

Demetri Kofinas: 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: 00:48 What's up everybody? My guest today is Christopher Cole, the founder of Artemis Capital Management, whose core focus is systemic, quantitative, and behavioral based trading of volatility and derivatives. Chris's research is highly influential in derivative and macro trading circles and widely quoted by the financial press. His 2012 research paper entitled "Volatility at World's End" was credited with repricing long-dated volatility and named one of the best macroeconomic thought pieces of the last decade.

Demetri Kofinas: 01:25 Chris, welcome back to Hidden Forces.

Christopher Cole: 01:28 Thanks. It's great to be back. It's been about two years and it's really good to be back on the show.

Demetri Kofinas: 01:32 It's actually, I think, been almost three years. Yeah.

Christopher Cole: 01:36 That's right.

Demetri Kofinas: 01:36 You were our episode five, that's right. And I was telling you that I was so excited when we first started the program and it was also so exciting having you there and having you fortuitously in person. Some people know this because I've mentioned this on one or two podcasts that I had first met you and come across your work in 2012 at Grant's fall conference. And actually, me and Jim talked about this recently. He was recently on the program and I think you had presented at the time, was it Volatility at World's End? Was that the paper?

Christopher Cole: 02:06 That's right. Volatility at World's End and how many investors were hedging the wrong tail effectively was the theme of that presentation at Grant's.

Demetri Kofinas: 02:14 Well, they were hedging for deflation when in fact they should have been hedging for inflation because inflation was much cheaper.

Christopher Cole: 02:21 Or at least hedging for asset price reflation.

Demetri Kofinas: 02:24 Right, right, right. I also want to say for anyone listening, nothing I or Chris say today can or should be viewed as financial advice. All opinions expressed by me and my guest are solely our own opinions and should not be relied upon as the basis for financial decisions. So, how did you first get into writing these research papers?

Christopher Cole: 02:46 Well, I think there's a power, obviously managing money is a process. I'm a quantitative investor and a systematic investor. The way we trade volatility is really looking at identifying mispricings in volatility and identifying opportunities and using computers to do that. However, I think when you're trying to formulate your views on the world, it's very, very powerful to sit down and put a pen to paper and think through the logic of why you believe certain things, why you're designing strategies in a specific way. And I think that really helped.

Christopher Cole: 03:22 It's a therapeutic process, but it also is a rational process that helps you understand, does this make sense? Because if you can't explain it to somebody else, then you don't really know it that well yourself. So, I think by creating a paper and putting those ideas out to the world, it really is an ultimate test that you've thought through your process in a very robust way.

Demetri Kofinas: 03:42 You always seem to embed these papers into allegories or popular stories as metaphors. Where did that come from? Has that always been something that you've done when you've tried to convey information to a lay person or to a crowd?

Christopher Cole: 03:59 Yeah, I think part of that is, first of all, I'm a visual thinker. I think in terms of visual allegory, so to that extent it reflects the way that I see the world and I think of the world. But at the same time, it is a lot easier to convey complex ideas to people in a narrative or in a visual image. We can talk about how there's tremendous gamma exposure in the stock market today and how that gamma exposure and the dealer re-hedging impacts the way that the flows work.

Christopher Cole: 04:30 I can talk ad nauseum about that, but it doesn't click until you show somebody a snake eating its own tail as a metaphor for that type of flow action in the stock market and then suddenly people can understand that on a very visceral level. So, I think it is a powerful communication tool, but it's also just sort of a natural byproduct of the way that I think personally.

Demetri Kofinas: 04:51 So that metaphor of the snake, that first appeared in Volatility and the Alchemy of Risk, or Ouroboros.

Christopher Cole: 04:56 That's right.

Demetri Kofinas: 04:58 As I mentioned, it's been about six years since you published Volatility at World's End, which was a really big paper. It had a wide reach in terms of readership. Actually, not six years, what am I talking about? Eight years.

Christopher Cole: 05:10 Eight years, yeah.

Demetri Kofinas: 05:11 And it's been three years since Volatility and the Alchemy of Risk. Where does this paper, the current paper fit in the continuum of research that you've been putting out over these years? And I should say that you might want to give the name of the paper to our listeners.

Christopher Cole: 05:28 Well, the latest paper is called The Allegory of the Hawk and the Serpent: How to Grow and Protect Wealth for 100 Years. This paper by far is the broadest reaching paper that I've written, and I think the most relevant paper, not only to the average investor, but also to the way that we think about retirement savings, entitlement programs, pension programs. It by far has the broadest reach. The purpose of this paper, it really starts with this kind of baseline question that's posed to the reader. Imagine you have the opportunity to grant your family great wealth and prosperity for 100 years. That opportunity is subject to one final choice and the choice is, you must decide what assets to invest in and maintain that allocation for an entire century without changing it.

