Dynamic Asset Allocation Through the Business Cycle

A Macro Regime Approach

Alessio de Longis, CFA
Senior Portfolio Manager
Invesco Investment Solutions (IIS)

"When the facts change, I change my mind.
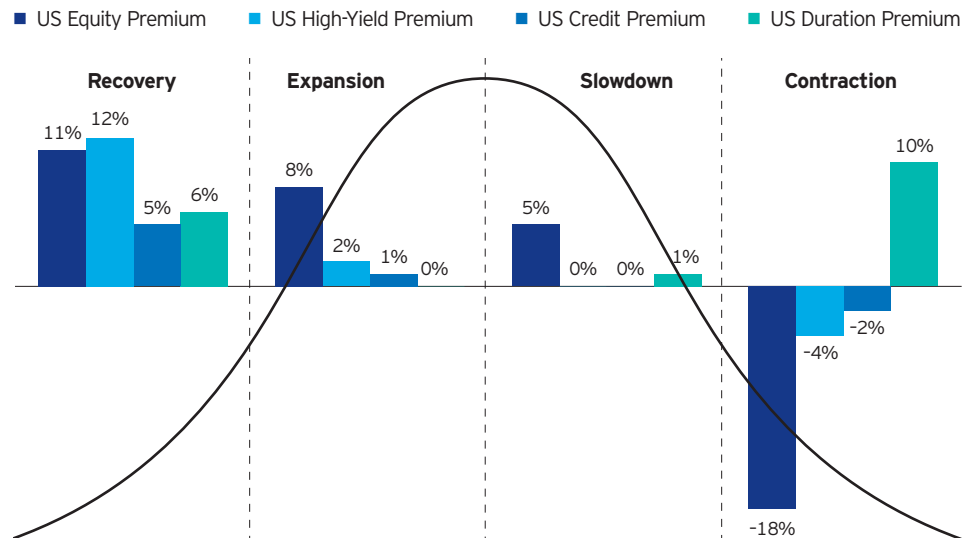What do you do, sir?"
−Attributed to John Maynard Keynes[1]

Executive Summary

+ While valuation is a powerful predictor of long-term asset returns, we believe its power as a performance indicator declines as the investment horizon shortens.
+ We have developed a macro regime framework to allocate assets dynamically through the stages of the business cycle over the short and medium term.
+ We use leading economic indicators to identify macro regimes in a timely manner and provide empirical evidence of how the prices of equities, credit and sovereign fixed income are driven by the change, not the level, of growth under different macro regimes.
+ Using our macro framework, historical analysis of the last 45 years shows that asset returns vary significantly between regimes, with major implications for asset allocation decisions.

Different Risk Premia Have Outperformed in Different Macro Regimes

US Historical Returns (January 1970-June 2019)

■ US Equity Premium　■ US High-Yield Premium　■ US Credit Premium　■ US Duration Premium

Sources: Invesco's proprietary research of the US Business Cycle Leading Indicator, 6/30/19. Bloomberg L.P. Annualized monthly returns of the defined risk premia from January 1970-December 2013. Risk Premia are defined as follows: US Equity Premium = MSCI US Total Return Index − US Treasuries 10-YR. High Yield Premium = US High Yield − US Investment Grade Credit. Credit Premium = US Investment Grade − US Treasuries. Duration Premium = US Treasuries 10-YR − US T-bills 3-Month. See definitions page for index definitions. **Past performance does not guarantee future results.**

The Limits of Valuation

Valuation-based investment frameworks are powerful predictors of long-term forward returns. However, a close look at the data makes it clear that valuation is not a reliable indicator over shorter time frames.

Investors across the board, from institutional to retail, face the common dilemma of how to manage an asset allocation over time. Should allocations be fixed and strategic, or should they be actively managed? We believe that a dynamic approach to asset allocation is the best way to capitalize on changing investment opportunities and risk environments. But how should the allocation be actively managed? It is well documented that owning cheap or undervalued assets typically yields good results. We believe this approach works best over longer time horizons; however, it is not a reliable indicator over shorter time frames. To better manage assets over the short and medium term, we use forward-looking macroeconomic analysis that helps us determine our asset allocation during particular phases of the business cycle.

In Exhibit 1, we use earnings yield—the inverse of the P/E ratio[2]—as a proxy for valuation methods in general (**Exhibit 1**). We plot earnings yield for a number of periods and chart the subsequent 10-year annualized return for the S&P 500 Index. We would expect to see that high earnings yields lead to strong returns and vice versa. In fact, the data confirms a remarkably strong relationship between earnings yield and long-term forward returns. Over the period since 1970, we find that roughly half of the variability of 10-year forward returns can be explained by the starting valuation point. The data tells us that investing when the market is cheap has typically delivered strong subsequent returns over a 10-year horizon. By the same token, investing when the market is expensive tends to deliver below-average returns over the same horizon.

Why is this the case? When earnings yields are relatively high, a portfolio gains two advantages that help it do well over time. First, the portfolio is exposed to a higher amount of corporate earnings per unit of cost. Second, equity prices tend to mean-revert over time, giving the portfolio an additional benefit from potential price appreciation. Exactly the opposite occurs when earnings yields are low. A portfolio receives less in starting yield and is less likely to earn a significant amount via price appreciation because its stocks are already expensive, and prices tend to mean-revert downward.

