Episode 211: The Math Behind Retirement Decisions (And Why It Matters)

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Retirement income, financial planning, present value, discount rates, break even analysis, internal rate of return, future value, Social Security, pension decisions, funded ratio, cash flows, investment management, risk, opportunity cost, financial personality.

SPEAKERS
Alex Murguia, Wade Pfau, Briana Corbin

Briana Corbin 00:00
The purpose of retire with style is to help you discover the retirement income plan that is right for you. The first step is to discover your retirement income personality. Start by going to retire with style.com/style, and sign up to take the industry's first financial personality tool for retirement planning.

Briana Corbin 00:41
Ever wonder how far your future dollars really go this week, on retire with style, we did Alex take us back to high school algebra, but trust us, it's way more interesting now that your retirement depends on it. We're talking discount rates, break even analysis, internal rate of return. And don't worry, calculators are optional. Common sense is not.

Wade Pfau 01:05
Hey, everyone, welcome to retire with style. I'm Wade, and I'm here with Alex, and we're continuing our journey through retirement income planning. We're going to talk today with Alex specifically about a workshop he did for the retirement researcher Academy with some background education on a theme we'll touch upon from time to time, like statistics and other economic analysis and financial planning. And in particular, today, Alex, the focus is going to be on understanding the ideas of present value, breakeven analysis, discount rates. So Alex, that's really a lot to unpack. Some of our listeners maybe have to get their minds back into middle school, high school algebra class. But, uh, what's this all about? What are we going to be discussing here?

Alex Murguia 01:51
Well, considering my mind was never in middle school, high school algebra class, it'll be challenging. No What, what we wanted to do on, and this is Retirement Research, our online communities, we have a series of workshops every month. And what we wanted to start tackling are some statistical concepts that are somewhat necessary for financial planning, obviously, for investment management, but for financial planning, because if you really take things down to its most common denominator, Wade, at least, I think that present value, future value, internal

rates of return, break even. Analysis really is at the heart of a lot of the decisions we're going to make. People can ask you questions. Wade, about Social Security claiming, about Roth conversions, about pensions or investments, and we'll talk about that later. But at the heart of that, I really do feel it's about a break even analysis. A lot of financial planning is just what's the break even analysis? Because you can do this, or you can do that right, you can go with this, or you can go with that, and ultimately, at the heart of that is determining what the present value is and what you know, a tag along internal rate of return is based on what your nuisance factor is, you know, and that lets you decide if you want to take action or not. And also it allows you to really make an apples to apples comparison when you have two decisions to be made, I think it brings it down to numbers really. And yes, the world is beyond numbers in terms of whether you want to do something or not. I mean, look at the Risa. But at the heart of it, you want to know what the numbers are as well. You know you want to make sure the math is mathing. What do you think? Wade about that?

Wade Pfau 03:43
Yeah, yeah. I know, just finishing up getting ready to publish the third edition of the retirement planning guidebook, and I use the concepts of present value and discount rates in that book quite a bit. So yeah, I think it's worth unpacking. First, we'll ask you some questions about the basic calculations here, but then we can talk about some of the retirement planning applications, I think in particular in the funded ratio chapter and in the Social Security chapter. I use those concepts quite a

Alex Murguia 04:11
bit Exactly. And when we do the when we do our retirement income challenge, and we're talking about how to do the funded ratio, we got easily, 10 variations of the same question for funded ratios that have to do with present value discount rates, right? How to discount, how to discount a future value back to its present value? Right? I mean, it's one of those things. And so, you know, ultimately, this stuff matters, and why? You know, right off the bat, the present value. You're trying to take a future value and think, Well, what is that that you know, what is $10 million in the future worth today? You know, and you do that by applying a discount rate to that. Why do you apply a discount rate to something like that? Well, because ultimately, future dollars are worth less in. Today's dollars. Why? Because opportunity cost. There's risk involved, there's inflation, and heaven forbid you change your mind, if you will. And ultimately, this is the podcast, so it's a little harder to convey equations and things along those lines, but really what we're talking about and what you want to figure out is nothing more than more, not more complicated than multiplication and division. It doesn't get to that higher level of, you know, astrophysics or anything like that. It, it really is simple math here that you're talking about, and the present value of something is what's its future value, you know, divided by the discount rate and the number of years you're bringing that back. That's ultimately what what you're getting at with that. Wait, would you agree?

