

Long-term capital market return assumptions

2015 estimates and the thinking behind the numbers

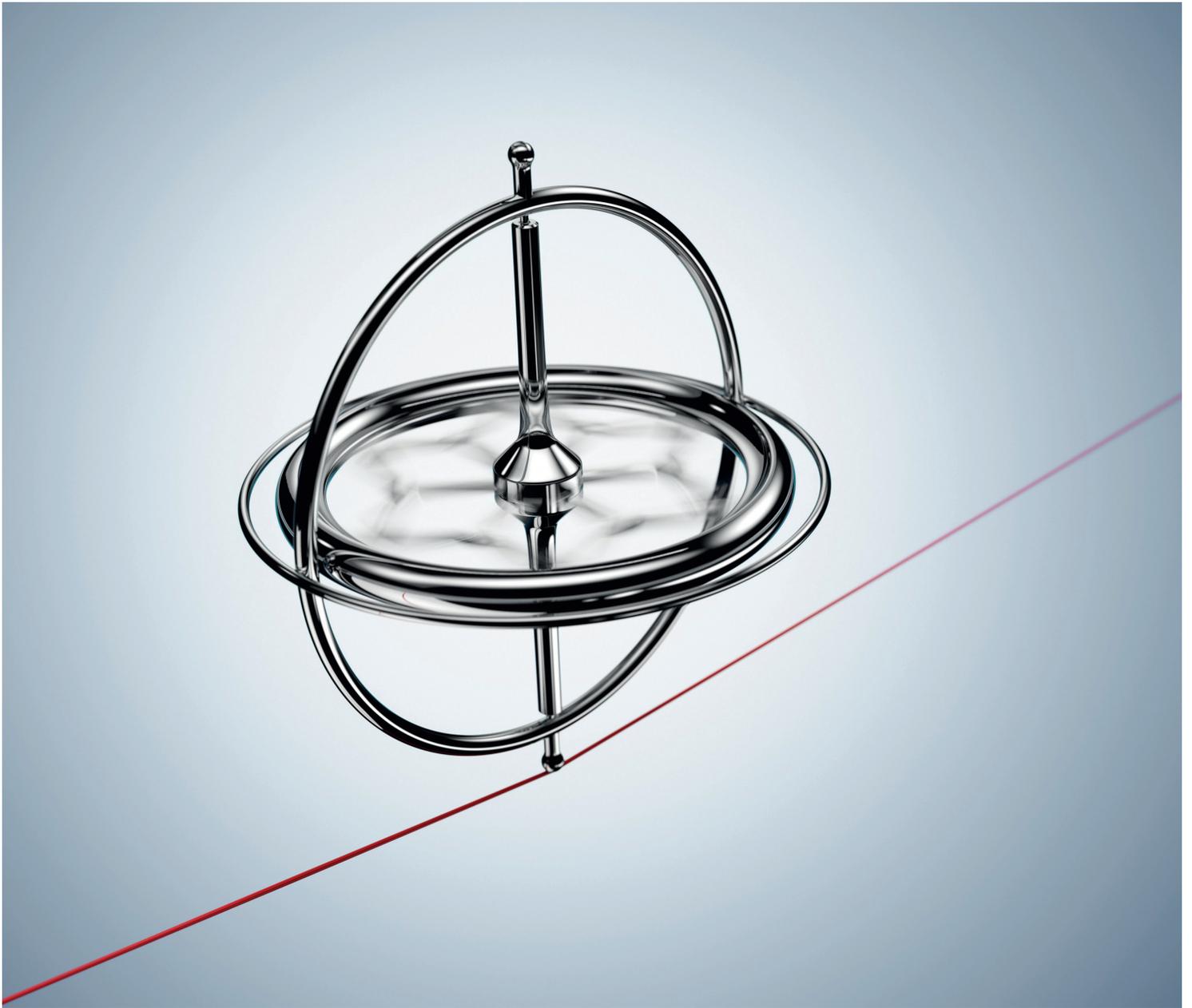




TABLE OF CONTENTS

4	FOREWORD
5	INTRODUCTION/EXECUTIVE SUMMARY A guide to the Long-Term Capital Market Return Assumptions
I. THEMATIC ARTICLES: CONSIDERATIONS FOR LONG-TERM INVESTORS	
14	GLOBAL ECONOMIC OUTLOOK On the road to normalisation
24	EQUITY RETURNS FRAMEWORK How dilution and share buybacks impact equity returns
31	MONETARY POLICY AND FIXED INCOME MANAGEMENT Forward guidance: Estimating the path of fixed income returns
35	CORPORATE CREDIT SPREADS Assessing what is “fair” in corporate credit spreads
39	INDEX-LINKED BONDS AND PORTFOLIO CONSTRUCTION The globalisation of inflation
44	VALUE-ADDED REAL ESTATE One of the laggards of normalisation
II. RATIONALE AND METHODOLOGY ARTICLES: THE THINKING BEHIND THE NUMBERS	
50	MACROECONOMIC ASSUMPTIONS Moderate growth in a multi-track world
53	FIXED INCOME ASSUMPTIONS Get ready for liftoff
57	EQUITY MARKET ASSUMPTIONS Building blocks behind the numbers
61	ALTERNATIVE STRATEGY ASSUMPTIONS A changing beta landscape and opportunity set as fundamentals normalise
70	EXCHANGE RATE ASSUMPTIONS Still close to fair value, but momentum for divergence is building
73	VOLATILITY AND CORRELATION ASSUMPTIONS Creating more robust forward-looking risk statistics
III. LONG-TERM CAPITAL MARKET RETURN ASSUMPTIONS	
80	ASSUMPTIONS—2015 ESTIMATES AND CORRELATIONS U.S. dollar assumptions
82	ASSUMPTIONS—2015 ESTIMATES AND CORRELATIONS Euro assumptions
84	ASSUMPTIONS—2015 ESTIMATES AND CORRELATIONS Sterling assumptions
GLOSSARY AND ACKNOWLEDGEMENTS	
88	GLOSSARY
90	ACKNOWLEDGEMENTS

FOREWORD



DAVID SHAIRP

AN AIR OF EXPECTANCY HAS DESCENDED OVER MARKETS AS 2014 HAS PROGRESSED.

The great monetary policy experiment that followed the Great Recession is starting to reverse its direction, although its destination is unknown. Geopolitical risks are on the rise and, while not imminent, several major economies face important elections over the next two-to-three years, which could result in significant changes to government policy.

Against this backdrop, it remains as important as ever to develop a well-reasoned, strategic perspective on markets and to understand the implications for strategic policy portfolios. With this in mind, the Long-Term Capital Market Return Assumptions (LTCMRAs)—which return for the fourth year in an expanded report format—have been helping investors make better informed strategic asset allocation decisions for well over a decade.

Our capital market assumptions reflect the best thinking throughout J.P. Morgan Asset Management. The Assumptions Committee includes some of our most senior investment experts, with representatives from the firm's Global Investment Management Solutions group, Endowment and Foundations Group, Strategy team and Private Bank.

To stay current in an uncertain and changing world, we have made several enhancements to this year's edition:

- We have expanded and enhanced our equity assumption framework to shine more light on corporate distribution policy and net dilution as drivers of total returns.
- We have refined and further formalised the methodology behind our volatility and correlation assumptions.
- We have expanded the LTCMRAs website to include reference graphics for the asset classes covered, as well as previous white papers.

While change is one predictable constant in today's world, some things can be relied on to stay the same. The LTCMRAs continue to be developed on the basis of a pragmatic, user-friendly blend of qualitative and quantitative analysis. They provide a comprehensive coverage of approximately 50 asset classes and strategies, and are derived from a transparent and accessible building-block process.

Once again, we assess the historical record of our LTCMRAs over the past decade, to illustrate how our assumptions have stood the test of time. We remain committed to running and developing our process with integrity and consistency, to ensure that the assumptions are relevant to the needs of our investors both today and tomorrow.

We would like to thank the many colleagues throughout the organisation who have contributed to the output and/or helped in the production of this document. Most importantly, we very much hope that you enjoy reading this edition of the LTCMRAs and find our conclusions useful and insightful.

David Shairp
Global Strategist and Portfolio Manager, GIM Solutions-Global Multi-Asset Group

Anthony Werley
Chief Portfolio Strategist, Endowment and Foundations Group

Michael Feser
Global Investment Director and Portfolio Manager, GIM Solutions

Note to readers: All assessments, data and forecasts in this document are made using data and information up to and including 30 September 2014, unless stated otherwise.

A guide to the Long-Term Capital Market Return Assumptions

Michael Feser, *Global Investment Director and Portfolio Manager, GIM Solutions*

Anthony Werley, *Chief Portfolio Strategist, Endowment and Foundations Group*

David Shairp, *Global Strategist and Portfolio Manager, GIM Solutions-Global Multi-Asset Group*

INTRODUCING OUR 2015 ASSUMPTIONS

- We are pleased to present our 2015 Long-Term Capital Market Return Assumptions (LTCMRAs), our annual assessment of the long-term outlook for all major asset classes and alternative strategy classes.
- The 2015 edition is once again divided into three main sections. The first section (Thematic Articles: Considerations for Long-Term Investors) contains six thematic articles that analyse a number of market trends and other strategic asset allocation issues, as well as specific aspects of the theory and methodology behind the numbers.
- The six articles in the second section (Rationale and Methodology Articles: The Thinking Behind the Numbers) discuss the factors, principles and reasoning underlying our projections for asset classes, as well as our macroeconomic and volatility/correlation assumptions.
- The final section (Long-Term Capital Market Return Assumptions) provides the numerical assumptions themselves laid out in three variations, each in an easy-to-reference matrix format, with data sets for U.S. dollar- euro- and sterling-based investors.
- While many aspects of our process have evolved over the years, our goal has remained the same: to create return and risk projections—through a transparent, comprehensive and consistent process—that are useful to investors when making, reviewing and/or analysing strategic asset allocation decisions in a multi-asset context.

SECTION I: THEMATIC ARTICLES OVERVIEW

In this year's first thematic article (*On the Road to Normalisation*), David Shairp and Michael Hood review how far we have travelled down the road back to normality in the six years since the Federal Open Market Committee (FOMC) started the great monetary policy experiment that helped to end the Great Recession. The article further explores how secular trends, such as demographic headwinds and the state of domestic as well as global rebalancing will affect the long-term growth and inflation outlook for the major economies globally.

In the second thematic article (*How Dilution and Share Buybacks Impact Equity Returns*), Patrik Schöwitz and Michael Albrecht shed light on an often overlooked aspect when projecting equity market index level returns: the aggregate impact of shareholder dilution and share buybacks on the total index return. Their analysis identifies the impact of this practice in different markets and assesses the extent to which increased buybacks—in lieu of dividends—will reduce the rate of shareholder dilution in the future. A favourable side effect of this enhancement to our equity methodology is that it also improves our projection for the portion of shareholder returns that is generated through dividends—an important consideration for income-oriented investors.

While the eurozone and Japan are still actively pursuing easier monetary policies to revive growth, the monetary policy cycle is turning in the U.S. and the UK. Our third thematic article (*Forward Guidance: Estimating the Path of Fixed Income Returns*) dissects the implication of policy normalisation on returns from bonds with varying maturities. Based on the yield curve of the UK government bond market, Rupert Brindley's analysis shows how to use the forward rate of interest concept to identify the policy risk term premium, and how liability-aware investors in particular can apply it to identify opportunities for enhancing returns along the yield curve. The framework itself is universal and can be applied to other government bond markets around the globe.

Our fourth thematic article (*Assessing What Is "Fair" in Corporate Credit Spreads*) quantifies the interaction between macroeconomic and credit fundamentals as well as risk appetite and volatility and credit spreads over the course of a market cycle. The unconventional monetary policies employed by central banks over the last several years have successfully helped to calm financial market volatility and normalise risk premia for liquid assets even while macroeconomic activity trails pre-crisis levels. Investors may therefore question whether corporate credit spreads have tightened beyond fundamentally justifiable levels and how rate normalisation will affect credit spreads. The fair value model presented by Grace Koo in this article provides a framework to answer these questions.

The fifth thematic article (*The Globalisation of Inflation*) sees Paul Sweeting and Alexandre Christie explore to what extent inflation can be considered to be a global phenomenon. While it is our central case that inflation in the developed world will remain range-bound and several deflationary factors still need to be overcome in the near term, there are a significant number of investors who invest relative to a stream of real liabilities. Given the limited availability of inflation-linked securities across maturities and their relatively extreme pricing by historical standards in some markets, Paul and Alexandre's article looks at the trade-offs and opportunities for investors willing to hedge domestic inflation through investing in overseas inflation index-linked bonds instead of domestic ones.

In this year's sixth and final thematic article (*One of the Laggards of Normalisation*), Dave Esrig and Anthony Werley take a closer look at U.S. value-added real estate. The compression of risk premia in recent years has predictably started with less volatile assets before progressing to more volatile assets, but more significantly, this trend has also strongly favoured assets with higher perceived liquidity compared with less liquid ones. This article analyses the unique demand and supply dynamics of this cycle and the resulting investment opportunities. By further assessing the impact of both normal cyclical factors and anomalous factors on valuations, the article makes the case for the existence of a significant risk premium in the value-added real estate asset class.

SECTIONS II AND III: RATIONALE ARTICLES AND OUR 2015 ASSUMPTIONS

The second section of this comprehensive report (*Rationale and Methodology Articles: The Thinking Behind the Numbers*) is organised into four asset class specific articles dedicated to our assumptions: fixed income, equities, alternative strategies (hedge funds, private equity, commodities, real estate, REITs and infrastructure) and currencies. We also present our macroeconomic projections and risk statistics in two cross asset class articles. Each article in this section includes a discussion of the factors, rationale and methodology behind the numbers.

The final section of the report (*Long-Term Capital Market Return Assumptions*) provides the numerical assumptions themselves, laid out in three variations, each in easy-to-reference matrix format, with data sets for U.S. dollar-, euro- and sterling-based investors. In addition to the data sets included in this publication, the team also creates data sets for investors in the following currencies: Canadian dollar, Australian dollar, Japanese yen, Swiss franc, Mexican peso and Brazilian real.

Our numeric assumptions feature expected compound return projections (both the 2015 and 2014 figures for comparison) and our 2015 arithmetic return projections. We also include expected annualised volatilities based on log-return data and on the multiplication by the square root of time (12), along with a corresponding correlation matrix covering a comprehensive range of asset classes all for an investment time horizon of 10-to-15 years. As in prior years we have given no consideration to the potential for return enhancement through the use of active strategies although we acknowledge that ultimately these considerations play a key role when determining the size and usefulness of a given portfolio allocation—in particular for alternative strategies.

While many aspects of our process have evolved over the years our goal has remained the same: to create return and risk projections through a transparent, comprehensive and consistent process that are useful to investors when making, reviewing and/or analysing strategic asset allocation or policy level decisions in a multi-asset portfolio context.

FREQUENTLY ASKED QUESTIONS ABOUT THE LTCMRAS

How is the time horizon defined?

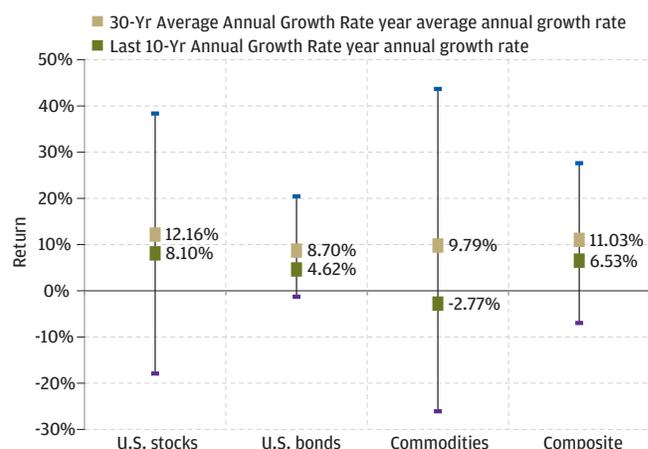
We want to ensure that the time horizon is such that these assumptions can be used as a common reference when translating real life organisational issues, which drive the purpose and objectives of an investment strategy, into an investment portfolio policy. The time horizon as well as the update frequency and inherent robustness of the process should therefore dovetail with the typical time frame of an institutional strategic planning process around asset allocation, actuarial issues, distribution objectives and other organisational goals.

The LTCMRAs are explicitly not designed to act as estimators of shorter term or even cyclical asset returns. Returns over a more compressed time horizon are invariably much more sensitive to the chosen start and end dates and actual returns are often wide of the mark of the longer term achievable and sustainable asset return. We believe that the longer-term achievable asset return is ultimately driven by secular trends, which this process tries to capture through the analysis of the following factors:

- macroeconomic, including fiscal, monetary and regulatory policy;
- absolute and relative asset valuation; and
- market structure, including supply and demand.

However, the considerable magnitude of difference between truly long-term historical results and actual results over still long, but relatively shorter, periods of time illustrates the important investment caveat that past is not necessarily prologue (**Exhibit 1**). As such, we do not believe that a truly long-term asset class framework primarily, or entirely, based on historical averages is a useful and reliable guide for most investment and policy decision-makers with less than full career tenure.

EXHIBIT 1: 30-YEAR ASSET CLASS HISTORY VS. 2004-2014 ACTUAL RESULTS



Source: J.P. Morgan Asset Management. 30-year average annual growth rate calculated from October 1974–September 2004.

Last 10-year average annual growth rate calculated from October 2004–September 2014. Composite is an allocation of 55% to U.S. stocks, 40% to U.S. bonds, and 5% to commodities. U.S. stocks are proxied by the S&P 500 Total Return Index; U.S. bonds are proxied by the Barclays U.S. Aggregate Bond Index (zero coupon five-year Treasury before February 1975); commodities are proxied by the S&P GSCI Official Close Index. The 90% confidence interval is based on 12-month rolling returns from October 1974–September 2014.

We have therefore chosen a time horizon of two economic cycles, or a period of 10-to-15 years, as an appropriate timeframe over which secular trend factors and issues can reasonably be expected to play out and be more fully reflected in the financial market returns. The relatively longer time horizon of a secular trend-based framework compared to a more variable set of shorter term, or cyclical, forecasts, also results in a reduced probability of large forecasting errors across individual asset classes and portfolio allocations—a fact that further enhances the attractiveness of this approach.

How do investors use the LTCMRAs?

The Long-Term Capital Market Return Assumptions are used widely by investment teams throughout J.P. Morgan Asset Management as well as by institutional investors—including pension plans, insurance companies, endowments and foundations—to ensure that investment policies and strategic asset allocations are developed based on a comprehensive and consistent set of “real world” views. In addition the LTCMRAs allow the resulting investment characteristics and return profiles to be tested and analysed, facilitating a more effective communication and underwriting of the implied risk and return profile.

When used, as is most often the case, to review an existing strategic asset allocation, the LTCMRAs can help investors to better assess and quantify the trade-offs available to them across multiple dimensions. These trade-offs include: the relative risk premia between more and less volatile assets; the risk premia associated with investing outside of their own domestic asset classes; which opportunities exist to increase portfolio diversification; and which nominal or real return target is achievable with a given level of portfolio volatility and vice versa.

In this context, the 2015 LTCMRAs suggest several diversification opportunities for long-term investors, including:

- adding diversified hedge funds as a fixed income substitute
- adding commodity allocations as a diversifier and tail hedge
- adding bond exposure in markets where central banks are easing as a substitute for U.S. and UK interest rate sensitivity

For investors in search of higher nominal returns, our projections suggest several options, including:

- venturing back into emerging markets, where valuations are lower and top-line growth is likely to be higher
- adding leverage, either directly or indirectly (through reduction of the bond allocation), while funding costs are low
- investing in less liquid markets where the risk premia have lagged, such as value-added real estate, and where opportunity sets have expanded, such as private equity

How are the LTCMRAs used within J.P. Morgan Asset Management?

The LTCMRAs are widely used throughout J.P. Morgan Asset Management to help in the development and analysis of investment solutions.

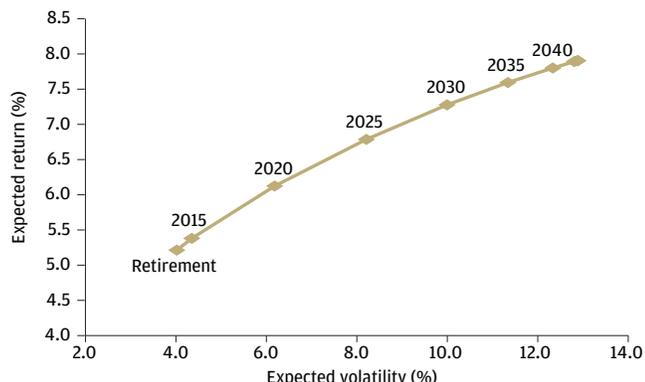
The GIM Solutions-Global Multi-Asset Group for example uses the LTCMRAs as an integral part of its solution design for its range of target date strategies. The projections aid in the determination of strategic asset allocations, are one of the inputs in the glide path formulation, and are used to test the expected effectiveness and efficiency of the solutions. For the last, a Monte Carlo simulation is used to generate 10,000 different possible portfolio outcomes that account in addition, to the LTCMRA inputs, for multiple variables, including: member contribution rates and changes to rates over time; frequency of salary growth; and event and size of post-retirement withdrawals to test our glide path (see **Exhibit 2**).

The J.P. Morgan Private Bank also uses the LTCMRAs as a key input into their proprietary MAPS (Morgan Asset Projection System) asset allocation model, which applies Monte Carlo simulation to generate multi-period wealth projections to help clients compare the risk and return trade-offs of potential allocation strategies and/or spending policies. The system generates 10,000 potential “paths” for each and every asset class within the asset allocation based on the LTCMRAs, using an in-house developed methodology.

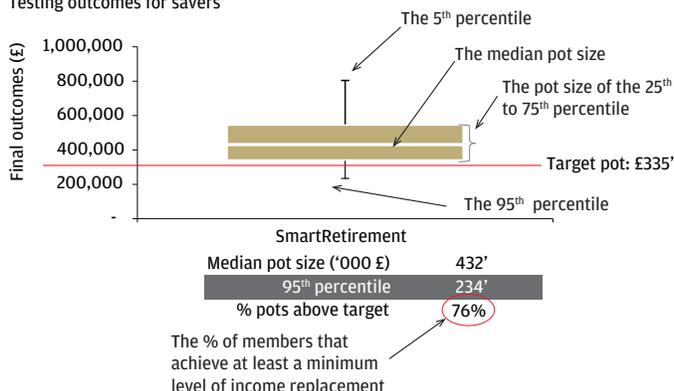
MAPS can incorporate numerous client-specific variables simultaneously such as: annual cash flow, either in or out of the asset allocation; taxes (income, capital gains, and excise); customised asset classes (for example, concentrated stock position, changing asset allocation strategies, leverage); different pools of assets (for example, taxable investments, IRA/401(k), deferred comp, trusts, foundations, etc); and illiquid assets, such as private equity, hedge funds and real estate. The model output is shown as wealth ranges, cash flow ranges, or probabilities of wealth values or cash flows beating or missing targeted values. The ranges are quoted from the fifth to the ninety-fifth percentile, with the median, or fiftieth percentile highlighted. **Exhibit 3A** and **Exhibit 3B**, showing how our LTCMRAs have performed over time, have been created using MAPS.

EXHIBIT 2: USING THE LTCMRAS IN TARGET DATE STRATEGIES—EXAMPLE OF A UK TARGET DATE GLIDE PATH ANALYSIS

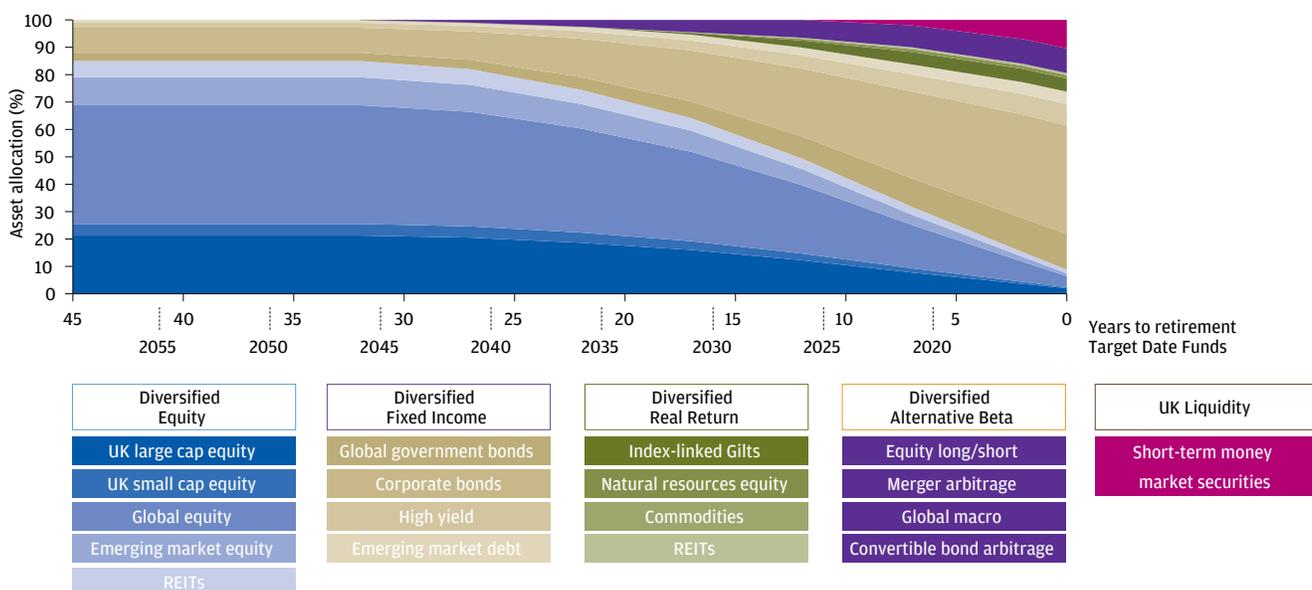
Expected return and volatility of the Target Date glide path



Testing outcomes for savers



UK target date glide path



Source: J.P. Morgan Asset Management. For illustrative purposes only. Data as of 2014.

How have the LTCMRAs fared over time?

With the 2015 estimations we are 11 years into our expanded process and are approaching the mid range of our assumption evaluation time period, as mentioned above. As last year, we evaluate ourselves on an asset class and portfolio level basis over a reasonable evaluation timeframe for which the economic, asset and strategy class assumptions are intended to be useful.

No-one needs to be reminded that the timeframe from October 2004 through to September 2014 contained highly unusual economic, financial and global economic policy conditions. Those conditions ranged from financial euphoria and real asset bubbles to the Great Recession in the U.S. and the crisis in the eurozone, with public policy prescriptions reminiscent of the 1930s.

Ultimately, these events and conditions resulted in global asset declines not seen since the 1970s, if not for the last 80 years. Some assets have since regained past peaks, while many assets—particularly outside of the U.S.—have not.

It is in this context that we evaluate our LTCMRAs process. We believe our bottom-up fundamental assessments, coupled with our top-down vision of what is, and often more importantly, what is not different this time, captures the principle of reversion to mean and the unique aspects of the secular trends reasonably well.

EXHIBIT 3A: ASSET CLASSES AND ALLOCATION PROJECTIONS VS. REALISATIONS, MONTE CARLO RESULTS

Range of projected asset values from 2004 LTCMRAs and realised returns

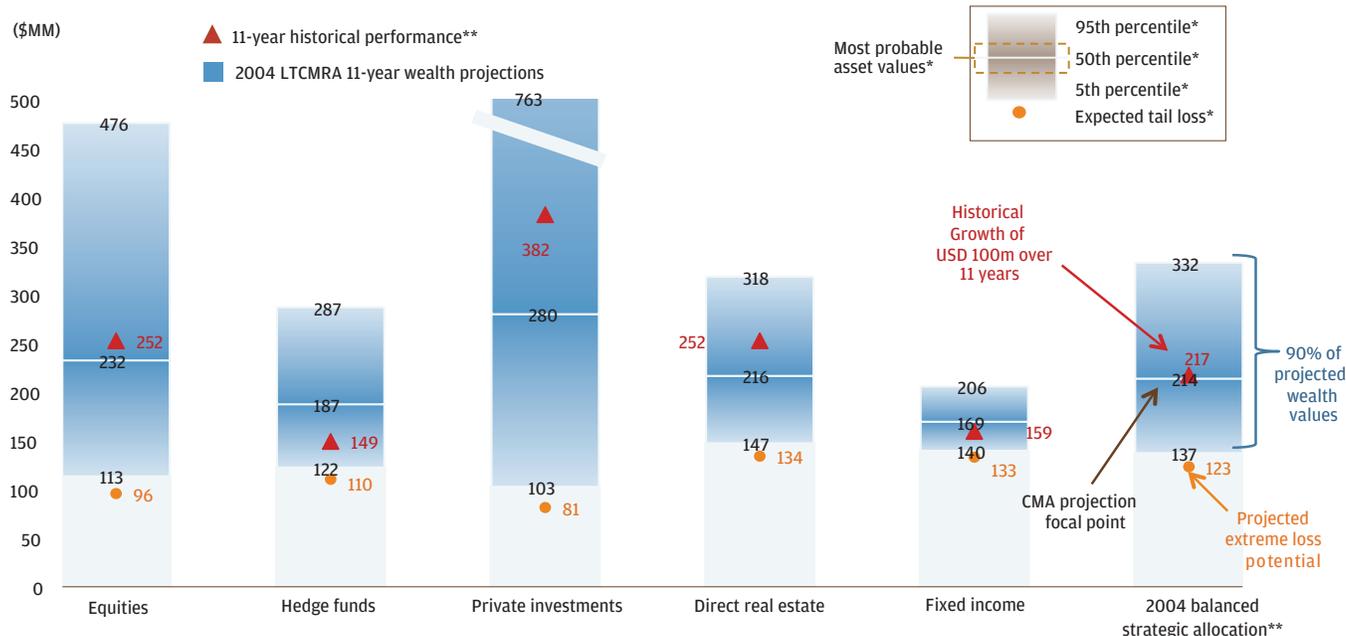


EXHIBIT 3B: ASSET CLASSES AND ALLOCATION PROJECTIONS VS. REALISATIONS

Range of projected asset values from 2004 LTCMRAs and realised returns

	Equity	Hedge funds	Private equity	Direct real estate	Bonds	2004 strategic asset allocation
95 th percentile	15.2%	10.1%	20.3%	11.1%	6.8%	11.5%
50 th percentile	8.0%	5.9%	9.8%	7.3%	4.9%	7.1%
5 th percentile	1.1%	1.9%	0.2%	3.6%	3.1%	2.9%
Expected tail loss	-0.4%	0.9%	-1.9%	2.7%	2.6%	1.9%
Historical	8.8%	3.7%	13.0%	8.8%	4.3%	7.3%
Asset allocation weights	50%	12%	5%	3%	30%	100%

Source for Exhibit 3A and Exhibit 3B: J.P. Morgan Asset Management. Note: This is a projection used for illustrative purposes only and does not represent investment in any particular vehicle. References to future asset values are not promises or even estimates of actual returns you may experience. Past performance is no guarantee of future results. It is not possible to invest directly in an index.

*Most probable asset values denoted by the darkly shaded area indicates the range in and around the fiftieth percentile. The fiftieth percentile indicates the middle wealth value of the entire range of probable asset values. The ninety-fifth percentile wealth value indicates that 95% of the probable asset values will be equal to or below that number; the fifth percentile wealth value indicates that 5% of the probable asset values will be equal to or below that number. Another way of looking at it is 90% of the probable asset values will be between those two figures. Expected tail loss is an assessment of the average loss as a result of a tail event (tail = worst 5% of outcomes).

**Historical allocation of 50% equity, 12% hedge funds, 5% private equity, 3% direct real estate, 30% global aggregate bonds. Asset allocation assumes annual rebalancing, no taxes, and no cash flows. All returns are based on index data and include no manager alpha. Indices used: Barclays Capital U.S. Aggregate Bond Index, S&P 500 Index, Russell Mid Cap Index, Russell 2000 Index, HFRI Fund of Funds Diversified Index, Cambridge Associates U.S. Buyouts Index (proxied with Russell Midcap Index from April-September 2014), Cambridge Associates U.S. Buyouts Mezzanine Index (proxied with Russell Midcap Index from April-September 2014), NPNCRE Index (proxied with NAREIT Equity REITs Index from July-September 2014).

As a means of testing the value of the 2004 assumptions for the investment period from October 2004 through to September 2014, we employ a standard portfolio-level exercise. Using a more granular, multi-asset class allocation, the projections are pitted against the actual results, as shown in Exhibit 3A and Exhibit 3B. The results are impressive for three main reasons:

1. At the end of the 11-year period, the portfolio's total wealth value projected by the LTCMRAs differed by approximately -1.7% (or -17 basis points of return per year) from the performance of a portfolio using actual benchmark results (before passive vehicle fees and tracking error). This margin of error represents a fifty-third percentile rank with a non-normal distribution framework (with a fiftieth percentile rank being a "perfect" score).
2. The projected portfolio results never fell out of a 90% confidence interval (an interval or range including 90% of all portfolio outcomes that are statistically possible using the LTCMRAs risk, return and correlation inputs) even during the multiple market and strategy declines of 2008 and early 2009. There was, however, a positive four-year compounding period from 2004-2007 that buffered the wealth value decline of the 2008 portfolio decline.
3. The greater the volatility of the underlying asset classes in the portfolio, the greater the absolute degree of missing the mark vs. the ultimate market performance. We achieved the relatively lowest mark with a nineteenth percentile rank within the empirical distribution (with a fiftieth percentile being a "perfect score") with our projection of the return for hedge funds.

While this analysis only illustrates the results of our 2004 assumptions and we intend to expand the analysis with the passage of time, we believe our process is sufficiently strong to provide consistent and value-added inputs to make, review and/or analyse strategic asset allocation or policy level decisions in a multi-asset portfolio context. We fully believe creating 10- to 15-year asset class projections throughout an era of extraordinary events and policies is as much an exercise in seasoned judgement as it is in quantitative analysis.

FURTHER INFORMATION

Readers wishing to access the underlying data, or wanting to access reports from previous years, can do so by visiting the J.P. Morgan website. All thematic articles contained in our expanded reports are stored on the site.