- Christopher Cole:** 06:22 The question is, what do you invest in? What assets do you choose that will ensure that your children's children have that money at the end of 100 years? And so, we looked at a wide variety of data. I back-tested financial engineering strategies going back 100 years and really came to some shocking conclusions about what it takes to manage money in a way that sustains wealth and grows wealth through different periods of secular decline and secular growth.
- Christopher Cole:** 06:54 In this sense, answering this question was a great education process for myself. I hope it's a great education process for the reader and it's entirely driven by an analysis of data over 100 years, not based on any macro views, not based on opinions, but truly just a presentation of pure data to understand, how can we rethink the process of portfolio management and help people.
- Demetri Kofinas:** 07:19 Every paper you've written, it is sort of a continuum. You mentioned the overpricing or underpricing of risk between the tales that you highlighted in Volatility at World's End. Some of these concepts or obviously repeated with respect to the hawk and the wings. But this paper has the most direct line with your previous of any other paper I've read, specifically because you overlay the hawk on top of the Ouroboros, the self-devouring snake, which again that was what was in the paper Volatility and the Alchemy of Risk. And I'm thinking maybe it would be helpful for listeners to get a sense of what that paper was about, where you were intellectually when you wrote it and what you were hoping to convey with that paper. And then maybe we can use that as an entry point into this one.
- Christopher Cole:** 08:07 Definitely. Well, the paper I wrote in 2017, the Alchemy of Risk, it used this idea of a snake devouring its own tail, a symbol known as the Ouroboros, as a metaphor for what's actually happening in the modern stock market. Essentially that there is now, in equity markets alone, 2.5 to \$3 trillion plus of financial engineering products that simultaneously exert influence over, but also use volatility as a proxy to generate excess yield. In this idea that if you're using volatility as a source of returns but also as a measure of risk, you end up in this cycle of self-reflexivity where buying pressure generates more buying pressure but then selling pressure at a certain point can generate more selling pressure.
- Demetri Kofinas:** 09:03 You're referring to short volatility strategies.
- Christopher Cole:** 09:05 This is exactly, these short volatility strategies and either implicit or explicit. There are strategies that are actually going out there and shorting options. Those are about \$200 billion worth of overriding strategies and those strategies are actually using derivatives. But then there are other strategies like for example risk parity or vol targeting funds that actually replicate some of the risk exposures of shorting volatility and actually result in the same self-reflexive flows.
- Christopher Cole:** 09:37 And so, in culmination you have all of these strategies that are essentially reliant on the expectation of stability in order to make money but become increasingly unstable in the event that there is any volatility, either internal or external to the market. Of course, one of the largest components of this is the trillion dollars' worth of share buybacks. Where, I mean, in almost purely literal fashion, the S&P 500 is self-cannibalizing itself by issuing debt, using that debt to then retire shares in what is now become a massive trade.

Christopher Cole: 10:14 So, if we go back and we think about some of these reflexive Ouroboros, of course the snake eating its own tail, it believes it's nourishing itself. But this is an illusion because eventually it will kill itself. These self-reinforcing strategies, they will reinforce stability until they suddenly become unstable.

Demetri Kofinas: 10:37 Until the snake runs out of its own tail, there's nothing left to eat.

Christopher Cole: 10:40 Out of its own tail. That's right. And a lot of people congratulated me on the 2017 paper because it correctly foreshadowed the demise of the short volatility ETPs, that was the XIV product that blew up. And we in explicit detail outlined why that was going to happen both in the 2017 and 2015 paper.

Christopher Cole: 11:01 However, that's just the smallest component of this trade. Back during the 1987 crisis in the stock market where the market dropped 20% in one day, the reflexive strategies which were in essence short gamma strategies like portfolio insurance, those were only 2% of the market and contributed to a 20% one day decline in the stock market. Today, these short volatility products are upwards of eight to 10% of the total market. So, it's quite powerful, especially in a market that's being dominated by passive investors.

Demetri Kofinas: 11:32 You're equating people that are buying volatility as buying insurance, the equivalent of buying portfolio insurance in this analogy.

Christopher Cole: 11:41 I think in this analogy it describes any strategy that continuously applies leverage based on the assumption of stability.

Demetri Kofinas: 11:47 This is, and I highly suggest for listeners, I mean, it makes more sense with you than almost any other guests we've had, for people to get a copy of this latest paper, I have a link to it in the rundown and I pull from your latest paper in formulating the material for this rundown and for the questions. But there's a great image, you always have these beautiful images. One of them is the same image, actually you have it both in your paper from 2017 as well as this most recent one, which is the self-eating, the tail eating snake. And on each of these scales you've got things like risk premia, CTAs, VaR rebalancing, risk parity. These are all volatility suppressing mean reverting strategies and aspects of the market. Is that why you've included them there?

Christopher Cole: 12:34 That's right. And if we take a step back, I mean, this can be done on a micro level, right? The snake eating its own tail is done on a micro level in the 2017 paper because it talks about individual financial strategies. But if we go out on a more macro level, the snake devouring its own tail represents entire secular periods of the overall market. During an initial stock market boom, an initial stock market boom becomes driven by usually some sort of combination of legitimate growth, favorable demographics and technology. That elicits an initial growth period and expansion of the stock market.

Christopher Cole: 13:15 But then as that growth goes on, as it goes on, in order to generate consistent growth in corporate earnings, year over year, we run out of fundamental drivers. Either the demographics don't look as good, the technology becomes commoditized or overvalued or just fundamentally there's not enough drivers to keep growth going.