Exhibit 1: Valuation Is a "Good" Predictor in the Long Term

Earnings Yield vs. 10-Year Forward Returns of the S&P 500 Index Since 1970
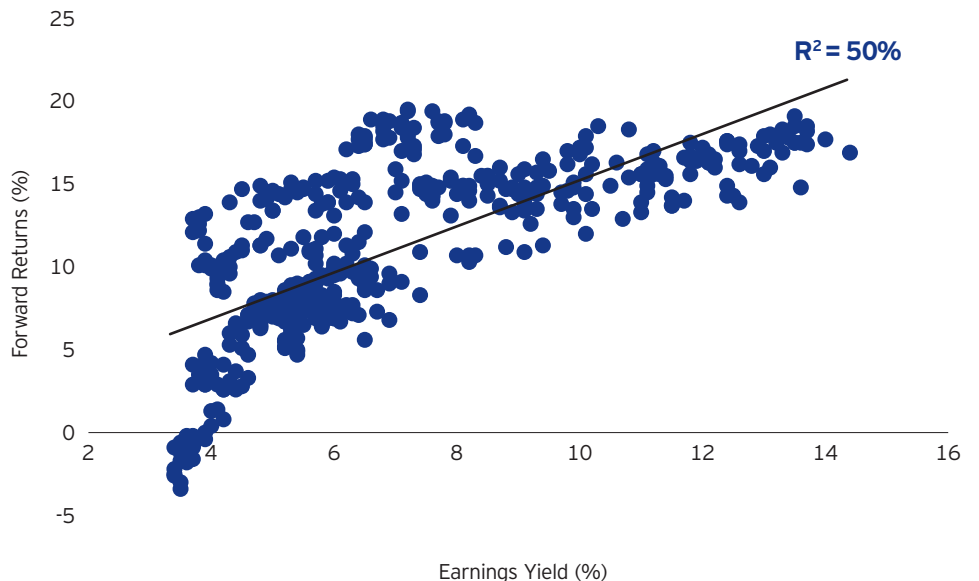
Source: Bloomberg L.P., 6/30/2019. **Past performance does not guarantee future results.**

2 Price-to-Earnings (P/E) Ratio: The valuation ratio of a company's current share price compared to its per-share earnings.

However, this relationship weakens significantly when the time horizon is shortened. Looking out over three years, the starting valuation point explains only 12% of the variability of returns. Over this window, sometimes expensive markets delivered good returns over three years, while sometimes cheap markets delivered poor returns. Further, when the time horizon is shortened to one month, valuation gives us barely any predictive power (**Exhibit 2**).

Valuation is less helpful over the short term because it is influenced by the economic environment, the business cycle, investor risk appetite, and monetary policy, all of which can drive valuations higher or lower. In contrast, these effects are less important over the long term.

If valuation doesn't provide the necessary insight into the drivers of short- and medium-term returns, what does? We believe that macroeconomic analysis provides helpful insights over shorter horizons. As we will show later, asset price performance varies considerably between different phases of the business cycle. By incorporating a macro regime framework into the investment process, we can better manage risk and capture opportunities to help deliver a better investor experience in the short to medium term.

Exhibit 2: Valuation's Effectiveness Decreases at Shorter Time Horizons
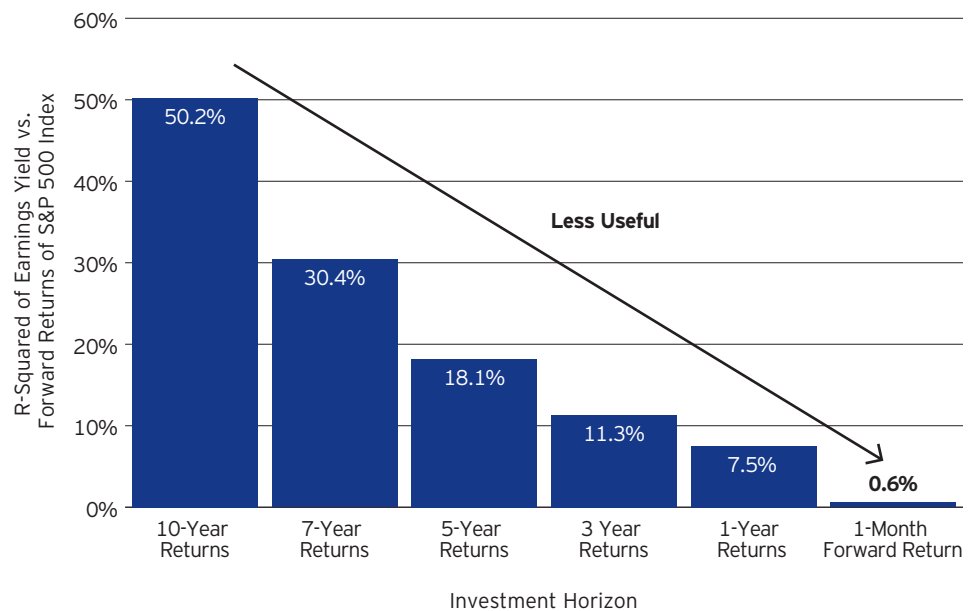
Source: Bloomberg L.P., 6/30/2019. **Past performance does not guarantee future results.**
The index is unmanaged and cannot be purchased directly by investors. Index performance is shown for illustrative purposes only and does not predict or depict the performance of any investment.

