

Investing for inflation

Lots of questions, some answers and
a few case studies

Contents

Introduction	1
Chapter 1 – Why is inflation a difficult problem to solve? ..	1
Chapter 2 – Solving the problem	5
Chapter 3 – Case study: Saving for retirement	8
Chapter 4 – Case study: Spending in retirement.....	10
Chapter 5 – Case study: Perpetual non-profit spending..	13
Conclusion – it takes a portfolio	16
References and related Reading.....	17
Appendix	19

About the author

Leola Ross is a director, capital markets research for Russell Investments. Leola joined Russell's investment division in 1998 and is currently part of the capital markets research team focusing on Russell's research publications, multi-asset solutions and alternative investments. Her role comprises oversight of the research agenda and process as well as contributing materially to the body of research at Russell.

B.A., Economics, Drew University

Ph.D., Economics, Southern Methodist University

CFA Charterholder, CFA Institute



Leola Ross PH.D., CFA
Director, Capital Markets
Research

Investing for inflation

Lots of questions, some answers and a few case studies

Leola Ross, Ph.D., CFA, Director, Capital Markets Research

Inflation is a modern problem with multiple sources and complexities. To meet the challenge of inflation, portfolios typically need the growth potential of equities, the growth and diversification potential of real assets and the stabilizing presence of fixed income. There is no silver bullet for hedging inflation; it takes a portfolio.

Introduction

Inflation, as we know it, is relatively new. As well, the way we use financial assets and investing to solve a host of issues is new. We all want our portfolios to provide for asset growth and meet our spending needs. At the same time, we know that inflation can gradually erode nest eggs. What does one do, then, in response to inflation? Consider investing in a diversified growth portfolio.

In today's investment world, real assets are often associated with inflation. Russell, an early advocate of real assets, has come out saying they are not "the" inflation hedge in one's portfolio. Indeed, real assets are typically *growth assets*; in an institutional portfolio (in both the equity allocation and across the whole portfolio), they can act as *diversifiers*; they are a *relatively neglected* part of the global economy; they can be an important *hedge against some types* of inflation; and, in many cases, they offer great opportunities for investors *seeking alpha*.

In the chapters below, I review the complexity of inflation and how it can be managed with real and other assets, and offer case studies to demonstrate how diversified growth portfolios can meet its challenges.

- **Chapter 1 – Why is inflation a difficult problem to solve?** In this chapter, I delve into the complexity of modern inflation and address why it takes more than real assets to solve the problem. Inflation can come from a variety of sources, affect investors differently, and diverge from the behaviors of the assets we utilize to "hedge" it. Moreover, the investments we hope will protect us may be influenced by our expectations about inflation.
- **Chapter 2 – Solving the problem.** It takes an entire portfolio to meet the challenge of inflation, and modern portfolio practices are designed to meet that challenge head on.
- **Chapter 3, 4, and 5 – Case studies: Saving for retirement, and the case for inflation; inflation-adjusted spending in retirement; and perpetual non-profit spending.** These case studies demonstrate the benefits of diverse portfolios that include real assets for meeting the inflation challenge.

Chapter 1 – Why is inflation a difficult problem to solve?

The need to store wealth to meet retirement needs or to meet fiduciary obligations, coupled with the declining value of money, eventually leads everyone to investing to grow their assets. Inflation-adjusted growth is a primary outcome we require from investing.¹ Ultimately, meeting the inflation challenge is the job of our investment portfolios. It is not the role of real assets, commodities, TIPS or any other component of the portfolio – it is indeed the entire portfolio that must tackle the complex problem of inflation. Consider these four main points:

Issue #1: Inflation sources may vary

There are many types of inflation and varying causes. For example, *demand-pull* inflation may come from a strong economy. In this case, equity markets may provide important, though possibly not concurrent, exposure to the growth this inflation is fostering. Indeed, for many years, experts considered the growth aspect of equities to be the primary component of long-term inflation management. These experts were right! But equities don't cover all the bases, because inflation can happen for many reasons.

Cost-push inflation may come from rising wages, energy or materials costs; increasing food prices (for example, during shortages due to droughts); or housing shortages, among other factors. Equities will have a hard time managing these situations, and having real assets in one's portfolio may help investors address them. One real asset that is difficult to incorporate within a financial portfolio is human capital. For individuals still in the workforce, rising wages can behave as an "inflation-linked human capital bond" that adjusts to changing prices – and it is critical for savers to increase savings rates when wages increase.

Easy-money policies may also induce inflation. In the case of easy money, domestic investments of any kind may be at odds with good inflation investing practices, and owning foreign securities may be an essential complement to a domestic portfolio. For example, recent quantitative easing in the U.S. and other economies led to heightened concerns about inflation that never materialized. Why? As the Fed planned, and investors came to realize, the impact of quantitative easing on price levels was minimal. Ultimately, banks didn't lend, and wages did not historically increase because of the oversupply in labor markets. Through the period of quantitative easing, the flow of money into "growth assets" demonstrated the positive impact of easy money on, for example, equity returns.

Currency devaluations may also lead to inflation, particularly for smaller or very import-dependent economies. Again, in these times, including foreign securities and keeping an eye on global markets for opportunities can be critical.

Ultimately, what causes inflation may be different in every case, so putting all of one's inflation eggs in, for example, the TIPS basket or the real asset basket may be a poor decision. That said, because some of the reasons we experience inflation may be uniquely tied to these assets, including them in a diversified portfolio is likely a good decision.

Issue #2: My inflation is not your inflation

Corporations, individuals, non-profits and other investors *experience* inflation differently. For example, the defined benefits retirement plan sponsor may have a CPI-linked payout provision that increases the amount paid out over time. However, any increase in interest rates linked to inflation will increase the discount rate and *reduce* liabilities for plan sponsors. Liabilities, like debt, diminish in real value over time, as they are nominally structured.

Possible "inflations" I've thought about: Non-profits with a 5% spending rule will struggle to maintain purchasing power, as will retirees living off their wealth. But here's the tricky part. *Which* inflation will a specific non-profit or retiree experience? The non-profit with overseas programs will be very sensitive to currency moves. The non-profit providing educational assistance – tuition hikes. Medical care and research – medical costs. Environmental programs – who knows? Retirees may be completely unaffected by rising tuition costs, but strongly impacted by medical costs – and if they like to travel, rising fuel costs and dollar devaluations may also be problematic.

Putting issues 1 and 2 together, we get that inflation is not a well-defined or singular concept. All we know is that we are scared of it and that we should try to do something.

Issue #3: Investing is a roller coaster, and inflation is often a "slow, steady" rise

Investments are by nature (and to different degrees) volatile and uncertain. We expect to realize a premium (i.e., asset growth over the long term) for putting our capital at risk. In 2008 and early 2009, many investors saw their portfolios lose about half their value and then climb back to new highs by 2013. By contrast, inflation as defined by economic statistics is a slow, steady tick. While inflation may spike, and while history has exhibited periods of rampant and unanticipated inflation, most typically, our spending power erodes gradually (as intended) in

developed economies. For example, the U.S. Bureau of Labor Statistics tells me inflation was a steady 2% for 2013 and is likely to stay that way for another year.²

So what is really going on? While inflation can come from many things, and everyone's inflation experience is different, the U.S. government publishes an "official" inflation measure that varies little year to year (and is probably completely disjointed as to from whence it comes, and how it affects us).³ This official inflation rate is meant to provide an *average* rate of decline for the purchasing power of cash. *We have little choice but to use this official notion of declining cash as our measure of inflation.* So in the pages to follow, I use Russell's June 2014 forecasts for official inflation expectations. That said, any of the analyses below could be modified to take a different inflation measure into account. *In contrast to any measure of inflation one uses, investments go up and down like a roller coaster, though we expect them to reward us for our patience over longer periods of time.*

Issue #4; Inflation may be anticipated...and then not happen

Investors price their inflation expectations in TIPS by bidding up the price when they anticipate a rise in prices. In fact, TIPS were a great place to be in late 2008, when the global financial crisis was causing deflation in the U.S.⁴ What was really going on? The Fed was pouring money into the economy when the velocity of money was close to zero.

