Alternative Thinking | 3Q19

Inversion Anxiety: Yield Curves, Economic Growth, and Asset Prices

Executive Summary

The yield curve is considered one of the better indicators to determine where we are in the economic cycle. Historically, a yield curve inversion in the U.S. has often been followed by a recession. If yield curves contain information about future economic growth, they may also predict future stock and bond returns.

We evaluate the ability of the yield curve slope to forecast future economic conditions, as well as returns on stocks and bonds, using over 50 years of data across six countries. While the yield curve slope has reasonably consistent predictive ability for next year's economic growth, both within and across countries, it has not been a very reliable market timing indicator. Instead, it may be more useful as one signal (among many) for cross-country allocation decisions in stock and bond markets. The current mild U.S. curve inversion is a bearish signal for these markets, but alone we believe it is not a compelling reason to take large bearish positions.

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Introduction

The "term spread" or "yield curve slope" is the difference in yield between a long and short maturity bond (say, the difference between the 10-year Treasury bond yield and the 3-month Treasury bill yield, or "short rate"). Mechanically, the slope of the yield curve is the sum of (1) the market's expectations of changes in short rates over the life of the bond and (2) the bond risk premium, which is the expected excess return required to hold longer-term debt versus rolling over short-term bills.

This decomposition is powerful. Since the end of the Gold Standard in the 1930s, U.S. yield curves have tended to slope upward on average. Why? Over long time periods the market's expectations of future changes in short rates should average out to near zero. Therefore, the positive average slope must reflect positive average bond risk premia. At any particular point in time, however, the slope of the yield curve mixes information about expected future short rate changes with bond risk premia, so the evolving shape of the yield curve may contain information about the market's perception of how short rates (and, therefore, monetary policy) are expected to evolve. For instance, a steeply upward sloping curve (such as observed in 2013 in **Exhibit 1A**) has predicted either rising future interest rates or high future bond returns. An inverted curve — where short-term rates are higher than long-term rates — (as observed in 2007 and 2019 in Exhibit 1A) has predicted either falling interest rates or negative/low future bond returns.

Abundant research suggests the yield curve has historically been one of the more useful predictors of a variety of macroeconomic and financial variables — interest rates, inflation, economic growth, as well as future asset returns.[1] Arguably, however, the yield curve is best known for its ability to forecast recessions. **Exhibit 1B** shows the well-known result that U.S. yield curve inversions have preceded all recessions of the past half-century, albeit at varying lags.

Exhibit 1A

Select U.S. Yield Curves

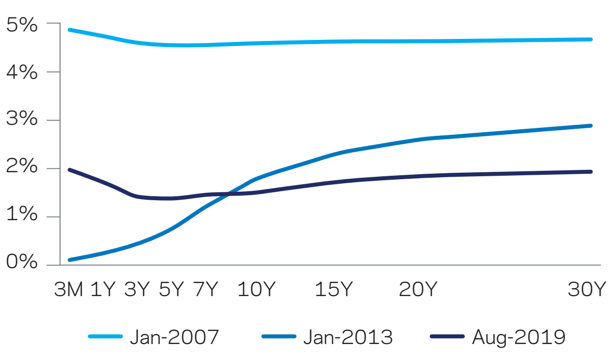
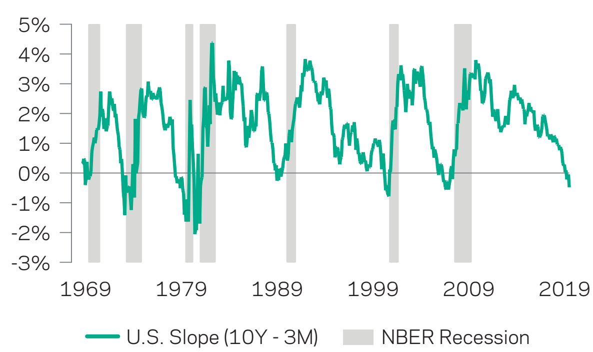


Exhibit 1B

U.S. Yield Curve Slope and NBER Recessions



Sources: AQR, Bloomberg, NBER, Global Financial Data. Select U.S. yield curves plot the yield at various bond maturities for the zero-coupon U.S. Treasury curve. U.S. yield curve slope is 10-year Treasury yield minus 3-month T-Bill yield from December 31st 1968 to August 30th 2019. U.S. recessions based on National Bureau of Economic Research (NBER) business cycle dating releases.