Defining Macro Regimes

It is well understood that financial markets are heavily affected by the macro environment. For instance, common wisdom suggests that recessions are associated with underperformance in risky assets; however, empirical evidence does not necessarily confirm this assertion, at least not on the surface.

As illustrated in Exhibit 3, each phase has its own economic environment with unique growth and inflation dynamics, corporate profitability and credit conditions. Next, we review in more detail each macro regime and its implications for monetary and fiscal policy which, in turn, play a critical role in the evolution of the business cycle and financial markets performance (**Exhibit 3**).

In the latest business cycle, for example, the US economy was still contracting through the end of 2009, with –0.2% year-over-year growth in the fourth quarter, while high yield and equity markets were up nearly 60% and 30%, respectively, that year.[3] So, why the disconnect? Is there a better way to define macro regimes that is more relevant to financial markets?

Though not an official designation, the often-cited definition of a recession is two consecutive quarters of negative GDP growth.[4] We argue that macro regime analysis is more nuanced than just measuring whether growth is positive or negative and that such a metric is not the key threshold driving financial markets.

We believe that a better way to define the business cycle and its macro regimes is to determine how growth is performing versus its long-term trend and, more importantly, to assess its direction (i.e., the change in growth). As we will show later, the combination of these two metrics has major implications for asset prices and portfolio decisions.

We define four phases, or macro regimes, as follows:
+ Recovery, when growth is below trend and accelerating.
+ Expansion, when growth is above trend and accelerating.
+ Slowdown, when growth is above trend and decelerating.
+ Contraction, when growth is below trend and decelerating.

Exhibit 3: Understanding the Business Cycle
Stylized Business Cycle
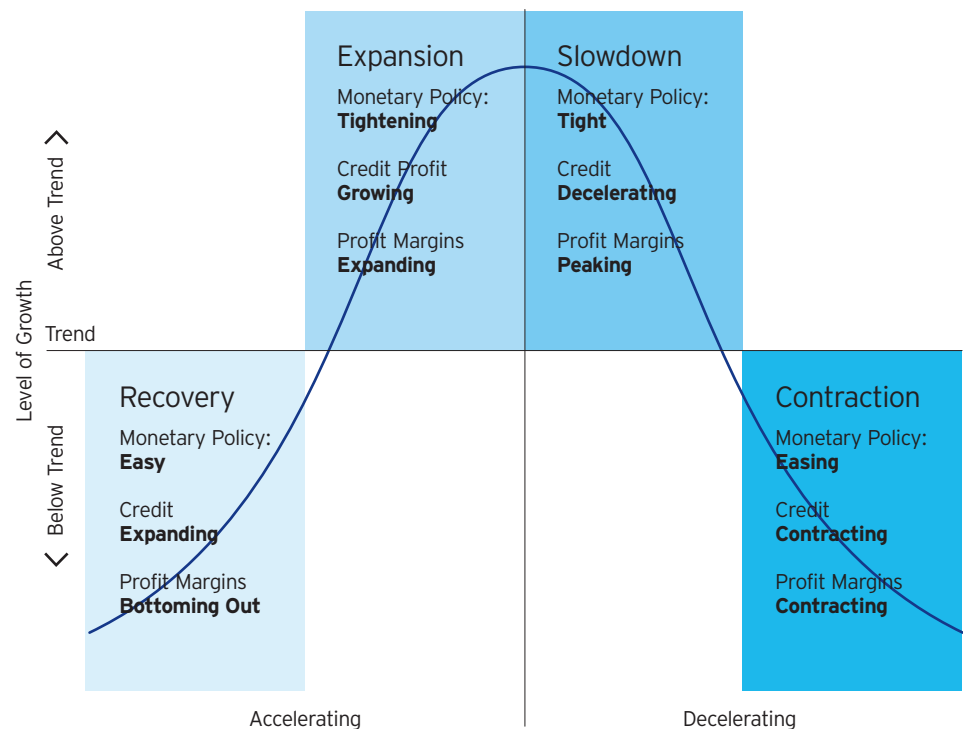
Recovery: Growth is below trend and accelerating
Recovery is the stage that occurs when the economy is coming out of recession, with a growth rate that is below trend but improving. Although others limit the definition of recovery to periods when GDP growth is positive, we also include periods when GDP growth is still negative, but showing improvements from past readings that were even more negative (e.g., growth going from –5% to –2% on an annual basis).

In this phase, the economy is relatively weak, with unemployment still rising and inflation falling due to ample spare capacity. Profit margins, while still low, are bottoming out because of previous cuts in investment and labor costs. Monetary and fiscal policies are geared towards supporting economic activity and countering disinflationary pressures;

3 Returns based on the JPMorgan Domestic High Yield Index and the S&P 500 Index.
4 Similarly, the official designation from the National Bureau of Economic Research defines a recession as a "significant decline in economic activity spread across the economy" http://www.nber.org/cycles/recessions.html.

the result is ample financial liquidity and positive credit growth. As we will see later, risky assets generally deliver strong performance during the recovery phase.

