

Demetri Kofinas: 00:00:00 Today's episode of Hidden Forces is made possible by listeners like you. For more information about this week's episode or for easy access to related programming, visit our website at hiddenforces.io and subscribe to our free email list. If you listen to the show on your Apple podcast app, remember you can give us a review. Each review helps more people find the show and join our amazing community. And with that, please enjoy this week's episode.

Demetri Kofinas: 00:00:47 What's up everybody? My guest today is one of the more creative and curious macro minded investors that I've had on this program. His name is Mike Green and he's been a student of markets and market structure in particular for nearly 30 years. His research and analysis of markets, specifically the shift from actively managed portfolios and investment funds to systemic passive investment strategies and their impact on market structure has been presented to the federal reserve, the BIS, the IMF, and numerous other groups and associations with the intention of alerting them to the clear and present danger that he feels these strategies pose to the stability and viability of our capital markets.

Demetri Kofinas: 00:01:42 This conversation is broken into two parts. The second hour of which can be found on the Hidden Forces Patreon overtime feed where we drill down into the specifics of Mike's thesis regarding the implication of passive investment strategies that have ballooned in popularity over the last 25 years, making up 47% and 27% respectively of assets under management in equities and bond funds at the end of 2018, up from less than 5% in 1995. The first part that you're about to hear sets the foundation for that conversation.

Demetri Kofinas: 00:02:25 I did my best to make it as accessible as possible without dumbing it down, but there's going to be terminology used and references made that many of you may not be familiar with. If so, don't worry. Hang in there. It's worth it. Mike is a wealth of information and this conversation is one you will be hard pressed to find anywhere else. It's eye-opening and I want you all to hear it.

Demetri Kofinas: 00:02:54 Lastly, because this conversation deals with investing, I want to make absolutely clear that nothing I say on this episode or during the overtime can or should be viewed as financial advice. All opinions expressed by me and my guests are solely our own opinions and should not be relied upon as the basis for financial decisions. And with that, please enjoy my conversation with investor Mike Green.

Demetri Kofinas: 00:03:31 Mike Green, welcome to Hidden Forces.

Mike Green: 00:03:34 Thank you, Demetri. It's nice to be here.

Demetri Kofinas: 00:03:36 I've been chasing you for over a year to get you on the show.

Mike Green: 00:03:39 Well, for various reasons as you know, I was somewhat limited in my ability to appear, but I am super excited to be here. I'm a huge fan of the program myself.

Demetri Kofinas: 00:03:46 That's a great endorsement, Mike. I'm really excited to have you on. I'm not sure where to start. As you know, I did a lot of research as I always do before this episode. You and I talked a bunch. We met once in New York about a few months ago in September for a number of hours of hanging out, talking, geeking out about this stuff. I did an episode with Shoshana Zuboff that I was reminded of often when I was preparing for this because it's not exactly the same, obviously it's a different subject matter. Her focus is on technology and the logic of surveillance capitalism within the technological environment, and I have a, I think, better understanding of this stuff natively than I did of that stuff to begin with.

Demetri Kofinas: 00:04:29 But the way that you talk about passive, the way that you talk about the uncanny valley metaphor that you use has done the equivalent for me. It's helped to click into place something that I've been struggling to name. Like Shoshana talks about that we need to be able to name it because if we can't name it, it's unprecedented. We don't know what it is. It feels very similar. So maybe you can start us off. How did you come to develop this thesis on this subject that we're going to talk about today?

Mike Green: 00:05:02 Look, the thesis of the impact of passive investing and this broader thesis, I think is a byproduct of having had the flexibility to zoom in and zoom out on markets. There's lots of people that are traders. Who are really good at taking product A and pricing it in one market better than it can be priced in another market and arbitrage in the difference between those two. I'm a terrible trader. I really am, I'm a terrible trader. But what I'm actually really good at is figuring out why people are being forced to do things that seem irrational. I've been fortunate to have been involved in the market for an extended period of time.

Mike Green: 00:05:37 A lot of people don't have that flexibility. One of the refrains that I just keep hearing from people in our space, when I say our space, I just want to clarify the difference between active and

passive. An active manager is somebody who trades with discretion. They make their own choices about how they're going to do something. They may have some restrictions on the products that they trade. They may have some restrictions on the flexibility that they have to either build a cash balance or to execute at a certain price, but they tend to have qualitative discretion. The ability to choose to do one thing or another. Passive, at least in theory, is supposed to be extraordinarily simple. It's supposed to take the aggregated behavior.

Demetri Kofinas: 00:06:14 So when you say passive, just for those people that don't know what we're talking about here, you're talking about passive investing.

Mike Green: 00:06:19 Correct.

Demetri Kofinas: 00:06:20 And what is that?

Mike Green: 00:06:21 Passive investing actually means something very different than what we see in the market. But typically, what people are referring to when they talk about passive is an S&P index fund or a Vanguard type fund but it's the Vanguard total market which is trying to buy all of the stocks in the market in proportion to the market capitalization or the float weighted market capitalization that supposedly all of the discretionary, the active players have decided is the "right price." This was an output. Passive investing as a theoretical construct was an output from the insights that were created in the 1960s from academics like Eugene Fama and Bill Sharpe and Harry Markowitz. The idea of market efficiency that markets functionally represented all of the information that could be known in their totality.

Demetri Kofinas: 00:07:11 And the efficient market hypothesis, modern portfolio theory, Markowitz. We covered this in an episode with Daniel Paris on the history of financial theory. I definitely suggest listeners, check that out. I think that was episode 73, that can help you in this conversation. But please continue, Mike.

Mike Green: 00:07:28 Yeah. One of the interesting dynamics is, is that the world tends to bifurcate in terms of skillsets. Somebody like myself who has historically been a discretionary investor and has operated in markets ranging from equities to fixed income to currencies to interest rates on global markets, that's somewhat unusual. Most people tend to focus or specialize in a particular area. I would say that in part you're able to actually, if you work across that very wide range, what's called macro investing, you can often get a better perspective on the idea that maybe the earth

isn't flat. It appears flat when we see a surface that looks very flat to our eye. But once you understand the interconnections across these markets, it becomes a little bit easier to see the curvature of that surface.

Demetri Kofinas: 00:08:13 That's a great observation. I want to interject and then please continue, the fact that reality is not what it appears to be. That markets and prices are surface phenomena, but there is something under the surface that is driving those changes.

Mike Green: 00:08:26 Well, and I think that's really important because you used a couple of phrases there. You introduced the idea of markets. People tend to think of markets as fixed entities. So, there's a stock market and there's a bond market and it's as if these things have always existed. But most of these are actually very recent phenomenon. The idea of a stock market on a continuous basis really doesn't exist in the United States. We all know the fantasy of the Buttonwood tree and the founding of the New York stock exchange.

Mike Green: 00:08:50 But the idea of tradable liquid securities really is a relatively recent phenomenon. The fact that we can date that back to the 1790s. And the greater scale of human history, that's actually a remarkably short period of time.

Demetri Kofinas: 00:09:03 And the index is even way newer than that.

Mike Green: 00:09:03 The index in the form of the S&P 500 which everybody is super familiar with, was created in 1957 it was backdated through construction techniques until the 1920s. But we're less than a hundred years into this phenomenon. So, when you have this type of dynamic where everybody thinks of it as this giant fixed thing, it's easy to forget what markets actually are. Markets are really designed to do one very simple thing, take illiquid things and make them liquid. A place where buyers and sellers meet and the more liquid they become, the closer the matches between buyers and sellers. So, it's actually a very fragile emergent property to have a market where you have to have participants who are coming in and having different perspectives on worth, but able to transact relatively close to each other.