- Christopher Cole:** 13:39 When we enter that late stage, we start to rely on financial engineering and debt and then all of a sudden the availability of credit and debt expansion and valuation, multiple expansion, start driving the growth cycle rather than fundamentals. This is very deceiving because if you look at secular cycles, this can occur for many years at a time, certainly in the late 20s, obviously we saw this in the mid 60s, we saw this during the late 90s and we're in that stage today where now, at least according to the Bank for International Settlements, it takes 11% for every initial dollar of debt, you're getting 11% less growth than you got several years ago.
- Christopher Cole:** 14:25 When economic expansion becomes driven solely by debt creation, central bank actions, credit availability, and multiple expansion rather than anything fundamental, you enter into this dangerous stage where it becomes a snake devouring its own tail. And then if we take that to the micro level, you then look at different financial engineering strategies that have proliferated such as short volatility selling in which where people are selling volatility because they can't get enough yield, there's really a way of leveraging the stability of the stock market. You see that in the US, you've seen that in places like Japan with the structured notice showing some of the Uridashi products.
- Christopher Cole:** 15:08 So, if you can't find growth, you start to introduce financial engineering tricks in order to create the illusion of yield and the illusion of growth. And this is where you get into this destabilizing process where the snake is now devouring itself. That can go on for a while until some sort of either internal shock or external shock in the sense what I've shown as the hawk. The hawk represents the forces of change that come down and attack the snake and disrupt this perpetual but decaying growth cycle. So that's the overall metaphor there.
- Demetri Kofinas:** 15:46 I want to ask you about that imagery of the hawk and the snake for listeners to really get it. What you're saying is that there is increasingly a disconnect between financial markets and the underlying economy. I think one of the interesting things about your point about debt to GDP of the bang for the buck, that there's a diminishing return on every dollar, that suggest to me that there is this powerful deflationary force at the center, this force of pulling markets to the left tail. But policymakers are simultaneously pushing it to the right tail, and this has been a debate that was raging in the early years after the financial crisis and which I imagine will come up again. How do you think about that in terms of the way you think about these tails and these wings in terms of the hawk? How do you think about that and how do you imagine that expresses itself?
- Christopher Cole:** 16:38 Sure, definitely. Well, if we go back to this metaphor of the hawk attacking the serpent, which really is. I mean, this is on the Great Seal of the United States of America. It's on the coat of arms of Mexico. It was an omen in the Iliad. It's in Greek, Egyptian, Indian, Aztec mythology. But really this allegory talks about this conflict of opposites. You have the serpent which represents the lower self, which is vital, but the lower kind of self-replicating self; and then you have the enlightened mind of the hawk.
- Christopher Cole:** 17:10 In economics, I see this as, the serpent represents this period of secular growth, fueled by value creation, rising asset prices. And that starts by some combination of good demographics, technology, globalization, prosperity. But as the secular boom matures in a cycle, it's corrupted and it's corrupted by greed,

fiat devaluation. And then eventually debt expansion replaces fundamentals as a critical driver of those gains.

- Christopher Cole:** 17:39 But the hawk comes down and it represents the forces of secular change that can destroy that corrupted gross cycle of the serpent. But there are two wings to that hawk and that's what makes them difficult. The two wings, there's the left wing which represents the deflationary path. The deflationary path, and we'll talk a lot about this, this is where you have an aging population like they've had in Japan, like they have now in Europe and like we have coming on up. That drives low inflation, faltering growth, and then debt default.
- Christopher Cole:** 18:10 But then you have this right wing of the hawk which represents inflation, fiat default and helicopter money where you in essence devalue the currency and create inflation to deal with your default. You can default on your debt in two ways. You can default on it or you can devalue money. The two wings of the hawk represent these different avenues.
- Christopher Cole:** 18:30 The point that I want to make is that it's almost impossible to predict what avenue we might go to. Typically, what we've seen historically is that you have these powerful forces pull you to the left wing, you have this horrible deflationary asset price crash, and then finally you have devaluation of the currency and an inflationary kind of crisis that occurs thereafter. It's impossible to tell necessarily what wing of the hawk we're going to get at any point in time and a lot of it is dependent on policy choices that are impossible to fully predict.
- Christopher Cole:** 19:09 But the point that I want to make is that if you're a fiduciary or if you're a retiree, you can build a portfolio that has elements of the hawk and serpent that can thrive no matter what happens. And that's what's really important, and I think the message of that portfolio is incredibly important right now because I think as we will show in this paper, and we can talk about a lot of the way that entitlement programs, pension systems are run right now, they're almost entirely geared towards the assets and the performance of these or the expectation of the serpent areas of secular growth.
- Christopher Cole:** 19:51 And if we don't get a repeat of those growth areas, most of the entitlement programs in our country right now are already below 50% funded when you take into account lower growth rates, and that means that an entitlement default and a financial and social crisis is almost certain if we don't actually rethink the way portfolios are organized and balanced.
- Demetri Kofinas:** 20:17 That kind of touches on a little bit and maybe we can discuss it, it touches on what has been this need for yield that is well above and beyond the risk free rate, 5%, 7%, maybe even higher depending on the money manager, depending on the portfolio. How important has this need for yield, not just the desire for it but the need for it been in driving the risk taking and how important do you think it'll be in fomenting or driving the policy options that will be deployed by policy makers in the years ahead?
- Christopher Cole:** 20:55 Well, thirst for yield represents what I will say is a recency bias and a delusion. It's a delusion as to what we could actually expect from yields. I will say right now that recency bias is a major systemic risk. It is a systemic risk. And what do I mean by recency bias? Recency bias is the expectation that the past that we've

experienced is likely to continue on in the future. I want to throw out some stats, I think, which are quite scary.