INFLATION IS A MODERN PROBLEM

Investing and inflation, as we know them today, are modern concepts. To buttress this assertion, I provide some "now and then" examples in Tables 1 and 2 of uncertainties individuals and organizations face.

In table 1, I give some examples of what "we" – those of us saving and investing right now – might be uncertain about, and what we might have expectations about.

Table 1: Uncertainties for us, now

UNCERTAINTY	EXPECTATION
How long I will live?	Elderly people face increasing health care costs and "longevity risk"
What will my child's tuition be in 18 years?	Tuition costs go up every year
How much will we pay staff before retirement?	Life expectancies and distribution of workers
What will be the economic consequences of the next Asian typhoon?	Typhoons will come with more frequency

All of the examples in Table 1 illustrate some form of inflation – either from prices increasing, or from increases in expenditures coming exogenously. As well, all of these examples are reasons we set funds aside for future uses – because we expect that we will need money later and that our costs will go up in the future. We all need to invest to meet the challenges of these rising costs.

But again, many of these "inflation-related" issues are relatively new. My assertion here is that the concerns of prior generations were less tied to rising costs than are the concerns of current savers, corporations and non-profits. In Table 2, I give some examples of more historical "uncertainties" – specifically, those experienced historically in agrarian societies (e.g. prior to industrialization).

Table 2: Uncertainties for them, then

UNCERTAINTY	EXPECTATION
How many of my children will survive?	Need labor for farm and possibly elder care
Will I produce enough food to feed us?	Weather and other factors may limit crops
How can I secure wealth and social standing?	Land ownership will bring wealth and power

None of the examples here suggest concern for rising costs, either from price levels or from increases in what needs to be purchased. In fact, none of these examples even suggest that money itself was of great importance. While money has been around as an important medium of exchange for about 5,000 years,⁵ and inflation as a monetary phenomenon came has come and gone, the relative importance of money and inflation to daily life is relatively new.

Naive investors expected inflation and bought TIPS; therefore, TIPS prices went up. We know in retrospect that the inflation never materialized; TIPS were overpriced and eventually sold at well above par – not so good for the new owners of TIPS. As well, other assets (most notably, equities) came roaring back, and investors who were overly exuberant on TIPS missed the rebound.

... and then happen

Expected inflation may actually be a contributing cause of inflation. If everyone expects inflation to happen, they will all act as though it will and may bid prices up.⁶ Therefore, inflation can be a self-fulfilling prophecy – particularly during periods of economic expansion. In this scenario, purchasing TIPS early can be beneficial. And timing will matter; holding TIPS to maturity will bring an inflation-adjusted return to the early TIPS buyer, but selling when their prices are really high can be even better. That said, the *late* buyers of TIPS who purchase above par may receive a return that is less than inflation-adjusted if held to maturity, and may do even worse by selling early at a low price. Indeed, TIPS can behave differently in the short run than we might expect.

TIPS, and how they can be used to mitigate inflation...

The contrasting scenarios above illustrate that TIPS are bonds whose pricing may be driven more by market sentiment than by their inflation-hedging characteristics. TIPS may not be an inflation hedge for some market environments and any number of investment strategies.⁷ That said, TIPS may be a useful component of one's portfolio. For example, investors who buy TIPS at or below par and hold them to maturity will receive the inflation match and may ladder cash flows over a specific horizon. I will demonstrate, below, how this strategy plays out. As well, TIPS are diversifying in the context of multi-asset investing and may be a valuable addition to many diversified portfolios.

Summary

Here we are in 2014. The first attempt to manage currency – the gold standard – started in the mid-19th century and ended in 1972. We are now 42 years into a newer experiment. This experiment is in managing inflation via a carefully engineered money supply. We've had a few decades of trial and error, and inflation has been tightly bound for the last 20 years or so. This experiment has inflation built into it, and our portfolios need to help us achieve growth beyond inflation's eroding effects. Inflation is a complex issue. It can come from a number of places, it can affect investors differently, and its own behavior differs from the behaviors of the assets we use to help protect ourselves from it. Moreover, investors may, by anticipating inflation, influence the behaviors of those assets even further. In this chapter we explored this complexity; in the next chapter we will explore some solutions.

Chapter 2 – Solving the problem

The importance of inflation to how we invest

The persistence of inflation in modern economies has a material impact on investment goals. Investments must grow at a rate that outpaces inflation to produce the outcomes many investors need. For example, all of us who are saving to fund retirement must do so knowing that prices for many goods and services will likely be higher in the future. Anyone using assets to provide cash flows will need to adjust those cash flows for inflation as they seek to maintain their lifestyle, and non-profits charged with spending, say, 3.5% or 5% to fund programs will need to grow their investments at those rates *plus* the rate of inflation to maintain their programs. These are very common investment challenges. Fortunately, modern investment practices are evolving to meet these challenges head on.

A typical exercise associated with investing is estimating how much in the way of assets will be needed to achieve future goals. The uncertainty of this estimation starts with risks associated with capturing growth through investing, and is complicated by inflation eroding the purchasing value of our investment returns, where inflation is also uncertain. Many investment professionals will suggest that the task is to “hedge inflation.” Let’s be frank about this – inflation cannot be hedged in the classic sense, but it is an important consideration for portfolio construction. Indeed, *the best defense any investor can mount in the face of inflation is capturing growth in a diversified fashion*. It is not the role of real assets, or commodities, or TIPS, or even just equities to help offset inflation. Managing inflation risk is the job of the entire portfolio.

Real assets and inflation

So now it is time to address directly the relationship of real assets to inflation. A very common story told in the investment management industry is that commodities, real estate or a real assets bucket (which Russell defines as including infrastructure, among other holdings) are the “inflation hedge” in one’s portfolio. In fact, many practitioners would have investors believe that when inflation hits, or hits unexpectedly, real assets will save the day. Why is this story so common?

As noted above, a possible category of inflation is *cost-push*. The first global experience with cost-push inflation was during the 1970s, when crude oil supply was severely curtailed and the price reaction was severe. At this time, crude oil futures *did not exist*, and investing in commodities futures was uncommon.

Indeed, crude oil futures and other commodities futures are now available in index based form, and many investors with an eye to inflation now include these and other real assets exposures in their portfolios. Real estate returns are heavily dependent on rental cash flows, which may increase during inflationary times (albeit usually with a significant lag), and infrastructure assets may have asset-by-asset provisions that increase cash flows with inflation (again with a lag, and possibly not at all). Therefore, commodities, real estate and infrastructure do have specific relationships to some types of inflation that equities and bonds will not have. Yet, as we noted above, inflation may happen for many other reasons, and in some cases other parts of one’s portfolio may perform better than real assets.

Ultimately, investments behave as a roller coaster, while inflation is typically a slow steady tick. Real assets are volatile assets, and they may not offer the “downside protection” we are looking for just when we need it. That said, the portfolio *without* real assets may be unnecessarily exposed during some typical inflationary environments. So do we want them in the portfolio? Absolutely! Real assets can diversify equity risk and provide exposure to economic growth that may not be otherwise captured.

THE IMPORTANCE OF MONEY AND THE INDUSTRIAL REVOLUTION

Let's define "investing" as putting capital at risk for the opportunity to gain value. Investing as we have done it for the past 150 years is relatively new in the grand scheme of things. What is new about it is the institutionalization and necessity of investing in financial assets. Let's define "inflation" as a persistent, substantial rise in the general price level that reduces purchasing power. Inflation, as we have experienced it for the past 150 years, is also very new. The new part here is the persistence of inflation that, more recently, is designed as part of our economic environment.