1 See Ilmanen (1996, 2011) and references therein on the theoretical and empirical term structure literature, as well as on yield curve algebra.

The theoretical literature often explains these empirically observed relationships by invoking the expectations hypothesis model (EH) of the term structure.[2] Steep yield curves, according to the EH, reflect market expectations of rising short rates. Short rates tend to rise, traditionally driven by contractionary monetary policy actions by central banks, in periods of strong economic activity and relatively higher inflation. Thus, steep yield curves may be indicative of strong future economic growth and rising inflation. Symmetrically, flatter or inverted yield curves (again, according to the EH) reflect market expectations of falling short rates, and therefore may be indicative of weak future economic growth and disinflation.

In the first part of our analysis, we use a large dataset (50 years, six countries) to explore the yield curve's ability to predict economic growth within and across countries at various horizons. In the second part, we examine the yield curve's ability to predict equity and bond returns. We conclude that the yield curve has demonstrated some ability to predict economic growth. Predictability is weaker for equity and bond market returns, however, particularly outside the U.S. In other words, the yield curve has some efficacy for market timing, but it still has a high degree of forecast uncertainty. Our results show the yield curve slope may be more useful for country allocation decisions than for market timing, and we remind readers that in both settings it is best combined with other predictors.

Part 1: Predicting GDP Growth

Media reports tend to emphasize the soundbite of yield curve inversions predicting recessions. Instead of focusing only on curve inversions, or only on recessions — both of which provide few observations — we take a continuous approach and examine the predictive power of the yield curve slope for economic growth. While this more comprehensive approach may miss any non-linear significance of the yield curve slope turning negative, it has the considerable benefit of incorporating more data points, so that we can have greater confidence in the relationships we identify.[3]

U.S. Growth

We start with the U.S. experience. The box-and-whisker plot in **Exhibit 2** shows there has been a positive (though not monotonic) relationship between yield curve slope and next year's real GDP growth. While median future growth rates differ across slope quintiles (see diamonds within the boxes), there's a wide range of growth outcomes when starting from any quintile. The last two boxes show similar evidence for inverted and upward-sloping curves. The median growth following yield curve inversions is lowest of all, as inversions capture the extreme bottom-decile of yield curve slopes.

2 The expectations hypothesis assumes that the bond risk premium is zero, or at least constant, over time. Instead of emphasizing the role of expectations (e.g. Estrella-Hardouvelis (1991)), another strand of literature, led by Harvey (1988), explains the (real) term structure's ability to predict future growth by investors' intertemporal consumption smoothing. Also see the literature survey on the relationship between curve and growth by Wheelock and Wohar (2009).

