"I Know It Was You, Fredo"

Sen. Geary: Hey, Freddie, where did you find this place?

Fredo Corleone: Johnny Ola told me about this place. He brought me here. I didn't believe it, but seeing's believing, huh? Old man Roth would never come here, but Johnny knows these places like the back of his hand.

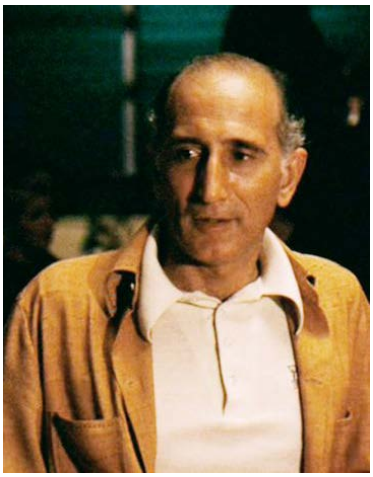
– "The Godfather, Part II" (1974)

Michael Corleone: C'mon, Frankie... my father did business with Hyman Roth, he respected Hyman Roth.

Frank Pentangeli: Your father did business with Hyman Roth, he respected Hyman Roth... but he never *trusted* Hyman Roth!

– "The Godfather, Part II" (1974)

There's no more dramatic moment in all of movies than the Havana club scene in *Godfather, Part II*, where Michael overhears Fredo blurting out that he's partied with Johnny Ola, Hyman Roth's lieutenant, and lied to Michael about knowing him. The look on Michael's face as he realizes that Fredo has betrayed the family is, for my money, Al Pacino's finest scene as an actor, and it helped him gain a 1975 Oscar nomination for Best Leading Actor. Unfortunately for Pacino, it was a good year for strong leading man performances, as Jack Nicholson was also nominated that year for his role in "Chinatown". The winner, of course, was Art Carney from the immortal film "Harry and Tonto". Thank you, Academy.



But this isn't going to be a note focused on Michael or Fredo, or even my favorite Godfather character of all time, Hyman Roth. No, this is a note focused on the polite and respected henchman, Johnny Ola. Johnny Ola is the transmission mechanism, the disease vector, the crucial connection between the schemes of Hyman Roth and the survival of the Corleone family. Without Johnny Ola there is no Fredo betrayal, no path for a misplaced trust in Hyman Roth to infect the Corleone family. Without Johnny Ola there is no movie.

Now bear with me for a moment. There is a Fredo inside all of us. We are, each and every one of us, often betrayed in our actions and decision making by aspects of our own psyches, and our investment actions and decision making are no exception. The Epsilon Theory Fredo is the little voice inside our heads that convinces us to act in what we think is our own self-interest when actually we are acting in the interests of others. The internal Fredo that we all must seek to identify and root out is, like the movie Fredo, not an inherently bad or evil sort, but weak-willed and easily misled by the Johnny Olas of the world.

The Johnny Olas of the world are not so much flesh and blood people as they are idea or concepts. They are the transmission mechanism by which powerful institutions and even more powerful ideas and concepts – the Hyman Roths of the world – wield their most potent influence: the internalized influence of trust. It's necessary and smart to do business with the Hyman Roths of the world. It's necessary and smart to respect the Hyman Roths of the world. But as Frankie Pentangeli reminds Michael, you can never *trust* the Hyman Roths of the world, and that's what Johnny Ola does … he convinces our internal Fredo to trust Roth and betray our self-interest.

I could write a long note about how the Fed is Hyman Roth and "communication policy" is Johnny Ola. Too easy. Too true, but too easy.

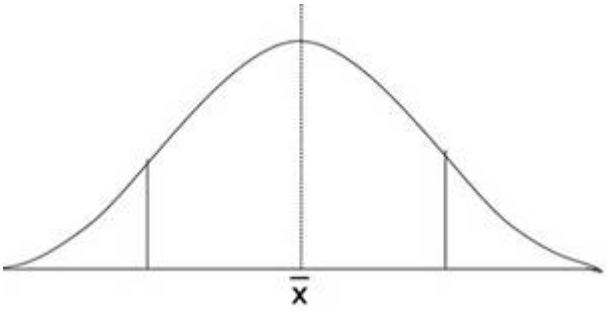
No, this note is about the Hyman Roth that works above even the Fed. It's a note about the Johnny Ola that sweet talks all of our internal Fredos, even the Fredo inside Janet Yellen.

