

Un-Supermodels and the FIA

*Ibbotson Associates / IFID Centre Conference
University of Chicago - Gleacher Center*

Guaranteed Living Income Benefit Insurance Products

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The Wharton School of Business
University of Pennsylvania
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November 11, 2008

Outline of Presentation

1. Negative Press on Fixed-Indexed Annuities (FIAs)

2. Recent Historical Evidence

Looking back to 1995, when FIAs were first introduced in the US, how do they perform compared to portfolios of stocks and bonds?

3. The Long-Run View

Given the historical experience of US stocks and bonds from 1926, how do FIAs compare to the alternatives listed above?

4. Do Critics Value FIAs Correctly?

Simple models used do not even begin to address FIA valuation

5. Risk Tolerance and FIAs Suitability

- How do FIAs perform when an individual's risk tolerance is considered?
- This analysis considers all features of the distribution of returns, not just the average performance

Disclaimer

- This presentation reflects the collaborative efforts of Professor David F. Babbel, Dr. Miguel Herce, and Dr. Kabir Dutta. While the figures shown in this presentation are believed to be accurate, the presentation is strictly an academic study and not intended to be used a marketing tool.
- In particular, any charts showing accumulation value of annuities and crediting rates derived from historical index returns are based on the assumptions of constant caps and participation rates. This assumption was adopted because it is the same as has been used by critics of annuities. Accumulation value of annuities and crediting rates derived from historical index returns may be higher or lower if caps and participation rates are not fixed.
- Furthermore, we make no projections of future annuity performance. The amount of upside participation in annuity crediting rates will depend, in part, on its cost, which is a function of interest rates and market volatility.



1. Negative Press on FIAs

Negative Press on FIAs – Voudrie

Guarding Your Wealth

Free Financial Advice

**GUARDING
YOUR
WEALTH**



by Jeffrey D. Voudrie, CFP

Equity-Indexed Annuities: “The Investment from Hell”

If you were nearing the edge of the cliff and didn't know it, would you want someone to warn you before it was too late? Of course you would. That's been the guiding principle of this column, to inform everyday investors of the pitfalls that could cause them and their nest egg irreparable harm.

I've been hearing from many of these investors lately. Some of them got the message before they stepped off the cliff. For others, the warning came too late.

Over the past several years I've been sounding the alarm bell due to the inherent dangers found in equity indexed annuities (EIAs). And the message is being heard. I've recently issued detailed reports on [EIAs in general](#) and one specifically on the most popular EIA on the market, the [Allianz MasterDex 10](#). In these free reports, I explain the risks and pitfalls to you that the person selling them doesn't.

Negative Press on FIAs – Voudrie

Why You Must Avoid the Allianz MasterDex 10™ Like the Plague

*Laying Bare the Hyped-Up Promises of
America's Most Popular Equity-Indexed
Annuity*

By Jeffrey D. Voudrie, CFP



Negative Press on FIAs – AnnuityMD.com

A screenshot of the AnnuityMD.com website. The top section has a dark red background with the text "AnnuityMD.com" in white. To the right is a collage of images showing people in a meeting. Below this is a navigation bar with contact information and links for "Contact" and "Order". The main content area features a portrait of Tony Bahu, CEO of AnnuityMD.com, on the left. To the right of the portrait is a quote in red text: "At last! Instantly download the tell-all report now available to the public for the first time ever that's infuriating corporate giants..." Below this is a large red headline: "Industry Infuriating Report Reveals The Astonishing Truths About Your Annuities, The Agents and Insurance Companies That Sell Them, And The Secrets That You've Never Been Told...If You're Suspicious About Your Annuities or Your Agent, This Report Will Tell You Why---And What You Need To Know To Avoid Being The Next Victim".

AnnuityMD.com

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Tony Bahu
CEO of
AnnuityMD.com

"At last! Instantly download the tell-all report now available to the public for the first time ever that's infuriating corporate giants..."

"Industry Infuriating Report Reveals The Astonishing Truths About Your Annuities, The Agents and Insurance Companies That Sell Them, And The Secrets That You've Never Been Told...If You're Suspicious About Your Annuities or Your Agent, This Report Will Tell You Why---And What You Need To Know To Avoid Being The Next Victim"

Negative Press on FIAs – SLCG (Craig McCann)



SECURITIES LITIGATION & CONSULTING GROUP

An Overview of Equity-Indexed Annuities Craig McCann, PhD and Dengpan Luo, PhD¹

Equity-indexed annuities are complex investments sold by insurance companies that pay investors part of the capital appreciation in a stock index and guarantee a minimum return if the contract is held to maturity. Sales of equity-indexed annuities have soared in recent years despite the impenetrable formulas used to calculate their likely returns. Equity-indexed annuities to date have been regulated by state insurance commissions, rather than by the Securities and Exchange Commission and the NASD. In this note, we provide an overview of equity-indexed annuities. We also sketch how they can be valued. We estimate that between 15% and 20% of the premium paid by investors in equity-indexed annuities is a transfer of wealth from unsophisticated investors to insurance companies and their sales forces.

Negative Press on FIAs – FINRA



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Equity-Indexed Annuities—A Complex Choice

Why an Alert on Equity-Indexed Annuities?

Sales of **equity-indexed annuities (EIAs)** have grown considerably in recent years. Although one insurance company at one time included the word "simple" in the name of its product, EIAs are anything but easy to understand. One of the most confusing features of an EIA is the method used to calculate the gain in the index to which the annuity is linked. To make matters worse, there is not one, but several different indexing methods. Because of the variety and complexity of the methods used to credit interest, investors will find it difficult to compare one EIA to another.

Before you buy an EIA, you should understand the various features of this investment and be prepared to ask your insurance agent, broker, financial planner, or other financial professional lots of questions about whether an EIA is right for you.

Negative Press on FIAs – NASAA and Craig McCann



This letter is submitted by the North American Securities Administrators, Inc. (NASAA) in response to the NASD request for comments regarding the above-referenced proposed rule. NASAA believes that many of the practices curtailed by the rule should already have been incorporated as part of firms' compliance programs. Thus, we appreciate the opportunity to comment on certain aspects of the proposed rule, as detailed below.

A. The Proposed Rule Should Cover All Variable Annuity Transactions, Not Just Deferred Variable Annuity Transactions

The specific exclusion of immediate variable annuities from the requirements of the proposed rule raises serious questions about the standards an NASD member would adopt for the sale of immediate variable annuities.

The proposed rule is very specific about an NASD member's requirements regarding the sale of a deferred variable annuity. No conditions are specified for the sale of an immediate variable annuity. There is not even a discussion in the proposal of conditions that would apply. A member must have the same reasonable basis of fact in recommending this type of variable annuity. The customer has the same legal right to be informed of the costs and risks associated with the purchase of an immediate variable annuity. We believe that NASD members have the same legal responsibilities of principal review, documentation and supervisory requirements as specified in Rules 3010 and 3110 for an immediate variable annuity. Because NASAA's view is that the requirements and legal responsibilities surrounding immediate and deferred variable annuity transactions are equivalent, the proposed rule should expressly include provisions governing all variable annuity transactions.

Negative Press on FIAs – SEC (McCann consultant)



U.S. Securities and Exchange Commission

SUMMARY: We are proposing a new rule that would define the terms “annuity contract” and “optional annuity contract” under the Securities Act of 1933. The proposed rule is intended to clarify the status under the federal securities laws of indexed annuities, under which payments to the purchaser are dependent on the performance of a securities index. The proposed rule would apply on a prospective basis to contracts issued on or after the effective date of the rule. We are also proposing to exempt insurance companies from filing reports under the Securities Exchange Act of 1934 with respect to indexed annuities and other securities that are registered under the Securities Act, provided that the securities are regulated under state insurance law, the issuing insurance company and its financial condition are subject to supervision and examination by a state insurance regulator, and the securities are not publicly traded.

Negative Press on FIAs – Forbes (Tim Bastian, SLCG and Craig McCann)

Commentary

Unwise At Any Age

Tim Bastian 05.12.08, 6:00 AM ET



Tim Bastian



The sign in the middle of a shopping mall reads, "Stock Market Returns With NO RISK." As I approached the kiosk, I knew I was looking at the latest ad for an "Equity Index Annuity" or EIA. They're often also referred to as a "Fixed Index Annuity." If you're over 50, you've probably received numerous cryptic invitations to attend a "financial" seminar with a free dinner. More than likely, you're being solicited to buy an EIA.

Typically, these annuities promise guarantees for your principal or even a modest return, while "allowing you to participate in the upside of the stock market." In other words, "you'll receive the gain, without the pain." To understand

this claim, which, in my view, is quite misleading, you need to know how these products work, what you actually own and exactly what "participate in the upside" really means.

EIAs are insurance products. When you buy one, you are entering into a contract with an insurance company. You are not buying shares of stock. Nor are you buying shares of a mutual fund or ownership in a stock market index.

Negative Press on FIAs – NYT (Ron Lieber & Craig McCann)

The New York Times

October 25, 2008

YOUR MONEY

Weighing an Investment That Promises No Risk

By [RON LIEBER](#)

One of the hardest parts about working in (or writing about) the personal finance industry these days is that there are no consoling words to offer up to people in their 60s and older who had a lot of money in stocks.

Work longer? Not attractive. Go back to work? Ditto, or not physically possible. Spend less? No fun. Stay the course in stocks? No guarantee that they'll come back in time to finance the retirement their owners had been looking forward to for decades.

No, what many of these people want to hear about now is a financial product that promises no more losses but offers the possibility to share in the gains if and when the stock market comes back. So it should not come as a big surprise that the financial services industry, at least, is ready and waiting to push just the thing to soothe them.

It's called an equity index annuity, or index annuity for short. And if your response to the word "annuity" is to move your eyeballs elsewhere on the page, please at least give me a shot at explaining why this is important.

Yes, annuities are often complicated and laden with fees. The salespeople don't always have your best interests at heart. And this particular type of annuity has been the subject of lots of regulatory scrutiny and the target of numerous lawsuits.

But given the attractiveness of the no-risk-with-growth pitch at the moment, you'll probably be hearing a lot about them in the coming months. That makes this an especially good time to review how an index annuity works, what its drawbacks are and whether there are simpler alternatives that can provide better results.

List of model's assumptions

- **No death**
- **No penalty-free withdrawals**
- **No taxes** (\Rightarrow tax deferral valueless)
- **Complete markets** (\Rightarrow full replication, risk aversion irrelevant)
- **Stock returns normally distributed, with constant mean and variance**
- **Stock returns are i.i.d.**
- **No transactions costs**
- **No distribution costs**
- **No management costs**
- **No servicing costs**
- **Trading is continuous**
- **Securities are perfectly divisible**
- **No restrictions against short sales**
- **Borrowing and lending interest rates are equal**
- **Volatility constant for 15 yrs**
- **Interest rates constant for 15 yrs**
- **Caps, participation rates constant**
- **Stock dividends known for 15 yrs**
- **Annuity value based only on 1 of 66 options; other options valueless**
- **That 1 option on which entire annuity value is based is one the annuity does not offer**

"the wrong number in the wrong formula to get the right price" ?

R Rebonato, *Volatility and Correlation in the Pricing of ... Options* (1999)

- **Implied volatility surface – the ultimate fudge factor!**
- **Problem: no price discovery**
- **Solution:**
 - Uses historical volatility
 - Assumes no volatility smiles or smirks
 - Uses most primitive option pricing model available
 - Calibrates model to model price
- **Result: All fudge, no factor!**



2. Recent Historical Evidence

2. Recent Historical Evidence

We compare the performance of two fixed indexed annuities to various alternatives:

- Vanguard's S&P 500 Total Return Fund
- The S&P Index used in calculating the FIAs' crediting rates
- An un-rebalanced **benchmark portfolio** comprised of:
 - 50% Vanguard's S&P 500 Total Return Fund
 - 50% Vanguard's Total Bond Market Fund
- A Money Market Index (Merrill Lynch 91-day T-bill Index minus 20 bps per year)
- We use actual returns to calculate the value of the annuity and alternatives just described, over the annuity's term or as of October 31, 2008

2. Recent Historical Evidence

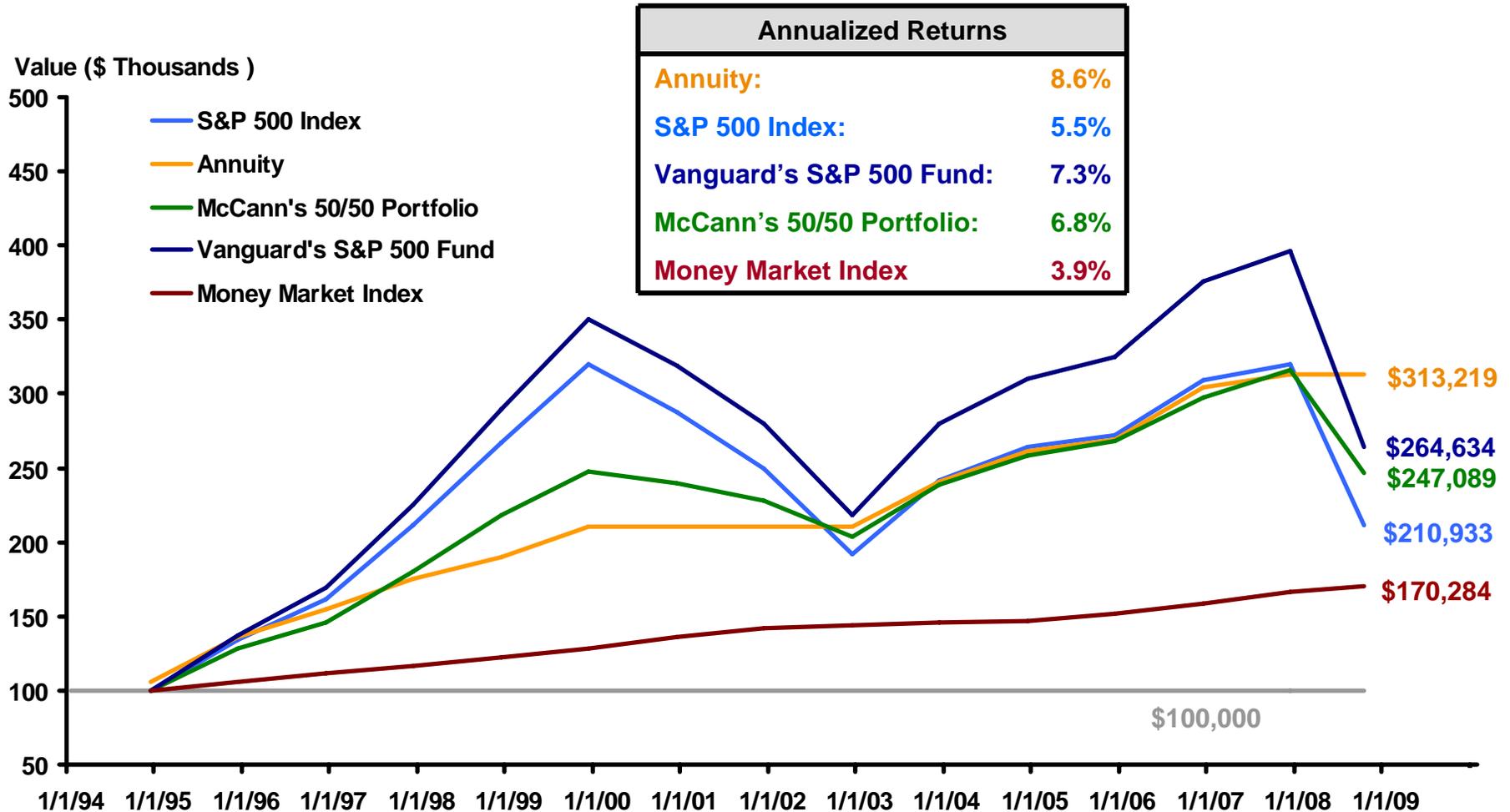
- **We first consider a monthly point-to-point, 14-year annuity**
We consider policies issued on the first day of each year starting on 1/1/95 and calculate the account values as of the end of the surrender charge period or October 31, 2008, whichever comes first
- **We also consider a monthly point-to-point, 9-year annuity, with similar issue dates**
- **Some annuities would still be in force as of 10/31/08, but we can calculate their account values**
- **These annuities are similar to some analyzed by Dr. McCann and have the following actual terms:**

Policy Name	Term	Monthly Cap	Annual Floor	Bonus
Annuity No. 1	14 yrs.	3.50%	0%	6%
Annuity No. 2	9 yrs.	4.25%	0%	3%