<https://am.jpmorgan.com/us/institutional>

A QUICK REFERENCE GUIDE TO THIS REPORT

Navigating the Long-Term Capital Market Return Assumptions white paper

SECTION I: THEMATIC ARTICLES

- Analyse long-term market trends across asset classes and the global economy
- Understand the research and other aspects of the concepts underlying our assumptions
- Discuss strategic asset allocation and portfolio construction issues facing long-term investors

SECTION II: RATIONALE ARTICLES

Understand how we arrive at our assumptions for:

- macroeconomic fundamentals
- fixed income
- equity
- alternatives
- foreign exchange
- volatilities and correlations

SECTION III: LONG-TERM CAPITAL MARKET RETURN ASSUMPTIONS

- Explore our return and volatility projections for approximately 50 asset classes in USD/EUR/GBP
- Find the cross-asset correlation assumptions for our entire data set

How to use the numbers

Our assumptions can be used by investors in several ways:

- develop or review a strategic asset allocation
- understand the available risk and return trade-offs across asset classes and within asset classes across regions
- make new, and review existing, relative value allocation decisions
- use the correlation and volatility data to analyse the risk characteristics of a strategic asset allocation

For example, investors may want to explore what opportunities exist to diversify their fixed income allocation ahead of a change in central bank monetary policy. After a period of strong returns in U.S. equities investors may also want to find out what opportunities may exist in other markets. The assumptions can also be used as a key input into an asset allocation model or simulation, such as the MAPS model that is used extensively by the J.P. Morgan Private Bank.

The assumptions are not designed to inform short-term tactical allocation decisions. Our assumptions process is carefully calibrated and constructed to aid investors with strategic asset allocation or policy level decisions over a 10- to 15-year investment horizon.

**I. THEMATIC ARTICLES:
CONSIDERATIONS
FOR LONG-TERM
INVESTORS**

On the road to normalisation

David Shairp, *Global Strategist and Portfolio Manager, GIM Solutions-Global Multi-Asset Group*

Michael Hood, *Senior Economist, Strategy Group*

IN BRIEF

- We look first at the current business cycle, to ask whether the already somewhat long-lasting expansion might be approaching its end, even before monetary policy has normalised.
- We tentatively conclude that the expansion, at least in the developed world, remains in its early-to-middle stages and likely has considerable room to run.
- We also re-examine longer-term rebalancing dynamics, to determine what pressure points remain that may pose problems for sustainable growth down the road.
- We find that much progress has been made in narrowing current account gaps, but that debt stock rebalancing within economies has not proceeded as far. In particular, the jump in public sector debt burdens associated with recession-era stimulus has not begun to reverse.
- The pressure for further adjustment in sovereign debt levels may resume at some point, probably from fixed income investors, given signs of austerity fatigue among electorates.
- Although private deleveraging remains partial in many countries, any resumption of fiscal tightening might not be met with more expansionary behaviour by households and firms, denting aggregate demand growth in high-debt economies. Our understanding of the current business cycle suggests that such a day of reckoning probably lies a few years down the road.

NORMALISATION IN A BUSINESS-CYCLE CONTEXT

Five years after the end of the global financial crisis, the world economy is growing, albeit slowly, but much of the unorthodox policy stance adopted in the wake of the recession remains in place. A comparison of the current expansion with past cycles leads to two conclusions: first, some demand-side indicators remain unusually depressed, suggesting considerable room for the major economies to grow; second, labour-market conditions have made more convincing progress toward normalisation, at least in the U.S. and the UK.

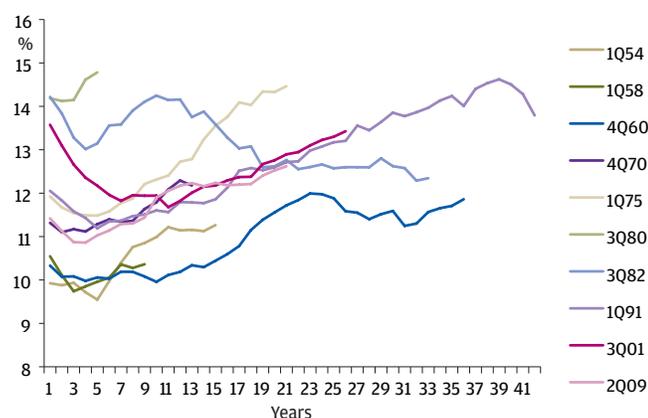
The rapid decline in unemployment rates in the U.S. and UK—partly reflecting weak labour supply and partly owing to poor productivity growth—raises the possibility that more capacity was destroyed during the recession and its aftermath than previously thought, or that potential growth rates have slowed more than we believe, or perhaps both. Resolution of this uncertainty on the supply side of the major economies will play a major role in driving market perceptions of the state of the expansion. Although supply-side concerns also affect the euro area, the depth of its two recessions since 2008 leaves little doubt that its normalisation process has just begun and that capacity constraints will not bind for years to come.

On the demand side, business capital spending, housing and durable goods purchases help to define cycles, typically moving higher as expansions unfold and then falling sharply during recessions. Among these factors, non-residential fixed investment (business capital spending) displays the clearest cyclical pattern. The behaviour of these factors in the U.S. over the past few years

suggests that the normalisation process remains far from complete (see **Exhibit 1**). Business investment spending has broadly followed the pattern of previous expansions and does not appear to have reached a worryingly high level. Meanwhile, both housing investment and consumption of durables—each of which reflects household decisions—are running at extremely low levels by long-term standards and have risen only modestly from their troughs (**Exhibit 2**). Although the specifics of the UK and euro area expansions look a little different, with a more mature housing cycle in the former, demand indicators appear less advanced than in the U.S., where the expansion got underway significantly earlier.

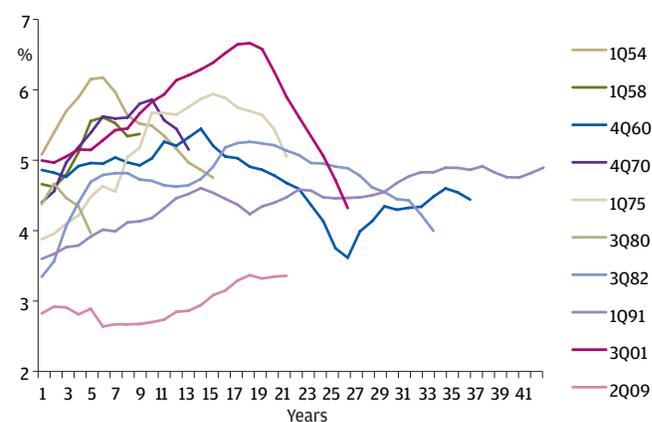
Another perspective on corporate and household behaviour comes from saving and borrowing patterns. A combination of regulatory change and chastened borrowers means that bank credit has barely expanded in the past few years. Total credit-related U.S. bank assets rose 2.1% year on year (y/y) in the first quarter of 2014. By contrast, during the comparable quarter of the 2000s cycle, bank credit rose at nearly a double-digit clip, and even in the more restrained 1990s expansion, credit was climbing at a 7% pace by the five-year point. In the euro area, bank lending is still shrinking (see **Exhibit 3**), and in the UK, credit to corporations is dropping steadily while lending to households is rising at less than 2% y/y. Reduced ability to take leverage appears to mark a significant contrast between the current expansion and past cycles. Still, even the modest credit growth rate in the U.S. represents a shift compared with the first few years of the expansion, when the household saving rate was broadly stable and credit outstanding was shrinking. In that sense, the deleveraging period, broadly speaking, appears to have come to an end, paving the way for a more typical expansion dynamic to unfold in coming years.

EXHIBIT 1: U.S. FIXED INVESTMENT BY CYCLE (% OF GDP, CYCLE START QUARTER IN LEGEND)



Source: J.P. Morgan Securities Ltd, J.P. Morgan Asset Management; quarterly data from 1954 to second-quarter 2014.

EXHIBIT 2: U.S. RESIDENTIAL CONSTRUCTION BY CYCLE (% OF GDP, CYCLE START QUARTER IN LEGEND)



Source: J.P. Morgan Securities Ltd, J.P. Morgan Asset Management; quarterly data from 1954 to second-quarter 2014.

EXHIBIT 3: EURO AREA BANK CREDIT BY TYPE (% Y/Y)



Source: J.P. Morgan Securities Ltd; monthly data through July 2014.

The situation looks different on the supply side of the major economies, especially in labour markets, where ambiguity surrounds current conditions and prospects for the future. In the U.S., joblessness has fallen rapidly and stands less than a percentage point above the Federal Reserve’s current estimate of a neutral long-term unemployment rate. Yet the employment-to-population ratio, a broader measure of labour market pressure, has risen only modestly from its recession trough (**Exhibit 4**). One measure suggests that the economy has already absorbed most of the slack created by the downturn, while the other implies that this process has barely begun.

Demographic drift, as more of the baby boomers reach retirement age, almost certainly explains a large portion of the drop in the U.S. labour force participation rate (the share of the working-age population actively involved in the labour market) and this ageing process will not reverse. But population ageing alone appears to account for only about half of the drop in the participation since 2007, leaving open the possibility that much of the remainder has reflected more cyclical phenomena, with workers becoming discouraged. As the job market firms, some of these sidelined individuals will likely return, boosting the labour force growth rate. Satisfactory growth could thus coexist with a slower decline in the unemployment rate and with an ongoing moderate pace of wage and price inflation.

Ultimately, the labour force participation debate reflects broader uncertainty about the U.S. economy’s productive capacity, both in terms of the damage inflicted by the recession and its trend growth rate. While hardly unusual, such doubt looks particularly elevated at the moment, complicating any assessment of the economy’s progress towards normalisation.

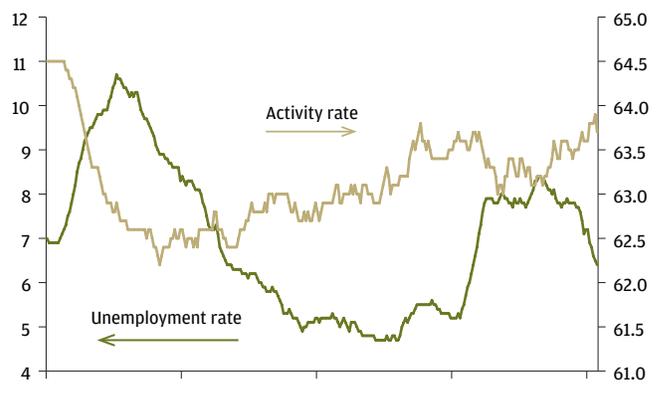
EXHIBIT 4: U.S. EMPLOYMENT/POPULATION RATIO AND UNEMPLOYMENT RATE



Source: J.P. Morgan Securities Ltd; monthly data through August 2014.

On the labour market front, conditions differ between the euro area and the UK. In the single currency zone, enormous slack exists, with the headline unemployment rate nearly 12% and only marginally below its 2013 peak. Supply-side indicators thus echo demand-side figures in placing the euro area in the early stages of its expansion. The UK jobless rate, by contrast, has behaved somewhat similarly to the U.S., dropping by 1.6 percentage points since the end of 2011. In the UK’s case, though, this decline does not reflect falling labour supply, as the participation rate has risen during that same period. Instead, the sharp improvement owes to fairly strong economic growth and a disproportionately rapid pace of job gains relative to growth (that is, sluggish productivity increases). At 6.8%, the UK unemployment rate as of June currently stands only a bit above the Bank of England’s 6.0%-6.5% estimate of a medium-term equilibrium rate (see **Exhibit 5**). In this respect, at least, the UK economy appears modestly ahead of the U.S., with the euro area trailing far behind both.

EXHIBIT 5: UK UNEMPLOYMENT AND LABOUR MARKET ACTIVITY (%)



Source: J.P. Morgan Securities Ltd; monthly data up to June 2014.

REBALANCING: PROGRESS TO DATE, AND WHY IT MATTERS

Since the recession, market participants have thought about possible rebalancing needs along two axes: first, across countries (essentially, by changing current account gaps), and second, within countries (via swings in sector-by-sector saving balances and debt stocks).

The way in which imbalances resolve themselves, or fail to, matters greatly from an investment perspective, by helping determine the underlying economic regime that prevails.

Exhibit 6 shows a simplified four quadrant illustration of various rebalancing scenarios:

1. **Successful rebalancing** would see reduced demand in the developed world (caused by private and public deleveraging) fully offset by increased demand in the emerging world. This scenario would be consistent with non-inflationary growth and would favour equities.
2. A **deflationary outcome** would entail reduced demand in the OECD (Organisation for Economic Co-operation and Development) due to tighter fiscal policy, but little or no offsetting rise in emerging market (EM) demand. This scenario would favour higher grade government bonds (as bond markets in heavily indebted economies could suffer from credit downgrades and solvency concerns).
3. An **inflationary scenario** would occur if OECD countries gave up on fiscal adjustment while the EM world chose to boost demand. This scenario could bring a surge in the cost of capital as excess

demand for funds clashed with limited global savings. An inflationary scenario would clearly favour real assets.

4. A **nightmare scenario** would entail a breakdown in cooperation globally, with the OECD failing to address its fiscal challenges and the emerging world retaining overly restrictive policies. This scenario might prove consistent with a locally set cost of capital, and it is difficult to see what asset class might benefit, other than perhaps bearer assets.

Developments during the past few years have most closely matched the “successful” quadrant. Although overall growth has slowed relative to the pre-crisis period, stimulus in emerging markets—particularly in the immediate wake of the recession—did compensate partly for developed market (DM) private and public belt-tightening. At the same time, no overheating occurred, and inflation remained low. These conditions have represented an equity-friendly environment.

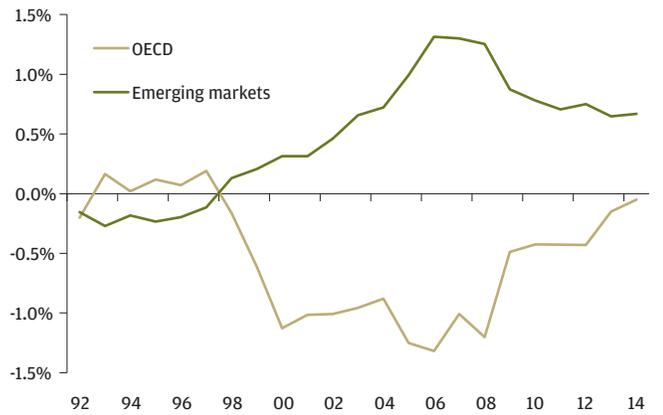
In the first area of rebalancing, across countries, major changes indeed have occurred. Before the recession, developed economies in aggregate were running a current account deficit, with EM economies showing surpluses. This pattern looked unsustainable, as the lower-growth DM economies eventually would have accumulated enormously negative international investment positions. Moreover, in theory, capital should have been moving from DM to EM economies in net terms, with an EM current account deficit as the counterpart to these flows. The anomaly reflected low DM saving rates and much higher EM saving rates, along with the surge in commodity prices, which on a net basis favoured emerging markets.

EXHIBIT 6: WHY REBALANCING MATTERS TO INVESTORS

	Emerging world promotes adjustment	Emerging world impedes adjustment
Developed world tightens fiscal policy (and eases monetary policy)	<p>Successful rebalancing</p> <ul style="list-style-type: none"> ↑ DM net saving ↓ EM net saving <p>Regime: Disinflation</p> <ul style="list-style-type: none"> • Lower cost of capital • Favours equities 	<p>Slump / Depression</p> <ul style="list-style-type: none"> ↑ DM net saving ↑ EM net saving <p>Regime: Deflation</p> <ul style="list-style-type: none"> • Stable/higher cost of capital • Favours AAA bonds
Developed world fails to tighten fiscal policy	<p>Sovereign credit crisis</p> <ul style="list-style-type: none"> ↓ DM net saving ↓ EM net saving <p>Regime: Inflation</p> <ul style="list-style-type: none"> • Higher cost of capital • Favours real assets 	<p>Financial repression/Protectionism</p> <ul style="list-style-type: none"> ↓ DM net saving ↑ EM net saving <p>Regime: Stagflation?</p> <ul style="list-style-type: none"> • Locally set cost of capital • Favours bearer assets

Source: J.P. Morgan Asset Management, Gemstrat. DM = developed market, EM = emerging market. Cost of capital considered in real terms.

EXHIBIT 7: CURRENT ACCOUNT BALANCES AS % OF GLOBAL GDP*

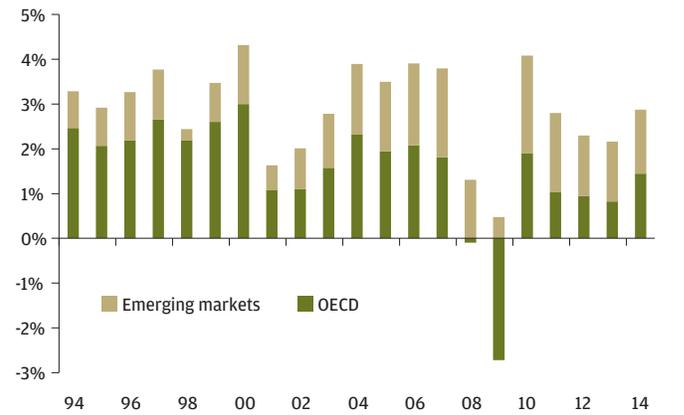


Source: J.P. Morgan Asset Management, International Monetary Fund (IMF) World Economic Outlook, April 2014. *Emerging markets and Organisation for Economic Co-operation and Development (OECD) aggregates are calculated from a sample of countries, where the sample aggregates equal 88%-90% of official IMF aggregates. Annual data up to 2014; 2014 estimated.

In the past few years, these imbalances have narrowed significantly. The DM current account deficit has nearly closed, while the EM surplus has shrunk (see **Exhibit 7**, which expresses both gaps as a share of global GDP; a combination of excluded economies and data errors means the two series never quite add up to zero). This swing reflects two main factors. First, the weak pace of expansion in the DM world means that a larger share of global growth is coming from EM economies (**Exhibit 8**). Second, the reversal in commodity prices represents an income transfer from emerging markets to developed markets. Emerging economies are still not running a deficit, as theory would suggest, but neither are they accumulating cross-border claims on DM economies at an alarming rate.

The weak demand growth responsible for narrowing the DM current account deficit has resulted in large part from deleveraging efforts, initially by the private sector, more recently augmented by fiscal authorities. These impulses have in some cases created “paradox of thrift” problems, as simultaneous drives to raise saving rates have depressed growth, in turn inhibiting debt reduction. Partly as a result, interest rates in the developed world have remained extraordinarily low. This interest rate environment has facilitated capital outflows to EM borrowers, with the narrowing of the EM current account surplus corresponding to a fall in domestic saving rates in these economies and a strong resulting tendency for private-sector leverage to move in the opposite direction to the DM pattern.

EXHIBIT 8: GLOBAL REAL GDP GROWTH CONTRIBUTIONS*



Source: J.P. Morgan Asset Management, International Monetary Fund (IMF) World Economic Outlook, April 2014. *Emerging markets and Organisation for Economic Co-operation and Development (OECD) aggregates are calculated from a sample of countries, where the sample aggregates equal 88%-90% of official IMF aggregates. Annual data up to 2014; 2014 estimated.

Exhibits 9 - 12 show the sectoral breakdowns of debt for the U.S., euro area, Japan and China since the early 2000s, illustrating how aggregate debt outstanding has moved and how it has shifted within each economy.

Several trends emerge from an examination of the past five years (see **Exhibit 13**, which additionally includes the UK):

- Only in the U.S. and to a lesser extent the UK has total debt in the system fallen. In both cases, this reflects significant private sector deleveraging, partly offset by sizeable increases in public debt.
- Leverage in the euro area rose sharply during the recession. Although it has levelled off since, there has been a rotation to public sector debt as the private sector has deleveraged.
- Japan has re-leveraged massively, with national debt rising by 69 percentage points of GDP. This has mainly been due to increased public debt, but the financial system has also re-leveraged.
- China has geared up its national balance sheet to the tune of 77 percentage points of GDP. This has mainly been driven by the private sector, primarily through the (state-influenced) corporate sector. Fairly similar developments have occurred in other EM economies.

EXHIBIT 9: U.S. DEBT BREAKDOWN BY SECTORS

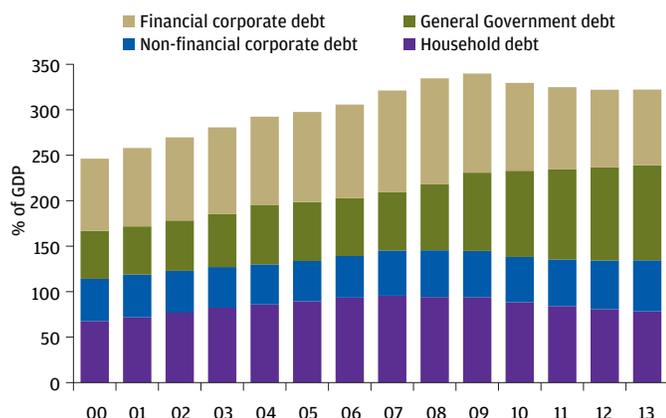


EXHIBIT 10: EURO AREA DEBT BREAKDOWN BY SECTORS

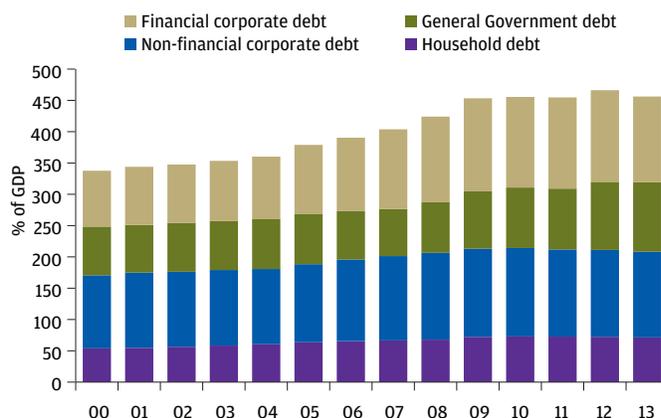


EXHIBIT 11: JAPAN DEBT BREAKDOWN BY SECTORS

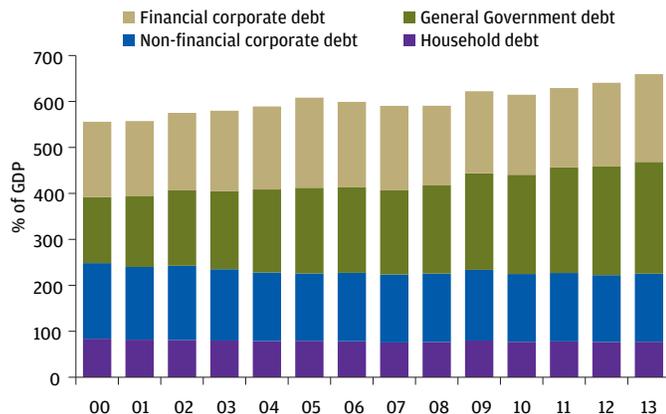
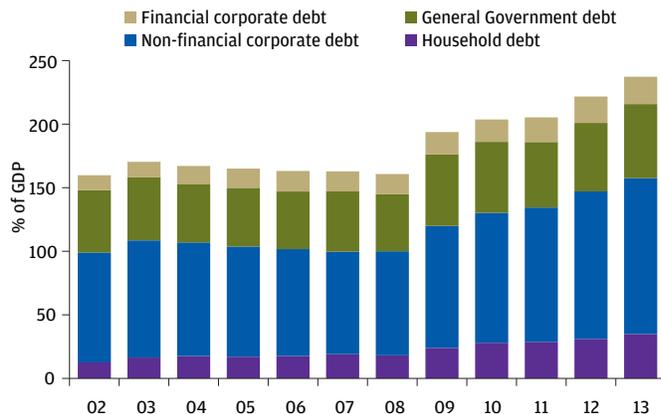


EXHIBIT 12: CHINA DEBT BREAKDOWN BY SECTORS



Source for Exhibits 9, 10, 11, 12: IMF, Haver, UBS Securities; annual data up to 2013.

EXHIBIT 13: CHANGE IN SECTORAL DEBT, PERCENTAGE OF NATIONAL GDP

	2008/2013 Change in sectoral debt (percentage points of national GDP)				
	Household	Corporate	Government	Financial system	Total
U.S.	-15.70	4.69	31.68	-33.02	-12.35
Eurozone	3.57	-1.82	30.13	0.16	32.04
UK	-8.84	-9.50	38.21	-24.46	-4.59
Japan	0.57	-0.81	51.41	17.54	68.71
China	16.74	40.76	13.39	5.67	76.55

Source: IMF, Haver, UBS Securities; annual data up to 2013.

EXHIBIT 14: AN OECD FISCAL REBALANCING EXERCISE

	Public sector				Private sector		Current account (C/A)
	2014 GDP USD, billions	2014 PSBR % GDP	Solvency ¹	Implied change USD, billions	2014 Private sector savings % GDP	Projected ²	Implied change in C/A USD, billions
	(1)	(2)	(3)	(4)=(3)-(2)	(5)	(6)	(7)
North America							
U.S.	17,528	-6.4%	-1.1%	934	4.2%	1.5%	467
Canada	1,769	-2.5%	-0.1%	43	-0.1%	-1.3%	21
Eurozone - core							
Belgium	535	-2.4%	-0.2%	12	1.1%	0.0%	6
France	2,886	-3.7%	-0.2%	99	2.0%	0.3%	50
Germany	3,876	0.0%	-1.1%	-44	7.3%	7.9%	-22
Italy	2,171	-2.7%	0.0%	59	3.8%	2.4%	29
Netherlands	838	-3.0%	-3.1%	-1	13.1%	13.2%	-1
Eurozone - periphery							
Greece	249	-2.7%	-0.8%	5	3.6%	2.6%	2
Ireland	230	-5.1%	-0.2%	11	11.6%	9.1%	6
Portugal	231	-4.0%	0.1%	9	4.9%	2.8%	5
Spain	1,415	-5.9%	-0.2%	80	6.6%	3.8%	40
Europe - rest							
Sweden	580	-1.3%	-1.2%	0	7.4%	7.3%	0
Switzerland	694	-0.2%	-1.8%	-11	10.1%	10.9%	-6
UK	2,828	-5.3%	-1.2%	115	2.5%	0.5%	58
Asia-Pacific							
Japan	4,846	-7.2%	4.7%	579	8.4%	2.4%	289
Australia	1,436	-3.4%	-0.3%	44	0.7%	-0.8%	22
New Zealand	196	0.3%	0.1%	-0	-5.1%	-5.1%	0
Total OECD	42,308			1,933			966
% of OECD GDP				4.6%			2.3%
% of Global GDP				2.8%			1.4%

Source: J.P. Morgan Asset Management, IMF World Economic Outlook (April 2014), IMF April 2014 Fiscal Monitor "Public Expenditure Reform—Making Difficult Choices", Gemstrat. PSBR=public sector borrowing requirement. Note: aggregates are calculated from the sample countries used. Sample totals equal 88%-90% of IMF aggregates.

¹This exercise is driven off the IMF debt-adjustment simulation, which estimates the required improvement in the cyclically-adjusted primary balance (CAPB) consistent with ultimate stabilisation and declines in debt ratios. We assume that the percentage point change in the CAPB "translates" into the same percentage point improvement in the overall public sector borrowing requirement.

²Assume that half of the percentage point improvement in the public sector borrowing requirement is offset by a decline in private sector net savings.

EXHIBIT 15: EMERGING MARKETS—THE POTENTIAL FOR (FURTHER) RE-LEVERAGING

Country	2014 GDP USD, billions	2014 Current account (C/A)	C/A % GDP	Target C/A % GDP	Target C/A USD, billions	Implied change in C/A USD, billions
North East Asia						
China	10,028	224	2.2%	0.2%	22	-202
Hong Kong	294	10	3.3%	-6.2%	-18	-28
Korea	1,308	57	4.4%	-4.0%	-52	-110
Taiwan	502	59	11.7%	1.2%	6	-53
South East Asia						
Indonesia	859	-26	-3.0%	-3.4%	-29	-3
Malaysia	343	14	4.0%	-9.7%	-33	-47
Philippines	292	9	3.2%	-4.7%	-14	-23
Singapore	304	54	17.7%	10.8%	33	-21
Thailand	374	1	0.2%	-7.9%	-29	-30
India	1,996	-48	-2.4%	-4.7%	-95	-47
EMEA						
Hungary	132	4	2.7%	-9.6%	-13	-16
Israel	306	4	1.4%	-4.8%	-15	-19
Poland	545	-14	-2.5%	-7.4%	-41	-27
Russia	2,092	45	2.1%	0.0%	0	-45
South Africa	354	-19	-5.4%	-7.2%	-25	-6
Turkey	767	-49	-6.3%	-9.7%	-74	-26
Latam						
Argentina	404	-2	-0.5%	-4.8%	-20	-17
Brazil	2,216	-80	-3.6%	-4.3%	-96	-15
Chile	263	-9	-3.3%	-4.8%	-13	-4
Mexico	1,288	-24	-1.9%	-5.6%	-72	-48
OPEC						
Kuwait	185	69	37.4%	8.5%	16	-54
Saudi Arabia	773	122	15.8%	-8.6%	-67	-189
UAE	412	55	13.3%	0.1%	0	-55
TOTAL	26,036	457			-628	-1,086
% of EM GDP		1.8%			-2.4%	-4.2%
% of global GDP		0.7%			-0.9%	-1.6%

Source: J.P. Morgan Asset Management, IMF World Economic Outlook (April 2014), IMF April 2014 Fiscal Monitor "Public Expenditure Reform—Making Difficult Choices", Gemstrat.

REMAINING REBALANCING: WHERE ARE THE PRESSURE POINTS?

For the moment, the deleveraging process in DM economies appears to have run its course. Credit to the private sector has begun growing, albeit modestly. Bank balance sheets have stabilised. And the intense fiscal austerity efforts of the past few years have given way to broadly neutral fiscal stances. As activity picks up and policy interest rates climb (a process expected to begin next year in both the UK and U.S.), the supply of capital to EM economies will likely diminish, impeding further credit creation in these countries.

Today’s level and distribution of debt, though, do not necessarily represent long-term equilibrium values. In particular, DM public-sector debt burdens look quite heavy by historical standards. For now, with policy interest rates low, demand for safe assets high, and alternative investment opportunities limited, public sector debt ratios are not alarming market participants. At some point, though—perhaps at the time of the next recession—bondholders may demand another round of public sector belt tightening.

Any need for significant debt reduction by DM public sectors would pose a significant challenge to the global growth outlook, for two reasons. First, private-sector debt positions themselves, though improved from a few years ago, also look rather large in comparison with the past. DM households and firms, then, might prove unwilling to adjust their saving rates downward to make up for the reduction in public sector demand. Second, after their own intense credit cycle of the past several years, EM economies appear in no position to fill the gap by cutting saving rates either.

Another round of sharp DM fiscal austerity, then, would likely produce a global slump in demand. This possibility represents the most significant downside risk to the growth projections embedded in this year’s Long-Term Capital Market Return Assumptions. It would correspond to the “deflationary” outcome in **Exhibit 6**, in contrast with the generally “successful” outcome that describes the past five years.

Exhibit 14 and **Exhibit 15** flesh out this scenario by tracing the connection between DM fiscal positions, aggregate DM saving rates, and the EM response. **Exhibit 14** uses the International Monetary Fund’s debt adjustment simulation, which for DM economies estimates the required improvement in the public sector balance in order either to bring the public debt ratio down to 60% of GDP by 2030, or to stabilise debt at the end-2014 level by that same year. These levels represent indicative guideposts, as the debt ratios that markets in actuality will demand will depend on many factors. Meanwhile, we assume that half of the improvement in the public sector position is offset by a decline in private sector saving. In other words, DM private sectors, protective of their own balance sheets, will not entirely fill the demand gap left by retreating fiscal authorities. This assumption determines the change in the current account for OECD countries, which we have estimated would amount to USD 966 billion, or 2.3% of OECD GDP (1.4% of global GDP).

In **Exhibit 15**, we move to the emerging world, gauging its ability to step into the breach by reducing its external surplus—in other words, cutting its savings rate to keep global growth steady. “Complete” rebalancing would, by definition, bring an equal decline in the EM current account to offset the improvement in the

EXHIBIT 16: CREDIT/GDP GAPS *

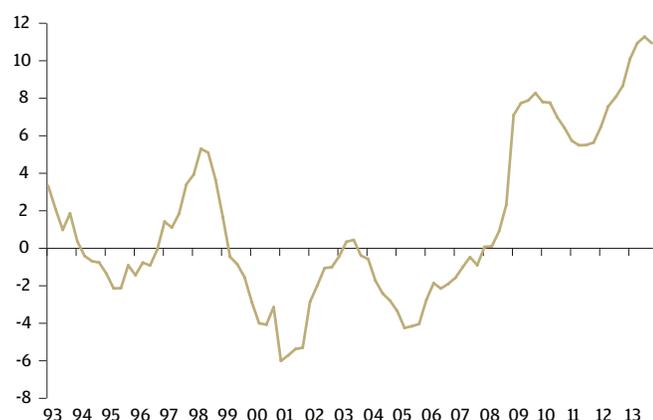
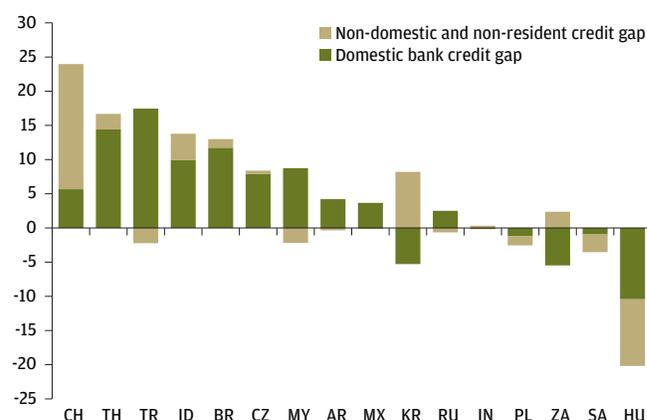


EXHIBIT 17: CREDIT/GDP GAPS **



Source: Bank for International Settlements, Institute of International Finance. *The credit/GDP gap estimates changes in the ratio of credit as a percentage of GDP relative to trend. This approach was highlighted by the BIS as a reliable warning signal. **Country key: CH=China; TH=Thailand; TR=Turkey; ID=Indonesia; BR=Brazil; CZ=Czech Republic; MY=Malaysia; AR=Argentina; MX=Mexico; KR=Korea; RU=Russia; IN=India; PL=Poland; ZA=South Africa; SA=Saudi Arabia; HU=Hungary. Data as of fourth-quarter 2013 for right hand chart. Quarterly data from first-quarter 1993 to fourth-quarter 2013 for left hand chart.

OECD current account. The emerging world would thus need to move into an external deficit equivalent to 2.4% of its GDP, or 0.9% of global GDP. In summary, further OECD deleveraging consistent with ultimate fiscal sustainability would entail a net savings transfer equivalent to 1.6% of global GDP.

