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Special Commentary

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Interest Rates, Credit and Policy Inconsistency in the Post-Great Recession Era: Parte Três

"Tertiam Qui Ipsorum Lingua Celtae"

As U.S. Treasury yields have remained at historically-low levels, it is important to consider whether the tools used to predict yields have changed. Using historical benchmarks to perform analysis on yields may be misleading, given the permanent shift in the relationship between asset classes since the past recession. This shift can be attributed to changes in the expected pace of economic growth and inflation, future tax changes, and changes in the balance of and demand for Treasury debt.

When performing analysis on the yield curve, it may be more useful to look at the direction of change rather than the yield levels compared to historical norms. In addition, looking at the pattern of yield movements in other countries (specifically, the G7 countries) may be a useful tool in understanding movements in the U.S. Treasury yields. In fact, the two-way relationship between global yields and the U.S. Treasury yields implies that changes in U.S. Treasury yields can also have predictive power over global yields.

Do Global Yields Correlate with U.S. Yields?

As investors seek higher returns and safe investments, they may compare Treasury bonds from different countries, typically the world's major economies. This raises some questions: How have global yields been affected by recessions, and more specifically, the Great Recession? Is there a correlation between the average global yield and the U.S. 10-year Treasury yield that might help explain the persistence of continued low Treasury benchmark rates?

How have global yields been affected by recessions, and more specifically, the Great Recession?

To answer this question, we create a "global yield" proxy that is the simple average of the 10-year Treasury bond yields from the G7 countries excluding the United States.[1] To see the impact of the Great Recession on the global yield proxy, we utilize a state-space approach to test for a structural break (Table 1). The results below show that in December 2008—in the midst of the Great Recession—there was a structural break in which global yields saw a downward shift.

Table 1

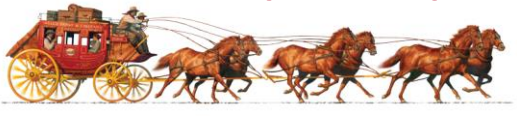
Identifying a Structural Break Using the State-Space Approach		
Global Yield		
Break Date	Type of Break	Coefficient
Dec-08	Shift	-0.37*
Oct-99	Additive	0.21*
Aug-11	Shift	-0.34*
Jul-03	Shift	0.33*
Oct-96	Shift	-0.32*

*Significant at 1 percent

Source: Wells Fargo Securities, LLC

[1] **The Group of Seven (G7) consists of Canada, France, Germany, Italy, Japan, United Kingdom and United States.**

Together we'll go far



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Two-way Causality: U.S. and Global Yields

To test whether global yields are statistically associated with the U.S. 10-year Treasury yield, we utilize the Granger causality test (Table 2).[2] The Granger causality test indicates whether the global yield proxy is a statistically useful variable to predict movements in the U.S. 10-year Treasury yields. As shown in Table 2, there is two-way causality between U.S. and global yields. This indicates that both global yields and U.S. Treasury yields are statistically useful in explaining movements in the other. Simply put, changes in the U.S. 10-year yield have an impact on the 10-year yields of other G7 countries, and vice versa.

Table 2

Granger Causality Test		
Regressor	**Dependent variable**	
	Ten-Year Yield	Global Yield
Ten-Year Yield	NA	0.10*
Global Yield	0.07*	NA

* Significant at 10 percent

Source: Wells Fargo Securities, LLC

Given the statistical association between global yields and the U.S. 10-year yield, to what extent should the global yield be used as a predictor in forecasting the U.S. 10-year Treasury yield? To determine this, we utilize two different models to estimate future U.S. 10-year Treasury yields, with the results reported in Table 3. The first model, labeled "Without Global Yield," uses the unemployment rate and the inflation rate (the year-over-year change of the PCE deflator) to predict the U.S. 10-year Treasury yield. The first model produces a root mean square error (RMSE) of 1.01, which indicates that the estimated U.S. 10-year Treasury yield is, on average, off by 101 bps from the actual yield. [3]

The global yield is a useful predictor of the U.S. 10-year Treasury yield.