14-yr Annuity v. Alternative Investments

Value of \$100,000

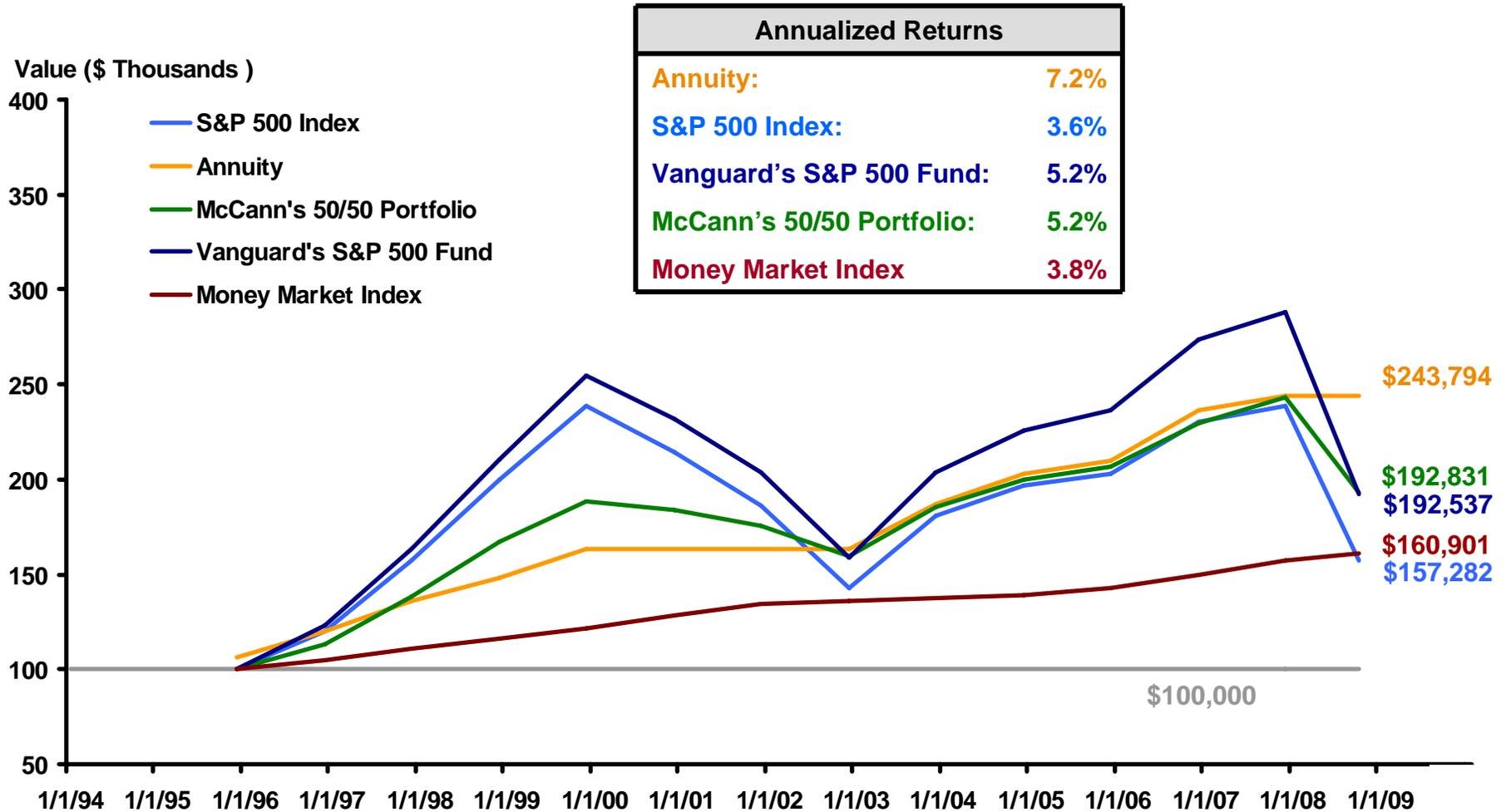
1995



14-yr Annuity v. Alternative Investments

Value of \$100,000

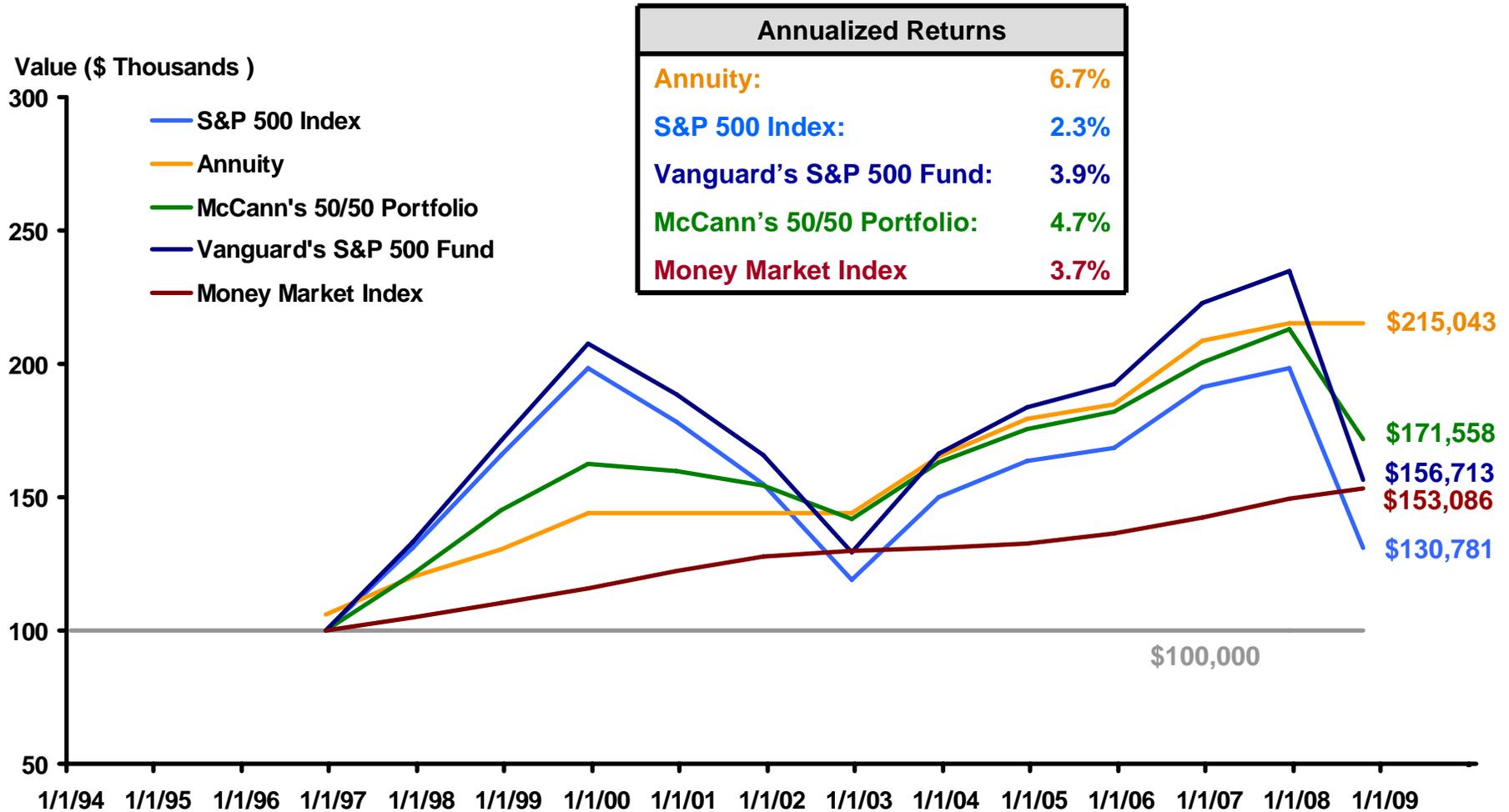
1996



14-yr Annuity v. Alternative Investments

Value of \$100,000

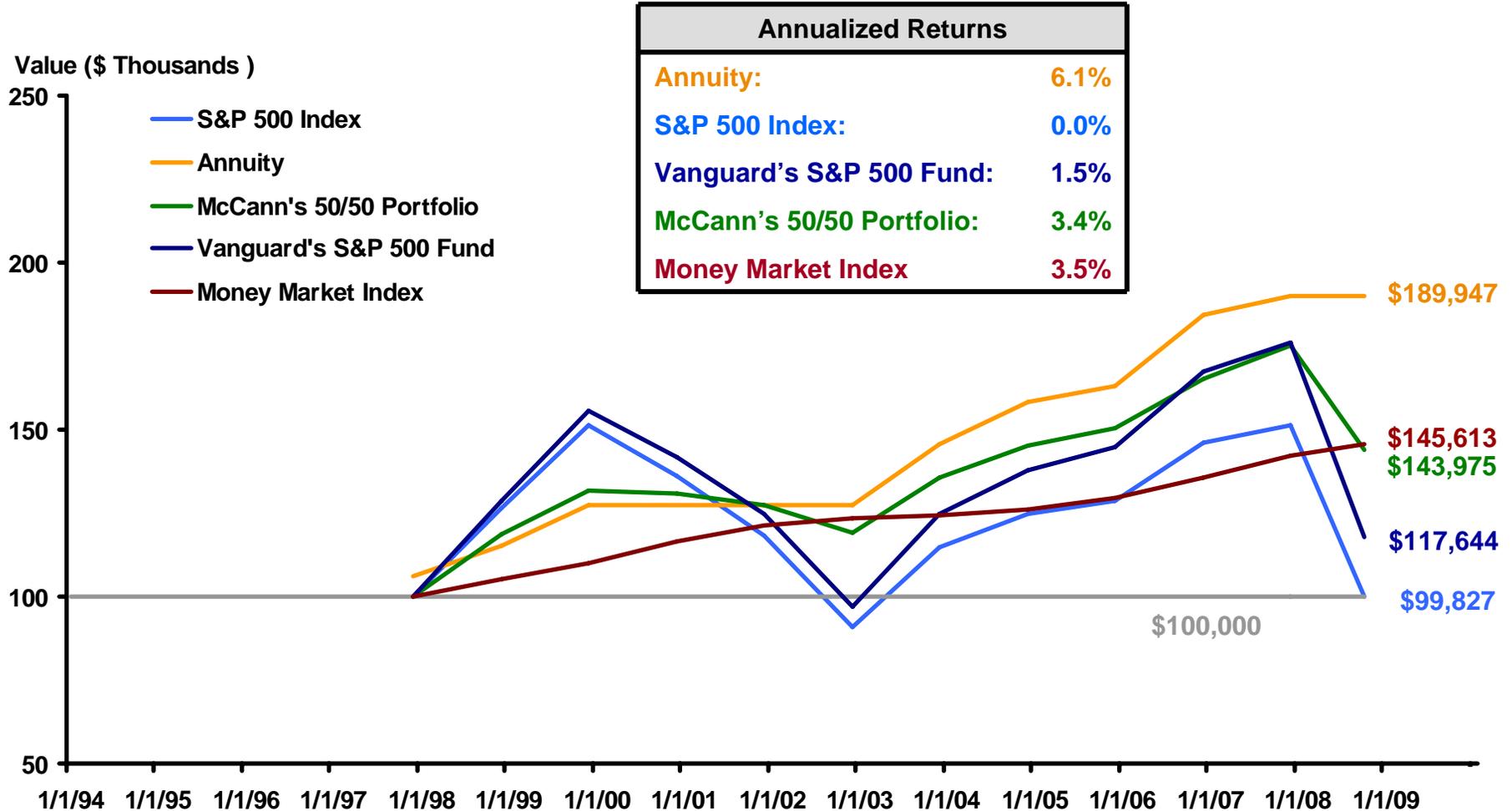
1997



14-yr Annuity v. Alternative Investments

Value of \$100,000

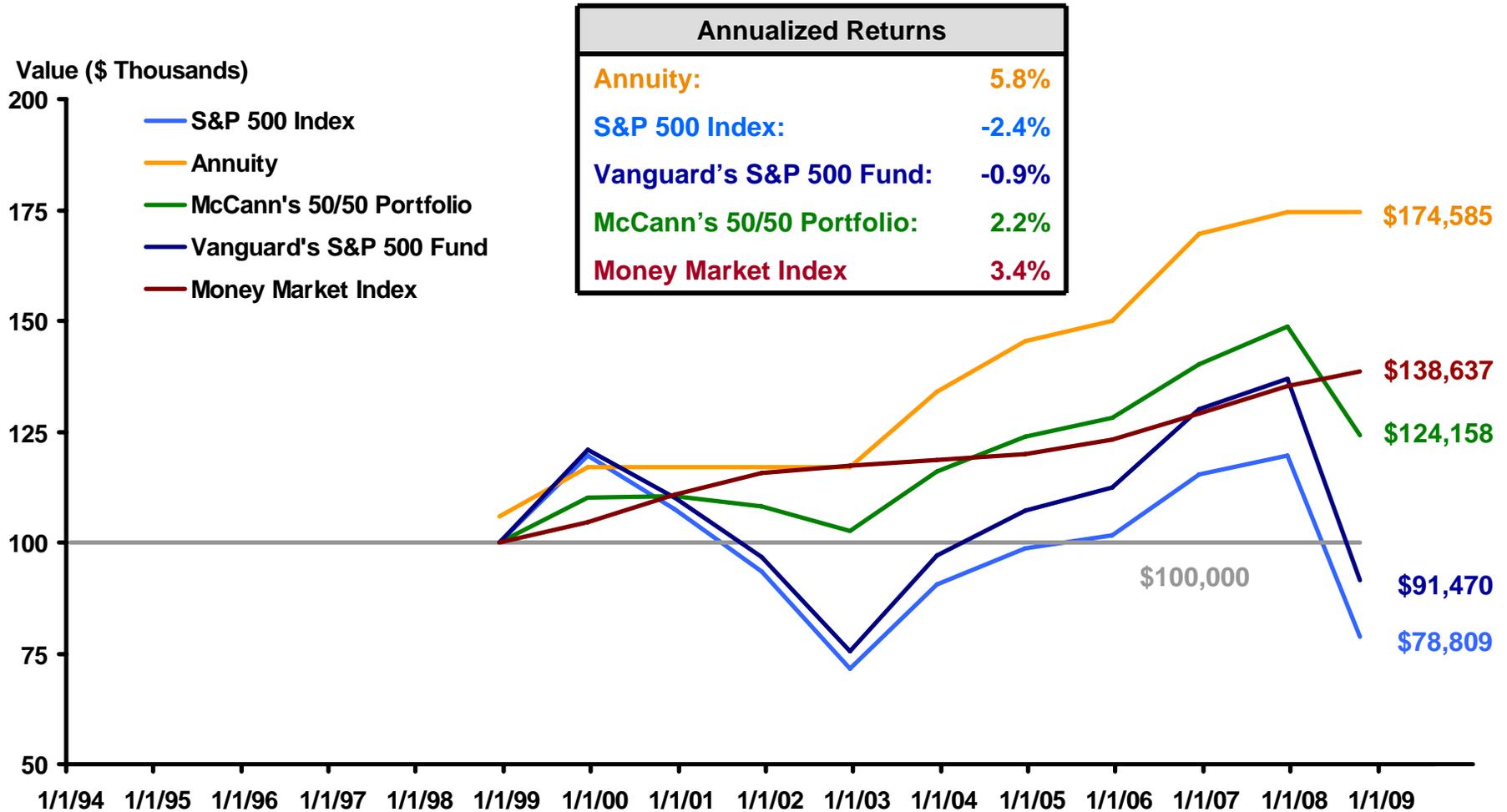
1998



14-yr Annuity v. Alternative Investments

Value of \$100,000

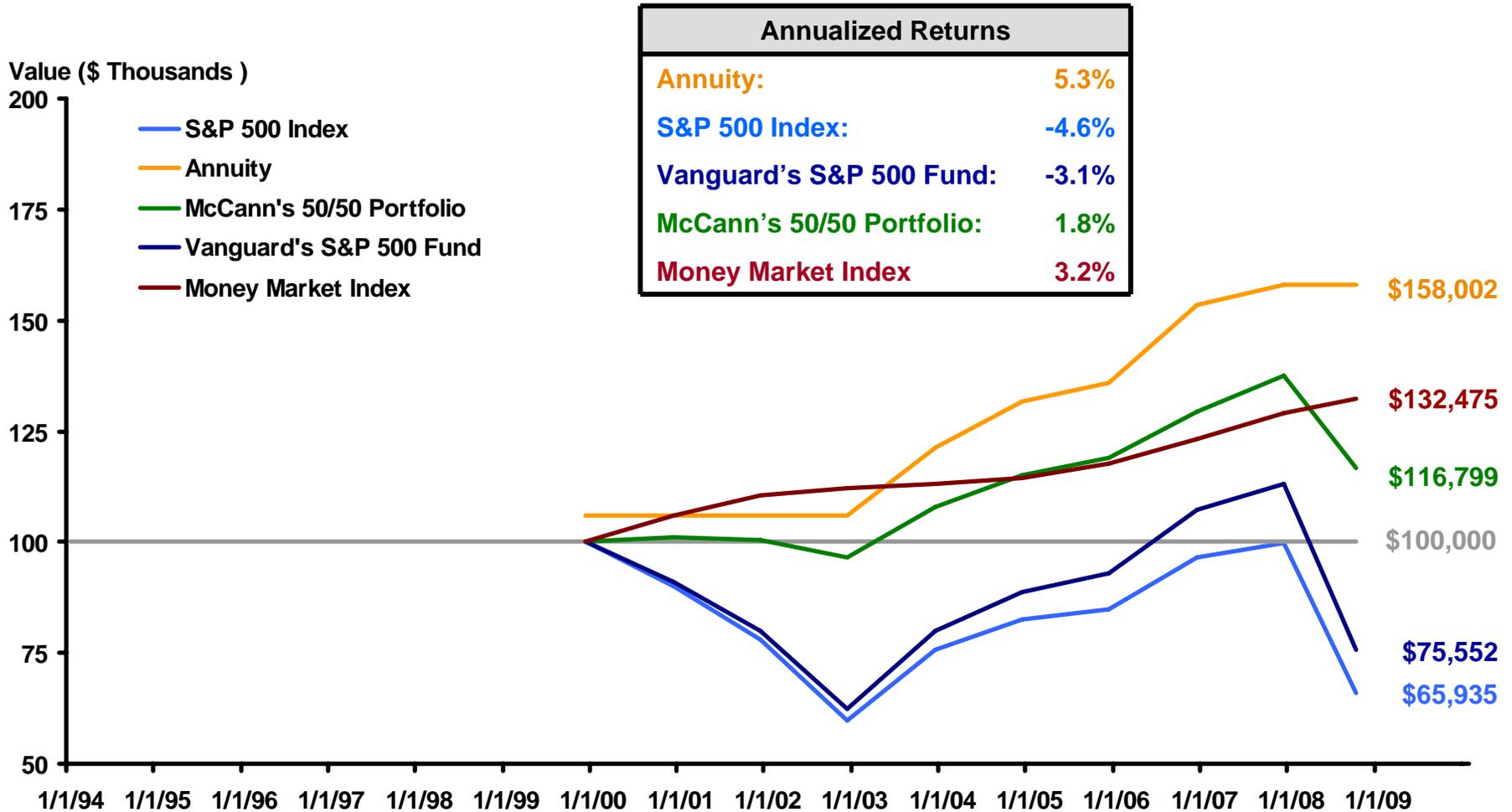
1999



14-yr Annuity v. Alternative Investments

Value of \$100,000

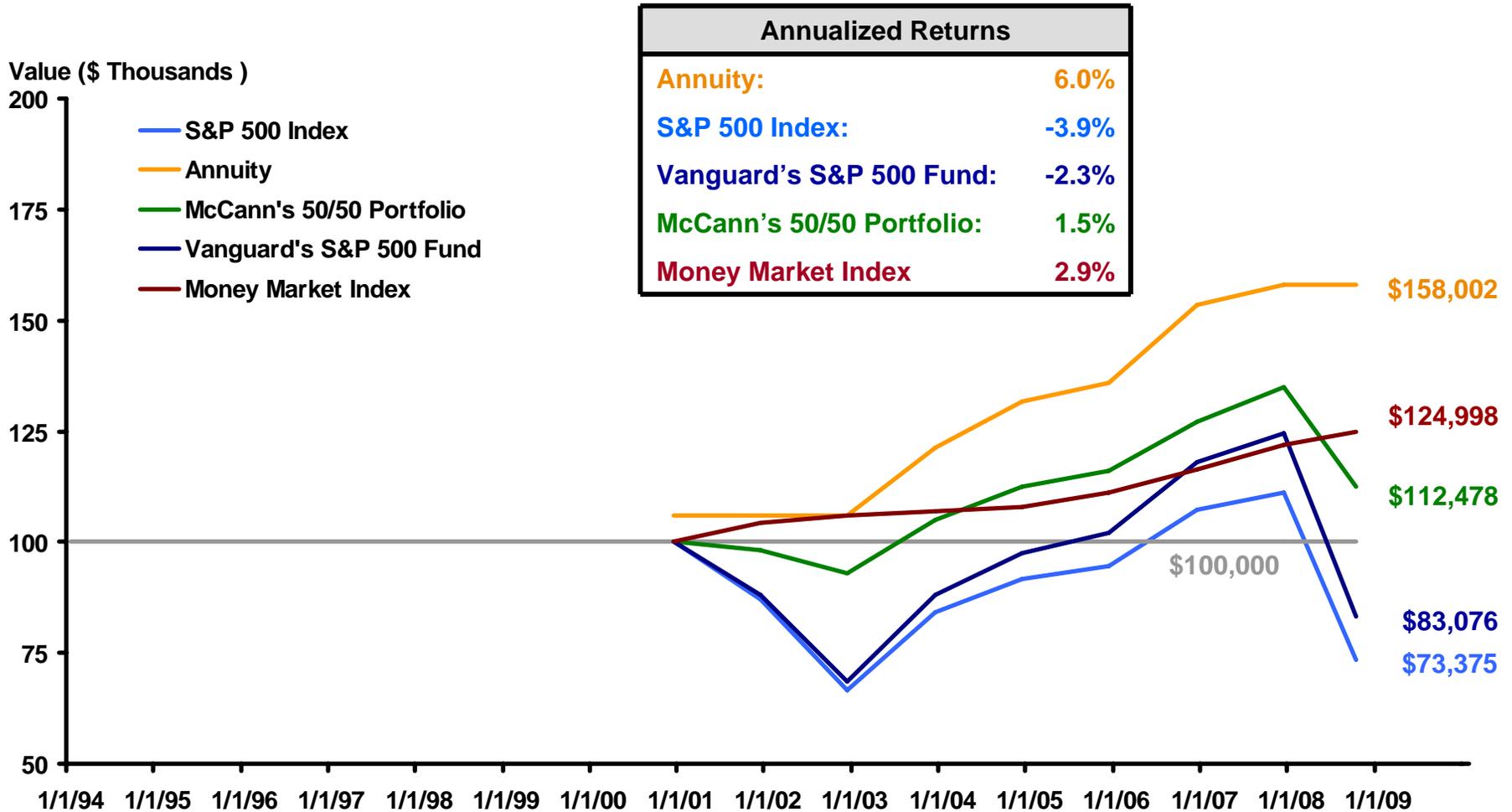
2000



14-yr Annuity v. Alternative Investments

Value of \$100,000

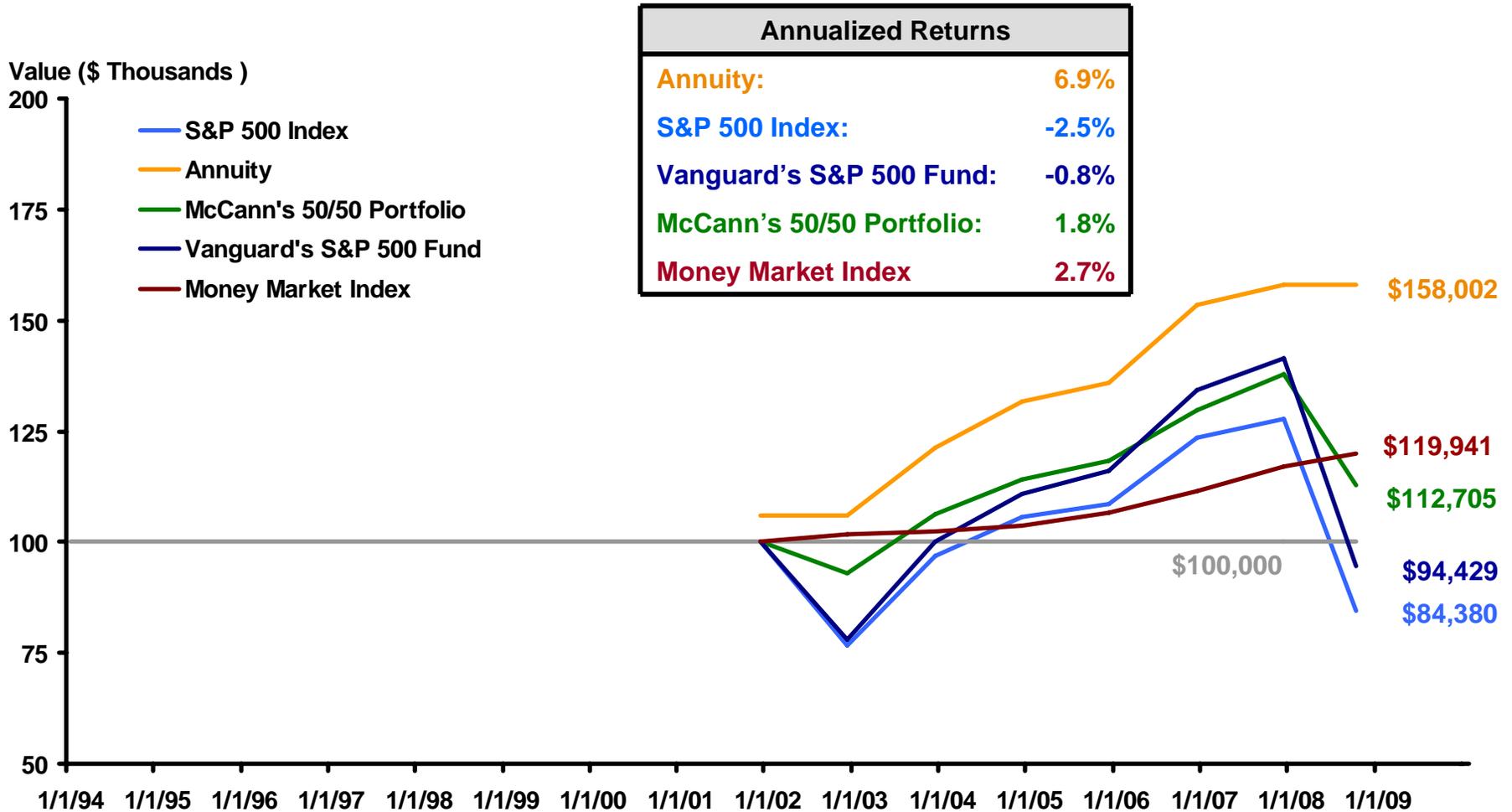
2001



14-yr Annuity v. Alternative Investments

Value of \$100,000

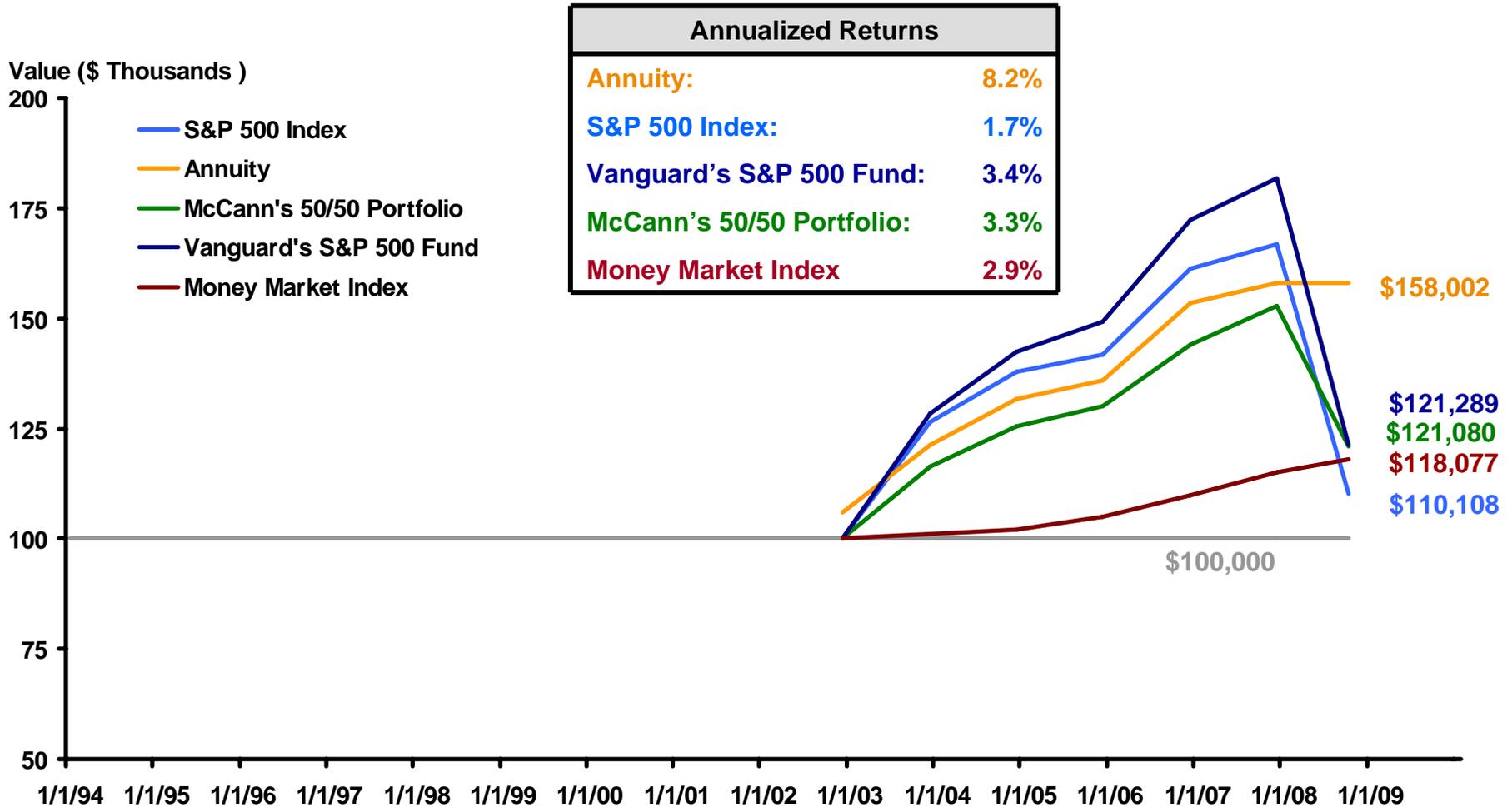
2002



14-yr Annuity v. Alternative Investments

Value of \$100,000

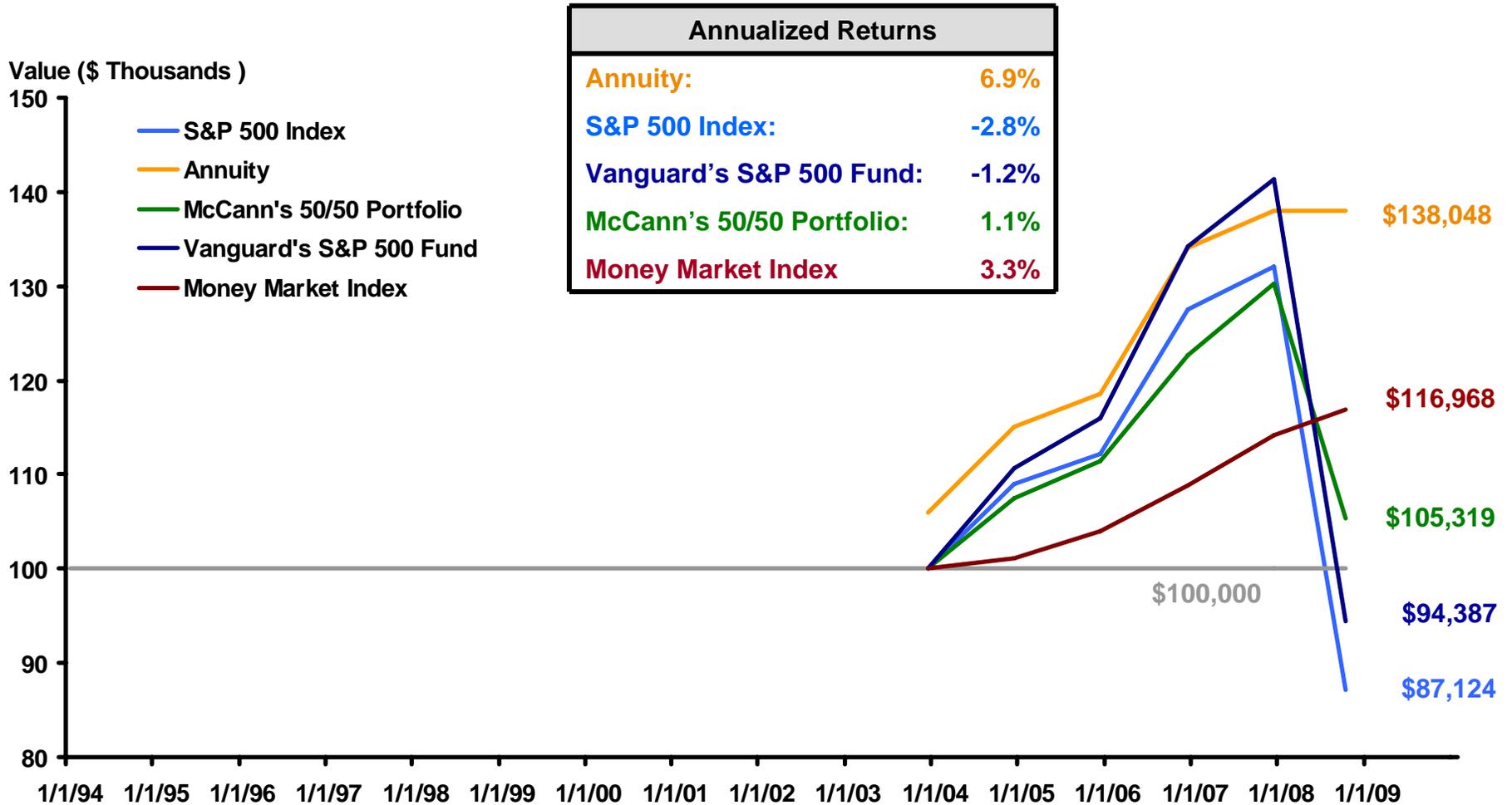
2003



14-yr Annuity v. Alternative Investments

Value of \$100,000

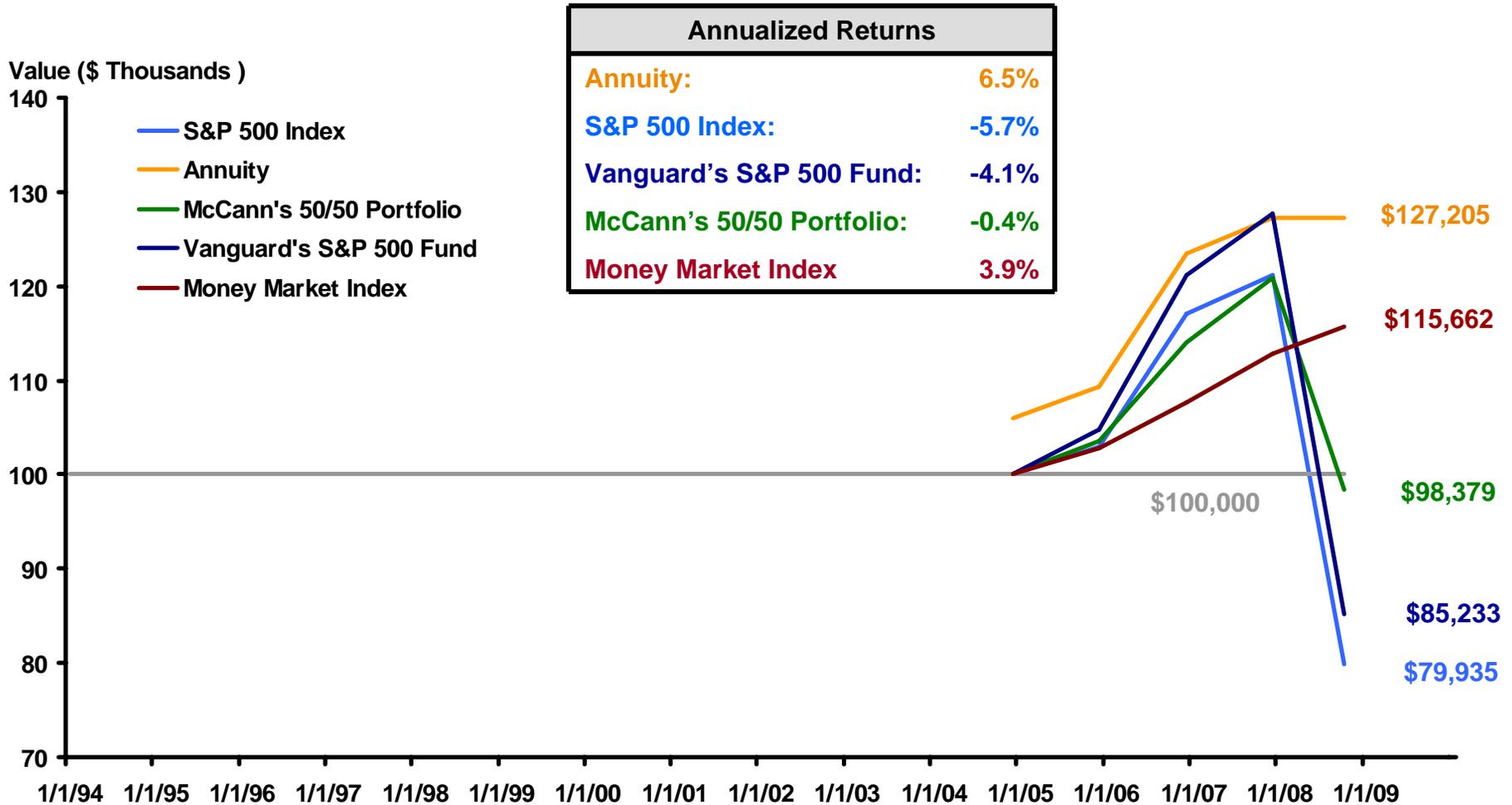
2004



14-yr Annuity v. Alternative Investments

Value of \$100,000

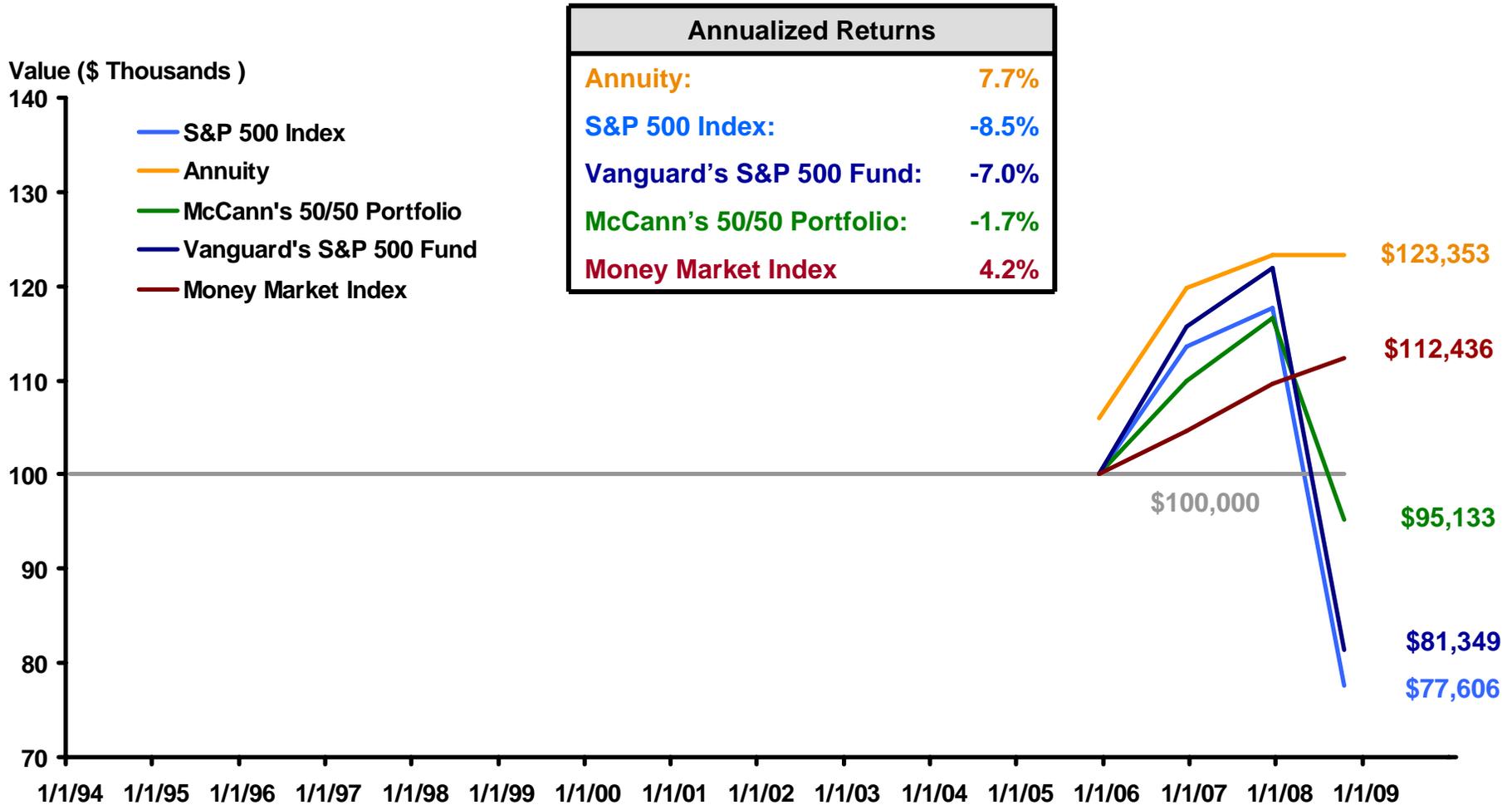