- Christopher Cole:** 21:30 The average investment advisor is 52 years old. They entered the industry in the early 1990s and they were a kindergartener during the last stagflationary bear market of the 1970s. So that means the average financial advisor cut their teeth in this period between 1984 to today, which by all measures of financial history was one of the greatest and most significant periods of asset price growth ever, ever!
- Christopher Cole:** 22:00 So, if we go back and we look at 200 years of history, a remarkable 91% of the price appreciation for a classic equity and bond portfolio over the last 90, 100 years comes from just 22 years between 1984 and 2007. It's amazing. 91% of the gains. 94% of the gains from domestic equities, 76% of the gains from bonds and 72% of the performance in home values were also from the period of 1984 to 2007. That period alone was responsible for those percentages of gains over the last 90 years.
- Demetri Kofinas:** 22:39 How do we think about those in real terms when comparing, for example, to the 1920s?
- Christopher Cole:** 22:45 I mean, if we go back and you think about this, right? The silent generation hated the stock market. They were afraid of buying homes. They were afraid of buying the stock market. Imagine you are a GI coming back from World War II, that year is 1946, and you come home, you marry your sweetheart, you want to have kids and family and you get some advice to say, "Go take your savings and put it in the stock market and buy a house and leverage it." All you could remember; the stock market went through 17 years of declines. 17 years, declines; home prices, 17 years of declines.
- Demetri Kofinas:** 23:22 You're saying before 1946.
- Christopher Cole:** 23:24 That's right. The period between 1929 up to 46, you would not have made your money. You would not have made your money. In fact, Japan has actually experienced this as well. The period of 1989 to 2003, someone would have lost over 50%. If you'd invested in the Japanese stock market in 1999, you'd be down 50% by 2003. That's incredible.
- Demetri Kofinas:** 23:48 Well, they still haven't made back. They still high, right?
- Christopher Cole:** 23:51 Exactly. They have not. That's exactly right. You'd still be waiting to make back your gains. And so, the GI who saw his parents invest in the stock market, who saw his parents lose their home would say, "Why would I want to be in stocks or real estate because it's been almost 20 years and my parents still haven't made their money back. I'm going to go put my money in a certificate of deposit." Recency bias was quite dangerous at that point because obviously the period between 46 and the 1950s was a tremendous period of economic growth as you had a dynamic where the US became the only last standing power, was rebuilding the world, and there's a tremendous demographic boom.
- Christopher Cole:** 24:31 Well, it's the exact opposite logic today. Recency bias is now the exact opposite where the largest generation in American history, baby boomers, entered the workforce in the early 80s, they began plowing money into stocks, bonds, and

real estate, interest rates dropped from 19% all the way to zero. And the baby boomers, their flows kept flowing into markets as the world became more globalized, inflation was under control, there was a major technological change and it was all fantastic. And so, we had this incredible period of growth between 1984 which really technically ended in 2007. As interest rates fell, boomers came to power and began saving and we had a lot of globalization.

Christopher Cole: 25:18 Well now, after this incredible four decades of growth, we now have the highest corporate debt to GDP in American history. Close to \$17 trillion in negative yielding debt globally. It's difficult for taxes to go much lower, and we haven't a historically high income disparity. And this is at a point where now the baby boomers are not putting money into the stock market. They have to draw it out. There's \$28 trillion of retirement assets that are going to have to come out of the market at a certain point in time.

Christopher Cole: 25:48 So, all of these factors, all of these secular factors are now turning against us. But unlike the opposite of what happened in 1946, everyone has the sugar high, this four decade sugar high because they're only looking at returns over the last four decades of seeing, "Wow, look at what equity markets did. Look at what real estate did." But the returns that we're expecting over the last four decades are very unlikely to be repeated over the next decade or the next four decades. And I think the net result of this is people expecting, the average US pension system is expecting 7.25% returns.

Christopher Cole: 26:27 If they can't get that return, what they're doing is they're turning to financial engineering products that short stability, doubling down trying to get those returns, and as a result of that, they're adding on more risk. They're adding on more debt. We are now a snake eating its own tail searching for yield. But this is not a solution. It's actually going to be part of the problem. I think a key thing you would think, boy, okay, the average USD pension system, they need to get 7.25% on plan assets. Back in the 90s you could get that on high grade corporate debt, but now it's very difficult to get 7.25% on plan assets.

Christopher Cole: 27:05 Well, the average system is about 70% funded. But in the event returns are just 2% lower, that average pension system falls from 70% funded to under 50% funded, and over one third of the state pension systems will have a funding ratio below 30%. The total underfunded pension liability will expand from \$1.4 trillion to \$3 to \$10 trillion. Conservatively, it could be four times the cost of the bail out of the banking system in the great financial crisis, or that \$3 trillion is pretty much the entire forward year tax revenues of the US government.

