QUANTUM WEALTH SYSTEMS

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# Sequence of Returns, Real Investor Outcomes, and the One Life Problem

A revised and expanded analysis of accumulation, distribution, Monte Carlo limitations, client questions, and the need for dependable retirement structure.

**Core thesis: People do not live inside averages, simulations, or market histories. They live one life, through one sequence of returns, with one set of cash flows, one family, one health journey, one tax environment, and one actual outcome.**

"*You do not know how the story ends until the story ends.*

*We plan looking forward, but we only know the truth looking*

*backward. That is why planning is not about probability of an ending.*

*It is about preparing for the endings we cannot see.*"

# Executive Summary

This conversation begins with sequence of returns and expands into a broader discussion of how financial planning can become overly dependent on averages, flat-return projections, and probability language. Growth assets are powerful, but uncertain. Their results depend on the specific time window a person actually lives through, the timing of cash flows, and whether the person is accumulating or distributing money.

The danger-zone concept, longevity risk, the tool-selection analogy, better client questions, and the shift from accumulation thinking to distribution design all point to one central idea: the plan should not depend on life happening in the right order.

**You do not retire into an average. You retire into an order.**

## The main argument

- The American retirement system shifted much of the responsibility from institutions and pension systems to individual households.
- Individuals now carry more responsibility for saving, investing, allocation, discipline, taxes, liquidity, and lifetime withdrawal decisions.
- Most planning conversations show average returns, historical returns, or probabilities of success, but a real person experiences only one sequence.
- During accumulation, bad returns late can be dangerous because more dollars are exposed and contributions may be highest.
- During distribution, bad returns early can be devastating because withdrawals and market losses attack the same account at the same time.
- The five years before retirement and the five years after retirement form a practical danger zone because the client is transitioning from building assets to depending on assets.
- A portfolio may be liquid on paper, but not every dollar is safely spendable if the same portfolio must support lifetime income.
- A model can call a plan successful if the account ends with a small positive balance, but a human being may have suffered lifestyle failure years earlier.
- The solution is not to abandon growth. The solution is to stop asking growth assets to guarantee the basic structure of a human life.

# 1. The Retirement System Shifted to the Individual

Stock market ownership became a mass-retirement issue only after the retirement system shifted toward individual accounts, mutual funds, and market-based savings. Before that shift, many workers had pensions where investment decisions were handled institutionally. After the shift, individuals increasingly became responsible for investment selection, contribution discipline, volatility, behavior, and lifetime withdrawal decisions.

In 1980, only a small percentage of U.S. households owned mutual funds. By 2025, mutual fund ownership was more than half of U.S. households. ICI reported that 72.7 million U.S. households, or 53.9 percent, owned mutual funds in 2025, representing about 123.2 million individual mutual fund shareholders.

| Year | Households owning mutual funds | % of U.S. households |
|---|---|---|
| 1980 | 4.6 million | 5.7% |
| 1990 | 23.4 million | 25.1% |
| 2000 | 48.6 million | 45.7% |
| 2010 | 53.2 million | 45.3% |
| 2020 | 58.7 million | 45.7% |
| 2025 | 72.7 million | 53.9% |

**This changes the conversation. Sequence of returns is no longer just a technical portfolio concept. It is a mass-retirement-system issue because millions of households now depend on market-linked assets for future income.**

The point is that individuals are humans with human emotions and real-life decision making. They are exposed to marketing, emotion, fear, greed, family needs, health issues, taxes, and the pressure of making decisions during uncertain times. That makes real-life investor outcomes different from clean spreadsheet outcomes.

# 2. Accumulation: The Hidden Sequence Problem Before Retirement

Most people hear about sequence risk only in retirement. The conversation is a much earlier life issue. Sequence risk also matters during accumulation because contributions are not all invested at once. The dollars enter over time, and the returns that happen later are applied to more money than the returns that happen earlier.