The Epsilon Theory Hyman Roth is Econometric Modeling.
The Epsilon Theory Johnny Ola is The Central Tendency.

It's important to respect the power of econometric models. It's important to work with econometric models. But I don't care who you are … whether you're the leader of the world's

largest central bank or you're the CIO of an enormous pension fund or you're the world's most successful financial advisor … it's a terrible mistake to *trust* econometric models. But we all do, because we've been convinced by modeling's henchman, The Central Tendency.

What is the The Central Tendency? It's the overwhelmingly widespread and enticing idea that there's a single-peaked probability distribution associated with everything in life, and that more often than not it looks just like this:



It's our acceptance of The Central Tendency as The Way The World Works that transforms our healthy respect for econometric modeling into an unhealthy trust in econometric modeling. It's what creates our unhealthy trust in projections of asset price returns. It's what creates our unhealthy trust in projections of monetary policy impact.

It also creates an unhealthy trust in the mainstream tools we use to project risk and reward in our investment portfolios.

I'm not saying that The Central Tendency is wrong. I'm saying that it is (much) less useful in a world that is polarized by massive debt and the political efforts required to maintain that debt. I'm saying that it is (much) less useful in a market system where exchanges have been transformed into for-profit data centers and liquidity is provided by machines programmed to turn off when profit margins are uncertain.

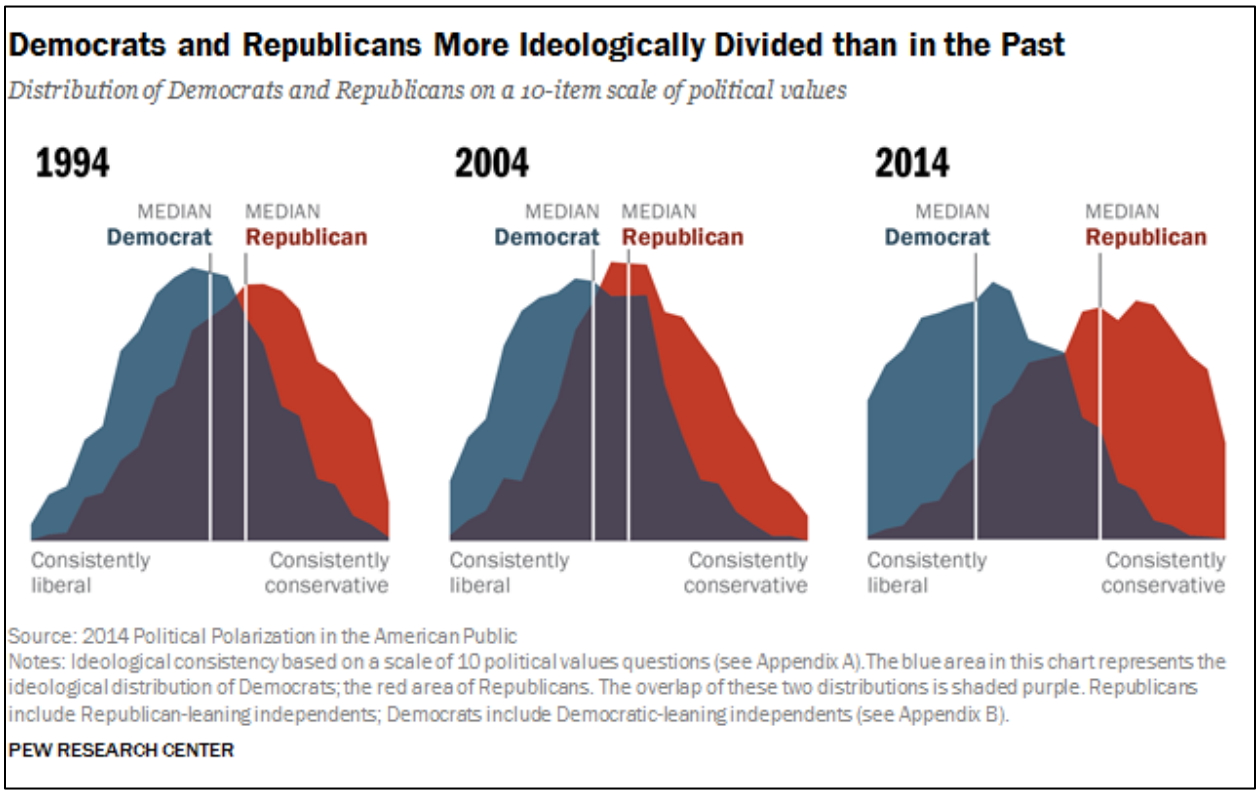
These are the two big Epsilon Theory topics of the past year – polarized politics and structurally hollow markets – and I'll give a few paragraphs on each. Then I'll tell you what I think you should do about it.

