Rodrigo Gordilllo:	00:00:00	Music.

Welcome to Gestalt University, hosted by the team at ReSolve Asset Management, where evidence inspires confidence. These podcasts will dig deep to uncover investment truths and life hacks you won't find in the mainstream media, covering topics that appeal to left-brained robots, right-brained poets and everyone in between. All with the goal of helping you reach excellence. Welcome to the journey.

Music.

Speaker 2:	00:00:28	Mike Philbrick, Adam Butler, Rodrigo Gordillo, and Jason Russell are principals of ReSolve Asset Management. Due to industry regulations, they will not discuss any of ReSolve's funds on this podcast. All opinions expressed by the principals are solely their own opinion and do not express the opinion of ReSolve Asset Management. This podcast is for information purposes only and should not be relied upon as a basis for investment decisions. For more information, visit investresolve.com.

Music.

Adam Butler:	00:00:54	Hello, and welcome to this episode of the Gestalt University Podcast. I am your host, Adam Butler, the Chief Investment Officer at ReSolve Asset Management. Today's special guest is Andrew Miller, who I have labeled Renaissance Advisor because Andrew brings such a deep, thoughtful, mindful background and framework for thinking about virtually every dimension of the investment management and estate planning problem for private individuals.

Andrew runs a very successful advisory practice out of Indianapolis and has very deep expertise in both the investment side, having had a background in analyzing private investments and hedge funds at an institution before migrating to the private wealth side of the business. And so he's thought very deeply about how to create diversified optimal portfolios for private individuals, with all of the myriad objectives that private individuals bring to the table.

He also has spent an enormous amount of time and invested quite a lot of money in research and building great tools to better understand the retirement planning problem as well as the estate problem especially in terms of asset location. So how to optimize where each of the different investments in the portfolio should go in order to minimize taxes while maintaining appropriate portfolio diversification, et cetera. So this is quite a wide ranging conversation and Andrew brings unique insights to each of these critically important dimensions of the investment challenge for advisors and individuals. Without further ado, I'm excited to bring you this conversation with Andrew Miller. Please enjoy.

Music.

So Andrew, welcome. Thanks so much. This has actually been too long, getting you on the podcast. We've had some really good conversations obviously on the phone, but also I think some of our best chats have been in advance of The March for the Fallen where we always get together at Wes' house or the Alpha Architect headquarters in advance, the night before or a couple of nights before and that always leads to great opportunities for conversation, but I'm glad to finally have you on.

Andrew Miller: 00:03:03   Well, thank you. It's a lot of fun being here and I think, there's a call last time, but it was kind of remiss that we weren't recording the conversation we had. I think perhaps before our video interview and then maybe on the way to Jeremy's podcast.

Adam Butler: 00:03:15   That's exactly right. I think we were talking about cleaning covariance matrices or something like that, which those who are listening are going to discover that Andrew is a bit of a polymath, so he can speak very intelligently on a wide variety of topics. I'm sure we won't have a chance to cover all of them today, but I do think it would be worthwhile for you to just give a brief introduction and I'd love for you to share your journey to how you came to be the advisor you are.

The Backgrounder

Andrew Miller: 00:03:42   Sure. I guess kind of a somewhat prototypical fashion, I was interested in the investing world, probably about 10 or 12. My father was a CPA, so was familiar with a lot of financial concepts and we started a private investment company. In order to get that started, I was required to read Professor Damodaran's book on Investment Valuation, at 12. So I got a bit of a head start and after high school, shut that down and took out the cash in college, used that to buy the engagement ring for my wife. Probably the best return on investment I've ever had.

After college, I got interested in working professionally in the financial industry and worked for Delaware Investment Advisers and started on the commercial loan underwriting department. I quickly moved into helping co-manage what they've viewed as, I think they called it the 10 basis point project or something like that. It was about a $2 billion carve out from the general account that was designed to provide uncorrelated sources of return. So it was a hedge fund portfolio, private equity portfolio, real estate private equity portfolio, anything designed to be uncorrelated to fixed income markets to help generate 10 to 20 extra basis points of return over and above the general account.

After about five years of doing that, my father started the financial planning firm in 2002 and in 2007, he was looking to make a transition and I was looking to make a transition too. I sat down and chatted, switched to the financial planning and investment advisor role that I've been in now for the last 13 years or so.

| Adam Butler: | 00:05:21 | So many people get introduced to investing through a family member or a close friend, and that person gives them some things to read or research, and that informs how they think about the investment problem for most of their lives. It sort of informs their investment personality. I've seen this time and again. I'm just wondering, do you feel like your experience reading Damodaran at that age and then working on the credit book, and then in the private equity hedge fund space. How do you think that informs how you think about the investment problem now? |

Asset Pricing Premiums

| Andrew Miller: | 00:06:06 | Probably, you might find that I'm far more interested in maybe, first principle's theory and understanding how an asset might be priced and why it's priced that way. I think with that comes the understanding of why should I earn a premium, some kind of return over and above the risk-free rate and how does that make sense in a portfolio? So that's the theoretical side. |

And just being involved in the credit markets and then maybe call it the alternative premia investment strategies, you begin to realize that stocks and bonds are a little bit like chocolate and vanilla ice cream flavors. They're great. They're the bedrock despite anything else you want to do, but it's just two flavors. There's the Baskin-Robbins 31 flavors of different risk premia that you can invest in.

To have something that is really a finished polished product that is perhaps more robust to the unknowable future, you really do need to diversify and really begin to spread risk in a portfolio across lots of different premia. Because we simply don't know what's going to work in the future, especially in five or 10 year segments of time. We're trying to build portfolios that generate some kind of return, probably over a 20 or 30 year period of time in order to make somebody's financial plan work.