2005



14-yr Annuity v. Alternative Investments

Value of \$100,000

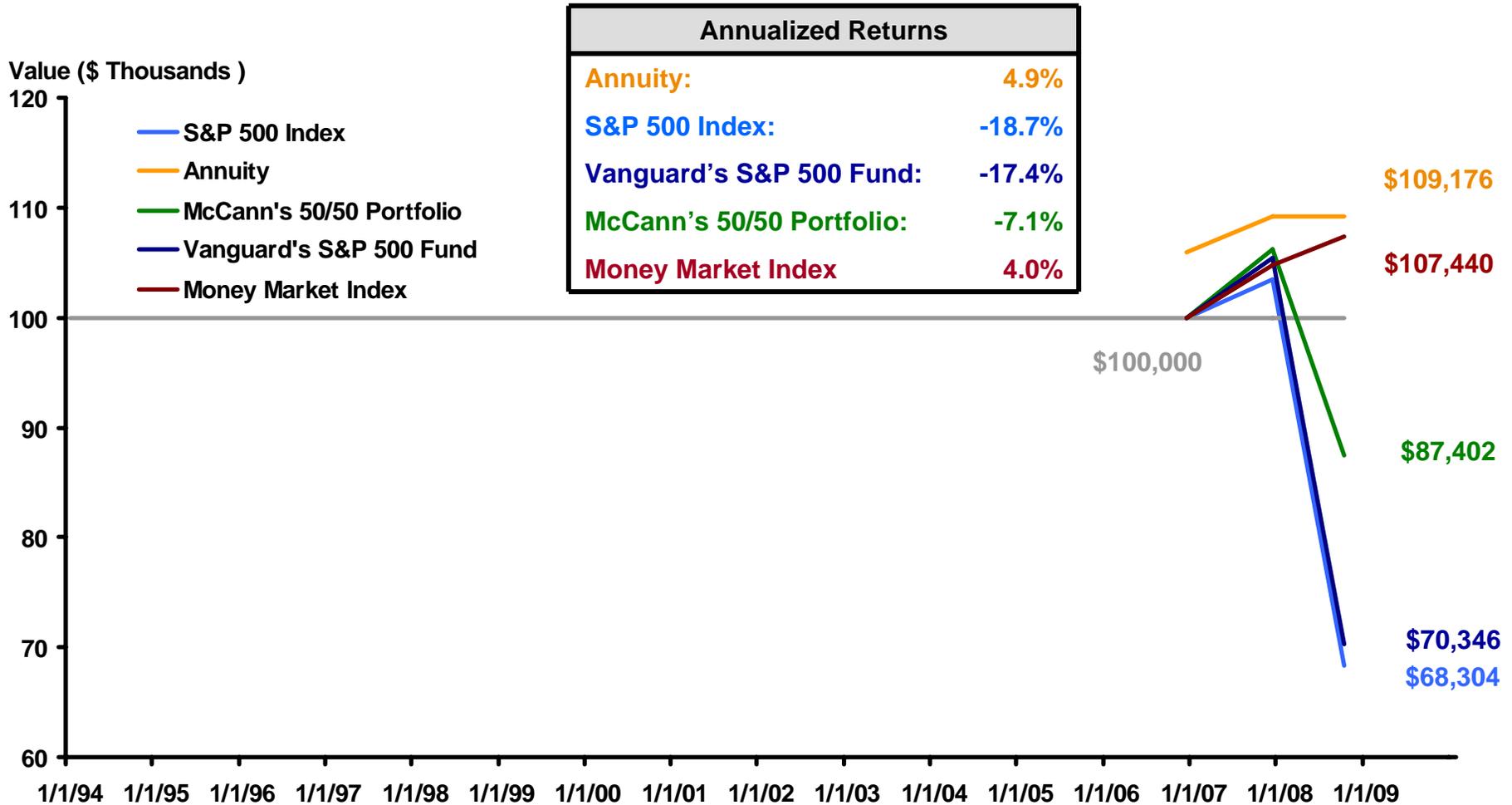
2006



14-yr Annuity v. Alternative Investments

Value of \$100,000

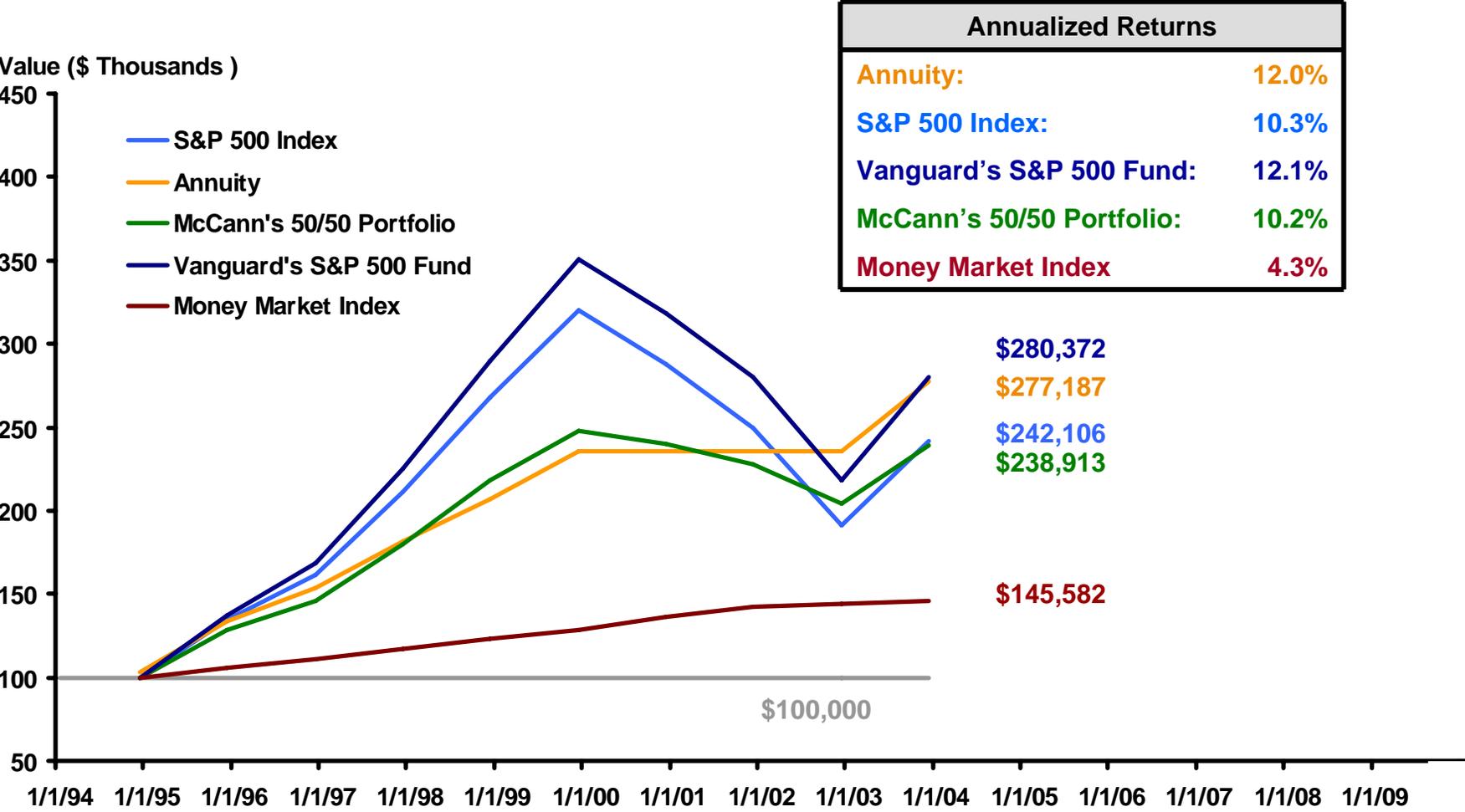
2007



9-yr Annuity v. Alternative Investments

Value of \$100,000

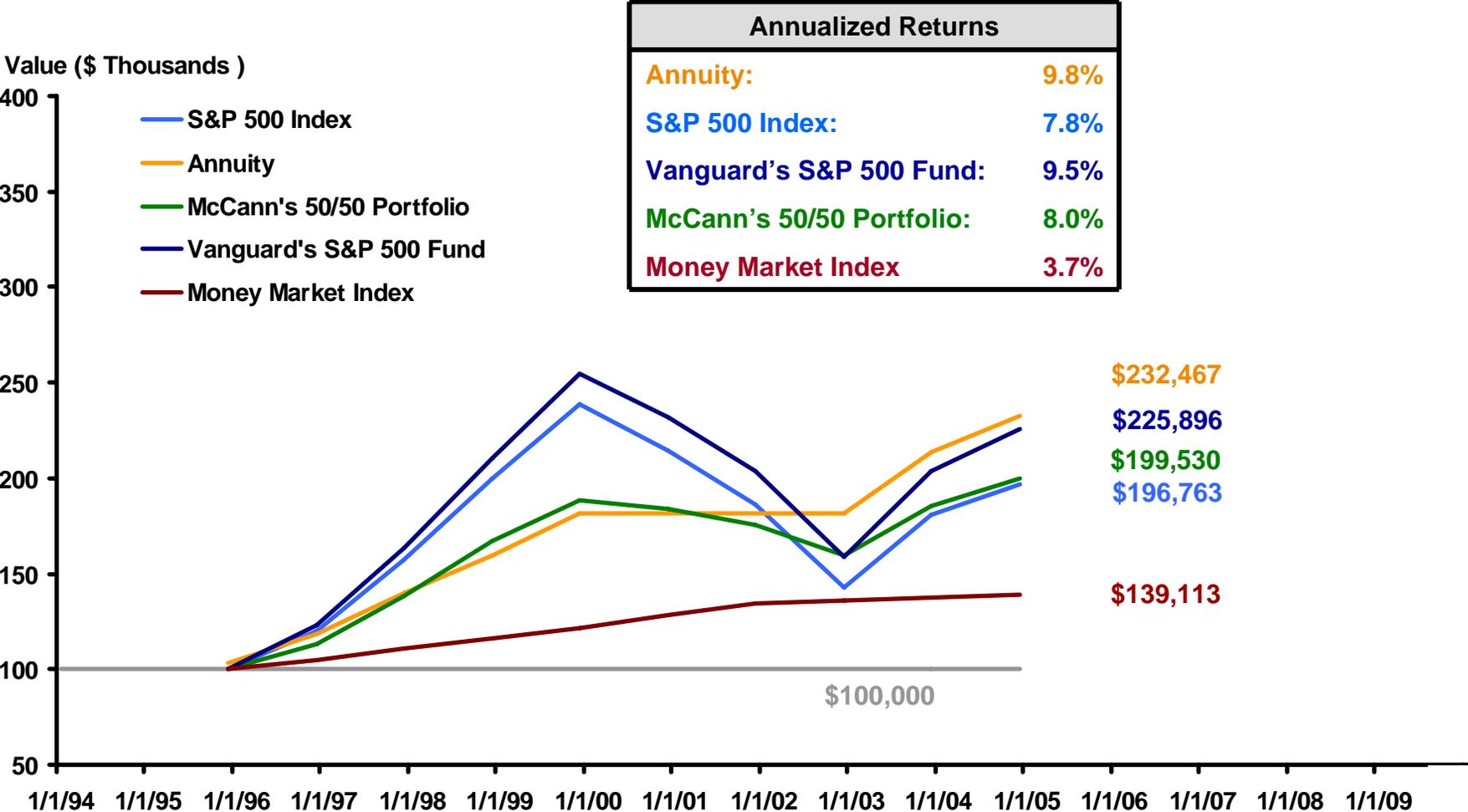
1995



9-yr Annuity v. Alternative Investments

Value of \$100,000

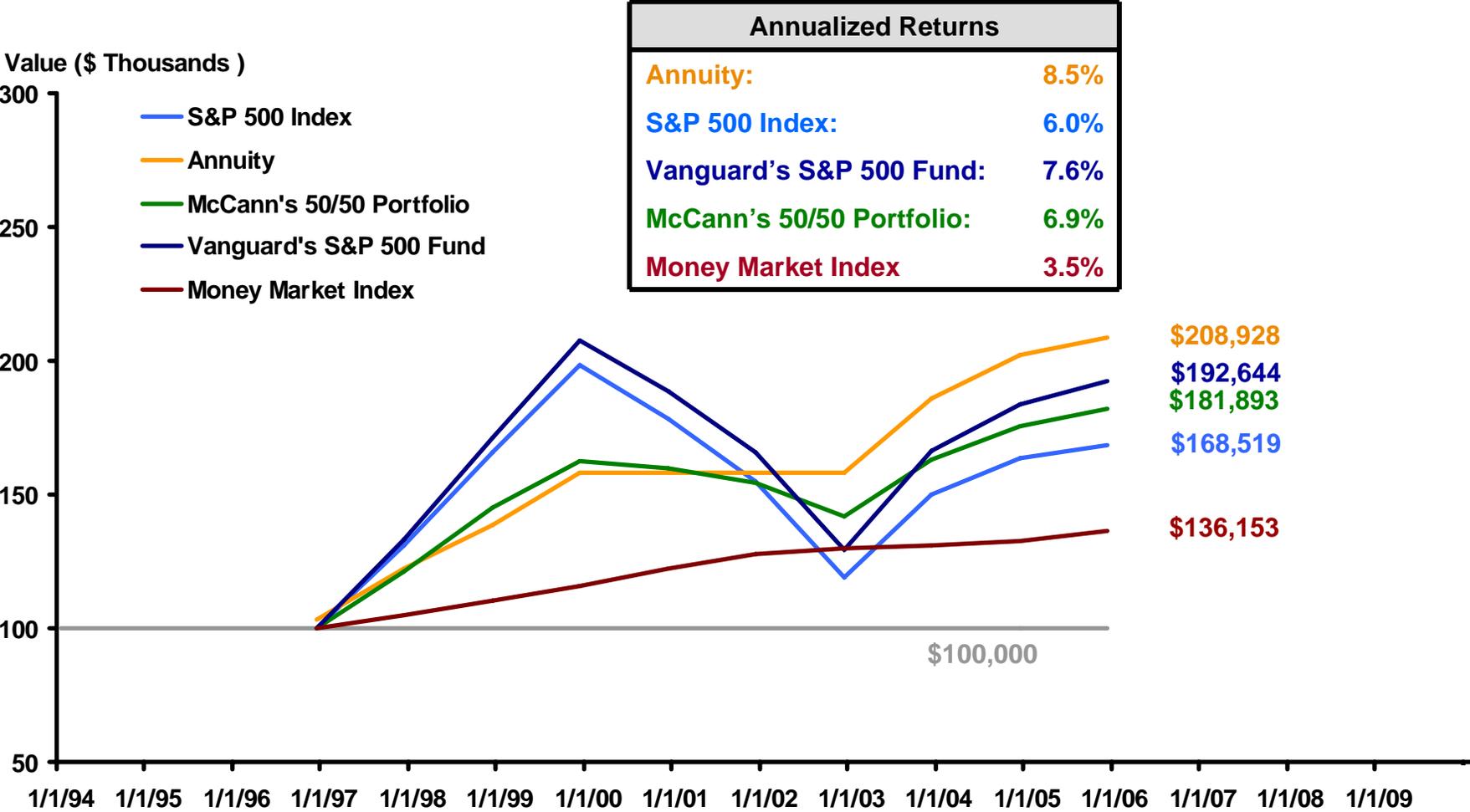
1996



9-yr Annuity v. Alternative Investments

Value of \$100,000

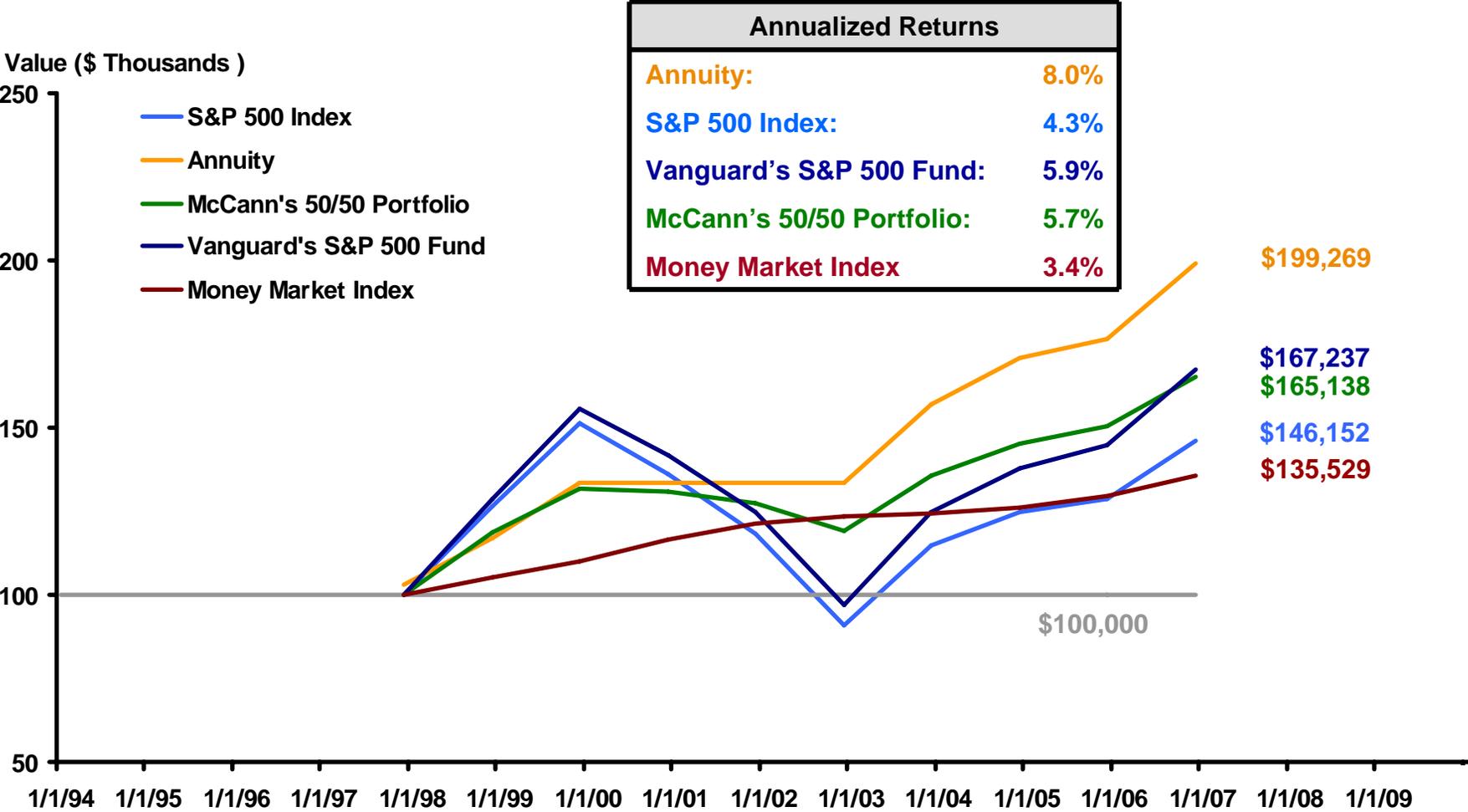
1997



9-yr Annuity v. Alternative Investments

Value of \$100,000

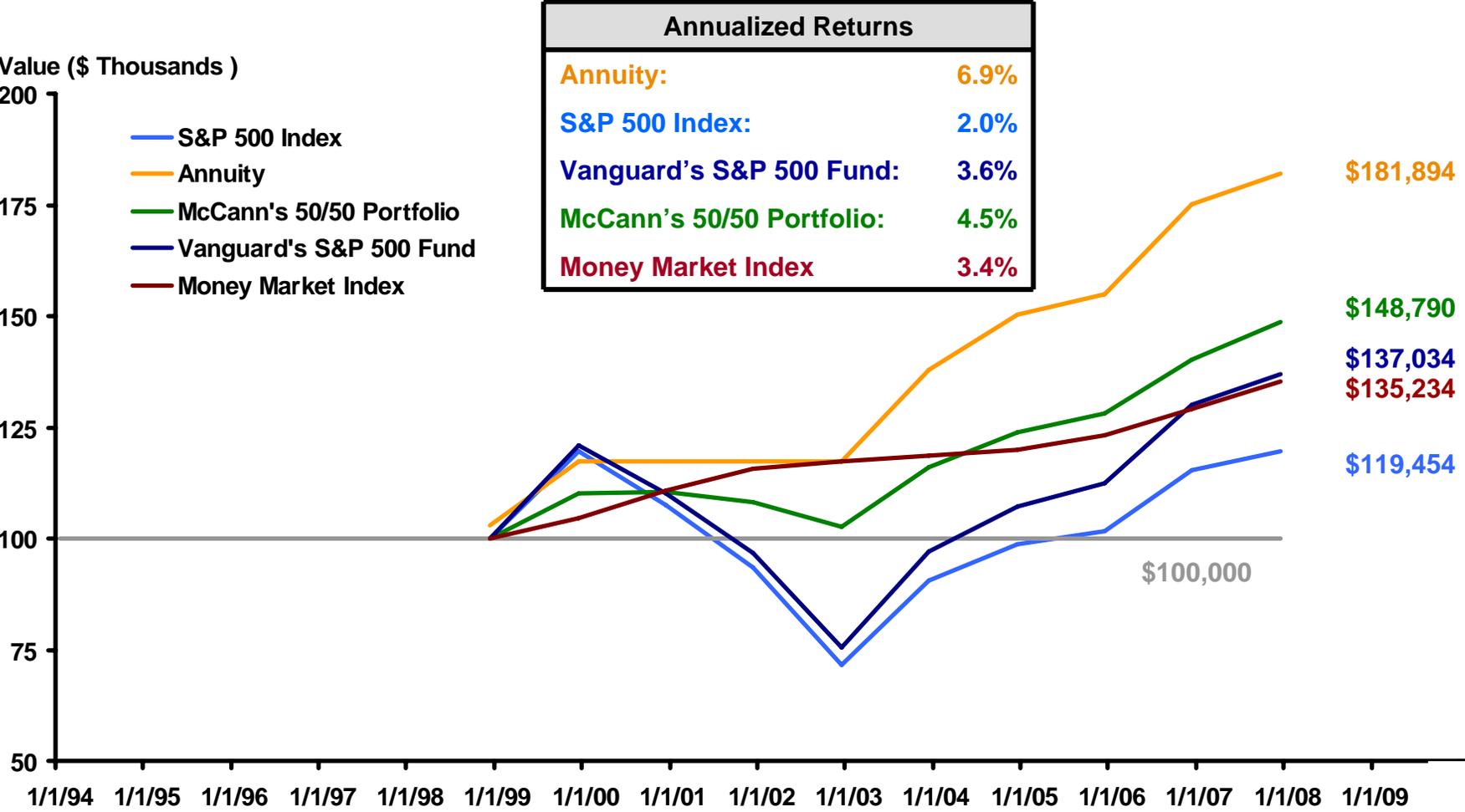
1998



9-yr Annuity v. Alternative Investments

Value of \$100,000

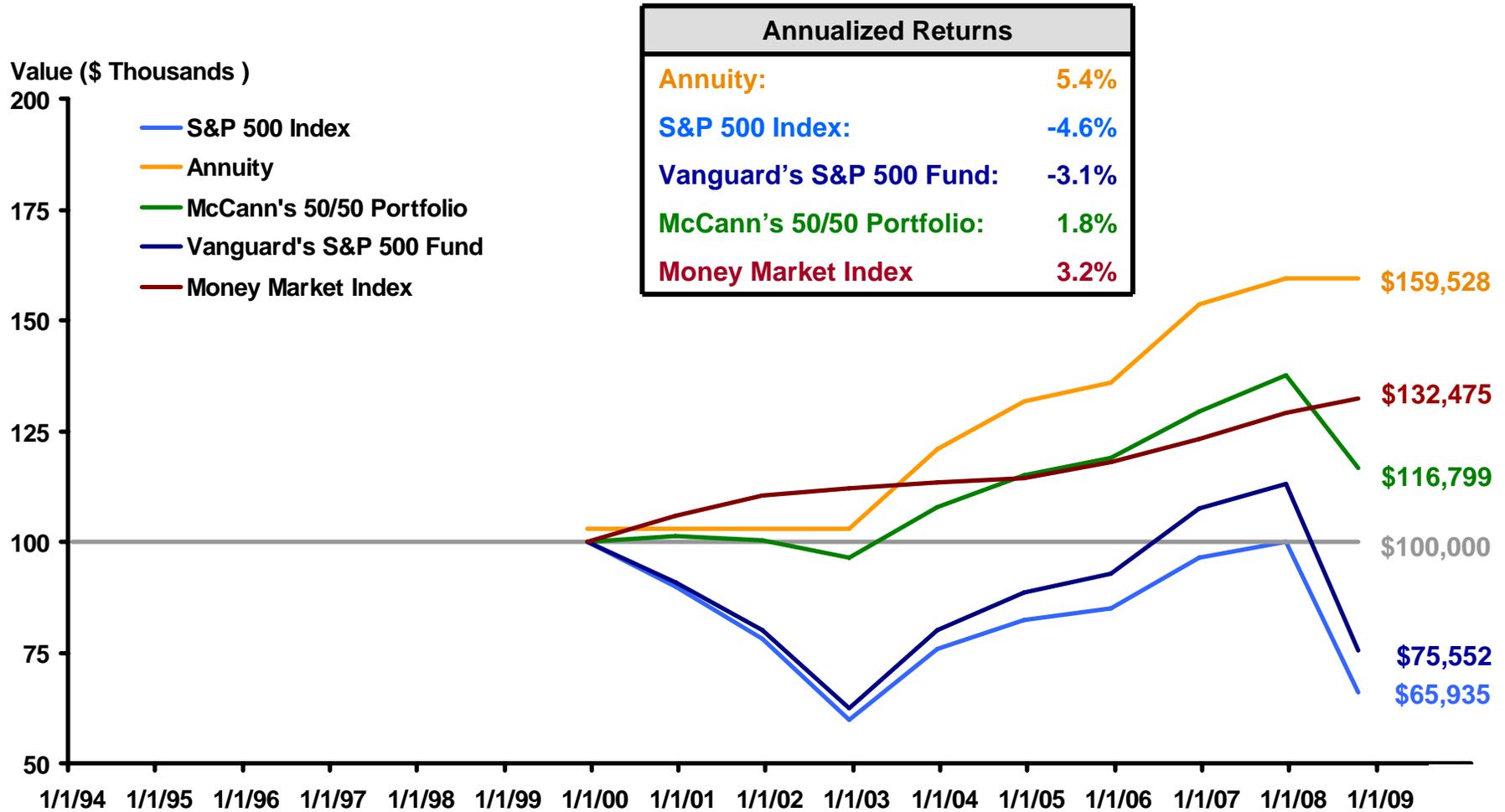
1999



9-yr Annuity v. Alternative Investments

Value of \$100,000

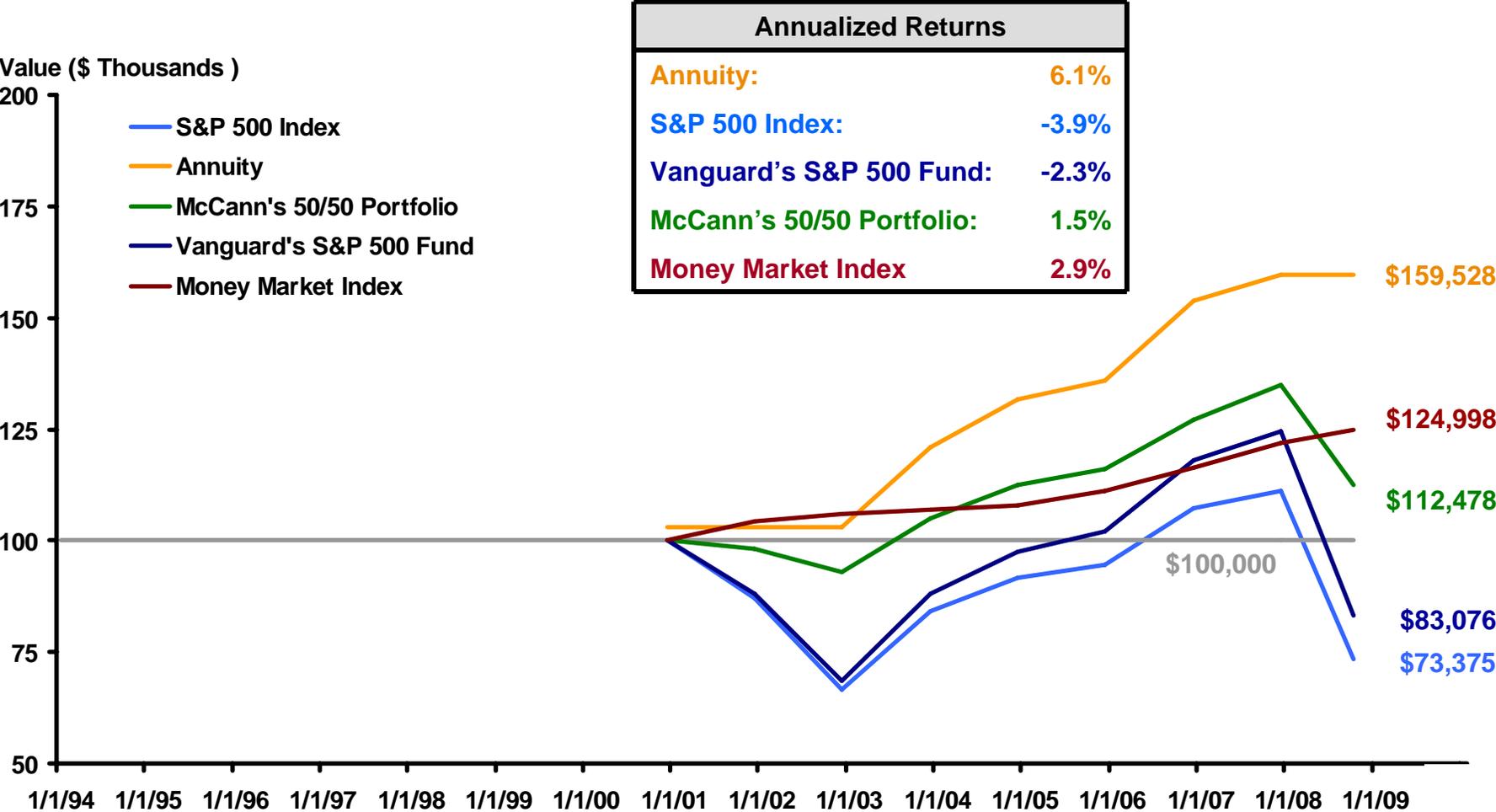
2000



9-yr Annuity v. Alternative Investments

Value of \$100,000

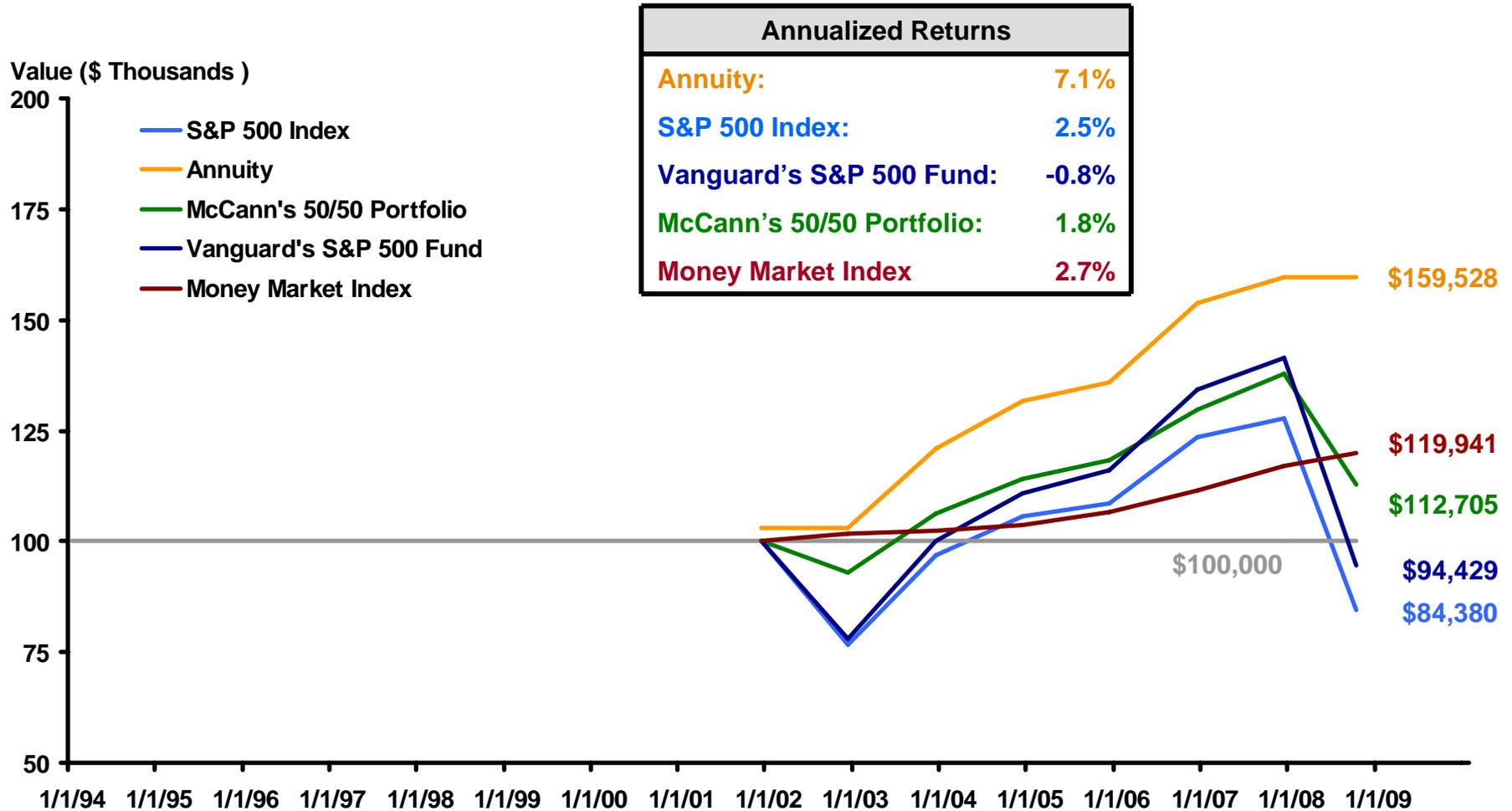
2001



9-yr Annuity v. Alternative Investments

Value of \$100,000

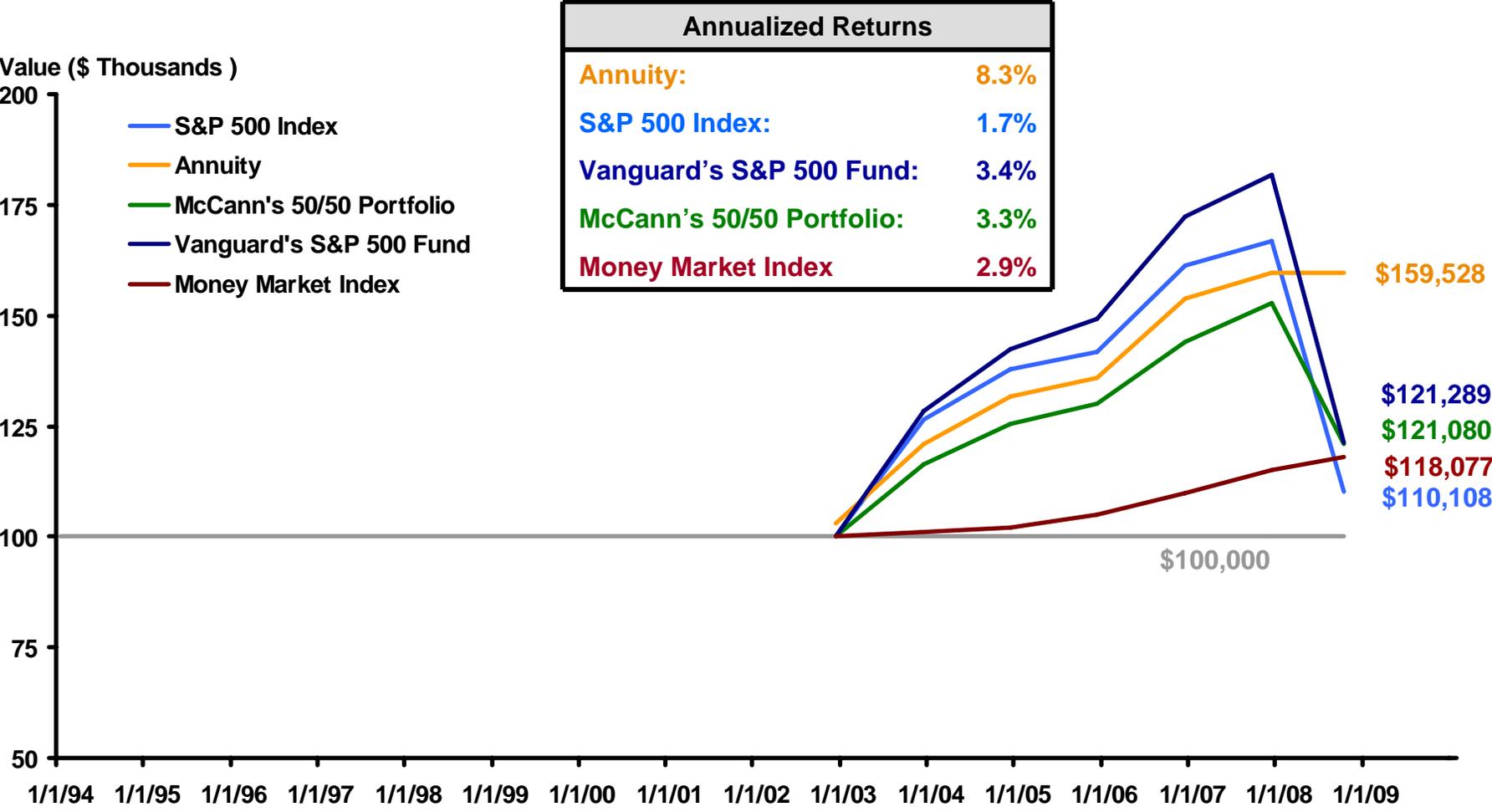
2002



9-yr Annuity v. Alternative Investments

Value of \$100,000