Mike Green: 00:09:47 The richness of these products, the richness of markets, again, is a super, super reason phenomenon, the more esoteric the product is, whether it's Michael Milken with junk bonds in the 1970s, 1980s and early 1990s, those just didn't exist. There was no capacity to create liquidity around that.

Demetri Kofinas: 00:10:04 And liquidity suggests price discovery.

Mike Green: 00:10:07 Liquidity suggests price discovery, which is really, again, the role of markets. It's facilitating liquidity. Your house, we talked about this example earlier, but when you go to transact in your house, there's a high degree of uncertainty. What am I going to be able to sell it for? It could be 10% less than I listed for, it could be 20% more than I listed for. If that were to happen with shares of Microsoft, people would be nonplus. They have absolutely no idea what to do with themselves. So, we presume that these things function as they always have and we treat them in that way, but they're very fragile.

Demetri Kofinas: 00:10:39 Going back to the efficient market hypothesis, the idea is that all the necessary information is publicly available in the market and that all the agents have access to that information and they are actively pricing and therefore markets are efficient.

Mike Green: 00:10:51 It assumes that, and it actually goes even a step further. What it presumes is, is that there's an incentive which we call profit for every individual actor to put risk capital up based on the information that they have. So, if I happen to know based on my contacts or my research that Microsoft is going to have better sales than people anticipate, I have to put capital up to take the risk and reflect the idea that I think ultimately that people will value Microsoft more highly in the aftermath of just the broad discovery of that information. The process of putting up that risk capital gives some form of probability weighted contribution to the existing price of Microsoft.

Mike Green: 00:11:35 One of the key criteria for efficient markets, and it goes to the heart of the emergence of the impact of passive strategies and the impact that passive strategies are having on the market, is the idea that each individual player has a very small voice. Nobody can stand above everybody else and shout, is the right price. But when players become so large that they represent tens of a percent of the market, they can actually dramatically influence those outcomes. We're seeing this, in my opinion, is what we're seeing happen in the markets today.

Demetri Kofinas: 00:12:09 So there's been an evolution in passive that incorporates the theory you talked about. Actually, I also want to bring in what we've seen in the market for volatility in terms of the VIX, it's the insurance market for the S&P, for equities. I want to bring that in too because that I feel like from what I understand, having spoken with you and read your writings on this, this is the canary in the coal mine for what you think we're going to see in equity markets more broadly.

Mike Green: 00:12:39 So again, it goes back to the underlying theory of markets. And the work of Kenneth Arrow highlights this underlying dynamic that ultimately markets need to be complete. They need to have options for, and I don't mean options in the form of derivatives, but they need to have products that allow people to express functionally all possible desires and outcomes. So, the desire to purchase insurance is a very important one. But inevitably, the participants in an insurance market are going to be smaller than the participants in the actual fundamental underlying. The emergence of products around what we call volatility. That would be the VIX inequity would be the most common one that people are familiar with. VIX stands for volatility index exchange, I believe.

Demetri Kofinas: 00:13:23 Just to drive that point home though for listeners, the cost, I think this will make it more intuitive. The cost to purchase your house is by necessity much, much greater than the cost to insure your home. And that's to do with probability.

Mike Green: 00:13:35 Exactly, correct. So, when you think about your house, the risk that your house is going to be lost to you through a fundamental event -- it burns down, an earthquake occurs, flood happens, etc. I live in California, so all of those seem to be increasing in probability, but that has to be a very small fraction of the underlying value of the house. Otherwise, one, I can't purchase insurance because it would represent such a sizable fraction of my overall outlay and two, that would actually retard economic development because if I can't buy the insurance on the house, I really can't take the risk of buying a nice house. I can't put that capital at risk except if I'm extraordinarily wealthy.

Demetri Kofinas: 00:14:12 Exactly, and actually that would have an interesting impact on the mortgage market and mortgage financing.

Mike Green: 00:14:18 And all of these innovations that have occurred on a financing standpoint or a financial standpoint. Things like diversifying the risk of mortgages or diversifying the risk in the form of insurance, all of those have facilitated the type of economic activity that we very much take for granted. So, when you have a market though, that emerges in the form of volatility that is fundamentally insurance on the underlying, occasionally it becomes very easy to mistake the behavior of those two markets as if they're interchangeable. And that's part of what we've seen in the past couple of years where people have sought similar payoffs to things like the equity market, but they've sought it with slightly better characteristics.

Mike Green: 00:15:01 So selling insurance against a house being destroyed perversely has pay off characteristics that are similar to owning a house. So, if you think about it in aggregate, if a hurricane comes along, lots of homeowners lose their homes and insurance companies have adverse consequences. They take losses. If you flip that on its head, if I've sold insurance over a continuous period of time, I receive positive feedback in the form of inflows of premium that looks an awful lot like the enjoyment that I get from living in my house.

Demetri Kofinas: 00:15:37 You're being paid to carry the risk.

Mike Green: 00:15:40 I'm being paid to carry the risk.

Demetri Kofinas: 00:15:41 As an insurer.

Mike Green: 00:15:43 So I am capturing a portion of the positive experience that the homeowners receive when I take their premiums. Whether they're happy or not in their house is somewhat irrelevant, but they're generating a benefit from it. Paradoxically, the payoffs of those two look actually very similar. Lots of lots of independent cash flows or utility from living in your house. The avoidance of having to pay rental prices for property looks an awful lot like what I'm receiving in terms of the inflow in terms of premiums on the insurance policies. So, it becomes possible to conflate the two and to think that selling insurance is the same thing as having exposure to the underlying asset.

Demetri Kofinas: 00:16:25 We'll get more into this because if people feel lost, there are going to be a lot of concepts here that are going to be a little weird. And for many people, probably the first time they're hearing them. In terms of volatility, what does that mean? How do you explain to a lay person what it means to buy and sell volatility?

Mike Green: 00:16:40 The easiest way to think about it is the vast majority of volatility, meaning change in price per unit of time. That's what volatility is really telling you. The vast majority of the risks associated with that are when prices go down. Because nobody is happy when their house blows up. Most of the risks can be characterized in the dynamic of you want to ultimately think of volatility as insurance on the market.

Mike Green: 00:17:08 When people are buying or selling volatility, that's a very technical definition of what the VIX is. It is the price of the implied volatility across all of the options that occur with a one-month expiry. More accurately a 30-day expiry on the S&P 500.

Demetri Kofinas: 00:17:25 So the VIX is an index that represents that 30-day --

Mike Green: 00:17:28 The 30-day expiry strip of options at all price points both high and low.

Demetri Kofinas: 00:17:33 Because that's only the front end of the volatility, term structures. A volatility has a term structure, just like-

Mike Green: 00:17:38 Interest rates.

Demetri Kofinas: 00:17:39 Interest rates.

Mike Green: 00:17:40 Yes, correct. That VIX front end and some of the financial innovation that's occurred over the last decade has involved extending that term. So, we can buy a VIX or the equivalent of a VIX on a weekly basis, we can buy it on a monthly basis, we can buy it three months, six months, nine months.

Demetri Kofinas: 00:17:55 And people are able to buy or sell exposure to price movement in the front end of that curve. Actually, along the curve, but in this case represented by the VIX. And this also has a really interesting relationship to how many of these models define risk. Risk has come to be defined as volatility, which is actually fundamentally incompatible with what we know to be true.

Mike Green: 00:18:21 Well, it's an approximation. This is one of the challenges that we face. Anytime we attempt to build a model of something, we're forced to discard features. Otherwise, we'd be modeling the entire world and that's just an intractable problem. It takes you back to the beginning. So, when you discard those features, you have to make simplifying assumptions. One of the assumptions that's been made in the modeling of risk is this idea that really what you're talking about is price volatility and some super smart market commentators, guys like Howard Marks or others. Often Warren Buffet points this out.