In order to do that, it takes some work to understand how different pieces fit together, how the premia work together, what kind of risk premia in total you're likely to get, what kind if risk level does that lead to, what causes the portfolio as it's constructed, to fail, what might cause it to go right. There's a deep theoretical understanding needed when you're constructing portfolios.

| Adam Butler: | 00:07:50 | Yeah, agreed. I think you were one of the early adopters, certainly in the advisory arena of these all premia strategies. So given that we've had now five or six or seven years of live trading in these strategies, and there's now been a variety of firms that have launched these types of strategies and all of them approach all premia from a slightly different direction, how would you say your views on these types of approaches have evolved? |

| Andrew Miller: | 00:08:21 | I don't think there's really a simple answer to that question. I still think they're there. Portfolio construction matters a lot and maybe even more so in the alternative premia space. Just as an example, the traditional value portfolio of |

going long the third of large stocks with the cheapest price to book and short the third with the most expensive price to book, and then replicating that again in the smaller cap space. It's one definition of value. It relies a lot more on the small value premia than the large. So it makes it much harder to be investible.

The value premia itself isn't market cap weighted then. It has a single rebalance date either annually or monthly, so it's just one small sliver of what that premia might look like. If you were to say, reconstitute it with price to earnings and rebalance on the 15th of the month instead of the end of the month, you can end up with a markedly different experience while still investing in the value premium.

| Adam Butler: | 00:09:25 | Yeah, so that's an example, right? So pick the exact same characteristics for sort, rebounds on the 15th of the month, run that strategy. You have a different account that rebalances on the last day of the month. Run that in a separate account and then look at the performance of these year over year, and what you could very easily observe and do observe historically, is that in many years the ones that rebalance on the 15th of the month had a positive year or the one that rebalances on the end of the month had a negative year or vice versa. This is totally due to random noise and is not at all accounted for in how most investors evaluate their allocations to products and strategies. |

| Andrew Miller: | 00:10:05 | Precisely. So I think the one takeaway there and something that I began to appreciate more over time is just how important craftsmanship is, especially in the alternative premia. Market cap weighted stock exposure is a great way to get started and get your foot in the water of investing. But one added benefit is, it's simple. There are rules and ironically enough, index investing is somewhat active but there are some rules that govern what gets out of the portfolio, what gets taken out when they rebalance. |

Just somewhat recently, they announced that they were going to skip a rebalance. So that was an active decision. That's fine, but they're very simple decisions. There's not a lot of craftsmanship in running an index, at least a market cap weighted index. The more granular I think you get in the strategy, the more possible variants you have and the more important it is to take into consideration the craftsmanship. In some ways, the diversification of it.

I think one lesson learned over time is, be way more humble than you think you need to be because there are lots of ways for things to fail out of sample, and it's really hard to get everything to work perfectly, to look like a genius. So I think one takeaway is diversify far more broadly in the alternative premia than you really think. It could be single manager but it needs to be a single manager who in essence, tranches portfolios, has lots of different definitions of the strategy in there, lots of different trading decisions that sometimes simple can be good, but sometimes simple can get you in trouble too when you don't understand perhaps why a simple definition of a strategy didn't work as you intended.

| Adam Butler: | 00:11:43 | It goes the other way too, of course. I mean, if you've got a thoughtful strategy that does take care to tranche their rebalances, to be humble about how they specify their models. So if it's value, you've got a variety of different specifications for value, a variety of different ways of constructing portfolios. So you're sufficiently diversified across all the major dimensions of risk. Then you're in a situation where your diversified model will always be underperforming some random single specification of a strategy that is branded the same way.

You've had an ensemble value strategy, it's doing what it does, which is a relatively smooth line. In any given year you're going to have some random hyper specified value product or value index that is just going to kick ass that year. And your diversified approach is going to look weak. Then there's going to be some groups that are going to underperform the diversified approach.

But investors who don't understand that out-performance of the highly specified approach is due to random noise and that over the long term, the diversified approach is likely to deliver better performance out of sample, will be tricked. We certainly see that all the time, and I don't know how you manage that or avoid that type of risk and just perception of risk with clients too. |
| Andrew Miller: | 00:13:10 | It's really hard. One of the ways I found to be, I guess maybe, less tempted to be hot money so to speak is to really understand the portfolio construction and begin to do some attribution analysis digging into, "But why?" You dig in through that first layer to understand, "Okay, perhaps it was a factor definition. Oh, okay. That helps explain some of the out-performance. Okay, but then why?"

Then you keep asking that question and digging in all the way down to trading decisions of, "Oh, okay. It's because this reconstituted this date and, okay well, let's play around with it and let's create an alternative reality. What happens if it was rebalanced on this date?" You begin to try to back out all of the decisions along the way and perhaps, pseudo create the ensemble for them and then take a look at the pseudo ensemble to say, "Is this still what I want? Is it extracting the premium I expect it to extract?"

Ignoring some of the decisions that have a really big influence in returns over the short term to say, "Okay, let's just pretend they didn't make that particular decision and really look at higher level decisions." It's tough. It's an art. I think even though you're doing it, the live actual results, you're always weighing something. The devil that sits on your shoulder but it's like, "Okay, but here's what they actually did." Don't pay attention to the theoretical stuff, you need to pay attention to hard data. It's really, really hard to weigh and balance those two to understand what you own and have the conviction to continue to own it that it's going to extract the premia you expect it to extract. |