## 2.1 Flat return vs. variable return

A flat return projection takes an annual average and applies it smoothly. Real markets do not behave that way. They move up and down. The difference between a smooth assumption and a variable experience can be enormous.

| Scenario | Starting balance | Return assumption | Ending value |
|---|---|---|---|
| Actual S&P; 500 total return sequence, 2000-2025 | $1,000,000 | Variable annual returns | $7,528,461 |
| Flat arithmetic average, 2000-2025 | $1,000,000 | 9.69% every year | $11,074,980 |
| Difference | | | $3,546,519 |

The arithmetic average of the annual returns was about 9.69 percent, but the money did not compound at 9.69 percent. The real compound result was closer to the geometric return, about 8.07 percent in this example. The flat model is much smoother and much richer than the variable path.

> *The average return was not wrong. It was just not the return the dollars actually experienced.*

## 2.2 Arithmetic average vs. geometric return

The simple example captures the concept. If an account loses 20 percent and then gains 20 percent, the arithmetic average is zero. But the account does not return to even.

| Step | Calculation | Value |
|---|---|---|
| Start | | $100 |
| Year 1: -20% | $100 x 0.80 | $80 |
| Year 2: +20% | $80 x 1.20 | $96 |
| Arithmetic average | (-20% + 20%) / 2 | 0% |
| Actual result | $96 vs. $100 starting value | -4% |

This is why volatility matters. A loss has to be recovered from a smaller base. A 20 percent loss requires a 25 percent gain to get back to even. The more volatility, the greater the potential gap between arithmetic average and compound return.

## 2.3 Lump sum sequence vs. contribution sequence

If a person invests a lump sum once, makes no contributions, takes no withdrawals, and has no taxes or fees, reversing the order of returns does not change the ending value. Multiplication does not care about order.

But as soon as cash flows enter the picture, sequence becomes a major issue. Contributions change the math because the account balance is different in each year. The same returns in a different order can create a very different result. In the example below, contributions over time can have very different values.

| Accumulation test | Actual order | Reverse order | Difference |
|---|---|---|---|
| $40,000/year for 25 years, 2000-2024, no fee | $4,991,826 | $2,090,972 | $2,900,855 |
| $10,000 growing 3% yearly, 2000-2025, no fee | $1,956,045 | $755,336 | $1,200,709 |
| $10,000 growing 3% yearly, 2000-2025, 1% fee | $1,668,803 | $636,403 | $1,032,400 |

These examples show the difference between market return and investor return. The market average is the same. The geometric return is the same. The total contribution schedule is the same. But the investor result changes because the dollars enter at different times and experience different returns after they enter.

**Average return is about the starting asset balance. Actual investor return is about the investor's cash-flow journey.**

# 2.4 Personal time window risk

A person who accumulated through one 26-year period could have a completely different experience from a person who accumulated through another 26-year period, even using the same index and same contribution pattern. Example: $10,000 increasing at 3% per year.

**1% fee applied to gross flat returns: 7.24% becomes 6.17% net, and 12.41% becomes 11.29% net. The ending values below are account values after the annual fee.**

| Accumulation window | Return order | Gross flat return | Net return after 1% fee | Ending value after 1% fee |
|---|---|---|---|---|
| 1985-2010 | Actual | 7.24% | 6.17% | $865,924 |
| 1985-2010 | Reverse | 12.41% | 11.29% | $1,875,784 |

In the actual 1985-2010 order, many of the strongest years came early, when the account had less money. Then the 2000-2002 decline and 2008 crash arrived later, when the account was larger. Reversing the order moved weaker years earlier and stronger years later, which helped the investor because more money was exposed to the later strong returns.

> *You do not just invest in the S&P 500. You invest in the S&P 500 during your personal time window.*

## 2.5 Additional accumulation risks to include

- Contribution interruption risk: job loss, business slowdown, health events, divorce, college costs, or caregiving may interrupt savings.
- Behavior during downturns: the math may reward continued buying during declines, but fear often causes people to stop contributions, reduce contributions, or move to cash.
- Late-life contribution concentration: many people save the most in their 40s, 50s, and early 60s. That makes late accumulation years especially important.
- In the final decade before retirement, much of the account balance may reflect the client's own accumulated capital, not just exponential growth. That makes late losses especially painful.
- Human capital risk: the ability to earn income is often the largest asset during working years. If income stops, the accumulation model changes immediately.
- Tax location and future spendable value: a dollar in a traditional IRA, a taxable account, a Roth account, a policy, or an annuity may not have the same after-tax value.
- Liquidity risk: assets may be technically accessible but not strategically available without damaging the plan.
- The final 10 years before retirement: the account is usually larger, the time to recover is shorter, and the emotional pressure is higher.