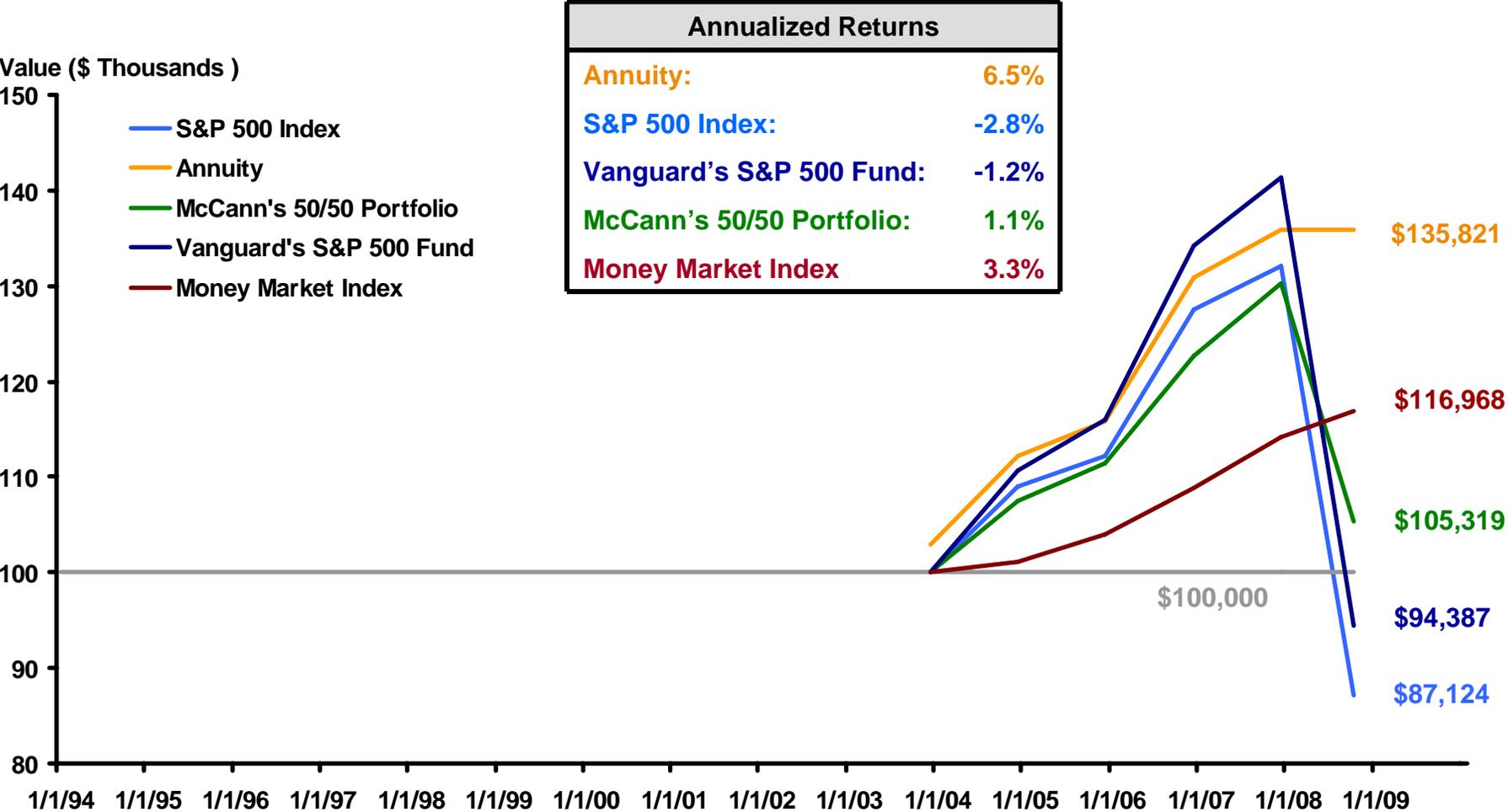
2003



9-yr Annuity v. Alternative Investments

Value of \$100,000

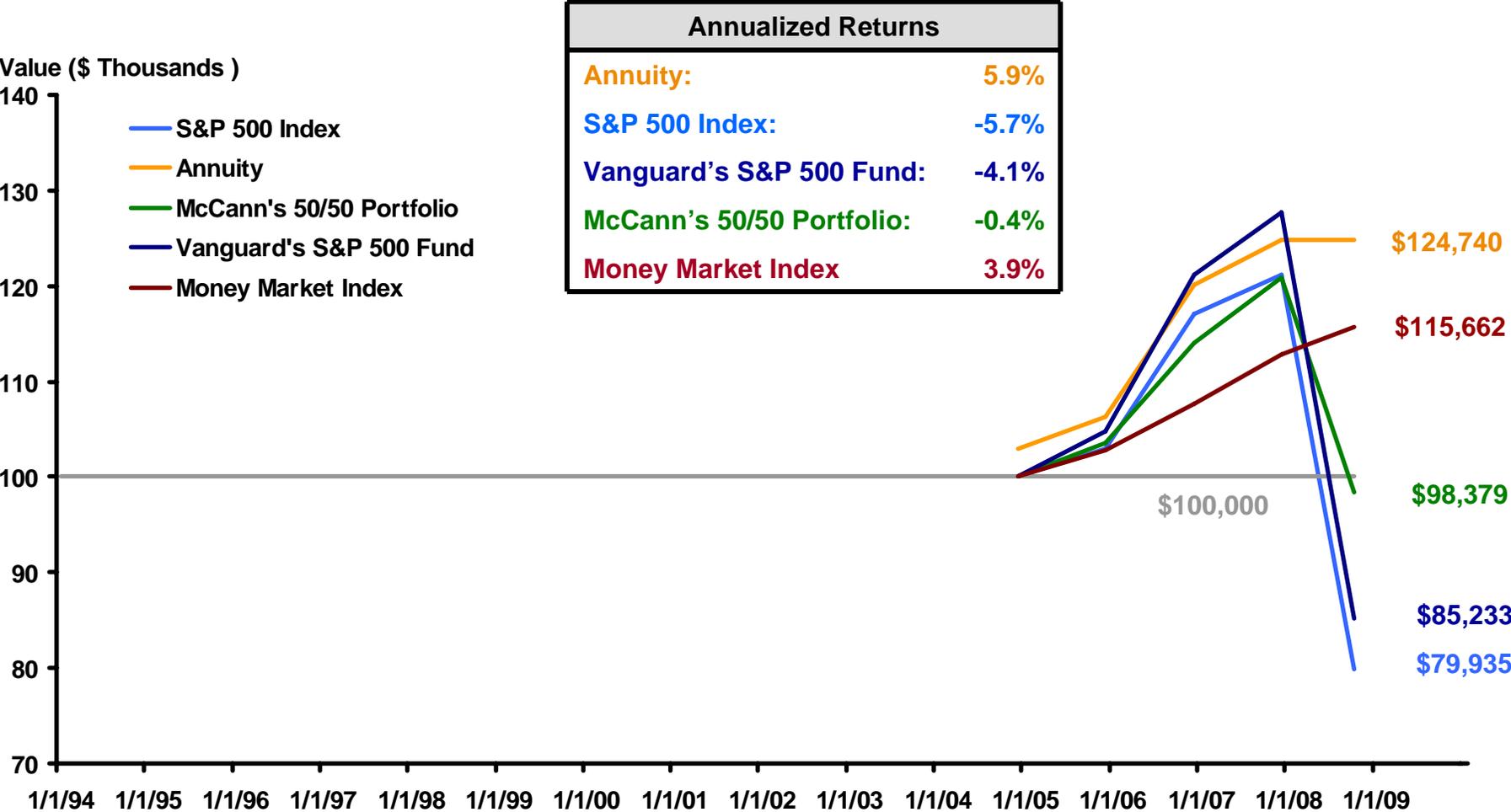
2004



9-yr Annuity v. Alternative Investments

Value of \$100,000

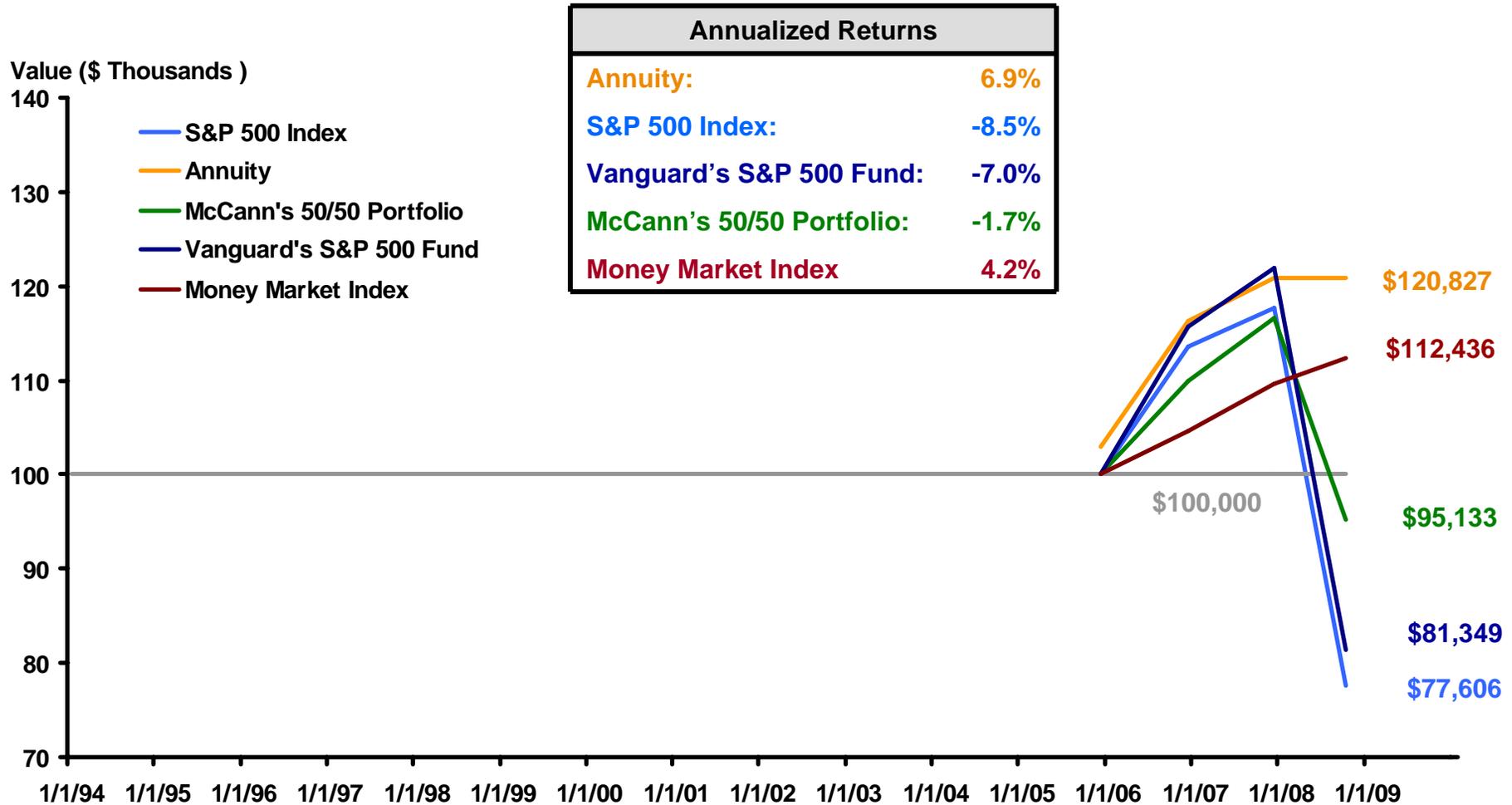
2005



9-yr Annuity v. Alternative Investments

Value of \$100,000

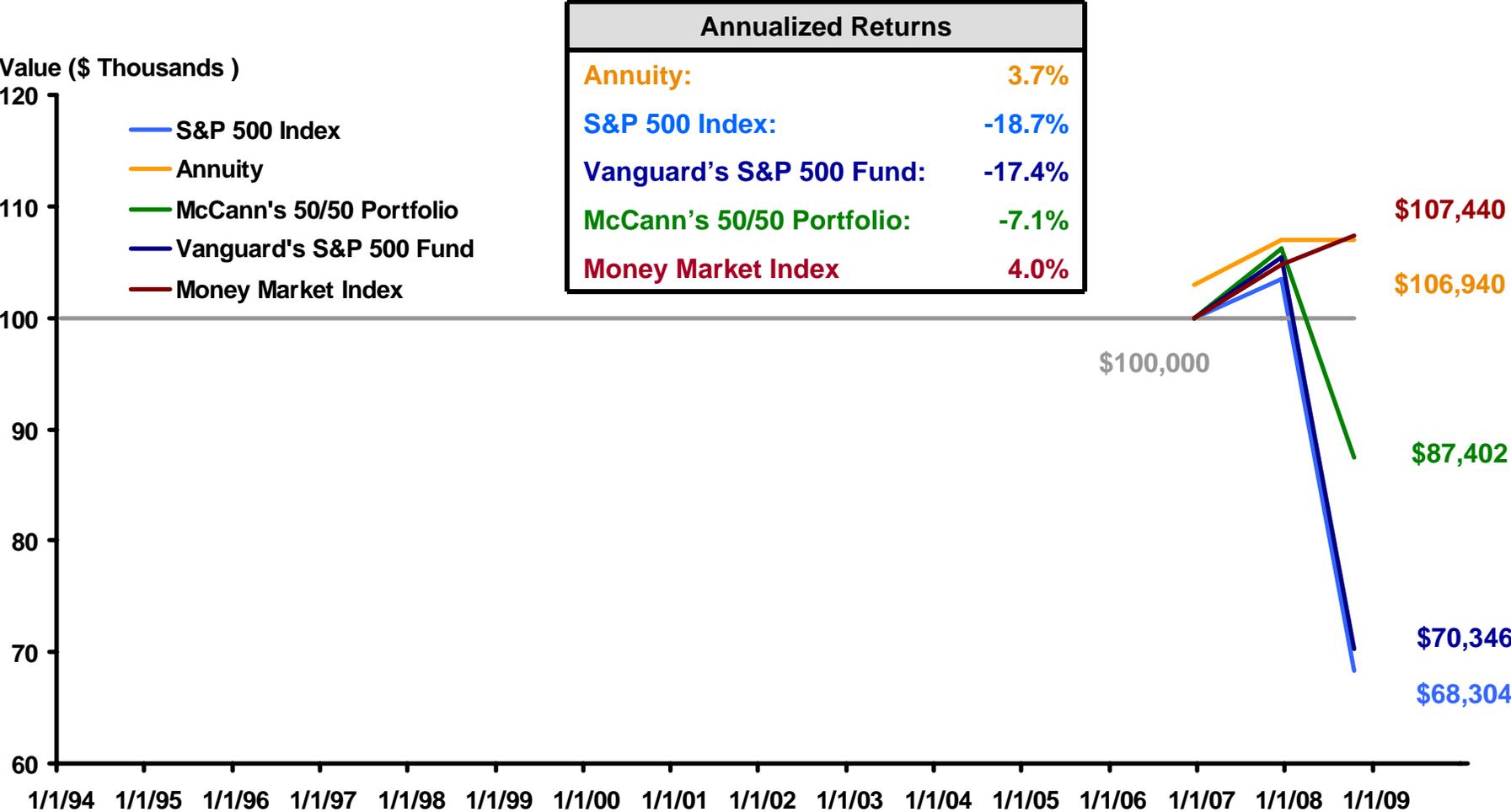
2006



9-yr Annuity v. Alternative Investments

Value of \$100,000

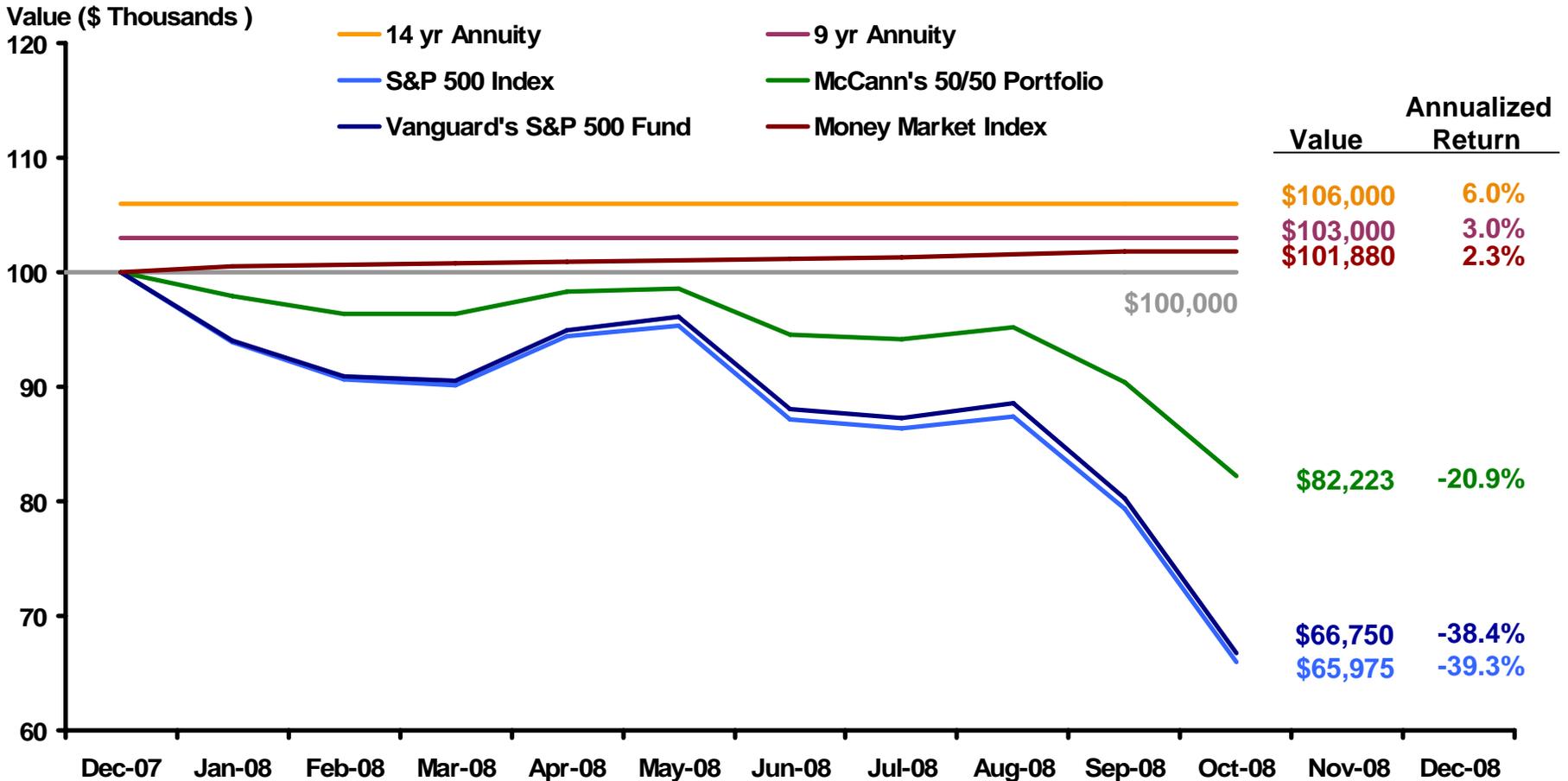
2007



14- and 9-yr Annuities v. Alternatives - 2008

Value of \$100,000

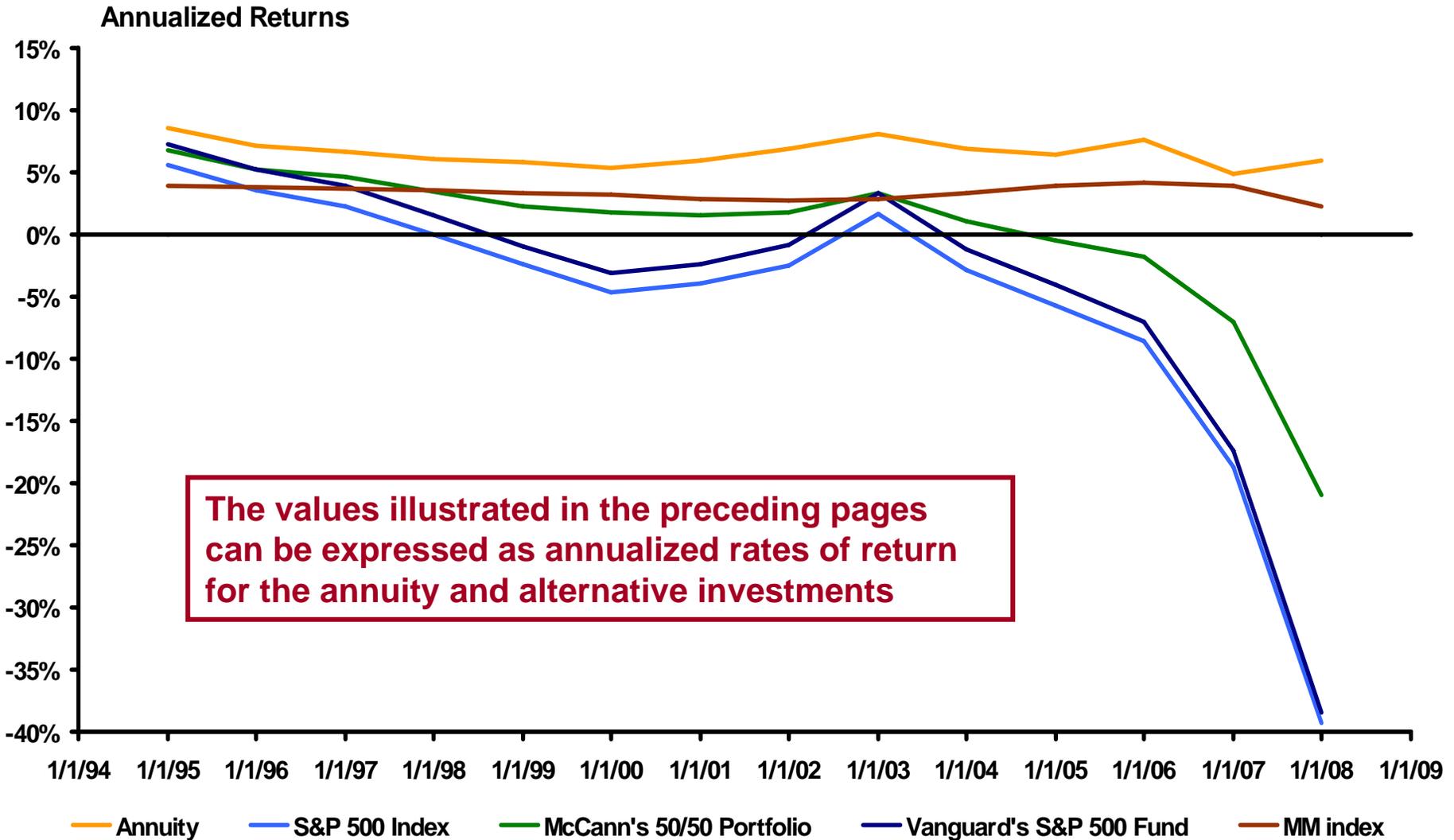
1/1/08 – 10/31/08



Note: For the two annuities considered, the annualized return is the premium bonus rate credited at the outset.

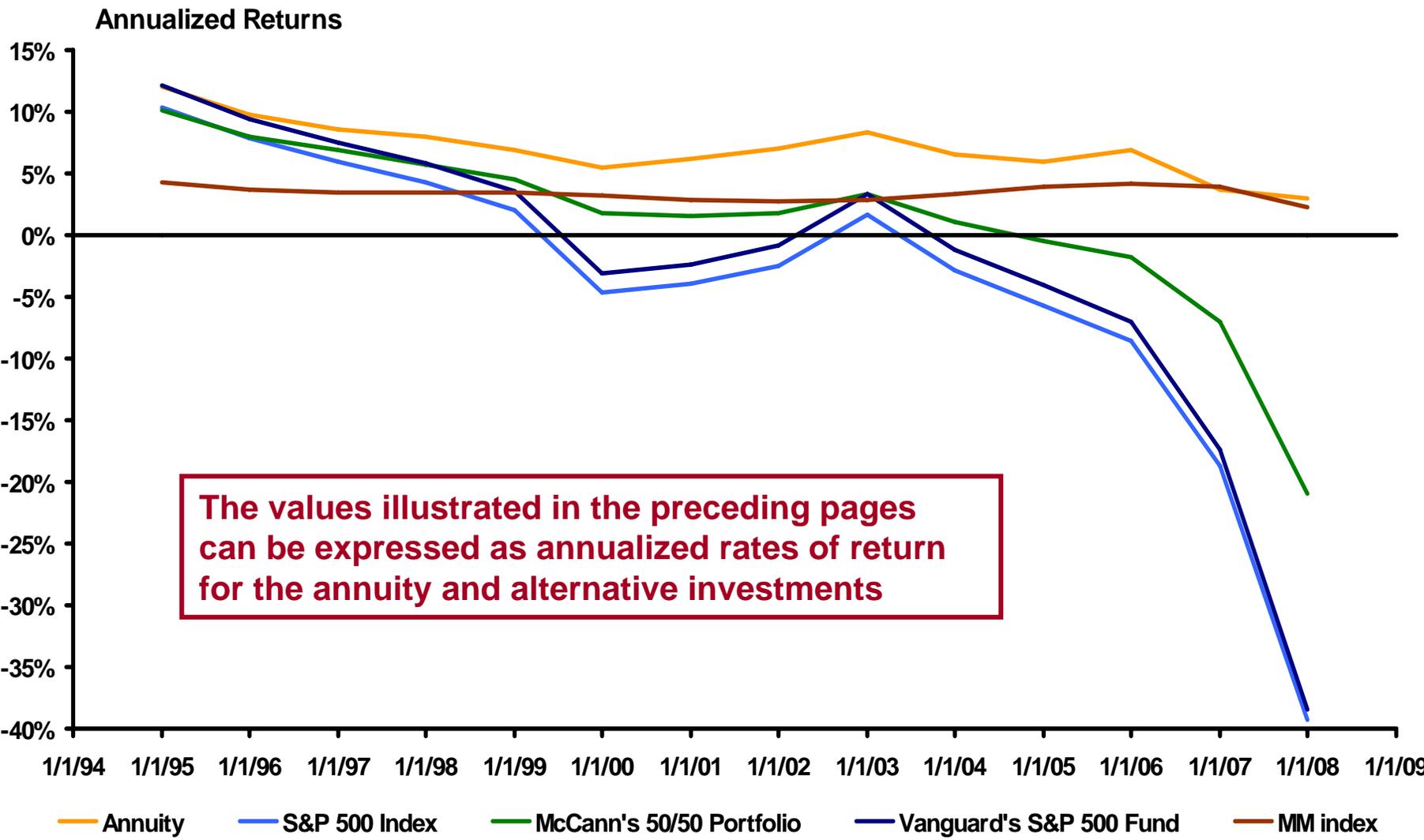
14-yr Annuity v. Alternative Investments

Annualized Returns from Start Date through 10/31/08



9-yr Annuity v. Alternative Investments

Annualized Returns from Start Date through Term or 10/31/08



Not intended for use with any sales presentations.



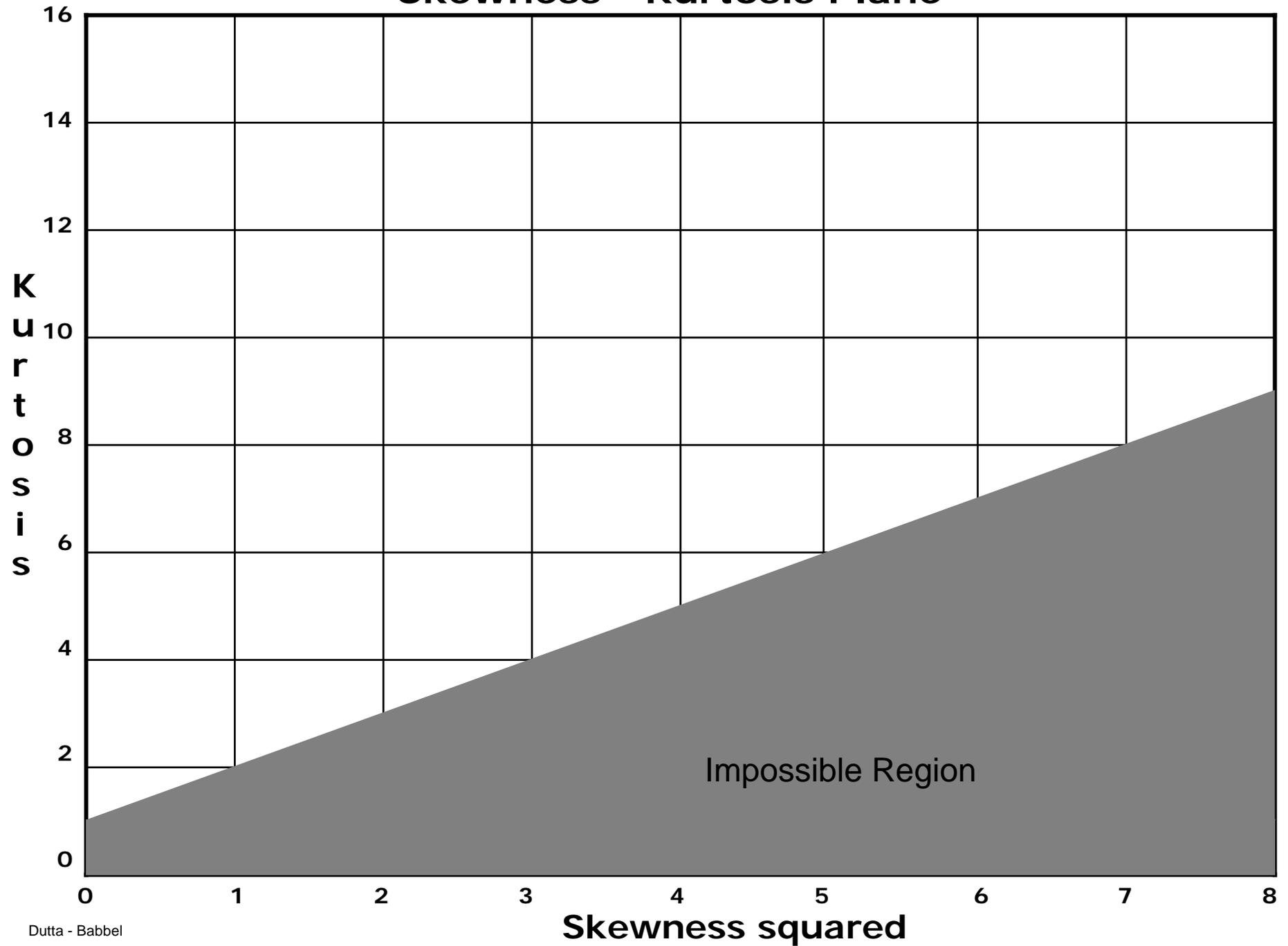
3. The Long-Run View

3. Long-Run View

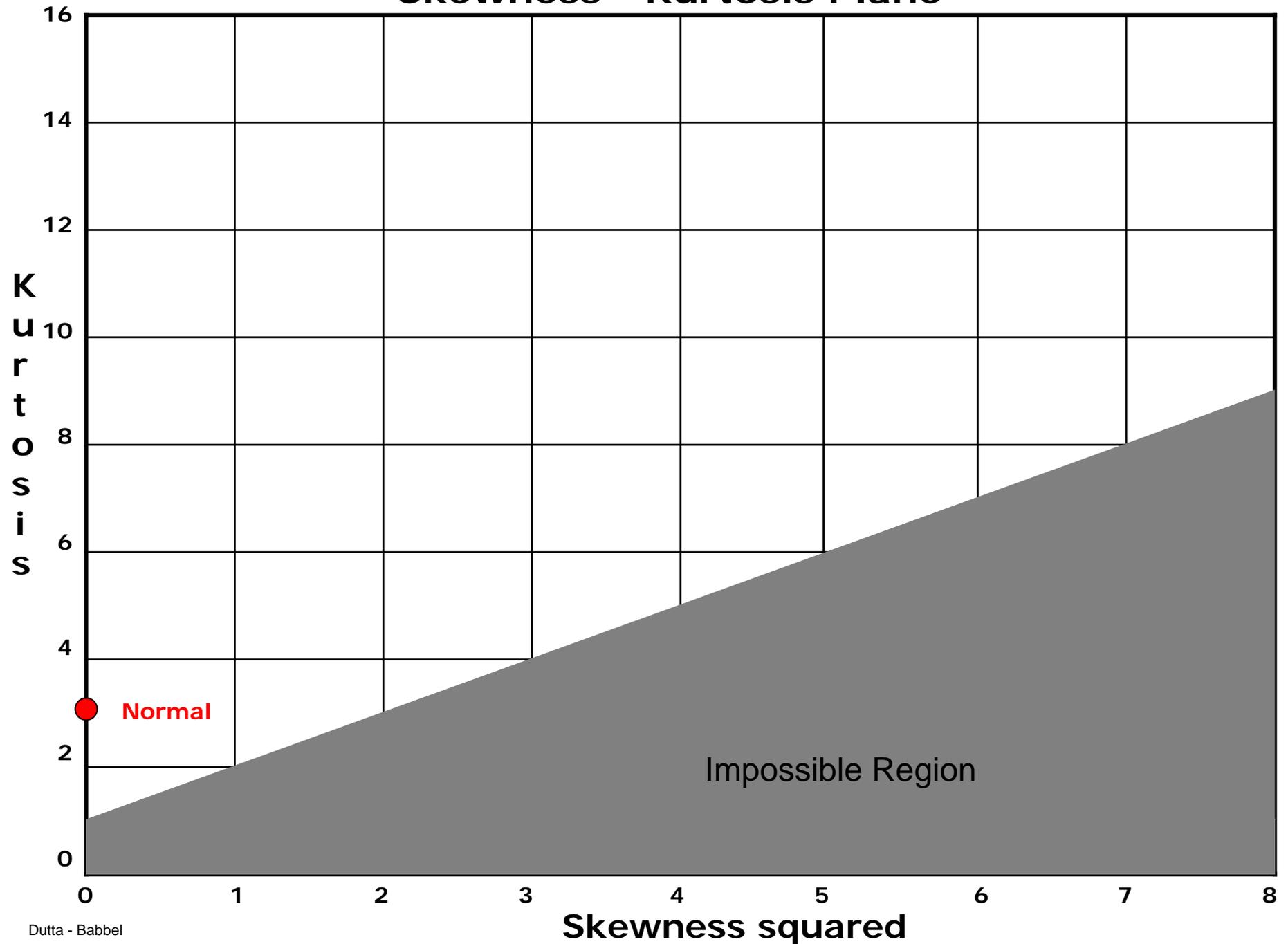
Equity Indexed Annuities Performance Analysis