The problem that this analysis reveals is that the emerging markets are in no state to lever further, as credit-to-GDP ratios have risen rapidly in recent years and have arrived at extreme levels. **Exhibit 16** and **Exhibit 17** use a credit gap approach, measuring increases in credit as a percentage of GDP compared to their trend averages. Pioneered by the Bank for International Settlements (BIS), this approach has been shown to be a reliable early warning signal of looming credit and banking crises. In other words, EM balance sheet considerations would likely impede these economies from reducing savings rates and filling the demand shortfall left by a bout of DM fiscal austerity, which as a result would likely produce significantly slower global real GDP growth than envisioned in our base-case projections.

OUTLOOK AND CONCLUSIONS

- The past five years have seen more evidence of rebalancing in the global economy than we had envisaged. EM leverage has partly offset the drag from sluggish OECD growth, which arose in part from fiscal tightening. This atmosphere has helped risk assets perform well.
 - As a consequence, EM balance sheets have expanded sharply. Debt levels have risen especially strongly in China, but also across several of the emerging markets.
 - The growth in credit gaps in the emerging markets suggests that a painful and messy adjustment could lie ahead. This is one reason why we have adopted conservative growth assumptions for the BRIC (Brazil, Russia, India, China) economies.
 - The process of fiscal adjustment is currently pausing but may not be complete. Sustainable public finances over the long run likely require additional improvement in fiscal balances. If markets force this adjustment to happen quickly, the resulting demand shortfall would likely not be entirely filled either by DM private sectors or by EM economies.
- Contrary to what most investors would probably have thought back in 2008, the past five years have been a golden era for equity investment, given the successful rebalancing that has occurred. This has provided the background for 23% annualised returns over this period¹. Meanwhile, our analysis of the current expansion suggests that it still possesses considerable room to run.
 - Whenever it occurs, though, the next business cycle downturn will likely pose considerable challenges to a world that continues to show significant imbalances. In particular, elevated public sector debt burdens mean that another bout of austerity might prove necessary. The resulting demand shortfall would not likely be filled either by DM private sectors or by EM economies, resulting in a prolonged period of unsatisfactory growth.

¹ Annualised total return on the MSCI U.S. Index between February 2009 and August 2014.

How dilution and share buybacks impact equity returns

Patrik Schöwitz, *Global Strategist, GIM Solutions-Global Multi-Asset Group*

Michael Albrecht, *Global Strategist, GIM Solutions-Global Multi-Asset Group*

IN BRIEF

- Equity share buybacks and shareholder dilution—including share issuance and the listing of new companies—are two related issues commonly overlooked or mishandled when projecting future equity returns.
- Share issuance and new company listings cause *earnings per share* to grow slower than aggregate earnings and the overall economy. Share buybacks work in the other direction, reducing share count and boosting earnings per share. It is the net effect of these two factors that impacts shareholder returns.
- Historically, continuous shareholder net dilution vis-à-vis the overall economy was the norm. However, the last decade or so has seen elevated levels of share buybacks in developed markets, offsetting this dilution and boosting shareholder returns. If this elevated level of payouts to shareholders is to be sustained, it may come at the expense of lower earnings growth.

INCORPORATING EARNINGS PER SHARE AND BUYBACKS INTO RETURN PROJECTIONS

Many approaches to projecting future equity returns relate future growth rates in fundamental factors—such as dividends and earnings—directly to estimates of economic growth. However, as much academic research has shown, *earnings per share* have grown at a slower pace than the overall economy, so failure to account for this effect can result in overly optimistic estimates.

Conversely, the increased importance of buybacks, in lieu of dividends, over recent decades has reduced the rate of shareholder dilution in many markets. Both issues must be carefully incorporated in any equity return-projection framework to achieve reliable results.

UNDERSTANDING DILUTION AT THE COMPANY AND INDEX LEVELS

Dilution happens when the share count of a company or an equity index increases, thus spreading earnings and dividend streams over a larger number of shares and reducing—effectively *diluting*—the claim on future dividends of existing shareholders.

At the *individual company level*, dilution is usually well understood. A company can issue new shares to raise capital to fund a major capital investment, or the takeover of another company (although debt is more commonly used here). It may also issue shares in the course of an ongoing employee stock options exercise, or as an emergency rights issue where new capital ensures the company's survival. A less salubrious possibility (most likely in environments with weak corporate governance, or where management or families hold large stakes) is where management deliberately dilutes existing shareholders to its own advantage.

At the *equity index level*, dilution is less often discussed. The key additional aspect is the listing of new companies¹. When a new constituent is included in an index, its properties—from earnings to market value—are simply added to the respective index aggregates. However, *current investors* in the index have no claim to these new earnings, and will need to purchase shares in the newly added company to participate in the additional earnings stream, either by diluting existing holdings or by investing new capital.

¹ For indices that target a specific number of constituents—such as the S&P 500, Russell 2000, FTSE 100, STOXX Europe 600, or Nikkei 225—the listing of a large company could replace a smaller one; alternatively, the merger of two index constituents could cause another company to be added to the index.

SIMPLE EXAMPLE OF INDEX-LEVEL DILUTION

Take a very simple index made up of just two identical companies: Company A and Company B.

Both stocks generate \$100 of earnings per year and have 100 shares outstanding at a price of \$10 each. Thus, the market value of each is \$1,000. The index has a market value of \$2,000 and total earnings of \$200.

Suppose an investor owns 50% of the market, thus owning 50 shares each in Company A and Company B. The investor's shares in each company would be worth \$500 and his total capital would be \$1,000. He is entitled to half of each company's earnings, for an earnings stream of \$100 per year.

Now suppose that another identical stock—Company C—is newly included in the index. The index's market value increases by \$1,000 to \$3,000 dollars, and total earnings also rise by 50% to \$300. Our investor, of course, is not yet entitled to any of the new income.

Assuming our investor wants to retain equal-weighted exposure to the index, he must now sell a third of his holding in both Company A and Company B to acquire new shares in Company C, taking his holding to 33.33 shares in each. Our investor is still entitled to \$100 in earnings, but since the number of shares (and total earnings) in the index has risen by 50%, his share of *aggregate index earnings* has been diluted from 50% to 33.33%.

One common mistake is to assume that earnings and dividends received by investors can grow in line with—or even in excess of—overall economic growth (GDP) in perpetuity. Granted, it is almost a truism that *aggregate earnings* must grow at the same pace as the overall economy in the very long run; otherwise, profits would eventually outstrip the size of the entire economy or dwindle to an insignificant share of it. But not all of this earnings growth accrues to *existing* shareholders. On the contrary, a large portion of economic growth comes from the birth of new enterprises. Some commentators suggest (for example, Bernstein and Arnott, 2003; Cornell 2010) that new enterprises account for more than half of GDP growth in the U.S., while in some rapidly developing economies new enterprises may account for the lion's share of overall economic growth.

Since existing shareholders are not entitled to any share of earnings generated by new enterprises *until they have invested in them*, either with new capital or by diluting existing holdings, there is continual dilution (or slippage) between the growth in *aggregate earnings* and the *earnings per share* that accrue to investors.

EXHIBIT 1: DILUTION OF GDP GROWTH AS IT FLOWS THROUGH TO DIVIDEND GROWTH: 16 COUNTRIES, 1900-2000

Country	Constituents of real stock return			Dilution in dividend growth (vis-à-vis GDP growth)	Real per capita GDP growth	Dilution in dividend growth (vis-à-vis per capita GDP growth)
	Real return	Dividend growth	Real GDP growth			
Australia	7.5%	0.9%	3.3%	-2.4%	1.6%	-0.7%
Belgium	2.5	-1.7	2.2	-3.9	1.8	-3.5
Canada	6.4	0.3	4.0	-3.7	2.2	-1.9
Denmark	4.6	-1.9	2.7	-4.6	2.0	-3.9
France	3.6	-1.1	2.2	-3.3	1.8	-2.9
Germany	3.6	-1.3	2.6	-3.9	1.6	-2.9
Ireland	4.8	-0.8	2.3	-3.1	2.1	-2.9
Italy	2.7	-2.2	2.8	-5.0	2.2	-4.4
Japan	4.2	-3.3	4.2	-7.5	3.1	-6.4
Netherlands	5.8	-0.5	2.8	-3.3	1.7	-2.2
South Africa	6.8	1.5	3.4	-1.9	1.2	0.3
Spain	3.6	-0.8	2.7	-3.5	1.9	-2.7
Sweden	7.6	2.3	2.5	-0.2	2.0	0.3
Switzerland	5.0	0.1	2.5	-2.4	1.7	-1.6
United Kingdom	5.8	0.4	1.9	-1.5	1.4	-1.0
United States	6.7	0.6	3.3	-2.7	2.0	-1.4
Full-sample average	5.1	-0.5	2.8	-3.3	1.9	-2.4
War-torn Group 1 average	4.0	-1.4	2.7	-4.1	1.9	-3.3
Non-war torn Group 2 average	6.4	0.7	3.0	-2.3	1.8	-1.1

Source: William J Bernstein and Robert D Arnott, "Earnings Growth: The Two Percent Dilution," (Financial Analysts Journal, 2003).

THE IMPACT OF DILUTION IN JUDGING HISTORICAL GROWTH RATES

Research suggests that the impact of this slippage is quite significant. In their well-known 2002 paper², Robert Arnott and Peter Bernstein showed that from 1802 until 2001 dividend per share growth for U.S. companies tracked much more closely to growth in per-capita GDP than aggregate GDP (in real terms). Academic literature has interpreted this as evidence that, over the long run, growth in both per-capita GDP and revenues is largely driven by productivity gains. Even so, dividend growth lagged growth in per-capita GDP over the 1802-to-2001 period by an average of 0.9% per annum.

William Bernstein and Robert Arnott expanded these findings in a subsequent paper³ published in 2003, which studied dividend and

GDP growth during the twentieth century across 16 countries (**Exhibit 1**). Excluding "war-torn" countries, they find net dilution of dividend growth per share vs. aggregate GDP growth of roughly 2% per annum over the century, or just over 1% dilution vs. per capita GDP (with dilution unsurprisingly much bigger in the "war-torn" sub group).

There are some additional factors to consider:

1. The rate of slippage should be proportional to the rate of growth in an economy, since faster growth likely correlates with increased creation of new businesses. Additionally, the portion of a given economy's business profits that are captured by a particular equity index might grow gradually over time as additional private entities become publically listed—which likely is especially true for developing economies with maturing financial markets.
2. There is a distinction to be made between "broad" indices with no fixed limit on constituents (for example, the MSCI U.S. Index and DataStream Total Market U.S. Index), which aim to capture

² Robert D Arnott and Peter L Bernstein, "What Risk Premium is 'normal'?", (Financial Analysts Journal, 2002).

³ William J Bernstein and Robert D Arnott, "Earnings Growth: The Two Percent Dilution", (Financial Analysts Journal, 2003)

a certain percentage of the market capitalisation of the total equity universe and therefore capture earnings from a *growing number of companies*, and more “narrow” ones that instead represent a fixed number of stocks (for example, the S&P 500). The former should be more susceptible to dilution.

- It is possible for profits to grow substantially faster or slower than the economy over limited periods, as factors like profit margins may vary. Additionally, companies operating in open economies derive much of their profits internationally where economic growth rates usually differ from their “home” economy, and the share of profits generated domestically or internationally will vary over time

However, as we explain below, there are reasons to believe that the increased level of buybacks has partially counteracted the effects of dilution in recent years.

THE OTHER SIDE OF THE COIN: BUYBACKS

Share buybacks, also known as share repurchases, are straightforward to define: they simply involve a company buying its own shares from the market, effectively reducing its own share count. The effect is the opposite of dilution, reducing the number of outstanding shares, and boosting shareholder returns since each remaining share accounts for a greater portion of company earnings and dividends.

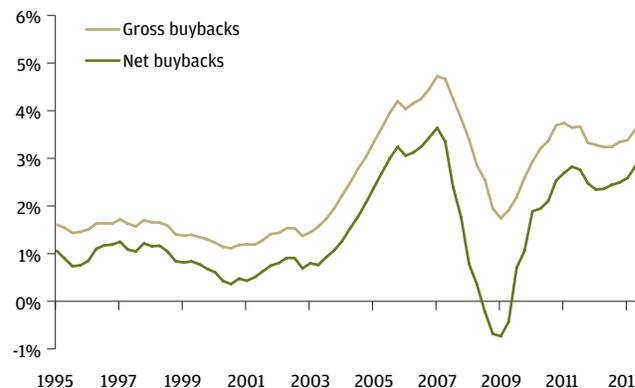
In recent decades, buybacks have grown in importance as a means of returning capital to shareholders. From the shareholder perspective, dividend payments are effectively traded for greater share price appreciation. A number of practical reasons have influenced the increased preference for buybacks, including capital cost arbitrage, tax advantages⁴ offsetting the exercise of stock options, and greater perceived flexibility in changing payout ratios. While some suggest it should not matter whether companies return capital to shareholders via dividends or buybacks, an argument can also be made that share buybacks only enhance shareholder value as long as the company’s shares are undervalued.

Obtaining consistent data on buybacks across regions is surprisingly difficult, but here we have collected some reasonably comparable evidence.

⁴ Historically buybacks have attracted a more favourable tax treatment in many jurisdictions, with dividends taxed at the usually higher income tax rate, while any capital appreciation as a result of buybacks would be taxed at the usually lower capital gains tax rate. However, in recent years the effective tax advantage of buybacks has been narrowing, due to tax changes in the U.S. and elsewhere.

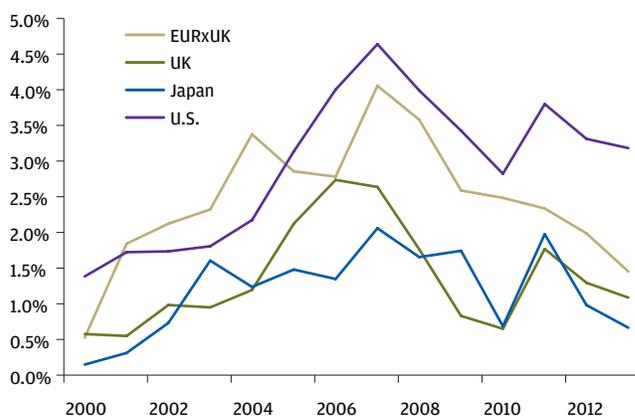
EXHIBIT 2: THE RATE OF S&P 500 GROSS AND NET BUYBACKS ROSE IN THE EARLY 2000S

S&P 500 (fourth-quarter sum % average market capitalisation)



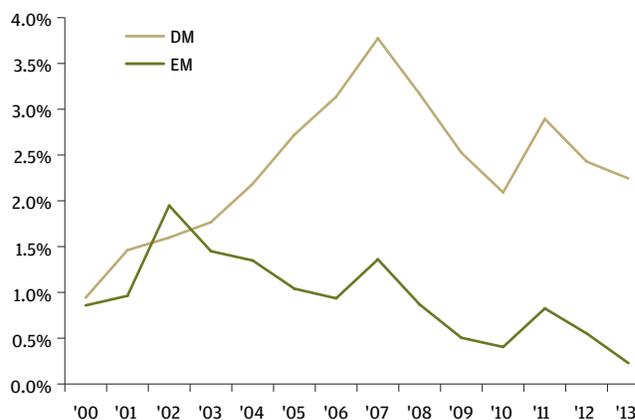
Source: Standard & Poor’s, Deutsche Bank. Quarterly data up to first-quarter 2014.

EXHIBIT 3: GROSS BUYBACK RATES RANGE FROM HIGH IN EUROPE TO LOW IN JAPAN



Source: Thomson Reuters Worldscope, Citigroup. Annual data up to 2013.

EXHIBIT 4: EMERGING MARKET BUYBACKS LAG BEHIND DEVELOPED MARKET BUYBACKS AND HAVE DECLINED SINCE 2002



Source: Thomson Reuters Worldscope, Citigroup. Annual data up to 2013.

Starting with the U.S., since the 1990s, buybacks have become increasingly important while dividend yields have fallen. Since 2000, S&P 500 *gross* share buybacks averaged USD 80 billion per quarter, equivalent to 2.7% of concurrent market capitalisation per annum—and an even higher 3.4% since 2009. Adjusted for share issuance, *net* buybacks since 2000 have still been USD 50 billion, or 1.6% of market cap per annum.⁵

Figures are less readily available for international comparisons, so here we use a sparser annual data set beginning in 2000⁶. Perhaps somewhat against received wisdom, the rate of gross buybacks relative to market cap has been only slightly lower in continental Europe (2.5% since 2000) than in the U.S. (2.7%). The rate of buybacks has, however, been substantially lower in the UK (1.4%) and Japan (1.2%). The persistently somewhat higher dividend yield in the UK may help explain some of that gap, while in Japan's case chronically low profitability may be the driver.

There is, however, a clear difference in trends over the past years: buybacks predictably fell broadly across regions in the aftermath of the global financial crisis. They have since been recovering in the U.S., while declining further elsewhere.

Looking at emerging markets, the average gross buyback rate as a share of market capitalisation has been only 0.9% since 2000—compared to 2.4% in developed markets. Buybacks (and overall payout levels) would be expected to be lower in rapidly growing economies where reinvestment opportunities should be more plentiful. Interestingly, the level of buybacks has been steadily declining in emerging markets since 2002 (**Exhibit 4**).

THE NET EFFECT

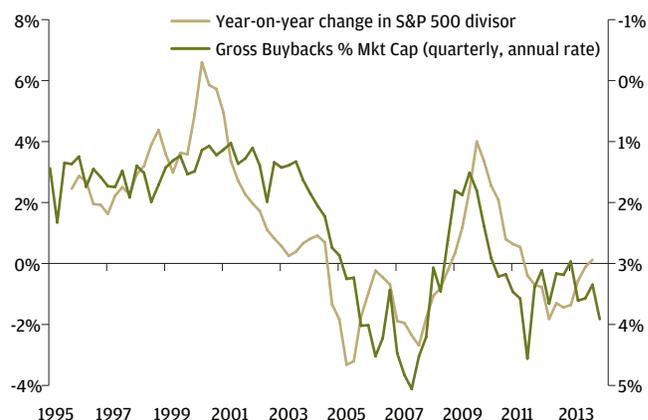
What matters for investors is the combined impact of dilution and buybacks—the *net* dilution or actual effective change in the share count—which will either dilute or boost dividends and earnings per share. Issuance data is not always available historically, but an easy way to judge the net impact of share issuance and buybacks is to look at the ratio of an index's market capitalisation to the index level. This ratio is the index's divisor, and the rate at which it changes should closely approximate the net dilution borne by shareholders⁷.

For example, comparing S&P 500 gross buybacks against the rate of change in the S&P 500 divisor (**Exhibit 5**) reveals a close relationship, where buybacks account for the lion's share of the variation in the rate of change of the index divisor. With the rate of share issuance actually fairly stable over our period at around an average of 1.1% per annum, the rest of the unexplained variation in the divisor is most likely largely due to M&A and listings activity (that the divergence is especially pronounced around the peak of the tech bubble is certainly suggestive). Furthermore, that the rate of change in the divisor has been negative for much of the past decade shows that, rather than being diluted, shareholder returns have been boosted!

A NOTE ON INDEX DIVISORS

Whenever index composition changes—whether due to companies entering or exiting the index, or as constituent weightings change—the index level does not change; instead the index's *divisor* fluctuates. The divisor is essentially the ratio of an index's market capitalisation to the level of the index. It is the “buffer” that ensures the index level stays unchanged when the index's composition changes.

EXHIBIT 5: S&P 500 GROSS BUYBACKS CLOSELY TRACK CHANGE IN THE INDEX DIVISOR

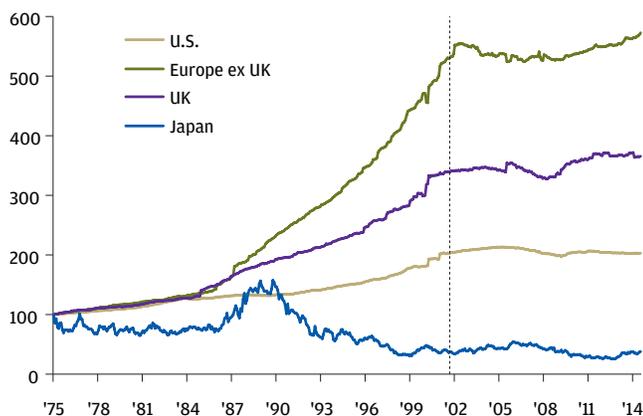


Source: Standard & Poor's, Deutsche Bank, Haver. Quarterly data up to first quarter 2014.

⁵ Source: Standard & Poor's.

⁶ Source: Citigroup, Thomson Reuters.

⁷ The index divisor is the most reliable indicator of *net dilution*. It is not directly comparable to actual currency amounts of buybacks and new issuance, as a lot of the time shares are bought and sold at different prices. Additionally, the divisor accounts for the inclusion (and removal) of index constituents.

EXHIBIT 6: INDEX DIVISORS SUGGEST CONTINENTAL EUROPE HAS SEEN THE MOST DILUTION

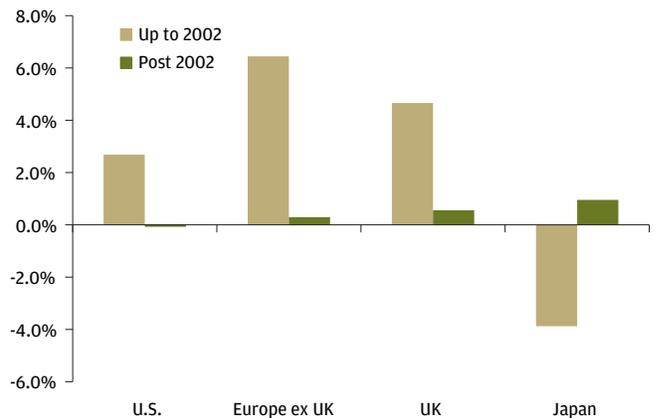
Source: Thomson Reuters DataStream. Monthly data up to July 2014.

For a longer history and greater regional breadth across major developed markets, we examine the ratio of index market capitalisation to index level. We use *Datastream Total Market* broad market indices, which provide these figures since January 1973, or earlier, for major developed markets.

The data suggests that dilution rates have varied significantly across regions (**Exhibit 6**), with Europe ex-UK (4.5% per annum since January, 1975) and Japan (-2.4%) on opposite ends of the spectrum. That the rate of index dilution in continental Europe has been much more rapid than elsewhere since the mid 1980s is probably mostly due to the wave of privatisations and the development of much deeper equity capital markets that started around that time (rather than any evidence of faster economic growth). This also holds to some degree for the UK market. In Japan, fairly rapid dilution is evident in the late 1980s up until the bursting of the bubble, then followed by a period of net shrinkage in the divisor, probably as some companies left the index.

Net dilution in Europe and the U.S. has drastically slowed since the turn of the century (**Exhibit 7**), as buybacks have become more popular. Prior to the start of 2002—an approximate “kink” in the data—the annual rate of dilution since the start of our data was 2.7% in the U.S., 4.7% in the UK, and 6.4% in Europe. Since then dilution has been dramatically slower, at -0.1%, 0.3% and 0.6% respectively.

While beyond the scope of this article, this change in behaviour clearly has implications for any equity returns estimate, as it suggests a lower level of shareholder dilution going forward than in the past—if current levels of payouts are sustainable.

EXHIBIT 7: DEVELOPED MARKET DILUTION HAS SLOWED SINCE 2002

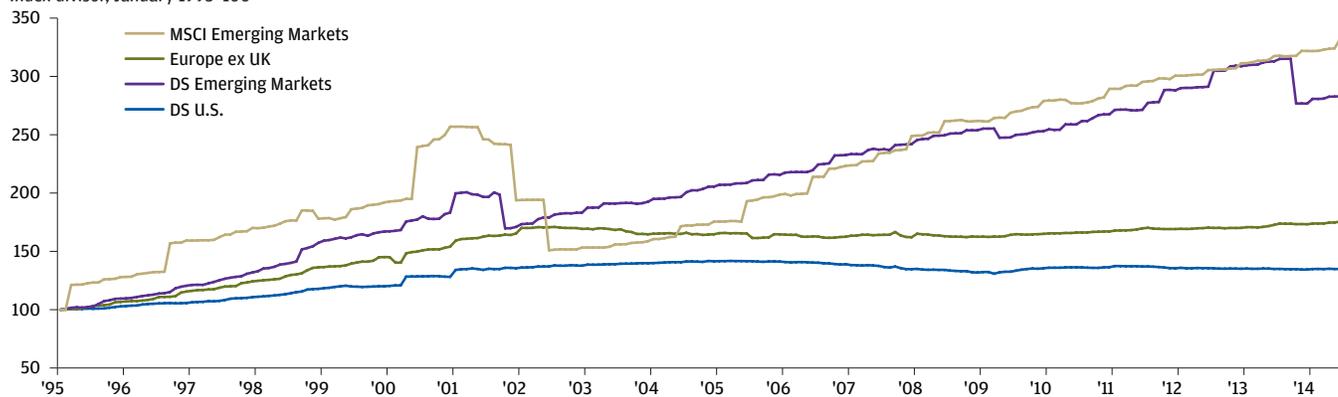
Source: Thomson Reuters DataStream. Data from 1975-2014.

Turning to emerging markets, the data clearly bears out the theory that dilution should be much higher in rapidly growing emerging economies. **Exhibit 8** shows the ratio of market capitalisation-to-index level for two emerging market indices and for the U.S. index from **Exhibits 6** and **7**. While there are clearly some distortions in the emerging market data (likely to do with index composition changes) it is clear the rate of dilution has been much more rapid than in developed markets, and over the longer term both sets of emerging market data show a similar message. Since 1995, annual dilution in emerging markets has been 7.1% per annum, compared to 1.6% in the U.S. Basing the calculation from 2002, as above, shows rates of 8.3% and 0.2% per annum, respectively.

Perhaps equally importantly, the rate of dilution has been slowing only marginally, if at all, in contrast to the developed market experience. However, individual country experience within emerging markets has varied widely. For instance, the rate of index dilution over the past decade has been 7.5% in India, but only 1.7% in South Africa to name but two examples. Again, any returns-projecting framework will need to consider these issues carefully and at a granular level.

EXHIBIT 8: DILUTION HAS BEEN MUCH MORE RAPID IN EMERGING MARKETS

Index divisor, January 1995=100



Source: Thomson Reuters DataStream, MSCI; Monthly data to July 2014.

CONCLUSIONS

Considering the impact of share buybacks and dilution carefully is vital in estimating equity returns. In this article we have focused on the mechanism and theory behind shareholder dilution and buybacks, and examined some data to gauge past magnitude. Academic research and the long-run historical data presented here clearly show that in the past shareholder returns have tended to be diluted significantly relative to the overall economy, but the increased use of buybacks in developed markets over the past decade or so has changed the balance in favour of shareholders. A similar easy conclusion cannot be drawn on emerging markets, however, as the picture here is very diverse—although in aggregate emerging market dilution has been, and continues to be, much higher.

The key question this leaves is whether the current high level of payouts to shareholders is sustainable, or whether the pendulum will swing backwards and the level of buybacks will fall, leaving investors with higher levels of net dilution. Because the level of dilution should be linked to the rate of growth in the economy, this

suggests the higher level of dilution in emerging markets could, at least to some degree, be justified by higher local economic growth rates. But it also suggests the current high levels of shareholder payouts in developed markets may have a dark side. They could be a symptom of an underlying lack of investment opportunities in the economy perceived by companies, who thus prefer to pay out their cash reserves—and this may well link in to the ongoing economic debate about secular stagnation. On the other hand, some investors might be disappointed if buybacks were to fall from here. But if this were driven by a higher rate of investment, it would also contain the silver lining of stronger earnings growth rates ahead.

This year's equity return assumptions reflect an ongoing relatively high level of share buybacks in major developed markets, but at the cost of more meagre earnings growth than investors may have grown used to in recent years.

Forward guidance: Estimating the path of fixed income returns

Rupert Brindley, *Portfolio Manager, Fixed Income Group*

IN BRIEF

- Over the past year, investors have become increasingly accustomed to “forward guidance” about the path of official short-term interest rates. The aim of the authorities is to credibly pre-commit to a clear policy in the absence of any major changes in the macroeconomic environment.
- The objective behind monetary policy signalling is to permit longer-term investment plans to be made within a more transparent environment, thereby reducing the need for a risk premium to be embedded in such commitments.
- If fixed income investors, in aggregate, believe that the guidance is credible and unbiased, then shorter-maturity Treasury bond yields will be priced in accordance with the signalled average level of interest rates over the period.
- We show why the concept of the forward rate of interest is central to fixed income investing, and how it informs long-term forecasting processes. We also highlight the significance of the policy risk premium, and how it can lead to additional return opportunities.
- We illustrate these themes by reference to the UK market, but the same framework applies to all risk-free markets around the globe.

WHAT ARE THE FORWARDS CURRENTLY SAYING?

Exhibit 1 shows the UK government bond curve, as at the close of 30 June 2014. By comparing the coupon rates of par bonds of progressively increasing maturities, we compute the implied forward six-month rate of interest, which is the breakeven reinvestment rate for each successive six-month period into the future.

If we assume that Gilt yields reflect a best estimate forecast of future short-term rates, then these forwards are also the market's expectations for future bill rates (we relax this assumption in a later section by adding a term risk premium). Currently, the forwards suggest progressively higher interest rates over the next several years, before reaching a terminal rate of about 4% after seven years.

A key indicator for fixed income investing is the forward bond yield path, along which a bond will earn the same total rate of return as short-term cash. If the future realised yield for the bond is lower than its forward rate, it will enjoy a positive excess return, whereas if it is higher, the bond will underperform cash.

DO CURRENT FORWARD RATES APPEAR TO OFFER A REASONABLE FORECAST?

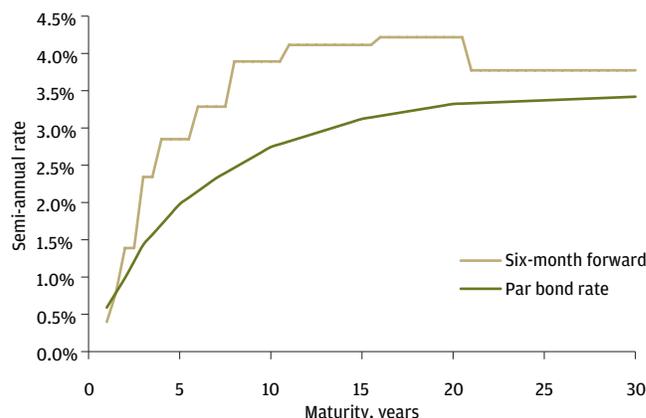
The first question to ask is whether current forwards anticipate rate rises that exceed, or at least match, our expected path for short rates? The answer to this question will confirm whether or not bonds offer long-term value that is commensurate with holding cash.

The J.P. Morgan Long-Term Capital Market Return Assumptions Committee believes that equilibrium short rates in the UK will settle at around 2.75% beyond a three-year time horizon. Because Gilt forward rates comfortably exceed this 2.75% hurdle, there is a risk that an investor who holds cash will be penalised for delaying a Gilt purchase. Counter-intuitively, this is a significant risk, even as short rates rise from their record low levels.

The second question is more challenging—namely whether bond investors should demand a superior rate of return than Treasury bill investors. This is an orthodox investment belief, but one that may be challenged in coming years as an ageing population increases the demand for stable income streams.

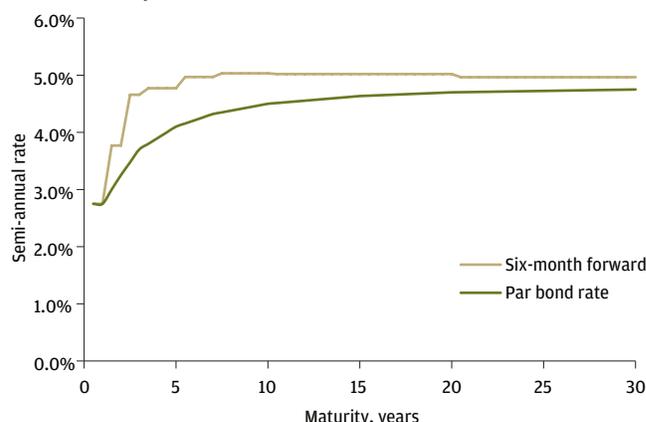
Given that we believe that bonds should attract a term premium, we test whether forward rates exceed expected future short rates by a sufficient margin.

EXHIBIT 1: GOVERNMENT BOND YIELD CURVE



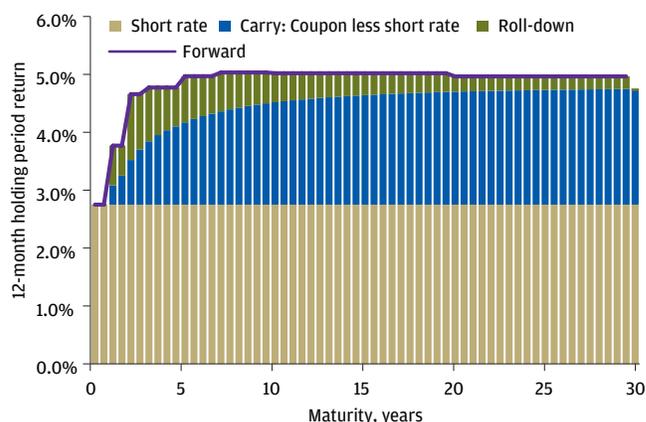
Source: J.P. Morgan Asset Management; data as of 30 June 2014.

EXHIBIT 2A: EQUILIBRIUM GOVERNMENT BOND YIELD CURVE



Source: J.P. Morgan Asset Management; data as of 30 June 2014.

EXHIBIT 2B: CARRY AND ROLL-DOWN FOR GOVERNMENT BONDS



Source: J.P. Morgan Asset Management; data as of 30 June 2014.

CALCULATING THE IMPACT OF THE TERM PREMIUM ONCE “EQUILIBRIUM CONDITIONS” HAVE BEEN ESTABLISHED

In the long-term, we assume that short rates will settle at 2.75%, while 10-year rates will be 4.50% and the 30-year rate will be 4.75%.

If there is a persistent term premium, the future yield curve will remain steeper than the forward rates suggest. A long-dated bond investment will routinely outperform a shorter-dated one by means of superior carry (a higher coupon) and a capital gain contribution from yield curve “roll-down.” We note that in such a yield curve environment, the annual holding period return of a zero coupon bond of maturity “T” is equal to the 12-month forward rate for year “T”.

