff in US Treasuries to a regional armed conflict about resources. The next major wars will start in cyber-space, as all parties are probing for weakness and hiding in the shadows. An attack on the electrical grid has become increasingly realistic. **Results: The disrupter scared the French initially but momentum is still moving in the direction of far right while leaving open a rebound to the far left. The 2018 election in the US will be interesting. It will be very hard to predict in advance. The dollar has weakened against the Euro while treading water against the yen and VM dropped for most of the year before potentially bottoming at third quarter. Three rate hikes and reversing of QE will have ramifications in 2018 but little impact so far on the economy. Venezuela and the Middle East are volatile concerns, and the UK is showing signs that they could survive Brexit. The Chinese Congress held in late 2017 has consolidated power in Xi Jinping, and I felt he backed off some initiatives prior so will be interesting to see what happens now. I still feel they are walking on egg shells as they accumulate access to resources and gold.**

- Political sidebar: a fun game would be to wager on how long before Trump is impeached, or how long before his advisors are sent to jail. Both are impossible to predict, and I don't bet, but my money would be on Jared Kushner. He's involved in too many things and not high enough in the structure to stay clean (unlike Ivanka). Most likely is he gets caught selling influence. **Results: the Mueller investigation is making jail seem likely for more than Mr. Flynn. Kushner is still my bet. Impeachment would happen quickly if Democrats take over Congress, but they would probably try to take out Pence first much like they did with Nixon/Agnew. Having Gerald Ford become president allowed the recovery to move forward much more quickly than if Agnew had become president due to his baggage.**
- Stocks and general economic conditions: I keep waiting for equities to have a correction that sticks. We nearly got one in early 2016 but markets rebounded. US markets are overdue, and the Fed increases may be the catalyst for a 20-30% drop. I suggest avoiding businesses that rely on exports from the US. Mexico will struggle under Trump. They are easy targets, although trading with Mexico and Canada will benefit all three countries. Tariffs and border taxes will not help markets. In fact, pressure on companies to repatriate jobs will lead to the work returning to the US, but without employees. Robots and other artificial intelligence methods will be the new workers. Be careful what you ask for, Donald Trump! When companies cancel projects in Mexico it sends immigrants a mixed message – we don't want you here, but we don't want you to be able to

work at home either. Is bullying the final stage of a cycle that starts with world dominance and ends with a fall from power? Emerging markets will suffer through a major bear market similar to 1997. Contagion may follow. I continue to avoid bonds. My preference is to use highly rated dividend stocks for this type of exposure. I see the economy performing okay initially in 2017, with a recession (or more, depending on how it is handled and how popular the new administration is) later in the year or early in 2018. Lower tax rates, if enacted, should add to confidence but may already be embedded in stock prices. The disaster scenario for interest rates is down and then spike up. Hyperinflation has arrived in South America. I expect consolidation in the insurance industry as foreign buyers seek diversification and US domiciled firms take advantage of the strong dollar. The S&P500 closed 2016 at 2,239, up 12% (total return) for the year. **Results: the market has not yet corrected and continues to worry me on a daily basis. What will the catalyst for a correction be? My repatriation comment about AI/robots replacing workers is playing out, with MAGA Trump leading the charge. Much like the late 1800s, technology will be disruptive and it will take time for workers to adjust.**

- Unemployment: Structural unemployment has risen in the last decade as it becomes harder to go between jobs (locked into mortgage or health insurance, last in first out mentality for layoffs). Pension plans are doomed for failure, with funding levels 20% below that needed even after 8 years of gains. I expect the unemployment level to rise from just below 5% in 2017. The uncertainty about the Affordable Care Act has likely increased structural unemployment even higher as Trump voters realize that he wants to take away their subsidized health care. The skill set needed for open positions is not held by the unemployed. Make sure the next generation becomes lifelong learners. This will be key to their success. **Results: the unemployment rate stabilized at 4.1%, but with a large population not participating in the work force. The potential repeal of parts of ObamaCare have made it harder for gig economy workers since it is hard and expensive to get insurance that is not tied to employment.**
- Residential home market: US regions continue to have lower correlations with each other. Fannie and Freddie are the only game in town right now to facilitate mortgages. That is a problem. Bubbles are forming in some areas as Asian currency seeks an outlet (e.g., Vancouver, Toronto, Seattle). Miami seems to be a home for South American money seeking safety. This will interact with climate change in a bad way for real estate in south Florida. **Results: bubbles in housing markets are building.**
- Volatility: The VIX closed 2016 at 14.04. I have thought for several years that if VIX was a predictor of the future it would be higher. Known risks include heavy personal and government debt levels, and loose monetary policy. I find it impossible to predict VIX but I think a reasonable “normal” range when debt is this high would be at least 20-25. A single digit VIX is definitely too low and above 35 is too high, but as usual I see more possibilities for a higher result going forward, especially if we experience both a recession and 20% drop in the stock market. I am not an options expert but wonder if this assumption has undervalued the cost of volatility in those markets. **Results: volatility as measured by the**