Wade Pfau 05:52
Yeah, that's what the equation says. You want to check your math, but yeah, maybe to help people just wrap their heads like, like, if we're do something in five years, you'd receive $100 would you rather wait five years to receive $100 or would you rather receive, well, $100 today. Pretty clearly, you'd prefer to get the $100 today. But what if I gave you the option say you could have $80 today or $100 in five years. Now you've got something you need to kind of evaluate, or figure out, what's $100 in five years equivalent to in terms of today's dollars. And you pointed

out some issues related to like the risk and things, but even if there's not any risk, if you could just simply assume you could earn a fixed rate of return if you had the $80 today and you stuck it in a checking or savings account and earned a fixed rate of return over five years, that's, that's how I like to think about discount rates. But it's a way to move money over time so that you can think about it on equivalent terms. So yeah, I think that's a meaningful way to consider it. But, uh, yeah, how would you evaluate that? Like a,

Alex Murguia 07:03
okay, so let's, let's talk about present value conceptually. So let's take your example, but let's use an equation that I have here. So let's say you had, you said something very interesting, which is like, what, what rate would you get in the bank? Right? And let's assume that's the going rate. I like to look at it as, what's your what's the return that you need on something to get out of bed? Because at a certain point you're like, I'm not doing anything. And this goes back to like, do I want to drive an extra 20 miles to make the concept a little reductive? Granted, but let's say, Would you drive 20 miles to save $1 on milk. Is that worth the aggravation? I'm just I'm just talking about nuisance, right? And so to put this in quantifiable terms, let's say your required return on something for you to get out of bed and really hassle and do it is 7% why? Because you can get 7% without, like lifting a finger, let's just assume that it's not that, because the bank it's maybe 3% whatever. But let's just assume it's 7% right? And so if you have a project that is going to be worth 28,000 in five years, and another project that's $25,200 in five years, and let's say you, you need at least a 7% return to make those worthwhile for you. So we're going to apply a 7% return on the discount rate to bring it back to its present what is the present value of that? And this could go back, and we'll get into it, but this would go back to you buying something, right? And so the present value of that is simply, let's say you take the 28,001 project that the future value is 28,000 divided by, you know, 1.07 to represent the 7% you know, over five years. So the you know, the coefficient five, that equals a present value of $19,968 I already did the math before, and I'm not doing this off the top of my head, only Wade can do that right?

Wade Pfau 09:06
Wade, no, no. But just to give you the intuition, yeah, if you're assuming a 7% discount rate, what that really means mathematically is, if I had $19,968 today, and I could earn a 7% return on it over the next five years, it would be worth $28,000 in five years. And that's that future value, yeah.

Alex Murguia 09:27
So the present value of $28,000 at a 7% return over five years is 919 $1,900, that's just, you know, round off here, right? So at 25,000 the future value of 25,200 do the same math, the intuition is the present value for that is $17,900 all right, and so that's what you would need in today's dollars. You know that that would make it neutral. You can have either that today or this 19. 1000, you know, $900 or $17,900 in today's dollars, or 28,000 in five years, or 25,200 in five years. Now, what that does is it allows you to look at these projects in an apples to apples weigh in current price. And you know, it would make sense at a required 7% return, you would choose project a all day long. Why? Because it's a higher present value, and that, even though that seems obvious, you'd be surprised how many financial planning decisions, from a break even standpoint, really, that's all that's being done in the background. But folks don't take the trouble to kind of do it, they just kind of eyeball it. And it's not always the case that it's that clear. Wait, you're going to say something.

Wade Pfau 10:48
Well, in this example, Project A is clearly better because it's worth more money five years from now. But the real life when this comes becomes relevant, and where people might not think through is when you're getting cash flows at different points of time in the future, then it's because one number is bigger than another, if it comes later, you don't really know if it's really a better deal or not, and that's where the true value of present value comes into play, 100%

Alex Murguia 11:17
and so does this Change? Just to get the intuition right? We discounted that that amount at, you know, at a higher number, at a higher rate. But if you discount it differently, you'll find that the numbers change. Wade. You want to talk about the direction of it like we talked about a discount rate at 7% right? What would happen if the discount rate is 4% would the No? Would the present value be higher or lower? And why?