Exhibit 2A shows the equilibrium par rate and forward rates, while **Exhibit 2B** shows the equilibrium returns on government bonds of various maturities.

We see that the 12-month return from a 10-year bond, for example, is equal to the short rate of 2.75% plus the additional coupon income of 1.75% over the short rate, plus a capital gain of 0.5% from “rolling down the curve” and discounting the bond at a lower rate. Thus a bond that yields 4.5% to maturity will earn 5.0% over the first year.

The above equilibrium returns suggest that it should be possible to earn a higher rate of return than is apparent from par yields. This higher return can be achieved by selling low-yielding bonds prior to maturity, and especially those with less than three years to run. We note that index-based investing (for example, five-year plus index-linked Gilts) will typically rebalance to remove short-dated bonds while replenishing duration. Hence, an index-based strategy will have a higher expected return than a pure “buy and hold” defeasance portfolio.

Traditional liability driven investment (LDI) investors are often simply looking to buy a long-term liability cash flow hedge, thereby locking in the rate of return on the hedging portfolio. This type of “buy and hold” portfolio will, over time, earn a weighted average of these forward rates, where the weighting scheme will reflect the maturity of the liabilities.

For a liability-aware investor with a moderate risk appetite, it may be more cost-effective to not cash flow hedge the short end of the curve, but to match duration by slightly over-hedging with longer instruments. Over time, this policy could be maintained by rebalancing hedges as the time to maturity of the bonds shortens, and reinvesting back into longer bonds with an equivalent dollar duration.

This strategy of “walking back up the down escalator” in maturity means that the ongoing portfolio return will be determined by more than just the initial curve, and that the future yield curve slope will be important for driving returns.

As this analysis shows, the expected future equilibrium term premium is a critical component of fixed income returns and can be captured via a dynamic managed roll-down policy. If our view on curve steepness is correct, it could offer hedgers an important lifeline in a low yield environment as they seek to make gradual progress towards an increasingly close match of their liabilities.

MONETARY POLICY NORMALISATION AND THE LONG-TERM OUTLOOK FOR BOND YIELDS

As we consider the prospects for fixed income returns, we need to form a view on both the equilibrium level of yields longer-term and the near-term normalisation path:

1. Calibrating the equilibrium level of yields

We use a fundamentally-based framework to calibrate our equilibrium yield expectations. The starting point is our long-term assumption for the real growth rate for the UK economy of 2.00% and the inflation rate of 2.25%. We also assume that, in the long run, cash will earn a small real return of 0.50%, resulting in an equilibrium cash rate of 2.75%.

We further believe that longer-dated government bond yields need to be consistent with debt sustainability considerations and provide investors with an adequate term premium.

The former calculation suggests that the long-term nominal economic growth rate should serve as an anchor for the equilibrium long-term bond yield, while the latter calculation implies an upward sloping yield curve in excess of the actual path of short-term rates as compensation to investors for tying up their capital for an extended period. We find strong historical evidence for structural curve steepness in the U.S. dollar and euro curves, and believe that this will also remain a feature of the sterling market.

From the above, we derive a 10-year bond equilibrium yield assumption of 4.50%, and we further assume a small additional premium of 25 basis points (bps) for the 30-year rate, for a total of 4.75%.

We note that according to this perspective, over the longer term, the real rate of interest should be relatively more stable compared to the nominal rate. Hence, nominal liabilities will be hazardous in a disinflationary/deflationary environment, whereas real liabilities should be relatively stable.

2. Establishing the near-term normalisation path towards equilibrium

The rate of progress towards “equilibrium” will inform the expected capital gains and losses along the path. We expect that the UK will start to emerge from its extraordinary monetary policy by the middle of 2015, and that the process of normalisation of the short rate will then take three years. We expect the longer end of the market to anticipate the new environment, and to move more quickly over a period of about 18 months.

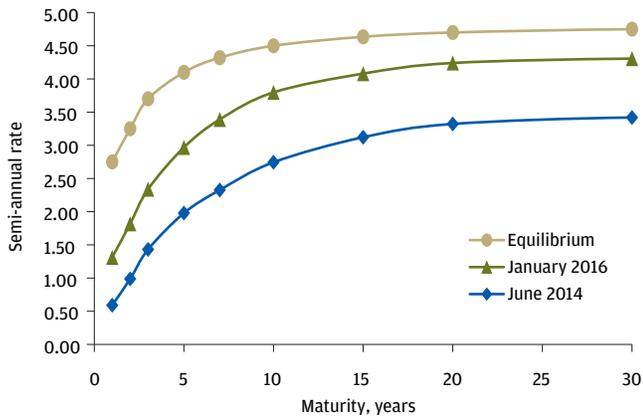
Exhibit 3A and **Exhibit 3B** show our central case for the yield curve normalisation path. The charts suggest that the current curve already anticipates that short rates will rise quickly, and our assumptions are broadly in agreement with the market on this point. Thus, we do not expect shorter-dated bonds to suffer significant capital losses during the normalisation process. However, we do believe that the term premium will raise longer-term forwards by about 100 bps above their current implied levels, and hence that longer-term bonds will suffer capital losses.

CONCLUSION

We anticipate that over the next year or two, investors will suffer capital losses on their long duration holdings as the impact of interest rate normalisation is felt across the curve. Thereafter, the curve will normalise to a higher long-term forward rate structure, and will retain structural steepness.

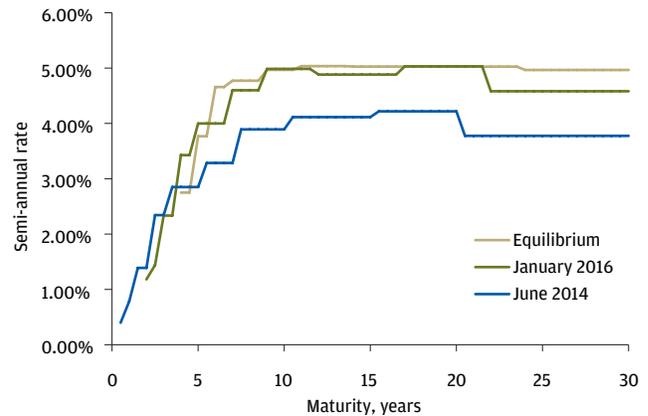
As this scenario unfolds, investors will then be rewarded for implementing a full duration hedge, perhaps complemented by a curve positioning that maximises roll-down returns, as a cost effective solution within a liability-aware portfolio.

EXHIBIT 3A: EVOLUTION OF PAR YIELD CURVES



Source: J.P. Morgan Asset Management; data as of 30 June 2014.

EXHIBIT 3B: EVOLUTION OF FORWARD RATE CURVES



Source: J.P. Morgan Asset Management; data as of 30 June 2014.

Assessing what is “fair” in corporate credit spreads

Grace Koo, *Quantitative Research and Portfolio Management, GIM Solutions-Global Multi-Asset Group*

IN BRIEF

- Our fair value model framework indicates that current credit spreads do not appear excessively tight and that spreads exhibit a negative relationship with economic growth.
- Investment grade and high yield load differently on underlying credit fundamentals; investment grade is more sensitive to rating migration, while high yield is more affected by indebtedness and the likelihood of repayment.
- Risk appetite and volatility have a strong impact on credit spreads, even after controlling for macroeconomic and credit fundamentals.
- In the near term, we believe the current tight credit spread levels are fairly valued given the recovering economy and volatile environment.
- Over the longer term, the fair value models, using our long-term equilibrium assumptions for Treasury rates and levels of economic and financial conditions as input, suggest equilibrium spreads of 165 basis points (bps) for U.S. investment grade and 500 bps for U.S. high yield—only a touch away from our LTCMRA estimates, which also incorporate qualitative insights.

IS IT TIME TO WORRY ABOUT CREDIT SPREADS?

Since the financial crisis, central banks around the world have been engaged in “lower for longer” interest-rate policies. Investors have, consequently, been on the hunt for higher yield assets globally. This search has benefited yielding instruments across the spectrum, from bonds to equities to hybrid asset classes. Within fixed income, extended credits such as high yield bonds and emerging market debt have experienced extraordinary demands and flows. As a result, credit spreads have narrowed a long way from their peaks during the credit crisis, with some even reaching pre-crisis lows. This strong move has caused concern among investors.

We investigate the long-term drivers of credit spreads to understand what fair spread levels should be at this stage of the business cycle. To study the impact of macroeconomic and financial fundamentals on credit spreads, we translate our business cycle views into estimates of fair corporate credit spread values.

Our analysis focuses in particular on U.S. corporate credit, namely, investment grade and high yield corporate bonds. Using long-term fair value models, we provide a framework for assessing whether these sectors are overvalued and, if so, to what extent. The fair value models can help in evaluating the long-term spread levels one should expect, given the fundamentals. Although asset values tend to revert to their fair values over the long run, mispricing exists in the market from time to time. Assets may at times deviate from fair values for extended periods and we caution against using the models presented for tactical trading.

FAIR VALUE MODELS AND FINDINGS¹

The corporate credit spread—the difference between the yield of a corporate bond and a similar “risk-free” bond—compensates investors for the embedded risk of holding a corporate bond, such as broad credit risk, rating migration risk, default risk, credit losses and liquidity risk. We look at three broad categories of potential factors driving corporate credit spreads: the macro environment, credit conditions and market volatility.

¹ We perform the analysis at both monthly and quarterly frequencies. The main difference between the two models is the inclusion of factors that are only available on a quarterly frequency, which tend to be fundamental factors. In the following section, we present the quarterly model as it contains meaningful fundamental factors despite fewer data points.

MACROECONOMIC CONDITIONS

U.S. corporates are highly sensitive to macroeconomic conditions because operating environments affect revenue, cost and profitability. The three macroeconomic components included in our analysis are business cycle, monetary policy and inflationary conditions. Specific examples include policy rates, inflation, real and nominal GDP, industrial production, the Institute for Supply Management (ISM) manufacturing survey, and U.S. Treasury bond yields and term spreads.

We find credit spreads are inversely correlated to economic leading indicators such as the ISM, which indicates manufacturing activity. Although the ISM manufacturing survey only captures a fraction of overall U.S. economic activity (less than 20%), its promptness and forward-looking nature allow a timelier peek into the state of the U.S. economy.² As expected, credit spreads contract when the economy accelerates and the overall operating environment improves for the corporate sector.

According to our analysis, credit spreads also exhibit a negative correlation to U.S. Treasury yields. Treasury yields could affect corporate spreads from two perspectives. On the one hand, Treasury yields affect the cost of funding for corporations when they issue new bonds. As Treasury yields rise, the overall absolute yield level at which corporations can issue debt is likely to increase as well and vice versa. On the other hand, U.S. Treasury Yields are also a key component when estimating the total return produced by corporate bonds. Corporate bond spreads will at times absorb part or all of the yield change in the Treasury market, resulting in a smaller move in the overall corporate bond yield. We find evidence of this tightening/widening when Treasury yields rise/fall, which reflects the inverse relationship of credit spreads and Treasury yields.

While we find economic growth (as captured by the ISM manufacturing survey) and U.S. Treasury yields to be strong explanatory variables in modelling credit spreads, in general, other macroeconomic factors—such as the policy rate and inflation—proved far less powerful. The relationship of these variables to spreads is further weakened as credit condition variables are incorporated into the model.

² The result is similar if one uses the ISM non-manufacturing survey, which also has a statistically significant relationship with credit spreads. Results are slightly better using the manufacturing survey.

CREDIT CONDITIONS³

We also consider the impact of credit conditions (such as credit availability, credit quality, credit rating migration, debt sustainability and the credit loss rate) on corporate credit spreads. The credit condition factors that capture these trends and changes in various credit risks in the corporate bond market include default rates, recovery rates, the upgrades-to-downgrades ratio, debt to Ebitda (earnings before interest, taxes, depreciation and amortisation), debt to equity, and cash flow per share.

The findings with credit fundamentals are very interesting, especially when comparing the results for the investment grade bond model with the high yield bond model. Generally, corporate bonds are sensitive to underlying credit fundamentals. However, the measures that capture the relationship differ depending on the rating spectrum.

High yield bonds—bonds that are rated as speculative (with a rating of BB or lower)—are more likely to default than investment grade bonds. High yield credits offer higher spreads to compensate investors for the higher probability of incurring default losses. Therefore, spreads should be mainly driven by the expected default rate and uncertainty around this rate. Not surprisingly, we find that high yield spreads exhibit statistically significant relationships to various measures of repayment risk, such as:

- profitability, which drives the generation of cash for repayment
- debt to Ebitda, which captures the leverage to earnings of the corporate sector (the sector’s ability to pay off its debt)
- credit losses, as measured by the trailing 12-month credit loss rate⁴

Investment grade bonds, in contrast, are unlikely to go into immediate default. Capital losses on investment grade bonds are thus more likely to be due to downgrades, and fallen angels⁵ are rare. Hence, repayment ability is not the prime concern for investment grade bond investors. Investment grade spreads are influenced more by overall credit trends, as captured by the upgrades-to-downgrades ratio, and are less affected by indebtedness/leverage measures and the ability to repay the debt.

³ We proxy the credit conditions of the corporate world using statistics from S&P 500 quarterly reports. Although the universe and the weighting of the companies are not a perfect match to the corporate bond universe, the trends are representative in our view.

⁴ Trailing 12-month credit loss rate = (12-month default rate) x (1 - recovery rate over the past 12-months).

⁵ Fallen angels are bonds that were once investment grade but have been downgraded to junk bond status.

We also find that credit availability, using the Federal Reserve Senior Officer Survey, affects credit spreads. However, the effect is similar to some of the other factors and there is little added benefit to incorporating it in the model.

RISK AND VOLATILITY

Risk appetite and technical factors, such as market volatility and risk appetite indices, may also drive credit spreads. Among the variables we examined, we find the Chicago Board Options Exchange Market Volatility Index (VIX) of implied U.S. equity volatility to be the most useful technical factor. The VIX is also commonly known as the barometer of investor sentiment and captures market perceptions of near-term risks. We find that both investment grade and high yield models load significantly on this factor, even after controlling for economic and credit fundamentals.

CREDIT MARKETS: NOT AS TIGHT AS THEY MAY LOOK

Using the fair value framework presented (**Exhibit 1**), we find that the credit market is not as stretched as one may be led to believe by simply observing the level of credit spreads. First, we believe we are on track in the economic recovery process. The cycle itself supports tightening credit spreads, reflected in our proxy of economic conditions which has a negative loading. Second, the low spreads are consistent with the current low volatility environment. Although volatility can quickly accelerate, at this point in the business cycle volatility could stay low for a long period of time, as observed in prior cycles.⁶

The fair value model is also helpful in validating our 10-to-15-year long-term assumptions for credit spreads. Using our equilibrium U.S. 10-year Treasury yield of 4.25% and equilibrium levels of economic and financial conditions, the fair value models suggest a U.S. investment grade spread of 165 bps and a U.S. high yield spread of 500 bps. Both of these fair value spreads are very close to our LTCMRA assumptions, which also incorporate other qualitative insights.

One of the downsides of the proposed model is that it does not capture the liquidity and technical positioning in the corporate bond market. With the decline in corporate bond liquidity caused by the changes in the regulatory environment, an unorderly unwind of positions built up over recent years may cause more short-term volatility and deviation from fair value.

⁶ The period from 2004-2006 is one example.

EXHIBIT 1: FAIR VALUE MODELS—INPUTS AND RESULTS

- U.S. investment grade spread = U.S. investment grade credit spread over comparable U.S. Treasury yield (UST), in bps
 - U.S. high yield spread = U.S. high yield credit spread over UST (bps)
 - UST10y = on-the-run 10-year U.S. Treasury bond yield (%)
 - Econ = ISM manufacturing survey level
 - Up-down_IG = the number of investment grade companies whose credit ratings have been upgraded divided by the number of investment grade companies downgraded in the quarter
 - VIX = the level of the Chicago Board Options Exchange implied Volatility Index
 - Loss = trailing 12-month default rate x trailing 12-month loss rate
 - Debt to Ebitda = the level of debt divided by Ebitda of S&P 500 companies
 - Corp profit to GDP = U.S. corporate sector profit divided by U.S. GDP
- Sources: J.P. Morgan, Barclays, Bloomberg, Federal Reserve.

U.S. INVESTMENT GRADE CREDIT MODEL

U.S. Investment Grade Spread (bps)	=4.96	- 0.029*UST10y	- 0.08*Econ	- 0.14 *Up-down_IG	+ 0.076*VIX
(t-statistics)	(5.77)	(-0.46)	(-6.17)	(-2.45)	(8.58)

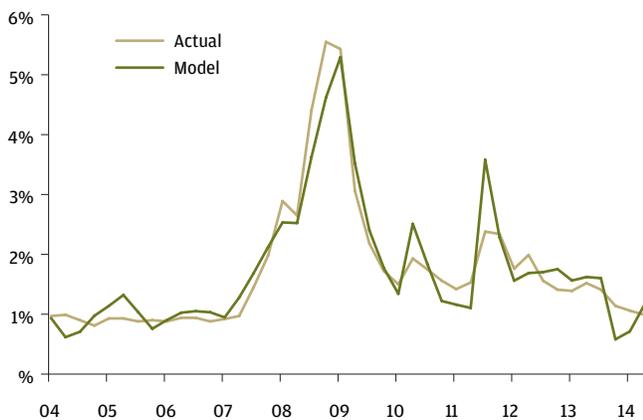
Adj. R² = 88.14%. Data used for estimation is quarterly, first-quarter 2004 to second-quarter 2014.

U.S. HIGH YIELD CREDIT MODEL

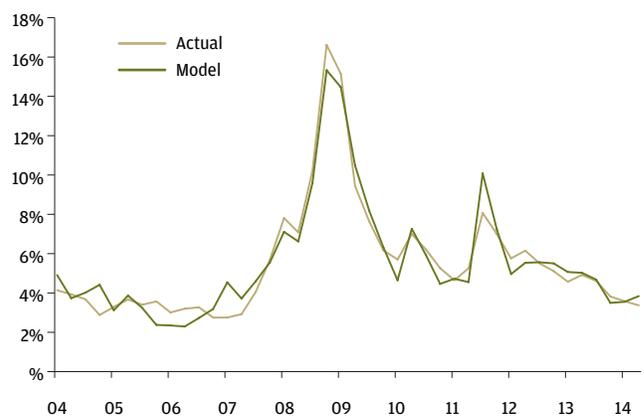
U.S. High Yield Spread (bps)	= 23.14	- 0.55*UST10y	- 0.18*Econ	+ 0.14*VIX	- 0.0016*Loss	-0.56*Debt to Ebitda	- 86.70*Corp profit to GDP
(t-statistics)	(3.36)	(-2.11)	(-4.96)	(6.43)	(2.17)	(0.36)	(17.76)

Adj. R² = 92.50%. Data used for estimation is quarterly, first-quarter 2004 to second-quarter 2014.

HISTORICAL FIT: ACTUAL VS. MODEL-GENERATED INVESTMENT GRADE SPREADS



HISTORICAL FIT: ACTUAL VS. MODEL-GENERATED HIGH YIELD SPREADS



Source: J.P. Morgan model estimates, Barclays indices; quarterly data as of 30 June 2014.

The globalisation of inflation

Paul Sweeting, *European Head, Strategy Group*

Alexandre Christie, *Vice President, Strategy Group*

IN BRIEF

- It is not always straightforward to fully protect a long-term strategic portfolio against domestic inflation.
- Institutional investors, such as pension plans, may need to match a set of liabilities that are tied to a particular measure of inflation—for example, the consumer price index (CPI) in the UK. However, there may not be an asset class available that reproduces the inflation objective of the liabilities exactly.
- Investors can resort to derivatives, such as inflation swaps, but these can be expensive because of counterparty risk.
- We consider whether there is a better way to gain protection against domestic inflation. In particular, we consider whether investing in overseas index-linked bonds could provide a more appropriate protection against domestic inflation than domestic index-linked bonds.
- We find that the correlation between domestic and overseas inflation tends to rise with the time horizon considered.
- As such, long-term investors could benefit from cheaper sources of inflation protection through overseas inflation-linked bonds, which may also offer different liquidity characteristics, maturities and correlations compared to other inflation-sensitive asset classes in a portfolio, such as real estate.

UNDERSTANDING THE MARKET FOR INDEX-LINKED BONDS

Demand for index-linked bonds has been growing in recent years, particularly from institutional investors. However, the asset class itself is not new, with one of the first bonds to be linked to the price of a fixed basket of goods being issued in 1780 in the Commonwealth of Massachusetts¹.

The reasons for issuing index-linked bonds have varied from country to country. However, issuers can be classed into three groups. The first group of countries to issue indexed debt exhibited high and volatile inflation at the time, and the issuance of index-linked bonds became the most efficient way of raising long-term debt capital over time. Indeed, prevailing inflation was expected to increase investors' willingness to pay a premium for the inflation protection, thereby reducing the yield that issuing governments would have to pay to bondholders over time. Chile, Brazil, Colombia, Argentina and Finland all fell into this category. These countries began issuing index-linked bonds between the 1950s and the 1970s.

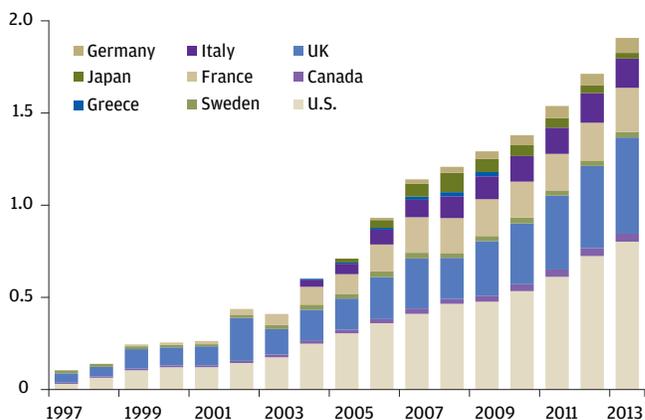
In contrast, the second group of countries began issuing index-linked bonds as a result of policy choice rather than by necessity. The objective for these countries, which began issuing indexed debt in the 1980s and the 1990s, was twofold. First, the argument was that while inflation-linked bonds protected investors from inflation risks, they also exposed the issuing governments to those same inflation risks. The issuance of indexed debt was therefore meant to add credibility to a government's disinflationary policies. At the same time, the premium that investors pay for indexed debt should reduce the yield that the issuing governments have to pay, thereby reducing government borrowing costs. The countries in this category included the UK, Austria, Sweden and New Zealand.

The third group of countries, which included Canada, the U.S., Germany, France, Greece, Italy and Japan, began issuing indexed debt in the 1990s and 2000s. These countries were experiencing low and stable inflation, so their issuance of indexed debt was intended to help complete their financial markets and to provide an inflation hedge for long-term investors, particularly pension funds.

In more recent times, as inflation expectations for the countries in the second category began to reduce and stabilise, these too extended their issuance of indexed debt for reasons of market completeness.

The most important markets for indexed debt are in the developed economies. The largest markets among these are shown in **Exhibit 1**, which depicts the rapid growth of the market for index-linked bonds over time. Of these markets, the U.S. and the UK have been dominant in recent years, as has the market for indexed debt in the eurozone.

EXHIBIT 1: THE MARKET FOR INDEX-LINKED BONDS (AMOUNT OUTSTANDING, USD MILLIONS)



Source: Barclays Live, European Central Bank; annual data up to 2013. For illustrative purposes only.

THE ROLE OF INDEX-LINKED BONDS IN AN INSTITUTIONAL INVESTOR'S PORTFOLIO

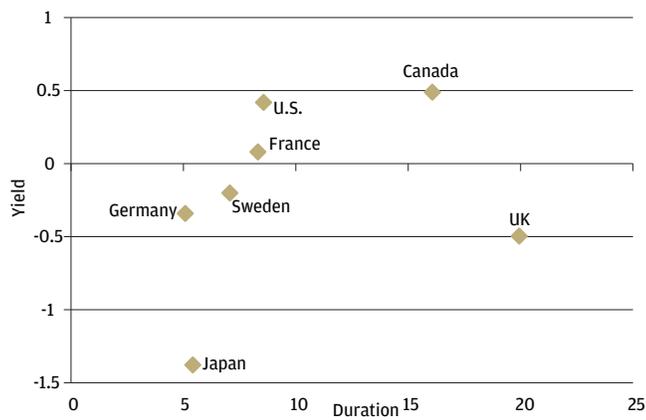
While real assets can provide a measure of protection against inflation, index-linked bonds have a special role to play in that they are, in theory at least, the only asset class to hedge exactly against a specific inflation index. However, there may not exist an index-linked bond that reproduces exactly the inflation objective of an investor in a particular country. One such example is the UK, where pension funds are required to match liabilities relative to the CPI, but only a retail price index (RPI)-linked bond is available in the UK government index linked bond market². At the time of writing, interest rates are at historical lows, and so the CPI and RPI indices are very close. When interest rates begin to rise, however, the gap between the two inflation indices can be expected to increase.

In the absence of an CPI-linked bond, investors can resort to derivatives, such as inflation swaps, but these can be expensive because of counterparty risk. It could in principle be possible, however, to invest in a CPI-linked bond from overseas, if the domestic and overseas CPI indices were expected to converge over time.

¹ "Inflation-linked bonds from a central bank perspective," (European Central Bank, June 2007).

² The Retail Price Index (RPI) is issued by the UK government and includes a number of costs that are excluded from the CPI, such as mortgage payments, council tax, and house depreciation. As a result, the weights ascribed to expenditure items for each index differs.

EXHIBIT 2: INDEX-LINKED BOND YIELDS



Source: Barclays Live; data as of 15 October 2014.

Indeed, investing in overseas indexed debt can be an attractive possibility for several reasons. First, it is possible that a bond that is linked to overseas CPI will be a better hedge against domestic CPI over time than a domestic bond that is linked to RPI, for instance. Beyond this, long-term investors could benefit from inflation beta premia, different liquidity characteristics of overseas index-linked bonds, and different maturities as well as differing correlations with other asset classes, such as real estate. More straightforwardly, an investor with access to overseas, as well as domestic, inflation-linked bonds can take speculative positions on inflation expectations and differences in duration across countries.

Exhibit 2 shows the yields and durations for index-linked bonds across different countries at the time of writing. This is interesting because it appears to show something akin to a term premium across all countries except the UK—in other words, UK investors in particular might be interested in the value offered in overseas index-linked debt. This anomaly arises because UK pension benefits, unlike those in the other countries shown, are explicitly defined relative to the CPI, thereby creating demand from pension fund trustees for bonds that are linked to the nearest available inflation index: RPI.

This all leads us to ask an important question: to what extent do inflation indices converge over time? At any given point in time, it is to be expected that the level of a given measure of inflation will differ across countries. The components of the CPI are weighted differently in each country.

Other factors account for differences in inflation between countries, including the relative importance of imports and exports, and differences in wage and productivity growth. **Exhibit 3** depicts the rates of inflation, as measured by the CPI, over time and across several countries.

It is clear from **Exhibit 3** that the differences between national CPI indices can be high. These differences reached a peak in the 1970s and 1980s, but the indices have tended to converge in the 1990s and 2000s. For a long-term investor, however, it is the convergence of inflation measures over time that matters more than short-term divergences.

In this respect, this long-term convergence of inflation measures is in line with economic theory, as reflected in the Law of One Price, which states that “a good must sell for the same price in all locations.” In a world of (near) perfect international capital mobility, there is arguably a greater chance of the Law of One Price holding in the longer term.

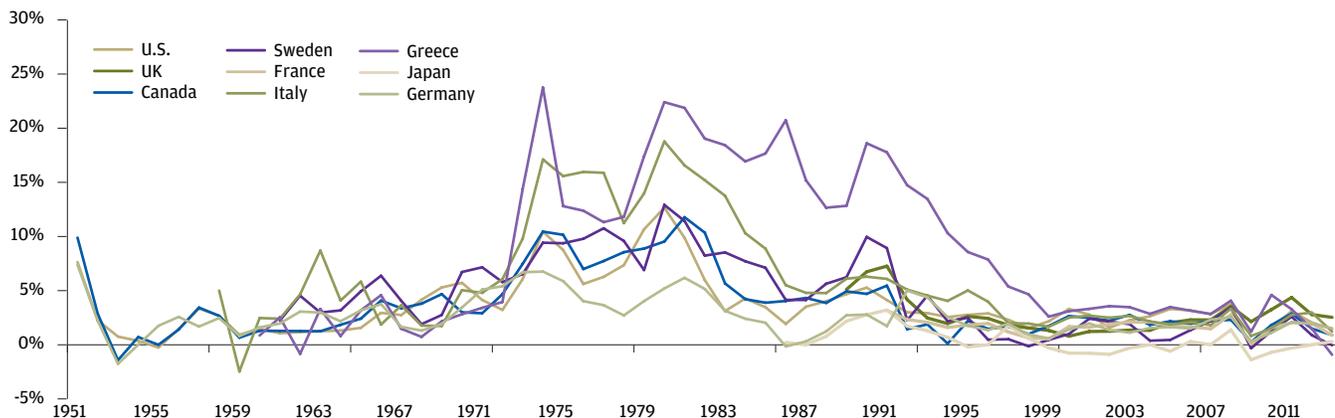
The most straightforward way of measuring the co-movement between CPI indices is by examining the correlations between them. **Exhibit 4** shows the correlations between the U.S. CPI and CPI indices in a selection of countries. The blue bars show the correlations over a 20-year period, while the red and green bars show correlations over 10 and five years, respectively.

The most striking feature of this chart is that the correlations differ widely between the periods considered. Indeed, the correlation between the U.S. and UK CPI rises from around 15% over a 20-year period to just over 25% over the five-year period. Correlations between U.S. and Canadian inflation are much higher, standing at 60% over 10 years and just over 50% over five years. The differences are greater when comparing U.S. inflation with French inflation: under 30% over five years, but nearly 65% over 10 years.

The main conclusion from this analysis is that correlations are a poor measure of the long-term structural co-movement between indices. This is because the correlation measure depends heavily on the period over which it is measured, and as such acts as a snapshot in time, emphasising differences between indices at a particular time rather than the long-term structural relationship that may exist.

While correlation analysis is useful in discerning short-term trends, it can disguise underlying long-term linkages that could exist, dissipate or vary between time series. An econometric measure of co-movement, known as cointegration analysis, not only reveals what correlation sometimes hides, it also gauges the strength of the relationship that two or more series may share over time. This method examines whether two variables (for which historical values are known) share a long-run, stable relationship.

EXHIBIT 3: NATIONAL CPI INDICES OVER TIME



Source: J.P. Morgan Asset Management, Datastream. Annual data up to 2013. For illustrative purposes only.

Our approach is to test the hypothesis that a statistically significant relationship does, in fact, exist between the U.S. and UK CPI indices. Beyond that, we also test whether this relationship changes significantly over time.

In **Exhibit 5**, we show the statistical measure that captures the strength of the long-term co-movement between the U.S. and UK CPI indices after controlling for exchange rates. The horizontal blue line, labelled “threshold,” represents the statistical threshold above which we conclude that there is evidence of significant long-term co-movement between inflation indices, at the 5% level of significance. When the green line falls below the blue line, this indicates that the evidence of co-movement between indices is not significant at the 5% level.³

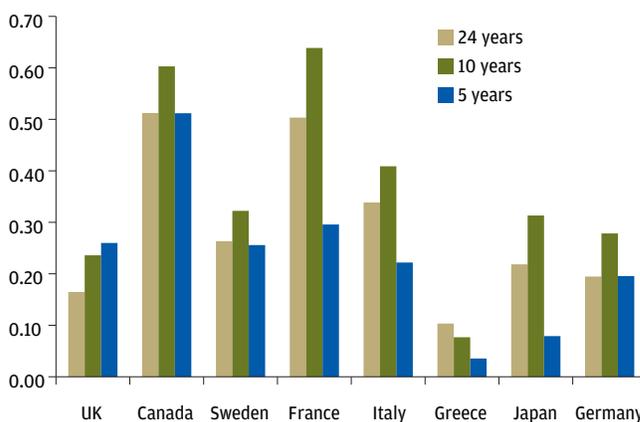
Exhibit 5 demonstrates that the co-movement between the U.S. and UK inflation indices appears to be strong during most of the period considered, with a few intermittent exceptions. Isolated periods of a few months appear during the 1990s and 2000s, during which the green line falls below the threshold, but it then rises up in the following few months to be above the threshold. This analysis is suggestive of the fact that, over the long term, the structural co-movement between the U.S. and UK CPI indices is significant.

In **Exhibit 6**, we show the corresponding analysis for several other pairs of countries. It is clear that in all the examples shown, CPI

³ This means that there is a 5% probability that the results obtained occurred by chance. All numbers here are given in U.S. dollar terms, and the subsequent calculations use U.S. dollar-based data. This means that, while the U.S. CPI figures are used unadjusted, others are considered in currency corrected form. For example, the UK CPI inflation figure is calculated from an index that looks at the changes in UK prices in U.S. dollar terms. For a full description of this methodology, please refer to Robert F. Engel, Clive W. J. Granger, "Co-Integration and Error Correction: Representation, Estimation and Testing," *Econometrica* 55(2). (1987) pages 251-276.

indices appear to exhibit long-term structural co-movement between one another over time.

EXHIBIT 4: CORRELATION BETWEEN THE U.S. CPI AND A SAMPLE OF OTHER COUNTRIES, OVER DIFFERENT TIME HORIZONS



Source: J.P. Morgan Asset Management, Datastream. For illustrative purposes only. Estimated using monthly data from February 1950 to May 2014.