VIX has remained low, breaking into single digits at times during 2017. It will be interesting to study this period historically to see if there was another metric we should have been following for risk.

- Oil: WTI oil on December 30, 2016 was about \$54 per barrel. I have lost all comfort in predicting the price of oil, but the combination of OPEC limits and frackers close to or below breakeven makes it likely that the next spike will be due to a geopolitical event. I would not be surprised to see \$20/barrel oil in the meantime as frackers become more efficient. Alternative fuel sources are complicating this complex model. **Results: frackers continue to improve efficiency, but high debt levels make many of them cash flow negative. An event in the Middle East seems much more likely, and will make oil stocks act like they are in the defense sector.**
- Credit risk: I am still worried that much of the junk bond issuance recently has been to energy companies that are now struggling due to the drop in oil prices. Watch out for defaults here and in emerging markets where the strong dollar is causing problems for dollar denominated bonds. These issues will cause spillover in other markets and industries as hedge funds sell “safe” assets to cover losses. European banks have a heavy debt overload, with Italy bailing out their largest bank and rumors of bank bail-ins swirling. US junk bond spreads have not widened to reasonable levels yet. **Results: waiting for the junk bond market to take the next step in the cycle.**
- Currency/Inflation: With other countries loosening and the new administration seeking to weaken the dollar for exporters this will be an interesting chapter in the currency wars that are ongoing. I expect the dollar to continue to strengthen against China, Europe and Japan. I am not as sure as to the direction versus the British pound, although short term strengthening seems likely a hard Brexit may help the UK currency strengthen. The next couple of years would be good ones for international travel. **Results: it's a race to the bottom, but with the US starting to tighten exports should weaken over time. Boeing has had a good year.**
- Fed policy: The US continues to be susceptible to a large catastrophe, financial disaster, or armed conflict. This will play out over the next couple of years as Fed governors are replaced and the Fed attempts to tighten. **Results: hurricanes in the Caribbean and Florida, with wildfires in the west, have impacted insurers a lot but not the national GDP numbers. Puerto Rico is too small and California fires too late in the year. The issue is why we haven't had these types of events, and whether the earth will have some reaction to climate change such as super volcano eruption.**

Emerging Risks - Concerns

- Infectious disease - increased resistance to antibiotics (e.g., tuberculosis, staph infections or pneumonia), coronaviruses, Ebola (and similar), avian flu types that are transmissible by air. Mosquito borne diseases are making a comeback led by Zika and Dengue, quickly becoming endemic in Brazil and moving north.

Results: some reductions in use of antibiotics in animals is occurring, but is it too late?