Expansion: Growth is above trend and accelerating
As the economy continues to improve, it reaches an expansion when its growth rate is above historical trend and still accelerating. In this phase, the economy fully benefits from the lagged effects of expansionary policies adopted during the recovery. Earnings growth and profit margins expand rapidly, leading to strong business and consumer confidence, falling unemployment and rising consumption. Credit growth continues to expand. Consequently, inflationary pressures begin to emerge, and monetary policy enters a gradual but steady tightening cycle aimed at containing inflation and excessive credit creation. As shown later, equities are the best performing asset class in this regime. Generally, this expansion phase can continue for a long period, even several years, until the economy begins to respond to tighter monetary policy, entering the subsequent slowdown phase.

Slowdown: Growth is above trend and decelerating
While growth remains solidly above trend, it starts decelerating due to lagged effects from monetary policy tightening. Credit growth begins to slow in response to tighter financial conditions and accumulated leverage in the system. Profit margins are no longer expanding, while labor markets remain tight due to lack of spare capacity. As a result, wage and inflationary pressures continue to warrant restrictive monetary policy, further reinforcing the slowdown. This phase of the business cycle is particularly uncertain, with growth decelerations and re-accelerations frequently alternating. Financial markets performance is also mixed, with insignificant risk-adjusted returns. Generally, these peak cyclical conditions can last for a couple of years, until the slowdown eventually becomes more pronounced, leading the economy into a contraction.

Contraction: Growth is below trend and decelerating
The economy enters a contraction when growth dips below its long-term trend and continues to decelerate. Within our framework, we consider the economy to be in contraction not only when growth is negative, but also when growth is still positive, lower than trend growth and falling, (i.e., a growth rate of 1% for an economy with a historical trend of 2%). This differs from the typical definition of a recession, which describes two or more quarters of negative growth.

In this final stage, growth deteriorates rapidly due to tight lending standards, credit contraction and excessive inventories. Finally, the unemployment rate steadily rises as companies shed workers in response to falling profitability. Disinflationary pressures rapidly emerge, central banks ease aggressively, and governments respond with fiscal spending to support employment. As this adjustment process advances, the economy stabilizes and responds to expansionary policies, moving itself back into recovery and a new business cycle. Risky assets severely underperform during contractions, while government bonds are typically the best performing asset class.

Forward-Looking Macro Analysis: Constructing a Leading Indicator of the Business Cycle

Traditionally, economists use indicators such as GDP, industrial production, or the unemployment rate to perform historical analysis of economic cycles. However, these measures are impractical for making investment decisions in real-time, for three reasons:

+ First, these statistics are released with a substantial lag to their reference period (often 1–2 months).
+ Second, they are subject to multiple revisions.
+ Third, financial markets tend to lead real economic activity, not the other way around.

Therefore, by the time this information is available, it tells us something about the past, and it is not predictive of future asset price returns. Indeed, these reasons are often cited to justify the common skepticism about macro analysis and its usefulness for an investment decision process.

To overcome these problems, we construct a leading indicator of the US business cycle using economic and financial data that are released in a timely manner, available at high frequency (at least monthly), and not subject to revisions.
By focusing on forward-looking indicators, we aim to anticipate turning points in economic activity and financial markets performance. To capture the breadth of the cycle rather than relying on one specific industry or indicator, we collect information from different parts of the economy, selecting indicators from five broad categories (see Exhibit 4 for more details), and combine them into one composite leading indicator (**Exhibit 4**).

Exhibit 4: Broad Categories

Business surveys
Surveys of manufacturing and service industries provide a timely read of sentiment in the corporate sector. Respondents' assessment of prospective demand, order books, and inventories offer insights into their outlook for future production, hiring intentions, and investment spending.

Consumer Surveys
Sentiment surveys contain valuable information about consumer expectations on future job prospects, their spending intentions in the near future, as well as their overall confidence in the economy. This information tends to lead growth in actual consumer spending.

Manufacturing Activity
Although manufacturing is a small part of overall GDP, especially in developed markets, it is one of the most cyclical sectors of the economy, carrying valuable information about potential turning points in overall economic activity. Information about new orders, inventories, working hours, and job vacancies provide early indications of likely changes in economic momentum.

Construction and Housing
Analogous to manufacturing, the housing sector is particularly cyclical and responsive to the flow of credit in the economy. Indicators such as building permits, housing starts and mortgage applications, among others, provide early signals of turning points in the cycle.

Monetary and Financial Conditions
Monetary policy affects the economy with a lag, usually over the course of one or two years. As a result, proxy measures of monetary and financial conditions offer some of the best leading indicators of future growth. These measures include short-term real interest rates, the slope of the yield curve, money supply growth, and so on.

We repeat this process for a large set of countries and regions, gathering a comprehensive view of economic performance around the world. As one example, Exhibit 5 plots our proprietary leading economic indicator for the US going back to the 1970s (**Exhibit 5**).

The historical perspective in **Exhibit 5** demonstrates how cycles follow repetitive patterns over time, with a full cycle typically completed over 7 to 10 years. This recurrence is an important reminder that the economy always tends to revert back to its trend and that every acceleration phase is inevitably followed by deceleration and vice versa.

A comparison of the theoretical business cycle in **Exhibit 3** with the actual data in **Exhibit 5** highlights the differences between economic theory and reality:

+ Over the long term the four regimes follow one another in a "predictable" fashion, with recoveries followed by expansions, then slowdowns, and then contractions, as suggested by theory. However, in practice, the cycle experiences several shorter-term back and forth movements between regimes. Especially at the peak of the cycle, the economy goes through typical "soft patches," where expansions and slowdowns frequently alternate.