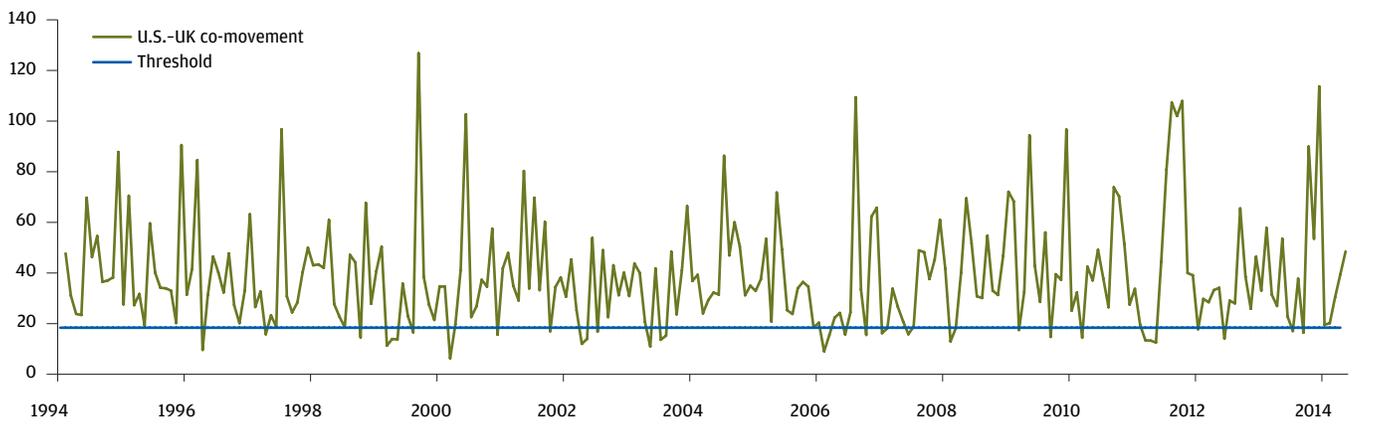
It is important to note that the analysis above does not imply that an investor should necessarily always invest in overseas index-linked bonds. Indeed, even if two CPI indices exhibit structural co-movement over time, it could be that one is systematically lower than the other, so that an index-linked bond issued by one country could provide systematically incomplete protection against inflation in another country. Other considerations are also important, such as the bid-ask spread at the time of investment. The purpose of this analysis is to illustrate the fact that, in some cases, investors can benefit from the differing characteristics of overseas index-linked bonds to protect against domestic inflation.

CONCLUSION

We have shown that index-linked bonds can play an important role in an institutional investor's portfolio. Where the domestic indexed debt market is insufficient to meet a particular inflation target, overseas index-linked bonds can offer a viable alternative.

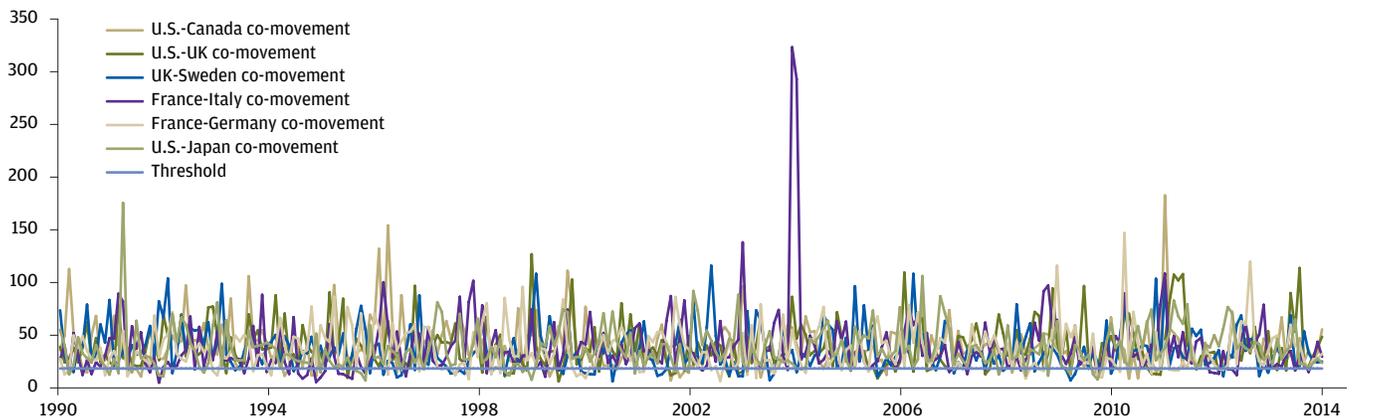
It is important to note that, while the methods of co-movement explained above are not as dependent on the time period over which they are measured as are correlations, they do rely on a number of other assumptions, such as the functional form of the co-movement measured. The structural, long-term co-movement thus identified will also not hold true if significant changes to international capital mobility and to existing trade sector openness occur. Barring significant changes of this nature, however, investors can expect to capitalise on the availability of bonds that are indexed to overseas inflation and that offer different duration and liquidity characteristics than are available in their domestic market.

EXHIBIT 5: LONG-TERM STRUCTURAL CO-MOVEMENT BETWEEN U.S. AND UK INFLATION



Source: J.P. Morgan Asset Management. Monthly data from December 1990 to May 2014. For illustrative purposes only.

EXHIBIT 6: LONG-TERM STRUCTURAL CO-MOVEMENT BETWEEN INFLATION INDICES



Source: J.P. Morgan Asset Management. Monthly data from December 1990 to May 2014. For illustrative purposes only.

One of the laggards of normalisation

Dave Esrig, *Director of U.S. Real Estate Research, Global Real Assets Group*

Anthony Werley, *Chief Portfolio Strategist, Endowment and Foundations Group*

IN BRIEF

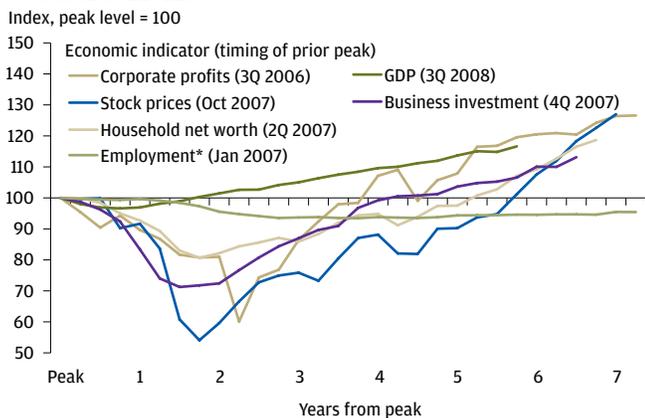
- We see promising demand/supply dynamics creating investment opportunities in several value-added real estate subsectors.
- With valuations driven by both normal cyclical factors as well as anomalous factors specific to the current cycle, we anticipate attractive returns over our long-term assumption horizon, with the most pronounced returns likely to be realised in the next three-to-four years. We anticipate opportunities driven by trends in the lease-up, redevelopment and speculative development subsectors.
- In lease-up risk, muted competitive construction, falling market vacancies and ongoing incremental space absorption create an opportunity to generate strong income growth in properties, especially offices, with space to lease.
- In redevelopment risk, there is a growing need for upgraded retail and apartment space to serve evolving consumer behaviour and office space to target firms that need to offer the environment that attracts the best workers.
- In speculative development risk, opportunities exist to develop industrial and office space in areas with dynamic leasing markets and to develop apartments—acknowledging that moderate returns are a fair result of only moderate risk.

REAL ESTATE PERFORMANCE IN PERSPECTIVE

In an environment in which most financial asset valuations have been driven to new heights by economic normalisation and the persistent search for yield, the term laggard can have positive connotations. Value-added real estate appears to exemplify the point—as it has recovered more slowly than equity and fixed income as well as core and opportunistic real estate. In fact, it appears to be lagging its own characteristic mid-cycle recovery.

Across the capital markets, risk assets, from equities through fixed income and real assets, have been re-rated as investors have embraced economic normalisation as well as lower-for-longer interest rates and put cash back to work. Since the bottom of the economic cycle in June 2009, the U.S. economy has expanded by 20.7%,¹ with new highs in economic output and corporate profit margins (**Exhibit 1**).

EXHIBIT 1: ECONOMIC INDICATORS—PERFORMANCE FROM PRIOR PEAKS TO CURRENT LEVELS



Source: J.P. Morgan, BEA, Federal Reserve, Standard & Poor's; quarterly data up to second-quarter 2014 (first-quarter 2014 for household net worth).

*Note: employment-to-population ratio of 25-54 year-olds.

Although the availability of credit might have been an issue during the early part of the economic recovery, the cost of credit has never been a problem for the most creditworthy borrowers. The financial markets have responded in kind by driving financial assets to record levels. U.S. equities, since the beginning of the economic expansion, have risen 19.3% annualised² while earnings have risen 61.2%,³ boosting U.S. forward-looking price-to-earnings ratios (P/Es) from

¹ Bureau of Economic Analysis; U.S. GDP growth, 30 June 2009-30 June 2014

² Bloomberg; Russell 3000 Index, 30 June 2009-30 June 2014.

³ Bureau of Economic Analysis; Non annualised change in earnings, 30 June 2009-30 June 2014.

13.6x to 16.4x.⁴ Credit fixed income, as measured by the Barclays U.S. Corporate High-Yield Index, has risen 13.8% annualised over the same timeframe, bringing yields down to new lows and spreads vs. Treasuries back to around their tightest ever levels.

In the real economy, where longer-term commitments and a stronger validation from the economy are required, pro-risk-taking decision making has also rebounded. Merger and acquisition (M&A) activity is now essentially back to 2007 peaks. Capital expenditures have grown 58.8%⁵ over the past five years.

Against this backdrop, core real estate pricing has also regained, and in some cases eclipsed, past peak pricing. Even residential real estate has inflated by 23.6%⁶ since the bottom of that cycle. Core real estate recovered sharply after the financial crisis, as it should have. While the asset class suffered from the same freeze in the capital markets as the housing market, commercial properties had the benefit of not being overbuilt. As a result, the market's trough at the end of 2009 has been followed by a 66% total return recovery for core unleveraged properties. In fact, core investors who bought at the peak were made whole in just 14 quarters—approximately one year faster than equity market investors.

While the core market's recovery has been impressive, we see the strategy as merely at mid cycle. Real estate construction remains muted, property net operating income growth has lingered near 5% and the internal rate of return (IRR) for newly underwritten core real estate assets is wide compared to alternatives, such as high yield debt. As a result, we view the lowest-risk commercial real estate strategies as fairly valued.

We do also see incrementally better risk-adjusted returns in value-added property strategies.

However, relative to economic activity and other asset class performance, value-added real estate has lagged what might have been expected from past risk and real estate cycles.

The underperformance of value-added real estate raises several questions. Is there still a sense that all is not completely normalised, as indicated by the Economic Policy Uncertainty Index (**Exhibit 2**)?⁷ Does the U.S. National Federation of Independent Business (NFIB) Small Business Optimism Index send a more appropriate signal as to

⁴ Bloomberg; Russell 3000 Index, Barclays U.S. Corporate High-Yield Index, FTSE NAREIT All Equity REITS, S&P 500 Index P/E, 30 June 2009-30 June 2014.

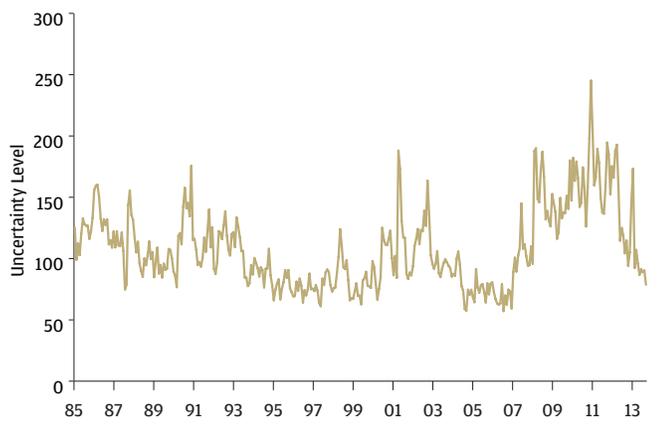
⁵ Bureau of Economic Analysis; Non annualised change in capital expenditures, 30 June 2009-30 June 2014.

⁶ Bloomberg; FTSE NAREIT All Equity REITS, 30 June 2009-30 June 2014.

⁷ Scott R. Baker and Nicholas Bloom and Steven J. Davis. Measuring Economic Policy Uncertainty, Chicago Booth Research Paper No. 13-02, January 2013. Available at SSRN: <http://ssrn.com/abstract=2198490> or <http://dx.doi.org/10.2139/ssrn.2198490>

the outlook for the domestic economy—getting better but not great? Or are there factors specific to this segment of the real estate market and holdover psychology from the past cycle that inhibit risk taking further out on the real estate risk curve?

EXHIBIT 2: U.S. ECONOMIC POLICY UNCERTAINTY INDEX



Source: Bloomberg; monthly data as of 30 June 2014.

WHY HAS THE VALUE-ADDED WINDOW REMAINED OPEN?

The relative value in risk is not ubiquitous. We see value added as occupying a medium-risk niche that offers, now, a better risk-adjusted value than both the riskiest opportunistic real estate strategies and highly levered core strategies.

Value-added excess returns over core are generated via development, redevelopment and lease up risk. This is in contrast, for example, to higher risk opportunistic strategies, which depend more on opportunities that have become scarcer as the economic cycle has matured, such as capital market dislocations and broken capital stacks accessed through note or other distressed asset sales. The more compelling risk-adjusted real estate opportunity is now in the incremental risk that benefits from a maturing economy, not from the distress that predominates in a time of panic.

Value-added real estate risk-adjusted returns are helped by mid-cycle timing but other factors, more unique to this particular business cycle, make incremental risk in commercial property investing lucrative. First, despite the advanced recovery in the fixed income market, construction lending standards are still unusually high. Outside of apartments, non-recourse construction loans for commercial properties with only partial pre-leasing are rarely as available as they typically are at this stage of the business cycle. The benefits of low construction activity accrue most sharply to investors in existing assets with vacancy as well as

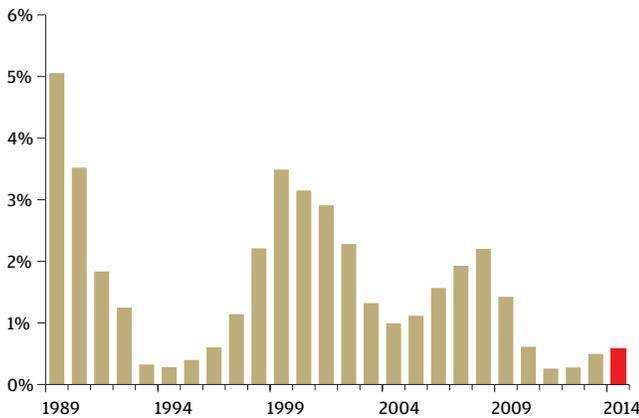
those value-added investors that have strong enough balance sheets to develop without debt.

Europe's decoupling from the U.S. has also played a role in keeping the window for value-added investment open. Value-added investing is a highly specialised, labour-intensive business with skill sets that overlap with higher risk opportunistic investing. Normally, when the availability of distress wanes, as it has now in the U.S., property investment experts turn their attention to more incremental risk strategies, such as value added. However, we have observed that U.S. opportunistic investors have, instead, turned their attention to the still distressed European property markets—reducing the number of well-capitalised competitors bidding for value-added transactions in the U.S.

OFFICE MARKET: ATTRACTIVE SUPPLY/DEMAND DYNAMICS

The office market, in particular, has faced additional idiosyncrasies that have reduced development. The recovery in occupancy has been slowed by continued weakness in financial services and related activities at law and accounting firms in many of the nation's central business districts. But, occupancy, rent levels, and the pace of rent growth have reached the point where construction starts would ordinarily be higher. Office construction has remained muted, nonetheless, because leasing has been driven by smaller, faster growing businesses in technology and new media—which do not fit the profile of the type of firm willing to pre-lease a large proposed office tower to be delivered two years hence.

In Manhattan, for example, the average lease size was 50% larger 10 years ago than it is today. As a result, office construction tends to be speculative—with little pre-leasing—and, consequently, is usually attempted only in those few hot markets, such as San Francisco, Houston and Dallas, where large firms are active and small firms are growing explosively. This has helped keep new office construction activity near lows typically observed during recessions (**Exhibit 3**). Furthermore, weak pre-leasing has exacerbated the impact of the recourse requirement by lenders for development.

EXHIBIT 3: DEVELOPMENT AS A SHARE OF EXISTING OFFICE STOCK

Source: J.P. Morgan, CBRE; historical annual data as of 30 June 2014. Estimates for 2014 by CBRE, from buildings now under development.

The value-added opportunity in offices takes advantage of both the slow additions to existing stock and improving demand conditions. Finance, accounting and law firms have been helped by the surge in M&A activity, while asset management, information technology and media, and corporate headquarters that grow in reaction to record high corporate profits, are all filling space. Just as importantly, another major headwind is waning. Over the past four years, office space absorption has been slower than office-using employment growth due to backfilling of space that was hoarded during the financial crisis. Simply put, many large firms could seat new employees in cubicles emptied during previous layoffs. We believe this cyclical densification has largely played out and while some structural densification will continue, we expect the pace of office absorption to be more similar to the pace of job growth going forward.

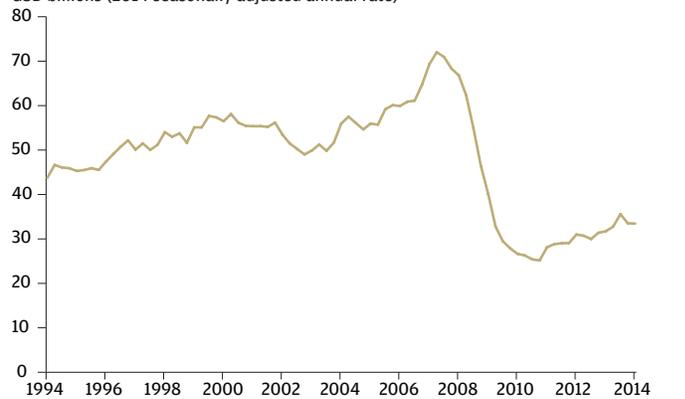
The office sector offers a surfeit of value-added opportunities. Buying high-quality assets with substantial lease roll exposure or outright vacancy, as well as development of partially pre-leased buildings, is compelling in many locations. Investors with strong balance sheets can take advantage of the fact that lenders are keeping others out of the development game. Strategies involving B-quality vacancy and refurbishing/re-leasing are still highly speculative in most locations but may be a good way to play the technology cycle given that these strategies have shorter lead times than ground-up development. Finally, many suburban locations still offer yield premiums to downtowns that are unusually wide by historical standards.

RETAIL SPACE: SERVICES RISE WHILE INTERNET DISRUPTS

Retail construction has, if anything, remained more depressed than office construction (**Exhibit 4**). The lending environment has been partly to blame, but perhaps more important is the perceived impact of internet retail sales. The disruption caused by direct-to-consumer sales online is just as substantial as the impact big box retailers had on thousands of small retailers during the 1990s. Ironically, it is those big boxes that are suffering the most from internet competition (outside of information sellers, such as book or music stores). At the same time, retail tenants delivering services instead of goods have expanded. In fact, the number of restaurants and establishments offering personal, financial and medical services has grown sturdily for the past 20 years, while the number of stores selling goods has remained unchanged.

EXHIBIT 4: RETAIL CONSTRUCTION

USD billions (2014 seasonally adjusted annual rate)



Source: Bureau of Census; monthly data as of 30 June 2014.

As a result, the incremental opportunity in retail is to create new centres, or convert old ones into the types of real estate that can deliver the kinds of spaces needed by a mix of services and traditional retailers. This includes anchor redevelopment in high quality malls as well as highly selective ground-up development of strip centres in densely populated locations. Redevelopment of dead malls in wealthy areas into non-retail uses is highly speculative, but is likely to pay substantial returns. Buying from owner/operators that are thinly capitalised, or from those that view assets with redevelopment opportunities as distractions from their core businesses, can help enhance risk-adjusted returns.

WAREHOUSES: THE “JUST-IN-TIME” CONSUMER STUFFS THE LOGISTICS CHANNEL

Rising internet sales and demand for goods purchased online to arrive in two days instead of five continue to help warehouses by pushing up economy-wide inventory-to-sales ratios. While low real interest rates reduce the drag from holding inventories, that drag has increased since the 10-year Treasury was yielding 1.6% more than a year ago. Additionally, the cost of just-in-time logistics expenses is weighing on internet retailers. The blend of rural ultra large boxes⁸ to handle inventories most efficiently with semi-urban small boxes⁹ to reduce logistics costs appears to be the winning solution right now. Speculative development makes sense in an increasing number of submarkets. While demand has been strong for spaces above 1 million square feet, the market for warehouses in the 500k-to-750k range is likely to enjoy better leasing volume than the ultra large boxes. Semi-urban locations, often with entitlement and environmental risks, offer a compelling opportunity to build smaller boxes serving retailers whose consumers increasingly demand that online-purchased goods arrive in just 24-to-48 hours.

APARTMENTS: VALUE-ADDED WINDOW STILL OPEN BUT NARROWING

The apartment development cycle is the most mature of the major property types. Apartments enjoy the most liquid debt markets—due in part to the participation of government-owned entities, such as Fannie Mae. Additionally, apartment tenant demand recovered early in response to the reluctance, or inability, of many households to buy homes and due to growth in the renter-age cohort. Finally, apartment lease-up risk is much lower than other property types because, in most markets, there is some reasonable rate at which tenants will promptly lease space. This is not always true with offices, for example. Value-added execution includes development—which has both lower risk and lower return than other value-added strategies. Profits for build and sell strategies have narrowed but some opportunities with wider spreads remain in emerging urban locations.

In sum, the value-added window of opportunity has remained open longer than it typically does—in part due to strong risk aversion among potential construction lenders. Muted competitive construction improves the expected risk-adjusted outcomes of risk assets that require lease up. Of course, this benevolent supply/demand balance flatters the fundamentals across the risk spectrum, but with core pricing having recovered nicely and opportunistic distress waning, we see mid-risk strategies as offering the most atypically accretive opportunity right now. Our outlook is for above-average returns over our long-term (10- to 15-year) assumptions horizon, with gains most pronounced over the next three-to-four years.

⁸ Often more than 1 million square feet with 32 foot high ceilings. Put another way, that covers 22 acres in one room-or five Wal-Mart Supercenters.

⁹ Small semi-urban boxes are often found in older reclaimed industrial areas. They are typically less than 100,000 square feet with small truck courts and inefficiently low ceilings, but their proximity to population centres makes them an important component of the U.S. straight-to-consumer logistics system.

**II. RATIONALE AND
METHODOLOGY
ARTICLES: THE
THINKING BEHIND
THE NUMBERS**

Moderate growth in a multi-track world

Michael Hood, *Senior Economist, Strategy Group*

IN BRIEF

- The macroeconomic projections underlying the 2015 version of the Long-Term Capital Market Return Assumptions have not changed dramatically from last year's edition.
- We continue to expect growth in the developed world to run at a modest pace by historical standards, if a bit better than what has generally been achieved since the 2009 recession.
- The world seems likely to remain multi-track, with the U.S., for example, travelling faster towards normalisation than the eurozone.
- We still do not foresee a significant acceleration in global inflation. Indeed, our projections for inflation in European economies have edged lower. In Japan, however, we do expect the central bank to make progress towards its goal of leaving deflation behind.
- Assumptions for the emerging economies still show this group of countries outgrowing their developed counterparts. Continuing a process begun last year, however, we have shaved our expectations for emerging market (EM) growth, trimming projections in five of the nine economies covered in this publication.

UNSPECTACULAR DEVELOPED MARKET GROWTH, LED BY THE U.S.

Growth projections for the major developed economies have not changed from last year. As a starting point for these forecasts, we make estimates for each country's long-run potential rate of growth, which in turn incorporate expectations for the expansion of the labour force along with productivity increases. Most of the time, our GDP forecasts match our view about trend growth.

We adjust these figures in cases where an economy appears to be operating well below or above its current potential level of economic activity. We believe that this condition applies in the U.S., where the economy has expanded sluggishly after a deep recession and where broad labour market measures suggest ample spare capacity. Given the private-sector healing that has occurred since the downturn and the current shift towards a neutral fiscal policy stance after a period of sharp contractionary impulses, the U.S. should be able to make use of that slack in coming years, averaging 2.5% growth over our assumption horizon. This is above our 2.25% estimate for the economy's long-term trend rate.

Although the eurozone is also operating well below its potential, it continues to face headwinds in the near term, in particular from its fragmented financial system. The region seems likely to overcome these constraints later in our forecast horizon, eventually experiencing stronger growth along the lines of what we foresee in the near term for the U.S. We therefore use our 1.50% potential-growth estimate as the GDP forecast for the period as a whole, unchanged from last year.

We have made marginal reductions to our forecasts for Canada and Sweden. In both economies, housing and leverage cycles seem advanced, and unwinding these buildups may result in a period of slower economic expansion. In addition, the Canadian economy is no longer benefiting from rising commodity prices, and we expect some currency appreciation in Sweden, which in general is living in a slow growth neighbourhood.

ON-TARGET INFLATION FOR THE MOST PART

Even after several years of highly accommodative monetary policy, inflation continues to run below the targets of most central banks throughout the developed world. In our judgement, serious inflation overshoots remain remote possibilities, in part because inflation expectations appear well-anchored, and also because central banks are displaying sensitivity to incoming information. A policy error—such as that of the 1960s and 1970s, in which

policymakers ignored steady increases in inflation—seems unlikely in the foreseeable future.

An alternative risk is that central banks repress interest rates for too long, or otherwise encourage faster inflation, in order to support indebted governments. While we acknowledge the inflation risk scenario, we believe that central banks up to now have managed their balance sheets successfully, and our base-case assumption is that they will continue to do so as they gradually exit supportive stances.

In major developed economies, our inflation forecasts stand broadly in line with central bank targets. In the U.S., we assume that the Federal Reserve's (the Fed's) 2% goal for the PCE (personal consumption expenditures) deflator translates to slightly higher core CPI (consumer price index) inflation, given the traditional gap between the two series. In the eurozone, we expect the European Central Bank (ECB) to fall a bit short of its own 2% target, given the low starting point for inflation and the ECB's reluctance to emulate the Fed in using the full suite of possible tools.

In Japan, we raise our projection to 1.25%, 50 basis points (bps) above last year's figure, recognising the success observed over the past year in boosting inflation into positive territory. At the same time, we expect the Bank of Japan to succeed only gradually in producing 2% inflation, leaving our full-period average forecast noticeably below that mark.

EM PROJECTIONS GRADUALLY DECLINING

Last year, we cut our EM growth projections almost across the board, reacting both to global factors (including weaker developed market growth, stagnant commodity prices, and the apparent completion of the globalisation process) and local developments (such as unfavourable policy frameworks in Brazil and India, and China's transition to a less credit-intensive development model). This year we move further in that direction, although the changes are smaller in comparison.

We have shaved our China growth forecast to 6.25%, 0.25 percentage points below the previous figure. With the authorities not yet having managed to achieve a significant slowdown in the expansion of credit, the possibility at some point of an extended period of retrenchment and slow growth (by Chinese standards) has risen. Our projection additionally incorporates a view that Chinese growth will slow secularly as per capita income rises, with a rate below 5% likely towards the end of our assumptions horizon.

Growth prospects appear to have fallen in South Africa and Turkey, with institutional and labour-relations problems besetting the former country and a combination of political uncertainty and neighbourhood effects hurting the latter. We also expect the foreign policy reorientation of Russia, symbolised by the Ukraine crisis, to fuel ongoing capital outflows and to slow integration with western Europe, denting the growth outlook for the Russian economy.

Our EM inflation numbers generally stand fairly close to central bank targets where these exist, though we have nudged our Brazil projection higher to take account of a seemingly persistent dovish bias among policymakers there.

By contrast, we have lowered the India inflation forecast by 0.5 percentage points to a still-high 7%. The Reserve Bank of India is moving gradually towards the adoption of an inflation target, and in general appears to have undergone a hawkish shift in its reaction function. Political change in India may eventually boost the economy's long-run growth outlook as well. Our 7% GDP forecast—the highest in our coverage set and well above recent outcomes—seems sufficient to reflect this possibility.

EXHIBIT 1: ECONOMIC ASSUMPTIONS

% per annum	2014 Assumptions		2015 Assumptions		Change	
	Real GDP (%)	Core inflation (%)	Real GDP (%)	Core inflation (%)	Real GDP (%)	Core inflation (%)
Developed markets	2.25	2.00	2.25	2.25	0.00	0.25
U.S.	2.50	2.25	2.50	2.25	0.00	0.00
Eurozone	1.50	2.00	1.50	1.75	0.00	-0.25
UK	2.00	2.50	2.00	2.25	0.00	-0.25
Japan	1.00	0.75	1.00	1.25	0.00	0.50
Australia	2.00	2.50	2.00	2.50	0.00	0.00
Canada	2.50	2.00	2.25	2.00	-0.25	0.00
Switzerland	1.75	1.00	1.75	0.75	0.00	-0.25
Emerging markets	4.25	3.25	4.00	3.25	-0.25	0.00
Brazil	3.25	4.50	3.25	4.75	0.00	0.25
China	6.50	3.00	6.25	3.00	-0.25	0.00
India	7.00	7.50	7.00	7.00	0.00	-0.50
Russia	3.25	5.50	3.00	5.50	-0.25	0.00

Source: J.P. Morgan Asset Management; estimates as of 30 September 2014.

Get ready for liftoff

Michael Feser, *Global Investment Director and Portfolio Manager, GIM Solutions*

Grace Koo, *Quantitative Research and Portfolio Management, GIM Solutions-Global Multi-Asset Group*

IN BRIEF

- Policy rates are set to start diverging as some central banks end their use of unconventional policies and commence the process of raising short-term rates, while others continue to ease monetary conditions further.
- U.S. and UK government bond yields are expected to finally start to rise towards their equilibrium levels, particularly at the front end of the yield curve. Equilibrium yields will appear low by historical comparison.
- In the eurozone and Japan we expect further monetary easing through unconventional policies for several more years before policy rate normalisation begins.
- Corporate credit spreads will be supported by continued strong demand for yield and shallower economic cycles limiting excess credit build-up, although a rising yield environment will keep returns subdued.
- A combination of higher inflation tolerance by emerging market central banks, an increase of longer maturity bond yields, and the lack of political pressure to pursue reforms despite slowing economic momentum, should all keep local currency equilibrium yields high—both in nominal and real terms— and hard currency spreads wider as the speed of convergence slows.

FINALLY MOVING TOWARDS THE EQUILIBRIUM RATE

After several years of what felt at times to be agonisingly slow progress, the U.S. and UK economies are finally approaching a level of activity that will allow their central banks to scale back the exceptional monetary policy support that they have provided and begin the process of raising interest rates to a more neutral level. U.S. GDP growth is at a moderate level and broader measures of employment suggest that some cyclical slack remains. With realised inflation at or below targets, and with inflation expectations well anchored, the Federal Reserve (the Fed) has the room and the incentive to raise short-term rates at a slow and gradual pace.

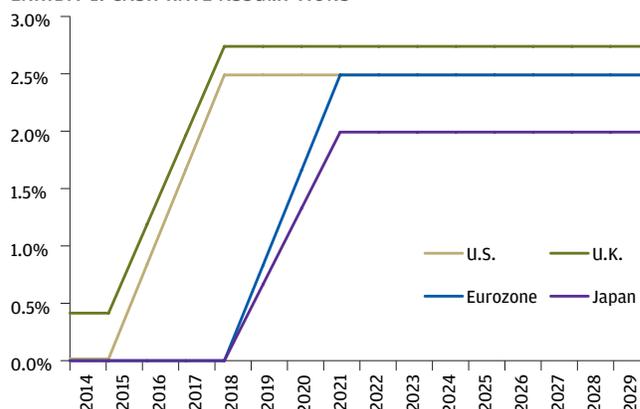
The progress made this year in the eurozone and Japan has been patchier. There is no doubt in our mind that substantial slack still exists in both of these economies. As a result, the biggest question mark hanging over the longer-term return outlook for bond investors in the eurozone and Japan remains the eventual timing of central bank rate increases. In contrast, the question in the U.S. and the UK has shifted, with investors now asking by how much central banks will raise rates, rather than when.

The impact of demographic change on both the long-term sustainable growth rate as well as the demand for fixed income assets, together with the impact of the increased regulatory burden on lending spreads, suggest to us that equilibrium cash yield assumptions will remain well below the levels historically considered to be normal. We expect policy rates to reach equilibrium levels only in 2017-18 as the economies whose central banks are first to move are also likely to experience incremental tightening through the strengthening of their currencies (**Exhibit 1**). This gradual rise towards a relatively low equilibrium level should also, to some degree, anchor the extent to which bond yields will be able to rise in the near term.

Real cash returns in most markets are likely to be flat to slightly negative compared to the rate of headline inflation, as accommodative central bank policies are expected to keep interest rates low by historical standards.

We continue to believe yield curves are likely to flatten globally, driven by the front end, as two-year and five-year yields rise more in line with short-term interest rates than the long end, and the ultra long end benefits more from an ageing population and flows from liability-driven investments. The need for income producing assets and a smaller credit quality differential between sovereign and corporate credit ratings should lead to lower equilibrium spread levels for investment grade and high yield bonds than have historically been the case.

EXHIBIT 1: CASH RATE ASSUMPTIONS



Source: J.P. Morgan Asset Management; estimates as of 30 September 2014.

Credit loss rates should remain below their historical averages for an extended period of time, driven by continued underwriting discipline, a flatter economic cycle, and reduced access to credit for the riskiest borrowers, as well as reduced rollover risks given the long-term structure of the debt stock.

U.S.: ON THE PATH TO EQUILIBRIUM

In line with our assumptions from last year, we expect the three-year adjustment period for cash yields to commence towards the end of 2015, when they will begin to rise to an equilibrium level of 2.50%. The 10-year Treasury yield will rise to an equilibrium level of 4.25% over a one-and-a-half year adjustment period. Both equilibrium levels are somewhat lower than last year, reflecting a more constrained growth environment due to demographic change, as well as the impact of regulatory change. We expect the latter to lead to a relative increase in demand for Treasury bonds as well as to a higher cost of credit, thereby lowering the equilibrium risk free rate. We therefore continue to expect cash and bond rates to reach their equilibrium level in 2017/18 and 2016 respectively, the same as last year. It is important to note that cash yields are expected to remain substantially below historical levels of neutrality and 10-year Treasury yields somewhat below historical neutral levels.

Based on the combination of an equilibrium cash yield assumption that is only 25 basis points (bps) above expected long run headline inflation, and several more years of normalisation before the Fed's support is fully withdrawn, we expect a negative real cash return of 25 bps. Fixed income market returns will struggle as yields rise to equilibrium levels, but they will benefit from the significant roll-down from the steep yield curve.

As in prior years we maintain the view that the yield curve between cash and 10-year U.S. Treasuries will be slightly steeper than in the past. This reflects an ongoing margin against a potentially inflationary policy bias and is a return enhancement for investors through roll-down in a low nominal yield environment. On the other hand, we expect structural demand to flatten the long end of the yield curve, between 10-year and 30-year maturities, to 25 bps in equilibrium.

For corporate credit markets, we continue to expect relatively tighter spreads when compared to long-run historical observations for investment grade and high yield bonds, broadly unchanged from our assumptions in prior years. Limited excess credit build-up, shallower economic cycles and sustained strong investor demand for yield, as well as narrower credit quality differentials, are all supportive for credit spreads.