The commonly referenced origin of modern inflation and modern investing is the industrial revolution as it occurred in the U.S. in the 19th century.⁸ This revolution produced (at least) four permanent changes in economic life that have made inflation and investing fundamentally intertwined and, in some cases, inseparable.

1. Movement from land-based economies to production-based economies – i.e., the "urbanization" movement that is still in motion today.
2. The near abandonment of barter-based transactions and (almost) complete reliance on money as a medium of exchange in developed economies.
3. The rise of share-based open market exchanges, where ownership is public, very divisible and highly tradable.
4. A departure from the notion that families are the primary source of labor and, ultimately, elder care, coupled with a dramatic increase in life expectancies.
5. A sustained and relatively rapid rise in output and productivity.

How did these permanent changes lead to both investing and inflation?

Points 1 through 5 all lead to a dramatic increase in the importance of money to modern economies, as both a medium of exchange and a measure of value. Production-based economies need to purchase inputs (materials, capital, labor) from very different entities than the users of its outputs. This is not necessarily true in a land-based economy. It is quite plausible that farmers could trade with each other (e.g., meat for produce; produce for fabric or labor).

Point 1 leads to Point 2. The use of money as a medium of exchange is fully affirmed by these developments. Money, as the measure of value with increased output, led to inflation. Productivity increases pushed wages and other prices upward. The value money "measures" has increased.

Industrialization also leads to Point 3. Industrialization requires massive financial resources. This need for financing led to the increased relevance of public market exchanges – and for multiple owners to provide the massive resources required. As wages and prices rose, money became the primary "storage" of value. Over the past 150 years or so, we have used money to store our wealth (in the land-based economies, crops, livestock or land holdings would have been considered the primary stores of wealth). The need to store wealth in money was exacerbated by the population flight to urban areas in search of work. Point 4 is an illustration of how families were no longer tied in the same intergenerational patterns we saw in land-based economies. Labor came from elsewhere; children left home to work. Now, with money storing our wealth, and inflation eroding the value of that wealth, inflation has become a persistent and material problem for all investors.

The modern era of investing has enabled individuals to grow assets to meet future spending needs and manage the erosion of wealth caused by inflation. By the early 20th century, some industries had begun to attract labor by providing pensions, but for the most part, individuals bore responsibility for saving for their old age needs. Inflation and investing were both born of the industrial revolution, and they set us on an irreversible course. The presence of inflation is now a fundamental starting point for how real growth of investments is defined.

So let's move from the notion that real assets are the inflation hedge to the reality that modern investment practices are all about providing inflation-adjusted outcomes for investors.

Actually, we already know this...

The construction of modern portfolios is highly mindful of inflation. This is not a new idea, nor is it revolutionary. In fact, there are proof points everywhere. To find those proof points, we look at the rise of balanced funds and the increasing use of CPI+ as a target return; the concept of the risk-free rate; and the rigor behind the building of modern portfolios.⁹

CPI fund targets

Single-asset funds often target single-asset benchmarks, such as the Russell 1000® Index or the Barclays Global Aggregate Index. Hedge funds and other absolute-return funds have often typically targeted T-bills, LIBOR (historically) or CPI to illustrate their long-term value-add. The idea of these targets is to demonstrate the importance of outperforming cash or inflation (as the value of cash declines). More recently, an increasing number of multi-asset funds have been targeting CPI to acknowledge the specific value of achieving growth in excess of inflation while managing volatility.¹⁰

Risk-free rate

The risk-free rate (RFR) is a term invoked by financial economists for decades. While there is no exact measure of this RFR, there is a well-accepted proxy, T-bills (1-month and 3-month are most typical). Clearly, these short-term cash rates are different from inflation measures, but there is a link here, as the RFR is responsive to inflation. For example, when inflation in the U.S. was quite high relative to current times – i.e., in the late 1970s – cash rates were commensurately higher. Today, when inflation rates are more moderate, cash rates are similarly low. Ultimately, if investors are going to hold (or lend) cash, they will require some compensation that is reflective of its declining real value. The RFR is the baseline for all of the assets in the capital asset pricing model and multi-factor models. As well, Russell uses forecasts for cash returns, a typical proxy for the risk-free rate, as the base for all of its strategic forecasts.

Skillfully built portfolios

Modern outcome-oriented portfolios are skillfully designed to provide growth while managing volatility. Growth is typically achieved by investing in equities, real estate, credit, hard assets – and skill. Volatility is managed to the extent possible by diversifying growth opportunities, mixing in high-quality debt and income-oriented securities, and skillfully, dynamically tilting portfolios as markets shake, rattle and roll.¹¹ The role of skill in designing, constructing and managing portfolios is increasing on all fronts, and the intended outcome – of earning steady growth that outpaces inflation – is at its utmost in importance.

How to meet the challenge of inflation

Modern investment practices have shifted from asset-allocation investing to outcome-oriented investing. Two primary outcomes investors seek are inflation-adjusted growth and inflation-adjusted cash flows. Achieving either or both of these outcomes requires a diversified growth portfolio. In the next three chapters, we will consider three case studies and review the benefits of diversified growth. Chapter 3 is a “saving for retirement” case study, where we will find that diversified growth can achieve strong inflation-adjusted wealth accumulation with lower volatility than less-diversified portfolios. Chapter 4 is a “spending in retirement” case study, where we will see the same benefit – that of diversified growth sustaining wealth while providing inflation-adjusted cash flows.

Chapter 3 – Case study: Saving for retirement

In the sections above, I've argued that inflation is a complex modern problem and indicated that modern investing practices have evolved as mechanisms for addressing it. Let's go back to the role of real assets as regards inflation and see if we can demonstrate how real assets work. To do this, we evaluate some examples of asset mixes and wealth accumulation.

Why does wealth accumulation matter, and how does inflation factor in? While our parents and grandparents may have had pension plans provided by long-term employers, many of us are challenged with funding a material portion of our own retirement. To fund retirement, we save. Yet we know that our current savings will be worth less 10, 20, 30 years from now than they are at present, due to inflation. As well, many of us will be challenged with accumulating *sufficient* wealth to fund retirement. Many will start saving too late. Many will struggle to meet today's expenses while setting aside enough money to meet tomorrow's. So: To stretch our savings and accumulate more wealth, we invest.

But how can we invest to meet the challenge of funding retirement, knowing that inflation is ever present? One way to think about this is to set a target savings rate and then to increase the savings rate in step with inflation. To make our analysis very simple, I make a few assumptions. Sally Saver:

1. Will save at the current pre-tax savings limit of \$17,500 per year.
2. Would like her accumulated wealth to grow at inflation plus 5½% per year.
3. Will retire in 30 years.
4. Has five investment options – Real Assets; Real Assets + TIPS; Equity Only; Equity + Fixed Income; and All Assets – a combination of equity, fixed income, real assets and TIPS.¹²

Assumptions 1, 2 and 3 suggest that Sally Saver's wealth target over a 30-year horizon is \$2,078,707.¹³ Assumption 4 indicates five investment options that are detailed in the Appendix.

To illustrate how an inflation-adjusted \$17,500 annual savings rate would grow under our five investment options, we draw upon Russell's ability to generate a range of economic scenarios. We can create simulated portfolio paths over a 30-year horizon to see how those portfolios might look in the future. In this case, I am using 2,000 paths to evaluate these five investment options.¹⁴

In Table 3.1, we observe the distribution of ending wealth over a 30-year horizon, including average ending wealth and 25th, median and 75th percentile ending wealth from our 2000 simulated paths. Asset allocations for the simulated paths may be found in the Appendix. In addition to ending wealth, we can also observe the volatility of each wealth-accumulation path relative to an inflation-plus-5½% wealth accumulation.