Christopher Cole: 27:47 So, we've based our assumptions on returns over the last four decades. But if you look back over 100 or 200 years, those last four decades were one of the most incredible periods of asset price expansion ever, not just in US history but ever. And if we don't replicate that, if we're unable to replicate that and by any rational person looking at the data would say it's very difficult to, a default in the pension and entitlement system is inevitable; and that will set up a generational, financial and social crisis.

Demetri Kofinas: 28:23 A lot of questions have come up for me while you're talking. One of them that I want to explore next, although I want to interject with another one, but I want to say it quickly, is a continuation of this point about recency bias because you're highlighting the cultural component of recency bias. But I do want to ask

you what time series asset managers are looking at and testing their strategies against and how that factors in. But before we explore that, you mentioned this cyclical drop in interest rates or secular drop in interest rates from early 1980s until the financial crisis or up through today. How much does this account for the anti-correlation between bonds and equities? Because you've pointed this out before, that historically bonds and equities actually spend more time correlated than not correlated. So how much does this play a role?

- Christopher Cole:** 29:17 Yeah. Well I think to... and I'll answer that question. I really want to let people know though that this is not doomsday. It doesn't have to be doomsday because there is a solution to these problems. But the solution is actually creating an allocation that balances offensive asset classes like stocks and real estate with defensive allocations that profit from periods of change like volatility investing, like gold, like commodity trending.
- Christopher Cole:** 29:54 One of the things that we've shown is that it's not about being afraid, it's about being prepared. And that if you're an institutional investor or you're a retail investor, if you look at different portfolio allocations that have large allocations to asset classes that are uncorrelated to stocks and bonds, that is the key to a portfolio that can last 100 years. And we'll get into that in a little bit more.
- Christopher Cole:** 30:23 But to kind of answer your question on things, I think there's been four key trends that have driven the outperformance of traditional asset classes like stocks and bonds over the last four decades. So, we've actually recorded multi-generational lows in stock market volatility and asset price volatility. That's been a key one. More importantly that is not looked at very much is the fact that asset price trending is very close to multi-decade lows.
- Christopher Cole:** 30:54 What do I mean by asset price trending? What I mean by that is, what is the propensity for the stock market to continue a trend in the event that very low asset price trending or high mean reversion means that if the stock market was down yesterday, it was very likely to be up today. We've seen a lot of that behavior over the recent years.
- Demetri Kofinas:** 31:14 By the dip mentality.
- Christopher Cole:** 31:15 By the dip mentality. Exactly. But in the past actually it wasn't always the case. If the stock market was down yesterday, it was more likely to be down today and down the next day or vice versa. So that's really interesting. Another thing we're seeing is obviously a secular low in interest rates. Obviously, rates at one point it's almost unimaginable to think, but there were at 19% and have been dropped all the way down to zero and in the US are likely to go back down to zero again. Obviously in Europe we have negative interest rates.
- Demetri Kofinas:** 31:45 That's been a huge boon to the... just for our listeners who may not be familiar, that's a boon to bond holders. If you're holding bonds and rates are perpetually dropping, the price of your bonds go up, so it's a great investment.
- Christopher Cole:** 31:58 Yes. It's a great investment. One of the things that people think about, the average investment advisor says, "Okay, you should be in stocks and bonds, and bonds are going to be a hedge to your stocks." Okay, that's true most of the time. Certainly, if interest rates are at 6%, policymakers have a lot of room to

lower interest rates, and every time they lower interest rates that results in additional gains on top of the coupons for bonds.

- Christopher Cole:** 32:23 Well, the problem is that given where interest rates are today, in about 150 basis points, for you to get the same type of return on your bond portfolio, US rates would have to go to negative 1.5% to get the same type of return that you got in a rate. And that's because rates are starting from a much lower base. Obviously moving rates down to negative 1.5% could have other social ramifications. So, it's just, you're not going to get the same type of return from a bond portfolio that you did when interest rates were at 5% or 10%, it's just math.
- Demetri Kofinas:** 32:59 It's also a question of, and this I hope we can kind of try get to it or navigate it when we talk about the hawk and the left and the right tail and the left and the right wings, but there's really a question of, how low can you take rates? How much money can you create before you begin to meaningfully deface the value of the currency in which the bond is denominated? We haven't really seen that up until now. Perhaps we've seen it just generally in terms of asset prices, but we haven't seen it in many other ways that people worried about. But please continue.
- Christopher Cole:** 33:31 Yeah. If we talk about some of these dynamics as they interrelate to one another, obviously the lower volatility goes, the more people feel comfortable shorting volatility as a source of yield, and that comes in a variety of different ways, either implicitly or explicitly. Obviously, the more interest rates drop, the more incentivized people are to use financial engineering to find ways to generate excess yield.
- Christopher Cole:** 33:55 The fourth factor I didn't quite mention was liquidity. We're actually seeing very low liquidity in markets. So, what this means is that the less liquidity there is, the more there is danger for air pockets. And then finally, the more that there's mean reversion in asset price trending that impacts both volatility and liquidity as well, the more that asset prices are likely to mean revert, the more you are willing to take an opposing bet on stability.
- Christopher Cole:** 34:21 Let's talk a little bit about a popular retail strategy that I would say is implicitly short volatility. This is a great example. This is the strategy of buying on dips, a very popular strategy that many investors have done. What this simply means is that if the stock market was down yesterday, you buy it today expecting it to go back up and mean revert. This strategy is not technically shorting volatility in the sense that you're not shorting a derivative or shorting a put option. But the strategy, if executed systematically, actually has an exposure to short volatility because it's a short volatility exposure dynamic because in essence you're doubling down every single time the bet moves against you. So, it actually ends up replicating and has replication to a shortfall position.
- Demetri Kofinas:** 35:07 Money rushes in to douse the fire. Or to alleviate the air pockets, money comes into the market, is your point.
- Christopher Cole:** 35:14 That's right.
- Demetri Kofinas:** 35:14 This condition of buying the dip.