Our expectation of equilibrium investment grade corporate credit spreads therefore remains unchanged at 125 bps. Continued investor appetite for yield and a higher prevalence of relatively larger and higher credit quality issuers lets us keep the average net premium required to hold high yield bonds at 275 bps. Adding to that an expected credit loss of 200 bps—based on an average default rate of 3.00%-3.50% and recovery rates of around 40%—this leads to an equilibrium high yield spread of 475 bps compared to the historical average of 550 bps.

EUROZONE: ANOTHER DETOUR REQUIRED BEFORE RETURNING TO THE EQUILIBRIUM PATH

The European Central Bank (ECB) has successfully helped to end the eurozone sovereign debt crisis, and peripheral government bond markets have responded forcefully, bringing spreads—and more importantly overall yield levels—down to more sustainable levels given the underlying economic conditions. With little room for governments to take a more expansive fiscal stance, credit conditions in the eurozone periphery remain too tight, while overall economic growth is still anaemic. It is, however, the fall in both realised and expected inflation that has most notably increased the ECB's willingness to embark on a further round of monetary policy easing, as well as persuading it to venture further into unconventional policy territory. We do not, therefore, expect yields to return to an equilibrium path before 2018.

Cash returns will consequently be lacklustre in the eurozone overall—particularly in the first half of our assumptions horizon—as it will take some time to reach our equilibrium level of 2.50%, which is 50 bps above our expected longterm equilibrium rate for the headline inflation.

For euro government bonds we maintain our assumption of a 10-year equilibrium yield of 4.00%, reflecting more normal levels of credit differentiation among eurozone sovereign issuers and a longer period of subpar growth. The outlook for European corporate credit remains similar to that of the U.S., with investment grade credit spreads of 125 bps and a high yield spread of 500 bps.

UK: NORMALISING AHEAD OF THE U.S.

For the UK, we assume that the path to normalisation will be a little faster than in the U.S., with cash yields rising over three years to an equilibrium yield of 2.75%—50 bps ahead of headline inflation at 2.25%. For UK government bonds, we lower our projection for the 10-year equilibrium Gilt yield further to 4.50%. The reductions of the cash and government bond equilibrium yields are a pass through of our reduction in of the expected long-run inflation rate.

JAPAN: WAITING FOR THE OTHER ARROWS TO HIT

For Japan, the longer-term prospects continue to be somewhat more uncertain. After successfully weakening the yen as an initial step, Abenomics has lost some momentum due to the lack of visible progress on the reform agenda. Overall, we continue to believe Abenomics will be somewhat successful in stimulating growth and ending deflation, although demographic pressures and high public debt levels curb our enthusiasm. Domestic savings and, increasingly, quantitative easing continue to support low real rates, and we therefore assume, despite our significantly higher long run inflation expectation compared to last year, only a moderate rise in cash yields and 10-year bond yields, to 2.00% and 2.75% respectively, sometime in the second half of our assumptions horizon.

EMERGING MARKETS: TAKING A STEP BACKWARDS

For hard currency emerging market sovereign debt, we continue to believe the credit quality of the market as captured by the benchmark has reached a plateau. Lower rated frontier markets will only grow very slowly in their share of the overall market, while higher quality issuers will stay more focused on issuing debt with a longer maturity than improving their credit rating further. We therefore raise the long-run equilibrium spread somewhat to reflect this change in the market structure from last year to 300 bps over U.S. Treasuries.

The political willingness and focus to pursue change in a number of emerging markets have been disappointingly slow despite poor growth momentum and the growing need for structural reforms and economic rebalancing, especially in commodities producing countries. Conditions may therefore have to deteriorate further to generate sufficient political pressure and appetite for change. Consequently we expect equilibrium yields for local currency emerging market debt to remain broadly unchanged at 7.25% over the horizon of the Long-Term Capital Market Return Assumptions. Despite the higher cyclical sensitivity of the emerging market corporate sector, we do not expect a large increase in corporate credit downgrades or defaults given the large proportion of state sponsored companies in the corporate bond market.

EXHIBIT 2: FIXED INCOME SELECTED LONG-TERM EQUILIBRIUM RETURN ASSUMPTIONS

GOVERNMENT-COMPOUND 10-15 YEAR RETURNS (LOCAL)

	Yields (%)	Returns (%)
U.S. Core Inflation	2.25	2.25
U.S. Cash	2.50	2.00
U.S. 10-year Treasury	4.25	4.25
U.S. TIPS (real yield)	1.75	4.25
U.S. Municipal (1-15 blend)	2.75	3.25
European Core Inflation	1.75	1.75
European Cash	2.50	1.50
European 10-year Government Bond	4.00	2.25
UK Core Inflation	2.25	2.25
UK Cash	2.75	2.25
UK 10-year Government Bond	4.50	4.50
Japan Core Inflation	1.25	1.25
Japan Cash	2.00	1.25
Japan 10-year JGB	2.75	1.25

CREDIT-COMPOUND 10-15 YEAR RETURNS (LOCAL)

	Spread (bps)	Returns (%)
U.S. Corporate Bonds	125	4.75
U.S. High Yield Bonds	475	6.00
European Investment Grade Corporate Bonds	125	2.50
Pan-European High Yield Bonds	500	4.25
Emerging Market Debt	300	6.75
Local Sovereign EM Debt	-	7.00
Corporate EM Debt	350	6.00

Source: J.P. Morgan Asset Management; estimates as of 30 September 2014.

Building blocks behind the numbers

Michael Albrecht, *Global Strategist, GIM Solutions-Global Multi-Asset Group*

Patrik Schöwitz, *Global Strategist, GIM Solutions-Global Multi-Asset Group*

IN BRIEF

- The economic backdrop remains broadly constructive for global equities. With exceptions like Japan, however, expected returns for equities have generally declined modestly for developed markets, largely due to higher valuation multiples following broad market rallies.
- We introduce a new refined building block framework for our equity assumptions, which allows us to consider a wider range of return drivers, such as international growth, margins and shareholder dilution, as well as buybacks.
- This year's assumptions paint an outlook of lower, but still constructive, equity returns, as relatively lower revenue and earnings growth are offset by sustained higher payouts to shareholders.

A NEW EQUITY METHODOLOGY

This year, we introduce a revised framework for our equity return projections. The new methodology involves a structured decomposition—similar to DuPont analysis—where return drivers are divided into more easy-to-forecast ratios. Compared to prior years, we break down total returns into more granular components (Exhibit 1 and Exhibit 2), more explicitly accounting for the global drivers of revenues and profit margins, including shareholder dilution and buybacks—the focus of this year’s equity thematic article (see page 24).

In aggregate, our equity return assumptions have fallen compared to last year. Developed market (DM) equity valuations have risen substantially since we published our 2014 Long-Term Capital Market Return Assumptions. Adjusting last year’s projections for this factor alone would reduce our global equity return assumptions by approximately 75 basis points (bps) per year.

As a general theme, our return assumptions paint a picture across markets of relatively lower revenue and earnings growth compared to history, largely offset by higher shareholder payouts. We also continue to reflect ongoing normalisation across return drivers—not only towards historical averages, but also cross-sectionally across regions, as financial markets continue gradually to become more globally-integrated, and as emerging markets look increasingly developed.

EXHIBIT 1: ANATOMY OF EQUITY TOTAL RETURNS

TOTAL RETURNS

1. Aggregate revenue growth

- Includes domestic and international growth, as well as any additional expansion of revenues

2. \times Aggregate earnings growth / revenue growth (margins) = Aggregate earnings growth

- Reflects normalisation in most markets

3. \times EPS growth / aggregate earnings growth (net dilution) = EPS growth

- Breaks down into: (a) gross dilution, (b) buybacks

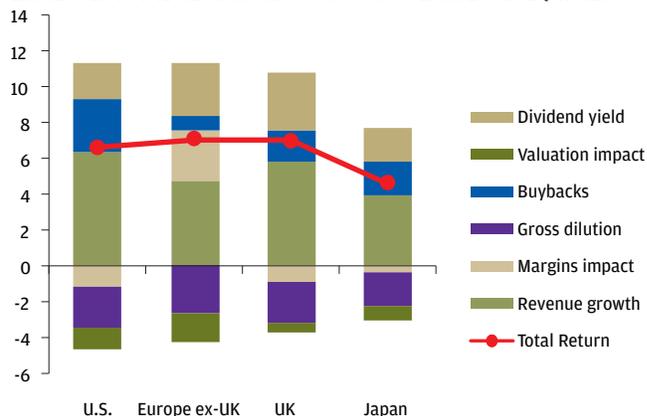
4. \times Price return / EPS growth (valuations) = Price return

- Consistent with long-term risk-free yields and equity risk premium (ERP)

5. + Dividends (carry) = Total return

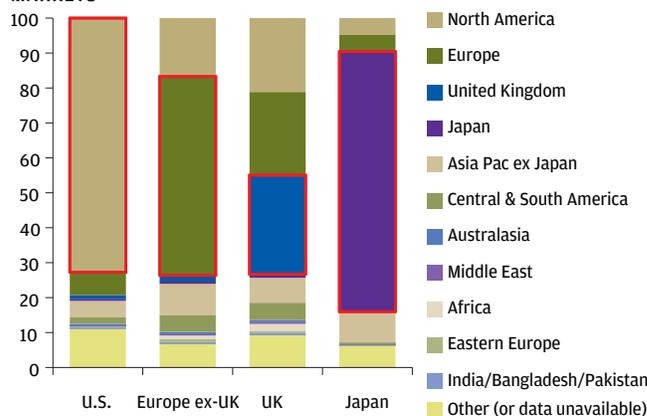
- Payout ratio consistent with sustainable growth rate (SGR)

EXHIBIT 2: TOTAL RETURN IMPACTS FOR G4 LARGE CAP EQUITIES



Source: J.P. Morgan Asset Management; estimates as of 30 September 2014. Please note that the data shown here provide more precise total returns than our assumptions, which are rounded to the nearest 25 basis points.

EXHIBIT 3: DOMESTIC REVENUE SHARE VARIES WIDELY ACROSS MARKETS



Source: J.P. Morgan Asset Management, Thomson Reuters Datastream; estimates as of 30 September 2014.

REVENUE GROWTH

With developed world output growth projected to decelerate over the long-term horizon, we expect a similar deceleration relative to history in revenues across the major economies. In the U.S., however, we expect revenue growth to remain slightly above trend as the output gap closes, while the outlook for revenues in Europe ex-UK remains relatively subdued, due to lower trend growth. Emerging markets, to varying degrees, should see an overall deceleration in revenue growth, including a drag from slower-growing developed markets, the unwinding of a large credit cycle, and a refocus on domestic markets.

Our updated framework considers more than domestic GDP growth, taking also into account the contribution to revenue growth from international business. Across major developed markets, the domestic share of revenues ranges from an

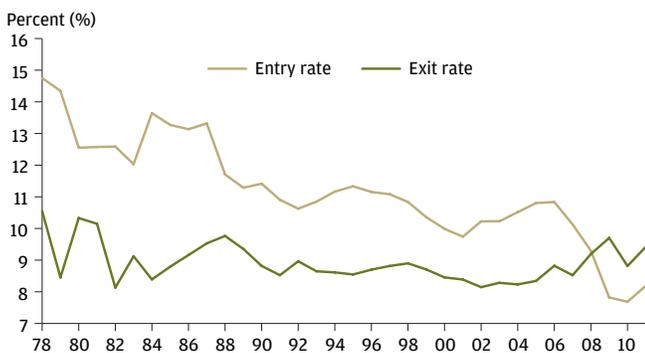
estimated 75% in Japan to 28% in the UK (**Exhibit 3**). Generally, for DM equities investing in fast-growing developing economies, the effect is to boost revenues by as much as 75 bps; the reverse is true for emerging markets.

Because our return projections are in nominal terms, higher domestic inflation can substantially increase revenue growth. Notably this year, the increase in our assumption for Japanese inflation (+50 bps to 1.25%) has played a role in boosting assumed nominal returns compared to last year.

Final adjustments to our revenue assumptions address the fact that the sizes of public equity markets continue to expand as a share of overall economies—as is especially the case in the emerging world—but that the pace of this historical trend has decelerated due to secular drivers, including the following:

- Much domestic enterprise has already become dominated by large corporations.
- The rapid globalisation of recent decades is largely completed; U.S.-listed corporations have accounted for an increasing portion of international enterprise, but the pace is decelerating.
- New business formation has slowed in the U.S. (**Exhibit 4**).

EXHIBIT 4: FIRM ENTRY AND EXIT RATES IN THE U.S., 1978-2012



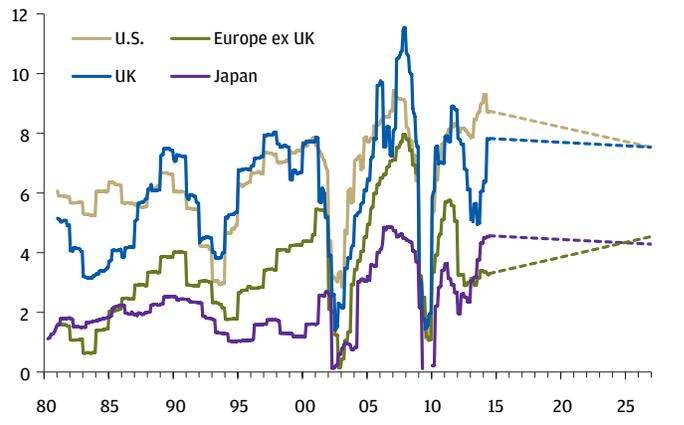
Source: U.S. Census Bureau, Business Dynamics Statistics.

EARNINGS: THE IMPACT OF NORMALISING MARGINS

Our new framework also specifically accounts for the impact of margins on total returns. In the U.S., margins are currently near record highs and should fall modestly as debt servicing costs rise with interest rates, as tightening labour markets drive domestic wage costs, and as overseas outsourcing becomes less competitive. In contrast, the normalisation of currently-depressed European margins is projected to contribute positively to returns.

Japanese margins, which have historically been well below other major economies, have recently risen close to historical highs, on the back of a weaker Japanese yen. We expect them to remain roughly at this level; as the one-time boost of yen weakness fades, higher inflation and price volatility should encourage wider margins, and structural reform should positively affect corporate governance and improve capital discipline. Finally, emerging markets should face more subdued margins amid increasing wage pressure and overcapacity in certain industries.

EXHIBIT 5: HISTORICAL MARGINS AND PROJECTIONS



Source: J.P. Morgan Asset Management, Thomson Reuters Datastream; data from 1980-2013, projections from 2014-2026 based on estimates as of 30 September 2014. Analysis based on broad market indices.

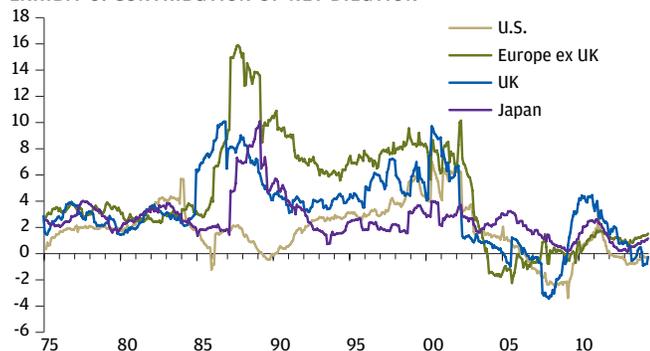
NET DILUTION: THE IMPACT OF LOWER NEW LISTINGS, ISSUANCE AND INCREASED BUYBACKS

In the next step of our framework, we take account of the impact of dilution on returns to move from aggregate earnings growth to earnings-per-share (EPS) growth. As discussed in this year's equities thematic article (see page 24) new listings and new issuance dilute shareholder returns, while buybacks offset this and boost returns. In line with the literature discussed in the theme piece, we typically assume a 2% rate of gross dilution (new listings and issuance) for developed markets. Our own historical data suggests that no market is an outlier, with gross dilution for G4 markets ranging from 2%-3% in 2013.

An important trend of recent years has been the rise in share buybacks across developed markets, with U.S. corporates in particular currently buying back their own shares at the fastest pace since the financial crisis, arguably due partly to a decline in investment opportunities. As a result, net dilution across markets is presently much lower than historical averages, or even negative in some cases (contributing positively to returns).

Emerging markets are the exceptions. Granting considerable variation among emerging markets, rapid earnings growth is often fuelled by dilutive external capital. Buyback rates are currently broadly close to zero in emerging markets, but rise modestly on our projections over the long-term horizon.

EXHIBIT 6: CONTRIBUTION OF NET DILUTION



Source: J.P. Morgan Asset Management, Thomson Reuters Datastream. Monthly Data from Jan 1975 to Sep 2014.

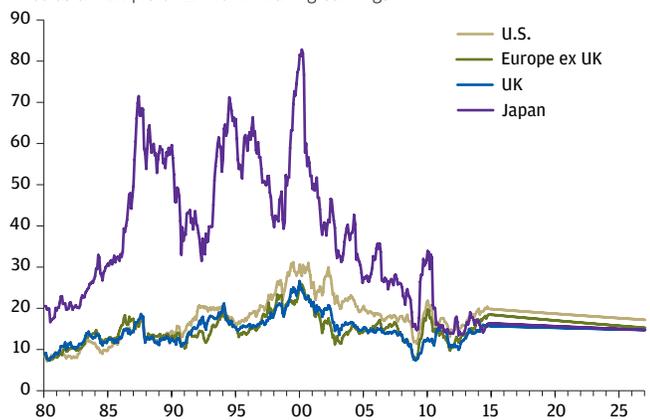
VALUATIONS: THE IMPACT OF LOWER PRICE MULTIPLES

We expect elevated valuations across developed markets to fall over our time horizon towards levels that are more normal. However, in line with our lower-for-longer fixed income assumptions, we expect these declines to be relatively moderate, and to levels that remain above historical averages (Japan’s history is an exception).

Valuations should not significantly affect emerging market returns, as the bloc has not re-rated along with developed markets, although there are exceptions: we assume a de-rating in Brazil of around 1.0% per annum, and a re-rating in China of about 0.5% per annum.

EXHIBIT 7: G4 PRICE/EARNINGS MULTIPLES AND FORWARD ASSUMPTIONS

Price as a multiple of 12-month trailing earnings



Source: J.P. Morgan Asset Management, Thomson Reuters Datastream. Monthly Data from Jan 1980 to Sep 2014.

SHAREHOLDER PAYOUTS

The final step of our framework adds dividends to arrive at total return projections. Here we account for total shareholder payouts, including both dividends and share buybacks, to ensure a sustainable payout level consistent with projected earnings growth rates. Given the much more sticky nature of dividends, and with dividend yields currently close to long-term averages across major markets, we assume that share buybacks reflect the majority of any necessary adjustments.

A key question is to determine the maximum sustainable level of shareholder payouts. An assumed payout ratio and return on equity (ROE) will imply a growth rate of aggregate earnings, which should match the assumption derived in earlier steps. This consideration has an important implication for the composition of returns: decelerating aggregate earnings growth rates imply higher sustainable payout ratios. In the extreme case of the U.S., aggregate shareholder payouts are close to 100% of earnings; we believe a ratio above 80%—even after considering a moderation of currently elevated ROEs—is sustainable even though it appears high relative to history. For Japan, it is notable that our assumption of ROEs gradually converging towards more globally consistent levels also implies higher payout ratios.

EXHIBIT 8: SELECTED EQUITY LONG-TERM RETURN ASSUMPTIONS AND BUILDING BLOCKS

Equity assumptions	U.S.	Europe ex-UK	UK	Japan
Revenue growth	6.3	4.8	5.8	4.0
Margins impact	-1.1	2.7	-0.9	-0.3
Earnings growth	5.1	7.7	4.8	3.7
Gross dilution	-2.3	-2.6	-2.2	-1.9
Buybacks	3.0	0.9	1.7	1.8
EPS growth	5.8	5.7	4.3	3.6
Valuation impact	-1.2	-1.6	-0.5	-0.9
Price return	4.5	4.0	3.8	2.7
Dividend yield (DY)	2.0	2.9	3.3	1.9
Total return, local currency	6.50%	7.00%	7.00%	4.50%

Source: J.P. Morgan Asset Management; estimates as of 30 September 2014. Total return figures are rounded to the nearest 25 basis points.

PUTTING IT ALL TOGETHER

Multiplying all the above factors—revenue, margins, gross dilution and buybacks—results in a price return. Adding an annualised dividend yield (carry) provides a total return (**Exhibit 8**). For our emerging market aggregate figure, we apply the same methodology to nine large emerging markets, which comprise over 80% of the MSCI Emerging Markets Index, and then apply our currency assumptions to arrive at a U.S. dollar figure of 8.75%.

A changing beta landscape and opportunity set as fundamentals normalise

Anthony Werley, *Chief Portfolio Strategist, Endowment and Foundations Group*

IN BRIEF

- The importance of manager diligence and return dispersion remains a key influence on whether investors are able to meet their risk and return expectations for all alternative strategy classes. Our assumptions are generated at the median manager level.
- Hedge fund return expectations are on average reduced from last year's projection, reflecting the lower equity and credit market return assumptions that are the dominant sources of risk for most of this strategy class. While industry headwinds (including asset size, regulatory issues and problematic market conditions) continue, hedge funds are expected to produce attractive risk-return characteristics consistent with their long-term track record.
- Private equity returns at the median manager level can be expected to generate a modest premium to the public markets. However, a global opportunity set seems the more relevant benchmark rather than a U.S.-centric reference.
- Commodities continue their down-cycle dynamics, consistent with stuttering Chinese growth and weak global demand overall. Return expectations are shaved slightly over the 10-to 15-year term of our assumptions.
- Real estate return assumptions, despite the price escalation of the last few years, remain relatively attractive as risk taking associated with illiquidity has not kept pace with many parts of the capital markets. We continue to see relative value in extended risk, value-added strategies.
- Infrastructure's low volatility and stable cash flows remain the exception to muted risk appetite conditions.

INTRODUCTION: ALTERNATIVES TAKE DIVERGENT PATHS

Alternative strategy return assumptions have taken divergent paths across hedge funds, private equity and real assets for 2015 (**Exhibit 1A** and **Exhibit 1B**). The beta-dominated strategies are marked lower, reflecting the reduction in the return outlook for global equities and credit. Meanwhile, the normalisation of asset class valuations has not been uniform across all of the capital markets, setting up a relatively better return potential in real assets and new investment opportunities are being taken advantage of in private equity.

In the following sections, we discuss our assumptions for the various alternative strategy classes in more detail.

HEDGE FUNDS

Reliance upon historical hedge fund composite data as a building block for extrapolating future returns would have misled investor expectations by a wide margin over the past 11 years. For example, data from Hedge Fund Research for the Diversified Strategies category showing returns from inception through to the end of 2013 indicates a compound return of 6.93%, while the actual compound return for the 2004-2013 period was 3.47%.

Since the introduction of absolute return/hedge fund strategy returns in 2004, our Long-Term Capital Market Return Assumptions (LTCMRAs) have used a factor-based approach to project forward

EXHIBIT 1A: ALTERNATIVE STRATEGIES—SELECTED LONG-TERM RETURN ASSUMPTIONS

U.S. DOLLAR-BASED COMPOUND (IRR) 10-15 YEAR RETURNS

	%
U.S. PRIVATE EQUITY	7.75
HEDGE FUNDS	
Event driven	6.00
Long bias	5.25
Relative value	5.00
Macro	4.75
Diversified	4.50

Source: J.P. Morgan Asset Management; estimates as of 30 September 2014 for private equity and 30 June 2014 for hedge funds.

Note: Private equity strategies are unlike traditional asset classes in that there is no underlying investable index. The return estimates shown above reflect a small premium relative to global equity market returns. Given their complex risk reward trade-offs, we counsel clients to use qualitative and quantitative approaches in setting strategic allocations to these alternative asset strategies.

returns. This methodology has produced reasonable accuracy vs. the historical composite average, especially considering the lack of a true benchmark, survivorship bias in the available data and the relatively short timeframe data that is available. We emphasise, as we have in past years, that our analysis is focused on “average” manager data and that generalisations about the sources of average manager returns are not necessarily representative of the performance of more highly skilled managers characterising the upper tier of practitioners in each strategy space.

The factor approach uses regression analysis to discern the overriding source of hedge fund returns—market-sourced risk, or beta exposures. The factor approach seeks to find the best fit of a composite’s return vs. a representative sample of traditional market returns, such as the S&P 500, high yield, commodities, U.S. government fixed income, and other sub asset class benchmark betas. These market risk exposures are multiplied by the traditional asset class forward-looking return assumptions and then modified by industry considerations pertinent to the unique 10- to 15-year outlook.

While the beta exposures of each strategy class vary over shorter time periods, beta exposures are relatively consistent over a longer period of time. Since the launch of our hedge fund assumptions in 2004, forward returns have generally been adjusted downwards vs. the raw beta estimations to reflect the numerous headwinds the industry has experienced, as we described in more detail in the 2013 edition of the LTCMRAs. Many of those same headwinds remain in place today.

EXHIBIT 1B: REAL ASSETS—SELECTED LONG-TERM RETURN ASSUMPTIONS

U.S. DOLLAR-BASED COMPOUND (IRR) 10-15 YEAR RETURNS

	%
REAL ESTATE/INFRASTRUCTURE	
U.S. REITs	6.50
U.S. direct real estate (unlevered)	6.00
U.S. value-added real estate (unlevered)	7.75
European direct real estate (unlevered)	5.75
Global infrastructure	6.75
Commodities (spot)	
Gold (spot)	4.00

Source: J.P. Morgan Asset Management; estimates as of 30 September 2014.

EXHIBIT 2: EQUITY HEDGED BETA AND R-SQUARED

HFRI Category	Time Period	Factor Betas							Adjusted R-Squared
		Small Cap	Mid Cap	Large Cap Core	EAFE Equity	Blended Commodities	U.S. Aggregate Bonds	Domestic High Yield	
Equity Hedged	July 2008 - July 2014	0.15	0.13	-0.19	0.40	0.08	-0.09	-0.02	0.83

Source: J.P. Morgan Asset Management; data as of end July 2014.

For expository purposes, **Exhibit 2** shows the betas and adjusted r-squared for the Equity Hedged category for the July 2008-July 2014 timeframe. This timeframe was chosen as a period that best captures multiple cycle conditions yet has a similar manager set and broadly similar return expectations.

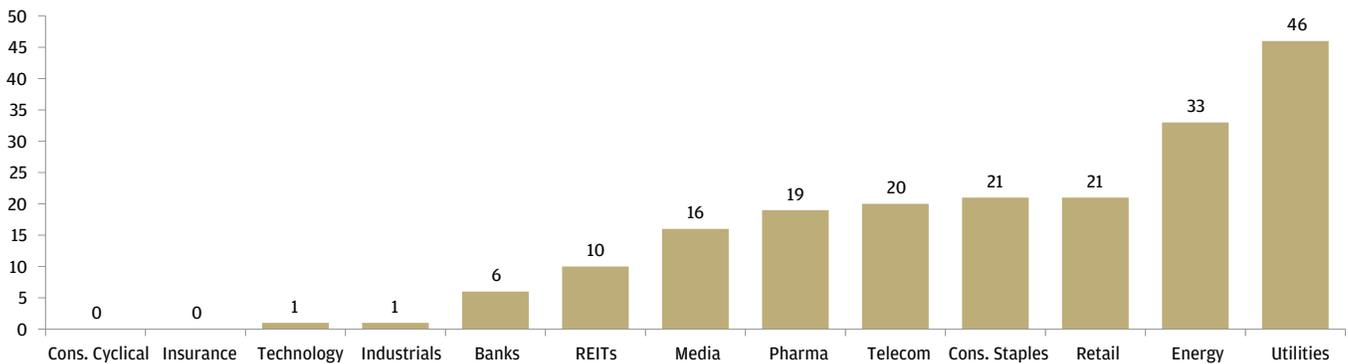
The hedge fund industry faces several headwinds, including growing asset size and crowded trades, and low volatility. Hedge funds also operate in a macro-dominated environment (rather than a fundamentally-driven risk landscape) that is still subject to novel central bank policies, a tougher regulatory backdrop, and

relatively illiquid markets from which getting out of a trade is much more difficult than entering.

Another market condition, and important mainstay, of equity-hedged manager alpha has been intra-sector dispersion.

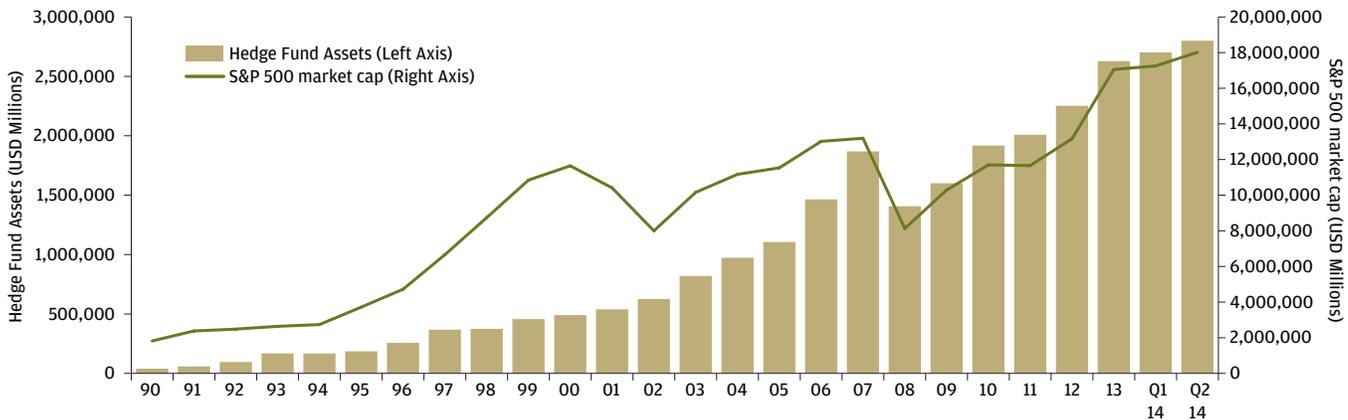
Exhibit 3 illustrates the narrow sectoral dispersion within the key consumer, technology and industrial market segments, which are often the source of non-beta pair trades. The growth of smart beta, or alternative beta, products that are easily accessible to the retail investing public adds to the growing asset surge (**Exhibit 4**) and potential alpha squeeze.

EXHIBIT 3: PERCENTILE OF THREE-MONTH DISPERSION OF RETURNS RELATIVE TO HISTORY



Source: J.P. Morgan, Standard and Poor's, IDC; data as of 30 June 2014.

EXHIBIT 4: HEDGE FUND VS. S&P 500 ASSETS OVER TIME



Source: J.P. Morgan Asset Management, Bloomberg, HFR; annual data to end of 2013, with last two observations quarterly up to June 2014.

Nevertheless, the forward environment is not without its positive attributes and potential improvements. The new regulatory regime for banks classified as systematically important financial institutions creates a vacuum in markets where proprietary trading desks once deployed large capital pools. Volatility is currently at multi decade lows (**Exhibit 5**), but is likely to revert to mean levels as the economic cycle matures and central banks cede ground to the unadulterated fundamentals.

EXHIBIT 5: IMPLIED VOLATILITY



Source: J.P. Morgan Asset Management, Bloomberg. Monthly data from January 1990 to July 2014.

The derivative markets offer a more expansive means of investment expression than was the case even 10 years ago. Most importantly, the ability to capitalise on new opportunities, new execution options and narrow windows of opportunity will, as in the past, reside with the skilled and resourceful organisations.

The wide dispersion of returns within the hedge fund manager composite data illustrates the performance outcome of those investment teams that can capture the changing and underpenetrated opportunity sets vs. those that essentially capture a piece of the beta opportunity, albeit with a fraction of the risk, in the public markets. Longer term, many of the conditions that challenge hedge fund returns will likely revert to normalised conditions, easing the path towards better relative—if not absolute—returns vs. the public markets.

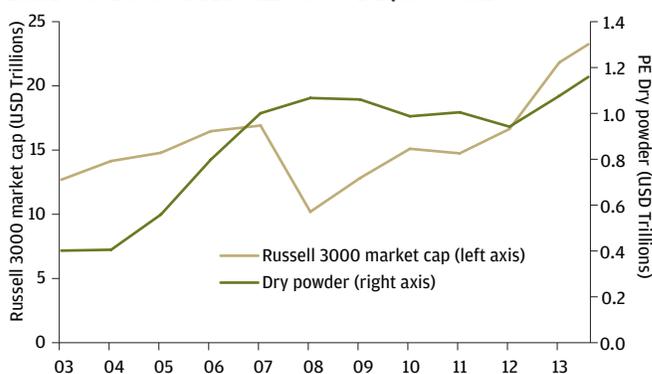
On balance, the hedge fund industry should enjoy better beta-adjusted performance vs. the public markets, if only because public market returns, sectoral dispersions, intra market correlations and volatility will increasingly revert to their means, allowing the long/short investment mode a better environment within which to operate. Considering the industry headwinds and historical record, we would expect the dispersion of returns to remain wide, if not increase, over the 10- to 15-year time frame of the LTCMRAs.

PRIVATE EQUITY

The forward-looking environment for private equity has both tailwind and headwind non-market factors to consider. On the negative side of the outlook, the size of cash assets needing to be put to work and stretched valuations look to be the core concerns going forward. The valuation environment, as of mid 2014, was described by one financial sponsor executive as “daunting.”

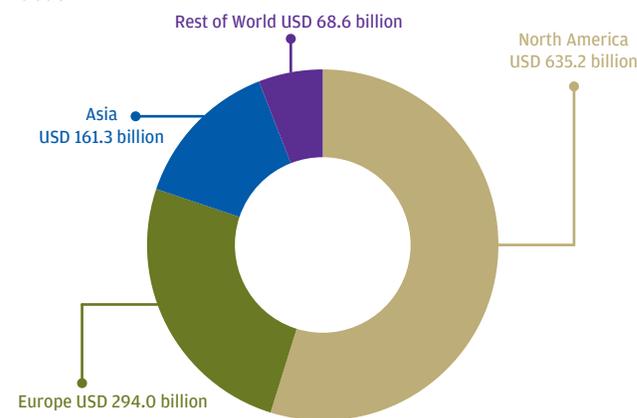
Stretched valuations may be a concern from an absolute point of view but stretched valuations for financial sponsors also mean stretched valuations for public market investors. As such, the private equity mark-up vs. the public market return expected by investors is not necessarily impacted. **Exhibit 6** and **Exhibit 7** put the “dry powder” and valuation issues in perspective. **Exhibit 8** examines the current EV/Ebitda valuation (enterprise value to earnings before interest, tax, depreciation and amortisation). In the first quarter of 2014, EV/Ebitda was 9.1. The last time valuations were at this level was during 2008.