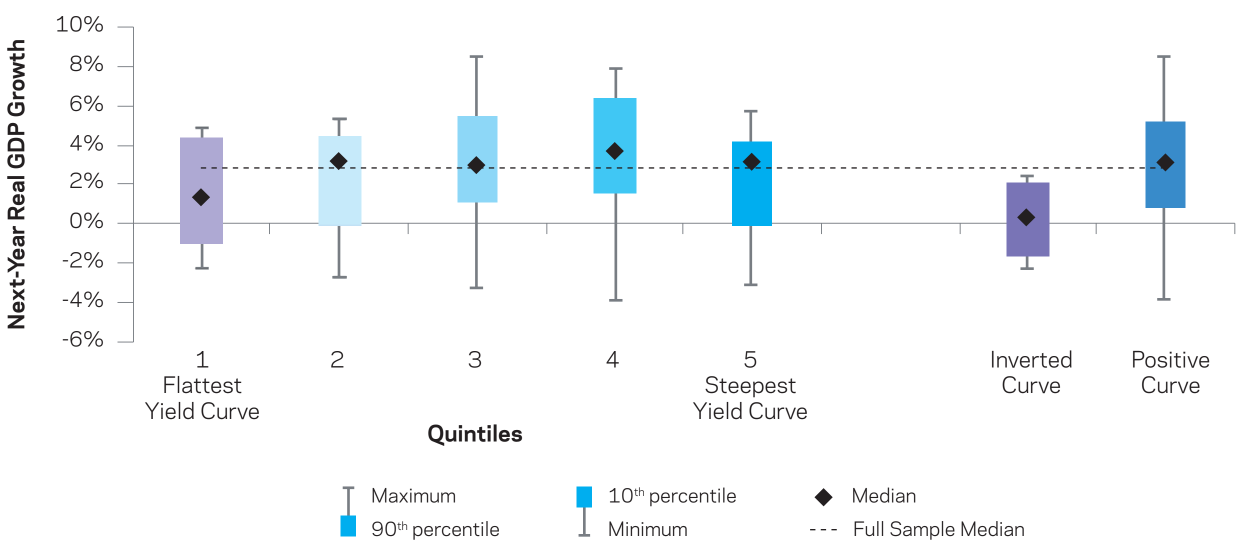
3 Appendix 1 shows that even if we study half a century of data in six countries, there have been few periods of inversion (especially during the past quarter-century), roughly one tenth of observations. (In the U.S., we would have longer histories to study. In the decades prior to our sample start, there was a long period of only upward-sloping U.S. yield curves between 1930 and 1966. However, during the earlier Gold Standard era, U.S. yield curve inversions were quite common.)

The table in Exhibit 2 presents evidence of the yield curve's ability to predict real GDP growth at various horizons. All coefficients are positive — as expected, steeper yield curves tend to coincide with stronger subsequent growth and vice versa — and for forecast horizons from one quarter to two years, are statistically significant. In the remainder of the paper we focus on the one-year horizon, as it has the most significant relationships both in the U.S. and internationally. The coefficient on yield curve slope at the one-year horizon is 0.62, indicating a one percent increase in the slope of the yield curve predicts a 0.62% increase in next year's real GDP growth. As seen in Exhibit 1B, the slope of the yield curve typically varies between zero and three percent, so there is quite meaningful variation in forecasts of real GDP growth based on the slope of the yield curve: a 3% slope predicts 3% * 0.62 = 1.86% higher real GDP growth than a flat yield curve! The relatively low R^2 (12.0%), however, indicates there is considerable variation in actual realized outcomes, echoing the box-and-whisker plots.

Exhibit 2

Has the Yield Curve Predicted U.S. Real GDP Growth?

A. Subsequent 1-Year Real GDP Growth for Different Starting Yield Curve Slopes 1969-2019



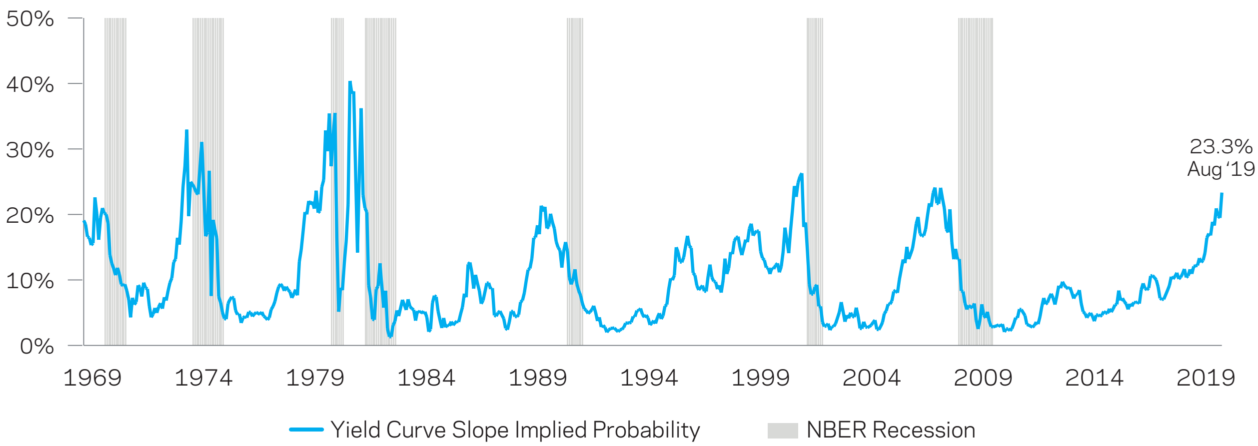
B. U.S. Real GDP Growth Regressed on Starting Yield Curve Slope 1969-2019