**Retirement income planning does not begin on the day you retire. It begins with the accumulation sequence that determines what you arrive with.**

# 3. Distribution: A Different Beast

Distribution is not simply accumulation in reverse. It is its own problem. During accumulation, the investor adds money and can often benefit from buying through downturns. During distribution, the retiree removes money, and losses can become permanent because the dollars withdrawn are no longer available to participate in any recovery.

Distribution is a different beast. The portfolio is now being asked to survive market returns, withdrawals, inflation increases, fees, taxes, emergencies, and human spending behavior.

## 3.1 The distribution sequence examples

The following examples used a $1,000,000 starting balance, a $50,000 initial withdrawal, 3 percent annual withdrawal increases, a 1 percent annual asset fee, and annual S&P; 500 total returns. Withdrawals were modeled at the beginning of each year.

| Retirement window | Return order | Ending result |
|---|---|---|
| 1985-2010 | Actual order | $5,779,618 |
| 1985-2010 | Reverse order | Depleted in year 24 |
| 2000-2025 | Actual order | Depleted in year 15 |
| 2000-2025 | Reverse order | $2,615,226 |

This is the cleanest evidence that order matters in retirement. For 1985-2010, strong early returns built a cushion. For 2000-2025, the retiree started with the 2000-2002 bear market, then later faced 2008. The account never had enough early strength to build a durable cushion.

**In accumulation, bad returns late can be dangerous because the account is larger. In distribution, bad returns early can be devastating because withdrawals are coming out while losses are happening. The practical danger zone is roughly the five years before retirement and the five years after retirement.**

## 3.2 Higher withdrawals accelerate the fragility

When the starting withdrawal rises from $50,000 to $60,000, the distribution structure becomes much more fragile. A 6 percent initial withdrawal indexed for inflation is not just slightly more aggressive than a 5 percent withdrawal. It can alter the survival profile entirely.

| Historical window | Return order | Result with $60,000 initial withdrawal |
|---|---|---|
| 1985-2010 | Actual order | $4,767,499 |
| 1985-2010 | Reverse order | Depleted in year 16 |
| 2000-2025 | Actual order | Depleted in year 12 |
| 2000-2025 | Reverse order | $1,978,823 |

The withdrawal pressure changes as the account value changes. A $60,000 withdrawal from a $1,000,000 account is 6 percent. If the account falls to $700,000, that same withdrawal is 8.57 percent. If the account falls to $500,000, it is 12 percent. Inflation can make the pressure worse because the withdrawal amount rises even if the portfolio falls.

> *Inflation can force larger withdrawals from a smaller account.*

## 3.3 Liquidity is not the same as spendability

A managed portfolio may be liquid in the technical sense: assets can be sold and cash can be accessed. But that does not mean every dollar is safely spendable. If the portfolio is also the primary income engine, extra withdrawals can reduce the engine's ability to produce future income.

**Liquid does not mean safely spendable. Just because money can be accessed does not mean the plan can afford for it to be spent.**

This is why emergencies, home repairs, helping children or grandchildren, medical costs, long-term care, and large discretionary expenses are not side issues. Each withdrawal changes the future

income math. A plan that was plausible at $1,000,000 may no longer be plausible at $900,000 if the same income need remains.

## 3.4 Distribution issues to be thought about

- The first 5 to 10 retirement years are the danger zone because the portfolio must still fund the full remaining retirement.
- Required income and desired income should be separated. Essential income needs a different structure than discretionary lifestyle income.
- Gross income is not spendable income. Taxes, Social Security taxation, IRMAA, state taxes, and account type matter.
- Longevity risk is not just living too long. It is needing income longer than the portfolio can support.
- Longevity is also a risk multiplier. A longer life creates more exposure to market downturns, inflation, taxes, health-care costs, and the risk that cognitive impairment makes financial decisions more difficult.
- Long-term care can disrupt even a strong plan by creating large, irregular withdrawals.
- Spousal continuity matters. When one spouse dies, Social Security, taxes, income needs, and vulnerability may change.
- The portfolio should not be asked to do every job: growth, guaranteed income, liquidity, emergencies, legacy, taxes, and care risk.