Diversification Strategies

Adam Butler:	00:14:50	Yeah. The last two or three years I think is revealing in terms of how we should think about diversification in the old premia space, don't you think? I mean, while the correlations if you look at them on a daily basis or even on a monthly basis are lower, just a visual inspection of these strategies, you can't help but come away feeling like they are more related than we may have originally thought from some of the historical data.
Andrew Miller:	00:15:25	Yes, I'm going to butcher it since I'm not deeply involved in physics, but is it the Schrödinger's paradox that things exist and don't exist all at the same time, and the existence of something helps reveal its state? That the more people are aware of this, I think begins to alter the reality a little bit going forward? Kind of gets down to understanding why you earn a premium in the first place, that you need to really be focusing on something that is either an economic reason for the premium or a behavioral reason for the premium to exist.
		But even think the behavioral can be on a bit of shaky ground I think, because over time investor behavior has largely gotten better. I think indexing is going to help reduce at least some of the inter-asset premium. Start looking across sectional value and momentum and quality, some of those I think are just going to be tougher premiums to earn over time because indexing I think, has come to remove a lot of the aggregate behavioral mistakes for investors going forward.
		Personally, I think I've come to appreciate some of the more traditional premia. Instead of just looking outside of value and momentum, some of the premia like merger arbitrage premium and convertible arbitrage premium and lots of other alternative premia I think, fit in portfolios and help defray I guess, some of the decline in value momentum specifically over time. It's easy to look at back tests and assume history will continue. It's very hard to understand what one should expect realistically going forward with the evolution of market participants.
Adam Butler:	00:17:10	Yeah. No, absolutely. And you take, I think a novel approach in how you allocate. You actually trend-follow to a certain extent, your managers, right? Even some of the old premia managers, in the past?
Andrew Miller:	00:17:25	Yes. Interestingly enough, trend shows up in lots of places, even including the alternative premia themselves to a certain extent... This may get a bit wonky and this is a bit of a working hypothesis so, interested in any feedback or thoughts you might have. I think one of the reasons trend-following is so interesting is, if you have a non-normal distribution or a distribution that tends to have some fairly fat tails and volatility is positively correlated, by trend-following you are in essence, beginning to chop off the left tail.
		So if to the extent, value follows that kind of probability or return distribution and momentum certainly does, you can in essence use trend-following to take advantage of that return distribution a little bit and remove some of the left tail. And as you do that, you force the whole return distribution a bit to the right and

pick up some returns simply because the negative compounding out of the left tail isn't as bad. I think most alternative premia are that way and I think March, is a great example why.

I think any strategy that tends to be liquid in liquidity crises, will suffer. It doesn't matter what the correlation matrix might show in events like March, where it's like, "Just give me cash and I don't care." Or you have to deal with deleveraging cycles. Things get very, very correlated, even if they might be market neutral. And one can take advantage of that in alternative premia just like traditional risk premia, like the equity risk premia or the term premia.

So those are somewhat minor bets in portfolios and probably the best way that those implemented might be in rebalancing decisions themselves. But yeah, I think there's something exploitable there, not to give too much away.

Adam Butler: 00:19:11 Yeah. I mean, we've researched some of that internally and have migrated much more towards conditional relationships between factors at an individual market level. So our thinking has evolved pretty substantially on that. But I will say that having some very high level or fairly basic analysis of how trend applies to trading factor portfolios, I'm keen to see your research on it. I haven't really seen a lot of success with it but I'd certainly take your word for it that there's something there.

I want to shift gears a little bit because I know actually, while you are a real student of the markets and student of empirical finance in particular, I think your real passion is on the planning side. I mean, we've had lots of conversations about planning. We co-developed a couple of tools and bandied around different ways of thinking about the problem, but I'd love to hear how your thinking on retirement planning and retirement modeling has evolved through time.

Evolution of Retirement Planning

I started with motion of the Moshe Milevsky and the inverse gamma distribution and the parametric models, and migrating fairly quickly to bootstrap models. But there's still lots of challenges and problems fundamentally with those. Where did you start, and has your thinking evolved through time there?

Andrew Miller: 00:20:31 I think like most people perhaps are slightly embarrassed about where one begins when you evolve over time, starts really with almost more on calculator, net present value computations that assume that there's a linear relationship. Then you begin to get into perhaps dangerously naive rules of thumb, like the 4% withdrawal rule. And you begin to see all of the assumptions that go into a rule of thumb like that. Your eyes open up a little bit to, "Oh my gosh, I can't believe I'm making this implicit assumption about levels of returns or levels of risk, or even states of the market."

You begin to then build your own models and try to control more of the assumptions. So that way you feel like either the assumptions that you're making are more plausible and you have a little more control over what happens in the simulation itself.

And then there are some interesting research implications for perhaps where we might go in the future. I guess I'm thinking more generally with the engine itself that drives a financial plan, whether it be a Monte Carlo simulation. Some interesting areas in the future are perhaps modeling real market behavior inside of the Monte Carlo engine itself with mean reversion and rates of return, which I know that may get some people's hair on their neck standing up a little bit.

But I think it exists in the sense of, if you consider a bond as an example. You buy it at a 6% rate, the yield to maturity. Whatever the length of the bond, when it matures you get 6%. Let's say you buy it day one at 6% and price declines day two. So that its yield to maturity now is 7% not six. If you were to run the Monte Carlo simulation day one using a 6% return, it's probably a pretty good model of what you can likely experience. But day two, you now have a bond with a yield of maturity of 7%.

Why should the Monte Carlo simulation just, again assume a 6% rate of return and the bonds yielded seven. So you need to update that capital market assumption in the model to say, "Well no, it's really a 7% return and some fluctuations around that," or whatever that might be. You can do that I think pretty safely with bonds. Monte Carlo doesn't really do that, currently. You could probably do something similar with equity markets and suddenly what you have now is a Monte Carlo simulation with dynamic capital asset pricing assumptions.

So that's kind of I think, where my interest lies now. Is in having the simulation itself be more dynamic and you don't tell it what return assumptions to use, like use 8% for equities or what have you, but you code in your belief perhaps of the asset pricing theory, what drives these returns, and then you allow the software to update those return assumptions over time and dynamically.