+ Second, the four regimes do not occur with equal duration and persistency. Economies typically spend only 15%–20% of the time in recoveries, 15%–20% in contractions, 30%–35% in expansions, and 30%–35% in slowdowns. Note in Exhibit 5 how our leading indicator experiences sharp falls and V-shaped rebounds in "below-trend" regimes (i.e., recovery and contraction), while it follows a more gradual evolution in "above-trend" regimes (i.e., expansion and slowdown).

Having described our leading indicators, in the next section, we investigate their historical performance over the past 45 years and verify their ability to anticipate turning points in financial markets.

Exhibit 5: A 45-Year History of the US Business Cycle

Invesco Investment Solutions Proprietary US Leading Economic Indicator (LEI) (1/31/70-6/30/19)
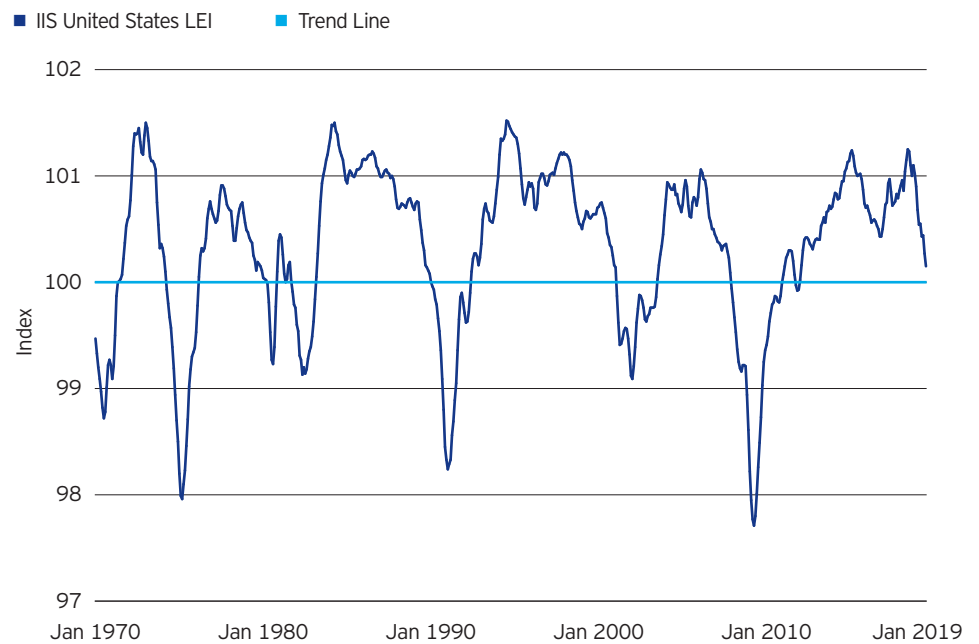
■ IIS United States LEI   ■ Trend Line

Source: Invesco Investment Solutions proprietary research of the US Business Cycle Leading Indicator, 6/30/19.
Past performance does not guarantee future results.

Applying Theory to Practice:

The Last Decade

Looking at recent history as an example, Exhibit 6 describes in detail the period between the two recessions of 2000 and 2008, which serves as a perfect template of business cycle dynamics and financial markets performance in each regime (**Exhibit 6**).

Recovery: The business cycle began with a recovery regime that lasted from April 2001 to June 2003. Our leading indicator began to rebound, driven mainly by improving business surveys, construction activity, and aggressive monetary easing by the Federal Reserve, which took the Fed funds rate to a historic low of 1%. Although the stock market continued to underperform due to excessive valuations from the technology bubble, other risky assets such as credit outperformed.

Expansion: The economy moved into the expansion regime when the US began to grow above trend, beginning in the third quarter of 2003. Our indicator registered broad improvements in housing activity, consumer sentiment, and stronger labor market conditions until the first quarter of 2006. As wage and inflationary pressures started to emerge, the Fed began raising rates steadily from June 2004 to June 2006. Equities were the best performing asset class, while credit offered stable income with low volatility, outperforming sovereign bonds.
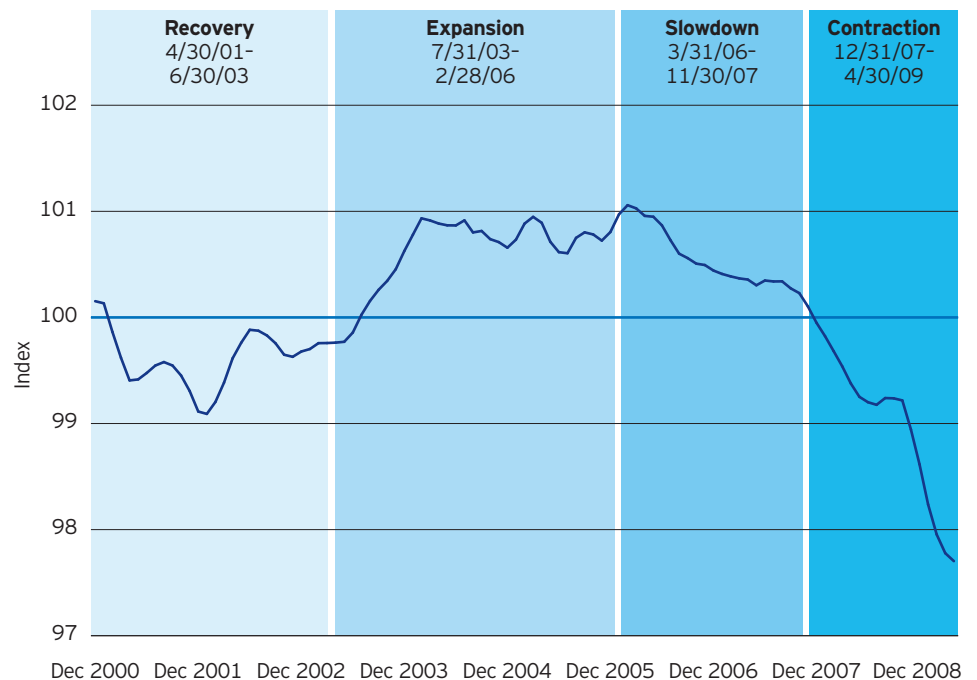
Slowdown: After three years of policy tightening, the economy peaked in the first quarter of 2006, just before the Federal Reserve's final hikes, and entered the slowdown regime. The slowdown was led by a substantial deceleration in housing activity, followed by manufacturing and falling consumer confidence. In spite of the slowdown, labor markets exhibited strength for another 12 months through mid-2007, with rising wages and falling unemployment, which caused the Fed to remain on hold. While stocks continued to outperform, driven mainly by strong growth in emerging markets, credit markets were showing clear signs of stress, confirming a tightening in lending standards.