Wade Pfau 11:46
Yeah, the present value would be higher. And this is the exact concept of when interest rates go up, the price of bonds goes down. When interest rates go down, the price of bonds goes up, because if the discount rate is lower, you don't need as much set aside today to grow to be that future value, so that present value will be larger, okay?

Alex Murguia 12:10
And to some extent, when interest rates change, you see movement when they change unexpectedly, right? Usually it doesn't change too much unexpectedly, but when you see these sort of gaps up gap ups or gaps downs in interest rates, it has an effect on the valuation of stocks. Because when you're when somebody is valuing stocks on a fundamental level, from a fundamental analysis point of view, what they're doing is they're applying a discount rate to the future value, to get a present value of what the stock price should be based on future earnings, right? So they're discounting it, and the discount rate there is always based on a risk free rate, what the government, what you can do. Remember, everything's a competition for capital. So if I put my money in the bank, what would I be getting? Or I put my money in 10 year bonds, what would I be getting? Because that I get for just like sleeping, right? And so if I'm going to invest in stocks, I need to be paid above and beyond that, right. And so when rates start going up or down, that changes the discount rate to determine the present value of a stock price, right? And so when it goes down. Stocks will go up when because the value all of a sudden, stocks look cheaper. When rates go up, all of a sudden, stocks look more expensive. So they tend to go down Wade. Do you want to clarify that? Maybe in a different way?

Wade Pfau 13:32
Well, yeah, and so that relationship, it's exact. For bonds, the price of a bond is just the present value of present discounted value of its future cash flows. For stocks, it's you're really kind of, what are the expected future dividends? And if you think the stock's going to grow, you kind of expect higher future cash flows. But there's a lot more uncertainty there. Everything else being the same, though, the price of the stock is roughly speaking the present value of all the future cash flows you'll receive from owning the stock, dividends and any capital appreciation or decline over time. And so it's the same kind of idea where, if your expectations about those future cash flows haven't changed, with the higher interest rate, the price of the stock would be

lower. The present value would be less. With a lower interest rate, the present value of those cash flows would be higher, the the price of the stock would go up. Okay?

Alex Murguia 14:25
So now, now that we can what we've conceptually done is we've done present value equals, effectively the you know, present value equals what the future, what your expected future value is divided by the discount rate and, you know, multiply by the number of years, right? You know, in that sense. But let's now play with numbers. If you know we're talking about stocks. But let's just, let's just play, you know, what the present value of something is, because that's what the price. Basis of the asset, right? You don't have to figure out the present you know what the present value is, and you have a strong expectation of what the future value will be, right? And so now you don't necessarily have a discount rate of mind, but you want to know which is a better deal. And to do that, you figure out an internal rate of return. You don't know what the discount rate is, and you want to know which one gives me a better deal, because sometimes it's hard if something's worth $10,000 in today's value and versus something that's 11,500 but the future value is 21,000 for one of them and 21,800 for the other which is the better deal? You know that kind of thing when the math isn't as obvious and it's a little fuzzy, well, you backtrack and you determine what, which one's giving you a better internal rate of return. And that's immensely important, because I think this is where the financial planning decision making really starts coming into play. And this allows you, when you're looking at two things, to determine which one is actually the better option. And frankly, a little caveat that we'll talk about as well is, remember, your internal rate of return was 7% your your ability to just get out of bed, you need to get paid 7% at least. Let's say the ones above 7% one's slightly below 7% or, let's say they're both above 7% which one do you do? You know, that kind of thing. And so internal rate of return is a very important concept in that manner. And so the expected rate of return for the project that gets you to yes is, to me, what the IRR is, you know, and you have that kind of preordained a little bit

Wade Pfau 16:42
Wait, yeah. So to recap, first we were talking about, you know the future value, the cash flows in the future. And you know the discount rate, you can calculate the present value now you're solving a different direction. You know the present value, and you know the future value. You know what it's worth today. You know the cash flows in the future. Now you want to solve for the discount rate, but there we just change the terminology and call that. You're solving for the internal rate of return. You're doing an internal rate of return calculation to see what discount rate would match those cash flows up.