EXHIBIT 6: DRY POWDER—ALL PRIVATE EQUITY FUNDS

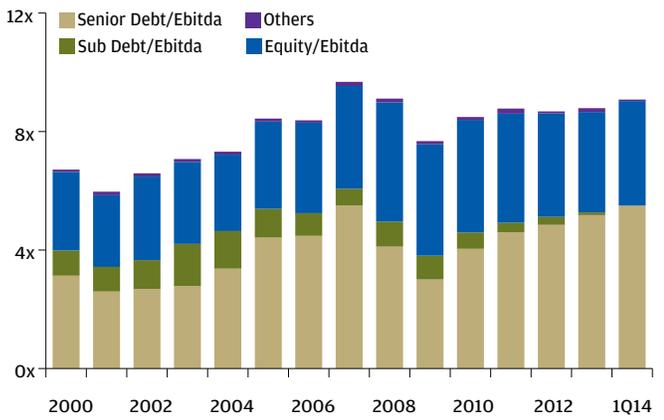


Source: J.P. Morgan Asset Management, Preqin; annual data from 2003-2013.

EXHIBIT 7: DRY POWDER—ALL PRIVATE EQUITY FUNDS BY REGIONAL FOCUS



Source: J.P. Morgan Asset Management, Preqin; data as of 23 July 2014.

EXHIBIT 8: PURCHASE PRICE MULTIPLE

Source: S&P Capital IQ LCD; annual data from 2000 to first quarter 2014.

The private equity opportunity set, particularly for the large and/or skilful operator, has expanded over the past few years, partially addressing the issue over the scalability of the private equity model. An example of the evolving opportunity set over the past few years has been the sale of private equity partnerships into the secondary market. While this niche strategy has produced returns above average, the strategy is likely to have passed the sweet spot of its return profile.

In the past we have referenced energy and energy infrastructure capital needs as a bright spot for potential returns. The largest expansion of financial sponsor opportunity is the increased geographic reach well beyond the traditional U.S. stomping grounds. Opportunities in Europe, emerging markets and, most recently, in the frontier markets, add an element of new challenges but an open opportunity compared to the relatively well covered U.S. market.

PRIVATE EQUITY METHODOLOGY

Considering the wide dispersion of manager performance, and lack of differentiated and repeatable risk and return characteristics endemic to a classic description of an asset class, private equity might be best described as an alpha class. This viewpoint is supported by the absence of a passive benchmark from which to identify the fundamental and immutable return and risk patterns of a true asset class.

Instead, composites of managers with somewhat unique value creation strategies, and subjective valuation methodologies (often with meaningful sectoral and geographic differences and composed of quarterly estimates of returns), are compared to the public market convention of standard benchmarks using monthly data. In essence there is an element of comparing apples to oranges with this approach. In this context we have created our projection approach, which is differentiated from widely used private equity databases.

To establish the volatility estimate we have referred to analysing the properties of recent buyouts vs. public market comparables, particularly micro-cap companies, to establish the types of risks that can otherwise remain hidden by the valuation techniques used to produce quarterly private equity returns. The effects of the leverage, premium paid, and corporate strategy pose similar risks for public and private markets at small capitalization levels. In short, we suggest that there is no "free lunch" as it relates to leverage and restructuring in private vs. public investments.

We clearly recognise, however, that leverage—in the hands of a skilful operator—is no guarantee of increased risk and could very possibly mean less risk, again reinforcing the notion that private equity is a skill-based strategy and less of a benchmark exercise. In attributing some core characteristics to the long-term return pattern of the investment strategy we look to the manager composites and their relationship to the public markets as our initial starting point.

We believe these manager composites overstate on the margin the universe of available returns basically by reason of their size bias. In the past we have used the mid-capitalisation U.S. public equity benchmark as a return reference, since historically this has been the main hunting ground of most financial sponsor activities. Our 2015 projection takes into account the broadening geographic mix of financial sponsor activity.

Importantly, our projections refer to the average—or some semblance of mean manager performance—with no accounting for peer group alpha. In referring back to our initial characterisation of private equity, more as an alpha class rather than as an asset class, manager dispersion and due diligence capability are the key lenses through which an allocation to private equity should be determined—not the estimate of mean performance.

Other strategy expansion examples would include moving down in capitalisation (where valuations are marginally more attractive), multiple company acquisitions for the purpose of creating synergies, platform building (or “roll-up”) strategies, capital expenditure-light growth strategies etc. More attractive leverage conditions in terms of costs and covenants add a small positive increment to future returns.

The 2015 private equity assumption, while lower than the 2014 assumption at 7.75%, represents an increased premium vs. U.S. public equity returns, primarily to reflect the impact of globalisation on returns and, to a lesser extent, strategy extensions and improved leverage terms available in the vintage offerings of the next few years.

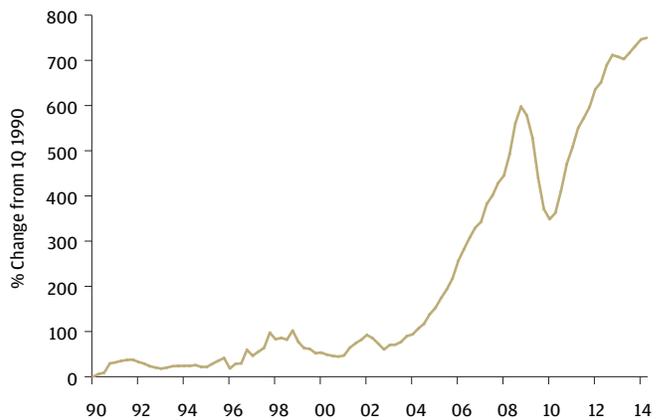
COMMODITIES

There is broad agreement that the era of the commodity supercycle (2002-2011) has passed, as Chinese and global growth have taken a step function lower. Factor input efficiency—particularly around energy—that is symptomatic of rising GDP per-capita economies, regulatory issues, and environmental and technology trends, is likely to curb the longer-term trajectory for commodity consumption vs. the 2002-2011 timeframe of the supercycle.

As discussed in the 2014 Long-Term Capital Market Return Assumptions, the classic supply response to the rapidly rising demand and commodity prices of this period caused a 10-year extraction capital expenditure boom and created a demand/supply imbalance across many parts of the commodity complex.

Exhibit 9 revisits the demand and capital expenditure cycle as one indication of the magnitude of the supply response. The following sub-industries are included: aluminium, coal & consumable fuels, diversified metals & mining, gold, integrated oil & gas, oil & gas drilling, oil & gas equipment & services, oil & gas exploration & production, oil & gas refining & marketing, oil & gas storage & transportation, precious metals & minerals, silver, and steel.

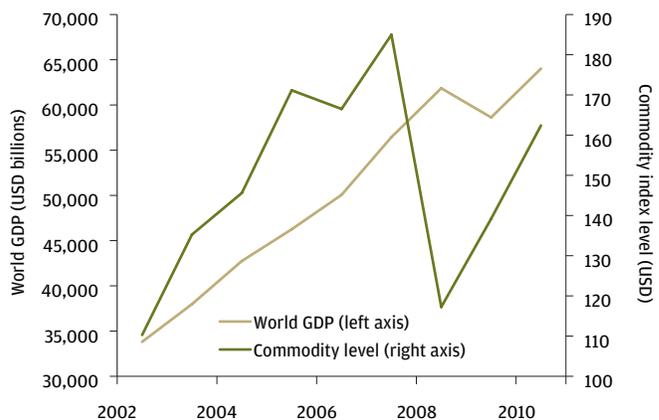
EXHIBIT 9: CAPITAL EXPENDITURES IN METALS AND ENERGY



Source: J.P. Morgan Asset Management, ISI Group; data as of end March 2014.

Exhibit 10 gives an indication of the relative demand differentials of the forward estimation time period based upon GDP growth vs. the supercycle years. This demand/supply shift is likely to keep a lid on commodity prices over the current economic cycle within the framework of ever present commodity volatility, particularly if shorter-term forecasts for a sustained global economic acceleration over the next few years are not well founded or if U.S. dollar strength continues.

EXHIBIT 10: WORLD GDP VS. COMMODITY LEVELS

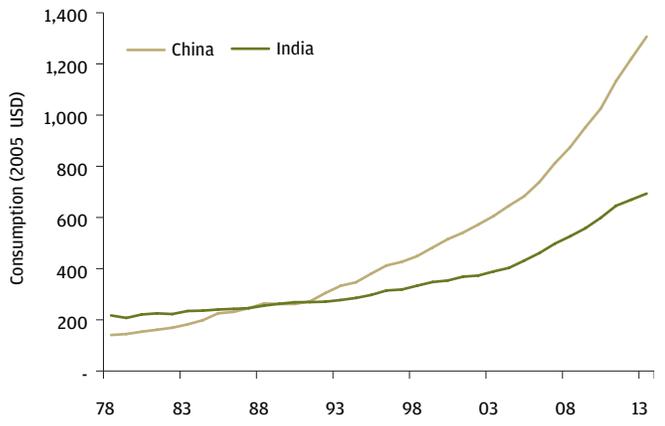


Source: J.P. Morgan Asset Management, Bloomberg, International Money Fund; annual data from 2002-2013.

The difference in our LTCMRAs from the consensus over the death of the supercycle is not whether the pace of the price gains seen between 2002-2011 can be revived, but whether real price gains are possible at all for the 10-to 15-year (or two economic cycle) horizon. This point of view is somewhat at odds with the history of broad commodity index returns in the aftermath of a capital cycle bust.

Our premise is that large segments of the emerging markets are still in relatively rapid growth mode, with many economies—including China and India—still in the rising per-capita consumption phase of their development (**Exhibit 11**). Meanwhile, stated Chinese economic policy calls for an emphasis on the quality of production rather than the quantity, indicating less support for the loss making and heavy commodity using part of the Chinese economy. This outlook, together with the microeconomic development of the last two years of increased action towards capital expenditure rationalisation, is likely to establish a demand/supply balance weighted towards the back years of the projection period.

EXHIBIT 11: CONSUMPTION EXPENDITURE PER CAPITA



Source: J.P. Morgan Asset Management, World Bank. Annual data from 1978 to 2013.

While the 25-year-plus case for supply scarcity has been reasonably articulated by other observers, our overall point of view for the 10- to 15-year outlook does not take into consideration natural supply constraints. In the forward-looking environment we would expect an era of activist-, shareholder-, and government-induced capital restraint rather than a depletion constraint. There appears to be ample evidence in support of corporate action supply constraints within the past 12 months.

On average, we project a small real rate of return in excess of global inflation over the evaluation time period of approximately 1%, or a nominal return of 3.50%.

GOLD: MOVING FROM WEST TO EAST

The great U.S. investor gold unwind of 2013, which produced a negative 28.3% return for the GLD Exchange Traded Fund (ETF), has given way to a less fevered pace of trading and a slightly positive return for the first three quarters of 2014. While the magnitude of the 2013 sell-off caught most investors off guard, a correction of some consequence might have been anticipated at any point as gold rose from USD 275 per ounce in 2002 to USD 1,925 at its peak in September 2011, producing returns far in excess of most asset classes in this period and making it an easy target for financial market tactical concerns and profit taking.

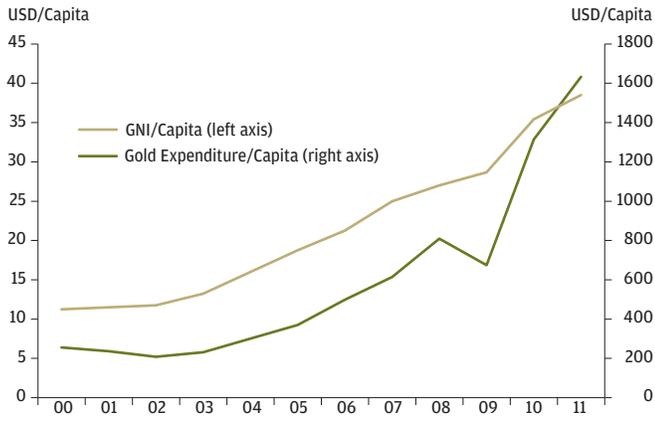
Tactically, gold responds to the movement of the U.S. dollar, and changes in interest rates and inflation expectations, all of which have given a slight to heavy headwinds to gold prices year to date. However, U.S. investor concerns may not be the core longer-term driver of demand, even as gold in its liquid ETF form may continue to be a source of volatility.

For the past few years a fourth, and likely a less ephemeral, driver of longer-term gold prices has been the rising consumption demand from the world's two largest populations. Both China and India have relatively high GDP and per-capita growth expectations and both have had, at least historically, a high per-capita preference for gold holdings. **Exhibit 12** and **Exhibit 13** illustrate the gross national income per capita and gold demand per capita for India and China respectively.

Both China and India have exhibited a longer-term appetite, if not cultural affinity, for gold rather than seeing the metal as a portfolio construction device for hedging risk or as an asset for short-term speculation—the factors that drew in many U.S. investors during the 2002-2011 timeframe. Longer term, this cultural preference vs. a tactical mindset for gold on the margin should produce a steadier demand base within the context of the present assumptions around growth, per-capita holding rates and other externalities of demand, such as tax rates and regulations. **Exhibit 14** indicates the growing market share for gold consumption on the part of India and China.

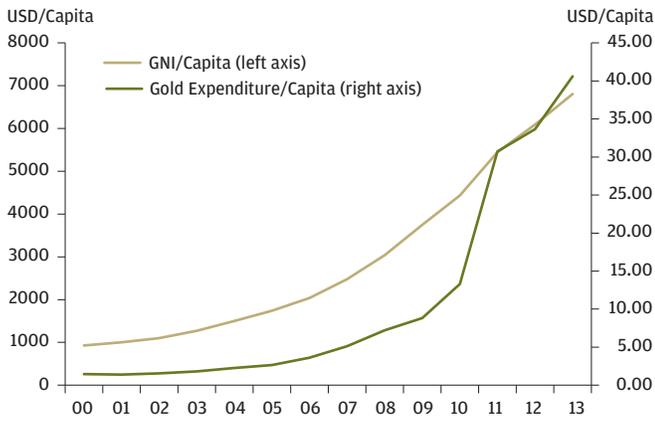
Consistent with the long-term outlook for global inflation, and with a small return premium for the growing longer-term consumption patterns of China and India, the gold return projection is 4.0%. This return projection represents a small decrement of 0.25 percentage points from 2014's projection, owing to the reduction in global inflation and Chinese growth expectation.

EXHIBIT 12: INDIA GROSS NATIONAL INCOME PER CAPITA AND GOLD DEMAND PER CAPITA (USD)



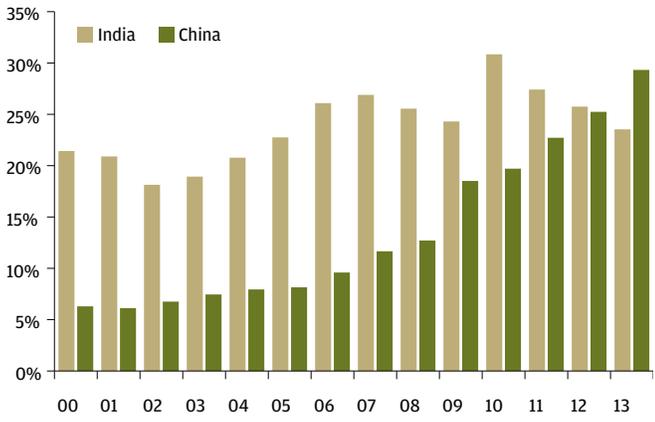
Source: GFMS, Thomson Reuters; World Bank; World Gold Council.

EXHIBIT 13: CHINA GROSS NATIONAL INCOME (GNI) PER CAPITA AND GOLD DEMAND PER CAPITA (USD)



Source: GFMS, Thomson Reuters; World Bank; World Gold Council.

EXHIBIT 14: SHARE OF GLOBAL CONSUMER DEMAND (TONNES)



Source: GFMS, Thomson Reuters; World Gold Council; annual data from 2000-2013.

REAL ESTATE

Real estate assumptions for 2015 take a slight detour vs. past economic and financial market reference points. While the outlook for real estate returns have historically been bounded by the outlook for equity and fixed income returns and are closely tethered to nominal GDP growth in the short-to-intermediate timeframe, real estate and economic cycle dynamics can also drive returns beyond fundamental assessments of long-term fair return. This cycle's real estate dynamics represent an anomalous departure from typical mid economic and current financial market risk taking, particularly within the value-added sector. Whether it is uncertainty factors related to the anaemic and stutter step growth of the economy and/or other asset class specific issues, real estate fundamentals have not aged as rapidly as other asset fundamentals and, as such, set up a relatively favourable outlook vs. equity and fixed income opportunities, at least on the margin.

The recent strong demand for yield and stable value assets continued into 2014. Despite the strong year-to-date performance through September, our 2015 assumptions for both core and value-added real estate are unchanged from the previous year. This assessment of future returns stands in contrast to the reduced return outlook for equities and most other risk assets. Underlying this assessment are two existing fundamental factors and one expectation. Presently, operating incomes are stronger and new supply less robust than what might normally be expected this far into an economic cycle. Investor demand for yield and asset price stability should remain healthy for the length of our assumptions timeframe. On a historical basis the absolute return assumption of 6% unlevered for U.S. core assets appears reasonable fair value vs. a U.S. nominal GDP growth rate of 4.75%, if somewhat expensive on a cross asset class basis vs. a U.S. large cap equity assumption of 6.5%. Value-added return expectations of 7.75% remain wide vs. the core expected return.

The European core assets return assumption in euro terms is reduced by 25 bps from last year's projection to 5.50%, reflecting the slight reduction in nominal GDP growth for the region. Continental European pricing was flat-to-down on a trailing one-year basis, while UK pricing was up over the same time frame.

REAL ESTATE INVESTMENT TRUSTS

Pricing for real estate investment trusts (REITs) was above trend in 2014 (to the end of September), reflecting strong underlying fundamentals and the continued search for yield, particularly among individual investors. Despite strong year-to-date performance, REIT valuations are attractively priced at high single-digit discounts on core assets and generally are at their fair value equilibrium on a mid single digit price premium to net asset value for the broad sector overall. REITs will in part continue to be held captive by the direction of interest rates and in an environment of rising interest rates and investor fickleness volatility should continue to be the norm. Adjusting for their higher operating leverage, REITs should deliver a return premium of 0.5% over core real estate over time.

INFRASTRUCTURE

Infrastructure returns are modelled on a global core basis and reflect exposure to both low volatility sectors, such as regulated utilities and pipelines (40%), and also more cyclical assets, such as transportation (30%) and contracted power (20%), as well as social infrastructure (10%). In 2014 demand for relatively stable cash flow generating assets was extremely strong, especially in Europe, even as the global regulatory cycle is likely to keep pressure on regulators to maintain rates at their present levels, if not toughen terms.

Our current return assumption of 6.75% (0.5 percentage points lower than last year) reflects the balance between the benefits of strong investor demand and the low cost of debt vs. the impact of a pro-consumer regulatory cycle and elevated prices being paid for assets.

Still close to fair value, but momentum for divergence is building

Michael Feser, *Global Investment Director and Portfolio Manager, GIM Solutions*

IN BRIEF

- This year we publish for the third time our foreign exchange (FX) assumptions as part of our Long-Term Capital Market Return Assumptions (LTCMRA).
- As we stated at the outset, we believe that the primary benefit of our currency assumptions is to enhance the internal consistency of the overall data set, rather than to act as an exact point-in-time predictor of the level of exchange rates in 10-to-15 years.
- We have therefore maintained the streamlined FX framework introduced last year, which broadly derives the assumptions from a mean reversion process of the current spot exchange rate towards the future fundamental fair value exchange rate.
- Qualitative views—implying either a more permanent deviation from fair value or a disagreement with the fair value estimate or both—beyond those already imbedded in our fundamental economic projections have been used only very selectively.
- As in prior years we would like to remind readers that the historical market records provide ample evidence for the wide ranges in which exchange rates swing around their fair values.
- As we enter a phase where global growth is likely to be less synchronised than in the early 2000s, we expect the cyclical forces that lead future exchange rates to swing in wide ranges around these assumptions to gather pace.

THE ANALYTICAL FRAMEWORK

Purchasing power parity (PPP) remains a cornerstone of exchange rate theory and of our analytical framework. According to PPP theory, exchange rates reflect the transaction value of traded goods and services between countries, which should be equal to the ratio of their price levels. PPP suggests that an equal basket of goods and services has the same relative price. We use the absolute PPP level as an initial fair value estimate, based on the actual individual consumption data from an analysis conducted by the World Bank and the Organisation for Economic Co-operation and Development (OECD) for the international price comparison programme. As this data is published only with a considerable time lag, we adjust this to the present day on the basis of historical consumer price index data from national sources and historical GDP per capita data as published by the International Monetary Fund in its World Economic Outlook.

In the second step we roll these initial fair value estimates forward to the LTCMRA assumptions horizon. For the developed economies, this is achieved by using a relative PPP approach. Relative PPP asserts that prices and exchange rates change over time in a way that preserves the ratio of each currency's domestic and foreign purchasing power. This enables us to look beyond static PPP and reflect the expected change in a country's terms of trade when formulating our currency assumptions. We therefore adjust the expected percentage change in the exchange rate between two countries over the assumptions horizon by our expected difference in the inflation rates between each country. For emerging markets we use an absolute PPP-based approach that accounts for GDP per capita differences, which we then normalise over time. We obtain the forward projection of these values using expected GDP growth and inflation rates as well as population growth rates.

The expected rate of appreciation/depreciation is then determined by comparing the current spot exchange rate level with its future fair value estimate, expressed as annual compounded rate of change. In the final step these results undergo a qualitative review and selective adjustment process to ensure their internal consistency and to incorporate secular factors and trends otherwise not captured in the process.

LONG-TERM CURRENCY EXCHANGE RATE ASSUMPTIONS

Several years of zero interest rate policies and quantitative easing by a number of central banks in the developed world have left their mark on currency markets. While before the crisis it was often noted that the Japanese yen was the only attractive funding currency for carry trades, we have since been faced with the opposite problem—there are plenty of currencies to fund trades but hardly any that offer significant carry. It is therefore maybe not too surprising that realised volatility has fallen repeatedly to new lows and we still find that our FX assumptions (**Exhibit 1**) suggest mostly relatively mild changes in major FX rates over the long run.

This apparent picture of calm in the long run does, however, look through the current cyclical environment, which suggests that we are entering a period of rapidly diverging monetary policy stances across countries—both in the developed and emerging world. If FX markets respond to these policy differences as they have in the past, then it is likely that overall market volatility will rise. Those currencies currently trading close to fair value will move, possibly significantly, away from fair value before converging back to fair value again over the long term.

EXHIBIT 1: ASSUMPTIONS FOR SELECTED CURRENCY EXCHANGE RATES—NEXT 10-15 YEARS

Currency		30 September 2014 levels	Assumptions*	Per annum % change**
Euro	EUR/USD	1.26	1.30	+0.25
Japanese yen	USD/JPY	110	100	-0.75
Swiss franc	USD/CHF	0.96	0.93	-0.25
Sterling	GBP/USD	1.62	1.57	-0.25
Canadian dollar	USD/CAD	1.12	1.14	+0.25
Australian dollar	AUD/USD	0.88	0.71	-1.75
Brazilian real	USD/BRL	2.45	3.26	+2.25
Mexican peso	USD/MXN	13.43	14.76	+0.75

Source: J.P. Morgan Asset Management, Bloomberg. Estimates as of 30 September 2014.

*According to market convention, CURRENCY A/CURRENCY B means one unit of CURRENCY A is worth the stated number of units of CURRENCY B. EUR/USD = 1.31 means EUR 1.00 is worth USD 1.31.

**For consistency and ease of conversion, we have assumed that the forecast horizon for the per annum change in percentage terms is exactly 12.5 years.

Euro

With the fires of the crisis firmly in the rearview mirror, the eurozone is now on the long and winding road to longer-term sustainability through further integration and more centralised political control. While growth is improving in some parts, including Germany, Ireland and Spain, other countries—particularly Italy and France—are still struggling to spark a revival in animal spirits after several rounds of fiscal tightening.

It is therefore unsurprising that the market has turned its attention once again to Mario Draghi, the president of the European Central Bank (ECB). Draghi is already credited with defusing the eurozone crisis with his “bumblebee” speech in July 2012, when he assured investors that the ECB was “ready to do whatever it takes to preserve the euro.”¹ While still shying away from the outright quantitative easing policies pursued by other central banks, the ECB has taken steps that it believes will make corporate credit cheaper and more readily available. It should therefore not be a surprise to see the euro trade just a little below fair value at EUR/USD 1.26 at the end of September.

Over the long run we expect that the eurozone’s current account surplus and its lower levels of inflation compared to the U.S. will lead to a small appreciation of the euro, by 0.25% annually, to the equivalent of a EUR/USD 1.32 exchange rate.

Yen

We are now in the second year of Abenomics, but the monetary policy “arrow” is still being asked to shoulder most of the weight of economic adjustment. The impact of the deregulation agenda is still to be felt. Monetary policy has been successful in further weakening the yen to USD/JPY 110. This level is certainly significantly below the fair value estimates of the World Bank/OECD price comparison programme.

Given the limited market share gains realised by Japanese companies despite this significant decline in the yen, we are concerned that the fair value estimate for the yen might be too high. We also expect Japan’s high level of sovereign debt and grim demographic outlook to reduce the attractiveness of Japanese assets. We therefore expect the yen to trade below fair value for an extended period of time. Over the longer term we expect the yen to rise by 0.75% per annum to USD/JPY 100.

¹ Speech by Mario Draghi, president of the European Central Bank, at the Global Investment Conference in London on 26 July 2012.

Swiss franc

Now fairly close to fair value, the Swiss franc should benefit from a relatively more benign inflation outlook than the U.S., which suggests that it will rise at a long-term annualised rate of 0.25% against the U.S. dollar to USD/CHF 0.93.

Sterling

With the spectre of a sudden end to the 307-year union between England and Scotland lifted from FX markets, the pound sterling appears again quite fairly valued and virtually unchanged from last year at GBP/USD 1.62. Higher inflation and slower growth than in the U.S., however, should gradually lower the pound by 0.25% per annum to an exchange rate of GBP/USD 1.57.

Commodity currencies

Similar to last year, we have a fairly doubtful outlook for the Australian and Canadian dollars, which we still consider overvalued despite the correction seen over the past year. In line with our lacklustre outlook on commodities, the need to unwind some of the significant build-up of household credit accumulated over the last decade and the elevated level of domestic asset markets, such as housing, we believe the adjustment has further to go. While the same forces are impacting both currencies, we consider the Australian dollar to be considerably more exposed. Having benefited strongly from China’s rise over the last 15 years, the Australian dollar has to adjust from a much higher degree of overvaluation than the Canadian dollar. We therefore expect the Loonie to fall a little more, by 0.25% per annum to USD/CAD 1.14, while the Aussie dollar is expected to decline more significantly, by 1.75% per annum to AUD/USD 0.71. In Brazil, the end of the commodities supercycle has created a cyclical downturn that is aggravated by political uncertainty over the elections in October 2014, a lack of progress on economic reform and a worsening inflationary trajectory. We therefore expect the Brazilian real to decline at a rate of 2.25% per annum to USD/BRL 3.26.

Creating more robust forward-looking risk statistics

Daniel Scansaroli, *Head of Quantitative Research, J.P. Morgan Private Bank*

Michael Feser, *Global Investment Director and Portfolio Manager, GIM Solutions*

IN BRIEF

- Long-term asset volatilities and correlations tend to exhibit much more stability than historical returns.
- This means that when risk is measured over multiple cycles, monthly historical return data can be a sound starting point to create reasonable forward-looking predictions of future behaviour.
- However, given the uniqueness of each cycle and any crises within, naively using historical risk statistics can result in over-calibration to past events.
- To overcome these short comings, as well as to adapt the data set to the unique aspects of our return assumptions themselves, we employ a robust step-by-step approach to arrive at our volatility and correlation assumptions.
- We recommend the use of annualised volatilities based on log-returns in simulations or other algorithms and discuss our reasoning in detail.

OUR APPROACH TO VOLATILITIES AND CORRELATIONS

We have developed a three-step approach to arrive at our volatility and correlation assumptions. In the first step we determine an appropriate length for the historical time period to include in the analysis, with 10 years as the default starting point. We believe one structural factor impacting volatility and correlation levels in the historical data set is the relative mix between the number of months when the economy was in recession and when it was not. Using recession data from the NBER (National Bureau of Economic Research) as well as our own analysis¹ about the expected future lengths of economic expansions and contractions, we adjust, when necessary, the lengths of the historical period so that this mix is consistent with our expectation for the future. Currently, we find the mix in the default 10-year data period to be appropriate.

In the second step we use statistical methods to identify events that are unique to the last 10 years of monthly data points, such as disproportionately large (positive or negative) observations that may be skewing the perception of future risk estimations. As can easily be shown, a single large observation can cause a significant deviation from the true long-term trend in the data, when estimating risk statistics with raw historical return data. We therefore adjust large historical outlier observations based on the z-score of asset class returns, prior to calculating our forward-looking risk statistics. The z-score tells us how abnormal a particular market return is relative to its history. Where a return has less than a 0.5% chance of occurring in the left or right tail of a normal distribution (absolute z-score greater than 2.58), we have chosen to scale the return back to the one-half percentile return implied by the normal distribution.

By choosing to rescale returns that have a greater than, or less than, 0.5% chance of occurring, we believe our analysis will create asset volatilities and correlations that are more representative of future expectations, while still adequately capturing the elevated risks associated with typical market crises and the majority of the asset’s non-normal and fat-tail behaviour. Typically, this results in zero-to-four monthly returns out of 120 that need to be adjusted for each asset.

Procedurally, we use the following approach to filter **log-returns**, r_i , by their z-score ($z = \frac{r_i - \mu}{\sigma}$). This is done by estimating the mean (μ) and standard deviation (σ) using 10 years of monthly data. We then adjust each return ($r_i, i = 1$ to 120) to obtain a new series ($r_i^{new}, i = 1$ to 120) using the following rules:

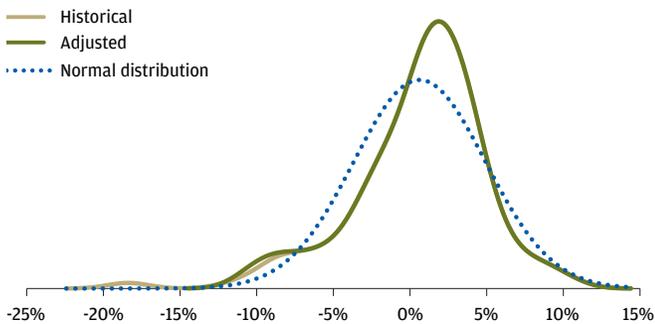
$$\begin{aligned} & \text{if } \left| \frac{r_i - \mu}{\sigma} \right| \leq z_{99.5}^* \text{ then } r_i^{new} = r_i \\ & \text{if } \frac{r_i - \mu}{\sigma} \geq z_{99.5}^* \text{ then } r_i^{new} = \mu + z_{99.5}^* \sigma \\ & \text{if } \frac{r_i - \mu}{\sigma} \leq -z_{99.5}^* \text{ then } r_i^{new} = \mu - z_{99.5}^* \sigma \end{aligned}$$

where $z_{99.5}^* = 2.58$

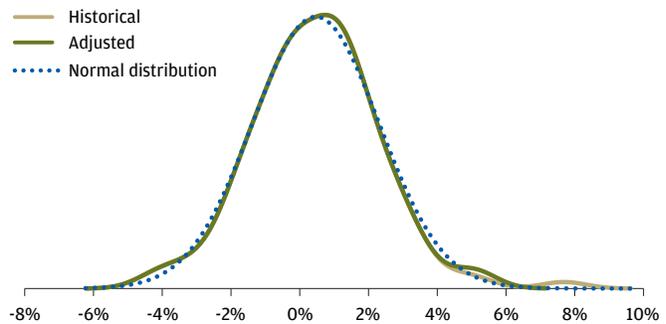
In the third and final step we review and selectively adjust these results by considering the future environment in terms of market liquidity, market structure and behaviour. Of particular importance at this stage is to generate an appropriate level of consistency in the implied risk-adjusted returns, or Sharpe ratio expectations, across all asset classes covered within the Long-Term Capital Market Return Assumptions.

EXHIBIT 1: EQUITY AND BOND DISTRIBUTION OF LOG RETURNS

U.S. large cap equities distribution of log returns



U.S. intermediate Treasuries distribution of log returns



Source: J.P.Morgan Asset Management, Bloomberg. U.S. large cap equities is proxied by the S&P 500 Total Return Index while U.S. intermediate Treasuries are proxied by the Barclays U.S. Treasury 7-10 Year Total Return Index.

¹ Michael Hood, “Tracking the Business Cycle,” (J.P. Morgan Asset Management Market Insights, July 2014).

Three final observations can be made regarding this approach. First, the inclined reader will have noted that we referred to log-returns, which we believe are the appropriate basis to calculate and annualise risk statistics. While we acknowledge that monthly volatilities are still often quoted as annualised after multiplying them by $\sqrt{12}$, we like to encourage every investor to use annualised volatilities based on log-returns as they more accurately capture the effects of return compounding in simulations or other algorithms. A more detailed discussion of our methodology and reasoning follows in the next section.

Second, the returns for illiquid and less frequently priced assets are, in addition to the process described here, un-smoothed using the process described in our analysis on non-normality². Last but not least, where an asset's historical data time series is shorter than 10 years, we use the method proposed by Stambaugh³ when estimating correlations. We also share some of the ongoing research that may help us to refine our estimation approach for our correlation assumptions further in the final section of this article.

RISK PARAMETER ESTIMATION USING THE NATURAL LOG OF MONTHLY RETURNS

To calculate our risk statistics we use the natural log (typically denoted "ln") of monthly returns. We perform this transformation for various reasons, the main one being that returns compound at an exponential rate over time, skewing our perception of both return and volatility. By taking the log of returns, we obtain linear relationships between log-returns, which provide a better representation of growth rates, volatility, and a plethora of other statistics. As an example of the skewing effects of compounding, an asset that continuously compounds at an annual rate of r_c sees an increase over one year of $FV = PVe^{r_c}$.