Contraction: Our indicator showed that the economy entered into the contraction regime at the end of 2007 when the US started growing below trend, driven by widespread deterioration in all its components. The economy then experienced a severe recession lasting almost 18 months. Risky assets underperformed dramatically, while government bonds were the only asset class able to provide protection and diversification. Our indicator showed that a new business cycle began with a recovery that started in the second quarter of 2009, led by very accommodative monetary policy (i.e., quantitative easing), and rebounding business and consumer confidence.

Exhibit 6: The 2001–2008 Business Cycle

IIS US Leading Economic Indicator (12/31/00-4/30/09)

■ IIS United States LEI   ■ Trend Line

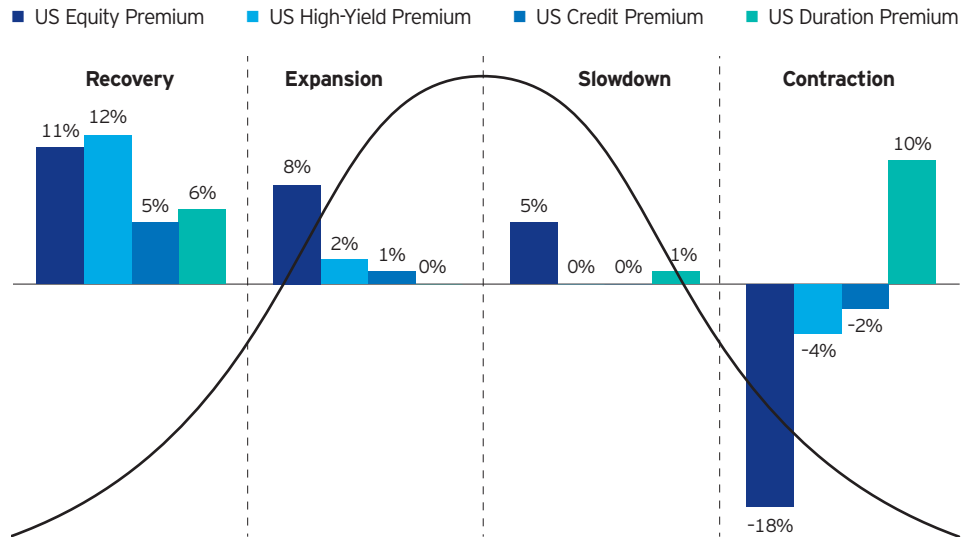| Recovery 4/30/01– 6/30/03 | Expansion 7/31/03– 2/28/06 | Slowdown 3/31/06– 11/30/07 | Contraction 12/31/07– 4/30/09 |

Source: Invesco Investment Solutions proprietary research of the US Business Cycle Leading Indicator, 8/31/15.
Past performance does not guarantee future results.

Historical Performance of Asset Classes During the Business Cycle

Using monthly historical data, we determine the current macro regime based on the most recent level and change in our leading indicator, relying only on information available at the time. Assuming we will remain in the same regime over the following month, we measure the performance of traditional risk premia (e.g., relative performance between major asset classes, such as equities, high yield, investment grade, government bonds and cash). Exhibit 7 summarizes our findings for the performance of US risk premia during the multiple business cycles experienced between 1970 and 2013 (**Exhibit 7**).