- In Dr. McCann's research on FIAs, he has **assumed** that the rates of return on the S&P 500 Total Return Index are **normally distributed**
- This assumption is embedded in all of his **simulations** and in his **risk-neutral pricing methodology**, upon which his conclusions regarding FIAs are based. We test his assumption over the available data from January 1926 through October 2008, *as well as various sub-periods*
- **The test results indicate that the normality assumption is unwarranted**
 - Dr. McCann's conclusion that the 14-yr annuity beats a 50/50 portfolio of stocks and bonds no more than 2% (and in some cases, 0.2%) of the time is based on a simulation of normally, independently distributed monthly index returns
 - Our finding that stock returns are not normally distributed renders his simulation irrelevant; moreover, our use of the historical record demonstrates how his simulation cannot even begin to accommodate patterns of returns that actually did happen

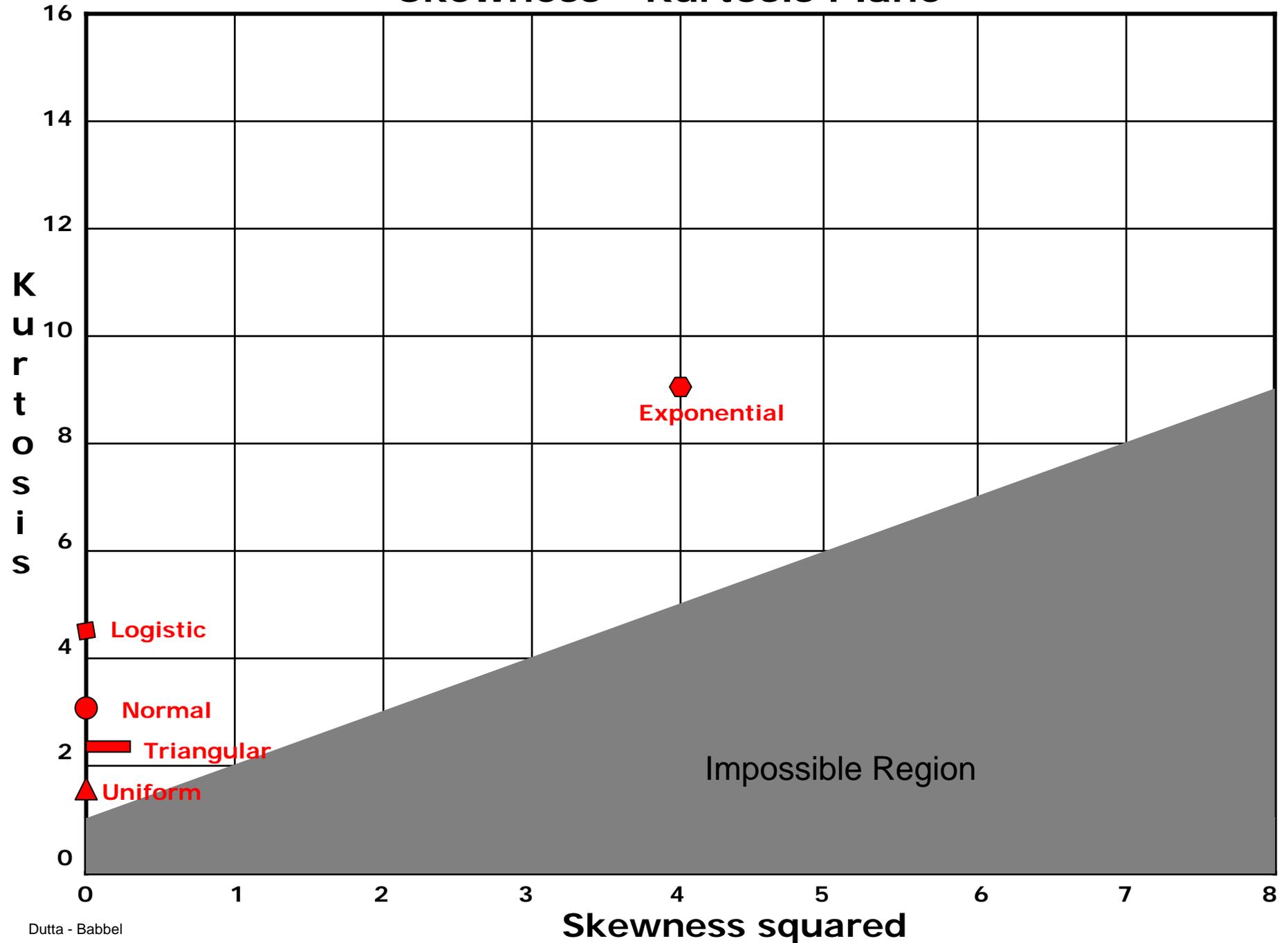
Skewness - Kurtosis Plane



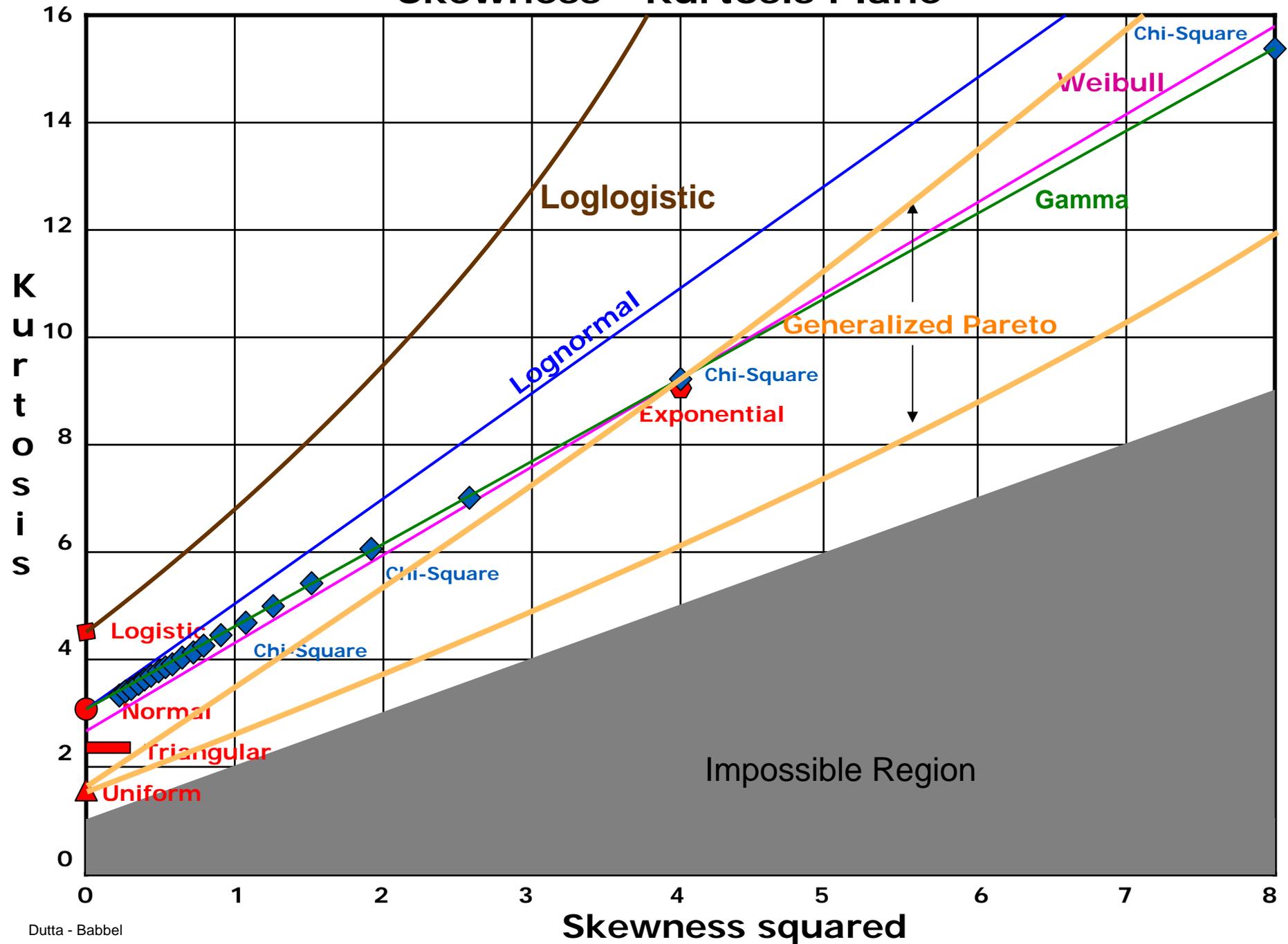
Skewness - Kurtosis Plane



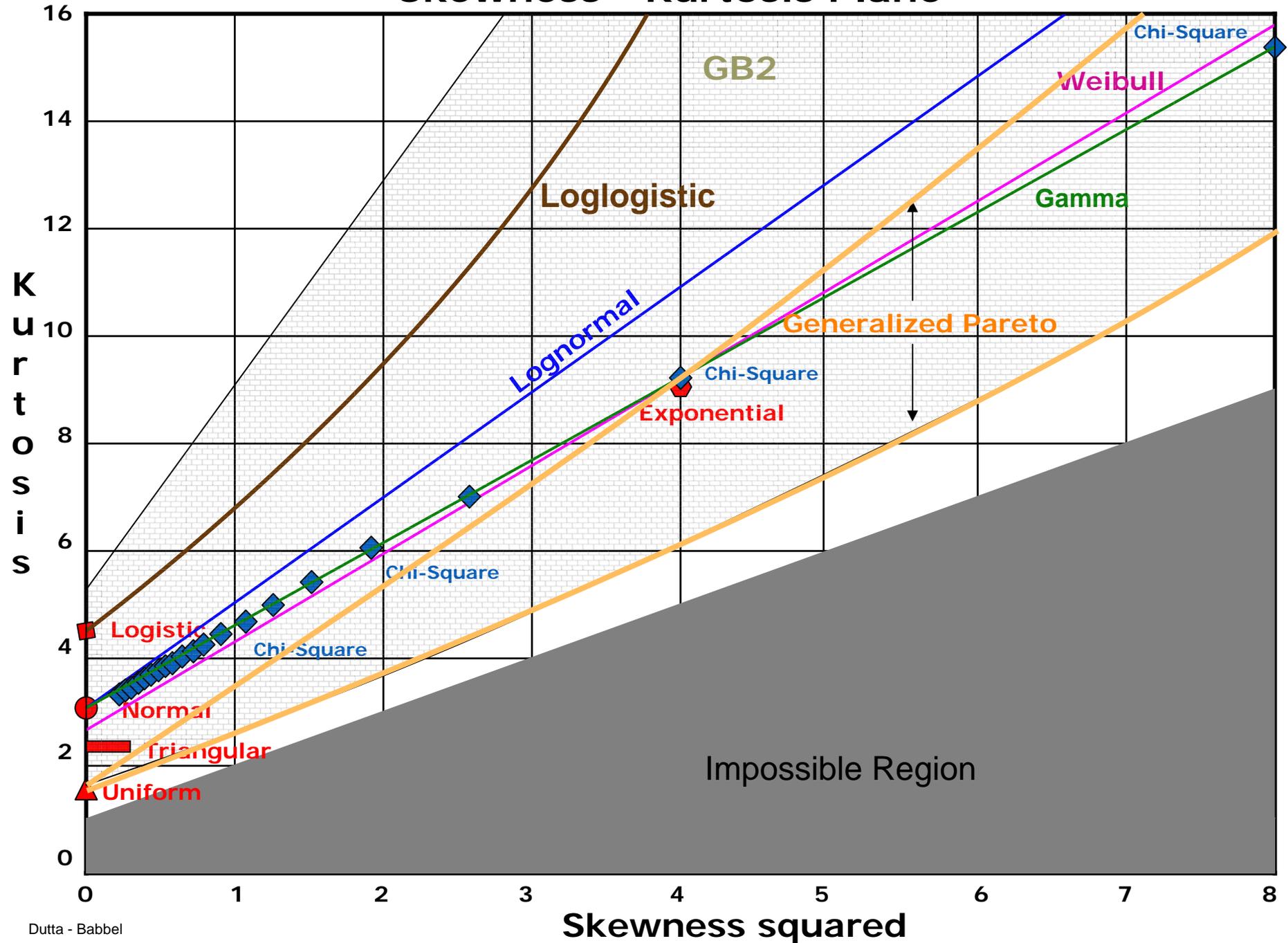
Skewness - Kurtosis Plane



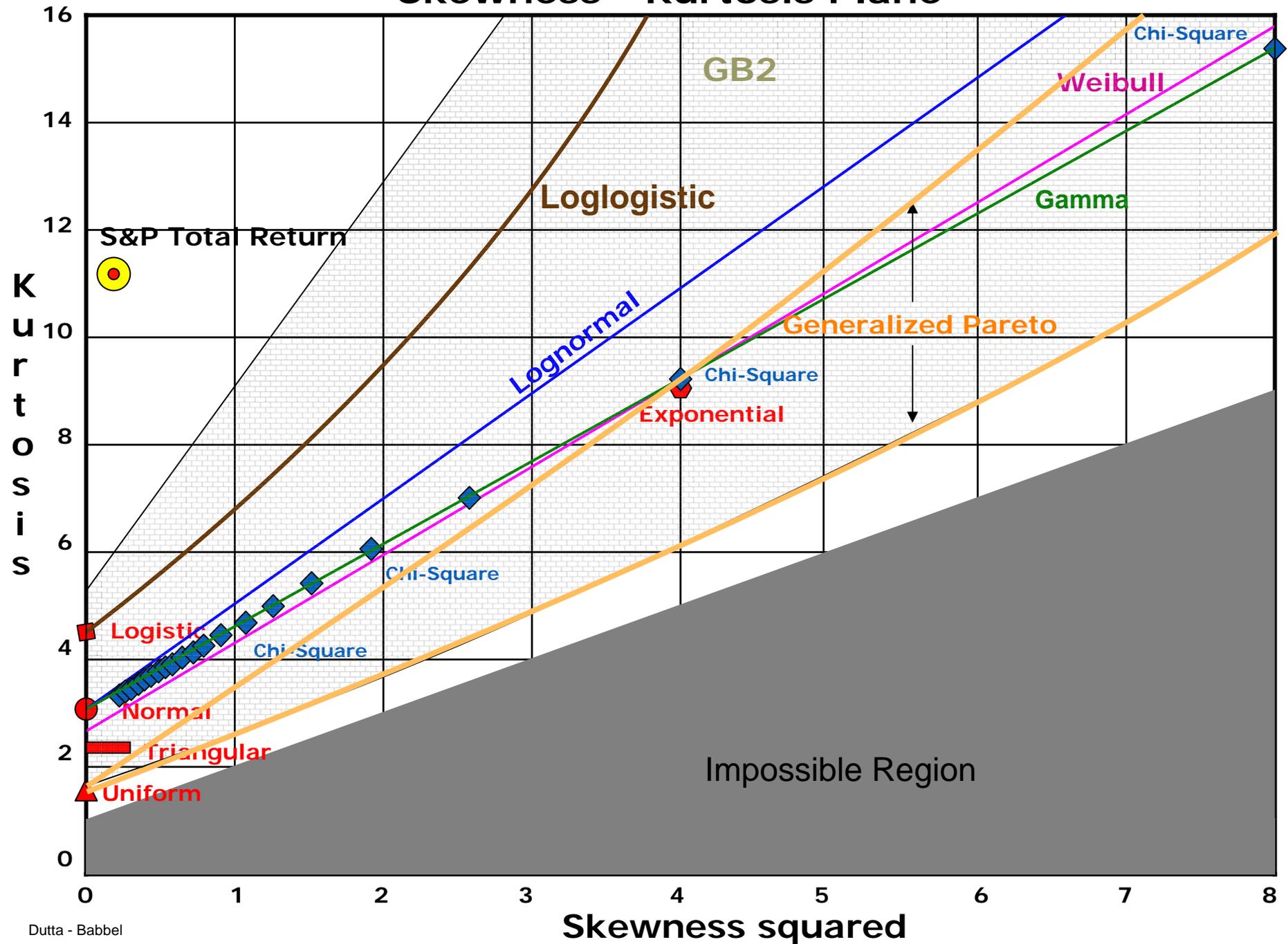
Skewness - Kurtosis Plane



Skewness - Kurtosis Plane



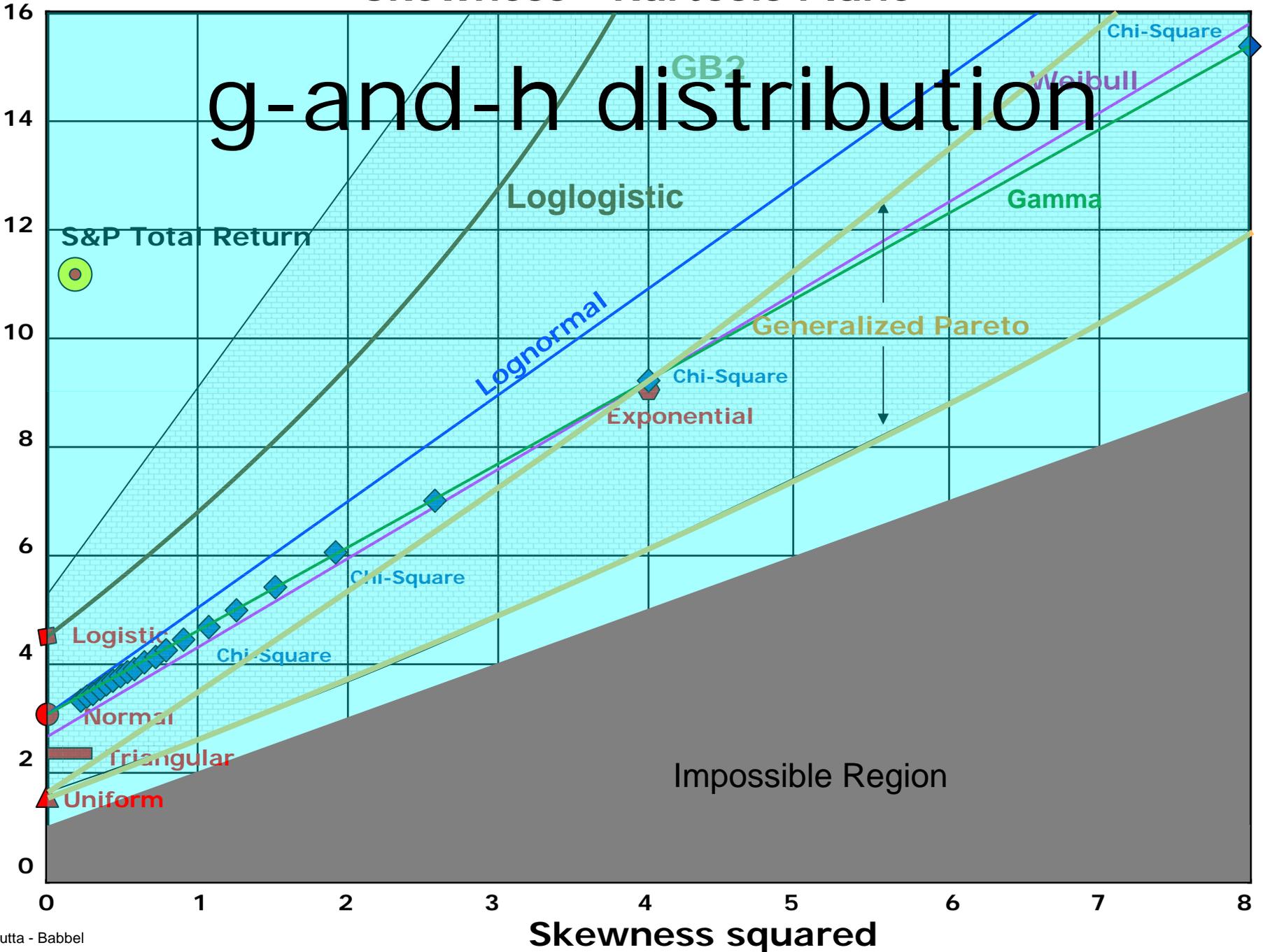
Skewness - Kurtosis Plane



Skewness - Kurtosis Plane

g-and-h distribution

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Jarque-Bera (JB) Test on Monthly S&P 500 Returns Jan-1926 through Oct-2008

The JB test combines the asymmetry (skewness) and peakedness (kurtosis) of a distribution to check for normality

The test reports very large values, compared to 27.63, indicating that the chances of normally distributed returns are far less than one in one million

Statistic	S&P 500	S&P 500 Total Return
N	994	994
Mean	0.44%	0.77%
STDEV	5.54%	5.51%
Skewness	-0.525	-0.483
Kurtosis	11.020	11.050
JB Test-Statistic	2,709.55	2,722.31
P-Value	0.0000%	0.0000%

Odds	Critical Values
5 in 100 (5%)	5.99
1 in 100 (1%)	9.21
1 in 1,000 (0.1%)	13.82
1 in 1 million (0.0001%)	27.63

A test-statistic greater than 5.99 means that chances are less than 5% that the data are normally distributed, and so on.

According to the Jarque-Bera test for normality, there is **less than one chance in one bicentillion** that the actual underlying distribution of monthly equity returns is normally distributed...

How much is one bicentillion?

We used three popular tests to see whether the Normal Distribution assumption was appropriate

Chance that Normal Distribution is appropriate assumption:

Jarque-Bera test: less than 1 chance in 1 million

Anderson-Darling test: less than 1 chance in 1 million

Kolmogorov-Smirnov test: less than 1 chance in 1 million

All tests showed that the Normal Distribution assumption was unsupportable based on observed behavior of monthly stock returns

Dr. McCann also assumed distributions were independently and identically distributed. We found that there is only 1 chance in 100 that such an assumption is consistent with the monthly stock returns data since 1926

3. *Long-Run View*

Equity Indexed Annuities Performance Analysis

- **We consider monthly returns for the period Jan-1926 through Feb-2008 and compare implied annuity account values with the values of alternative investments over the full terms of the various annuities considered**
 - We assume that an annuity is issued at the beginning of each month starting on January of 1926
 - We compare the annuity's annualized returns over the term of the contract with annualized returns for alternative investments over the same period
 - 3 normality tests strongly conclude that monthly S&P returns are not normally distributed. This conclusion makes Dr. McCann's simulation irrelevant and justifies our use of the historical record to compare annuities with alternative investments

- **The data used in this section are monthly returns on the S&P 500 index, and intermediate-term government bonds from Morningstar's SBBI**
 - Monthly returns are adjusted for fund fees based on Vanguard's stock and bond funds data used in the previous section

3. Long-Run View

Equity Indexed Annuities Performance Analysis

- **We next consider monthly S&P 500 Index returns for the period January 1926 through February 2008 and calculate implied account values and the value of alternative investments over the full term of the various annuities considered**

- **We then look at the annualized rates of return on annuities and alternative investments over the accumulation phases of the annuities**
 - We assume that an annuity is issued at the beginning of every month, starting January 1, 1926 and ending March 1, 1994 (for the 14-year annuity) or March 1, 1999 (for the 9-year annuity)
 - The alternative investment also starts on the same day, and has the same investment horizon, as the corresponding annuity
 - The annualized returns for the annuity are calculated for all historical paths and histograms are constructed to compare the performance of annuities and alternative investments
 - In the spirit of Dr. McCann's treatment of dividends, we construct a Total Return Index by adding a constant dividend yield to the monthly S&P 500 Index return

3. Long-Run View

Percent of Times the Annuity Beats Alternative Investments

“... there is a pretty broad range of asset allocations that give you the stock and bond portfolio being better 98, 98.5, almost 99 percent of the time.”

Craig McCann, Ph.D., CFA.

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	14-yr Annuity	9-yr Annuity
S&P 500 Index	41.9%	58.0%
S&P 500 Total Return Fund	21.5%	37.1%
50/50 Portfolio	33.8%	63.3%
50/50 Portfolio (Z-Bond)	25.0%	56.3%

3. Long-Run View

Percent of Times the Annuity Beats Alternative Investments

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S&P 500 Index	41.9%	58.0%
S&P 500 Total Return Fund	21.5%	37.1%
50/50 Portfolio	33.8%	63.3%
50/50 Portfolio (Z-Bond)	25.0%	56.3%

Contrary to Dr. McCann's assertions, the 14-yr annuity, as well as the 9-yr annuity, beat the alternative investments a lot more often than 2% of the time, from 21.5% to 63.3% of the time, based on the long-run historical evidence

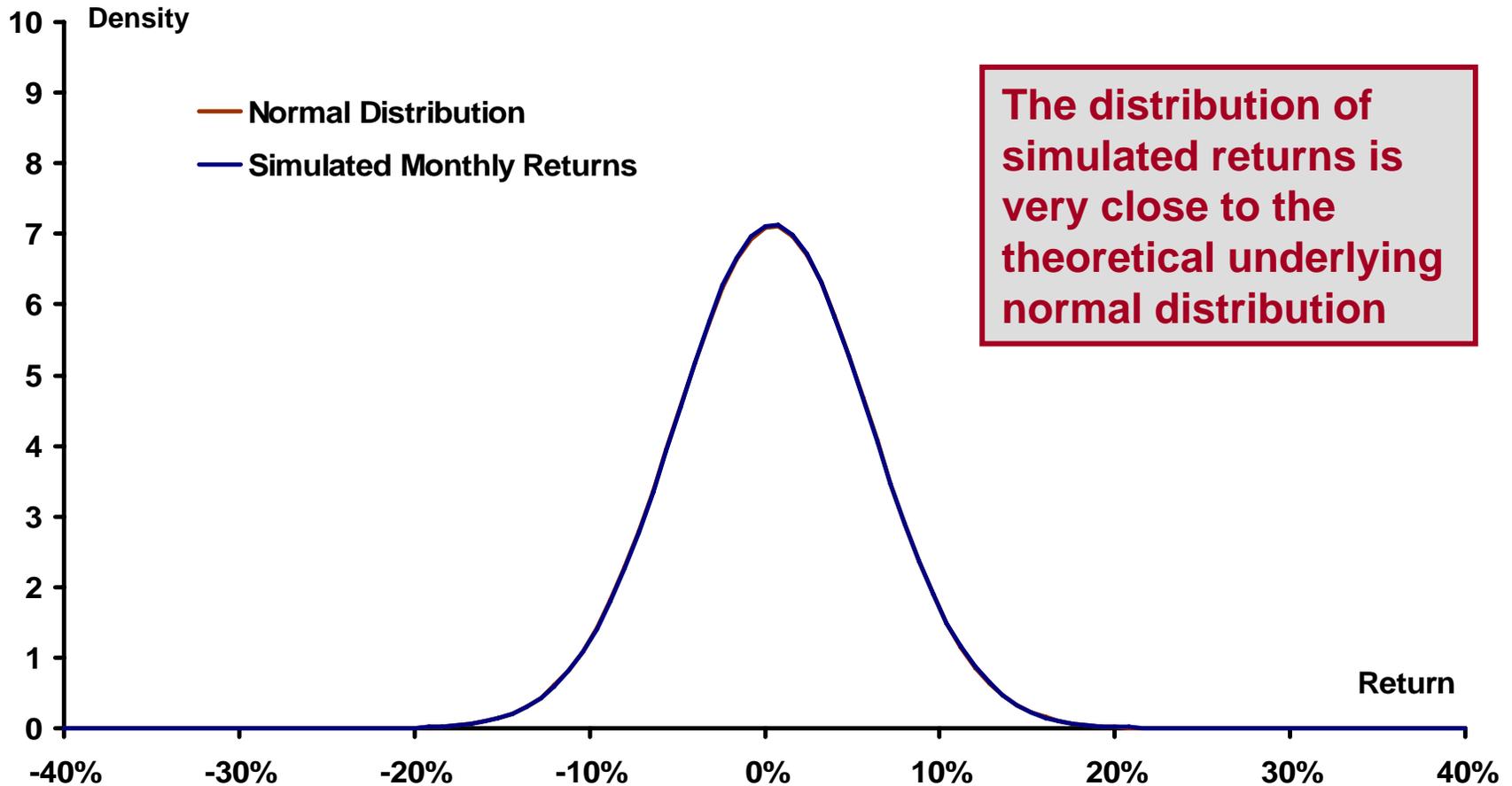
3. *Long-Run View*

Non-Normality, Dependence and Crediting Rates

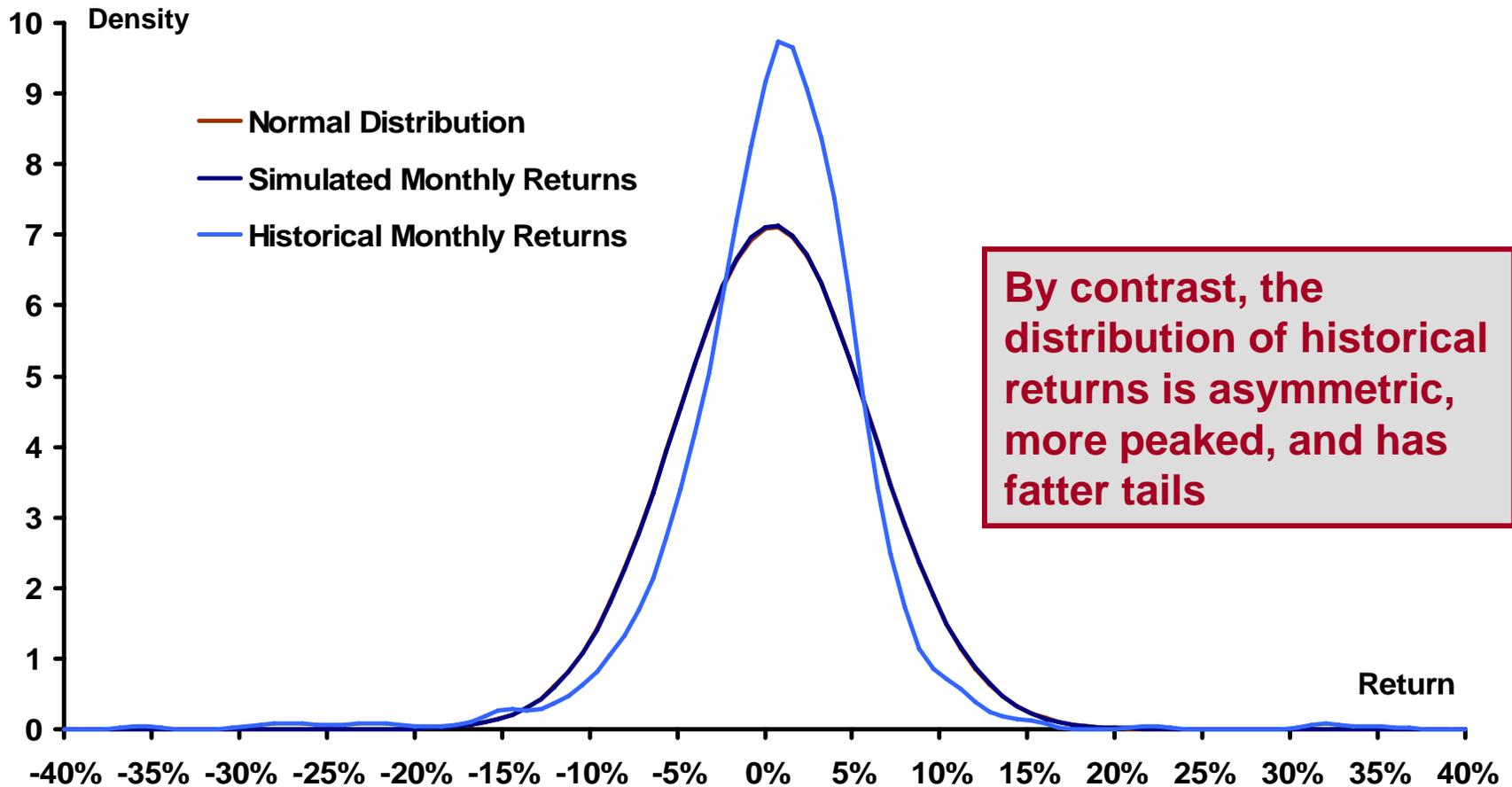
- **Dr. McCann's Simulation, used in both his "Benefit of the Bargain" and "Out of Pocket" calculations is flawed not only because his normality assumption fails, but also because:**
 - The assumption that monthly S&P 500 returns are independent also fails (p-value of lack of correlation test is 0.0199)
 - The crediting rate formulas, when combined with the non-normality of, and dependence among monthly S&P 500 returns result in a distribution of crediting rates that is fundamentally different from the one implied by Dr. McCann's simulations