Table 3.1: Ending accumulated wealth for various investments over the 30 year horizon – baseline wealth accumulation is \$2,078,707

	REAL ASSETS	REAL ASSETS + TIPS	EQUITY ONLY	EQUITY + FIXED INCOME	ALL ASSETS
Average	\$2,681,754	\$2,362,822	\$3,085,822	\$2,402,793	\$2,397,578
25th percentile	\$1,513,723	\$1,493,863	\$1,511,030	\$1,576,707	\$1,588,759
Median	\$2,199,808	\$2,043,929	\$2,398,386	\$2,145,009	\$2,132,219
75th percentile	\$3,278,172	\$2,859,928	\$3,808,640	\$2,860,773	\$2,873,464
TE[†] to Inf. +-5½%	\$423,871	\$318,098	\$568,039	\$303,535	\$294,669
Prob > Inf. +-5½%	54%	48%	58%	53%	53%

[†]Tracking Error

In reviewing Table 3.1, we observe that all of Sally Saver's investment options outperform the baseline of inflation plus 5½% at the average. However, only four of the five investment options will outperform inflation plus 5½% at the median – the one that doesn't is Real Assets + TIPS. Why is this true? Thinking back to Chapter 2, "Solving the Problem," note that the best defense for inflation is diversified growth, and that Real Assets + TIPS is lacking the growth engine investors have tapped for decades: equities. Real assets are indeed growth assets, but not at the level of equities.

Lesson #1: Real Assets + TIPS is not the sole answer to meeting the challenge of inflation

Well, what about those equities? Indeed, Equities Only will offer the highest average ending wealth among the five options – the highest median ending wealth *and* the highest probability of meeting the inflation plus 5½% target. However, Equities Only exhibits the highest tracking error around the inflation plus 5½% *and* the second-lowest 25th percentile ending wealth. Therefore, while equities are certainly a growth generator, and while they offer high probabilities of achieving wealth, they bring that probable growth at almost double the volatility of the most diversified All Assets option and with the most downside risk.

Lesson #2: Equities bring growth with volatility and downside risk

So how do we achieve growth while moderating volatility and limiting downside? Diversifying with fixed income *and* real assets. We see this effect in the last two columns of Table 3.1. Both Equity + Fixed Income and All Assets offer ending wealth means and medians that substantially exceed the target... *and* they do so at materially lower volatilities than the other three options. As we might expect, the lowest volatility, and the highest 25th percentile ending wealth, is achieved with the All Assets option.

Lesson #3: Diversifying equities with fixed income and real assets achieves diversified growth

So what is so great about real assets? First, real assets are growth engines – although not as strongly so as equities. Second, real assets diversify equities, because they capture parts of the global economy equities will miss. Third, real assets have a unique relationship to inflation and, as noted in Chapter 1, are tied to particular types of inflation. Therefore, adding real assets to a diversified portfolio of equities and fixed income can preserve the growth we expect while further moderating volatility.

What should Sally Saver do? In the real world, Sally Saver will have a multitude of choices before her. These choices are not always easy to decipher, and she will have preferences that are different from other Savers out there. *To achieve strong inflation-adjusted investment outcomes and minimize volatility over long investment horizons, Russell recommends retirement plans offer diversified growth portfolio that includes equities, fixed income, real assets and other assets and strategies.*

Now let's consider the case of Peter Procrastinator. Peter was very "spendy" in his youth and didn't start saving until he was well into his career. Now he needs to save, but he has only a 20-year horizon. Except for Peter Procrastinator's shorter horizon, let's use the same assumptions we used for Sally Saver. Peter and Exhibit in Table 3.2:

1. Will save at the current pre-tax savings limit of \$17,500 per year.
2. Would like his accumulated wealth to grow at inflation plus 5½% per year.
3. Will retire in 20 years.
4. Has five investment options – Real Assets; Real Assets + TIPS; Equity Only; Equity + Fixed Income; and All Assets – a combination of equity, fixed income, real assets and TIPS.

Table 3.2: Ending accumulated wealth for various investments over 20 year horizon – baseline wealth accumulation is \$843,937

	REAL ASSETS	REAL ASSETS + TIPS	EQUITY ONLY	EQUITY + FIXED INCOME	ALL ASSETS
Average	\$1,022,645	\$942,871	\$1,107,236	\$949,139	\$947,606
25 th percentile	\$690,531	\$689,773	\$673,720	\$716,087	\$723,582
Median	\$916,456	\$872,680	\$959,050	\$891,610	\$895,598
75 th percentile	\$1,243,167	\$1,122,630	\$1,378,628	\$1,120,390	\$1,117,368
TE to Inf. +5½%	\$139,250	\$106,618	\$178,536	\$101,077	\$97,517
Prob > Inf. +5½%	57%	54%	61%	57%	56%

With the shorter horizon, Peter Procrastinator expects to outperform inflation plus 5½% both at the median and the average for all of his options. And like Sally, he can expect a higher average wealth accumulation, higher median wealth accumulation and higher probability of outperforming inflation by selecting Equity Only. However, also like Sally's, such a choice would come with the highest volatility over the 20-year horizon and the biggest downside risk. Peter will accumulate materially less wealth than Sally, given the shorter time horizon, but can also reduce volatility along the way with diversified growth that takes advantage of available All Assets options.

Chapter 4 – Case study: Spending in retirement

A majority of today's workers will be self-funding retirement. We are charged with saving assets, often with the assistance of tax incentives and corporate matching contributions. As well, we typically have a large variety of retirement income vehicles to transform our accumulated wealth into cash flows. These options can include everything from annuities to day trading. As in the case of the savers in Chapter 3, we will consider a limited number of options for Jane Retiree, a 65-year-old retiree. Also, as in the case of the savers, Jane Retiree is well aware that inflation will be nipping at her heels as she ages. She wants to maintain her very active lifestyle, which includes exercise classes, travel, dining out and keeping her home in good shape. She expects to live a long time and is looking at a life expectancy above 90 years. Jane Retiree has \$1,700,000 of financial wealth and estimates that she will need \$100,000 per year at the current price level to support her retirement.

Running out of money too soon (becoming insolvent) is never a happy outcome. For Jane Retiree, it may mean accepting a government program (such as Medicaid) for support, moving in with her son's young family or seriously curbing her lifestyle. Jane Retiree wants to stay solvent. I will illustrate one possibility to almost guarantee solvency: *immunization*.¹⁵ Immunization – in our example, via TIPS – is guaranteed only for a particular horizon. Jane Retiree would use her wealth to purchase a series of TIPS that provide \$100,000 annually, inflation adjusted, for a maximum horizon of 30 years.¹⁶

The second investment option I consider is *diversification growth*.¹⁷ Diversified growth does not offer certainty, but it materially reduces the amount of wealth required for a high probability of success in meeting cash-flow requirements. For Jane Retiree to choose among the various options available, matters to be considered include her particular preferences on level of certainty; the risk of insolvency; the balance between spending now and spending later; and the expectation of retaining capital at some future date. As an economist, I'd refer to the consideration of these preferences as a "utility function." While I do not specify or assume any particular utility function for this analysis, I will provide some ideas afterward as to how to think of preferences in the context of the options available.¹⁸ But let's start with immunization.

Cash flow immunization is almost riskless

Immunization, or partial immunization, is typical in the defined benefit retirement plan world. In the case of defined benefits, sponsors may "immunize" part of their liabilities by setting up cash-flow "ladders." While the application of such liability-driven investing will vary by situation, let's consider the case of how an inflation-oriented ladder of TIPS might be used to meet Jane Retiree's cash-flow needs over a manageable horizon.¹⁹ The longest-dated TIPS are 30 years.²⁰ Recall that Jane Retiree needs \$100,000 of inflation-adjusted cash flow annually to maintain her lifestyle. The inflation forecast in this analysis is the approximate

average from Russell's Strategic Planning Assumptions.²¹ Fortunately, these assumptions also offer a 30-year horizon on the inflation forecast.