Alex Murguia 17:17
And so you would see this, let's just say an easy one would be. And this comes up a lot with clients and prospects and folks on our retirement researcher site, where they're asking us about where they ask us about rental properties. So let's say there's an opportunity here. Let's take the same example and where one property, you know, Project A is selling for like, Well, they're both the same, right? So let's just say they're both $15,000 one of them you can expect to sell one. Sell it into the future. You know, you look at the rentals and everything, and you think, look in the future, this is going to be worth $28,000 right? And I want to sell it in five years. The other one in the future is going to be worth 25,200 and again, just making it easy, right? And you want to sell it in five years. The first one represents a 13 and a quarter percent return, internal rate of return. The next one represents not just a year, I mean, a yearly the next one represents an

11% yearly return. And so in IRR So then from that standpoint, you can kind of figure out, in a very clean way, which is the better project right? Project A, because that's a 13 and a quarter percent return versus project B, which is an 11% return. Now that being the case, go back to your required return being 7% they're both. They both exceed the hurdle, right? They both exceed the 7% so they're both good deals. Even though you want a over b, they're both good deals. But where it gets interesting is if, let's say, you begin to negotiate on the price for this property, right? You know then what your lit floor is, and you know what your lit what your ceiling is, right? You don't want to pay so much more that the return becomes less than 7% on an IRR basis. At that point, you're out right. And so this is where it's interesting, where you can begin to negotiate, or you can begin to make financial planning decisions based on, is it meeting my hurdle for an IRR of what I need to make this worth it.

Briana Corbin 19:22
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Wade Pfau 19:50
Yeah, and these examples, since they're both the cash flows coming in a fixed number of years, the answer is a bit more trivial in terms of what's going to give you the higher IRR, but we're again. Where it really applies in practices, when those cash flows are not coming at the same time in the future, then you really do need to make that calculation to see which can give you the higher internal rate of return.

Alex Murguia 20:11
Yeah, and so when you're looking at things, and I can't stress enough, because I see this in in everyday decisions that folks make, it could be about getting rid of cable and buying individual streaming services, right? There's obviously a nuisance factor of, you know, not having a universal remote, I guess, but you get it right. And even though we're not talking about high stakes poker here, it's ultimately, which is a better payout phone plan, you know, these everyday financial planning decisions. It really comes down to these kind of break evens. And so you accept, you know, you accept the project. If the IRR is higher than your required return, you reject it if it's less. And then if you have a decision to make between two, as long as they're both above your internal rate of return, you select the one that's higher with a caveat of, that's where risk, that's where preferences and things like that come into play. All right. Now, again, you can use this with rental properties. You can use this for other areas, if you will Wade you were talking about cash flows and the like. You know, what would be a financial planning example where there's different cash flows and you have to kind of integrate that thinking.

Wade Pfau 21:32
Well, we use this quite extensively in the funded ratio, which is the tool we use at the with retirement researcher to look at, are you funded for retirement? And that's a huge question about cash flows. Some things you know today you have the current values are just like account balances, things that don't imply future cash flows. You've got your account balances, but then so much of retirement planning is about cash flows. Whether it's income sources, I'll get this amount of Social Security every year. I'll get this amount of a pension every year. Those are cash flows that are going to have present values. And then all your retirement expenses, for the

most part, are going to be cash flows. I want to spend this amount of money a year. I want to have this amount set aside as a legacy at my planning age. Those are all future cash flows, and you're going to be calculating present values on all of those. And then, based on the discount rate that you choose, calculate the present value of all your assets, the present value of all your liabilities or expenses, and you see if your assets exceed your liabilities, and then usually that your your liabilities, your expenses are more backdated in retirement. So if you had a higher discount rate, usually that would improve your funded status. The present value of both your assets and liabilities would decrease, but the liabilities would decrease at us at a faster rate than the assets. And it's all present value calculations that's part and parcel. What it's all about,

Alex Murguia 23:03
yeah, and if anyone wants to see this live, Wade, this is something we've been working on. This is something you talk about extensively in your book, your new book that's coming out, well, the previous versions too, but also in the new one. Do you want to give a little blurb? And I guess this is somewhat promotional, but if we don't do it, no one else will right the funded ratio tool that we're coming out with in on the retirement researcher membership side.