- **The following slides illustrate the fundamentally different historical and simulated distributions and implied crediting rate distributions**
 - Monthly S&P Index returns are simulated with the same mean and variance as the historical monthly returns
 - And they are simulated under Dr. McCann's assumptions of normality and independence
 - The corresponding annual crediting rates are also derived for both the historical and simulated return series
 - We simulate 600,000 monthly returns and 50,000 corresponding crediting rates

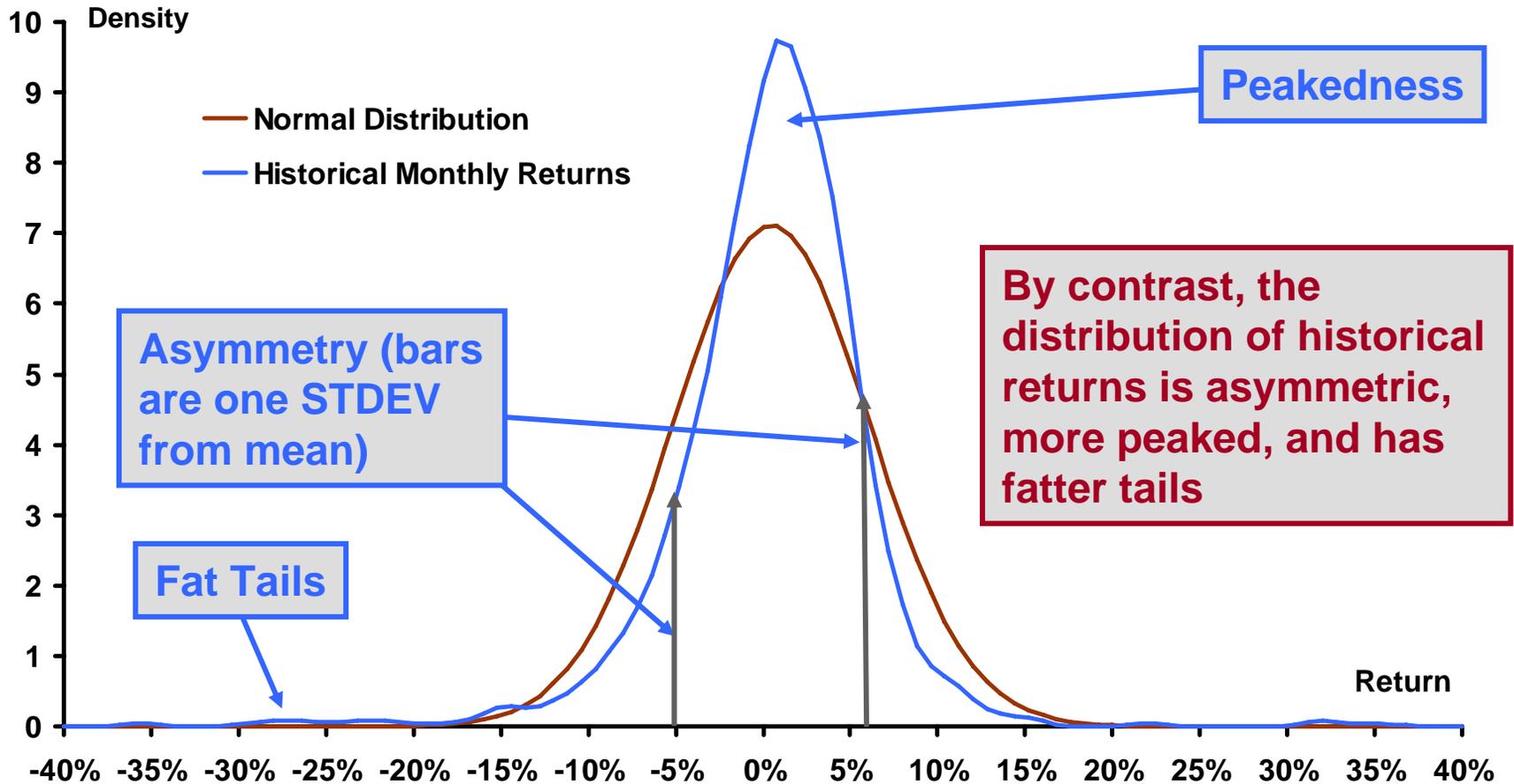
Distribution of Historical (Jan-26 through Feb-08) and Simulated Monthly S&P 500 Returns



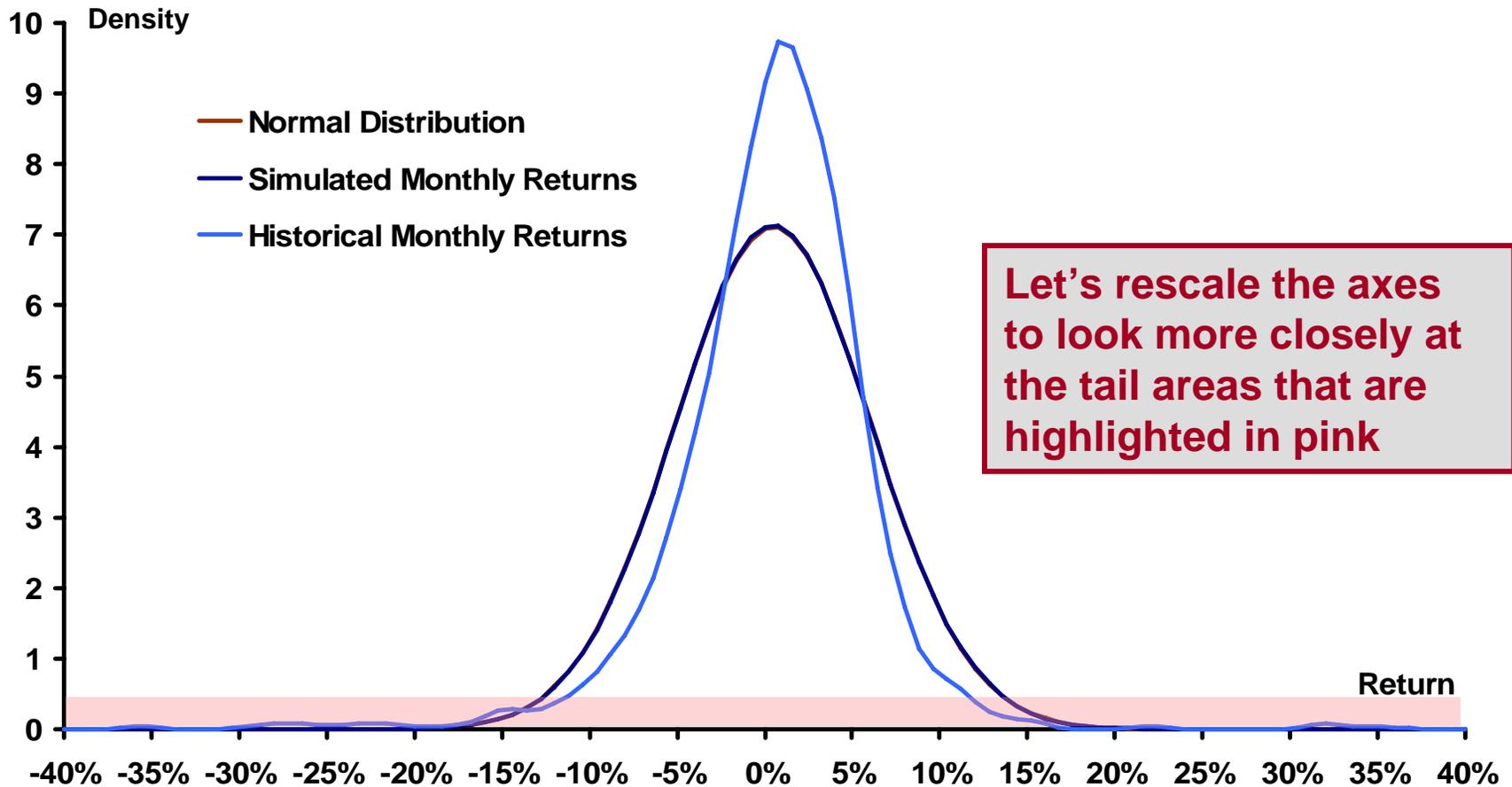
Distribution of Historical (Jan-26 through Feb-08) and Simulated Monthly S&P 500 Returns



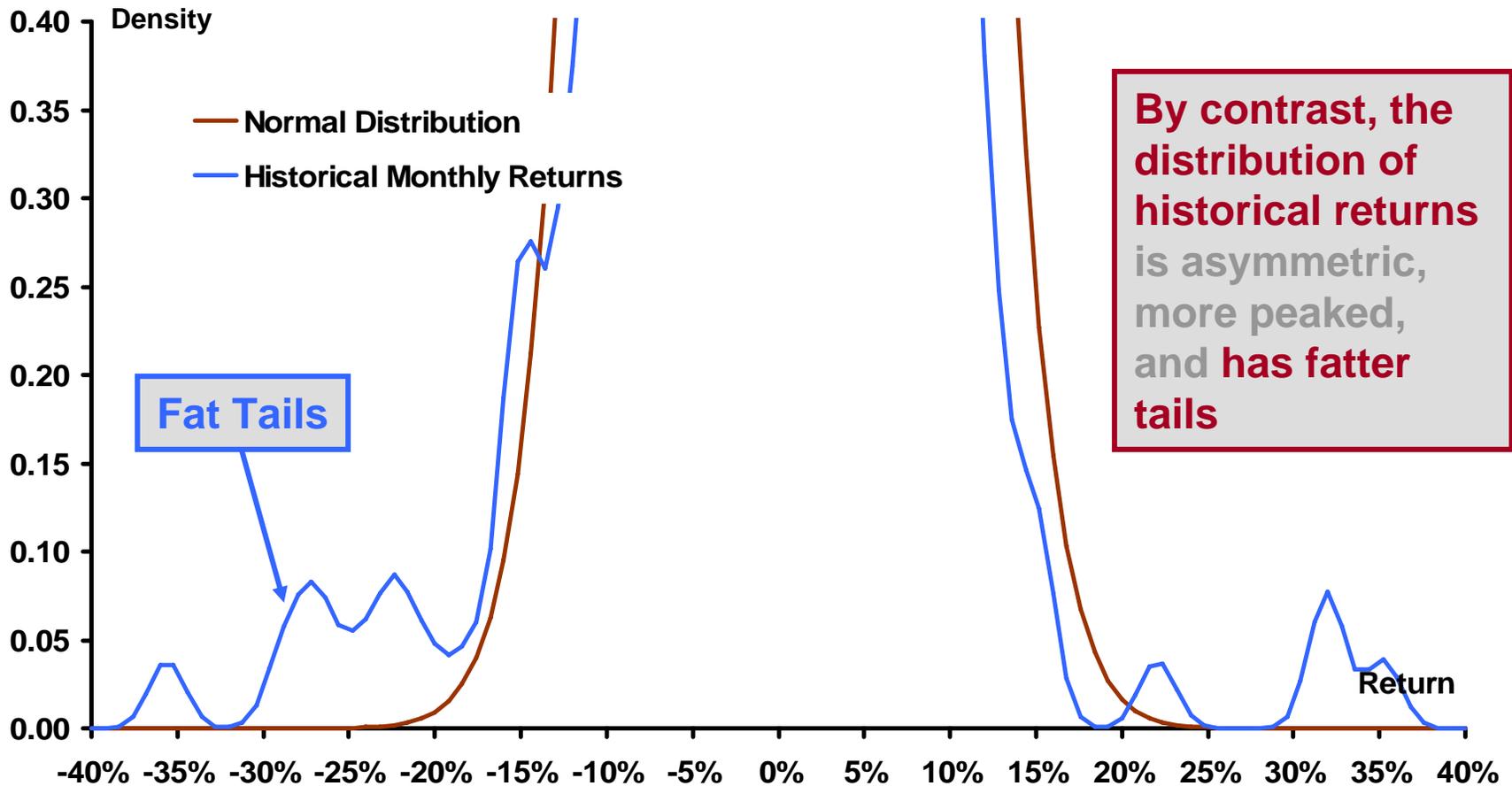
Distribution of Historical (Jan-26 through Feb-08) and Simulated Monthly S&P 500 Returns



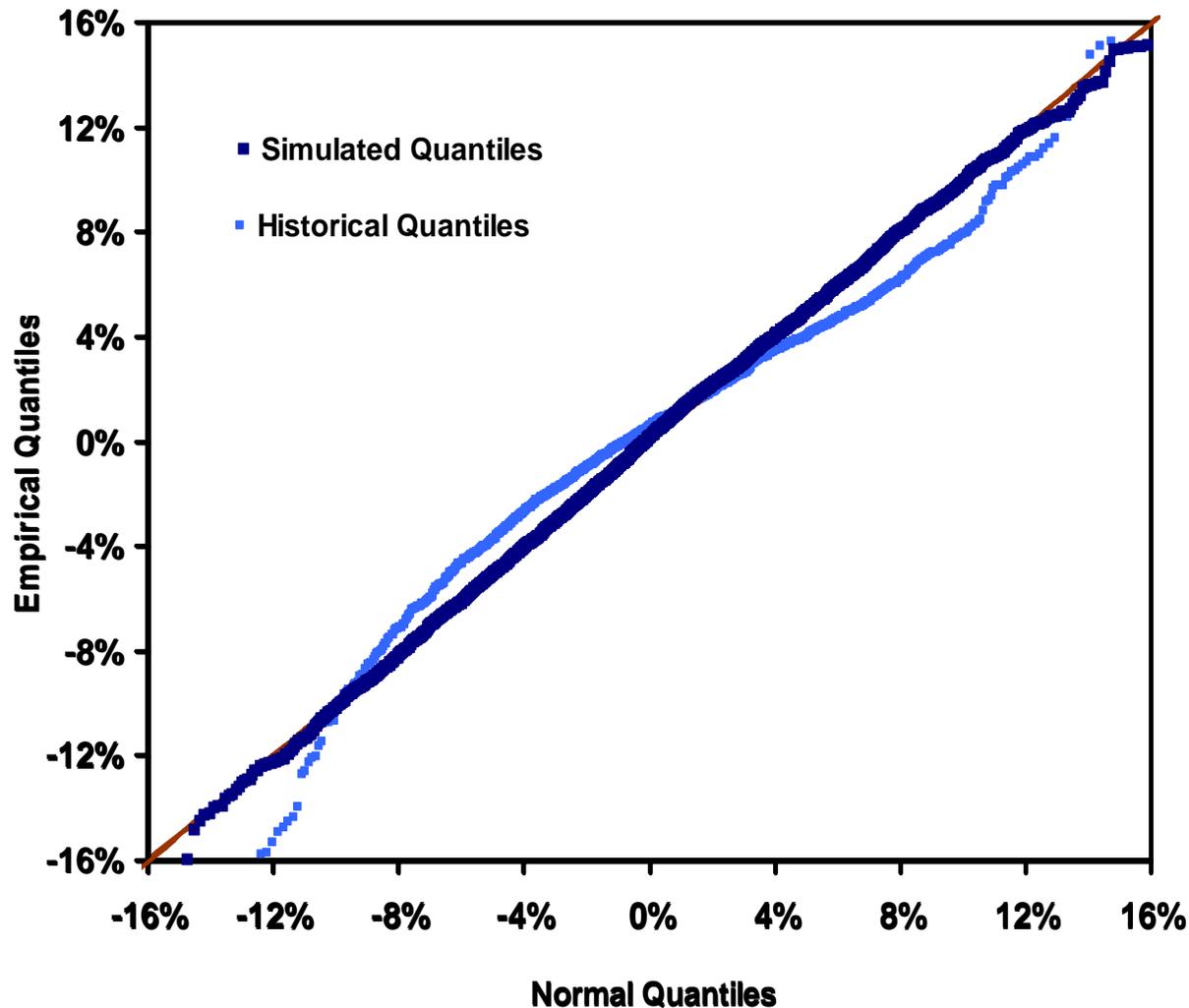
Distribution of Historical (Jan-26 through Feb-08) and Simulated Monthly S&P 500 Returns



Distribution of Historical (Jan-26 through Feb-08) and Simulated Monthly S&P 500 Returns – *Focus on Tails*



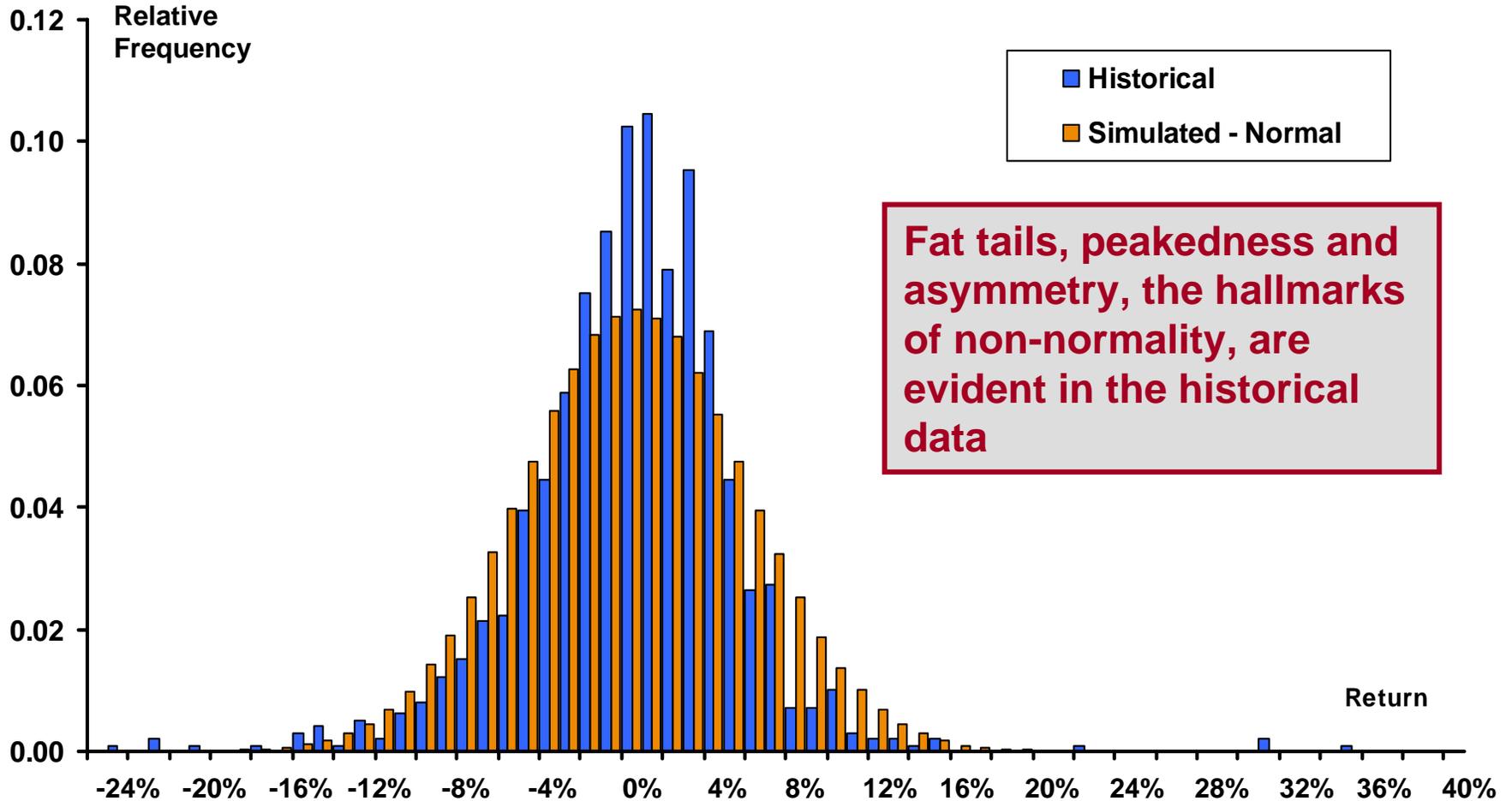
Further Evidence of Non-Normality: Q-Q Plot Monthly S&P 500 Returns (Jan-26 through Feb-08)



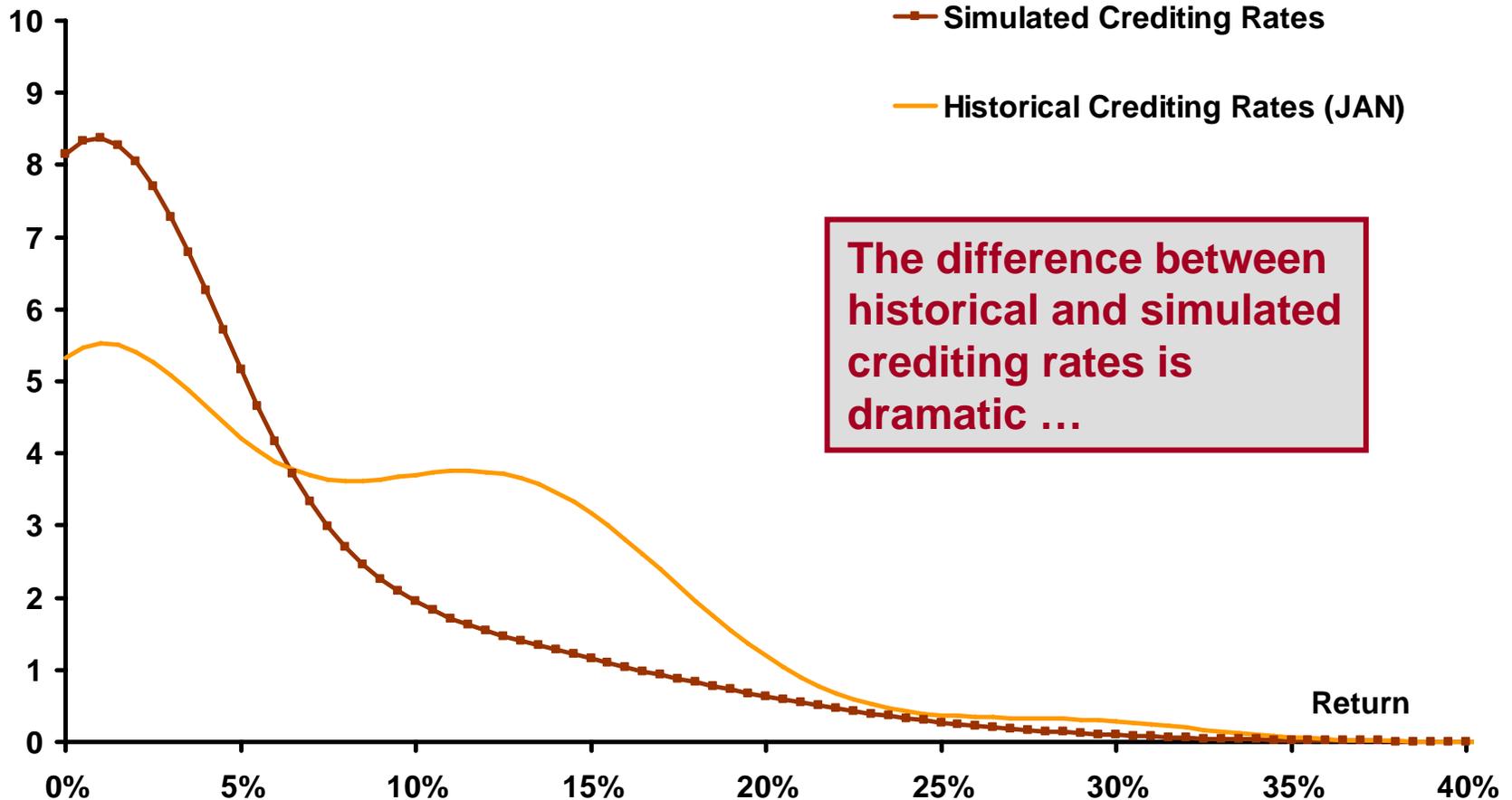
If returns are normally distributed, the quantile-quantile plot (Q-Q plot) should be close to the 45° line

This is the case for simulated returns but not for historical returns

Distribution of Historical (Jan-26 through Feb-08) and Simulated Monthly S&P 500 Returns



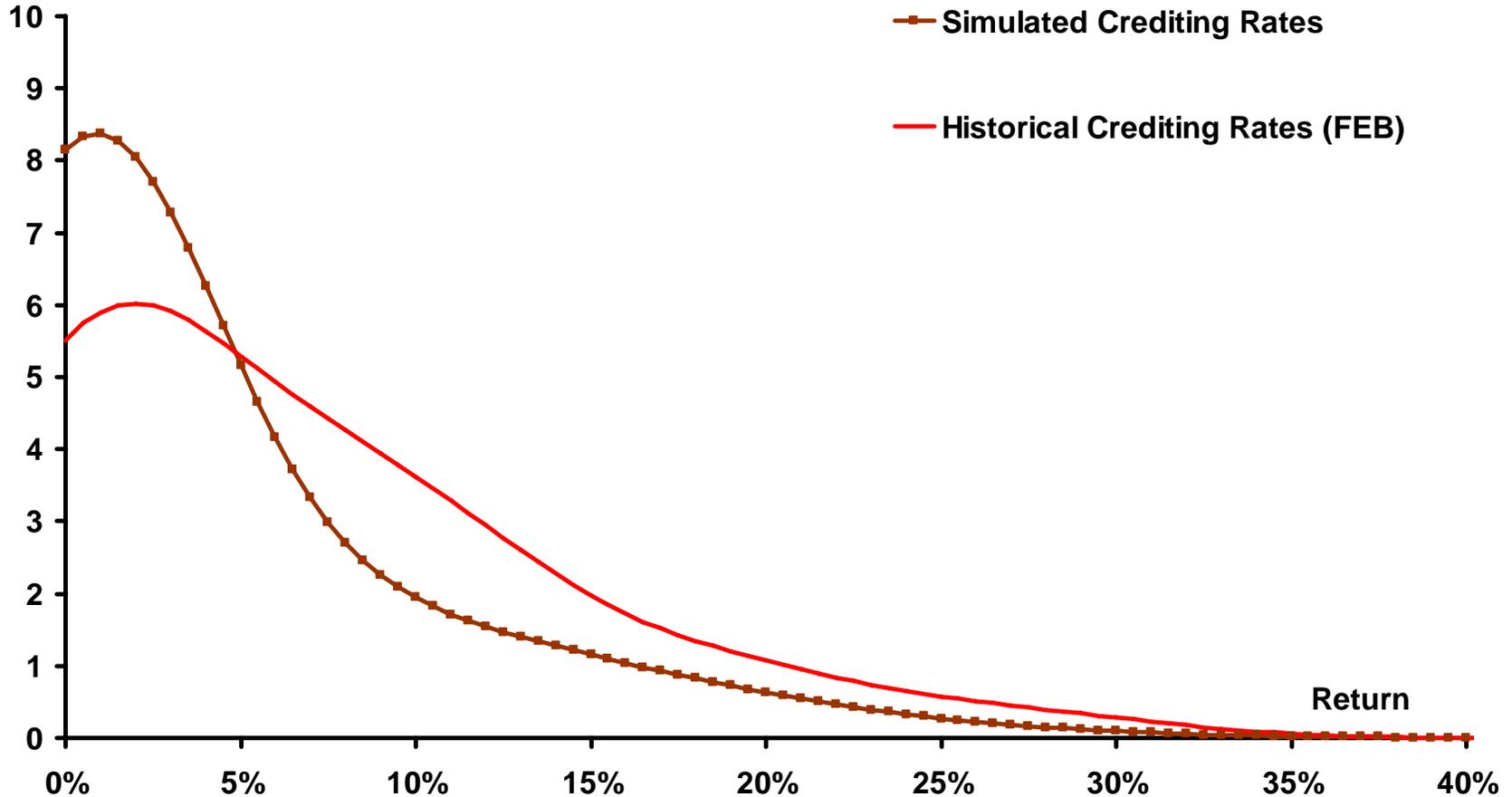
14-yr Annuity: Historical and Simulated Crediting Rates



The difference between historical and simulated crediting rates is dramatic ...

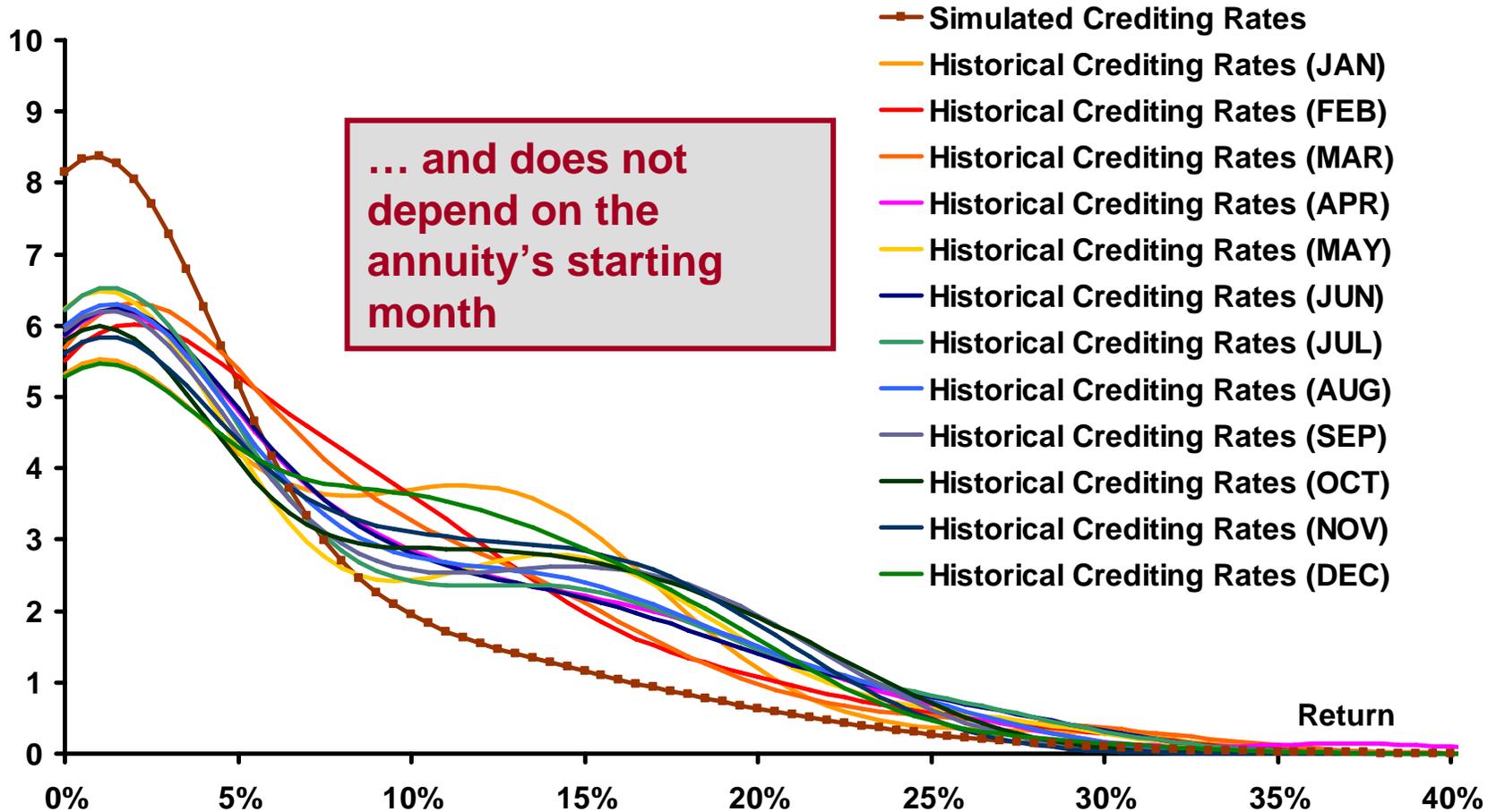
Note: Since the minimum guarantee applies to the terminal value of the policy, it is not incorporated in the calculation of the crediting rate distributions. This understates the ability of the annuity to beat alternative investments.