Mike Green: 00:18:53 The true definition of risk is permanent loss. Taking yourself out of the game. If you didn't insure your house and your house gets destroyed in a hurricane, that's really risk. But if you're insured, your real risk is not that the house gets destroyed, but that you improperly read the contract and so you're not actually protected against a hurricane or you improperly vetted the insurance company and the insurance company goes bankrupt.

Demetri Kofinas: 00:19:19 100%, and to the other point I was making, which is it's fundamentally incompatible with what we know to be true. We know that some of the periods of the greatest risk that we've

seen in financial markets have been some of the least volatile. And this goes back to Minsky, stability begets instability.

Mike Green: 00:19:35 Well, I would actually say that the precursor to the most risky periods have actually been periods that have exhibited very low volatility. And that's what the Minsky hypothesis or framework is working on.

Demetri Kofinas: 00:19:45 Low volatility environments can facilitate the buildup of risk.

Mike Green: 00:19:48 They facilitate the buildup of risk because among other things, they encourage people to take leverage. And leverage is actually a very unique animal because leverage is actually a contract that says you will pay a fixed amount regardless of the underlying characteristics. So, when you experience adverse consequences, people's net worth, effectively the difference between the value of what they own and the contracts that they now have to pay with guarantee can collapse very quickly. The value of those guarantees, which is what we call debt contracts can in turn collapse. And the most frightening thing about a lot of the debt contracts is that people they are correct in thinking of these as assets, but if they improperly analyze my ability to repay that debt on uncertain conditions and they in turn lever that debt, then you can see a collapse of collateral in the system. That's what 2008 really was.

Demetri Kofinas: 00:20:45 And what's interesting is also there's a parallel that in 2008 which is there was an insurance market in 2008 as well-known as credit default swaps.

Mike Green: 00:20:52 Right, it's a market, I know very well as we discussed the models that were built for the pricing of credit default swaps by AIG and their financial products group was done by a guy by the name of Gary Gorton who's a professor currently at Yale, but he was actually at Penn when I was there, at Wharton when I was there and I was his TA. Which was, it was fun to watch the impact of that and Gary just very quickly is absolutely brilliant and there's a very short list of guys in the running for the Nobel economics prize and he is definitely on that list.

Demetri Kofinas: 00:21:23 Let's bring it back again. We're going to do this a few times, I think, to try to get the most out of this as possible. But let's get back to the market for volatility because there was a very important event in February of 2018, which was the blow up of the XIV, the inverse VIX fund, short ETN. I want to throw that out there, but let's go back to that and talk to me a little bit about how this market evolved. Because I think when most people think about options and derivatives, they think about

them in terms of hedges to the extent that they even think about them at all. They think about them in terms of hedges as part of a larger risk balancing for your portfolio. But this market radically changed over a very short period of time. Talk to me about that so that we can get into this climactic event of the XIV.

- Mike Green:** 00:22:13 In 2018, yeah. When you refer to the dynamic, most people think about options as hedging. The first thing to recognize is that options or derivatives are not a super complex topic. What they actually are, they're just things that derive their value from some underlying --
- Demetri Kofinas:** 00:22:29 Hence the name "derivative."
- Mike Green:** 00:22:29 Derivatives, that's exactly correct. In the period roughly around 2005-2006, the market for volatility as an asset class really began to develop. And what that really means is what it was referring to earlier where you have this dynamic of people begin to use the characteristics of the insurance market to actually create an alternative payoff stream that looked at a lot like being long equities. Pension funds and insurance companies began searching for a less volatile payoff structure that offered equity like characteristics. The development of that market-
- Demetri Kofinas:** 00:23:08 Actually, I want you to explain to our listeners what you really mean when you say "a less volatile income structure that also has some of the benefits of equity or behaves a little bit like equity." I think it's important to really drive that point home.
- Mike Green:** 00:23:20 Sure. It's a super complex topic, but in really simple terms, we are all familiar with the idea of dividends. That you get paid dividends on some stocks or many stocks. Most stocks used to carry dividends.
- Demetri Kofinas:** 00:23:31 Yeah, fewer than --
- Mike Green:** 00:23:33 Many fewer today.
- Demetri Kofinas:** 00:23:33 Many fewer, yeah.
- Mike Green:** 00:23:34 In part because of the emergence of these types of alternate cashflow streams that have made that less attractive.
- Demetri Kofinas:** 00:23:40 And the idea that the dividend was effectively embedded in the valuation of the stock, which is again, something we talked

about in our episode on the history of financial theory. And I do recommend listeners download that, but go ahead, Mike.

- Mike Green:** 00:23:51 So this exactly the underlying feature is, is that when you engage in the sale of insurance, you receive a consistent stream of profits associated with the deterioration of the time period remaining in your insurance contract. And we call that theta or time decay. Or it can actually take the form of a stream of income payments if you're continually writing insurance or continually writing periodic components of insurance. Again, to use the house example, if I fail to make a payment on my house insurance, the insurance company will say, guess what, you're not covered. That continual stream of income, again, has equity-like characteristics. It has a payoff feature that looks a lot like owning that house, but it has greater stability to it.
- Demetri Kofinas:** 00:24:37 Yeah, because you gain exposure to that house as opposed to, let's say, purchasing a fixed income security, like a bond where you're getting a coupon but you're owning a bond. You're not owning a stock.
- Mike Green:** 00:24:48 Right. The difference between an equity and a bond is that an equity has an uncertain payoff at the end and I receive additional compensation for that uncertainty, and a bond has a fixed pay off at the end. That's why we call them fixed income instruments. I'm certain of what I'm going to get, assuming I've correctly underwritten the credit risks. If I think about a US government bond, I'm 100% certain that I'm going to get back. If it's a par value or a price value bond at 100 bucks, I'm definitely getting back 100 bucks. And my only uncertainty is how much can that 100 bucks actually buy; the inflation.
- Mike Green:** 00:25:22 These markets began to develop in the time period from 2005-2006 and they actually introduced complimentary products, which we're familiar with in the fixed income space. Things like, you've heard the term CDO or CDS, credit default swaps. These were insurance products that were created against the risks that fixed income products would not be able to return the principal and coupons that you'd ultimately expected. So, the development of those markets heralded effectively the growth of these volatility markets. The failure of those markets in 2008, the inability of those who had written insurance contracts to ultimately--
- Demetri Kofinas:** 00:26:02 Most famously AIG and AIGFP, Cassano's unit that blew up.

Mike Green: 00:26:06 Correct. That is the perfect example of it. What you ended up with was a situation in which people had made promises to pay and they couldn't actually stick to them.

Demetri Kofinas: 00:26:15 Because the income stream of writing the insurance was so lucrative and the fees associated with it as well.

Mike Green: 00:26:22 One of the most interesting things that actually came out of 2008 was, it wasn't actually that the defaults and the outcomes were particularly adverse relative to the uncertainty. But as we were in the heat of the moment, the uncertainty as to how severe the outcomes were going to be required people to put additional capital up in the form of collateral. And that was the fundamental mistake between AIGFP. The actual defaults on investment grade bonds and many other products were within the tolerances of what the products were designed for.

Mike Green: 00:26:57 But the uncertainty at that time and that their prices had deteriorated that people needed to post collateral. It's the posting of collateral that killed people.

Demetri Kofinas: 00:27:05 It's the point that insolvency and illiquidity look very similar--

Mike Green: 00:27:10 In the heat of the moment.

Demetri Kofinas: 00:27:11 In the heat of the moment.