Polarized Politics

The world is awash in debt, with debt/GDP levels back to 1930 levels and far higher than 2007 levels prior to the Great Recession. What's different today in 2015 as compared to the

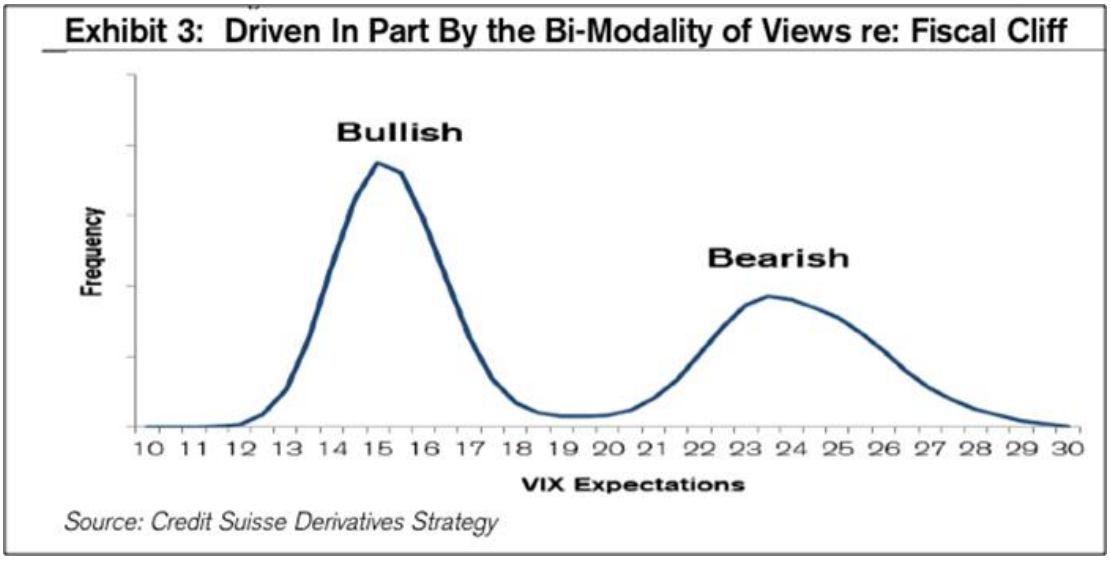
beginning of the Great Recession, however, is that governments rather than banks are now the largest owners (and creators!) of that debt. Governments have more tools and time than corporations, households, or financial institutions when it comes to managing debt loads, but the tools they use to kick the can down the road *always* result in a more polarized electorate. Why? Because the tools of status quo debt maintenance, particularly as they inflate financial asset prices and perpetuate financial leverage, *always* exacerbate income and wealth inequality. I'm not saying that's a good thing or a bad thing. I'm not saying that some alternative debt resolution path like austerity or loss assignment would be more or less injurious to income and wealth equality. I'm just observing that whether you're talking about the 1930s or the 2010s, whether you're talking about the US, Europe, or China, greater income and wealth inequality driven by government debt maintenance policy simply IS.

Greater income and wealth inequality reverberates throughout a society in every possible way, but most obviously in polarization of electorate preferences and party structure. Below is a visual representation of increased polarization in the US electorate, courtesy of the Pew Research Center. Other Western nations are worse, many much worse, and no nation is immune.



There's one inevitable consequence of significant political polarization: the center does not hold. Our expectation that The Central Tendency carries the day *will* fail, and this failure will occur at all levels of political organization, from your local school board to a congressional caucus to a national political party to the overall electorate. Political outcomes will always surprise in a polarized world, either surprisingly to the left or surprisingly to the right. And all too often, I might add, it's a surprising outcome pushed by the illiberal left or the illiberal right.