14-yr Annuity: Historical and Simulated Crediting Rates



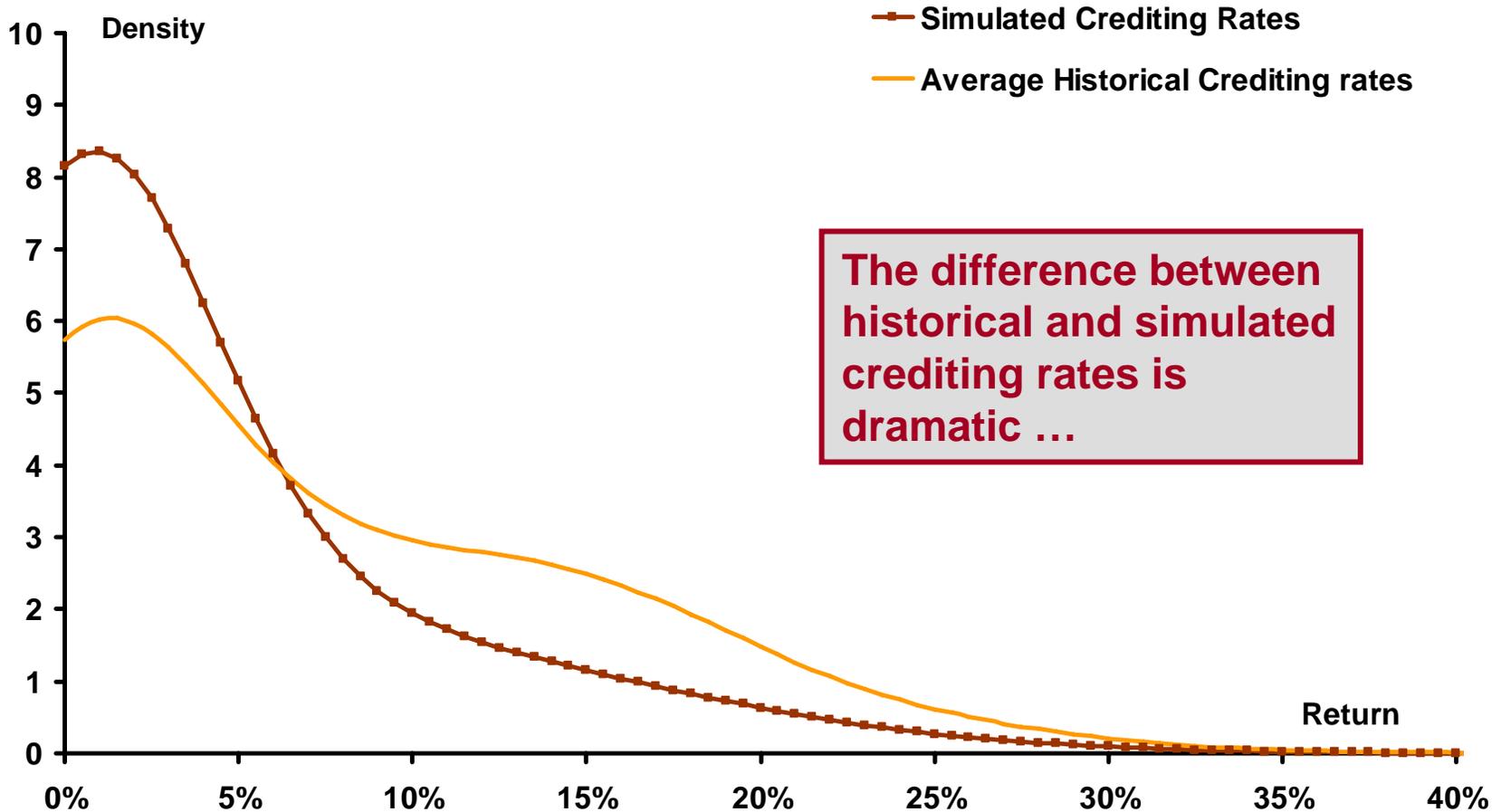
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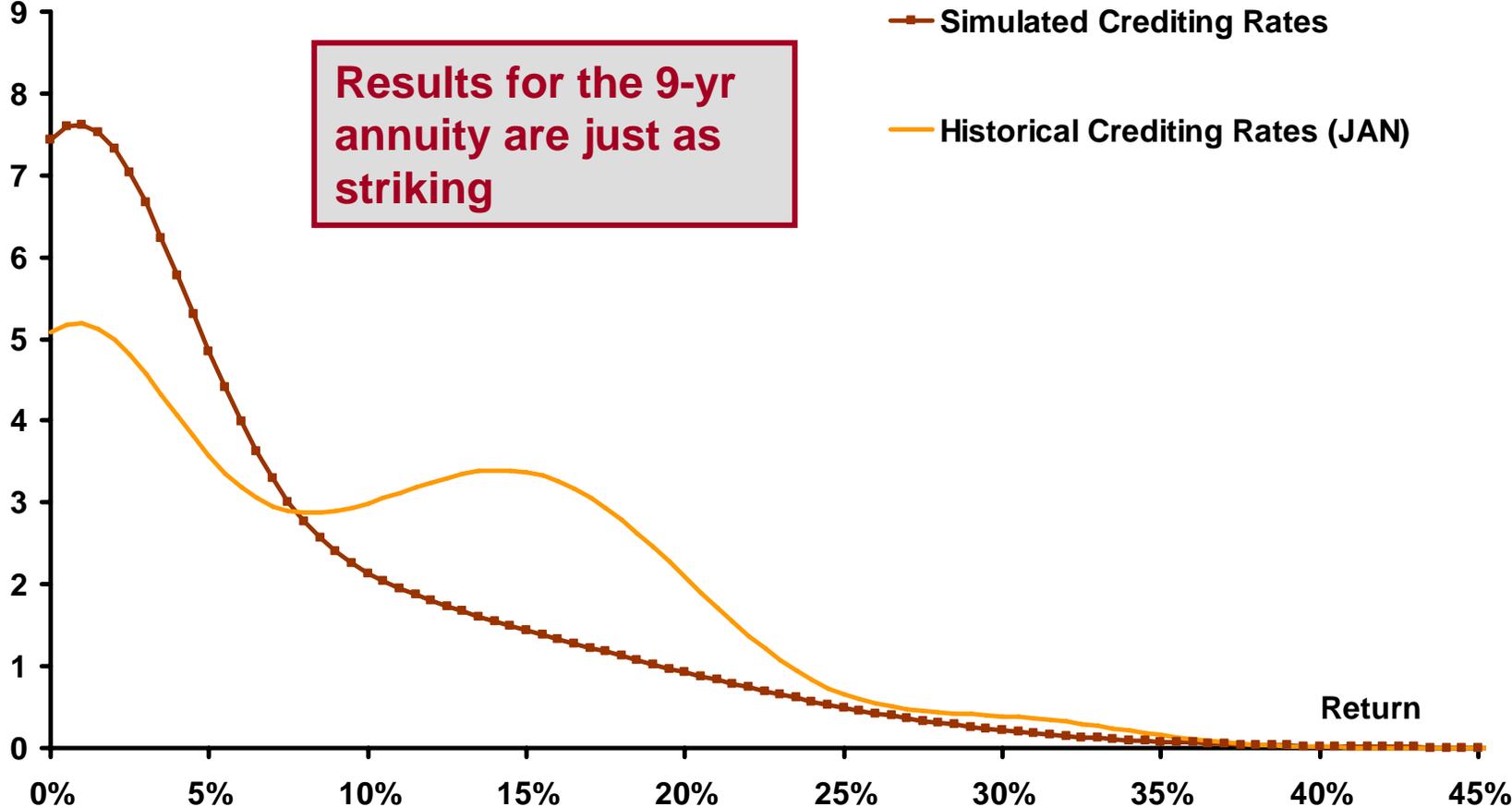
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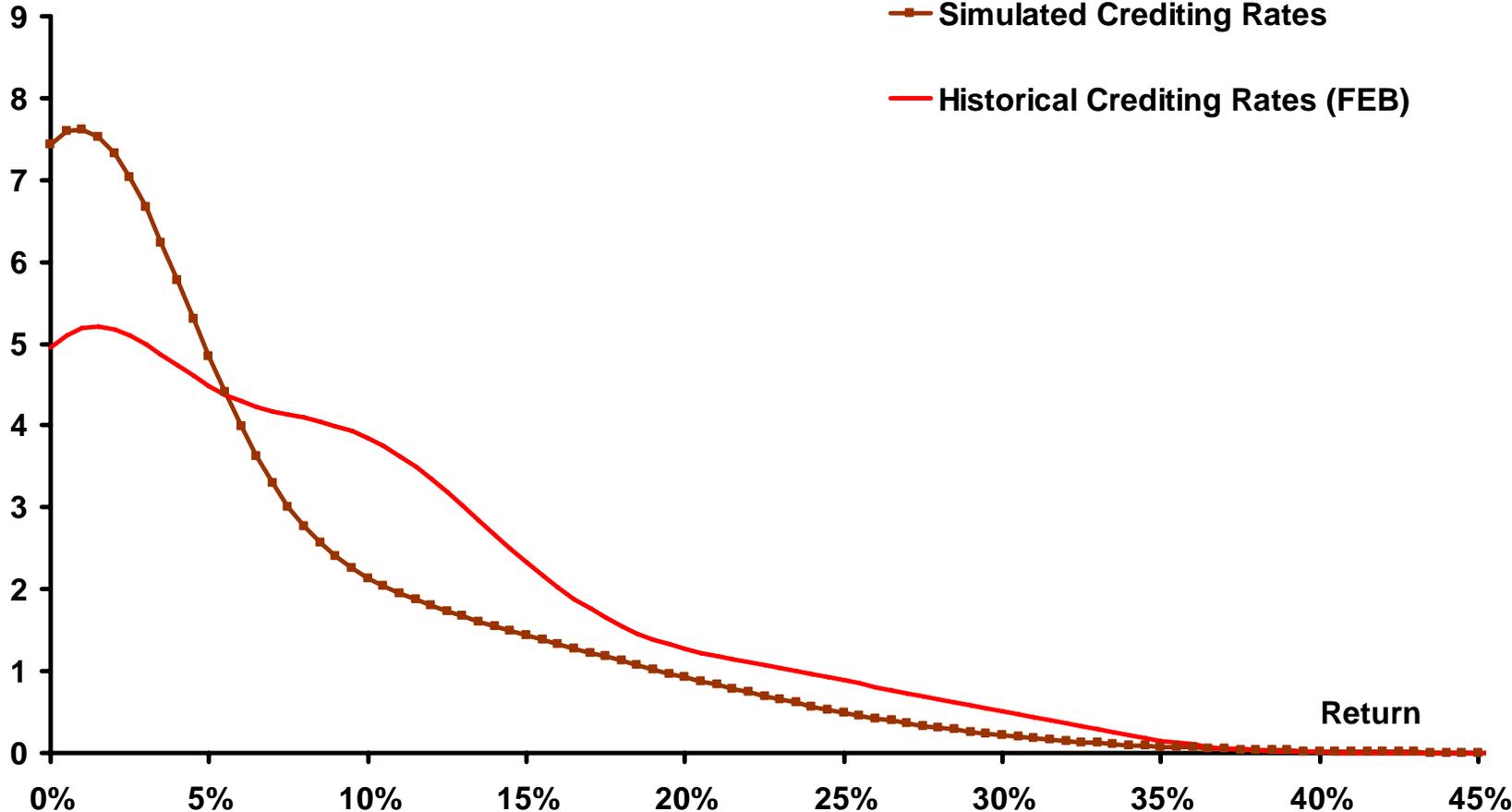
9-yr Annuity: Historical and Simulated Crediting Rates



Results for the 9-yr annuity are just as striking

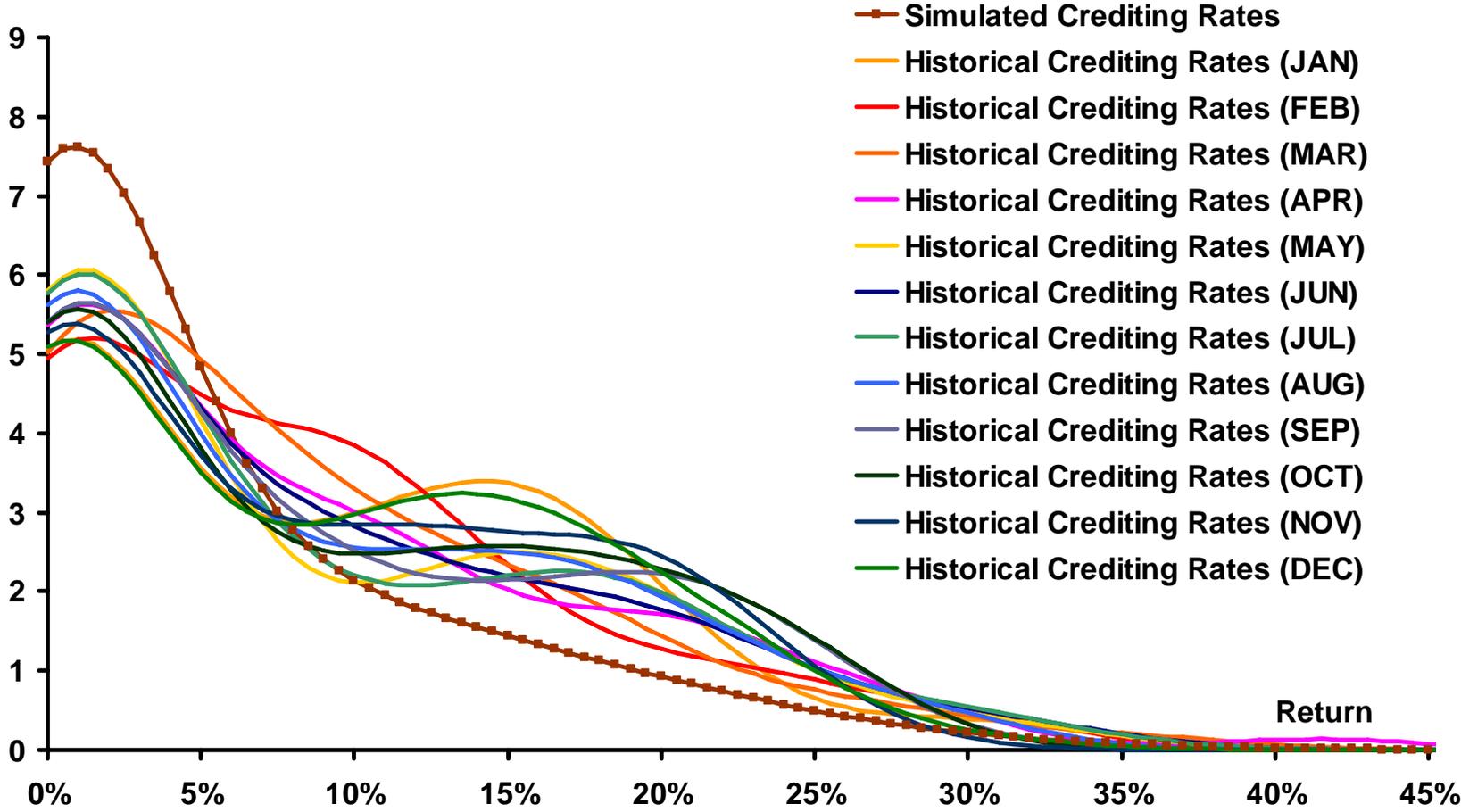
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9-yr Annuity: Historical and Simulated Crediting Rates



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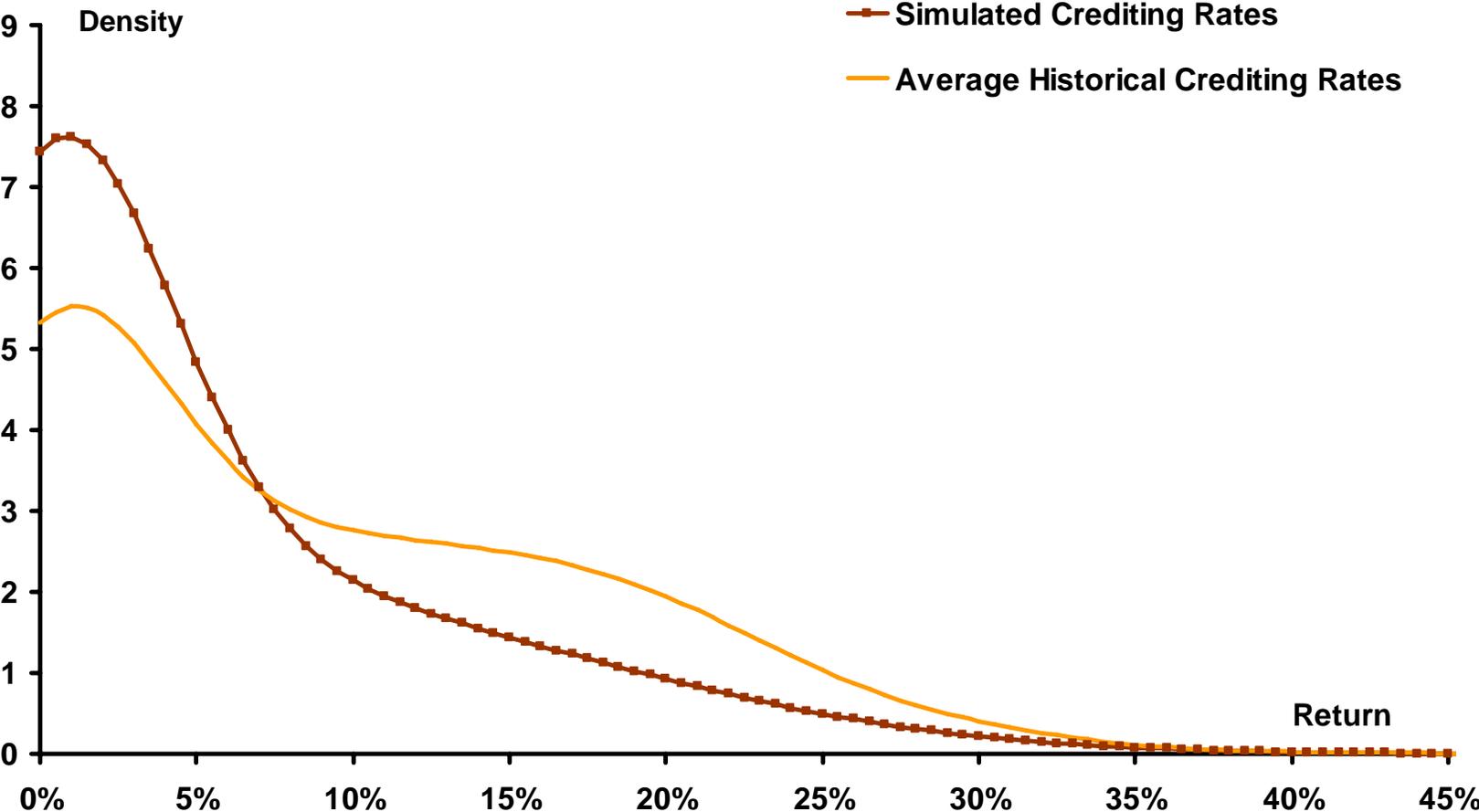
9-yr Annuity: Historical and Simulated Crediting Rates



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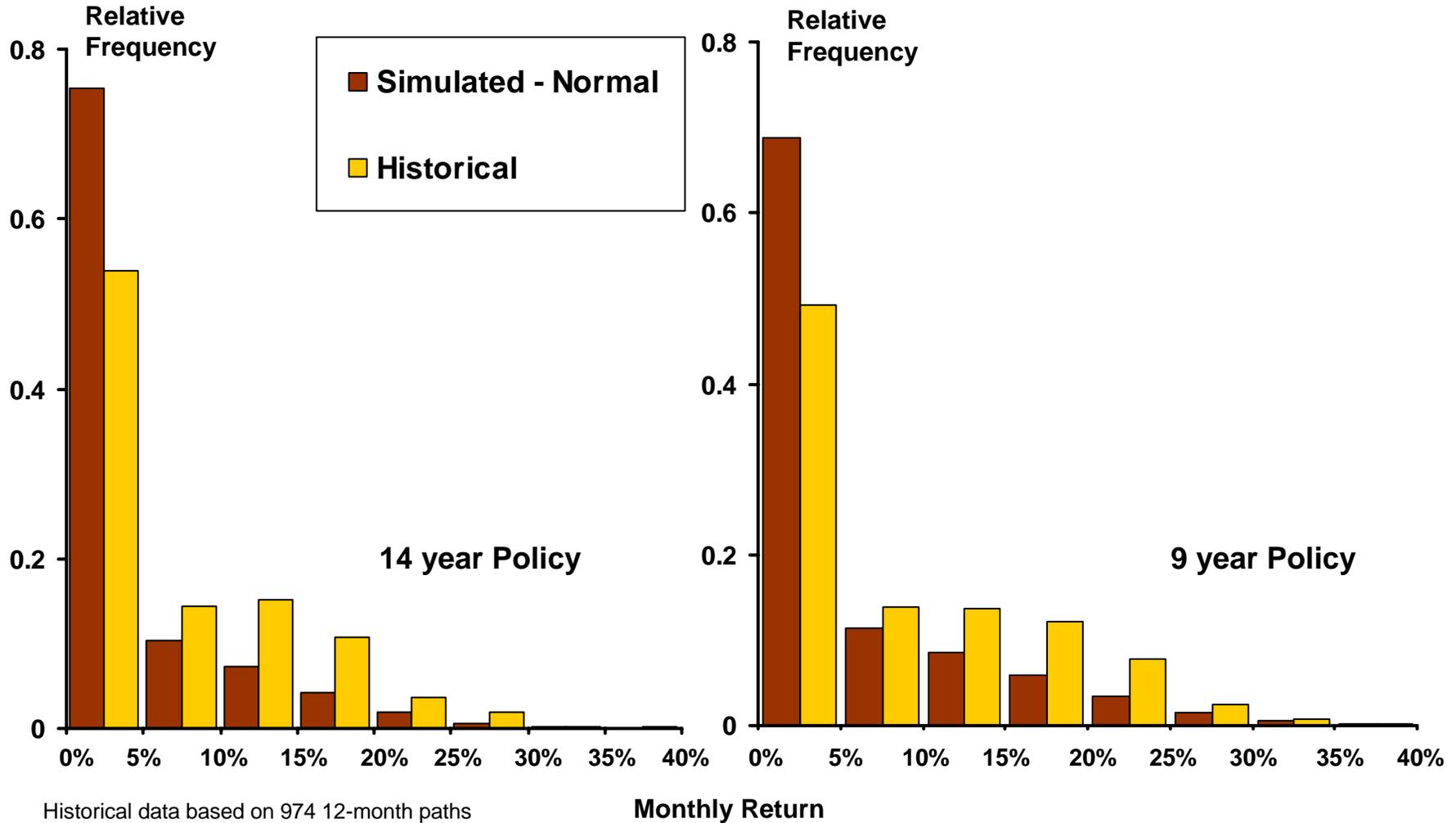
9-yr Annuity

Historical and Simulated Crediting Rates

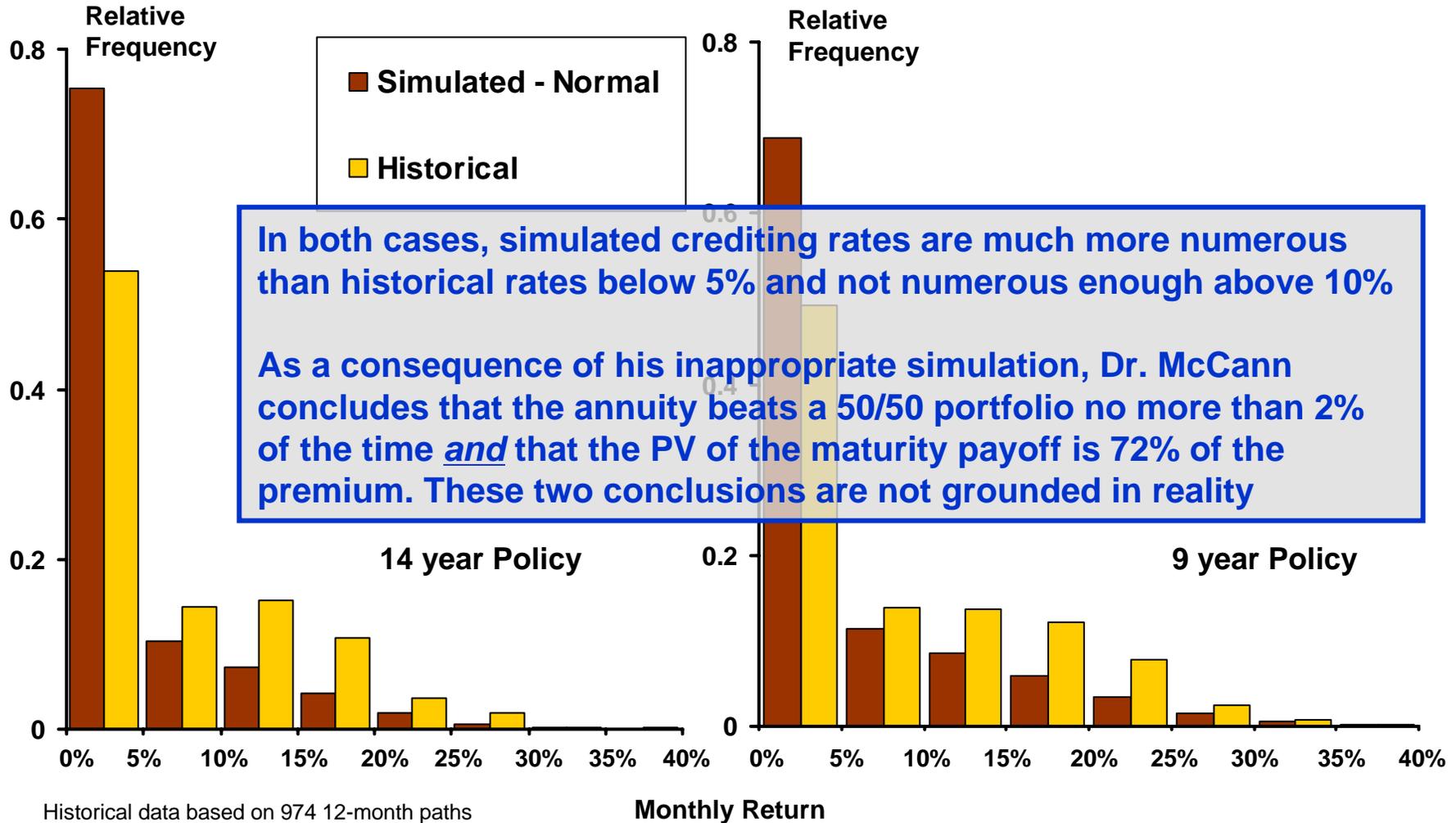


Note: Since the minimum guarantee applies to the terminal value of the policy, it is not incorporated in the calculation of the crediting rate distributions. This understates the ability of the annuity to beat alternative investments.

Distribution of Historical and Simulated Crediting Rates



Distribution of Historical and Simulated Crediting Rates





4. Do Critics Value FIAs Correctly?

4. Do Critics Value FIAs Correctly?

- **Dr. McCann uses the risk-neutral valuation approach**
 - Assumes complete markets
 - Assumes log-normally, independently distributed index returns (and therefore normally distributed rates of return)
- **This valuation approach does not incorporate the value of annuity features such as mortality risk, penalty-free withdrawals, the option to switch crediting buckets, etc.**
- **I apply Dr. McCann's model to a 17-year annual point-to-point annuity, with a 7% annual cap, a 10% premium bonus**
 - I incorporate mortality risk and penalty-free withdrawal features using the company's mortality tables
 - I assume that 10% of the initial premium can be withdrawn annually and that the minimum account value is \$1,000

Relevance of Mortality Risk and Penalty-Free Withdrawals (per dollar of premium)

[1]	Dr. McCann's Value of 17-year Annuity:	\$0.69
[2]	Estimated Value of Annuity Using Correct 100% Participation Rate:	\$0.76

Panel A: Incorporating Mortality Risk

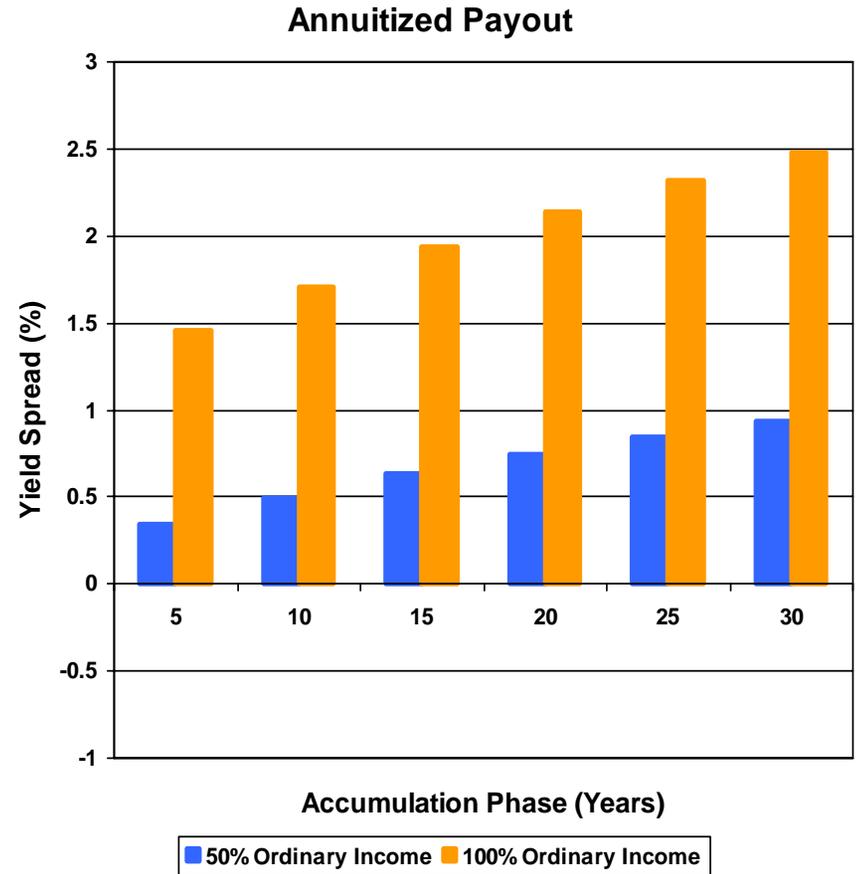
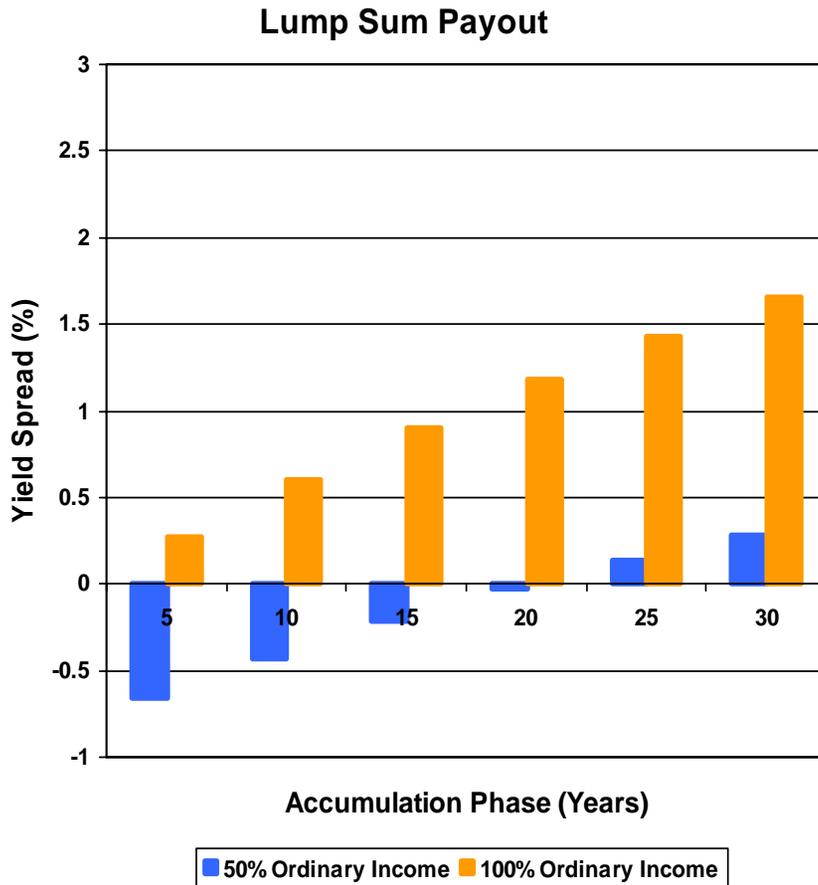
Discount Rate	Purchase at Age 65		Purchase at Age 75		Purchase at Age 80	
	Female	Male	Female	Male	Female	Male
[3] AA Insurer's Rate	\$0.79	\$0.81	\$0.83	\$0.86	\$0.88	\$0.90
[4] Risk-Free Rate	\$0.88	\$0.90	\$0.92	\$0.94	\$0.95	\$0.97

Panel B: Incorporating Mortality Risk and Penalty-Free Withdrawals (at 10% per year)

Discount Rate	Purchase at Age 65		Purchase at Age 75		Purchase at Age 80	
	Female	Male	Female	Male	Female	Male
[5] AA Insurer's Rate	\$0.95	\$0.96	\$0.96	\$0.98	\$0.98	\$0.99
[6] Risk-Free Rate	\$1.00	\$1.00	\$1.01	\$1.02	\$1.02	\$1.03

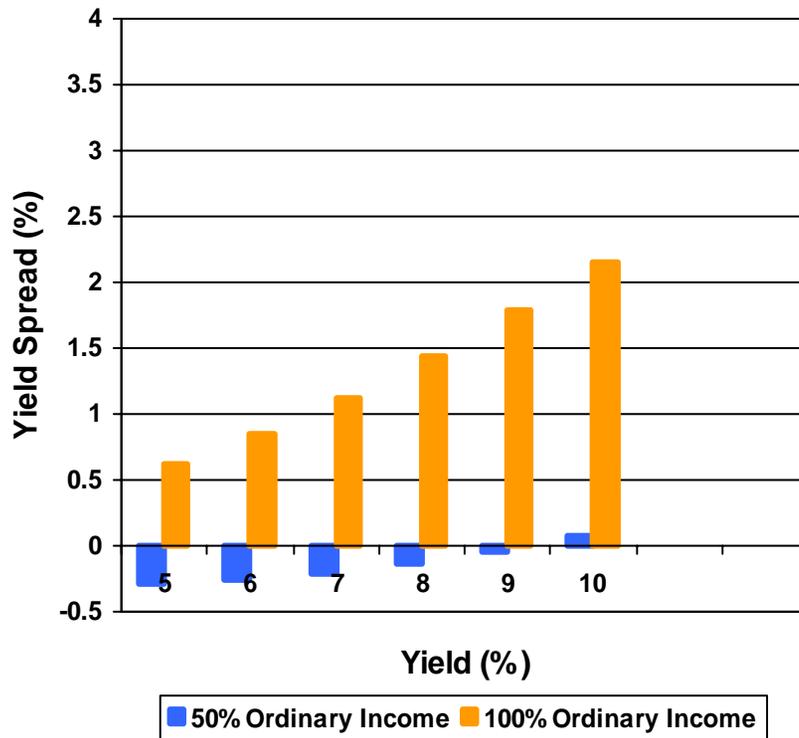
The annuity in this case is a 17-year annual point-to-point annuity with an annual cap of 7% and a premium bonus of 10%.