# 4. Monte Carlo Simulations & the One Life Problem

The critique of Monte Carlo is not merely that clients misunderstand probabilities. The deeper argument is that a retirement plan is a human life problem, not only a portfolio math problem.

## 4.1 Where Monte Carlo came from

The Monte Carlo method was developed in the Los Alamos scientific environment after World War II. Los Alamos describes the method as first conceived in 1946 by Stanislaw Ulam and subsequently developed by John von Neumann, Robert Richtmyer, and Nicholas Metropolis. One of its early uses was calculating neutron diffusion paths for hydrogen-bomb work.

The name came from the Monte Carlo casino because the method uses random sampling to estimate outcomes when exact deterministic calculation is difficult. That history matters because the method was created for mathematical and physical uncertainty, not for capturing the emotional, behavioral, tax, health, and family complexity of a human retirement.

**Monte Carlo can model return uncertainty. It does not model the full human life that must live through the outcome.**

## 4.2 The technical success problem

A common Monte Carlo output is probability of success. But in many retirement models, success can simply mean that the portfolio does not hit zero by the end of the measurement period. In plain English, an account ending with a small positive balance may be counted as successful even if the client lived through years of fear, lifestyle cuts, or near-depletion.

| Monte Carlo-style example | Original plan | After extra $100,000 withdrawal |
|---|---|---|
| Starting balance | $1,000,000 | $900,000 |
| Time horizon | 25 years | 24 years |
| Starting withdrawal | $50,000 | $51,500 |
| Technical success rate | 64.9% | 56.6% |
| Median ending balance | $844,543 | $314,721 |

This example used a simplified return model with random annual returns, a 1 percent fee, and inflation-adjusted withdrawals. It is not a complete financial plan. Its value is that it shows how one life event - a $100,000 withdrawal - can change the probability score and the median ending balance. Real life does this constantly.

When the withdrawal began at $60,000 instead of $50,000, the simplified Monte Carlo-style result produced a technical success rate of about 50.5 percent and a failure rate of about 49.5 percent. The median ending balance was only about $24,423, which illustrates the weakness of a success metric that focuses on whether the portfolio technically survives rather than whether the lifestyle remains intact.

**Portfolio survival is not the same thing as lifestyle survival.**

## 4.3 The one life problem

A person does not live thousands of simulations.

A person lives one life.
One sequence.
One spouse.
One tax environment.
One health journey.
One family situation.
One set of decisions.
One death date.
One actual outcome.

There may be many paths a person could have taken during a lifetime, but only one path is actually lived. That is the only path that can be counted.

You will not know the full result until you reach the end. That is why planning cannot depend only on looking backward. History can teach us, but it cannot tell us which version of the future this person will actually live.

From the client’s point of view, the probability of living their life is 100 percent. The probability of dying at some unknown point is also 100 percent.

But the probability that their assets last as needed is not guaranteed — especially if the plan depends on market sequence, withdrawal behavior, future tax rules, health, family events, and assumptions that may not hold.

That is the one-life problem.

> **You are not living in a simulation. You are living a life.**

This does not mean probability has no place anywhere. It means probability should not be used as the foundation for the essential parts of life. Probabilities may belong in the growth layer. They do not belong in the survival layer.

# 5. The Coherent Framework

When all the thoughts are connected, the framework becomes clear. The problem is not the stock market. The problem is asking the stock market, or any variable asset, to provide certainty where certainty is required.

## 5.1 The two-sided sequence coin

| Phase | What is happening? | Main sequence danger | Plain-language explanation |
|---|---|---|---|
| Accumulation | Money is going in | Bad returns late | A larger account and larger contributions may be exposed to downturns close to retirement. |
| Distribution | Money is coming out | Bad returns early | Withdrawals and losses hit together, leaving fewer dollars to recover later. |

This is the central philosophical structure. Accumulation and distribution are connected but different. The accumulation sequence determines the starting balance for retirement. The distribution sequence determines whether that balance can support income.

The transition period matters. The danger zone is not only the first years after retirement. It includes the years immediately before retirement because the client has less time to recover and is close to depending on the portfolio for income.