The failure of The Central Tendency occurs in markets, as well. Below is a chart of 3-month forward VIX expectations in December 2012, as the Fiscal Cliff crisis reared its ugly head, as calculated by Credit Suisse based on open option positions. If you calculated the average expectations of the market (the go-to move of all econometric models based on The Central Tendency), you'd predict a future VIX price of 19 or so. But that's actually the least likely price outcome! The Fiscal Cliff outcome might be a policy surprise of government shutdown, resulting in a market bearish equilibrium (high VIX). Or it might be a policy surprise of government cooperation, resulting in a market bullish equilibrium (low VIX). But I can promise you that there was no possible outcome of the political game of Chicken between the White House and the Republican congressional caucus that would have resulted in a market "meh" equilibrium and a VIX of 19.



If you want to read more about the Epsilon Theory perspective on polarized politics and the use of game theory to understand this dynamic, read "Inherent Vice", "1914 Is the New Black", and "The New TVA".

Hollow Markets

Whatever shocks emanate from polarized politics, their market impact today is significantly greater than even 10 years ago. That's because we have evolved a profoundly non-robust liquidity provision system, where trading volumes look fine on the surface and appear to function perfectly well in ordinary times, but collapse utterly under duress. Even in the ordinary times, healthy trading volumes are more appearance than reality, as once you strip out all of the faux trades (HFT machines trading with other HFT machines for rebates, ETF arbitrage, etc.) and positioning trades (algo-driven rebalancing of systematic strategies and portfolio overlays), there's precious little *investment* happening today.

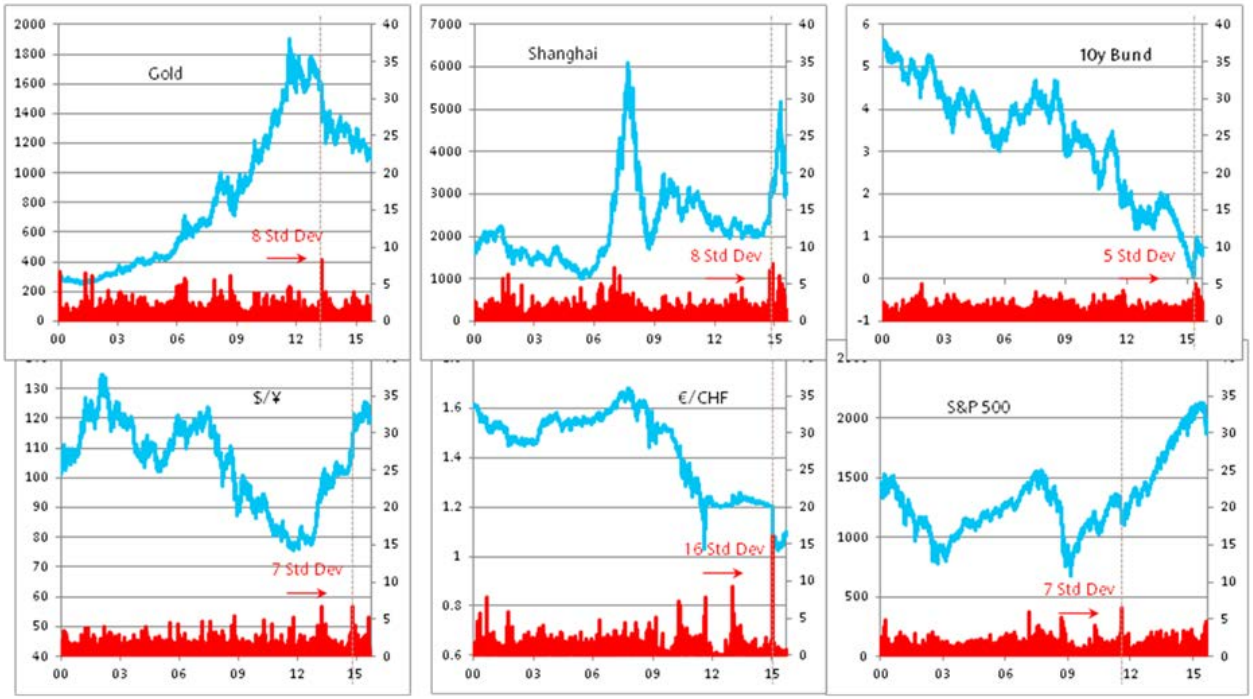
Here's how I think we got into this difficult state of affairs.