Wade Pfau 23:30
Yeah, we've been doing major revisions to improve our funded ratio tool. And all the getting all the bugs out of it. It's not quite finished, although there was substantial, significant improvements and enhancements finished today. So it's making me more you brought the hammer down. Yes, I don't want to clearly say the date that we're going to have our next Retirement Income Challenge, just in case, but I feel in a lot more confident about it today that in late March we'll we'll bring back our retirement income challenges, and we'll give folks week long access to calculate your funded ratio and to get a good financial plan for your retirement with a much new and improved funded ratio tool. So if you've been part of our one of our funded ratio retirement income challenges in the past, I'd encourage you to come to the new one and try out the new tool and make sure you're still on track for your retirement and the dates will likely be the last week of March, but just subject to we do, got to make sure we've got all the bugs out. I don't want to release the funded ratio and find there's still bugs in there. So we're really doing a very thorough and deep dive into it, and we're getting close to being completed at this time. So I'm really looking forward to bringing that new and improved fed ratio to everyone,

Alex Murguia 24:41
yeah and again, just in terms of the takeaway here, present value and analog to that future value. But present value and internal rates of return ultimately begin to simplify complex decisions, just as two properties we said as an example. But. Because they bring everything down to an apples to apples comparison. Whenever you're you have this fork in the road, you need to begin to kind of make sense of it. And by looking at it under the from the lens of present value, future value, internal rate of return and what my discount rate is being my opportunity cost, it begins to really simplify the process, no matter what it is, Social Security, break even, do I do a lump sum or a pension, things like that? That's a cash flow piece that wait, those are all these, these types of calculations. And in fact, I would think a vast majority of financial planning decisions are just present value, internal rates of return analysis with, you know, layered in with the nuances of the regulations of that particular thing that you're looking at right regulations, being taxes and the like. But really at the heart of it, that's what you're looking at. I can't stress that enough, and when you apply that discount rate, you really start to get the true value of something. Now, the beauty of a discount rate is that's the risk free rate. It's kind of set, if you

will. And these tools really begin to allow you to make these rational break evens. And you know, we create a lot of the tools that we create are really spin offs of present value calculations like a financial planning tool, the funded ratio is, you know, front and center in that right now, I can't stress enough, why does discounting matters in everyday life? Well, because you all everything is a competition for capital, right? And you're already getting paid a certain amount from a risk free standpoint, so you always need to compare future money to where you could earn what you to what you can earn elsewhere at the end of the day. That's why keeping money under the bed is kind of very risky, because it's the decision to actually lose money every year on a real term basis, you're actually losing money every year when you when you take into consideration future value, present value and the like, right? And so you always have to compare money to what you could earn elsewhere from a competition standpoint. And the discount rate is your opportunity cost. For me, the discount rate the internal rate the internal rate of return. I see it as this is what I need to like to motivate me to get out of bed. I need this and above that, anything less than that, I'm not going to bother because I just put it in the risk free rate and call it a day, right? So this applies again, how you want to look at rentals, how you want to look at, I said rentals, because that's the example we did. But, you know, basic financial planning items, right? Yeah, there's plenty of scenarios in which you do that Wade. You want to riff off of that a little bit

Wade Pfau 27:52
well, we mentioned briefly earlier, but one of the other big applications would be when you claim Social Security, yeah, the Social Security optimization software that's out there and available to consumers. It's all doing present value calculations based on a discount rate and a longevity. It looks at different claiming strategies and calculates which gives you the highest present value. And then that's the recommended or suggested claiming strategy from the software. So it's another present value application

Alex Murguia 28:22
exactly talk about. Here's one that question that comes up all the time, especially with, like, government employees, which is, do I take a pension, or do I take the drop? Do I take the the I don't know, what do you call it, like lump sum? Yeah, here you go. Do I in Florida? It's called the drop. That's why I had that in my head. Do I take the pension? It sounds terrible, by the way, doesn't it? But do I take the pension, or do I take the lump sum? Well, at its heart, What? What? What are you doing there from an analysis standpoint?