Mike Green: 00:27:11 That's exactly correct. So, when these markets began to develop, as we came out of 2008, the rules changed quite sharply. The regulatory environment changed, the risk that people had to demonstrate or the protection that people had to demonstrate to their clients, to hedge funds at the time and other investors had to show their clients how they wouldn't allow a 2008 repeat. And I was extraordinarily fortunate to be in a seat that allowed me to dispassionately look at the insurance that people were buying. Many people are familiar with the work of Nassim Taleb in the black Swan.

Mike Green: 00:27:47 In the aftermath of 2007, the desire to purchase this insurance exploded. And the pricing of the insurance did exactly what you would anticipate in an environment in which the demand rises and the supply because of the changing regulatory framework decreased, the pricing exploded for the insurance.

Demetri Kofinas: 00:28:05 The price to insure against multi-standard deviation order events exploded.

Mike Green: 00:28:12 What we call black swans exploded. So, when we have that type of dynamic emerge, you need time for people to build the ability to sell that insurance. And I was extraordinarily fortunate to be able to do that in the seat that I was in. But as the adverse events failed to materialize-

Demetri Kofinas: 00:28:28 So, your point, just to clarify, because I think it's important, you were saying that there was a period of time between 2007 and 2013 or so where you were able to sell insurance. Insurance because you felt that the risk to reward was sufficiently low that it made sense. It was a profitable decision.

Mike Green: 00:28:47 Right, that it's absolutely correct. Mechanically, you can think about it in the framework that people were trying to buy investment products that they thought were attractively priced. So, in the heat of the aftermath of 2008 if we go back to roughly March 2009, the yields that were available on very high-quality investment grade bonds approach nine to 11%. But in order to convince their investors that they were protected, they had to go buy insurance. And because the regulatory framework had changed to limit the ability of that insurance to be sold particularly by the historical providers of it, most famously, Warren Buffet was actually a huge provider of that insurance. But also, the investment banks themselves had significantly underwritten that insurance and AIG disappeared. All sorts of players that had been able to provide it disappeared. The pricing of that insurance rose to the point that it wasn't uncommon to see an implied yield, an implied return on selling that insurance that was 35%, 40%, 50%.

Mike Green: 00:29:52 I was extraordinarily fortunate to be in a seat where I was able to take advantage of some of those opportunities. But it also gave me an interesting place to sit and watch the evolution as that disappeared. And so--

Demetri Kofinas: 00:30:05 It has now actually gone the other direction, which we will talk about.

Mike Green: 00:30:08 So, now it's completely flipped in the opposite direction. In particular, there's been a growth in the desire to sell insurance because people are concerned about generationally low interest rates. As people get older, they need to find sources of yield so that the assets that they've accumulated over their investment lives can actually fund their future consumption in retirement. When you face that type of demand and central banks choose to stimulate the economy by trying to lower interest rates, people are suddenly faced with a mismatch. The

assets that they had accumulated no longer offer the returns that they had anticipated when they were saving.

Demetri Kofinas: 00:30:47

And that they need.

Mike Green: 00:30:48

And that they need. That's a very important to articulate that. We've developed all sorts of alternative ways for people to generate that yield. One of which is selling insurance and most people don't understand that that's what they're doing. Many of these products are marketed in a manner that doesn't really attempt to minimize the risks explicitly, but people really don't fully understand that what they're engaged in is selling disaster insurance to the markets.

Demetri Kofinas: 00:31:17

You touched on one of the two major drivers of this, this one that you touched on is one of the more well established, well understood, which has to do with the search for yield, the reach for yield driven by the very low interest rates, which I do want to talk about right now. But I want to tease this other point about automation that you and I've talked about. I think this is more of an original contribution on your part in terms of how you think about it, which I think is super interesting. And that gets into the conversation about passive approaches, where they were talking about in volatility or inequities, but this point about needing the yield is really powerful.

Mike Green: 00:31:50

It is, and it's one that I think is very, very hard for people to understand. Because the fact that I need that yield, it doesn't mean that I get it. But it does mean that I'm going to seek out behavior that tries to deliver it to me. When we talk about automation, and this is actually a natural segue, if you ask me what are the risks associated with writing insurance, it's very natural to look back over the history and say, well, here's how frequently 100 years storms occur that wipe out beach front property in Miami. So, if I'm going to write insurance for hurricanes in Miami, I want to have that information.

Mike Green: 00:32:29

The availability of datasets in financial markets has exploded and has given people the ability to try to articulate that by looking back at historical data. And the minute you start doing that, the minute you start providing these very robust datasets that contain all of the available information, and I specify available because I think it's important, you start to develop a degree of certainty that says, Hey, I can do this with an algorithm. I can construct a model. We've talked about the pricing of real estate.

Mike Green: 00:33:01 Increasingly, when I speak to friends that are in real estate, they'll tell me the frustrations that they're dealing with, where their clients will come to them and say, well, here's what Zillow says it's worth. That must be what it's actually worth. It's the same underlying dynamic. There's an algorithm that underpins Zillow that says, this is what we think the house is worth, but the reality is that's what the algorithm says it thinks the house is worth. It's not what it's going to transact for.

Demetri Kofinas: 00:33:24 Yeah, 100%.

Mike Green: 00:33:26 When you have that type of phenomenon and it spreads broadly across the markets, it actually has a perverse feedback loop because if people become increasingly confident that that answer is the right answer, they become increasingly confident about transacting at that price. Regardless of whether it's the right price.

Demetri Kofinas: 00:33:45 It's a similar model about the mark-to-model accounting of the CDOs pre-crisis.

Mike Green: 00:33:50 No, it's not similar. It's identical. So, when you have that type of dynamic, when you have people becoming increasingly confident with the models that the historical information embeds, the future distribution of outcomes, the future potential outcomes, they start to ignore something really important that we saw in the housing market and we saw on the dot com cycle and that we've seen in functionally every financial crisis that's ever existed. Which is that when people become overly confident in these types of things, when they begin the process of actually providing liquidity or providing insurance based on a presumed certainty about what that distribution is, they start to influence the markets themselves.

Demetri Kofinas: 00:34:29 Well, actually to that point and to a fix this to what we were talking about earlier, the purchase of insurance against collateralized debt obligations actually made it so that the market for trading those was less active or less liquid. Because if you could buy insurance on a product that you were carrying, you were able to carry that product having adjusted the risk without actually having to sell it if you felt that your risk models were out of whack.

Mike Green: 00:34:52 Yeah, that's exactly correct. You were actually able to hold to the underlying asset and trade the derivative. Or you use the pricing of the derivative to presume that you actually had a product that was valued at X. [crosstalk 00:35:07].

Demetri Kofinas: 00:35:07 Which is one way in which the insurance market actually has a tangible impact on the underlying.

Mike Green: 00:35:12 Correct. And it's exactly the same thing. If you, again, take yourself back to your house, which is the insurance that people are most familiar with, if the insurance company comes back to you and says, Hey, your house is worth X and therefore we're going to ensure it at that value, well that gives you confidence that your house is worth X. You become increasingly tied or in the behavioral component, you frame or you reference that underlying dynamic. Yeah, my house is worth X because the insurance company tells me. They're an expert. They've got an algorithm that tells them what my house is worth.

Demetri Kofinas: 00:35:43 It also makes me feel better. Makes me feel better to know there's an algorithm. This is what Zillow tells me. It makes me feel good. And the more people that say that to me, the better I feel because now there are people that agree with me.

Mike Green: 00:35:57 Again, it creates a feedback loop. Because the more people that subscribe to the idea that Zillow has the right price, the more likely they are to transact at that price. So, it actually has a self-validating mechanism. Again, this is the underlying framework of a Minsky dynamic. If I become more confident in that, well then, I'm increasingly willing to actually leverage that exposure. If I'm told that my houses are going up in value and they're going up on a consistent basis, well maybe I should own two of them. Maybe I should get three. Well, let's go for four. That's the underlying framework and it's the same thing that we're seeing in the markets today.