Christopher Cole: 35:16 Exactly. So, someone might think, I'm not shorting volatility, but if you're buying the dip, you are in essence creating an implicit short volatility position that's actually highly correlated to a strategy like selling pullets. That strategy has returned buying dips; every time the stock market's done, gone down, that has generated a 10% return over the last decade. Not bad, right? Wow, that's great. Wonderful returns over the last decade. Well, if I go back and I test that strategy, going back 90 years, I see something very different. I see a strategy that has gone bankrupt. I mean, literally you lose all your money three times over 90 years by systematically buying every single time every day the market is down.

Christopher Cole: 36:05 This is an example where people are attenuated to doing something. If you go on these message boards, you go on Twitter, everyone says, "Buy the dip, buy the dip, buy the dip," I don't think most people realize that systematically applying a buy the dip strategy over 90 years is a recipe for bankruptcy.

Demetri Kofinas: 36:19 So how many asset managers are testing their strategies against time series that don't go back before the 1980s?

Christopher Cole: 36:26 Yeah, I'd say practically none.

Demetri Kofinas: 36:27 Why is that?

Christopher Cole: 36:29 I mean, I think what's quite interesting is that some of the largest quantitative managers in the world, and there's many, many strategies like this, there's not that great data going back past the 80s in different markets like options. So, you have to make some assumptions. And in our paper, we go at great lengths to explain the assumptions we make. But essentially what a lot of people say is, well, if it can't be executed, literally executed, and if you don't have tick by tick data, then we're not going to back test it. And if he can't back test it, then we're just going to ignore that that data history exists.

Christopher Cole: 37:02 So most of these modern asset managers are big, big managers running hundreds of billions of dollars in strategies, we'll simply say that, well, if we can't get a good assessment on what it would have done if there wasn't a specific market prior to 1986, we're not going to run our back tests over that any longer history. And so, they'll extol these incredible back tests starting in the 80s or 90s or early 2000s without any realistic assessment of how these strategies would have performed over 90 years.

Christopher Cole: 37:35 So what we did is we actually at Artemis went to great lengths modeling out each of these independent strategies with very defensible assumptions and tried to, in a very honest way, understand how they would have performed. There are some strategies that I actually think perform better than I would have anticipated. For example, risk parity is a strategy that legitimately I think did better than I thought it would have done in different other regimes.

Demetri Kofinas: 38:00 Can you explain what risk parity is for those of our listeners who may not know.

Christopher Cole: 38:04 Risk parity in a nutshell is a strategy that seeks to equalize risk adjusted returns across different asset classes in a way that effectively it ends up being a strategy that leverages bonds. You have, usually bonds, stocks and commodities, but compared to a classic 60/40 portfolio, the risk parity portfolio is going to apply

some leverage to the fixed income component of the strategy. But overall, you're rebalancing the risk adjusted returns of these different asset classes based on some rolling period across time.

- Demetri Kofinas:** 38:36 So in order to make up the yield that you would have if you were more fully invested in equities, you just leverage up the bond portfolio a little bit more.
- Christopher Cole:** 38:46 In practice that's what you end up seeing a lot of the time. Effectively what they'll find is that even though stocks have a higher return, US treasury bonds have a higher risk adjusted return. Using a different mathematics, you would come up with a different weight that might leverage the fixed income component of the portfolio and to balance out the risk weightings between stocks, bonds, and commodities and to have that reweight itself every quarter or every six months or every year.
- Christopher Cole:** 39:14 That strategy, very popular strategy, there's about \$500 billion worth of that strategy in US equities alone, but that strategy didn't do terribly over 90 years. I think it does a lot worse during the 1930s than most people would imagine because as we talked about, you're not getting much return out of your bond portfolio. When bonds are at the zero bound, they lose their anti-correlation to equities and they don't perform as well.
- Christopher Cole:** 39:41 There are some strategies I think that really did shockingly bad to a point that I think people should be aware of. Many pension systems are doing these short volatility overlays. This might include selling puts, or it might include covered call strategies where you have exposure to the stock market, and you sell calls against these strategies. We found that these strategies at best had 90% drawdowns over the years.
- Demetri Kofinas:** 40:06 You're talking about selling insurance to the market.
- Christopher Cole:** 40:09 That's right. These strategies not only underperformed, they represented complete impairment of cash.
- Demetri Kofinas:** 40:15 This is what XIV was doing, right?
- Christopher Cole:** 40:16 I would say XIV was a levered version of this. There's a lot of investors that are, for example, one of the most popular would be just call over writing where you have a portfolio of stocks and you sell calls against that. You think that seems really safe. You're doing that for excess yield. That seems really safe in theory. If you go back-test that to 1986 you'd say, "Okay, that's done pretty well. This seems like a great portfolio." Well, if you go back-test that over 90 years, you see a very, very different reality.
- Demetri Kofinas:** 40:47 Was it one of your points when you presented at Grant's in 2012 that at that time it was actually in your favor to sell insurance to the market, that it was actually a profitable trade to make.
- Christopher Cole:** 41:00 Let me explain this for a second. It's not that selling volatility is bad all the time, right? I'm not somebody who's going to sit back and say that it's always bad. It's something that when it's done tactically and when it's done on a discretionary basis, you say, "Okay, we believe that the risk premium that the market is charging at this point in time is too expensive. So, we're going to put on a