Exhibit 7: Different Risk Premia Have Outperformed in Different Macro Regimes

US Historical Returns (January 1970-June 2019)

■ US Equity Premium   ■ US High-Yield Premium   ■ US Credit Premium   ■ US Duration Premium

Sources: Invesco's proprietary research of the US Business Cycle Leading Indicator, 6/30/19. Bloomberg L.P. Annualized monthly returns of the defined risk premia from January 1970-December 2013. Risk Premia are defined as follows: US Equity Premium = MSCI US Total Return Index - US Treasuries 10-YR. High Yield Premium = US High Yield - US Investment Grade Credit. Credit Premium = US Investment Grade - US Treasuries. Duration Premium = US Treasuries 10-YR - US T-bills 3-Month. See definitions page for index definitions. **Past performance does not guarantee future results.**
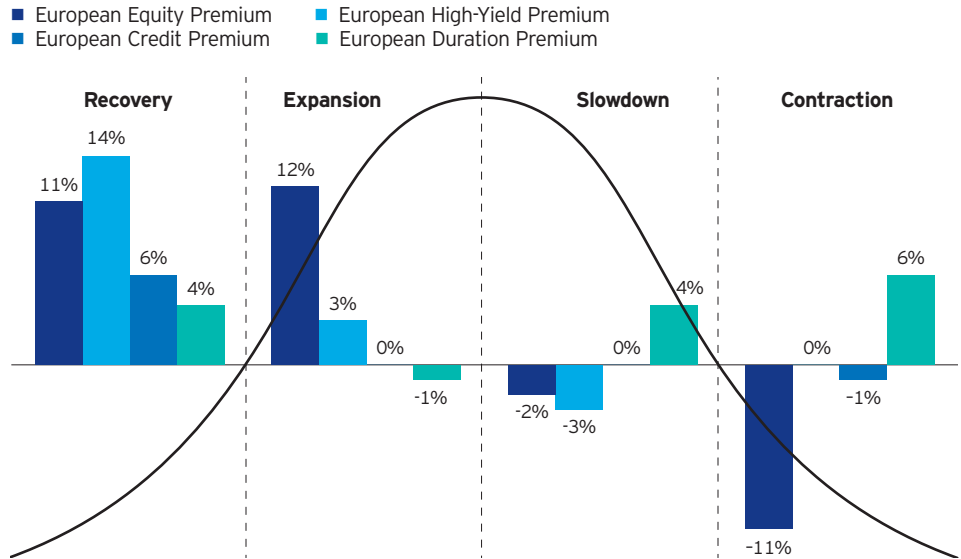
Recovery: Risky assets do remarkably well, and investors are compensated for taking on additional risk. Both equities and credit outperform government bonds; in addition, high-yield credit outperforms investment grade and delivers the best total returns as an asset class, often outperforming equities. This performance is consistent with the common perception that high-yield spreads tend to compress rapidly towards the end of a recession, providing substantial price appreciation for investors, and leading the turn in the broader risk appetite. Government bonds provide attractive returns over cash since inflation is still falling and monetary policy is in its final easing stage.

Expansion: Equities are the best-performing asset class in the expansion phase, benefiting from the sustained acceleration in economic momentum, which translates into rapid earnings growth and expansion in profit margins. Credit markets, which experienced the bulk of spread compression in the recovery phase, are now mainly an income proposition. Spreads stabilize at or below the historical average, supported by solid macro backdrop and limited volatility. High yield still outperforms investment grade, but this relative outperformance is mostly explained by higher yields rather than price outperformance. Because of rising inflation and tightening monetary policy, government bonds are the worst-performing asset class, barely matching returns from cash.

Slowdown: This phase of the cycle is the most uncertain for asset allocation decisions. Despite economic growth being above trend, equity, credit, and government bond markets all deliver similar performance, broadly in line with cash yields, which at this stage have risen because of cumulative policy tightening. Once volatility is factored in, this macro environment offers unattractive risk-adjusted returns, arguing for a neutral asset allocation stance.

Exhibit 8: Different Risk Premia Have Outperformed in Different Macro Regimes

European Historical Returns (January 1970-June 2019)

- ■ European Equity Premium
- ■ European Credit Premium
- ■ European High-Yield Premium
- ■ European Duration Premium

Source: Invesco's proprietary research of the Euro area Business Cycle Leading Indicator, 6/30/19. Annualized monthly returns of the defined risk premia from January 1970–December 2013. Risk Premia are defined as follows: European Equity Premium = market-cap-weighted average of Equity risk premia for Germany, France, Italy, Spain, Belgium and Netherlands, using MSCI Indices - Citigroup 7-10-YR Treasury Indices (or estimated total returns using 10-YR yields from the OECD before Citigroup data is available). European High Yield Premium = Barclays Pan European (Euro) Index - Barclays Euro Aggregate Corporate Bond Index, from 1/29/99. European Credit Premium = Barclays Euro Aggregate Corporate Excess Returns Index, from 9/30/98. European Duration Premium = From 1985–2013, Citigroup Germany 7-10-YR Treasury - 3M German T Bill; from 1970–1985, Total return estimates from Germany 10-YR yields (OECD data) - 3M German T-Bill. See definitions page for index definitions. **Past performance does not guarantee future results.**

Contraction: Government bonds are the best-performing asset class, supported by severe risk aversion, falling inflation and aggressive monetary policy easing. In this environment, the appropriate asset allocation strategy should reduce risk by underweighting exposures to equities and credit, and overweighting high-quality government bonds.

Applying this methodology to other regions of the world yields very similar conclusions. In Exhibit 8, we replicate the analysis for the European business cycle and its impact on European risk premia (**Exhibit 8**). The overall mapping of asset returns to macro regimes is remarkably similar to what we have seen for the United States, confirming the validity and intuition of this macro framework.[5]

This description of the relative performance between asset classes is very intuitive and consistent with economic priors. Our analysis shows that asset returns vary significantly across different business cycle regimes, and it demonstrates that the change in growth is far more important than the level of growth. Financial markets respond to accelerations and decelerations in growth, not the level of growth, as proven by the dramatically different performance in recoveries versus contractions (i.e., same level but opposite change), and expansions versus slowdowns.