Demetri Kofinas: 00:36:34 Let's go back to the market volatility because I want to cover XIV before we get into passive. We were talking a little bit about how this market began to change around 2005-2006 or some of these pension and insurance companies that were entering the market that we're looking for income flows while still having exposure to equity-like products.

Mike Green: 00:36:55 The emergence of those facilitated the 2008 event. In the aftermath of 2008, the desire for insurance, the need to buy these products to show investors that they were protected emerged. That's actually where the very first volatility ETFs emerged. This is super esoteric description. We're talking about markets--

Demetri Kofinas: 00:37:15 This is where the demand emerged from [crosstalk 00:37:16].

Mike Green: 00:37:16 This is where the demand emerged.

Demetri Kofinas: 00:37:17 The demand for the insurance emerged.

Mike Green: 00:37:18 So, in the aftermath of 2008, the demand for what we call black Swan insurance or funds that were designed to protect people's portfolios exploded. Most people don't have access to a hedge fund like Nassim Taleb's universe or others that attempt to protect their portfolio against super esoteric outcomes. Most hedge funds have access to products like CDS or what are called OTC, over the counter derivatives contracts that are designed to allow them to protect their portfolio. Doesn't mean that they're pricing them correctly, but they have access to them.

Demetri Kofinas: 00:37:52 What type of accounting exists to actually ensure that the people that are writing these securities or these products actually have the income or the assets to actually make good on the insurance?

Mike Green: 00:38:05 The quick answer is that in the regulated space there is capital that has to be held against it, but it's one of the perverse dynamics of selling insurance in an unregulated environment, which is what's emerged on the markets. We talked about XIV. XIV emerged as a direct analog of people's desire to purchase insurance. The purchasing insurance product was called VXX. VXX is something that many registered investment advisors, many brokers recommended to their clients in the period of 2000, I believe it emerged in early 2009. They recommended that they buy some form of insurance associated with it. The product was so disastrous in its performance, that people very quickly realized that, Hey, I don't want to actually be long this thing. I want to be short this thing. I want to bet against the markets. I want to bet against the insurance markets, I want to offer insurance.

Mike Green: 00:39:02 Again, I was very fortunate in doing that in the immediate aftermath of the regulatory environment that emerged in 2008. But by 2013, the markets had completely flipped and as we came into 2014 and 2015, the demand to bet against that, to offer insurance to the markets began to explode. That's where the popularity of products like XIV really began to take off. They were competing products, some offered by velocity shares, which is a credit Swiss dynamic, some of which were offered by a firm called ProShares. The offerings of these exploded and it hit its peak excitement as we came into 2017.

Demetri Kofinas: 00:39:41 AM I remembering this correctly, that not only was it cheap to issue, but the left tail or the right tail was being dramatically

underpriced relative to the left tail? In other words, the fear of the recency bias of the deflationary anxiety was causing the price of insuring that side of the distribution to be much more expensive than the risk of a hyper inflationary event.

Mike Green: 00:40:06 Yeah. Chris Cole, who I believe you've interviewed, actually wrote a phenomenal piece called Volatility at World's End. Again, it's super esoteric and-

Demetri Kofinas: 00:40:15 I think it's actually digestible though.

Mike Green: 00:40:18 Well, Chris has a better gift with words than I do, but I would encourage anyone who is interested in reading this stuff to prepare themselves for some pretty esoteric topics. But in really simple terms, what Chris had identified, Chris and I are good friends. It's something that I had identified as well, is this idea that the right tail was undervalued and the left tail was very richly valued. To give you some idea of how extreme that was, at the peak of the disconnect between the two in the summer of 2012 and it was very particular dynamics around that, I'm not going to go into it. You could sell a contract that provided insurance to the market only in the event that the market fell by 50% over the next two years and then your insurance was only offering the remaining ability to fall. For the sale of that contract, you could purchase 100% of the upside in the market for the next decade. It was just a complete mismatch.

Demetri Kofinas: 00:41:15 I watched Chris deliver that presentation, I believe, in the fall of 2012 at Grant's Conference. I was in New York scouting some guests and then I had him on capital account shortly thereafter talking about exactly this. But I took you off, you're talking about velocity shares for example, which created an XIV, the ETN. Where did I cut you off?

Mike Green: 00:41:33 No, you didn't cut me off at all, but the underlying dynamic of what emerged in that 2014 to 2017 time period was that people became aware of these products that were betting against it. Betting against the insurance in the market and the performance of these products, at least on their surface, appeared spectacular. So, XIV, which is the most famous of these and became the largest of these, its performance was in the neighborhood of 40% to 50% a year for several years. I don't remember the number off the top of my head, but I want to say it's somewhere in the neighborhood of the price of the XIV went from somewhere around five dollars to, at its peak in January of 2017 was about \$125 over the course of give or take five years.

Demetri Kofinas: 00:42:21 Huge returns.

Mike Green: 00:42:22 Huge returns. In 2017, if you go back and you read the popular press, there was tons of references to target managers leaving their jobs after having made millions trading XIV and launching investment vehicles to offer these types of products.

Demetri Kofinas: 00:42:38 Were you also getting, at the same time if you were invested in XIV, were you also getting an income flow?

Mike Green: 00:42:43 You weren't receiving an income flow, but what you were receiving is an appreciation associated with the term structure--

Demetri Kofinas: 00:42:48 With being wrapped into the income flow.

Mike Green: 00:42:50 Right. What's called "carry." The difference between buying low and selling high thing. That was embedded in the term structure of volatility.

Demetri Kofinas: 00:42:59 The underlying options that were purchased. Those yielded an income flow that were incorporated into XIV's price.

Mike Green: 00:43:06 Those would yield an income that was incorporated into performance of XIV. That's exactly correct.

Demetri Kofinas: 00:43:07 They just held XIV. Simple. Boom, boom. I make money from appreciation.

Mike Green: 00:43:10 Hence, the attraction for the retail public. What people failed to understand about this product. What was so interesting about is because it was an inverse product. So as XIV is rising, the underlying VIX is falling. So, the really critical insight, and again, I was fortunate--

Demetri Kofinas: 00:43:31 As XIV is rising, volatility is dropping on the short end.

Mike Green: 00:43:33 It is dropping on the short end. And so, this setup dynamic in which people were under appreciating this inverse characteristic. So, when volatility gets very low, when the VIX gets very low--

Demetri Kofinas: 00:43:46 Implied volatility.

Mike Green: 00:43:47 Implied volatility, it takes very little price change to actually cause a spike in volatility. And as it super low, the potential for it to double actually begins to rise.

Demetri Kofinas: 00:43:58 It's all relative.

Mike Green: 00:43:59 Because it's all relative. That's exactly right. If you have an inverse product, something that is betting in the opposite direction, when something doubles then it has to go down 100%. Meaning what you would expect to see is a risk of the product not falling in price but instantaneously going to zero. And that's exactly what we saw on February 5th, 2018.

Demetri Kofinas: 00:44:21 What happened in February 5th, 2018?

Mike Green: 00:44:23 There's a lot of things that happened on February 5th, 2018. But the XIV product had become large enough in its share of the overall market, particularly in the volatility space that when the underlying product, the S&P faced a period of instability. When something began to go wrong in the S&P, the price of options, the volatility exploded. Now, this is not particularly well documented and I certainly can't present it as proof, but it actually appears that what happened is that the Federal Reserve changed the characteristics of how they monitored or how they measured risk that was being held in volatility terms by the investment banks. They changed what are called the CCAR provisions associated with volatility.