tactical trade in order to sell volatility to harness that." This isn't what these institutions are doing. They're systematically selling insurance regardless of the price. It's a strategy that people put on continuously expecting it to be-

- Demetri Kofinas:** 41:44 They're depending on things staying the same. Back to your point about the Ouroboros, they're expecting a reversion of the mean, they're betting on no change.
- Christopher Cole:** 41:53 Constantly as a form of yield, as a consistent systematic strategy. And there's entire institutions that are built on this. I guess one of the things that I've talked about in this paper is that those strategies, they will go bankrupt over 100 years. Even some of the most innocuous ones, the one that's most innocuous is selling upside volatility on the stock market. You own the stock market and you sell the gains for excess yield. Well, what could possibly go wrong? And I could say, "Well, let's look at the period leading in the 1932." The stock market drops 80% between 1929 and 1932. You lose 80% of your money, but you're making a little bit of yield on the insurance that you're selling on the upside.
- Christopher Cole:** 42:39 Then we have the Banking Act of 1932 and the market goes up 70% in literally 1.4 months. A month and a half, the market goes up 70%. It's incredible, right? Well, imagine this. You've realized the brunt of the declines on your portfolio, but all the way down, you're selling insurance on a market rebound, then the market rebounds massively high, and as a result of the insurance that you've been selling for excess yield, you don't get to realize that 70% gain. In fact, you're realizing a loss.
- Christopher Cole:** 43:16 So boy, I mean, something as simple as a covered call strategy. Now, this is one example. I mean, that's just one of the episodes. I mean, we can get into... there's so many other different examples of that.
- Demetri Kofinas:** 43:31 And this is why timeshares is so important, right? I mean this really highlights the point. It depends on what you're looking at. How big is the data set that you're examining? If it's just from 1980, you get a very different set of results than if you look at the dataset from 1920, right?
- Christopher Cole:** 43:48 That's right. Or the 1970s is very different. The problem is that we've been in this one regime where baby boomers came into the stock market right at a period where the world began globalizing. All these capital inflows came in, interest rates dropped from 19% all the way to zero and we think this is normal. We're expecting returns to match that reality and it's not possible for us to get the type of returns you get when taxes are cut from extreme highs in the 70s all the way down to where they are today. Interest rates drop.
- Christopher Cole:** 44:27 You have one large generation in American history enter the prime earning years right at the point in time the world globalizes and this is your baseline expectation. Anything that doesn't match that expectation will represent underfunded liabilities. And if you can't get that expectation, you're willing to plow on more debt and take additional financial engineering risk to try to match those ridiculous expectations. So, we need to rethink the entire way we think about portfolio management. Effectively what's been happening is that investors have been seeking excess yield to solve their problems when in fact that is a recipe for crisis.

- Demetri Kofinas:** 45:12 This is where I've wanted to get to, right? Rethinking portfolio construction, and that's where we're going to go. But before we do that, I have one more question. In the paper at one point you write, "To seek our fortune, we must first understand our place in history." This goes back to the point about, how big is the data set that you're looking at? Where are we... in that larger open ended data set that hasn't taken into account what's going to happen yet, where do you think we are today in 2020?
- Christopher Cole:** 45:44 I think we're at a very similar to where we were in the early 1930s, very similar to where we were in the 1960s, going into late 1960s. We're at a point of transition from secular growth to secular decline. That can take many different forms. Effectively we've had a long period of excess returns, a long period of demographic inflows and we are now transitioning to a period of likely lower returns, demographic capital outflows, globalization breaking down into more individual interest of countries and nationalism and then finally a shift from capital creation to income redistribution.
- Christopher Cole:** 46:32 So, when you go from a period of secular growth to a period of secular change, it's very difficult to understand how that will cut. It can cut to either wing of the hawk. You can have a deflationary collapse; I think that's what a lot of people are afraid of. Or you could have a situation where they do helicopter money, they devalue the currency and you get a very different type of volatility where asset prices are sustained, but you eat away at your debt with inflation and income redistribution.
- Christopher Cole:** 47:07 So, on one end of the spectrum, you have the standard portfolio that is just dominated by these assets that are linked to secular growth. The standard portfolio as your average retiree, it's most of the pension systems out there. It's most of the entitlement programs out there, which currently have an allocation that's 72% allocated to equity linked products, 72% allocated equity and equity linked products.
- Christopher Cole:** 47:34 If there's any type of downturn, these institutions are very susceptible to that type of risk. But it also goes in tandem because if you're a retiree or if you're someone who has a job, you're likely to lose that job in an economic downturn right at the time your portfolio is going down.
- Demetri Kofinas:** 47:52 Their portfolios and their jobs, everything is implicitly short vol.
- Christopher Cole:** 47:57 Yeah, implicitly short vol or another way of saying there's long instability. And then if you're an institution or a state pension system, well, you're relying on tax receipts. Well, all of a sudden if there's an economic downturn, your risk assets do really badly, and the tax receipts go down. And people, if you try to raise taxes, people are going to move out of your state. So, this all compounds the problem.
- Christopher Cole:** 48:20 So in essence, all of these risks are correlated to one another. And people who are in these secular growth portfolios, much like the serpent, they lack the self-introspection to understand whether they're genuinely eating something that is fundamental prey or if they're just devouring themselves on accident. And it's very easy to be like, "Well, you're alarmist. Look at the last two years, I've made X percent," not realizing what a period of secular decline can do.