Our analysis demonstrates that risky assets such as equities and credit perform best during recoveries and expansions when growth is accelerating. This is when investors are best compensated for increased risk in their portfolios. On the other hand, defensive assets such as long-dated government bonds offer the best returns during contractions, when growth is low and decelerating. Finally, the analysis indicates that slowdown regimes are highly uncertain, delivering insignificant risk-adjusted returns over cash.

5 Performance patterns illustrated in Exhibits 7 and 8 are very similar when using risk-adjusted returns.

Conclusion

Valuation is a powerful tool for long-term asset allocation decisions, but its effectiveness over the medium term is substantially weaker. Over shorter time horizons asset prices are driven, among other things, by fluctuations in the business cycle and economic policies enacted along with it. Using leading indicators of the business cycle, we build a real-time framework to determine the current phase of the cycle and make informed investment decisions. Our analysis shows that asset prices are mostly driven by the change in growth, not the level of growth. In other words, knowing the current growth rate of the economy per se does not provide insights into the likely performance of financial markets. Instead, what matters for asset prices are accelerations and decelerations in growth.

There are strong underlying linkages between economic growth, corporate earnings, the health of balance sheets, the ability of companies to invest productively, and consumers' desire to spend and consume. All these phenomena are self-reinforcing and affect asset prices in a significant way. When the economic cycle is improving, risk assets–equities and credit in particular–perform well, and vice versa.

While it is imperative to anticipate the cycle with forward-looking economic information, macro regimes tend to be persistent in the medium term, allowing investors to adapt to the changing economic environment and adjust their portfolios accordingly.

It is also important to note that while our macro regimes framework is a very significant and powerful input to our investment process, we do not rely on it on a standalone basis. It is one part of a well-structured system designed to give us insights into drivers of financial markets and asset prices. We combine macro analysis with market indicators used to assess valuation and momentum and use risk measures to assess volatility and the credit cycle.

Together, these multiple perspectives help us create asset allocations based on a comprehensive view of the opportunities and risks in the marketplace.

Alessio de Longis, CFA

Senior Portfolio Manager, Invesco Investment Solutions

Alessio de Longis, CFA, is a Senior Portfolio Manager for the Invesco Investment Solutions team, which provides customized multi-asset investment strategies for institutional and retail clients. Mr. de Longis also serves as Portfolio Manager for Invesco Oppenheimer Global Allocation Fund. He is primarily focused on global macro tactical asset allocation, factor strategies, and currency overlay.

Prior to joining Invesco, Mr. de Longis was a portfolio manager at OppenheimerFunds and team leader of the global multi-asset group (GMAG). Between 2004 and 2013, Mr. de Longis was a member of the OppenheimerFunds global debt team where he served as portfolio manager and quantitative FX strategist.

Index Definitions

The **S&P 500 Index** is a market-capitalization-weighted index of the 500 largest domestic US stocks.

The **Barclays Aggregate Bond Index** is an index of US Government and corporate bonds that includes reinvestment of dividends.

The **Barclays US Aggregate Credit Index** includes both corporate and non-corporate sectors. The corporate sectors are industrial, utility and finance, which include both US and non-US corporations. The non-corporate sectors are sovereign, supranational, foreign agency and foreign local government. The index is calculated monthly on a price-only and total-return basis. All returns are market-value-weighted inclusive of accrued interest.

The **Barclays Pan-European High-Yield (Euro) Index** measures the market of non-investment-grade, fixed-rate corporate bonds denominated in euro.

The **Barclays Euro Corporate Bond Index** is a broad-based benchmark that measures the investment-grade, euro-denominated, fixed-rate corporate bond market.

Credit Suisse US High Yield Index tracks the performance of domestic non-investment-grade corporate bonds.

Citigroup 3-Month Treasury Bill Index is an unmanaged index that tracks short-term US Government debt instruments.

Citigroup 10-Year Treasury Benchmark On-the-Run Index is an unmanaged index that tracks the performance of on-the-run US Government debt instruments with approximately 10 years to maturity.

The MSCI Total Return Index measures the price performance of markets with the income from constituent dividend payments.

The MSCI Europe Index is a free-float-weighted equity index designed to measure the equity market performance of the developed markets in Europe.

US Duration Premium: US Treasuries 10-Yr – US T-Bills 3-Month. For the 10-Yr Treasuries, Citigroup 10-Year Treasury Benchmark On-the-Run Total Return Index is used from 1980 onward. Prior to 1980, history is backfilled with estimated total returns using 10-Yr yields from Bloomberg between 1970 and 1980.

US High Yield Premium: US High Yield – US Investment Grade Credit, using the Credit Suisse US High Yield Index and the Barclays US Aggregate Credit Index.

US Credit Premium: US Investment Grade – US Treasuries, using the Barclays US Aggregate Credit Excess Return Index from 1988 onward. Prior to 1988, we backfill the excess returns using the Barclays US Aggregate Credit Total Return Index minus estimated duration-equivalent US Treasury total returns.

US Equity Premium: MSCI Total Return Index – US Treasuries 10-Yr.

The indices are unmanaged and cannot be purchased directly by investors.