- Global warming – unexpected side effects like new viral/bacterial attacks, along with coastal flooding, more concentrated coastal storms at unusual times of year, stronger and more frequent convective storms, and shifting weather patterns that impact farming through changes to the jet stream due at least in part to the shrinking Arctic ice flow. It is going to be increasingly difficult to be a farmer over the next 50 years as climate warms and modifies. Whether we like them or not, genetically modified foods may be the only thing that adapts quickly enough. We'll continue to see extinctions as conditions change too quickly for most species to adapt. Record high temperatures for the planet will subside temporarily as el Nino moves past the peak of its cycle. The proper comparison will be against the years right after the last el Nino's strongest year. It makes sense to look at a graph of all data points rather than compare single year data points. It makes it too easy for climate deniers to lie with statistics. The solar cycle has been argued to be the driver of this warmth, but the current cycle has been weak and this theory is in doubt. The real estate market in Miami should blow up in the near future, but to date shows no signs of doing so. **Results: this continues to play out, with the US government moving in an isolationist direction that will make it harder to save the earth. Was Malthus just early?**
- Earthquakes and hurricanes – the US is overdue for a major quake on the west coast and areas not normally thought of for seismic activity due to long dormant periods (e.g., Seattle, Yellowstone super volcano, St. Louis, New York City) are well into their cycle. I'm starting to worry more about an atmospheric river event on the west coast. The drought is strong enough that there is no longer a season when wildfires are not common in California and Australia, and other regions in the US are also at risk due to the pine beetle infestation combined with drought. Due to warmer air, more moisture is held by the atmosphere, with unknown results (so far it looks like this breaks up hurricanes but leads to stronger convective storms and nor'easters). Recent research argues that this environment provides a protective buffer around the US coasts, keeping small storms offshore. **Results: We saw atmospheric rivers in northern California and Seattle in 2017, temporarily reducing the drought. By December Santa Ana winds had created a wildfire crisis in southern California during what should be the rainy season. The worst hurricane season in recent time devastated Puerto Rico.**
- Levees in California, earthquakes/volcanos, water poisoning in big cities, cyber hackers, transportation of oil and oil based products via rail through urban centers (e.g., downtown Chicago). **Results: cyber risk continues to grow in unexpected ways.**
- Malthus – too many people, not enough resources – will good intentions of the rich to save lives in Africa lead to increased systemic risk for society (mass starvation, unstable regions, forced migration) in the longer term? Are there unintended consequences associated with the “giving pledge” by the rich? How do these complex systems interact based on changing and fast moving inputs? Is it really so bad to have aging demographics and shrinking populations? Should we

look at GDP growth by splitting it between population growth and productivity growth? In the long run we are more susceptible to war, famine and disease through population growth, and this interacts with climate change issues. Hopefully more billionaires will follow the Zuckerberg model to rebuild infrastructure.

- Student loans – not only will millennials default due to student loans, there are many instances where their parents co-signed for them. These retirees are seeing their Social Security checks garnished. This situation will have much more impact on the economy in the future than we have seen previously (negative). **Results: certainly not getting any better.**
- Concentration risk – this will be a hot topic over the next few years. Whether it is power at the top of an organization, short term liquidity, geographic focus or silo risk focus, too much concentration in too few entities or people is a great risk. Eventually it will take you down, especially if leverage is involved. Margin debt is at record levels, not a good sign. Identifying concentrated exposures should be a focus during strategic planning efforts at companies. Concentration risk also increases contagion risk. Less focus should be put on fancy econometric models and more on simple exposures and their downside impacts. Having a president who negotiates using twitter does not help. **Results: it seems there is more interest in listening to contrarians in 2017.**
- Terrorism – in the US, political extremists may become active leading into the next election cycle. It amazes me that we have not had more attempts to injure politicians, especially with the lack of gun controls. **Results: too many gun attacks to mention, but generally against the public rather than targeted.**

Top Actuarial Issues

- Defined benefit plan valuation – valuation methods need to be revamped to front end funding levels for both private and public plans. Assumed returns remain orders of magnitude too high. I would suggest using nothing higher than 5%, with a cap using the most recent 10-year geometric mean, and that might need to be lowered. **Results: continues to get worse. Why actuarial standards of practice allowed this to happen amazes me.**
- ORSA/PBR implementation – regulators have moved toward checklists with ORSA, but can still make it worthwhile if they outsource review of the reports to experts who understand how risks aggregate and diversify. PBR has baked in conservatism (percentile) on top of conservatism (margins). When a complex system includes margins the results embed unintended consequences.
- Product design – be sure to look at exposures in case hedges are not available. The gross exposure is more important during a crisis, while the net exposure drives results in most circumstances. A concern I am seeing is that companies are adding the NAIC 1000 scenarios from the ESG (Economic Scenario Generator) to their cash flow testing because of the mean reversion feature. Results are better than from the NY7. As I've shown in my research papers, in this environment the ESG provides best case results.

- Obesity/smoking – how will the various drivers of mortality and morbidity interact (some good, some bad)?
- Health care – there is so much uncertainty as we enter 2017 that it is hard to predict. It is unclear that the Republicans have a handle on how ACA works, let alone how to improve or replace it. Actuaries can help, if allowed. One hand grenade tossed by Trump could play out like this: pick a fight with the pharmaceutical industry; prices on drugs go down as government is the largest buyer; research on new drugs goes away; Trump declares success; antibiotic resistant bacteria runs rampant; many die. **Results: Republicans continue to show no understanding of how health care or insurance works.**
- Systemic risk – too many insurers rely on FHLB for capital infusions during a crisis – it has not been tested and may not play out as expected. **Results: every insurer I talk to states that this is their plan. Has anyone told Treasury?**
- Over-reliance on the normal distribution – I would like to see life actuaries learn from their casualty brethren and learn more about power laws that appear to represent the tail distributions better than bell-shaped, normal, distributions.