To achieve \$100,000 of inflation-adjusted annual cash flows, Jane Retiree needs an initial investment of \$2,727,927. Because she has only \$1,700,000, TIPS will leave her a couple of other nearly riskless options, which we review in Table 4.1.

Table 4.1: Options for TIPS-based inflation-adjusted cash flows

	INITIAL INVESTMENT	INFLATION-ADJUSTED CF	YEARS TO INCOME
Base case	\$2,727,927	\$100,000	30
Shorten horizon	~\$1,700,000	\$100,000	17½
Reduce income	~\$1,700,000	\$62,894	30

With the same level of certainty, Jane Retiree can have 17½ years of \$100,000 inflation-adjusted cash flows or 30 years at \$62,894 inflation-adjusted. With Jane Retiree's goals, these are some pretty stark statistics. I started with the TIPS example to set a specific starting point for establishing a near-certain outcome for the official inflation rate. In the next section, we will observe that she has other options by investing in a diversified growth portfolio.

Some comments on preferences and utility functions

An investor who selects immunization of cash flows will likely have very strong preferences for future spending guarantees over current spending (i.e., saving more). Note that the guaranteed ending wealth is zero at a fixed horizon. If Jane Retiree lives longer than 30 years more, she cannot hope even to receive the lower \$62,894 per year.

Diversified growth portfolios and investment risk

Now we move from nearly riskless too risky with diversified growth portfolios. While certainty is indeed a very expensive option relative to diversified growth, diversified growth introduces shortfall risk. In the case of TIPS, Jane Retiree had a certain outcome of 30 years of inflation-adjusted cash flows below her target, or 17.5 years of inflation-adjusted cash flows at her targeted \$100,000. By contrast, in the case of diversified growth we have a "probability" of achieving 30 years of inflation-adjusted cash flows. We use the same five portfolios our savers used in Chapter 3 – the details are available in the Appendix.²² As well, we simulate 2000 paths to create a distribution of forecasted outcomes for evaluation. To evaluate expectations related to diversified growth portfolios and the shortfall risk they carry, I use Russell's strategic forecasts as described above in Chapter 3.

In Table 4.2, I exhibit a variety of summary statistics for various diversified growth portfolios.²³ Given the \$1,700,000 of wealth that Jane Retiree has accumulated, we can analyze how that wealth may help her achieve her goal of \$100,000 per year inflation-adjusted cash flows. The first three rows of Table 4.2 exhibit the number of years wherein Jane Retiree will have some probability of achieving her cash-flow targets. For example, "Years > 95% CF" indicates the number of years during which 95% of scenarios provide \$100,000 inflation-adjusted cash flows. The second two sets of rows in Table 4.2 exhibit the range of wealth Jane Retiree will have in 20- and 30-year horizons, respectively.

Table 4.2: Providing \$100,000 of inflation-adjusted income with \$1,700,000

	REAL ASSETS	REAL ASSETS + TIPS	EQUITY ONLY	EQUITY + FIXED INCOME	ALL ASSETS
Years > 95% CF	12	13	10	14	14
Years > 75% CF	18	19	17	20	20
Years > 50% CF	28	26	28	27	27
WEALTH AT 20 YEARS					
Average	\$2,173,749	\$1,570,172	\$2,850,576	\$1,519,171	\$1,503,867
25 th percentile	\$0	\$0	\$0	\$50,572	\$89,141
Median	\$1,095,219	\$914,341	\$1,142,253	\$945,769	\$973,780
75 th percentile	\$3,040,289	\$2,353,780	\$3,906,722	\$2,277,459	\$2,245,144
Standard deviation	\$3,080,202	\$2,032,760	\$4,595,120	\$1,868,095	\$1,791,038
WEALTH AT 30 YEARS					
Average	\$3,335,729	\$1,885,656	\$5,128,844	\$1,686,930	\$1,643,616
25 th percentile	\$0	\$0	\$0	\$0	\$0
Median	\$0	\$0	\$0	\$0	\$0
75 th percentile	\$3,348,449	\$1,827,027	\$5,033,980	\$1,849,747	\$1,806,194
Standard deviation	\$7,894,211	\$4,433,855	\$12,056,339	\$3,625,395	\$3,501,843

In reviewing Table 4.2, we can see that investment risk is present in all of these choices, and that none of them offer the certainty of TIPS, but instead offer varying probabilities of success. Noting that TIPS could guarantee the desired income of an annual \$100,000 inflation-adjusted for 17½ years, we observe that none of these options offer a 95% probability of such a term. The longest horizon of high probability of income (95%) is 14 years – and this probability is achieved with our most diversified options, Equity + Fixed Income and All Assets. The least-diversified option, Equity Only, offers about the same horizon as TIPS, with 75% probability of success.

Equity Only has an expected wealth of \$2,850,576 at the 20-year horizon, but this expectation comes with an extremely broad range of outcomes, as illustrated by a standard deviation of \$4,595,120. The numbers are quite similar for Real Assets – another growth-oriented choice with one more year with 75% probability of income and a slightly smaller standard deviation. Again, the longer horizons with 75% probability of success are Equity + Fixed Income and All Assets – moreover, these two options have strong expected wealth at both 20- and 30-year horizons and materially smaller standard deviations. The tightest standard deviation at both 20- and 30-year horizons is offered by the All Assets option.

Noting that All Assets includes real assets, we can observe directly that including real assets in a portfolio can preserve growth while improving diversification at the margin. *Indeed, the combination option, All Assets, demonstrates how diversified growth can be used to achieve inflation-adjusted cash-flow outcomes.*

Some comments on preferences and utility functions

Creating a relatively certain stream of inflation-adjusted cash flows over a horizon can be done, but it is too expensive for Jane Retiree. By contrast, diversified growth portfolios are far less costly, but will introduce investment risk. The reality for many investors, like Jane Retiree, may be that they cannot accumulate enough wealth to achieve the certainty they desire. In other words, they want more certainty than they can afford. Rather than curbing her lifestyle, Jane Retiree has the potential to extend her spending horizon if she is willing to take on investment risk.

In reality, the choices facing retirees seeking inflation-adjusted cash flows are numerous, and many more elegant solutions can increase the probabilities of success at these investment horizons. Retirees will need to decide for themselves. Ultimately, different preferences will guide investors to different portfolios.

Other potential options for impacting outcomes

- Annuities – Purchasing an annuity that is intended to provide \$100,000 of inflation-adjusted cash flows annually may cost less than the TIPS but more than the diversified growth.
- Longevity annuities – A longevity annuity is one where cash flows begin at some future date, typically at age 80 or 85. Combining a planned horizon until age 85 and annuitizing the remainder of one's years may mitigate the zero-wealth risk associated with TIPS after 30 years, or soften the blow of a potential shortfall in the latter years of a diversified growth portfolio.
- Enhancing return potential with active security selection – All of the results above describe expected outcomes without the potential benefit of active security selection. Identifying and employing skilled active funds managers may increase the expected returns associated with any diversified growth portfolio.
- Dynamic portfolio management – Professional investors may adjust asset allocations on the basis of an investor's current wealth levels and expected liabilities. As well, professionally managed investing programs may achieve additional returns or lower levels of volatility via dynamic tilting.

The above options are not an exhaustive list.

Lesson for retirees: Assuming investment risk may stretch retirement dollars

Creating certain inflation-adjusted cash flows over a long horizon is a very expensive proposition – likely one that very few can afford. By taking on investment risk via diversified growth portfolios, and including real assets, investors have the potential to extend their accumulated wealth longer, with less downside risk than with growth alone.