First, Dodd-Frank regulation makes it prohibitively expensive for bulge bracket bank trading desks to maintain a trading "inventory" of stocks and bonds and directional exposures of any sort for any length of time. Just as Amazon measures itself on the basis of how little inventory it has to maintain for how little a span of time, so do modern trading desks. There is soooo little risk-taking or prop desk trading at the big banks these days, which of course was an explicit goal of Dodd-Frank, but the unintended consequence is that a major trading counterparty and liquidity provider when markets get squirrelly has been taken out into the street and shot.

Second, the deregulation and privatization of market exchanges, combined with modern networking technologies, has created an opportunity for technology companies to provide trading liquidity on a purely voluntary basis. To be clear, I'm not suggesting that liquidity was provided on an involuntary basis in the past or that the old-fashioned humans manning the old-fashioned order book at the old-fashioned exchanges were motivated by anything other than greed. As Don Barzini would say, "after all, we are not Communists". But there is a massive and systemically vital difference between the business model and liquidity provision regime (to use a good political science word) of humans operating within a narrowly defined, publicly repeatable game with forced participation and of machines operating within a broadly defined, privately unrepeatable game with unforced participation.

Whatever the root causes, modern market liquidity (like beauty) is only skin deep. And because liquidity is only skin deep, whenever a policy shock hits (say, the Swiss National Bank unpegs the Swiss franc from the euro) or whenever there's a technology "glitch" (say, when a new Sungard program misfires and the VIX can't be priced for 10 minutes) everything falls apart, particularly the models that we commonly use to calculate portfolio risk.

For example, here's a compilation of recent impossible market events across different asset classes and geographies (hat tip to the Barclays derivatives team) … impossible in the sense that, per the Central Tendency on which standard deviation risk modeling is based, these events shouldn't occur together over a million years of market activity, much less the past 4 years.



So just to recap … these market dislocations DID occur, and yet we continue to use the risk models that say these dislocations cannot possibly occur. Huh? And before you say, "well, I'm a long term investor, not a trader, so these temporary market liquidity failures don't really affect me", ask yourself this: do you use a trader's tools, like stop-loss orders? do you use a trader's securities, like ETFs? If you answered yes to either question, then you can call yourself a long term investor all you like, but you've got more than a little trader in you. And a trader who doesn't pay attention to the modern realities of market structure and liquidity provision is not long for this world.

If you want to read more about the Epsilon Theory perspective on hollow markets and the use of game theory to understand this dynamic, read "Season of the Glitch", "Ghost in the Machine", and "Hollow Men, Hollow Markets, Hollow World".

Adaptive Investing and Aware Investing

Okay, now for the big finish. What does one DO about this? How does one invest in a world of bimodal uncertainty and a market of skin-deep liquidity?

Both of these investment goblins – Political Polarization and the Hollow Market – are so thoroughly problematic because our perceptions of both long-term investment outcomes and short-term trading outcomes are so thoroughly infected by The Central Tendency and a quasi-religious faith in econometric modeling. But while their problematic root cause may be the same, their Epsilon Theory solutions are different. I call the former Adaptive Investing, and I call the latter Aware Investing.

Adaptive Investing focuses on portfolio construction and the failure of The Central Tendency to predict long(ish)-term investment returns. Aware Investing focuses on portfolio trading and the failure of The Central Tendency to predict short(ish)-term investment returns. Each is a crucial concept. Each deserves its own book, much less its own Epsilon Theory note. But this note is going to focus on Adaptive Investing.