Adam Butler:	00:23:25	So you start with a set of initial conditions?
Andrew Miller:	00:23:27	Exactly.
Adam Butler:	00:23:28	Then you have functions that are evolutionary functions and will adjust the capital market expectations at each step, given assumptions about market momentum or market long term mean reversion and as you say, with bonds. That is fairly straightforward. We've got really good models that explain 95 to 98% of the variance of forward bond returns over a period equal to twice the duration.
Andrew Miller:	00:23:59	Exactly.

Adam Butler:	00:24:00	And with equities, I guess you'd have to tease out what those relationships may look like and be fairly humble with your ability to specify what some of those parameters are.

Andrew Miller:	00:24:12	Exactly. You could do this I think in a spectrum of potential, I guess, asset pricing theories. Perhaps you believe in a somewhat fixed risk premium, so now you're just updating the risk-free rate over time. Just as one example, to perhaps having on the complete opposite end of the spectrum, you believe in some mean variance or something like a CAPE ratio might drive the return expectation over time.
		So you model a CAPE ratio over time and you believe that it reverts back to some mean or median multiple over some time horizon, and you're kind of baking lots of assumptions into that one. But you could use anywhere along the spectrum of what fits with your assumption of what drives asset class returns.

Adam Butler:	00:24:59	What emerges from that is an ensemble of estimates, then you can weight the different models and what have you, and hopefully get to a closer estimate of reality than what you get with the naive model.

Andrew Miller:	00:25:11	Exactly. And I think this might be a distinction without a difference. When you run just traditional Monte Carlo, what you get is the median case and probably things within one standard deviation of the median begin to make sense conceptually. But what happens is the tails of a traditional Monte Carlo in a financial plan are almost ludicrously good and ludicrously bad.
		And it's because that expectation doesn't get updated over time. So you get a fantastic return year one, it doesn't tamp down all of the return expectations going forward, it just comes as great, year one was fantastic. Then it compounds that over time. So that initial good luck gets compounded with more and more good luck. And you just end up with some almost unusable tail scenarios. It doesn't really paint an accurate picture of what the tails look like.
		Anything within one standard deviation makes sense but if you're looking at it from a risk mitigation standpoint, for example, how much equity risk can somebody actually take in their portfolio? And one of the things is you're starting to look at failure rates and failure magnitudes, and how bad can things get. Well, when you're compounding bad cases or bad luck over time, it's going to give you a far more conservative answer than you're likely to face in reality if there's some kind of mean reversion in portfolio returns, either driven through fundamentals like in bonds or perhaps just mean reversion of market multiples. So there are some practical cases.

Adjusting for Bias

Adam Butler:	00:26:41	Yeah. No, for sure. How do you deal with the potential optimistic bias that is injected on a lot of these models by virtue of using U.S. data? Primarily because,

U.S. data has one of the longest histories. Do you have good data for some of the other markets using global financial data back to, God, the 1200s and stuff in some cases? But in terms of the data that most investors have access to and that probably is most meaningful to contemporary modeling, how do you overcome that? Do you just sort of discount the results of the U.S. case?

I mean, if we say the ex-US equity risk premium is on the order of 4% a year, the U.S. is on the order of 6% a year or you just come in halfway or, do you adjust things at all?

Andrew Miller: 00:27:34   I'll start with, we do adjust for that. I don't necessarily mean to think that the way we do it might be the right way, but we even try to use a bit of an ensemble method for something like that. The first one is, it may have been Ante who decomposed the U.S. historical returns and tried to isolate how much of the return was unexpectedly good, by decomposing the returns into their sources over time. And I think it was something on the order of magnitude of about 1% a year. I think it was a little less but that's generally the magnitude. So you can use that to strip away the U.S. historical returns to put it on par with other markets.

The next way is probably a bit first principle of the U.S. got lucky, what really should an equity risk premium be? Then we treat all equity risk premia as that number. If it's equity risk premia, that's our expectation going forward. I think we use somewhere around 5% or so over cash for the equity risk premia there.

The next piece is using a theoretical way to arrive at the risk premia. Take dividends plus real growth, plus inflation. You can use net buybacks plus dividends, whatever your method there. I also think you can use earnings with a 50% constant payout, and that'll give you a similar answer.

The final way is to take medium to long term capital market assumptions from major financial institutions, JP Morgan, BlackRock, AQR research affiliates, and take a look at those. You begin to adjust a little bit for really long term historical numbers and probably a little bit of current valuation adjusted expectations going forward. Then you pretty much put a lot of noise around that for the equity risk premium, and you can be a little more precise with term premia.

Then you run it through the Monte Carlo, and that adds some noise too. And now you're really figuring out how robust somebody's financial plan might be in determining, "Hey, what's a safe spending rate from this portfolio?" Even that is customized for every individual. Time horizon matters a lot, their savings rate when they're not yet retired matters a lot, and you can take into account non-portfolio capital, things like social security payments for a U.S. citizen, how much they have in real estate and what's the correlation between the tenants and their real estate in the overall market.

You begin to build in a lot of this, which is I think why somebody should have the financial plan and not just rely on rule of thumb from a portfolio because that's just looking at a portfolio in isolation, it's looking at only U.S. data, it's only going back to 1926, just as an example. It's assuming that the cash rate is I think somewhere around 3.1% or 3.5% or whatever the U.S. historical cash rate is. So even if you were assuming constant risk premia, you need to shave those returns down by basically 3.1 to 3.5% to adjust for current yields. There's a lot of work to prepare the ingredients, so to speak, of a financial plan even before you do any cooking.

Adam Butler:	00:30:47	Yeah. And I know that your team focuses quite a bit on tax management and asset location. When we last chatted, I think you guys were working on some skunkworks project where you were using generic programming to help inform the optimal asset location in the context of all the other portfolio moving parts. Have you made any progress with that?