Mike Green: 00:45:11 That change in the regulatory framework closed an arbitrage where it had been cheaper to hold risk in the form of short volatility from a regulatory standpoint than it was to be long an underlying equity index. And the impact that that had rippled through the market and created a bid for volatility that rapidly escalated and again, caused the product to instantaneously, nearly instantaneously go to zero.

Demetri Kofinas: 00:45:34 What's really interesting about that is it brings up the point that regulations are so important. In fact, regulations play such an important way down the vector of behind the scenes role in all of this stuff, not just in this conversation that anybody in markets, period.

Mike Green: 00:45:47 Again, when I talk about studying market structure, I talk about the dynamics of market structure. Almost inevitably when you find somebody doing something that on its surface seems foolish, the answer is they're either doing it because they're trying to evade taxes or they're doing it because they have to for regulatory purposes. So, when people talk about the impact of the Fed on markets, I'm much less interested in the idea that low interest rates somehow stimulate activity. I'm much more interested in what are the regulatory frameworks or what are the constraints on people's behavior that is created by a regulator? Whether they're taking away the prospect of earning an adequate return on a bond by lowering interest rates or

whether they're changing the CCAR provisions in an esoteric piece of paper that was released on February 2nd, 2018.

- Demetri Kofinas:** 00:46:34 Also, another question that this brought up to me is, how effective is zero to 30-day volatility options? How effective is that as a hedge?
- Mike Green:** 00:46:45 Well, when you describe it as a hedge--
- Demetri Kofinas:** 00:46:47 As a way of protecting yourself against the risk of volatility?
- Mike Green:** 00:46:52 The quick answer is it depends on the price. In the same way that description of how effective is insurance on your house. You can be living entire life and pay insurance on your house every year and never have your house burn down and you're very happy about that outcome. But you look back on it in hindsight and you say, boy, that insurance wasn't very effective. But a single fire or an earthquake or any sort of adverse event that takes away your house, you're pretty happy you had that insurance. So, the underlying demand for that protection is valid. How it's priced and a truly random outcome in terms of whether you needed it or not is a very different statement.
- Demetri Kofinas:** 00:47:33 So XIV was becoming a larger and larger player in this market, correct?
- Mike Green:** 00:47:38 Correct. So, the demand for this product, because of its simplicity, because it felt like a buy it, set it, forget it, make fantastic money. Again, if you go back and you read the contemporary reports, you'll see descriptions of taxi drivers explaining to people that XIV was this company that just made money. And it wasn't a company at all.
- Demetri Kofinas:** 00:47:56 Where was this?
- Mike Green:** 00:47:57 In the wall Street Journal there was actually an article at one point where somebody was in a taxi and the taxi driver started explaining to them that he was investing in this company called XIV.
- Demetri Kofinas:** 00:48:05 [laughter] How do these things always pop up? [laughter] I wonder how often these things actually happen, or they're just so paradigmatic that we focus on them.
- Mike Green:** 00:48:17 I think the quick answer is, is that they're always happening in one form or another. People have misperceptions about things,

but they tend to resonate with us when you experience things behaving in a manner that they probably shouldn't.

- Demetri Kofinas:** 00:48:31 One of the things that I think people often confuse, I know that I often do, is correlation with volatility. What is correlation? How does that play a role in what we're just talking about today?
- Mike Green:** 00:48:47 Correlation is really just a measure of how much the movement of two things are related to each other. The benefit of a diversified portfolio is, is that you may have-
- Demetri Kofinas:** 00:48:59 Going back to Markowitz, MPT.
- Mike Green:** 00:48:59 Going back to Markowitz, is that you have a series of assets that have their own individual risk characteristics, but those risks are not perfectly correlated. You generate a diversification benefit from taking a series of different risks. If I simultaneously insure houses in Miami and houses and Alaska, the prospect of me being simultaneously wiped out by a hurricane in Miami is reduced. But if I concentrate all of my risks in Miami Beach Front properties, I have a much greater risk. That correlation dynamic, it's just a measure of saying how likely or how correlated are the underlying payoff structures in my portfolio. It's typically measured in price terms. And in markets, we think again about that risk, those risks in terms of payoffs of the day to day price movements of these events.
- Demetri Kofinas:** 00:49:49 The covariances between equities.
- Mike Green:** 00:49:52 Correct.
- Demetri Kofinas:** 00:49:53 Which, not to go too far off, but to bring it back to Markowitz and MPT, the emergence of beta, the idea of investing in the broader index came out of the fact that it was computationally impossible at the time to actually measure all the different covariances to actually create a risk adjusted portfolio according to how Markowitz had originally envisioned it.
- Mike Green:** 00:50:15 Right. In purely mathematical terms, what we call beta is actually just the slope of a line between two items. It's how much of the movement of Y can be explained. Both an amplitude and timing can be explained by the movement of X. If two things are very highly correlated, you basically get a 45-degree line with the lines set up perfectly in no variance around it. If things are weakly correlated, you get weakly, not as in the time period, but in terms of a poor relationship, you get something that looks like a cloud where there is no apparent

relationship between the two. Literally, what we could talk about in linear regression terms or the solving of that line through a linear regression, it's called R squared, the explanatory power for it, also just known as the correlation coefficient.

Demetri Kofinas: 00:51:05 This is actually really great because when you were talking there about how do we explain a correlation, what we have been seeing or what the consensus view was that correlation has been falling. But you actually put together some, I have some of the charts in the rundown here. You actually use something called co-movement and you use that to basically replicate correlation data going back before 2011. I think because the data doesn't go until 2011, and what you found is actually that correlation has been rising. And to bring it back to that point about movement, how does that relate to the fact that correlation seems to have been dropping when in fact in your view, the data suggests completely otherwise that it's actually been doubling roughly?

Mike Green: 00:51:50 Again, This sounds like a really esoteric point. But in really simple terms, because these products, these insurance type products really only emerged in the aftermath of the global financial crisis. Much of the data in terms of analyzing it, the importance of this data really only emerged in the aftermath of that. So publicly available data series on things like correlation, particularly as we're discussing it here, where it's measuring how much of the behavior in the stocks in the S&P 500 are correlated. How much they move together. That data really only began to emerge post 2009, 2010, '11.

Mike Green: 00:52:30 That time period broadly is a period of decreasing risks. Or what's perceived as decreasing risks. We're coming out of the Global Financial Crisis.

Demetri Kofinas: 00:52:38 Out of the Big Bang.

Mike Green: 00:52:39 Exactly. We're out of the dynamic associated with the global financial crisis. We had a period of excitement associated with European crises, but by and large, it has been in a period that has felt safer and safer over time. Now the irony is, is that if you think about that dynamic of people feeling safer and safer over time, they start selling more and more insurance. So as people feel safer and safer, they sell more insurance. Perversely, that begins to impact the behavior of the market because that willingness to sell insurance facilitates other people taking more risks. And if people are facilitating and taking more risk, then actually the market itself exhibits less volatility.

Mike Green: 00:53:21 Under the conditions of less volatility, you would expect there to be less of a systemic factor, less of an aggregate economic factor that would show up as declining correlation. That concealed something that was really interesting. Which is if you look inside the market and you look inside the behavior of the market, and I adjust for how is the market moving on each individual day? So, was the market moving less than 25 basis points, less than 0.25% on a day or 25 to 50 basis points, 50 to 100 basis points? A very, very different pattern emerges, which is when I hold those types of movements constant, I see a pattern of sharply rising correlation. So instead of a decline in correlation, we actually have an underlying feature in which correlations have roughly doubled over the last 25 years.