The second model, labeled "With Global Yield," utilizes the global yield as a predictor along with the unemployment rate and inflation rate. Using the global yield, the model's forecast for the 10-year Treasury yield is, on average, 46 bps away from the actual yield. In other words, including global yields in forecasting cuts the level of error in half (when compared to the level of error from excluding global yields from a model). Therefore, the global yield is a useful predictor of the U.S. 10-year Treasury yield.

Table 3

Ordinary Least Squares Estimates		
10-Year Yield	**RMSE**	**R^2 Value**
Without Global Yield	1.01*	0.50
With Global Yield	0.46*	0.90

* All variables in this model are significant at 1 percent

Source: Wells Fargo Securities, LLC

Credit Spreads: A Break with History

Traditionally, credit spreads vary over the business cycle. Spreads tend to rise during periods of economic weakness and uncertainty and decline during periods of economic prosperity. Therefore, periods of optimism can be represented by a tightening in credit spreads, while pessimism is associated with increases in spreads. These patterns reflect the dominance of cyclical

[2] The Granger causality test identifies whether two (or more) variables statistically cause each other and thereby it is appropriate to say "Granger-causes" instead of "causes." The term "Granger-causes" implies quantifying statistical causality between the variables of interest. See Granger (1969) for more detail.
[3] The important determinants of an interest rate are inflation and unemployment rates and that why we include these variables in the model.

forces—not secular change—and yet, secular forces may indeed be the more important driving force in interest rates since 2007.

Tradition may be taking a back seat. For analysts, the challenge is to recognize, or at least question, on a cyclical basis, when credit spreads are at extremes and when such spreads provide a signal of a possible change in the economy, or at least sentiment on the economy. Behind the utilization of any cyclical pattern as a guideline is an implicit assumption that spreads may vary and that they will vary around the same mean value over time and over different cycles. However, how might we assess changes in sentiment as represented by credit spreads if, in fact, the average values and their volatility vary over time?

Table 4

Bond Yield Statistics						
	1968-1981 Average	1982-Present Average	1968-1981 Std. Dev.	1982-Present Std. Dev.	1968-1981 Stability Ratio	1982-Present Stability Ratio
Aa/5 Year Spread	0.9	1.5	0.38	0.52	40.07	33.69
Aa/10 Year Spread	1.8	2.3	0.56	0.73	31.61	31.52
Baa/5 Year Spread	1.0	2.0	0.56	0.85	56.42	41.73
Baa/10 Year Spread	1.8	2.8	0.71	1.02	39.07	36.34

Source: Bloomberg LP, Federal Reserve Board and Wells Fargo Securities, LLC

Table 4 shows that credit spreads between corporate bonds[4] and Treasury bonds have, on average, risen during the post-1982 period. In addition, standard deviations have also risen, while stability ratios have actually declined. The larger standard deviation and smaller stability ratio implies that the volatility of interest rates has risen in recent years. How can we measure changes in benchmark credit spreads as a signal of possible change in the economy? Moreover, can we identify a structural change in credit spreads since 1982?

Testing for a structural break in credit spreads is crucial, as a positive finding indicates that a series has changed for a specific time period when compared to its historical norm. A break implies that a benchmark for a series—for example, the average level of volatility for a given period—has shifted (upward or downward) when compared to historical standards. In this example, it is useful to determine if there has been a structural break in a credit spread. Given a structural break, indicative of a change in behavior of the credit spread, it would be misleading to use a historical benchmark in analysis. Following a structural break, a benchmark may be higher or lower than the historical average.

A break implies that a benchmark for a series has shifted when compared to historical standards.

[4] Both the Aa and Baa Corporate bonds referenced in this report are based on bonds with maturities 20 years and above as calculated by Moody's Investors Service.