- Christopher Cole:** 48:47 But there's another spectrum to this. The other end of the spectrum is the overly defensive investor who says, "I don't want to be in stocks. I'm afraid of stocks." These are the investors that hoard gold, they hoard cash and they buy a bunch of portfolio insurance. The problem is that these portfolios really fail to participate in any secular growth. If they're all in cash, they can underperform if there's any type of fiat devaluation. And definitely if you're a portfolio advisor, you're going to get fired by your client if that portfolio is not timed perfectly to the business cycle.
- Demetri Kofinas:** 49:25 They bleed out.
- Christopher Cole:** 49:26 You bleed out. Yeah. So, I think the thing that I found is that if you want a portfolio that consistently does well through every single decade, that compounds through every single decade, you need to rebalance these two juxtaposed forces, the force of the hawk and the force of the serpent. The forces of secular growth and the forces of secular change. That is the key to a portfolio that grows consistently over 100 years. And it's so painfully obvious when you look at the results.
- Christopher Cole:** 50:01 To that effect I talk a little bit about this power of duality, the idea of opposing and complimenting energies, and this is like yin and yang, winter and summer, male and female. There's so many examples of this in nature and in life. One of the ones I really love is Dennis Rodman, the basketball player who's the lowest scoring inductee in the Basketball Hall of Fame. I grew up being a Rodman fan in Detroit. Rodman couldn't score consistently outside of five feet. So, he was a terrible score. He couldn't shoot. But counterintuitively, when Rodman was put on the floor with other basketball players, the offensive efficiency of his team improved. It was incredible. It shot through the roof.
- Demetri Kofinas:** 50:48 He added convexity to their portfolio essentially.
- Christopher Cole:** 50:50 That's right. One of the reasons this happened is that Rodman was so good at one skill, is that he rebounded the basketball. He was six standard deviations better at rebounding than anyone else in the league. It was absolutely incredible. So, when another player missed a shot, Rodman would get the rebound and give them a second chance and sometimes a third chance. All of those extra chances dramatically enhanced the scoring ability of his teammates. And it turned an average team into a good team, and it turned a good team into a great team. And that's one of the reasons that Rodman was a key contributor on five championship teams.
- Christopher Cole:** 51:30 There's some great analysis that Rodman, based on wins over replacement metrics, was one of the 20 greatest players to ever play the game of basketball simply because he was so good at rebounding. In asset management, it's the same thing. If you have two asset classes that are correlated to the growth cycle, those two asset classes, you say, "Okay well, I'm going to put them together. I'm going to get a better portfolio." Yeah, you'll get bigger returns, but you'll get bigger draw downs and bigger crises during periods of declines.
- Christopher Cole:** 52:02 Actually a portfolio that's a better portfolio on both an absolute return or a risk adjusted basis is taking a growth asset, combining with an asset that maybe doesn't make any money but is anti-correlated to that growth asset. And when you put that portfolio together, you get better overall returns and better overall

risk returns than adding two asset classes that are correlated with positive returns.

- Demetri Kofinas:** 52:28 I want to move from this general conversation about portfolio construction to specifics because what I think is notable about this most recent paper is that, and you mentioned Dennis Rodman, of course you wrote a paper where you used Dennis Rodman as a metaphor for adding convexity to your portfolio. But to my knowledge, this paper is the most specific in terms of portfolio construction and what asset classes and strategies you should deploy in tandem in order to achieve the most balanced high yielding portfolio over 100 years. I want to discuss that in the overtime, Chris.
- Demetri Kofinas:** 53:04 For regular listeners, you know the drill. If you're new to the program or if you haven't subscribed yet to our audio file, Autodidact or Super Nerd Tiers, head over to patreon.com/hiddenforces. You can also go down to the summary of this week's episode in your podcast application and click on the link that takes you directly to our Patreon page as well as to the link with instructions on how to integrate the RSS overtime feed with your favorite podcasting application of choice. Chris, thank you so much and stick around. We'll be right back for the second half of this conversation.
- Demetri Kofinas:** 53:43 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.
- Demetri Kofinas:** 54:22 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 at Hidden Forces Pod or send me an email. As always, thanks for listening. We'll see you next week.