Chapter 5 – Case study: Perpetual non-profit spending

Non-profits have unique spending requirements, and their very status may be dependent upon how much they spend. As well, while the target for the retiree in Chapter 4 was a fixed \$100,000/year inflation-adjusted, the task for a non-profit is not a fixed cash flow, but rather a fixed percentage of assets. Specifically, non-profits may be bound to spend 3.5% or 5% of their assets annually.²⁴ While spending 3.5% or 5% may not be a challenge for any organization with a mandate to support its programs, maintaining a strong asset base, maintaining inflation-adjusted cash flows, reducing the volatility of the asset base (and the annual spending it induces) and all the while staying solvent in perpetuity is a material challenge. Indeed, as cash-flow targets move from 3.5% to 5%, we will see that there is an inherent tension between meeting spending goals and preserving capital for future spending. In the case study below, I assume that all of these challenges are goals of the non-profits modeled.

To help non-profit clients work to achieve their desired financial outcomes amidst all these challenges, Russell has model portfolios that are detailed in the Appendix.²⁵ Because inflation consistently erodes the spending power of a non-profit's asset base, and therefore the spending that comes off that base, the analysis below will explicitly model forward-looking inflation. To maintain inflation-adjusted program spending at their target rates, let's consider two non-profits with similar liquidity mandates but different spending requirements:

- 3.5.org – An environmental organization that must spend 3.5%.
- Waterways Foundation 5.0 – A water-provision charitable trust that must spend 5%.

Using Russell's forecasted scenarios for all asset classes,²⁶ we compare the distributions of portfolios with All Assets with the Equity Only, Equity + Fixed Income, and Real Assets sub-portfolios as defined in the Appendix. We consider each portfolio's ability to achieve the desired outcomes noted above.

As these are typical goals for a non-profit, we must seek to address these outcomes simultaneously. To demonstrate inflation-adjusted cash flows, Tables 5.2 and 5.3 exhibit (in the first columns) how the Year 1 average cash flow would grow with Russell's forecasted average inflation rate over 20- and 30-year horizons. We see in Table 5.2 that for all three

non-profits in our case study, All Assets, a well-diversified portfolio, offers the best shot at meeting these goals.

Maintain inflation-adjusted cash flows

The forecasted outcomes for 3.5.org are in Table 5.1. At 20- and 30-year horizons, 3.5.org has a median income that is competitive with inflation for all asset allocations. Where we begin to see differences is in the volatility of those income paths. The *cross-sectional standard deviation* of cash flows in Year 30 that result from the less diversified Real Assets (\$32,486) and Equity Only (\$41,981) portfolios are materially higher than the cross-sectional standard deviation of cash flows in Year 30 for the more diversified Equity + Fixed Income (\$17,595) and All Assets (\$18,097) portfolios.

Table 5.1: 3.5.org's inflation-adjusted cash flows (3.5% annually) with \$1,000,000 asset base

	INFLATION-ADJUSTED INCOME	REAL ASSETS	EQUITY ONLY	EQUITY + FIXED INCOME	ALL ASSETS
Median CF 20 years	\$53,060	\$60,812	\$65,782	\$54,403	\$59,897
Median CF 30 years	\$69,359	\$83,796	\$96,924	\$72,702	\$74,284
Cash flow St. D - 30 years	-	\$32,486	\$41,981	\$17,595	\$18,097
TE to Inflation - 30 years	-	\$28,908	\$38,312	\$13,341	\$13,651
	INFLATION-ADJUSTED ASSET-BASE	ASSET BASE AT 20 YEARS			
25 th percentile		\$1,121,326	\$1,079,502	\$1,194,189	\$1,221,343
Median	\$1,515,993	\$1,737,480	\$1,879,492	\$1,554,384	\$1,575,436
75 th percentile		\$2,701,004	\$3,091,522	\$2,007,623	\$2,045,071
Standard deviation					
	INFLATION-ADJUSTED ASSET-BASE	ASSET BASE AT 30 YEARS			
25 th percentile		\$1,378,851	\$1,350,854	\$1,494,149	\$1,532,053
Median	\$1,981,681	\$2,394,178	\$2,769,262	\$2,077,210	\$2,122,399
75 th percentile		\$4,197,700	\$5,129,971	\$2,893,448	\$2,996,631
Standard deviation		\$3,518,552	\$4,880,503	\$1,981,681	\$1,362,147

Lesson #1: More diversified portfolios can materially reduce the range of possible outcomes while achieving inflation-adjusted cash-flow targets

Reduce the volatility of the asset-base... and consequently, the cash flow from the asset base

As well, we observe that the time-series tracking error to inflation-adjusted cash flows is also materially lower for the more diversified portfolios: Real Assets (\$28,908) and Equity Only (\$38,312) are more than double Equity + Fixed Income (\$13,341) and All Assets (\$13,651).

Grow the asset-base at the rate of inflation to achieve perpetuity

At this point we might conclude that the Equity + Fixed Income and All Assets allocations are so similar in median cash flows and volatilities that there is no distinction between them. However, if we examine the distribution of the asset base at the 20- and 30-year horizons, we will note that the entire distribution is shifted to the right (higher at 25th, median and 75th percentile points) under the All Assets allocation. As well, by the 30-year horizon we note that the cross-sectional standard deviation of the asset base is materially lower for the All Assets portfolio (\$1,362,147) than for Equity + Fixed Income (\$1,981,681). These two points suggest that adding more diversification to a non-profit portfolio can preserve its cash-flow properties while increasing our confidence in the perpetuity of the asset base.

Lesson #2: Including real assets and alternatives in portfolios may achieve desired income growth, with lower volatility, while preserving a strong capital base for a perpetual organization

Now we move our discussion from 3.5.org, which had a 3.5% spending requirement, to Waterways Foundation 5.0, with its far more aggressive spending requirement of 5%. Table 5.2 provides the same statistics as Table 5.1 with the 5% spending assumption.

Table 5.2: Waterways Foundation 5.0's inflation-adjusted cash-flows (5%) with \$1,000,000 asset base, liquid

	INFLATION-ADJUSTED INCOME	REAL ASSETS	EQUITY ONLY	EQUITY + FIXED INCOME	ALL ASSETS
Median CF 20 years	\$53,060	\$63,301	\$70,064	\$66,399	\$66,214
Median CF 30 years	\$69,359	\$73,834	\$88,633	\$82,702	\$83,384
Cash flow St. D - 30 years		\$26,629	\$39,782	\$26,251	\$25,754
TE to Inflation - 30 years		\$25,263	\$37,995	\$24,280	\$23,685
	INFLATION-ADJUSTED ASSET-BASE	ASSET BASE AT 20 YEARS			
25 th percentile		\$827,229	\$794,725	\$890,064	\$912,902
Median	\$1,515,993	\$1,266,029	\$1,401,273	\$1,327,990	\$1,324,282
75 th percentile		\$1,919,783	\$2,324,890	\$1,937,812	\$1,951,852
Standard deviation		\$1,096,833	\$1,769,883	\$1,032,747	\$1,004,684
	INFLATION-ADJUSTED ASSET-BASE	ASSET BASE AT 30 YEARS			
25 th percentile		\$868,467	\$853,830	\$975,182	\$999,264
Median	\$1,981,681	\$1,476,690	\$1,772,667	\$1,654,043	\$1,667,687
75 th percentile		\$2,542,445	\$3,337,935	\$2,644,278	\$2,611,588
Standard deviation		\$1,937,140	\$3,270,650	\$1,755,468	\$1,736,313

We might expect that achieving higher cash flows will require taking more investment risk and putting the asset base under more stress. Indeed, this is correct, and we can observe this asset-base stress in the second and third panels of Table 5.3. Note that the higher spending target induces a higher allocation to the risky growth assets including equities and real assets. Asset allocations may be found in the Appendix.

Maintain inflation-adjusted cash-flows

We observe that higher cash flows can be achieved over the 30-year horizon. What is most interesting is that the heavy reliance on growth assets puts the median income levels for Real Assets (a diversified basket of risky growth assets) into a ballpark similar to Equity + Fixed Income and All Assets, at shorter horizons. The Real Assets portfolio exhibits similar levels of cross-sectional standard deviation at the 30-year horizon.