GDP Horizon	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Year	2nd Year	3rd Year	3-Year Annualized
Coefficient	0.37	0.75	0.66	0.64	**0.62**	0.54	0.02	0.42
T-Stat	2.0	4.2	3.6	3.5	**3.5**	2.6	0.1	2.8
R^2	2.0%	8.1%	6.3%	5.8%	**12.0%**	9.2%	0.0%	12.9%

Sources: AQR, Global Financial Data. Quarterly data from December 31st 1968 to June 30th 2019. U.S. yield curve slope is 10-year Treasury yield minus 3-month T-Bill yield and real GDP growth is the annualized change in real GDP over each horizon. Box-whisker plot shows realized next-year real GDP quintiles based on in-sample yield curve slope. The box includes all observations from 10th to 90th percentile starting from each quintile, the whiskers include the full range of next year's growth outcomes, while the diamond shows the median. Inverted curve and positive curve shows the next-year realized GDP when the yield curve slope is negative or positive respectively. Regressions use Newey-West adjusted t-statistics to account for overlapping data. Intercept not shown. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

We can convert the regression results into a (pseudo) probability of recession. **Exhibit 3** depicts the implied probability of negative year-on-year real GDP growth over the next year between 1969 and 2019 using the parameters from the "1st Year" column in Exhibit 2. The average probability of negative next-year growth has been 10% between 1969 and 2019, peaking between 20% and 40% before every recession. Stated differently, every time the estimated probability reached 20%, a recession ensued within the next 1.5 years. The latest observation is 23%, implying a recession in 2019-2020 if past patterns hold. This is, of course, a very simple model, and the results in Exhibit 3 are mainly shown for illustration.[4]

Exhibit 3
Probability of Negative Next-Year U.S. Real GDP Growth Implied by Yield Curve Slope



Sources: AQR, Global Financial Data, NBER. Monthly data from December 31st 1968 to August 30th 2019. We calculate the probability of negative next-year real GDP growth using the parameters estimated in the 1st year regression model and assuming normally distributed residuals. U.S. yield curve slope is 10-year Treasury yield minus 3-month T-Bill yield and real GDP growth is the annualized change in real GDP. U.S. recessions based on National Bureau of Economic Research (NBER) business cycle dating releases.

An additional avenue of research is to understand *why* the yield curve slope predicts next-year real GDP growth. Is the pattern of predictability driven by information about short rate expectations or bond risk premia? To decompose the yield curve slope into short rate expectations and bond risk premia components requires a term structure model. Using the Adrian, Crumb, and Moench (2013) model, which is maintained and updated regularly by the Federal Reserve Bank of New York, we find fairly equal impact from both drivers, though we caution that any decomposition results are potentially very model-specific.[5] We also analyzed whether inversions in a low short-rate environment (today's case) are less bearish for growth than inversions in a high short-rate environment (typical case), based on the logic that low short rates indicate that monetary policy is presently accommodative. Our two-factor regressions did not find support for this conjecture.[6]

4 We could also run a linear regression on binary outcomes (dummy 1 for NBER recessions or quarters with negative real growth), or we could run a nonlinear probit regression. The Federal Reserve Bank of New York regularly updates recession probabilities from a probit model using the slope of the yield curve. See https://www.newyorkfed.org/medialibrary/media/research/capital_markets/Prob_Rec.pdf. All these models give broadly similar contours but the detailed results and recession probabilities will inevitably differ.