This implies that an investor would observe an arithmetic return:

$$r_a = \frac{FV}{PV} - 1.$$

However, as investors quickly learn, the compounding of arithmetic returns is not symmetric. For instance, if an asset returns $r_{a,1} = 10.0\%$ in one year and returns $r_{a,2} = -10.0\%$ the next, the total change is not zero, but is

$$(1+r_{a,1})(1+r_{a,2})-1=-1.0\%.$$

This also means that as an asset's price falls, the arithmetic return's loss is capped (the price can't fall below zero), while theoretically the upside can be infinite. This skewed distribution of arithmetic returns (due to compounding effects) doesn't easily lend to measuring the true growth rate and volatility of the return series. Log returns can more accurately capture the behaviour of market returns, as they give a symmetric account of how returns evolve. As a contrast to the previous example, a log return $r_{c,1}=10\%$ followed by log-return $r_{c,2}=-10\%$ results in an asset price that is back to its original value.

$$FV = PV e^{r_{c,1}} e^{r_{c,2}} = PV e^{r_{c,1}} e^{r_{c,2}} = PV$$

In this framework, the rate of return is given by the sum of the log-returns: $\ln\left(\frac{FV}{PV}\right) = r_c = r_{c,1} + r_{c,2}$. Just as arithmetic returns do not accurately capture the average growth rate, volatility and correlations can also be skewed by arithmetic returns. This ultimately means that log returns give a better representation of performance statistics, such as return, volatility, and correlation.

To summarise, arithmetic returns can be converted to continuous returns by applying the formula $r_c = \ln(1 + r_a)$. Therefore, using the original example where $r_{a,1} = 10\%$ and $r_{a,2} = -10\%$ same format as the 10% stated in the line above gives continuous returns $r_{c,1} = 9.5\%$ and $r_{c,2} = -10.5\%$. In this situation, the arithmetic returns have an average return of 0%, but in actuality, the true average return is -0.50% (which is given by the average of the log returns).

To model the compounding effects and randomness of price moments, *modern portfolio theory* uses a geometric process of the form:

$$S_t = S_{t-\Delta t} e^{\left(\mu - \frac{1}{2}\sigma^2\right)\Delta t + \sigma z \sqrt{\Delta t}},$$

where

S_t is the price of the security at time t

μ is the annual continuously compounded return

σ is the annual continuously compounded return volatility

z is a random variable typically moded by a standard normal distribution

Δt is the change in time (measured in years)

When the log-returns in this framework are assumed to be normally distributed, the set of arithmetic returns, $r_{a,*}$, have a log-normal distribution and they have the following properties:

$$\mu_a = \text{Mean}(r_{a,*}) = e^{\mu\Delta t} - 1$$

$$\sigma_a^2 = \text{Variance}(r_{a,*}) = (e^{\sigma^2\Delta t} - 1)e^{2\mu\Delta t}$$

$$\text{Skewness}(r_{a,*}) = (e^{\sigma^2\Delta t} + 1)\sqrt{e^{\sigma^2\Delta t} - 1}$$

$$\text{Excess Kurtosis}(r_{a,*}) = e^{4\sigma^2\Delta t} + 2e^{3\sigma^2\Delta t} + 3e^{2\sigma^2\Delta t} - 6$$

² Abdullah Z Sheikh and Jianxiong Sun, "The Blind Side: Managing Downside Risk in Corporate Defined Benefit Plans," (J.P. Morgan Asset Management Global Strategic Research, July 2010).

³ Robert F Stambaugh, "Analysing Investments Whose Histories Differ in Length," (Journal of Financial Economics 45, 1997). pages. 285-331.

According to this model the log-return series (also known as continuous returns), $r_{c,t}$, is calculated from the log of the arithmetic returns, such that:

$$\ln \frac{S_t}{S_{t-\Delta t}} = \ln(1 + r_{a,t}) = r_{c,t} = \left(\mu - \frac{1}{2}\sigma^2\right)\Delta t + \sigma Z\sqrt{\Delta t}$$

This form allows us to obtain consistent estimators of the mean, variance, and correlation of assets without the non-linear effects of compounding.

Another advantage of using log returns is the ability to properly annualise data. Traditionally, monthly volatility is annualised by multiplying by $\sqrt{12}$. However, this rule only applies to independent returns. When it is applied to arithmetic returns, compounding causes significant biases in the estimators. As previously discussed, log returns are theoretically independent and linear. Therefore, we first estimate our annualised mean and volatility using log returns based on the following formulas:

$$\sigma = stdev(\ln(1 + r_{a,monthly})) \cdot \sqrt{12}$$

$$\mu = average(\ln(1 + r_{a,monthly})) \cdot 12 + \frac{1}{2}\sigma^2.$$

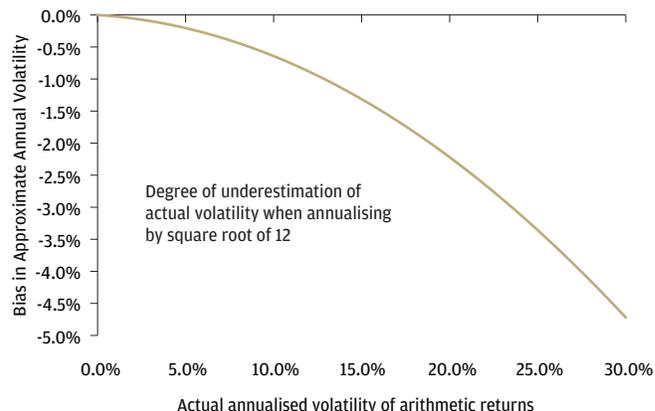
We then convert the annualised continuous volatility, σ , to the annualised arithmetic equivalent using the log-normal distribution's properties:

Equation 1

$$\sigma_a = e^{\mu} \sqrt{e^{\sigma^2} - 1}.$$

Using the approximate method—by annualising monthly volatility by $\sqrt{12}$ vs. the exact method in Equation 1—results in an underestimation of the true annual volatility of the asset.

EXHIBIT 2: ANNUALISATION OF MONTHLY VOLATILITY BY SQUARE-ROOT OF 12 UNDERESTIMATES THE TRUE VOLATILITY



Source: J.P. Morgan Asset Management. *Analysis is created by assuming the annual arithmetic return and volatility are related by a 0.5 Sharpe ratio and a cash rate of 2.0%.

Generally, the volatility could be annualised by using the monthly arithmetic mean and volatility:

Equation 2

$$\sigma_a = \sqrt{[(1 + \mu_{a,monthly})^2 + \sigma_{a,monthly}^2]^{12} - (1 + \mu_{a,monthly})^{24}}$$

Exhibit 3 shows a comparison of the different methods for estimating annual volatility from 120 months of data. Specifically, note that when we properly annualise the arithmetic volatility, it gives us estimates close to the more robust log-return method.

Similarly, to our calculations for volatility, we calculate the correlation of assets i and j using their log-returns series:

$$\rho_{i,j} = correl(\ln(1 + r_{a,i}^t), \ln(1 + r_{a,j}^t)),$$

EXHIBIT 3: ILLUSTRATIVE VOLATILITY COMPARISONS

Equity assumptions	Arithmetic (approximate annualisation Method*)	Arithmetic (annualised using Equation 2)	Annualised log-returns (Equation 1)	Annualised log-returns with Z-Score adjusted**
U.S. large cap	14.7%	15.9%	16.3%	15.5%
EAFE equity hedged	14.4%	15.4%	15.8%	15.1%
Emerging markets equity	23.8%	27.3%	28.4%	26.6%
Commodities	18.2%	20.0%	20.6%	19.4%
U.S. muni 1-15 year blend	3.4%	3.6%	3.6%	3.4%
Global aggregate bonds hedged	2.6%	2.7%	2.7%	2.7%
U.S. high yield bonds	10.3%	11.1%	11.5%	9.3%
Emerging markets sovereign debt	8.8%	9.6%	9.9%	8.3%
Currency strategies	2.9%	2.9%	2.9%	2.6%

Source: J.P. Morgan Asset Management. Monthly data Jun 2004 - Jun 2014. * "Approximate annualisation method" refers to multiplication of monthly arithmetic volatility by square root of 12. **See analysis on z-score adjusting of returns in the "Our Approach to Volatilities and Correlations" section of this article. EAFE=Europe, Africa, Far East.

Correlation is a measure of linear dependence and therefore the non-linear effects of compounding are not properly captured when correlation is calculated using arithmetic returns. This ultimately means that the magnitude of the relationship between two assets can be masked when estimated with arithmetic returns. After calculating our correlations on log returns we convert to the annualised arithmetic equivalent using the equation:

$$\rho_{a,i,j} = \frac{e^{\rho_{i,j}\sigma_i\sigma_j} - 1}{\sqrt{(e^{\sigma_i^2} - 1)(e^{\sigma_j^2} - 1)}}$$

By using annualised volatility, the arithmetic correlations give a more accurate representation of the annual correlation of arithmetic returns.

REFINING OUR APPROACH TO ESTIMATING AND ADJUSTING CORRELATIONS

While our correlations currently are based on the z-score filtered log-returns, we are considering approaches to adjust our correlations based on an analysis of the long-term asset relationships. **Exhibit 4** shows an analysis of the pair-wise relationships of asset returns using statistical methods that can determine breaks in long-term relationships between asset classes. In this example, we use an Orthogonalised Gnanadesikan-

estimates. The circles encompass the stable pair-wise relationships of their distributions while the points outside the circles indicate paired returns that are disconnected from this historical relationship. By reviewing these extreme pair-wise returns, one is able to understand how a specific crisis or market move impacts the correlation estimate. One can then use this information to adjust correlations based on an assessment of another similar crisis occurring or not.

REFERENCES

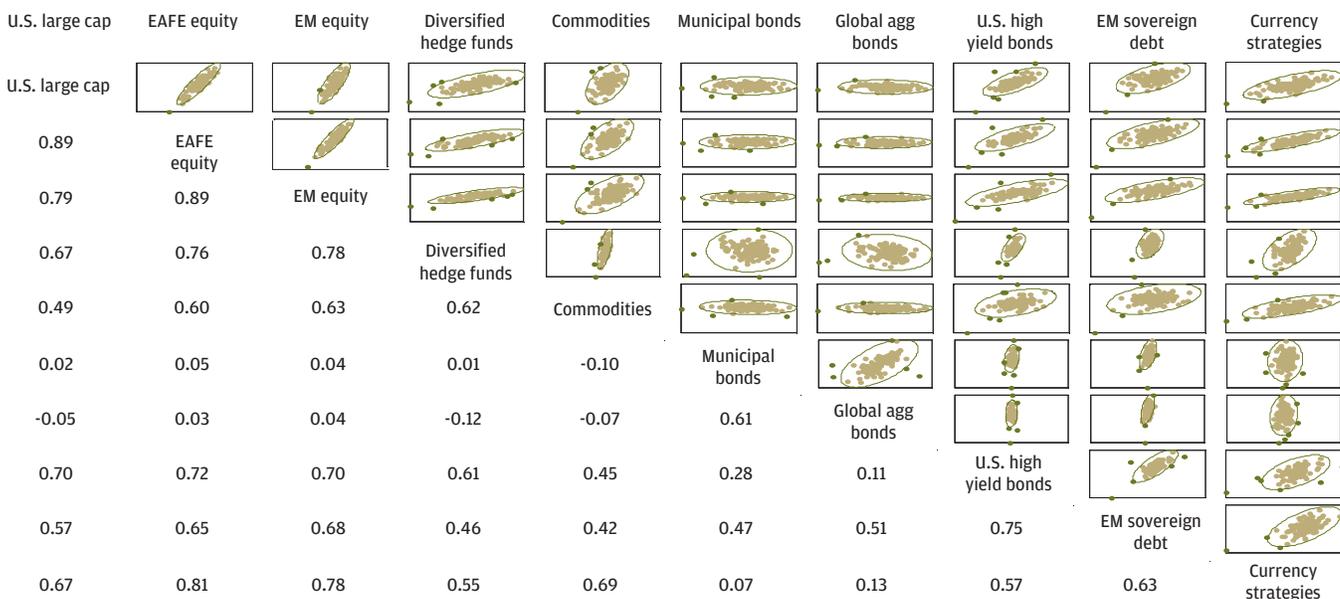
Steven E Shreve, “Stochastic Calculus for Finance II: Continuous-Time Models,” (New York: Springer, 2004).

Paul D Kaplan, “What’s Wrong with Multiplying by the Square Root of Twelve,” (Morningstar, Inc, January 2013).

PJ Rousseeuw and K van Driessen, “A Fast Algorithm for Minimum Covariance Determinant Estimator,” (Technometrics 41, 1999). pages 212-223.

R Maronna and R Zamar, “Robust Estimates of Location and Dispersion of High-Dimensional Data Sets,” (Technometrics 44(4), 2002). pages 307-317.

EXHIBIT 4: PAIR-WISE RELATIONSHIPS OF ASSET RETURNS USING MINIMUM COVARIANCE DETERMINANT ESTIMATORS



Source: J.P. Morgan Asset Management. EAFE=Europe, Africa, Far East. EM=emerging market. Agg=aggregate.

**III. LONG-TERM CAPITAL
MARKET RETURN
ASSUMPTIONS**

		Annualised Volatility: Square Root of 12																															
		Annualised Volatility																															
		Arithmetic Return 2015 (%)																															
		Compound Return 2015 (%)																															
		Compound Return 2014 (%)																															
		Inflation		U.S. Cash		U.S. Intermediate Treasuries		U.S. Long Treasuries		TIPS		U.S. Aggregate Bonds		U.S. Short Duration Government/Credit		U.S. Long Duration Government/Credit		U.S. Inv Grade Corporate Bonds		U.S. Long Corporate Bonds		U.S. High Yield Bonds		U.S. Leveraged Loans		World Government Bonds hedged		World Government Bonds		World ex-U.S. Government Bonds hedged		World ex-U.S. Government Bonds	
FIXED INCOME	Inflation	2.25	2.25	2.26	1.50	1.50	1.00																										
	U.S. Cash	2.00	2.00	2.00	0.50	0.50	0.10	1.00																									
	U.S. Intermediate Treasuries	4.25	4.00	4.29	7.75	7.50	-0.22	0.03	1.00																								
	U.S. Long Treasuries	3.25	2.75	3.59	13.25	12.25	-0.25	0.00	0.90	1.00																							
	TIPS	4.75	4.25	4.50	7.25	7.00	0.01	-0.02	0.68	0.53	1.00																						
	U.S. Aggregate Bonds	4.25	4.00	4.08	4.00	3.75	-0.21	0.00	0.86	0.76	0.78	1.00																					
	U.S. Short Duration Government/Credit	2.50	2.75	2.77	2.00	1.75	-0.20	0.29	0.64	0.41	0.65	0.74	1.00																				
	U.S. Long Duration Government/Credit	4.75	4.00	4.41	9.25	8.75	-0.23	-0.07	0.83	0.86	0.66	0.90	0.51	1.00																			
	U.S. Inv Grade Corporate Bonds	5.00	4.75	4.95	6.50	6.25	-0.21	-0.13	0.50	0.45	0.64	0.82	0.60	0.78	1.00																		
	U.S. Long Corporate Bonds	5.00	4.50	4.95	9.75	9.00	-0.25	-0.14	0.55	0.58	0.57	0.81	0.47	0.87	0.93	1.00																	
	U.S. High Yield Bonds	6.00	6.00	6.40	9.25	8.50	0.00	-0.16	-0.22	-0.29	0.27	0.19	0.11	0.10	0.57	0.46	1.00																
	U.S. Leveraged Loans	4.50	4.50	4.67	6.00	5.75	0.26	-0.10	-0.44	-0.43	0.03	-0.08	-0.15	-0.10	0.28	0.21	0.77	1.00															
	World Government Bonds hedged	3.25	2.75	2.80	3.25	3.25	-0.30	0.05	0.87	0.83	0.55	0.79	0.58	0.78	0.51	0.55	-0.21	-0.44	1.00														
	World Government Bonds	3.25	2.50	2.72	6.75	6.50	-0.06	0.05	0.57	0.43	0.63	0.64	0.62	0.52	0.52	0.48	0.15	-0.21	0.55	1.00													
	World ex-U.S. Government Bonds hedged	3.25	2.50	2.54	3.00	3.00	-0.30	0.02	0.76	0.73	0.45	0.71	0.50	0.71	0.48	0.52	-0.17	-0.38	0.95	0.50	1.00												
	World ex-U.S. Government Bonds	3.25	2.25	2.58	8.25	7.75	-0.02	0.04	0.46	0.31	0.58	0.56	0.56	0.44	0.49	0.44	0.22	-0.14	0.45	0.96	0.42	1.00											
	EM Sovereign Debt	6.75	7.00	7.58	11.25	10.50	-0.13	-0.07	0.29	0.17	0.56	0.60	0.43	0.50	0.75	0.67	0.69	0.35	0.29	0.48	0.30	0.49											
	EM Local Currency Debt	7.00	6.75	7.68	14.25	13.25	0.01	0.05	0.08	-0.04	0.38	0.34	0.30	0.24	0.50	0.43	0.59	0.24	0.09	0.55	0.11	0.59											
	EM Corporate Bonds	6.25	6.00	6.36	8.75	8.25	-0.08	-0.14	0.18	0.05	0.51	0.56	0.45	0.45	0.81	0.71	0.72	0.45	0.17	0.41	0.19	0.43											
	U.S. Muni 1-15 Yr Blend	3.75	3.25	3.33	4.00	3.75	-0.12	-0.05	0.52	0.45	0.55	0.66	0.47	0.57	0.60	0.55	0.29	0.12	0.52	0.37	0.49	0.33											
U.S. Muni High Yield	5.25	5.00	5.25	7.25	6.75	0.18	-0.09	-0.01	-0.03	0.30	0.23	0.02	0.19	0.35	0.29	0.47	0.53	0.00	0.03	0.03	0.04												
EQUITIES	U.S. Large Cap	7.50	6.50	7.60	15.50	14.00	0.01	-0.06	-0.29	-0.37	0.04	-0.02	-0.05	-0.06	0.26	0.20	0.69	0.48	-0.27	0.16	-0.23	0.24											
	U.S. Mid Cap	7.75	6.75	8.34	18.75	16.50	0.04	-0.08	-0.32	-0.39	0.04	-0.04	-0.08	-0.08	0.25	0.19	0.72	0.53	-0.31	0.11	-0.26	0.19											
	U.S. Small Cap	7.50	6.75	8.81	21.50	19.00	0.01	-0.07	-0.34	-0.41	-0.05	-0.12	-0.14	-0.15	0.15	0.11	0.65	0.45	-0.32	0.07	-0.27	0.15											
	U.S. Large Cap Value	7.75	6.75	7.95	16.25	14.75	0.01	-0.06	-0.29	-0.36	0.01	-0.02	-0.06	-0.06	0.25	0.20	0.67	0.45	-0.25	0.17	-0.20	0.24											
	U.S. Large Cap Growth	7.25	6.25	7.39	15.75	14.25	0.02	-0.08	-0.31	-0.40	0.06	-0.04	-0.06	-0.09	0.23	0.18	0.70	0.52	-0.31	0.13	-0.27	0.20											
	Europe ex-UK Large Cap	7.75	7.25	8.83	18.75	17.25	0.03	0.04	-0.24	-0.33	0.11	0.05	0.08	-0.01	0.33	0.26	0.69	0.44	-0.21	0.35	-0.17	0.43											
	Japanese Equity	6.75	5.25	6.47	16.25	15.50	0.01	-0.02	-0.18	-0.21	0.11	0.08	0.05	0.06	0.34	0.29	0.53	0.39	-0.15	0.21	-0.11	0.26											
	UK Large Cap	8.00	6.75	8.34	18.75	17.00	0.07	0.00	-0.31	-0.39	0.08	0.02	0.01	-0.03	0.34	0.27	0.71	0.54	-0.29	0.28	-0.25	0.36											
	EAFE Equity hedged	7.75	7.00	8.03	15.00	13.75	-0.02	0.02	-0.37	-0.39	-0.06	-0.06	-0.10	-0.06	0.28	0.23	0.68	0.56	-0.30	0.01	-0.23	0.08											
	EAFE Equity	7.75	6.75	8.10	17.25	16.00	0.03	0.02	-0.25	-0.33	0.12	0.07	0.07	0.01	0.37	0.30	0.71	0.48	-0.22	0.34	-0.18	0.42											
Emerging Markets Equity	9.00	8.75	11.77	26.50	22.50	0.03	0.08	-0.22	-0.30	0.17	0.07	0.08	0.01	0.35	0.28	0.69	0.47	-0.21	0.27	-0.17	0.34												
Asia ex-Japan Equity	9.25	9.75	12.48	25.25	21.75	-0.03	0.06	-0.20	-0.28	0.16	0.10	0.10	0.05	0.40	0.33	0.70	0.47	-0.17	0.26	-0.13	0.33												
AC World Equity	7.75	6.75	8.14	17.50	15.75	0.03	0.00	-0.28	-0.37	0.10	0.03	0.02	-0.03	0.33	0.27	0.74	0.50	-0.26	0.27	-0.21	0.35												
ALTERNATIVES	Private Equity	8.00	7.75	9.89	22.00	20.00	0.05	-0.11	-0.39	-0.44	-0.03	-0.13	-0.13	-0.16	0.18	0.12	0.69	0.53	-0.36	0.06	-0.30	0.14											
	U.S. Direct Real Estate	6.00	6.00	6.61	11.50	10.75	0.00	-0.01	-0.03	-0.06	0.04	0.05	0.00	0.03	0.11	0.10	0.25	0.14	-0.02	0.09	-0.01	0.11											
	U.S. Value Added Real Estate	7.75	7.75	8.84	15.50	14.25	0.00	-0.01	-0.03	-0.06	0.04	0.05	0.00	0.03	0.11	0.10	0.25	0.14	-0.02	0.09	-0.01	0.11											
	European Direct Real Estate	5.75	5.75	6.89	15.75	14.75	-0.04	0.00	-0.03	-0.04	0.03	0.06	0.02	0.06	0.15	0.14	0.20	0.13	0.03	0.05	0.06	0.07											
	U.S. REITs	6.75	6.50	8.17	19.25	17.75	-0.03	-0.04	-0.04	-0.11	0.14	0.17	0.03	0.14	0.35	0.31	0.64	0.35	-0.02	0.26	0.00	0.30											
	Global Infrastructure	7.25	6.75	7.47	12.50	11.75	0.10	-0.01	-0.11	-0.14	0.01	-0.03	-0.04	-0.04	0.06	0.04	0.21	0.17	-0.11	0.04	-0.10	0.07											
	Diversified Hedge Funds	5.25	4.50	4.67	6.00	5.75	0.16	0.10	-0.41	-0.43	0.03	-0.14	-0.12	-0.15	0.17	0.11	0.58	0.54	-0.39	0.02	-0.34	0.10											
	Event Driven Hedge Funds	6.00	6.00	6.23	7.00	6.50	0.14	0.00	-0.46	-0.51	0.01	-0.14	-0.12	-0.18	0.23	0.14	0.73	0.62	-0.42	0.07	-0.35	0.15											
	Long Bias Hedge Funds	6.25	5.25	5.82	11.00	10.50	0.10	0.02	-0.42	-0.49	0.04	-0.11	-0.06	-0.16	0.24	0.16	0.72	0.57	-0.41	0.11	-0.35	0.20											
	Relative Value Hedge Funds	4.75	5.00	5.16	5.75	5.50	0.17	-0.03	-0.40	-0.45	0.11	-0.02	-0.03	-0.08	0.37	0.26	0.81	0.76	-0.38	0.01	-0.32	0.08											
Macro Hedge Funds	5.25	4.75	5.22	10.00	9.50	-0.02	0.20	-0.09	-0.10	0.16	0.01	0.14	0.00	0.13	0.10	0.20	0.03	-0.06	0.33	-0.04	0.37												
Commodities	3.75	3.50	5.22	19.25	17.25	0.22	0.08	-0.15	-0.24	0.23	0.05	0.12	0.00	0.23	0.17	0.41	0.28	-0.22	0.31	-0.22	0.37												
Gold	4.25	4.00	6.11	21.50	18.50	0.08	0.10	0.20	0.08	0.39	0.27	0.31	0.15	0.25	0.17	0.10	-0.10	0.11	0.45	0.07	0.46												

Source: J.P. Morgan Asset Management. Data as of 30 September 2014, except hedge funds (diversified, event driven, long bias, and relative value) as of 30 June 2014 and hedge Private equity, hedge funds, real estate, infrastructure and commodities are unlike other asset categories shown above in that there is no underlying investable index. Hedge returns among managers in these asset classes and strategies is typically far wider than for traditional asset classes.

**GLOSSARY AND
ACKNOWLEDGEMENTS**

GLOSSARY

BALANCE OF PAYMENTS is the record of monetary transactions between a country and the outside world. Receipt of funds, such as those from exports, new borrowing and investment receipts, are recorded as positive (credit) items; payment of funds, such as for imports, debt servicing or new investment, are negative (debit) items. The overall balance of payments should equal zero when all components (including changes in reserve items) are included.

BEARER ASSETS are assets whose ownership is not recorded, such as bank notes, bullion and some government bonds. Bearer assets are difficult, if not impossible, for authorities to track (and expropriate).

BUDGET SURPLUS (DEFICIT) is a government's revenues (expenditures) in excess (or in deficit of) of expenditures (revenues), including interest payments.

CURRENT ACCOUNT is equal to the balance of trade, or value of exports minus imports of goods and services, plus factor income (for example, interest and dividends) and net unilateral transfers (for example, foreign aid). A current account surplus often increases a country's net foreign assets.

CYCLICALLY ADJUSTED BUDGET BALANCE is a structural fiscal position estimated by adjusting the budget surplus (deficit) to reflect a hypothetical business-cycle neutral environment, based on assumptions for cyclical sensitivities of government revenues and expenditures. The International Monetary Fund and OECD publish estimates of this indicator.

DEBT is some quantity owed as a result of past or present borrowing.

DEBT SERVICE is a borrower's payments on its debt over some period, usually inclusive of both principal and interest.

DEFICIT is the amount by which cash outflows (expenses) exceed inflows (income) in a given period.

DELEVERAGING, in the macroeconomic context, is a reduction of a nation's total public and private sector debt, especially relative to nominal GDP.

EQUILIBRIUM LEVEL is the average or cycle-neutral value for a market or macroeconomic variable (for example, yield or credit spread) expected to prevail over the long term.

FOREIGN EXCHANGE RESERVES, or international reserves, are foreign currency-denominated assets (for example, cash deposits, bonds, special drawing rights and IMF reserve positions) and gold held by a central bank. These assets are usually denominated in certain reserve currencies (for example, U.S. dollar), and are sometimes used to intervene in foreign exchange markets to influence or peg the exchange rate.

HARD CURRENCIES are globally traded currencies that are expected to maintain value, and therefore, often held as foreign-exchange reserves. Examples from recent history include the U.S. dollar, euro, British pound sterling, Swiss franc, and Japanese yen.

LIQUIDITY PREMIUM is the extra return investors demand for holding an asset that is less readily convertible to cash than another, such as private equity and real estate.

NON-NORMALITY is a term we use to describe three characteristics of asset returns typically ignored by traditional mean-variance models. These effects include serial correlation, "fat" left tails and converging correlations. For a fuller treatment of the topic, please refer to "Non-Normality of Market Returns: A Framework for Asset Allocation Decision Making" by Abdullah Z. Sheikh, J.P. Morgan Asset Management, May 2009.

NORMALISATION refers to the restoration of economic conditions, such as interest rates, to more cycle-neutral levels following a temporary dislocation period.

OECD or the **ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT** is an international organization of democratic countries with market-based economies founded in 1961, which "provides governments a setting in which to discuss, develop, and perfect economic and social policy."

PRIMARY BUDGET BALANCE of a government is its overall budget deficit (or surplus) excluding debt service net expenditures (interest and principal payments on outstanding debt).

PURCHASING POWER PARITY or **PPP** exists when the same bundle of goods (usually that defined by the CPI) in two countries has an equal value at the prevailing exchange rate. Adjusting GDP for PPP means converting a country's GDP to another currency using the hypothetical exchange rate that would yield purchasing power parity.

QUANTITATIVE EASING or **QE** is a form of monetary policy by which a central bank purchases financial assets, thereby expanding its balance sheet, increasing the money supply and stimulating aggregate demand; quantitative easing is distinct from the more usual policy of targeting interest rates through open market operations and is usually employed when interest rates are already exceptionally low.

RE-RATING occurs when market views shift, increasing or decreasing price-to-earnings and other valuation ratios.

RISK PREMIUM is the return investors expect to earn by holding risky assets, in addition to the return on a virtually riskless asset.

SERIAL CORRELATION, also known as autocorrelation or lagged correlation, is correlation between a time series variable with itself over some interval. If returns are serially correlated at lag 1, then returns in one period are positively related to returns in the prior period.

SOVEREIGN DEBT is issued by a national government to finance its operations and may be denominated in either local currency or foreign hard currency.

STANDARD DEVIATION is one measure of how dispersed data is around the average. Mathematically, it is calculated as the square root of variance, which is the mean of squared differences from the mean.

TAIL RISK is the risk of the value of an asset or portfolio of assets moving more than three standard deviations from its current value. Managing downside, or left tail risk, has become a major focus for portfolio risk managers. Kurtosis is the statistical measure of tail thickness, and is higher for most asset classes than implied by the normal distribution.

VOLATILITY is a term used interchangeably with standard deviation throughout this paper to describe the variation in changes of some financial level or rate over time.

WINSORISATION applies a cap and floor to extreme data values to remove the impact of potentially spurious outlier data on statistical results. A 90% Winsorisation would set all values below the 5th percentile and above the 95th percentile to these respective percentile values. Winsorising is not equivalent to “trimming,” which simply excludes outlier data from the sample.

ACKNOWLEDGEMENTS

CONTRIBUTORS TO THE 2015 EDITION OF THE LONG-TERM CAPITAL MARKET RETURN ASSUMPTIONS



David Shairp
Global Strategist and Portfolio Manager
GIM Solutions - Global Multi-Asset Group



Anthony Werley
Chief Portfolio Strategist
Endowment and Foundations Group



Michael Feser
Global Investment Director and Portfolio Manager
GIM Solutions



Grace Koo
Quantitative Research and Portfolio Management
GIM Solutions - Global Multi-Asset Group



Michael Hood
Senior Economist
Strategy Group



Patrik Schöwitz
Global Strategist
GIM Solutions - Global Multi-Asset Group



Michael Albrecht
Global Strategist
GIM Solutions - Global Multi-Asset Group



Paul Sweeting
European Head
Strategy Group



Alexandre Christie
Vice President
Strategy Group



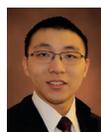
Daniel Scansaroli
Head of Quantitative Research
J.P. Morgan Private Bank



Rupert Brindley
Portfolio Manager
Fixed Income Group



Dave Esrig
Director of U.S. Real Estate Research
Global Real Assets Group



Jeff Sun
Quantitative Analyst
GIM Solutions - Global Multi-Asset Group



Livia Wu
Analyst
GIM Solutions - Global Multi-Asset Group

The *Long-Term Capital Market Return Assumptions Committee* would like to thank the following for their contributions throughout the preparation of this report:

Our *Long-Term Capital Market Return Assumptions* have incorporated input from investment thinkers throughout the J.P. Morgan network. The *Long-Term Capital Market Return Assumptions Committee* is grateful to many investors for their insights, including: John Ancona, Serkan Bahceci, Pierre-Yves Bareau, Richard Biebel, Brian Bovino, James Brown, Maria Castro, Jonathan Cummings, Dave Esrig, Nicole Goldberger, Tony Gould, Roger Hallam, Joseph Handelman, Nick Handley, Michael Hudgins, George Iwanicki, Eric Klein, Steven Lear, John Littlefield, Jonathan Lowe, Stephen Macklow-Smith, Solita Marcelli, William Morgan, Ryusuke Otori, Paul Quinsee, Ellen Rachlin, Luke Richdale, Kathryn Rosa, Yoshito

Sakakibara, James Shanahan, John Speer, Paul Sweeting, David Tan, Richard Taormina, Katy Thorneycroft, Michael Vaknin, Yang Dong, Suzanne Wuebben.

We also want to express our appreciation to the Co-Heads of GIM-Solutions Jed Laskowitz and Mike O'Brien and the members of the *Asset Management Investment Committee* for their input and oversight: Lawrence Unrein (Chair), Joseph Azelby, Michael Cembalest, Mary Erdoes, Jamie Kramer, Naveen Kumar (Secretary), Robert Michele, Martin Porter, Christopher Willcox, Doug Wurth.

Finally, thanks to Investment Writing: Richard Hall, Barbara Heubel, Rita Lockheart; Marketing Communications and Design: Lauralee Nouyou, Jamie Lonie; and Institutional Marketing: Chris Scicluna, Kristen Swanson.

NOT FOR RETAIL DISTRIBUTION: This communication has been prepared exclusively for Institutional/Wholesale as well as Professional Clients as defined by local laws and regulation.

The opinions, estimates, forecasts, and statements of financial markets expressed are those held by J.P. Morgan Asset Management at the time of going to print and are subject to change. Reliance upon information in this material is at the sole discretion of the recipient. Any research in this document has been obtained and may have been acted upon by J.P. Morgan Asset Management for its own purpose. References to specific securities, asset classes and financial markets are for illustrative purposes only and are not intended to be, and should not be interpreted as advice or a recommendation relating to the buying or selling of investments. Furthermore, this material does not contain sufficient information to support an investment decision and the recipient should ensure that all relevant information is obtained before making any investment. Forecasts contained herein are for illustrative purposes, may be based upon proprietary research and are developed through analysis of historical public data.

J.P. Morgan Asset Management is the brand for the asset management business of JPMorgan Chase & Co. and its affiliates worldwide. This communication may be issued by the following entities: in the United Kingdom by JPMorgan Asset Management (UK) Limited which is authorised and regulated by the Financial Conduct Authority; in other EU jurisdictions by JPMorgan Asset Management (Europe) S.à r.l.; in Switzerland by J.P. Morgan (Suisse) SA; in Hong Kong by JF Asset Management Limited, or JPMorgan Funds (Asia) Limited, or JPMorgan Asset Management Real Assets (Asia) Limited; in India by JPMorgan Asset Management India Private Limited; in Singapore by JPMorgan Asset Management (Singapore) Limited, or JPMorgan Asset Management Real Assets (Singapore) Pte Ltd; in Australia by JPMorgan Asset Management (Australia) Limited; in Taiwan by JPMorgan Asset Management (Taiwan) Limited and JPMorgan Funds (Taiwan) Limited; in Brazil by Banco J.P. Morgan S.A.; in Canada by JPMorgan Asset Management (Canada) Inc., and in the United States by J.P. Morgan Investment Management Inc., JPMorgan Distribution Services Inc., and J.P. Morgan Institutional Investments, Inc. member FINRA/SIPC.

© J.P. Morgan 2014.

LV-JPM21158 | 10/14