Reduce the volatility of the asset base...and consequently, the cash flow from that asset base

As well, we observe tracking error to inflation-adjusted cash flows over the 30-year horizon for Waterways. Indeed, only the least diversified option, Equity Only, has a materially different (and more volatile) cash flow profile than the other three options.

Grow the asset base at the rate of inflation to achieve perpetuity

The real differentiator for Waterways is in the asset base. By the 20-year horizon, we see the distribution of the asset base squarely to the right (higher at the 25th, median and 75th percentile points) versus Equity + Fixed Income and Real Assets. As well, the smallest cross-sectional standard deviation of the asset base at the 30-year horizon is exhibited by the All Assets allocation. Therefore, we can see once again that the All Assets portfolio preserves the asset base with the highest confidence (lowest cross-sectional volatility). That said, the median capital base is *materially lower* than the inflation-adjusted asset base – by almost \$200,000 at a 20-year horizon, and by more than \$300,000 at the 30-year horizon. Waterways is putting considerable pressure on its asset base by taking such large cash flows. Therefore, we have low confidence that Waterways will be able to survive in perpetuity with a 5% annual draw on assets over long horizons.

Lesson #3: The greatest challenge for non-profit organizations with high cash-flow requirements is perpetuity

Other options for impacting outcomes

- *Enhancing returns with active security selection* – All of the results above describe expected outcomes without the benefit of active security selection. Identifying and employing skilled active funds managers can potentially increase the expected returns associated with any diversified growth portfolio. This option will be particularly important for non-profits with higher cash-flow targets.
- *Dynamic portfolio management* – Professional investors may adjust asset allocations on the basis of current wealth levels and expected liabilities. As well, professional investing programs may achieve additional returns or lower levels of volatility via dynamic tilting.
- *Fundraising* – A non-profit may have the option of fundraising to maintain its asset base.

The above options are not an exhaustive list.

Non-profit summary

The great challenge for non-profits is to balance the inherent tension between meeting inflation-adjusted spending obligations while stabilizing cash flows and growing the asset base to keep up with inflation. Non-profits with modest spending goals will put less stress on their asset bases than non-profits with more aggressive spending goals.

Conclusion – it takes a portfolio

Inflation is a permanent feature of modern economies. Given that reality, most investors need to achieve inflation-adjusted asset growth and cash flows in order to arrive at their desired financial outcomes. The investment community has responded to investor needs by acknowledging, in many contexts, the importance of taking the complexities of inflation into account in the measuring, modeling and targeting of successful portfolio outcomes.

While many in the investment community continue to talk about TIPS, commodities or real assets as being the “inflation protection” investors need in their portfolios, this is only part of the story. Real assets have a unique relationship to inflation, and investors who ignore real assets may be exposed to particular sources of inflation. To improve inflation-aware investment outcomes, investors are well advised to consider including real assets among their allocations to equities, fixed income and other assets.

In this paper we have seen that adding real assets to a diversified equity and bond mix can foster the growth investors need to achieve in order to meet their goals, while moderating the volatility that increases uncertainty and potential downside risk. This was observed in the case of an inflation-aware saver accumulating wealth for retirement; of a retiree looking to stretch her own accumulated wealth so as to provide a specific, inflation-adjusted annual cash flow over a long horizon; and the non-profit seeking perpetual cash flows from its investment portfolio. Ultimately, this combination – growth with diversification – may be the best defense an investor can mount against the risks posed by inflation.

REFERENCES AND RELATED READING

- Ankrim, Ernest, and Chris Hensel (1992). "Exchange-traded real assets: Commodities in asset allocation," *Russell Research Commentary*.
- Barber, James (2014). "Russell's investment process: positioning strategies aim to add flexibility and precision," *Russell Topic Sheet*.
- Collie, Bob (2012). "Money," *Great moments in financial history*, Russell Investments.
- Murray, Steve (2012). "Are 5% distributions an achievable hurdle for foundations? Were they ever?" *Russell Research*.
- Murray, Steve, and Leola Ross (2010). "Endowments, foundations and the inflation challenge," *Russell Viewpoint*.
- Pittman, Sam, and Rod Greenshields (January 2014). "Adaptive Investing: A responsive approach to managing retirement assets," *Russell Research Viewpoint*.
- Ross, Leola (2009). "The rediscovery of real assets," *Russell Research Report*.
- Ross, Leola, Mark Teborek and Darren Spencer (2012). "The evolution of listed real assets: A fresh look at a rediscovered asset class," *Russell Viewpoint*.
- Report 1046 (March 2012). "Consumer Expenditures in 2012," *BLS Reports*.
- Sexauer, Stephen C., Michael W. Peskin and Daniel Cassidy (January/February 2012). "Making retirement income last a lifetime," *Financial Analysts Journal*, Vol. 68(1), pp. 74–84.
- Teborek, Mark, and Josh Cohen (2012). "Real assets for the defined contribution menu," *Russell Research Report*.

¹ See Murray (2012).

² <http://www.bls.gov/>. This particular point may be either U.S. or developed world centric. As well, history provides many examples of massive currency devaluation and hyperinflation. In these cases, the most sensible investment strategies will focus on investing in foreign securities denominated in a stable currency. That said, foreign securities might not be available to local investors in any convenient fashion during such extreme conditions! Ultimately, this discussion is related to inflations that are typical of stable, developed economies.

³ In 15 of the last 23 calendar years, official U.S. CPI inflation has been tightly bound between 1% and 3%. In six years, we've seen greater than 3% and only two years below 1%.

⁴ The U.S. CPI inflation rate for 2008 was -0.04%.

⁵ See Collie (2012) on the early origins of money.

⁶ When workers have pricing power, wages are typically the first to rise.

⁷ As a footnoted aside: I am very aware of other useful characteristics of TIPS. For example, for investors with inflation-linked liabilities, structuring a duration-matched cash flow ladder can be very sensible, as TIPS are purchased in specific notional denominations to match anticipated cash flows and not to time the market. TIPS may also serve as a high-quality investment during times of market distress, as we saw in 2008/2009 (where TIPS outperformed many other securities during the most *deflationary* period in recent history), or as a diversifier to risk assets.

⁸ Note that the industrial revolution started earlier in the U.K. while the U.S. was still very agrarian.

⁹ CPI+ return targets are quite typical outside the U.S. for multi-asset funds and increasing in the U.S.

¹⁰ For example, the Russell Multi-Asset Core portfolio complex is CPI+.

¹¹ See Barber (2014).

¹² In reality, Sally Saver would have dozens of options before her, including target date glide paths and adaptive retirement accounts that include equities, fixed income, real assets, TIPS and other assets. I do not consider the more elegant solutions to retirement savings, because my goal is to demonstrate very simply the impact of diversifying assets for wealth accumulation.

¹³ Our inflation assumptions are average forward-looking expectations as suggested in Russell's Strategic Planning Assumptions as of December 2013. (We are using December 31, 2013 forecasts to remain consistent with the April 30, 2014 TIPS. Note that new forecasts dated June 30, 2014 are now available.)

¹⁴ We include 2,000 forecasted 30-year paths, from Russell's December 2013 Strategic Planning Assumptions, that the allocated portfolios might take. For inflation, we use the average inflation expectation across the 30-year horizon.

¹⁵ Another nearly riskless option to consider is an annuity. Annuities are only guaranteed to the extent that the annuity provider remains solvent.

¹⁶ This 30-year horizon is the longest horizon available for TIPS.

¹⁷ I also present the option of adaptive investing in the Appendix. Adaptive investing is similar to growth with diversification, but increases the probabilities of success by allowing the investor's portfolio to adapt to changes in wealth and spending wishes.

¹⁸ For a nice overview of withdrawal strategies and the utility functions that lead to decisions, see Blanchett, Kowara and Chen (2012).

¹⁹ For a similar type of analysis, see Sexauer, Peskin and Cassidy (2012).