Demetri Kofinas: 00:54:11 So the perception that correlation has been dropping is actually a result of the fact that there has not been sufficient movement in variable X to provide the data, the information to show the correlation if it were to have existed.

Mike Green: 00:54:24 Exactly right. And because we all tend to behave in a very localized fashion, it's a little bit like saying, well, the earth is clearly flat because I can see it with my eyes. But if you pull back and look at it from outer space, you can see something very, very different. So, the critical insight from my standpoint was that I was able to isolate this dynamic by basically saying, can I control for this market's increased willingness to provide insurance and the liquidity that that creates? And what that identified was this dynamic overall rising correlation. We have rising correlation when events become more correlated. Or when underlying components of an index become more correlated. The prospect of hundred-year storms becomes far more frequent.

Demetri Kofinas: 00:55:07 Explain that for listeners because this is super important. Why is correlation so important in the context of turning what would be a five-year storm into a hundred-year storm?

Mike Green: 00:55:18 Yeah. It's not actually that the storm itself is increased.

Demetri Kofinas: 00:55:24 Rather the damage of the storm.

Mike Green: 00:55:26 The damage of the storm. Exactly, correct. So, if you think about it, again in the context that I gave of Alaskan waterfront property in Miami waterfront property. Because those two are so geographically distant, the prospect that I'm going to incur simultaneously as tsunami in the Pacific that strikes my Alaskan properties that I've insured and a hurricane in the Atlantic strikes the Miami properties that I've insured is fantastically

low. Functionally, we can dismiss it and we can say, it only happens when a giant asteroid hits the earth and causes a worldwide tsunami of one form or another. So functionally I can disregard that and that's what we call a hundred-year storm. It's not a risk that is really worth factoring in because it's going to happen largely with frequency outside of our observable lifetime.

- Mike Green:** 00:56:17 But if what I don't understand is that there's a feature that's actually causing those to become increasingly correlated, and I don't know what they are. But in really simple terms, you could think of it as Alaska geographically migrates to be on the Gulf of Mexico. The prospect of Texas beach front property in Miami beach front property being hit at the same time or in the same hurricane season, that actually is much, much higher. That increase in underlying fundamental correlation takes the dynamics of the frequency of events that I would expect to see and compresses them dramatically. We've talked about the dynamic of roughly a doubling in correlation. You can think of it as taking a hundred-year storm and turning into a 15-year storm.
- Demetri Kofinas:** 00:57:03 There are two important points you made. I want to just double down to the point about the storm. Another way to think about it I think is that if a hundred-year flood were to occur today in parts of India, that would have a much more devastating effect on the population today than it would have had a thousand years ago because there are cities along the coast are much higher levels of population density. So, the impact of the same storm has a very different effect.
- Mike Green:** 00:57:29 Well, it's interesting you say that because in many ways it would have a much less devastating impact for each individual that's there. Because you can fly in resources from outside, Americans and others can contribute to relief efforts. There's technology that allows people to deal with the ramifications of that.
- Demetri Kofinas:** 00:57:46 I mean like the monetary impact, let's just say like there's more property than more people there to be damaged as a result of the rising sea levels than would otherwise.
- Mike Green:** 00:57:54 I would actually say though that part of the reason why those people are there and why people have that behavior is because of the dynamics that I was referring to. Which is the mitigating factors are higher. So, people can actually take those risks.
- Demetri Kofinas:** 00:58:06 Yeah, including climate insurance.

Mike Green: 00:58:08 Including flood insurance, which is subsidized across multiple geographies. Including the ability to rescue people, including the ability to receive early warning, which says, Oh, okay, I'm not that worried about living on the beach because I can get back from the beach as quickly as possible. So, the presumption of that, again, this goes back to the Minsky type framework, the presumption of that actually encourages the concentration of those risks.

Demetri Kofinas: 00:58:31 Yeah, and the herd behavior. To go back, we talked about interest rates that I called the yield imperative automation, and actually I would throw in herd behavior there too. So, let's go back to correlation because there is something that's driving the correlation. It's deep down in the vector.

Mike Green: 00:58:45 Deep down in the vector. That's one of these things. And to be clear, to my knowledge, nobody else has really highlighted this dynamic of rising correlation because the experience that people have is that the world is flat and I'm saying it's curved.

Demetri Kofinas: 00:58:57 So we've established that correlation is important. Your contention is that it is rising. Why is correlation rising?

Mike Green: 00:59:06 Empirically, I can show that it's rising if you make these adjustments, if you isolate for the underlying behavior. Then you have to start asking yourself why you're seeing this. And this is where I make the link to passive investing because as passive investing grows, as people increasingly make the decision not to buy Coca-Cola or Microsoft, but increasingly make the decision to buy the S&P 500 as an aggregate through an ETF or through an index fund, the propensity of those stocks to move together should naturally rise. If the only vehicles that were available to trade were index funds, we would expect correlations to be one. We would expect everything, the only reason-

Demetri Kofinas: 00:59:50 Because everything is investing using the same economic logic to go back to Shoshana Zuboff. The same logic is being used.

Mike Green: 00:59:56 That's exactly correct. So, when you have that type of dynamic, we should naturally be expecting this to rise. And the fact that it hasn't appeared has created the conditions for people to by and large say, I'm not going to spend my time thinking about it. I'm not going to spend my time thinking about these risks. It's facilitated by the regulatory environment. The increasing concentration in our industry, the power that is accruing to these vehicles that are attracting capital. The ability to change the underlying structure of the regulatory framework to create

conditions that force people to go into these products by default. That's actually facilitating this dynamic. The way that we measure performance of managers in our industry is increasingly influenced by these underlying type dynamics. And again, I started this off by saying that markets are fragile, that they're a phenomenon that by and large on a continuous basis. We only have about a hundred year's worth of experience with. We're presuming that the very, very simplified models under which passive vehicles are supposed to work are an accurate representation of the world. And my contention is, is that they very clearly, are not.

- Demetri Kofinas:** 01:01:05 Absolutely. Another really interesting thing, this is something that I wrote out in the top of the rundown because I was thinking about it. There has been a flourishing of interdisciplinary thinking that has entered the field of economics from behavioral sciences, from complexity sciences and other fields that have enriched, I think, our understanding of economics post-crisis. And yet this higher level of intellectual understanding has been impotent in the face of these larger forces that we've talked about. One is the search for yield, the yield imperative that it isn't just that yields are low and people want higher yields. It's that they need them. By the way, this is going to touch on the demographic. The demographic just is enormous because these passive strategies invest in some cases with only the question of how old are you in mind in the case of target funds, which you've actually done a lot of work on and focused on. But then there's also the point about automation, and that's something that you've really thought a lot about. How does that fit into this?
- Mike Green:** 01:02:08 Well, so automation is a byproduct--
- Demetri Kofinas:** 01:02:11 And by the way, when we're talking about automation, we're not talking about automation in the sense that you hear about it in terms of machine automation. We're talking about automation in the much more basic, original sense of the word.
- Mike Green:** 01:02:21 Yeah, so these are literally algorithms. Automation is a byproduct of certainty. If you know that you are going to be making the exact same product in the exact same way, then you can, the first thing you do is you build a, if you're thinking in carpentry terms, you build a jig that facilitates the improvement in productivity associated with making the same thing over and over again. The same underlying dynamic plays into an investment world. Where the access to financial advice, the access to allocation strategies for where do I put my money, is a

byproduct of more and more people needing to answer that question.