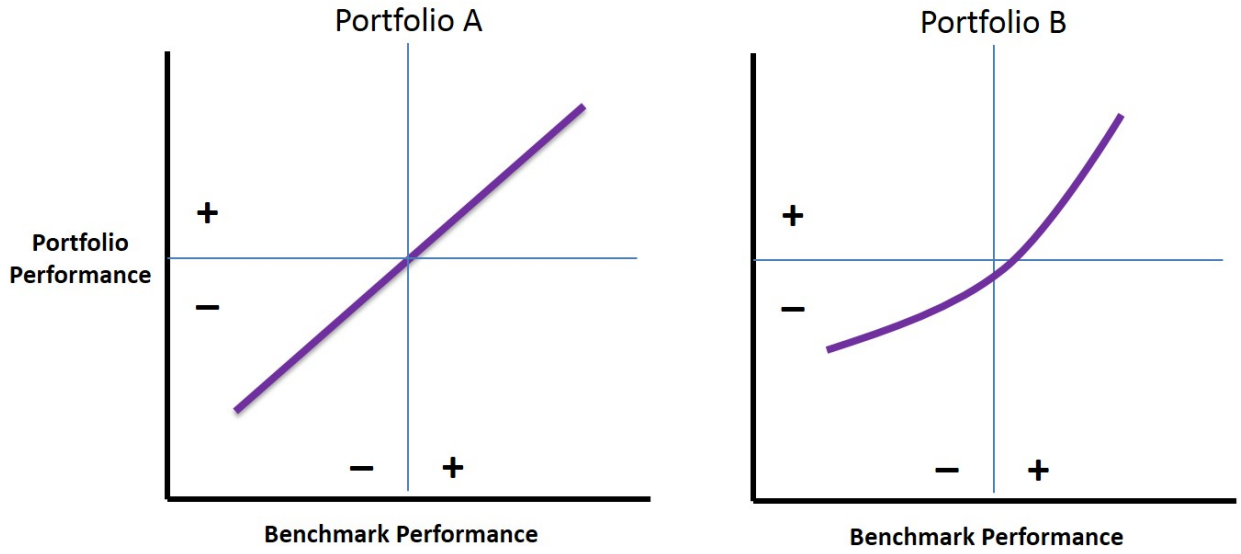
Adaptive Investing tries to construct a portfolio that does as well when The Central Tendency fails as when it succeeds. Adaptive Investing expects historical correlations to shift dramatically as a matter of course, usually in a market-jarring way. But this is NOT a tail-risk portfolio or a sky-is-falling perspective. I really, really, really don't believe in either. What it IS – and the stronger your internal Fredo the harder this concept will be to wrap your head around – is a profoundly agnostic investing approach that treats probabilities and models and predictions as secondary considerations.

I'll use two words to describe the Adaptive Investing perspective, one that's a technical term and one that's an analogy. The technical term is "convexity". The analogy is "barbell". In truth, both are metaphors. Both are Narratives. As such, they are applicable across almost every dimension of investing or portfolio allocation, and at almost every scale.

Everyone knows what a barbell is. Convexity, on the other hand, is a daunting term. Let's un-daunt it.

The basic idea of convexity is that rather than have Portfolio A, where your returns go up and down with a market or a benchmark's returns in a linear manner, you'd rather have Portfolio B, where there's a pleasant upward curve to your returns if the market or benchmark does really well or really poorly. The convex Portfolio B performs pretty much the same as the linear

Portfolio A during “meh” markets (maybe a tiny bit worse depending on how you’re funding the convexity benefits), but outperforms when markets are surprisingly good or surprisingly bad. A convex portfolio is essentially long some sort of optionality, such that a market surprising event pays off unusually well, which is why convexity is typically injected into a portfolio through the use of out-of-the-money options and other derivative securities. Another way of saying that you’re long optionality is to say that you’re long gamma. If that term is unfamiliar, check out the Epsilon Theory note “Invisible Threads”.



All other things being equal, few people wouldn’t prefer Portfolio B to Portfolio A, particularly if you thought that markets are likely to be surprisingly good or surprisingly bad in the near future. But of course, all other things are never equal, and there are (at least) three big caveats you need to be aware of before you belly up to the portfolio management bar and order a big cool glass of convexity.

Caveat 1: **A convex portfolio based on optionality must be an actively managed portfolio, not a buy-and-hold portfolio.** There’s no such thing as a permanent option … they all have a time limit, and the longer the time limit the more expensive the option. The clock works in your favor with a buy-and-hold portfolio (or it should), but the clock always works against you with a convex portfolio constructed by purchasing options. That means it needs to be actively traded, both in rolling forward the option if you get the timing wrong, as well as in exercising the option if you get the timing right. Doing this effectively over a long period of time is exactly as ~~impossible~~ difficult and expensive as it sounds.