## 5.2 Market return vs. investor return

A market return measures the asset. An investor return measures what happened to the investor's actual dollars after payment timing, contribution size, withdrawals, fees, taxes, behavior, and time window. This is why the same index return can create different outcomes for different people.

| Concept | What it measures | Why it can mislead |
|---|---|---|
| Arithmetic average | The simple average of annual percentages | It does not show compound growth. |
| Geometric return | The compound return of the asset | It does not include personal cash flows. |
| Money-weighted investor return | The return on the investor's actual dollars | It depends on timing, behavior, fees, taxes, and withdrawals. |
| Probability of success | How often a model survives under assumptions | It may not capture human confidence, lifestyle, or changing needs. |

## 5.3 The emotional truth

People do not live on averages. They do not live on standard deviations. They do not live on Monte Carlo trials. They live on income, account values, family responsibilities, health, taxes, liquidity, and emotional confidence.

If a retiree watches a $1,000,000 portfolio fall to $600,000 while still needing income, they are unlikely to keep spending as if nothing happened. The plan may technically survive under a model, but the human being may cut lifestyle, stop traveling, postpone repairs, or live in fear. That is a different kind of failure.

**Monte Carlo tells you how many simulated portfolios survived. It does not tell you how many human lives stayed intact.**

# 6. The Solution Bridge: Structure Before Hope

The solution is not to abandon growth. Growth assets are necessary for many plans, especially when retirement may last 25, 30, or more years. The solution is to stop asking growth assets to fund and guarantee the basic structure of life.

## 6.1 Separate the jobs

A stronger design separates the financial life into layers:

| Layer | Purpose | Appropriate tools or concepts |
|---|---|---|
| Survival income | Basic needs that must be dependable | Social Security, pensions, SPIAs, FIAs with lifetime income, protected income floor, cash reserves, insurance design |
| Lifestyle income | Travel, hobbies, family support, upgrades, flexible spending | Portfolio withdrawals, HECM, income ladders, flexible rules |
| Growth and legacy | Long-term wealth, inflation fight, heirs, charity | Market assets, real estate, business interests, tax-efficient accounts, charitable tools |

**Do not ask one asset to do every job. Have a toolbox with different tools for different jobs. You would not use a hammer to dig a hole or a shovel to hammer a nail.**

This allows each asset to perform its proper role. Guaranteed or protected tools can support essential income. Liquidity tools can handle uncertainty. Growth assets can pursue long-term appreciation without being forced to fund every need at the worst possible moment.

## 6.2 The protected income floor

The protected income floor is the part of the plan that should not depend on the market showing up in the right order. It is the foundation that supports life essentials. The portfolio can then become a growth and lifestyle asset rather than the only source of survival income.

The exact tools depend on the client. The principle is what matters: protect the income that must happen, create liquidity for the unknown, and let market assets do what they are designed to do - grow over time with volatility.

**The foundation of the plan should not be built on probability. The foundation should be built on certainty wherever certainty can reasonably be created.**

## 6.3 Better Client Questions: Where Does the Money Come From?

Instead of asking only, "What is my probability of success?" the better retirement question is:

> "*Where does the money come from when life does not follow the spreadsheet?*"

- If the market drops 30%, where does your paycheck come from?
- When markets are struggling, which assets would you spend first?
- How much of your retirement income depends on market performance?
- If taxes rise, where will the additional money come from?
- How exposed is your retirement income to future tax changes?
- If one spouse passes away, does the survivor have enough income to maintain the same lifestyle?
- When the first spouse dies, where does the replacement income come from?
- If long-term care becomes necessary, where does the money come from?
- When inflation raises the cost of living, what adjusts in your plan?
- If you live to 100, what keeps the income flowing?
- How long can your income continue without running out?

**These questions move the conversation from portfolio probability to life design. They are not meant to create fear. They are meant to reveal whether the plan has structure, liquidity, protection, and dependable income when life changes.**

# 7. Final Analysis

The argument is not designed to instill fear. It is built on realism. The stock market can create wealth, but it cannot promise that its returns will arrive in the order a person needs. Averages may be accurate, but they can still mislead. Monte Carlo may be mathematically interesting, but it can compress a human life into a probability score that does not reflect confidence, lifestyle, care needs, cognitive decline, family needs, or real-time behavior.