Tax Implications

Andrew Miller:	00:31:12	A little bit. Although I think over time, we realized that we were bringing a howitzer to do a knife fight. So I think we've turned down the brain power and actually it's built in Excel and it uses the gradient descent algorithm to solve for that. I'm hoping to maybe have something up shortly, I've been working on it intermittently. Kind of some interesting takeaways here again, I'm not sure how familiar you are with asset location rules of thumb. But if you think conceptually, there are three different account taxation types.

You have a tax free account where that might be like a Roth IRA or a health savings account In the United States. You have a tax deferred, which like a 401k traditional IRA annuity, you don't pay tax on the income inside of the account. But what you pay tax on is when you take a withdrawal, the amount of the withdrawal is considered income, ordinary income. And finally, you have a taxable account. Each year you pay tax on the income generated in that account when it's recognized, so dividends when they're paid, capital gains when you sell them. So that creates a bit of a tax drag.

Well, traditional rule of thumb is, you put bonds inside of the tax deferred account. You try to put as much stock in a tax free account as you can and whatever stock is left over in a taxable account, that's the general rule of thumb. Like all rules of thumb, there's a reason for it, it's probably not a bad starting place. But when you begin to incorporate actual current data prices return assumptions, especially now, a lot of the logic tends to get flipped on its head. Again, this is customized. So you need your own personalized tax rates, time horizon that go into this but... This is probably a little stale but I'll give you an example.

Municipal bonds in the United States have about a 3% yield and they're tax-free. If you're really lucky, you can get a state municipal income bond fund that fits your

state or residency. In which case, you don't even pay state tax on the income. You compare that with a 10 year treasury yield of, I don't know what it was yesterday, 0.66% or something like that. You even take out the taxes on that and you're talking about 0.4% after-tax rate of return. Well, you could earn a 3% tax-free rate of return by owning municipal bonds. And so, that literally flips a lot of the equation on its head on how you want to do this.

Some really rough estimates are for an all equity portfolio. You might be able to add something to the order of 0.25 to 0.4% in after-tax return through optimizing what account owns what, and again, that's dependent on time horizon and your own tax rates and the relative amounts you have in all the different account types, but that gives you a general idea. Then if you have some bonds in your portfolio, a general idea now for somebody with a half stock, half bond allocation is probably on the order of 0.6 to 0.8% of after-tax return improvement from-

Adam Butler:	00:34:18	Well, that's gargantuan.
Andrew Miller:	00:34:19	Yeah. And it's simply due to, you define your target asset allocation. That pickup is just from determining what piece goes in which account. It's a meaningful amount of money from doing it correctly at current rates. So it's not immaterial. And some of this really, you have to have a very good understanding of, what kind of income is going to be generated from all these different kinds of investments? What's the taxation type? Do I get to defer it at all? Is the deferral voluntary or as an example, with a mutual fund they may pay capital gain distribution? And that's an involuntary recognition of gain.

So there are still lots of ways to slip up but one can go a long way towards boosting their after-tax return.

Adam Butler:	00:35:03	Yeah. No, that's really interesting. Shifting gears again, you had a really interesting tweet I think it was last week, it could be earlier this week. Time seem to be melding together.
Andrew Miller:	00:35:14	Yeah. March was a pretty long year.

Short and Long-term Hedges

Adam Butler:	00:35:15	Yeah, exactly. Or decade. But you tweeted about risk management and tail hedging. You made a really interesting statement about whether it makes sense or the degree to which it makes sense to try and hedge against these very short term spikes down versus trying to hedge against the longer term risk of not achieving your required return objectives, for example. And I think that's a really interesting thing to dwell on for a minute. Do you want to expand on that for us?
Andrew Miller:	00:35:49	Sure. Well, and hopefully provide a lot more nuance that the lack of nuance sometimes that Twitter provides. I think it comes down to conceptually, risk for

every investor is different. And I think one really needs to understand the nature of what risk is to each person. I'll take perhaps two opposite ends of the spectrum, in an institution or an endowment and individual funding their own retirement. Ironically, they might be more similar perhaps than I'm going to portray them in their objectives.

But for most individual investors, they're going to be owning liquid products, liquid investments. They want to turn it all to cash, they can do it tomorrow, they can do it today. It's not hard to turn the portfolio into cash. They also have a very long time horizon. They don't have any boards they're reporting to, they don't have an investment committee. They're making their own decisions. Risk for them as you actually model it out in a financial plan, isn't a really quick sharp decline in prices. And especially so, if we touch on something kind of two conversations ago about mean reverting return assumptions, that oftentimes quick declines increase expected returns. Perhaps that isn't really a risk for an individual.

So something like what happened in March, although it's terrifying to experience, that in and of itself isn't a real risk. The risk for an individual is 10 years. Especially 10 years as soon as they start retirement of enduring zero portfolio growth and negative real portfolio growth. That's what tends to kill retirement plans, is not the sharp declines, the grinding out of just going nowhere.

Let's go to the other end of the spectrum. You have an institution, they have liquidity needs. They're required to spend. They have portfolios that have private investments that can't be turned to cash immediately. You perhaps have funds that are being added to the endowment over time and those might be correlated with equity markets. You have spending that might be negatively correlated to equity markets. So as equity markets decline, spending needs might go up. In a situation like that, a sharp decline might literally be a very real risk for that portfolio.

So as you begin to understand the nature of risk I think, you then look at tail risk very differently, that an individual can take on short term tail risk. Now, obviously the risk is you get a big decline and then a flat line for a while, or even a very gradual recovery in which case, they've gone nowhere for 10 years. It's not in and of itself, the sharp decline, it's the long period of no returns. An institution might have liquidity needs and they experience a sharp decline, their funding may go down, their spending needs might go up, they might violate policy constraints on how much private investments they have, their liquidity then is dynamic. Something to hedge that risk I think, makes sense there.