²⁰ To do this I obtained the list of available TIPS, including maturity date, current price, and coupons that were available as of April 30, 2014. The full list of TIPS is available in the Appendix.

²¹ I say "approximate" because I use the 5-, 10- and 20-year horizons as times when the assumption will change.

²² Note that these are not recommended portfolios, but examples to demonstrate the benefit of diversifying growth assets to achieve cash-flow goals. As well, note that we do not include the benefit of active management in these examples.

²³ The details of these allocations may be found in the Appendix.

²⁴ Note that a consistent 3.5% rate of spending does not imply a consistent cash flow. Cash flows are a function of the spending rate *and* the size of the asset base. Therefore, we will observe that 3.5% spending has material volatility of cash flows associated with it. Some non-profits may smooth their cash flows by considering average assets over a recent sample period, such as five years. This smoothing is not modeled here, so the income volatilities will be at the upper bound of what a non-profit would actually experience. Some non-profits may be more comfortable than others with volatility in their cash flows. Indeed, a five-year-average asset base might impose additional restrictions on a non-profit when markets are declining or reduce desired spending when markets are strong

²⁵ Model portfolios may be updated on an ad hoc basis.

²⁶ We include 2,000 forecasted 30-year paths, from Russell's December 2013 Strategic Planning Assumptions, that the allocated portfolios might take. For inflation, we use the average inflation expectation across the 30-year horizon.

Appendix

Table A.1: TIPS available as of April 30, 2014

OUTSTANDING (MILLIONS)	COUPON	MATURITY	IDX RATIO	PX BID	PX ASK	SPREAD
15,265	1.250	4/15/2014	1.1067	100.04	100.09	0.06
19,002	2.000	7/15/2014	1.2425	101.54	101.59	0.05
19,001	1.625	1/15/2015	1.2266	102.52	102.58	0.06
21,234	0.500	4/15/2015	1.0807	102.00	102.08	0.08
17,000	1.875	7/15/2015	1.2041	104.81	104.90	0.09
17,001	2.000	1/15/2016	1.1800	106.19	106.25	0.07
38,365	0.125	4/15/2016	1.0611	102.87	102.94	0.07
20,000	2.500	7/15/2016	1.1597	109.21	109.29	0.08
17,249	2.375	1/15/2017	1.1614	109.70	109.76	0.07
44,429	0.125	4/15/2017	1.0311	103.09	103.17	0.08
13,998	2.625	7/15/2017	1.1300	112.24	112.31	0.07
16,417	1.625	1/15/2018	1.1179	108.87	108.96	0.09
50,000	0.125	4/15/2018	1.0132	102.69	102.75	0.06
14,970	1.375	7/15/2018	1.0861	108.93	109.03	0.10
14,740	2.125	1/15/2019	1.0909	112.17	112.26	0.09
15,177	1.875	7/15/2019	1.0969	111.91	112.01	0.09
18,973	1.375	1/15/2020	1.0831	108.64	108.73	0.09
32,378	1.250	7/15/2020	1.0739	108.40	108.48	0.08
36,678	1.125	1/15/2021	1.0706	106.81	106.91	0.10
35,840	0.625	7/15/2021	1.0391	103.62	103.72	0.11
41,282	0.125	1/15/2022	1.0348	98.63	98.74	0.11
41,000	0.125	7/15/2022	1.0184	98.61	98.72	0.11
41,000	0.125	1/15/2023	1.0147	97.43	97.55	0.12
41,000	0.375	7/15/2023	1.0064	99.67	99.75	0.09
28,000	0.625	1/15/2024	1.0037	101.12	101.21	0.09
28,001	2.375	1/15/2025	1.2425	118.67	118.84	0.17
20,000	2.000	1/15/2026	1.1800	114.86	115.05	0.19
16,482	2.375	1/15/2027	1.1614	119.66	119.82	0.16
15,634	1.750	1/15/2028	1.1179	111.76	111.92	0.16
16,783	3.625	4/15/2028	1.4480	136.97	137.22	0.25
14,151	2.500	1/15/2029	1.0909	122.41	122.62	0.21
19,497	3.875	4/15/2029	1.4247	142.25	142.46	0.21
5,012	3.375	4/15/2032	1.3195	139.52	139.75	0.22
15,171	2.125	2/15/2040	1.0836	121.10	121.33	0.23
23,985	2.125	2/15/2041	1.0695	121.57	121.81	0.23
23,128	0.750	2/15/2042	1.0365	88.29	88.54	0.25
23,000	0.625	2/15/2043	1.0187	84.89	85.17	0.28
9,000	1.375	2/15/2044	1.0049	103.39	103.69	0.30

Table A.2: Portfolios of diversified growth

(for Chapter 3, “Saving for Retirement” and Chapter 4, “Spending in Retirement”)

ASSET CLASS	EQUITY ONLY	EQUITY + FIXED INCOME	REAL ASSETS	REAL ASSETS + TIPS	ALL ASSETS
US Eq. Large Cap	60%	30%			30%
US Eq. Small Cap	10%	10%			6%
Global x US Dev	20%	15%			10%
Global x US EM	10%	5%			5%
Commodities			40%	32%	4%
Property			30%	24%	3%
Infrastructure			30%	24%	3%
TIPS				20%	3%
Credit HY					3%
Credit Short-term					3%
US FI Aggregate		40%			30%

Table A.3: Model portfolios for Chapter 5

(“Non-profit Spending”)

ASSET CLASS	3.5.ORG ALLOCATION	WATERWAYS ALLOCATION
US Large Cap Equities	13%	19%
US Small Cap Equities	2%	3%
US LC Defensive Equities	2%	3%
Global x US Equities	14%	20%
Emerging Markets Equities	4%	6%
US Aggregate Fixed Income	30%	20%
US High Yield Fixed Income	5%	5%
Absolute Return Fixed Income	5%	5%
Global REITs	3%	4%
Global Listed Infrastructure	4%	5%
Commodities	3%	5%
Aggressive Hedge Funds	5%	2.5%
Conservative Hedge Funds	5%	2.5%
Private Equity		3%
Core Real Estate		7%

ACKNOWLEDGEMENTS

Thanks to Mac Skimming from Russell's FI desk for providing the available TIPS contracts and all their details, Peiyuan Song for creating the diversified growth portfolios, and Sam Pittman for sharing Russell's Retirement Lifestyle Planner

Important information

Nothing contained in this material is intended to constitute legal, tax, securities, or investment advice, nor an opinion regarding the appropriateness of any investment, nor a solicitation of any type. The general information contained in this publication should not be acted upon without obtaining specific legal, tax, and investment advice from a licensed professional.

The analyses included in this paper are based on the allocations and study inputs outlined in this report and the Russell Capital Market Assumptions (December 2013). Forecasting represents predictions of market prices and/or volume patterns utilizing varying analytical data. There is no guarantee that the states results will occur.

Russell Investments is a trade name and registered trademark of Frank Russell Company, a Washington USA corporation, which operates through subsidiaries worldwide and is part of London Stock Exchange Group.

The Russell logo is a trademark and service mark of Russell Investments.

Copyright © Russell Investments 2014. All rights reserved. This material is proprietary and may not be reproduced, transferred, or distributed in any form without prior written permission from Russell Investments. It is delivered on an "as is" basis without warranty.

First used: December 2014 (Disclosure revision: December 2014)

USI-20888-12-17

ABOUT RUSSELL INVESTMENTS

Russell Investments provides strategic advice, world-class implementation, state-of-the-art performance benchmarks and a range of institutional-quality investment products, serving clients in more than 35 countries. Russell provides access to some of the world's best money managers. It helps investors put this access to work in defined benefit, defined contribution, public retirement plans, endowments and foundations and in the life savings of individual investors.

FOR MORE INFORMATION:

Call Russell at **800-426-8506** or
visit www.russell.com/institutional