Mike Green: 01:02:59 It becomes increasingly prohibitively expensive to provide them with that type of advice on a customized basis. It's also incredibly hard to look forward into the distribution of potential outcomes and have any form of certainty about how good that advice that you're receiving is. So, when you have that type of construction, it's very easy for the industry to naturally gravitate to saying, well, what has worked. And again, to go back to this idea that as the data has become more and more available, we have greater and greater certainty to say, Hey, this worked in the past. And while it's very explicit in financial regulation that you're not able to say, Hey, this worked in the past, this is the results in the past. We actually are required in the financial industry to put a very specific disclaimer that says past performance is not a predictor of future outcomes.

Mike Green: 01:03:50 Functionally, everyone discards that. Because what do we do? We look at the historical performance, and this is explicitly true when you think about things like quantitative strategies or systematic strategies. You look at prior price behavior and you say, this is what I think is going to happen in the future on that basis.

Demetri Kofinas: 01:04:07 This embeds into a larger philosophical point. Again, something that you've observed and this whole thing of automation embeds into that, which is that we all feel increasingly overwhelmed. You and I have talked about this choice is a fundamental feature of capitalism. The abundance of choice is something that famously we advertised when Nixon met with Khrushchev on national television back in the 1950s and you could see what an American home looked like and you could see what a Soviet home will look like. Of course, the Americans live with greater abundance, but today choice has become a detriment. It's become something that overwhelms us and we look to offload decisions. We look to offload decisions when it comes to driving. We look to offload decisions when it comes to planning our day, Siri, Alexa, everything else. And one place that we have done it has been in markets.

Mike Green: 01:04:55 100%, and I would even go so far as to say that we have increasingly begun to fetishize not the accumulation of different products, materialism. We're increasingly fetishizing people's ability to shed the need to make those decisions. Elizabeth Holmes with her black turtleneck and black tire that she wore every single day to us represented a higher form of intelligence, a higher form of certainty, that I don't want to be distracted by

the minutia of selecting my outfit for everyday because I've got more important things to do.

- Demetri Kofinas:** 01:05:26 Cognitive load.
- Mike Green:** 01:05:27 Right, exactly. I'm reducing my cognitive load. We talk about this. It's the language of the millennial, candidly, like what are the life hacks? What are the things I can do to take the shortcuts? Well, the simplest one of those is, I'm not going to worry about my investments. I'm going to buy an S&P index fund.
- Demetri Kofinas:** 01:05:44 It's my time, put in.
- Mike Green:** 01:05:46 Right, exactly.
- Demetri Kofinas:** 01:05:47 If it's that time of the month, put it in. Stocks always go up in the long-term.
- Mike Green:** 01:05:51 That's exactly correct. And you see this in the language that people have adopted. Jeremy Siegel most famously with stocks for the long-run. The idea that somehow the returns associated with roughly 150 years that we have of market data represent the forward return distribution of the next 100 years or the next 50 years and the next 10 years is on its face, absurd. Things that happened in the last 150 years have very little relevance to what happens in the next 10 or the next 50 or the next 100. But because we're trying to shed this decision making because we feel so inexperienced in making those decisions for ourselves because there's so little ability in advance to express certainty of what those outcomes are going to be, whether I'm an expert and you're a moron. And that wasn't an association, that came out wrong. But-
- Demetri Kofinas:** 01:06:40 I feel like one pretty often.
- Mike Green:** 01:06:42 As my wife will claim regularly that I inhabit that space as well. But the underlying uncertainty about the validity of the advice that you receive encourages people to default to the machines and hand it over. And I encourage everyone to look at their own behaviors in this dynamic. You receive a paycheck every two weeks. Do you stop and think, do I actually want to put money into the market? Almost no one does.
- Demetri Kofinas:** 01:07:07 So I want to move us into the overtime for the second half of this conversation, Mike, but I really want to hammer a point home before we get in there because we're going to drill down

into the details. I think you alluded to it earlier, which is that the role of markets is to provide liquidity to be a source of discretionary buying. Part and parcel of that is the idea that independent agents competing over a finite amount of information can arrive to the most accurate price of a particular asset or security, whatever. These passive funds impart part of this, is they don't just depend on the liquidity. They also depend on the pricing. They expect that others are going to do the work to determine what the price of whatever it is they're going to purchase is, and then they come into the market with their flows and they buy it, they free ride.

Demetri Kofinas: 01:07:52 That makes sense if you're small, if you're a parasite on a large elephant, that can work. But as you get larger and larger, those dynamics change. I think what you've highlighted and what we're talking about today is that this ecosystem is basically in danger of collapse. To another point too, we can think about it in terms of variables. These models that passive investment strategies are using do not take themselves into account in the model. They do not see themselves as you have said, I think you've used the term that they're incentivized to demonstrate that they do not exist.

Mike Green: 01:08:24 Well, the entities themselves very clearly have that from a regulatory framework. Their goal is to say, we are not impacting the markets. That's not, to be fair to the participants, that's not actually saying that the people at these index funds, the Vanguards, et cetera, are mal intentioned because in many situations they actually truly believe what they're saying. But I would also, the fact that you believe something doesn't make it true. So, if your goal is to demonstrate that you're not impacting the markets, if your goal is to demonstrate that you're ultimately helping people, the easiest thing to do is to point to the historical performance and say, look what's happening. Markets are all time highs, therefore everything's great. Americans have made more money investing in index funds than they have with active managers or with other vehicles. That's very easy to demonstrate in the past. But there's very little ability to actually detect the emergent phenomenon that are being created because of this. That's some of the stuff we've talked about.

Demetri Kofinas: 01:09:20 Yeah, and before we go, I want to highlight that point. In the case of these funds, they have a very simple model, which is that they expect markets are mean reverting. They also expect that over the long-term, being invested in equities is a good proposition. So, they're not discriminating by price or value. When we think about investing, we tend to think about it as,

okay, well, Howard Marks said this on my show. Like, if I come to you and I tell you I want to sell you my car, the natural question is how much? I'll buy any piece of crap you have if it's cheap enough. It all depends. But what you've highlighted and what we're going to get into is that increasingly, because of the presence of these large non-discriminatory buyers, their flows, their cash flows, their incremental dollars are becoming increasingly the dominant variable that's driving price, not the underlying value, not anything else. It is the systematic flow of dollars from these funds that grow larger as they become more successful and they reach a tipping point and that is ecosystem decline.

Mike Green: 01:10:21 To take us full circle back to Shoshana Zuboff's observation, the underlying dynamic that we're actually experiencing is the success of these vehicles is actually leading to self-validation that the algorithms themselves are correct.

Demetri Kofinas: 01:10:35 100%. So, Mike, stick around. We're going to drill into all the details on the other side of this in the overtime. If you're new to the show and you haven't subscribed yet to our Patreon overtime feed, you can do that by going into the description to this week's episode where you can find a link to our Patreon page as well as information about how to link the RSS feed to your favorite podcasting application so you can listen to that alongside the regular episodes seamlessly downloaded straight through your phone. You can also get access to a transcript of today's conversation with me and Mike as well as to my illustrious rundown full of graphs, links, materials, much of which Mike provided me with and that I incorporated into this rundown. Mike, thank you so much and stick around.

Mike Green: 01:11:22 I'm looking forward to it.

Demetri Kofinas: 01:11:25 Today's episode of Hidden Forces was recorded at Creative Media Design Studio in New York city. For more information about this week's episode, or if you want easy access to related programming, visit our website at hiddenforces.io and subscribe to our free email list. If you want access to overtime segments, episode transcripts, and show rundowns full of links and detailed information related to each and every episode, check out our premium subscription available through the Hidden Forces website or through our Patreon page at patreon.com/hiddenforces. Today's episode was produced by me and edited by Stylianos Nicolaou. For more episodes, you can check out our website at hiddenforces.io. Join the conversation at Facebook, Twitter, and Instagram

@hiddenforcespod, or send me an email. As always, thanks for listening. We'll see you next week.