Not to say anything's right or wrong, but I think an individual trying to hedge very short term declines perhaps is a tail hedge mismatch, perhaps. If they were interested in hedging tails, their tail risk looks different and should be hedged differently as well. And I think it's a lot easier to hedge that risk with diversification than perhaps it might be for an institution who might need something more akin

to a hard hedge on that risk. I think you, Rodrigo, Mike and Jason talked about that quite a bit in earlier podcasts. And I think you guys hit the nail on the head of, what is risk? It's an ever evolving, ever changing personalized demon that needs to be dealt with.

Adam Butler:	00:39:27	Yeah. And like you say, for many investors if not for all investors, the first line of defense is better diversification. So in that context, there's been a lot of agitation about the fact that CalPERS is going to take on a little bit of extra leverage in their portfolio to try and hit their required return target. How do you think about that? I guess it depends pretty substantially on what they're going to use that leverage for.

I mean the objective is, we've recognized we've got too high a concentration of risk, let's say in equity risk. And in order for us to diversify into truly orthogonal sources of return, that's going to lower the expected return of the portfolio at the same level or at that current level of volatility because those assets have high Sharpe's maybe, and are uncorrelated but also have low volatility.

So in order to create better balance in the portfolio and achieve our return objectives, we need to layer on some leverage. That's a different conversation than I guess, "We're going to maintain our current portfolio posture and just leave it up." What was your reaction to that? How do you think that applies to other investors?

Andrew Miller:	00:40:45	It's interesting. I guess my first reaction was amusement, the reaction it was generating. Because it's so nuanced in, what exactly are they doing? That until you know that, your reaction should be one of indifference, I think. We could go to one extreme and let's say that they can issue debt very cheaply and perhaps buy back other California higher yielding municipal bonds at the same time. I mean, the link to the bond not necessarily the debenture itself. But there's no duration mismatch or anything like that, and it's like a direct arbitrage of the California Municipal income market.

Something like that, you look at it's like, "Okay, we'll leverage the heck up because there's not a whole lot of real risk there because they're doing something much more similar to - in essence the assets, they are buying is very similar to the debt that they're issuing and there's basis for risk, but it's very minimal risk.

I think what they're doing, well, I don't know what they're doing with the assets but let's pretend. Let's say that they're, to your point, adding assets that reduce risk and they're adding leverage. That is literally the definition of some of the portfolio math on Markowitz's, "You own the portfolio with the highest risk adjusted return and simply, lever it or de-risk it until you hit your return target or your risk target, whichever way you're wanting to solve."

Also, the way pensions work with their liabilities being a little more fixed income like, I think you need to take into account their funding ratios and how they're managing that. There's just a lot that goes into it and it's really hard to think if it's a good idea or a bad idea on its face.

Adam Butler: 00:42:29   Well on its face, it's silly because they obviously already have an enormous amount of leverage on the books that no one's ever batted an eye about. Every private equity or infrastructure deal that they're invested in has a massive amount of leverage to it. There is leverage in the equity book, the S&P is levered over two to one. So I mean, everyone freaks out and gnashes teeth about... And the amount that they're proposing is actually relatively small as a portion of the total size of their book. I think they're talking about 20% excess leverage ratio, so it's minuscule but it seems to have attracted an enormous amount of negative discourse. I always find it fascinating.

Andrew Miller: 00:43:05   One can get in trouble is when you start to mix two of these three, leverage, volatility and illiquidity. And when it's in the same investment. Any one on its face by itself, isn't a problem. I think when you start to mix more than one of those together in the same investment, that begins to be a real issue. If the debt's termed and it's non-callable and they match it against an asset that has a similar investment horizon, that fits with a lot of theory.

I think maybe, Citadel at one point was one of the only hedge funds to get a credit rating and issued term bonds. And I think they were pretty prescient with doing that. That makes a lot of sense. It's when you go borrow money and you think everything's fine, and then you get blown out of the position because everybody else had the same trade on and you're getting margin calls or... That can be dangerous. Even levering but having the leverage termed so it's non-callable leverage, can go a long way to mitigating a lot of risk because you can ride out all of the bumpiness along the way.

Adam Butler: 00:44:07   So speaking of leverage and speaking of shocks and risk, how has 2020 shaken how you think about diversification, how you think about risk management in general? Have any of your views shifted at all?

Diversification and Risk Management

Andrew Miller: 00:44:23   Yes and no. I guess I'll perhaps share some things that I find a little frustrating or surprising about 2020 from the diversification front. March of 2020, was one that was so bifurcated in reaction to things that... Diversifying your diversifiers hurt in the sense that it was pretty much U.S. treasuries and U.S. government agency mortgages, and then everything else.

Even there were a couple of days in there I think you and I were corresponding on Twitter when I think there was a 20 year treasury ETF that was trading at an 8% discount to NAV intraday, that things just got nuts to the level of personally, that

felt more disconnected than some days of September and October in 2008. Stuff that I just thought never would happen, was happening. So to some extent you think you can understand risk but every event is unique and different, and it's going to surprise you.

The things that weren't necessarily surprising when you take a look at a lot of crises, especially short term crises, they tend to be very deflation focused. Fixed income tends to do very well during those kinds of crises because inflation comes down and the real return on bonds continue to look better and better, so yields fall to keep a regular real return. So that was helpful. Personally I think, to assume that's always going to be the case, it's perhaps a bit dangerous.