Table 5

Identifying a Structural Break Using the State-Space Approach					
Aa/5 Year Spread			**Baa/5 Year Spread**		
Break Date	Type of Break	Coefficient	Break Date	Type of Break	Coefficient
Q2-80	Shift	1.47*	Q4-08	Shift	2.46*
Q4-08	Shift	1.26*	Q2-80	Shift	1.87*
Q4-81	Shift	1.18*	Q4-81	Shift	1.55*
Q1-08	Shift	1.02*	Q3-09	Shift	-1.37*
Q3-09	Shift	-0.89*	Q4-74	Shift	1.30*
Aa/10 Year Spread			**Baa/10 Year Spread**		
Break Date	Type of Break	Coefficient	Break Date	Type of Break	Coefficient
Q2-80	Additive	0.79*	Q4-08	Shift	2.22*
Q4-08	Shift	0.99*	Q3-09	Shift	-1.51*
Q3-09	Shift	-0.86*	Q2-80	Additive	1.01*
Q3-81	Additive	-0.43*	Q4-74	Shift	1.04*
Q1-08	Shift	0.59*	Q4-81	Shift	0.96*

*Significant at 1 percent

Source: Wells Fargo Securities, LLC

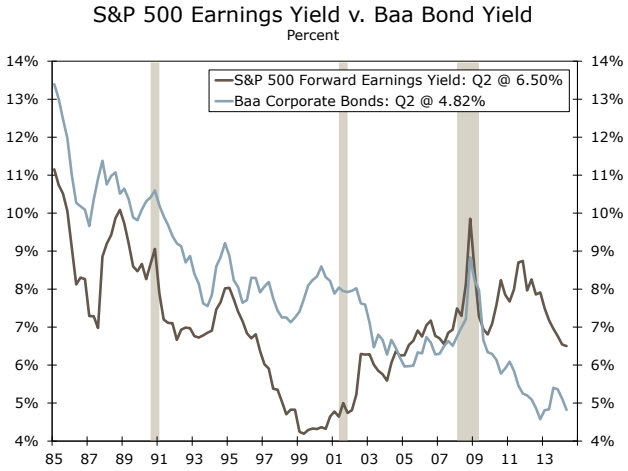
We test for a structural break in credit spreads using the state-space approach, with the results presented in Table 5. Using the results from the table, we are able to determine that yield spreads between corporate and Treasury bonds did experience a shift during the past recession (in Q4 2008) that was significant at the 1 percent level. For the Aa corporate five-year spread, there is evidence of a structural break during the Volcker period (Q2 1980) and again in Q4 2008, the Lehman shock.

Patterns since the Great Recession: Corporate Debt Yields and Equity Earnings—Case Against the Central Wisdom of Low Volatility

There may have been a shift in the relationship of returns between asset classes since the Great Recession.

There may have been a shift in the relationship of returns between asset classes since the Great Recession. Typically, an increase in economic growth is associated with an improvement in earnings and a rise in interest rates. Alternatively, weak economic growth is associated with weaker earnings and a decline in bond yields. In the expansion of the 1990s, S&P 500 earnings declined along with declining Baa bond yields (Figure 1) as would be expected. However, in more recent cycles, the pattern has not always held. Earnings yields rose, while Baa yields fell in the early parts of the 2001 and 2009 recoveries/expansions (2001-2003 and again during the 2009-2013 period). The Aa corporate 10-year spread reports this pattern. In contrast, the Lehman shock appears the dominant factor in the Baa corporate five-year spread and Baa 10-year spread. Has there been a change in the relationship between bond yields and the S&P 500 earnings yield? Is there evidence of a structural break in this relationship, particularly since the past recession?

Figure 1



Source: Federal Reserve Board, Bloomberg LP and Wells Fargo Securities, LLC

One simple way to identify a possible shift in the relationship is to calculate the mean, standard deviation and the stability ratio during several economic expansions. The mean for the S&P earnings yield in the most recent period (2007-2014, Table 6) exceeds the Baa corporate bond yield mean, which is different than in the first three periods. While there appears to be a shift in the mean, what about volatility?