Caveat 2: **A convex portfolio fights the Fed, at least on the left-hand part of the curve where you’re making money (or losing less money) as the market gets scorched.** Yes, there are going to be more and more political shocks hitting

markets over the next few years, and yes, those shocks are going to be exacerbated by the hollow market and its structurally non-robust liquidity provision. But in reaction to each of these market-wrenching policy and liquidity shocks, you can bet your bottom dollar that every central bank in the world will stop at nothing to support asset price levels and reduce market volatility. Make no mistake – if you're long down-side protection optionality in your portfolio, you're also long volatility. That puts you on the other side of the trade from the Fed and the ECB and the PBOC and every other central bank, and that's not a particularly comfortable place to be. Certainly it's not a comfortable (or profitable) place to be without a keen sense of timing, which is why, again, a convex portfolio expressed through options and derivatives needs to be actively managed and can't be a passive buy-and-hold strategy.

Caveat 3: **Top-down portfolio risk adjustments like convexity injection through index options or risk premia derivatives are *always* going to disappoint bottom-up stock-picking investors.** I've written a lot about this phenomenon, from one of the first Epsilon Theory notes, "The Tao of Portfolio Management", to the more recent "Season of the Glitch", so I won't repeat all that here. The basic idea is that it's a classic logical fallacy to infer characteristics of the whole (in this case the portfolio) from characteristics of the component pieces (in this case the individual securities selected via a bottom-up process), and vice versa. What that means in more or less plain English is that risk-managing individual positions in an effort to achieve a risk-managed overall portfolio is inherently an exercise in frustration and almost always ends in unanticipated underperformance for stock pickers.

Okay, Ben, those are three big problems with implementing convexity in a portfolio. I thought you said this was a good thing.

You'll notice that each of these three caveats pertain most directly to the largest population of investors in the world – non-institutional investors who create an equity-heavy buy-and-hold portfolio by applying a bottom-up, fundamental, stock-picking perspective. The caveats don't apply nearly so much to institutional allocators who apply a systematic, top-down perspective to a portfolio that's typically too large to engage in anything so time-consuming as direct stock-picking. They have no problem employing a staff to manage these portfolio overlays (or hiring external managers who do), and they're not terrified by the mere notion of negative carry, derivatives, and leverage. These institutional allocators may not be large in numbers, but they are enormous in terms of AUM. I spend a lot of time meeting with these allocators, and I can tell you this – implementing convexity into a portfolio in one way or another is the single most common topic of conversation I've had over the past year. Every single one of these allocators is thinking in terms of portfolio convexity, even if most are still in the exploration phase, and you're going to be hearing more and more about this concept in the coming months.

So that's all well and good for the CIO of a forward thinking multi-billion dollar pension fund, but what if it's a non-starter to have a conversation about the pros and cons of a long gamma portfolio overlay with your client or your investment committee? What if you're a stock picker at heart and you'd have to change your investment stripes (something no one should ever do!) and reconceive your entire portfolio to adopt a top-down convexity approach using derivatives and risk premia and the like?

This is where the barbell comes in.

The basic concepts of Adaptive Investing can be described as placing modest portfolio "weights" or exposures on either side of an investment dimension. This is in sharp contrast to what Johnny Ola has convinced most of us to do, which is to place lots and lots of portfolio weight right in the middle of the bar, with normally distributed tails on either end of the massive weight in the center (i.e., a whopping 5% allocation to "alternatives"). What are these investment dimensions? They are the Big Questions of investing in a world of massive debt maintenace (and are actually very similar to the Big Questions of the 1930s), questions like … will central banks succeed in preventing a global deflationary equilibrium? … is there still a viable growth story in China and in Emerging Markets more broadly, or was it all just a mirage built on post-war US monetary policy? … is there a self-sustaining economic recovery in the US?

Here's an example of what I'm talking about, a barbell portfolio around the Biggest of the Big Questions in the Golden Age of the Central Banker: will extraordinarily accommodative monetary policy everywhere in the world spur inflationary expectations and growth-supporting economic behaviors? Like all barbell dimensions, there's really no middle ground on this. In 2016, either the market will be surprised by resurgent global growth / inflation, or the market will be surprised by anemic growth / deflation despite extraordinary monetary policy accommodation. I want to "be there" in my portfolio with modest exposures positioned to succeed in each potential outcome, as opposed to having a big exposure somewhere in the middle that I have to drag in one direction or another when I end up being "surprised" just like the rest of the market.