To the extent we start to get any inflation shocks, I think a lot of people who either aren't students of history or haven't lived through it are going to be a little surprised when stocks and bonds begin to act positively correlated during selloffs. That hasn't been an issue lately, and returns in portfolios have been mildly hurt by having inflation protection over the last 20 plus years. Just because the risk hasn't come to fruition doesn't necessarily mean there isn't a risk there.

| Adam Butler: | 00:46:23 | Yeah. How are you diversifying in a way to allow your investments to be resilient to an inflationary regime? |
| Andrew Miller: | 00:46:32 | Thankfully you can do that somewhat expensively in the fixed income market now, owning treasury inflation protected securities. You can go back and forth on well, to the extent that they're using government published inflation, perhaps that understates actual inflation and your purchasing power can be eroded even in the event of that. But that's certainly one area. |

Second is, you can find sometimes assets that have very high sensitivity to unexpected inflation shocks. I'll use an example. Not to say that we use it but gold historically looks like it has zero correlation to inflation, which say largely an empirical fact, historically. But when you begin to decompose that into expected inflation or inflation that's already should be priced-in, in unexpected inflation it has actually a mild negative sensitivity to changes in unexpected inflation, but a six times beta on unexpected inflation.

So you can begin to take a look at assets that do well towards unexpected inflation shocks because it's unexpected inflation that we should care about not priced-in inflation. So I think that would be one thing to keep an eye on is just, what's expected and what's expected should be discounted. Do you want to in essence, try to look for free call options on unexpected inflation?

| Adam Butler: | 00:47:55 | You're not invested in gold, so how are you implementing diversification in that context? |

Andrew Miller:	00:48:03	Some of it is through trend-following and exposure itself. That we look at trend-following a little bit to the extent that we get any sustained regime in something, whether it be deflation or inflation.
		Trend-following should depending on the speed that you're using, kind of getting back to some of the craftsmanship, pick up on the change in the regime and begin to own assets that are doing well in that particular regime. So to the extent that we get sustained inflationary pressures, my expectation would be that it would probably go along lots of different commodities, short interest rates and probably long and short different currency pairs that would fit with that kind of regime.
		Then on the fixed income side, the inflation protected securities can go a long way to helping, perhaps not completely mitigate but mute some of the noise or harm that unexpected inflation shocks could cause a portfolio.
Adam Butler:	00:48:59	It is a challenge because as we try to demonstrate the empirical efficacy of our portfolios, any attempt to diversify into sleeves that protect against inflation have had negative carry over the past 30 years. You run into this situation where your back test looks substantially worse while fundamentally you understand that you need to have this beta too in unexpected inflation risk.
		So you may create the illusion of having a strategy that is resilient to many different market regimes when you examine the fact that a high unexpected inflation regime has only occurred about 10 or 12% of the time over the last 30 or 40 years. Then you've got to dilute the value somewhat of the empirical data in acknowledgement of that and seek other ways to evaluate the expected efficacy of your models going forward.
Andrew Miller:	00:50:04	Exactly. I'm going to touch interestingly up on two prior conversations we've had. One that gets to the understanding why something should work in theory and the first principles to it like we were talking about on the alternative premia versus what's actually happened and kind of that poll you get, but it hasn't worked recently. Then you can almost turn to your other side and say, "But I really need it in portfolios because I understand intellectually why it needs to be there."
		And gets to also I think another interesting point on, what is risk and what is tail risk for a pension fund who has nominal obligations and will be making nominal payments to its pensioners? Inflation isn't necessarily a risk. To be picked up in your liability over time as perhaps wages rise faster and you are going to have to do some different actuarial assumptions. But in and of itself, the inflation, isn't a risk.
		Take a look at an individual who's funding their retirement from a portfolio. I think one of the biggest risks to that is inflation. And what's interesting is when you actually take a look at the data. When you go back from 1926 through whatever,

the plan that fails it, like the 4.05% portfolio withdrawal rate is not 1929, it's not 1937. It's actually 1964. And it's because-

Adam Butler: 00:51:26 A person who retires in 1964.

Andrew Miller: 00:51:28 Yes, exactly. The one who has to deal with the rampant inflation during the first 10 to 15 years of their portfolio, their plan is ruined and it's not necessarily because of the gross returns over their lifetime, because the gross returns are actually pretty good. They could have been Hans Gruber and going to the beach earning 20%. The reality is, it's the real rate of return that they earned that was just dismal and wrecked the retirement plan.

So I think that perhaps might be a very unappreciated or underappreciated risk to retirees is, you have to understand that inflation poses a very real risk. And it's not necessarily inflation generally, it could be a very personalized rate of inflation. You own your home and it's not leveraged, you don't have to worry about house price inflation in the sense of that cost is fixed. Perhaps your rate of inflation that you need to be worried about is more energy related and perhaps it's exposure to oils and petroleum that gets used in everyday products.

Adam Butler: 00:52:25 Healthcare inflation.

Andrew Miller: 00:52:26 Exactly. As a father to five young kids, tuition inflation is a very real thing. So it's not necessarily inflation per se, but it's your personal definition of inflation.

Adam Butler: 00:52:38 But what's so shocking is how few portfolios are positioned to thrive or even really survive a prolonged inflationary episode. I mean, your typical 60-40 portfolio clearly is going to have a very difficult time. You're probably going to have negative real returns for that inflationary period and the assets that you need in that period are the ones that have for the most part done the worst over the last 10 years.

So how do you sell that kind of diversification? How do you make it real emotionally? How do you connect with clients emotionally on the need for those types of exposures when there's the real risk that they end up just negative attribution line item in their portfolio statements for years to come?

Andrew Miller: 00:53:28 Well, I'll start off with, it's tough and I'm not sure I have a real good solution. I think that one of the easiest things is to be constantly working on education, that your portfolio is not your plan. Your plan is your plan and your portfolio was there simply to implement your plan.