To gauge how volatility among series may have changed over time, we can compare the stability ratios of different time periods. If the ratios of the recent period are smaller than the past, then we can conclude that volatility has declined over time. As shown in Table 6, the mean of the S&P 500 earnings yield was highest in the 2007-2014 period, while its standard deviation and stability ratio were both lower when compared to the other periods. These data imply that earnings have behaved differently since the start of the Great Recession when compared to the past. The Baa corporate bond yield has the smallest mean along with a fairly large standard deviation, leading to the largest stability ratio for the 2007-2014 period compared to the past two sub-periods. That is an indication of different behavior in the Baa series as well. Curiously, with a large stability ratio, this argues against the case that the recent period is one of low volatility. There appears to be confusion between a low mean value of Baa rates and their volatility.

These data imply that earnings have behaved differently since the start of the Great Recession when compared to the past.

Table 6

	S&P 500 Forward Earnings Yield			Baa Corporate Bond Yield		
Period	Mean	Std. Dev.	Stability Ratio	Mean	Std. Dev.	Stability Ratio
1992-2014	6.55	1.24	18.9	7.11	1.20	16.9
1992-2000	6.28	1.18	18.8	8.09	0.61	7.6
2000-2007	5.77	0.92	15.9	7.12	0.87	12.2
2007-2014	7.55	0.82	10.9	6.06	1.06	17.5

Source: Bloomberg LP, Federal Reserve Board and Wells Fargo Securities, LLC

Identifying a Structural Break

We can test for a permanent shift in the behavior of bond yields and the earnings yield by utilizing a state-space approach. The approach shows possible additive outliers—spikes or temporary shocks—in the S&P 500 earnings yield. The Baa series shows a structural break or shift during 2003. Again, the Lehman shock appears the most likely candidate (October 2008).

Table 7

Identifying a Structural Break Using the State-Space Approach					
S&P 500 Earnings Yield			**Baa Corporate Bonds**		
Break Date	Type of Break	Coefficient	Break Date	Type of Break	Coefficient
Oct-08	Shift	1.74*	Oct-08	Shift	1.27*
Dec-08	Shift	-1.81*	Dec-08	Shift	-0.80*
Aug-11	Shift	0.95*	May-00	Additive	0.45*
May-10	Shift	0.92*	Jun-09	Shift	-0.41*
Aug-07	Additive	0.64*	Jan-08	Additive	-0.25*

*Significant at 1 percent

Source: Federal Reserve Board and Wells Fargo Securities, LLC

Changes in the overall balance of demand and supply of Treasury debt in the post-Lehman era may also have affected yield spreads.

Possible explanations for a break in equity earnings and bond earnings are numerous. Included are potential changes in the expected pace of growth and inflation as well as future tax changes. Lowered expectations for economic growth and inflation may reflect, in part, the experience of this recovery but also the impact of higher taxes and underlying changes in labor force growth and productivity. Changes in the overall balance of demand and supply of Treasury debt in the post-Lehman era may also have affected yield spreads. New capital requirements, the relative risk of European sovereign debt, and large-scale central bank purchases have increased demand for Treasury debt, while the moderately improved revenue situation of the U.S. federal government has led to lower issuance over the past few years.

Conclusion

As U.S. Treasury yields have remained at historically-low levels, it is important to consider whether the tools used to predict yields have changed. Using historical benchmarks to perform analysis on yields may be misleading, given the permanent shift in the relationship between asset classes since the past recession. This shift can be attributed to changes in the expected pace of economic growth and inflation, future tax changes and changes in the balance of and demand for Treasury debt.

When performing analysis on the yield curve, it may be more useful to look at the direction of change rather than the yield levels compared to historical norms. In addition, looking at the pattern of yield movements in other countries (specifically, the G7 countries) may be a useful tool in understanding movements in the U.S. Treasury yields. In fact, the two-way relationship between global yields and the U.S. Treasury yields implies that changes in U.S. Treasury yields can also have predictive power over global yields.

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