Effect of Time Horizon on Yield Spread

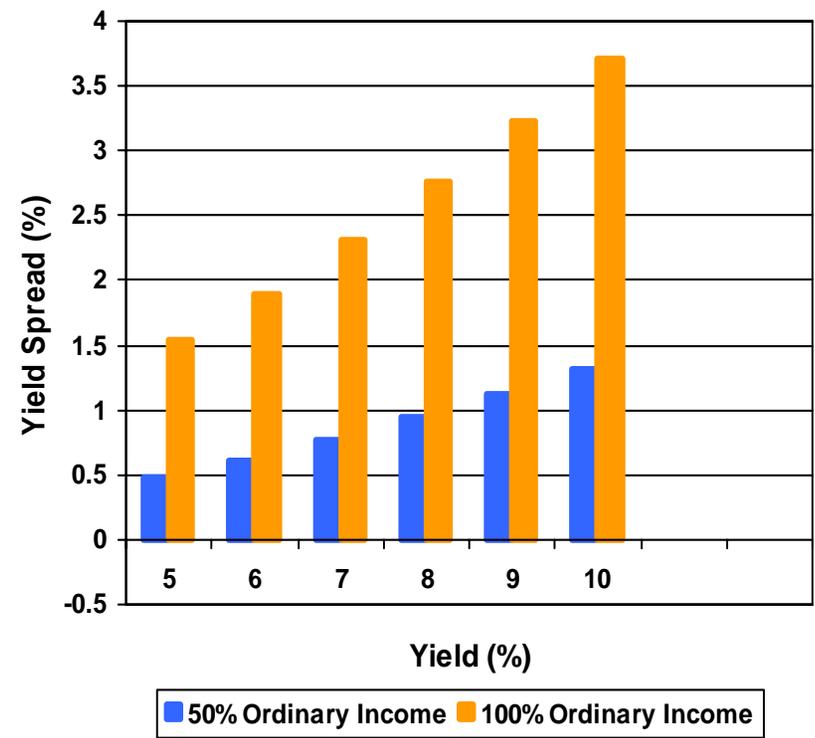


Effect of Investment Yield on Yield Spread

Lump Sum Payout



Annuitized Payout





5. Risk Tolerance and FIA Suitability

5. Risk Tolerance and FIA Suitability

- The analysis in Sections 1 and 2 considers the distribution of annualized returns for the annuity and alternative investments over certain time periods
- This analysis is useful because it shows that it is not obvious that, as Dr. McCann argues, no rational investor will purchase annuities such as the ones considered
- But it does not conclusively demonstrate that there may be a large class of individuals who would rationally purchase FIAs in preference to the investment alternatives considered here
- By taking into account an individual's risk tolerance, it is possible to establish for what degrees of risk aversion a rational individual prefers an annuity to an alternative investment

5. Risk Tolerance and FIA Suitability

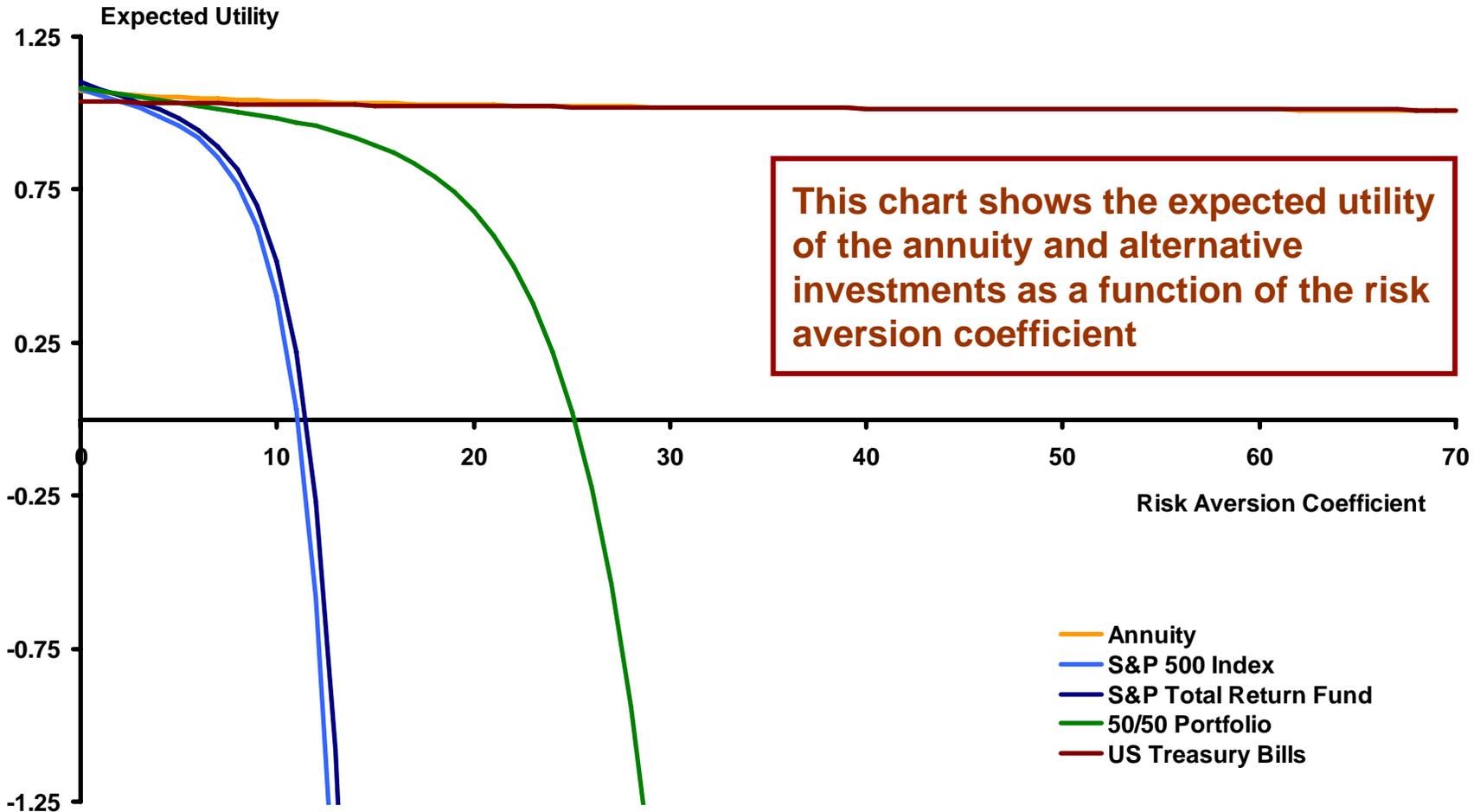
“The ... annuities are so inferior compared to readily available alternative investments – such as alternative investments in Treasury securities and in equity mutual funds – that class members would not rationally purchase these annuities if all material facts concerning the annuities were told to them.”

Craig McCann, Ph.D., CFA.

- **We conclude that many rational individuals will prefer annuities to alternative investments**
 - Based on the historical data used, moderately risk-tolerant individuals would generally prefer FIAs to alternative investments when forced to choose between an FIA and an alternative investment
 - And individuals who are even more risk-tolerant would include FIAs in a diversified portfolio
- **This conclusion disproves Dr. McCann’s assertion**

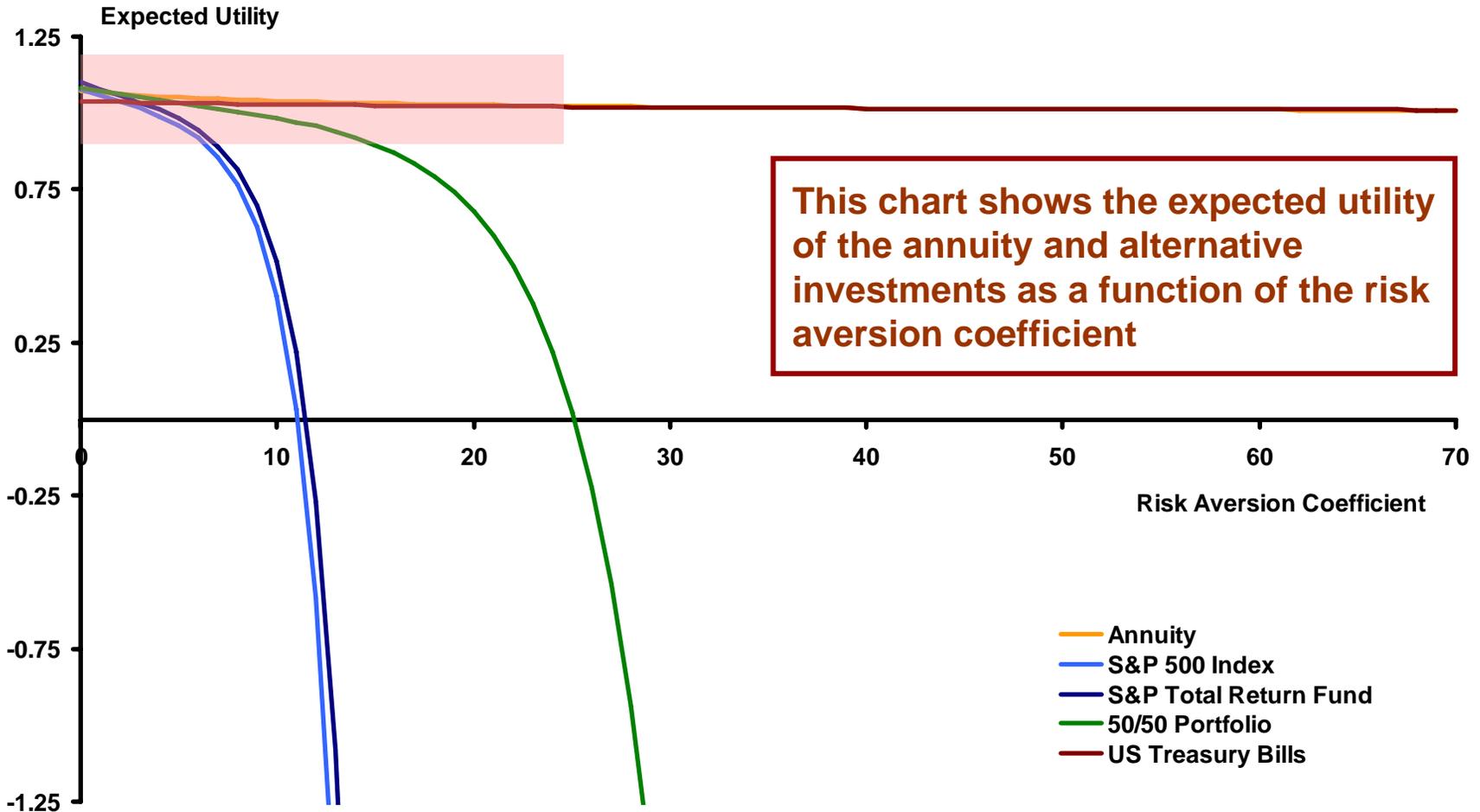
14 yr Annuity v. Alternatives

Impact of Risk Tolerance on Expected Utility



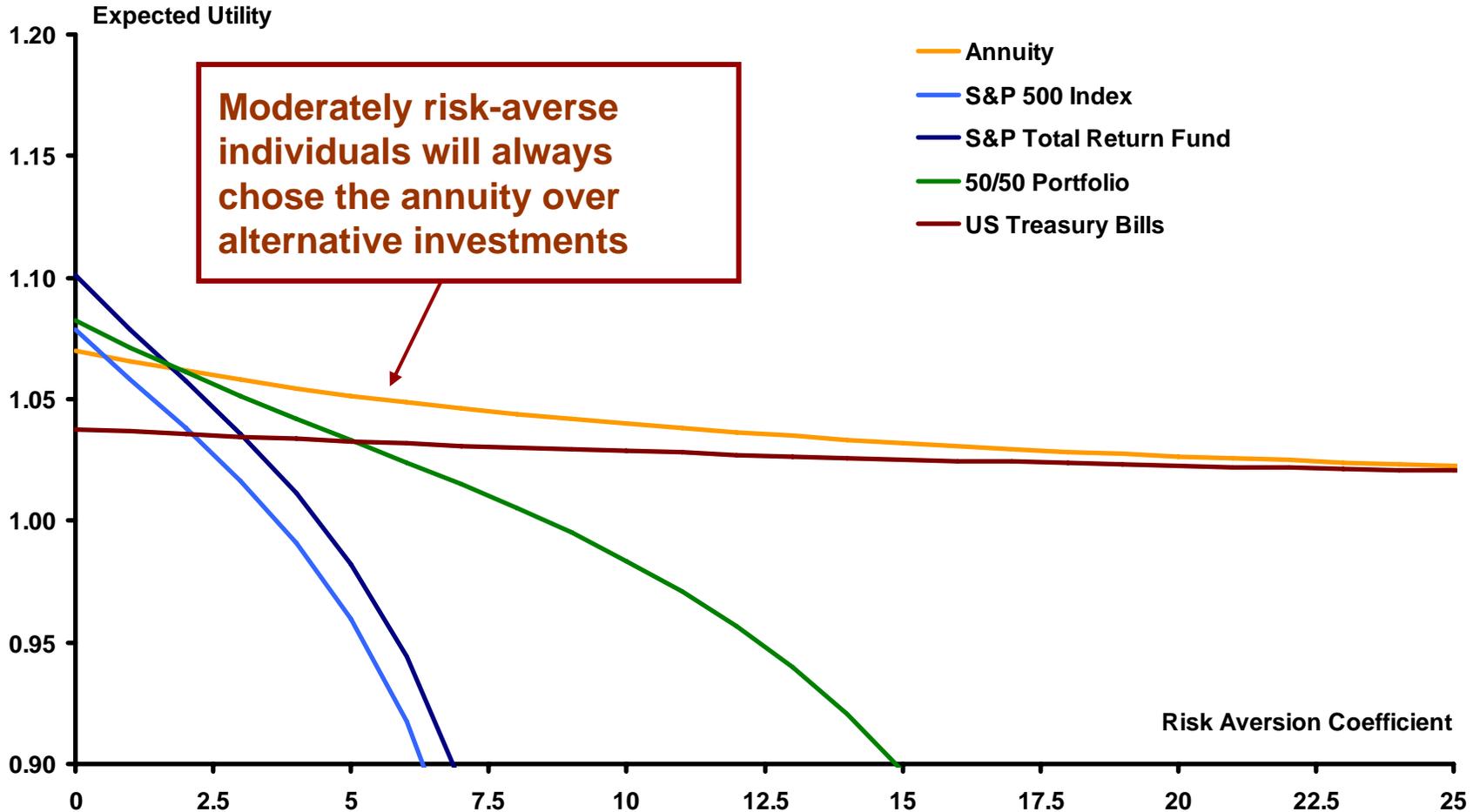
14 yr Annuity v. Alternatives

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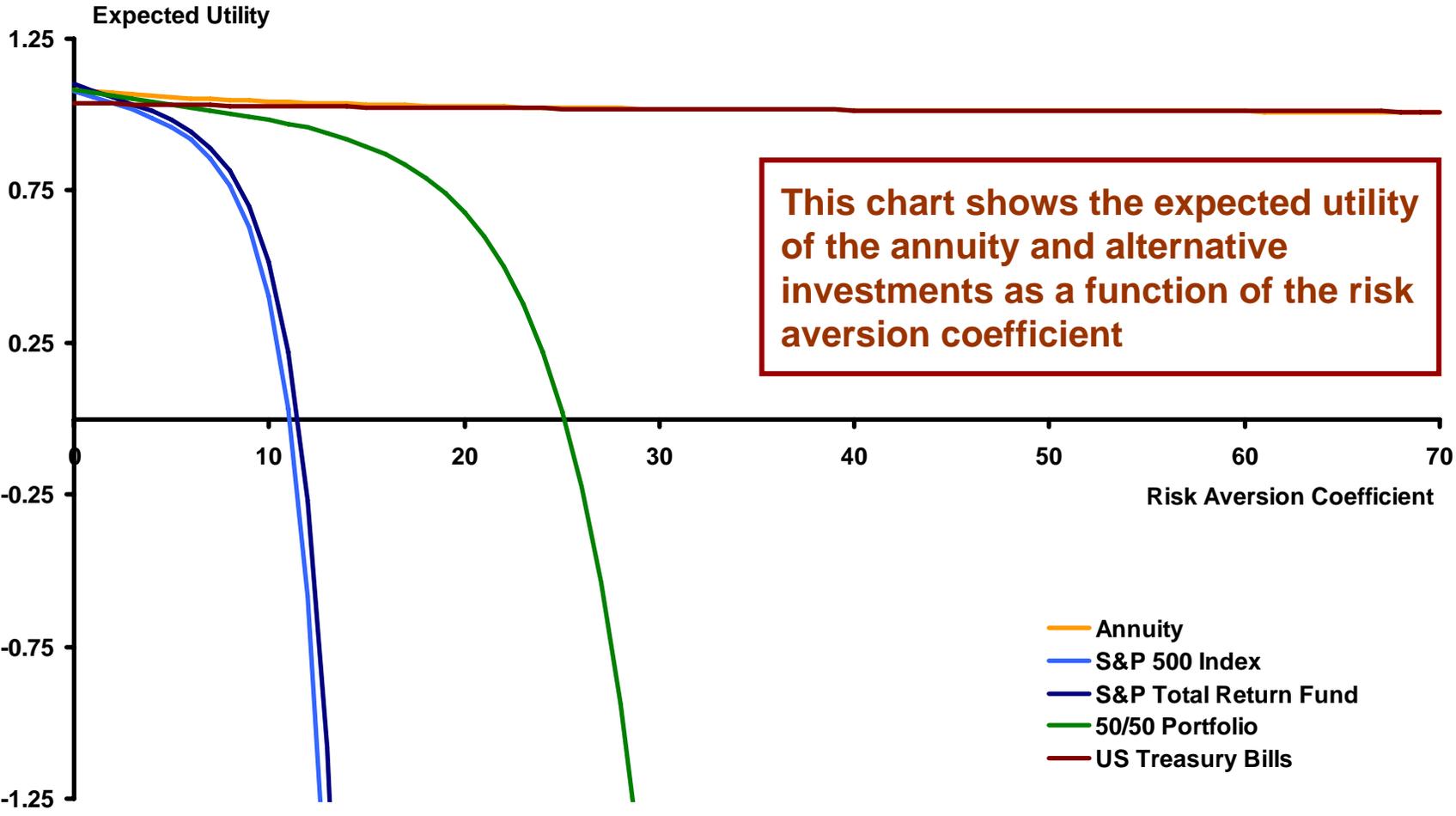
14 yr Annuity v. Alternatives

Impact of Risk Tolerance on Expected Utility - *Detail*



9 yr Annuity v. Alternatives

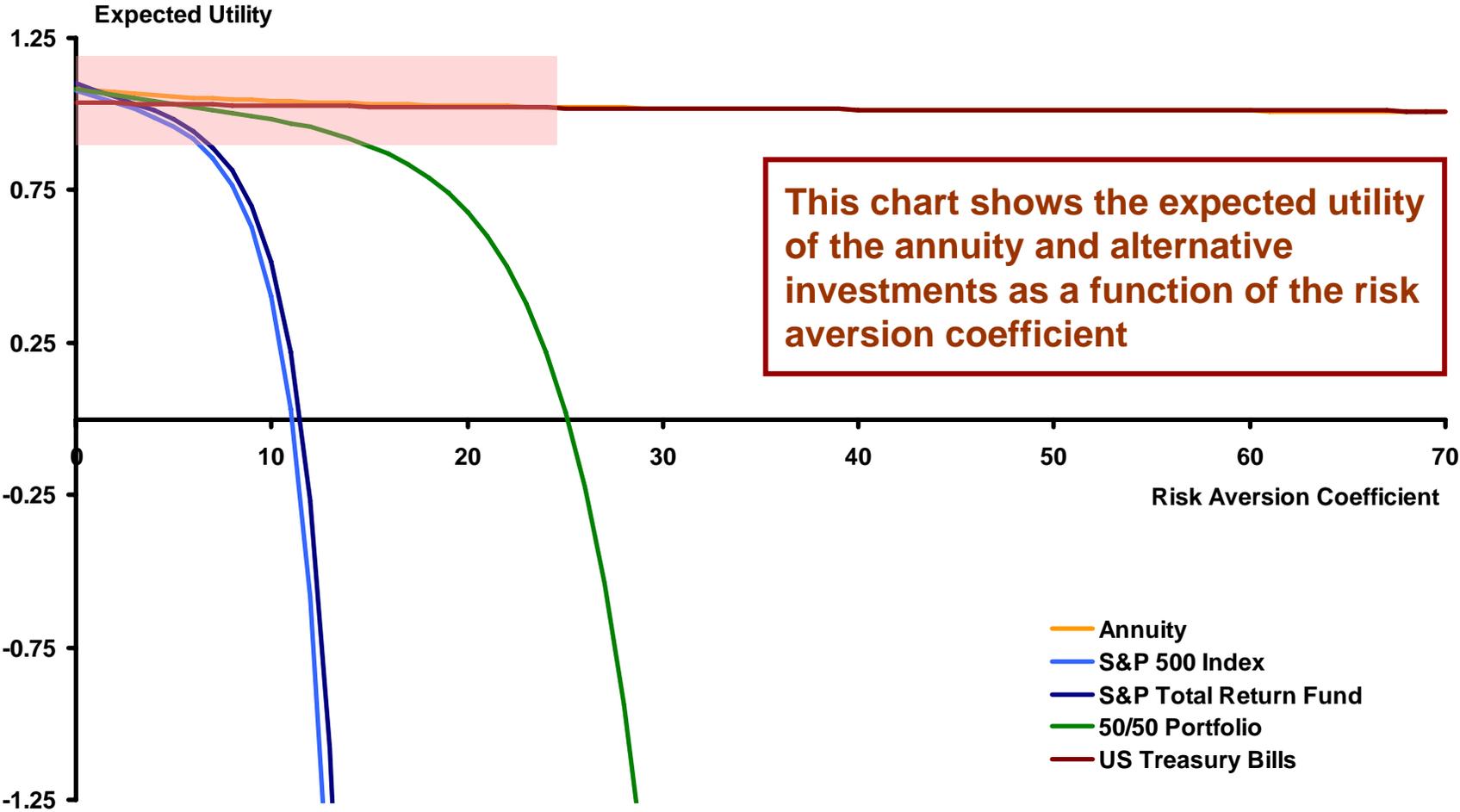
Impact of Risk Tolerance on Expected Utility



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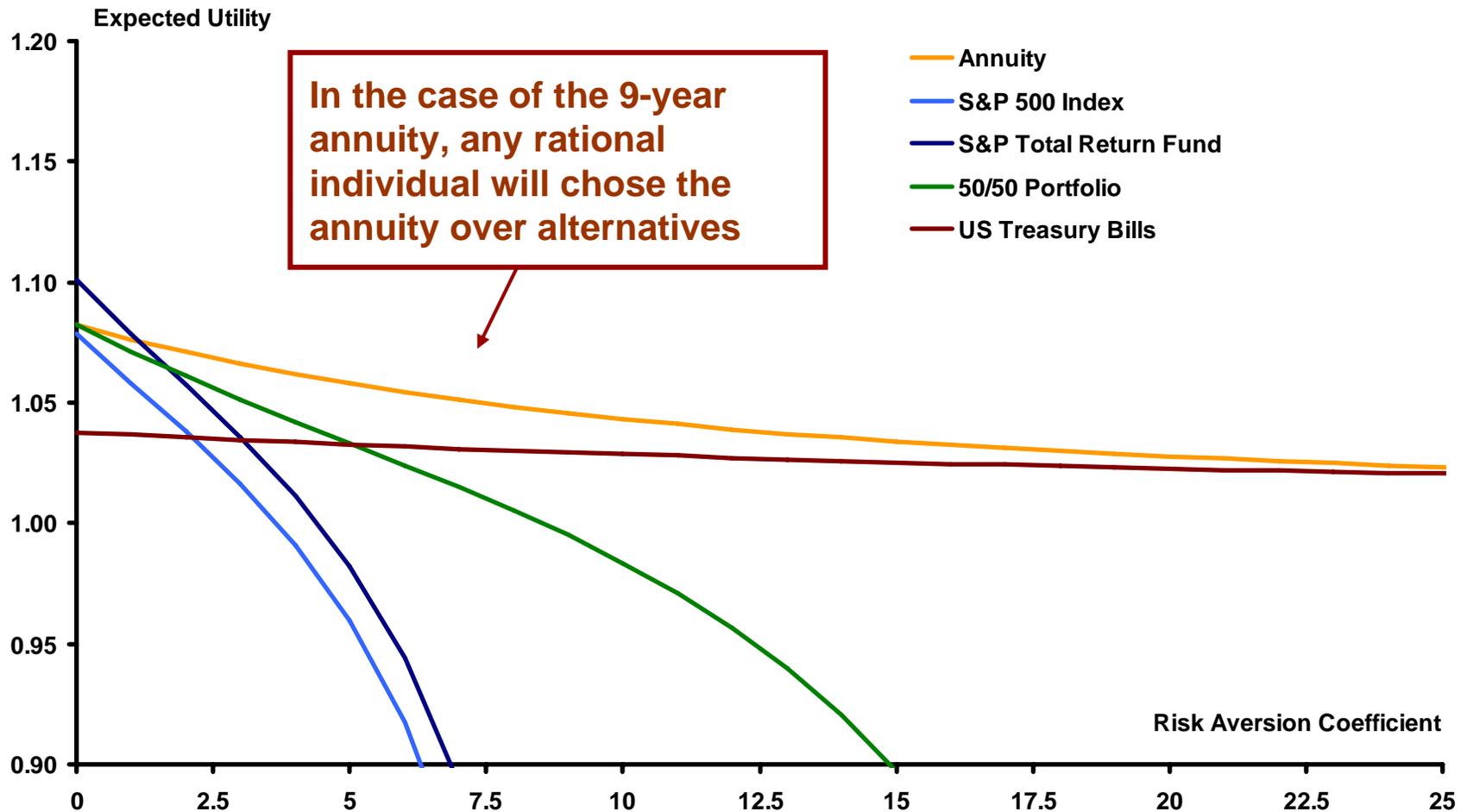
9 yr Annuity v. Alternatives

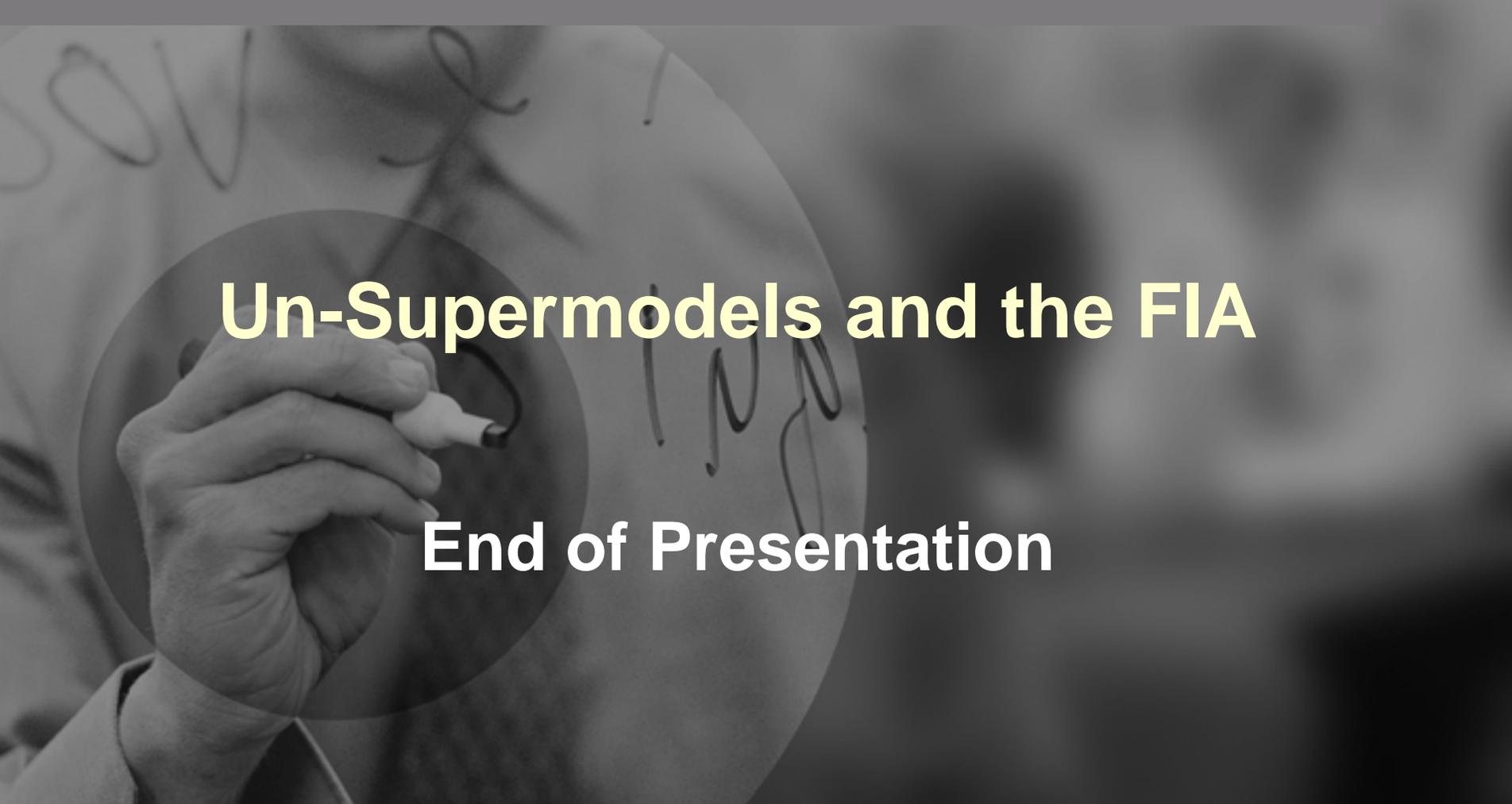
Impact of Risk Tolerance on Expected Utility



9 yr Annuity v. Alternatives

Impact of Risk Tolerance on Expected Utility - *Detail*





Un-Supermodels and the FIA

End of Presentation

Professor David F. Babbel

Miguel Herce, Ph.D.

Kabir Dutta, Ph.D.