So if let's say you have an investment which is a negative attribution on a portfolio analysis, but it ensures a risk in their plan or even allows them to execute their plan more quickly or wherever that might be. And I'm making this up, I'm not sure that there's an asset that does this, but let's just say. You focus on not necessarily

the portfolio results, although those are important, but it's the progress that they're making towards their plan.

Your success rate has moved from a model 85% to an 87%. This is working. That risk that we talked about of, "Hey, you plan on buying a boat at age 70 and we've been putting this in here, and there's a lot of petroleum costs going into a boat," I don't know, I'm just making it up. But that over allocation to oil stocks that we've had in your portfolio to hedge that risk, well, the good news-bad news is that's done poorly but you can now buy your boat more cheaply. And really trying to directly tie the asset and the liability together a lot like a pension fund does, that it's there to fund spending or a liability. You can call it a goal or whatever, but those two need to be tied.

So I think that goes a long way but there's always going to be re-education necessary because inevitably it's, "Why do I own this again?" It's the, "Yes, we're trying to diffuse a liability here, and here's why." But I think tying it back to the bigger picture can help cure a lot of ills on, I don't know what the term might be but a lighter term, isolation and investment portfolio or anything else where somebody might create a very different benchmark than what their actual benchmark is, both for their portfolio and their plan.

Adam Butler:	00:55:26	Yeah. I mean, I think it's a useful construct to try and position all of the investments in the portfolio as a hedge against something. Your equities are a hedge against not achieving your required return. Your bonds are a hedge against equities failing spectacularly in their primary role. The commodities are in there because the two primary things that you're leaning on, fundamentally are designed to not work in certain economic environments that we just happen to haven't really seen in the last 20 or 30 years but nevertheless, we know can manifest.
		And then connecting those investments to very real future goals is I think a way to emotionally connect to the need for these items, even as they continue to deliver pain on a line item basis, year in, year out. It's good insight.
Andrew Miller:	00:56:19	Interestingly enough if you take a look at funded retirement, really the risk-free rate so to speak, is just a whole series of zero coupon or a ladder of TIPS, treasury inflation protected securities that match all of the expected spending over some actuarial time horizon. Then what you begin to do, I think in reality is say, "Okay, well maybe instead of owning a 30 year TIP, I actually want to own some equities there." And kind of begin to work backwards from that portfolio.
		Two, not to say that we do this or anybody else does this. But the framing is interesting when you go from a benchmark of that instead of starting from a benchmark of market cap weighted global stocks and global bonds. Because it's like well, what you're really saying when you own the market cap weighted stock and bond portfolio is, "My goal is equal to the portfolio aggregate weighted goal of the market participants." But that's not my goal. So I now need to go in and

actually figure out what is my goal and change the portfolio to match that. I think I've probably badly butchered my meaning behind that.

Adam Butler:	00:57:30	I'll pick it up where you are right now. Really, the idea is if you really want to hedge, perfectly hedge or almost perfectly hedge your retirement liabilities, you can do that with a ladder of TIPS. Where the first TIP matures the first year you plan to retire and then the next. So you can absolutely fully hedge that if you like.
		"Here's how much you need to save if you would like to fully perfectly hedge this portfolio with virtually no path risk." And when people see the true cost of that in terms of the amount that they need to save, then that helps to frame the value of the shorter term risks that they need to embrace by investing in things like equities and these all risk premia products and all of the other factors in the portfolio that deliver risk premia above the expected return on this long term inflation protected asset.
Andrew Miller:	00:58:24	Exactly. In essence, what one's doing is putting some statistical confidence intervals around being able to meet those cashflow needs instead of literally diffusing those cashflow needs.
Adam Butler:	00:58:35	Right. With the least onerous imposition on your lifestyle during your working years.
Andrew Miller:	00:58:41	Exactly. It's interesting when you change the framing, sometimes how the perception of that changes. Because I think a lot of people start with the 60-40, and probably more specifically, the U.S. 60-40 portfolio was the starting benchmark and then make changes from there. I think probably the better way to view it is that risk-free ladder of TIPS and then making modifications from there to either get to a savings rate that's palatable or something along those lines. It's just the difference between having a benchmark that is investment focused versus one that is plan focused.
Adam Butler:	00:59:17	Yep. Absolutely. Very good insight. All right. Well, we're about 10 minutes past an hour here and we've covered a lot of ground. Is there anything else you wanted to make sure we chatted about or should we save the rest for next time?
Andrew Miller:	00:59:30	I guess the rest for next time, got everything hopefully insightful or useful.
Adam Butler:	00:59:35	That was terrific. I really appreciate you making time for this. And I really hope we can get back to our usual conversations, especially at The March for the Fallen. That's such a great event and it doesn't look like it's going to go off in the same way this year. But maybe they'll find some creative work around so we can all still have a chance to get together virtually and make the event, and connect the way that we have historically, because it's such a great time.

Andrew Miller:	01:00:00	You bet. Although it'll be a little different when it's suffering individually instead of collectively.
Adam Butler:	01:00:06	Very true. We'll have to find a way to connect the suffering to keep us all going.
Andrew Miller:	01:00:12	Yeah.
Adam Butler:	01:00:12	Anyways, thanks again, Andrew. I really appreciate it. What's your Twitter handle in case people want to follow you?
Andrew Miller:	01:00:18	It's @millerak42.
Adam Butler:	01:00:18	All right. There you go. Thanks again, and I'm sure we'll be chatting soon.
Andrew Miller:	01:00:26	Sounds good. Take care, Adam.
Rodrigo Gordillo:	01:00:27	Thank you for listening to the Gestalt University podcast. You will find all the information we highlighted in this episode in the show notes @investresolve.comforward/blog . You can also learn more about ReSolve's approach to investing by going to our website and research blog, Investresolve.com, where you will find over 200 articles that cover a wide array of important topics in the area of investing.

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