Strategic Scenario Planning

Look at stress scenarios qualitatively and graphically in addition to quantitative focus. Consider a combination of several deterministic scenarios, including one where the Wall Street tool kit (e.g., derivatives) is not available. Note that climate change acts as a threat accelerator as it interacts with other risks. We are at a tipping point as previously permanent frost melts, releasing long forgotten virus/bacteria. Carbon, disease, spillover, and freshwater shortages are all terms we will increasingly see in the press.

Pick some of these to do every year, some can be done qualitatively, some rotate every 3 or 5 years. Total stress scenarios completed should be 10 or fewer.

- Negative interest rates
- Spike interest rates over 10%
- Level
- High credit risk – double default rate for below investment grade (BIG) assets
- Equities – down 35% and options market dries up
- Mortality – pandemic .6% excess mortality (compare to equity)
- For companies writing indexed products – model/report separately – test product if derivatives market dries up or leading counterparty becomes insolvent
- Higher interest rates and inflation: grade 3% per year until you get to 12%
- Qualitatively consider 20% inflation environment (if you have annuities you should already be testing 1,000 scenarios from the ESG)
- Low interest rates – Japan scenario
- Flat equity markets combined with higher inflation
- Falling dollar – combine with high interest rate scenario

- Global climate change – how will this impact your business and suppliers (e.g., look out 20 years to consider new agents or a mortgage in southern Florida, where over \$100 billion of property value is at risk from a 3 foot rise in sea levels)
- Liquidity risk – consider your largest markets and what would happen if they dried up or were regulated out of business. Have you accepted risks that you thought were mitigated? A core line of business should not be at risk here. If it is then it should be a satellite line. What would you do if no one offered a derivative position for you to hedge against? Are there protections written into liabilities?
- No diversification is allowed between risks. Do you have enough capital to survive?
- If you are ambitious run a scenario with equity markets down 35% and 10 years' worth of deflation

Predictions from January 2011

I posted my first annual financial predictions in 2007. Each year I will look back and share interesting comments I made that seem accurate in hindsight. I have deleted sections but not changed the wording in what remains.

These (mainly) economic predictions were made in January 2011.

- Politics: The Democrats have lost their supermajority in the Senate and President Obama is now trying to reposition himself as a moderate prior to the next election. He will struggle to implement health care reform and Dodd-Frank this year and will be seen internationally more to position himself for the reelection bid as a foreign policy expert. When King Abdullah of Saudi Arabia dies that will spark a period of uncertainty that could lead to an outbreak of hostilities in that region.
- Oil: If oil prices fall below \$50, political instability in Russia and South America will quickly follow. Watch Venezuela for problems.
- Credit risk: the market is once again allowing liberal covenants, so I am not sure what the market actually learned. Government entities are at risk and a major state or municipality in the US is likely to default on their bonds. Junk bond spreads will widen.
- Insurance consolidation will accelerate, with household names and smaller firms being merged out of existence.
- Currency/Inflation: Food inflation internationally will be high and lead to riots and potentially regional violence as countries that import try to reduce their dependency by force.

Top Actuarial Issues

- Defined benefit plan valuation – needs to reflect marketplace economics, mean reversion and conservatism. Valuation methods have led defined benefit plans to be little more than a Ponzi scheme, relying on inflation to reduce the value to the retiree and the expense to the employer. Everyone needs to save for their own future.

- National health care – we continue to need actuarial solutions with transparency. Tort reform is not happening but is necessary for cost reductions. Will health care reform be repealed? No. The votes aren't there. The Republicans will attack it through funding mechanisms and making the legislation difficult to implement.

Hopefully these annual letters look at things from a slightly different perspective than you see from others and make you think. That is my goal.

Happy New Year!

Warning and disclaimer: The information provided in this newsletter is the opinion of Max Rudolph and is provided for general information only. It should not be considered investment advice. Information from a variety of sources should be reviewed and considered before decisions are made by the individual investor. My opinions may have already changed, so you don't want to rely on them. Have fun!