Specifically, what might those positions look like? Everyone will have a different answer, but here's mine:

- **If deflation and low global growth carry the day, then I want to be in yield-oriented securities where the cash flows are tied to real economic activity in geographies with real growth prospects, and where company management is really distributing those cash flows to shareholders directly.**
- **If inflation and resurgent growth carry the day, then I want to be in growth-oriented securities linked to commodities.**
- **And yes, there are companies that can thrive in both environments.**

Now of course you'll get push-back to the notion of a barbell portfolio from your client or investment committee (maybe the investment committee inside your own head), most likely in the form of some variation on these three natural questions:

Q: Wouldn't you be be better off predicting the winning side of any of these Big Questions and putting all your weight there?

A: Yes, if I had a valid econometric model that could predict whether central banks will fail or succeed at spurring inflationary expectations in the hearts and minds of global investors, then I would definitely put all my portfolio weight on that answer. But I don't have that model, and neither do you, and neither does the Fed or anyone else. So let's not pretend that we do.

Q: But if one side of your portfolio barbell ends up being right, that must mean that the other side is wrong. Wouldn't we be just as well off putting all the weight somewhere in the middle like we usually do?

A: No, that's not how these politically-polarized investment dimensions play out, with one side clearly winning and one side clearly losing. The underlying dynamics of the Big Questions in investing today are governed by the *multi-year* spiraling back-and-forth of multiple equilibria games like Chicken, not The Central Tendency (read "Inherent Vice" for some examples). Not only is it far more capital efficient to use a barbell approach, but *both* sides will do relatively better than the middle. That is, in fact, the entire point of using an allocation approach that creates optionality and effective convexity in a portfolio without forcing the top-down imposition of option and derivative overlays.

Q: But how do we know that you've identified the right positions to take on either side of these Big Questions?

A: Well, that's what you hire me for: to identify the right investments to execute our portfolio strategy effectively. But if we're not comfortable with selecting specific assets and companies, then we might consider a trend-following strategy. Trend-following is profoundly agnostic. Unlike almost any other strategy you can imagine, trend-following doesn't embody an opinion on whether something is cheap or expensive, overlooked or underappreciated, poised to grow or doomed to failure. All it knows is whether something is working or not, and it is as happy to be short something as it is to be long something, maybe that same thing under different circumstances. As such, a pure trend-following strategy will automatically move on its own accord from weighting one end of a barbell to the other, spending as little time as possible in the middle, depending on which side is working better. That is an incredibly powerful tool for this investment perspective.

A barbell portfolio captures the essence or underlying meaning of portfolio convexity without requiring top-down portfolio overlays that are either impractical or impossible for many investors. The investments described here have a positive carry, meaning that the clock works in your favor, meaning that – unlike convex strategies that are actively trading options and volatility – these strategies fit well in a buy-and-hold, non-Fed fighting, stock-picking portfolio. I think it's a novel way of rethinking the powerful notions of convexity and uncertainty so that they fit the real world of most investors, and whether these ideas are implemented or not I'm certain that it's a healthy exercise for all of us to question the conceptual dominance of The Central Tendency.

You know, Michael Corleone has a great line after he wised up to Fredo's betrayal and the true designs of Johnny Ola and Hyman Roth: "I don't feel I have to wipe everybody out … just my enemies." It's the same with our portfolios. We don't have to completely reinvent our investment process to incorporate the valuable notion of convexity into our portfolios. We don't have to sell out of everything and start fresh in order to adopt an Adaptive Investing perspective. Our investment enemies live inside our own heads. They are the ideas and concepts that we have allowed to hold too great a sway over our internal Fredo, and they can be put in their proper place with a fresh perspective and a questioning mind. Econometric modeling and The Central Tendency don't need to be eliminated; they need to be demoted from a position of unwarranted trust to a position of respectful but arms-length business relationship. After all, let's remember the secret of Hyman Roth's success: he always made money for his partners. I'm happy to be partners with modeling because I think it's a concept that can make me a lot of money. But I'm never going to trust my portfolio to it.

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