This message is pro-structure. Use the market for growth. Use guarantees where certainty is needed. Use liquidity for uncertainty. Use planning to separate essential income from discretionary lifestyle. Use risk assets where risk belongs, not where survival depends on certainty.

Retirement requires a mental shift from accumulation to distribution. Many people remain concerned with accumulation throughout retirement. That can create a strange outcome: the retiree lives with anxiety, underspends, avoids enjoying life with family, and later beneficiaries spend the assets that the retiree was afraid to use. That is not necessarily planning success. It may be a different kind of failure.

**The future is unknown, so the strategy has to be built to survive more than one version of the future.**

That is the bridge into the solution: a planning system that does not pretend the future can be predicted, but organizes the client's resources so the most important parts of life are not left to the market sequence alone.

The real message is not only about market order. It is about life order. Markets may not arrive in the order you need. Taxes may not stay where they are. Health may not cooperate. One spouse may not live as long as the other. Inflation may change the cost of life. Retirement may last longer than expected.

It is easy to believe the plan works when everything is smooth.

But the real question is not whether the plan works when everything goes right.

### The real question is:

## Where does the money come from when life does not happen in the order we planned?

# 8. Things worth thinking about!

- The average return was not wrong. It was just not the return the dollars actually experienced.
- The market return measures the asset. The investor return measures the experience of the dollars.
- Life is lived forward and understood backward.
- You do not know how the story ends until the story ends.
- We plan looking forward, but we only know the truth looking backward.
- That is why planning is not about probability of an ending.
- It is about preparing for the endings we cannot see.
- You do not retire into an average. You retire into an order.
- You do not retire into an average. You retire into a sequence, a tax environment, a family situation, a health journey, and one actual life.
- The same returns that build wealth in one order can destroy income in another order.
- The five years before retirement and the five years after retirement are the danger zone.
- Portfolio survival is not the same thing as lifestyle survival.
- Liquid does not mean safely spendable.
- Monte Carlo tells you how many simulated portfolios survived. It does not tell you how many human lives stayed intact.
- Probabilities may belong in the growth layer. They do not belong in the survival layer.
- The answer is not to abandon growth. The answer is to stop asking growth assets to provide certainty.

# 8. Things worth thinking about!

- Do not ask one asset to do every job.
- Different tools belong in different jobs.
- The plan should not depend on life happening in the right order.
- Averages describe history. They do not protect a household.
- Retirement income planning is not about finding the perfect prediction. It is about building a structure that can survive imperfect reality.
- The question is not whether the market can recover. The question is whether the client can wait for it to recover.
- A portfolio can look liquid and still be emotionally unavailable.
- A plan is not strong because it works in a spreadsheet. A plan is strong because it still works when life changes.
- The future does not have to be predicted perfectly if the important parts of the plan are protected properly.
- The more important the income, the less it should depend on luck, timing, or market order.
- Nobody sees a hearse towing a U-Haul. Assets left behind can be enjoyed by beneficiaries, but the retiree may have lived smaller than necessary if fear controlled the plan.

# Sources and Notes

[1] Investment Company Institute, "Ownership of Mutual Funds and Shareholder Sentiment, 2025," ICI Research Perspective, 2025. Also ICI, "Profile of Mutual Fund Shareholders, 2025." These sources report 72.7 million U.S. households, 53.9 percent of U.S. households, and 123.2 million individual mutual fund shareholders in 2025.

[2] ICI historical Fact Book data was used in the conversation for household ownership counts and percentages for 1980, 1990, 2000, 2010, and 2020.

[3] Los Alamos National Laboratory, "Hitting the Jackpot: The Birth of the Monte Carlo Method," describes the Monte Carlo method as conceived by Stanislaw Ulam in 1946 at Los Alamos and developed with John von Neumann, Robert Richtmyer, and Nicholas Metropolis, with early use in neutron diffusion calculations.

[4] Slickcharts, "S&P; 500 Total Returns by Year Since 1926" and "S&P; 500 Price Return, Dividend Return, and Total Return." The annual total return series used in the examples includes price return plus reinvested dividends.

Numerical examples are educational and illustrative. Results depend on annual return dataset, fee timing, withdrawal timing, contribution timing, tax treatment, and other assumptions. This report is not investment, tax, legal, insurance, or financial advice.