Wade Pfau 28:53
Yeah, that's going to be another present value calculation. And usually the the lump sums are calculated with a discount rate. And so if you check the documentation, you'll find out what discount rate they're using, and then it's kind of back to your analysis in terms of if you think you could easily beat that discount rate with your own kind of finding investments and investing, you might take the lump sum and invest it, but if you think you'd have a hard time, at least Without taking significant risk to beat that discount rate, then you might go ahead and take the pension and get that monthly income which the present value of which for you, if you're really thinking in terms of a lower discount rate for that protected income source, you have a higher present value by taking the pension versus receiving the lump sum of value Today. So it's another application of what you were talking about with looking at the present value and comparing which is going to give you the higher result. Is it the the one they used with their discount rate, or the what you think you'd be able to get as your own discount rate?

Alex Murguia 29:56
And therein lies the rub, right? And that's why it's it's kind. Kind of that's why you have to view the analysis that people present, to some extent, with a grain of salt, because you can easily mess around with a discount rate and all of a sudden show look at this break even. Why would you ever do that? Why would you ever claim Social Security late when you know, yeah, claim it early, and what they're doing is just playing around with those numbers to their advantage.

Wade Pfau 30:26
Yeah, that's one of the big issues. If there's any debates in personal finance right now, there's a contingent of folks that are always talking about you should apply like stock market, like returns to you as a discount rate for Social Security. And if you do that, it would point to claiming early, because the future benefits that you could receive are significantly discounted. With a higher discount rate, they're not worth as much today, and so you don't value from delaying in that sort of calculation. You value from claiming early. It's but it's all right,

Alex Murguia 30:56
I personally don't subscribe to that for one of the things you mentioned earlier, which is, to me, the consistency of cash flow,

Wade Pfau 31:08
well and yeah, like the insurance value of Social Security. Yeah, I just said longevity protected with survivor benefits. There's a lot of value there that you don't necessarily want to mix and match your discount rates and use a stock market type rate on something that's a very secure and reliable 100%

Alex Murguia 31:27
i i think this is when people get too cute by a half, or when some financial planners all of a sudden they want to be contrarians for the house for the sake of being contrarians. And they're like, Aha, what about such and such? But I think they miss this basic foundational concept, you know, and they're no longer doing apples to apples. They're kind of just like stacking the deck in a way that's

Wade Pfau 31:51
total return style. They're comfortable relying on a probability based approach, comfortable relying on market risk premium

Alex Murguia 31:59
and yeah, but they're also comfortable telling you, everyone should do

Wade Pfau 32:02
this, oh, yeah, and everyone

Alex Murguia 32:04
else should follow their lead, which is idiotic, you know, which is like, No, not really, you know, kind of thing. And so that's it. That's all we wanted to do here today. Was really well. The other point I want to make is we broke it down to its math. But the last part that you do is you layer in your preferences, you layer in potential risk, you layer in the fact that life is not optimized on an

Excel spreadsheet, right? And all of those things, and that's where the art comes into play. But the reality is, when it's pure planning analysis, at the heart of, I'm not gonna say everything, but at the heart of, let's say 80% plus of all these financial planning questions that you're deciding is a present value, future value, internal rate of return, discount rate. Kind of analysis. Wade, do you agree or disagree?

Wade Pfau 32:58
Yeah, no, I think it's absolutely the case. It really is the heart and soul of retirement and financial planning calculations.

Alex Murguia 33:08
And there it is. Yeah, it only took us 200 episodes plus to get to the heart and soul of to get to the heart of the matter. But here we are the present value. All right. Everyone. There it is. Thank you for listening to retire with style. We'll catch you next week. Wade. You want to take us away?

Wade Pfau 33:29
Yeah, yeah. Well, next week, we're gonna begin a series of discussions about what's new with the retirement planning guidebook. Third Edition is going to be out very soon. I've got my author's copy already, the only copy in the world at this point. Well, there's one hard copy, one paperback, but soon, there's going to be a lot more. So please stay tuned, and there's a lot more to come with. Retire with style. Have a good week. Everyone bye, everyone.

Briana Corbin 33:55
Wade and Alex are both principals of McLean Asset Management and retirement researcher. Both are SEC registered investment advisors located in Tysons, Virginia. The opinions expressed in this program are for general informational and educational purposes only, and are not intended to provide specific advice or recommendations for any individual or on any specific securities to determine which investments may be appropriate for you consult your financial advisor. All investing comes with the risk, including Risk of Loss past performance does not guarantee future results.