5 If the predictive effect had mainly reflected the rate expectations channel, as some earlier studies suggest, and if currently low required bond risk premia were dragging down the yield curve slope, then the current growth forecast based on yield curve would arguably be too bearish. But as we find (subject to the model we use) that both channels predict growth about equally well, it matters less whether the current inversion reflects mainly falling rate expectations or negative required bond risk premia.

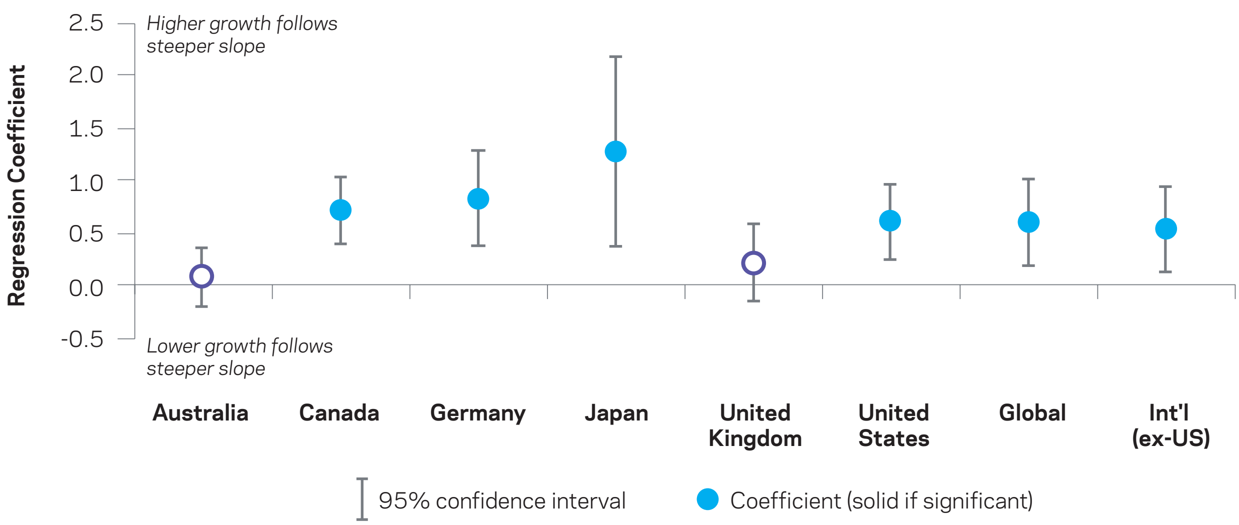
6 Specifically, when we regress next-year GDP growth on curve steepness and the bill rate level, the latter has a positive (if insignificant) coefficient, in contrast to results in Wright (2006). In yet another two-factor regression, we asked whether the front end (2y-3m) or the back end (10y-2y) of the curve has more growth predictive information. In line with some earlier studies, we found that the front end predicts growth better but both ends matter.

International Evidence

How robust is the U.S. evidence? To find out, we run growth forecasting regressions country-by-country. **Exhibit 4** shows one-factor regression results for just one horizon, next-year real GDP growth. Coefficients are positive in all countries, and statistically significant (the confidence interval lies north of the horizontal axis) in all but Australia and the U.K.[7] The estimated relationships between yield curve slopes and subsequent growth internationally are similar to our results for the U.S. For example, in the international regression, which averages across non-U.S. markets, the estimated coefficient on the yield curve slope is 0.53, indicating a one percent increase in the slope of the yield curve forecasts 0.53% higher real GDP growth over the next year. This estimate is strikingly close to what we observed in the U.S. data (0.62). Overall, we conclude the international evidence strengthens our conviction in the U.S. results.

Exhibit 4

International Evidence on Next-Year Real GDP Growth vs. Local Yield Curve Slope



Sources: AQR, Global Financial Data. Quarterly data from December 31st 1968 to June 30th 2019. Government yield curve slope is 10-year government bond yield minus 3-month yield, and real GDP growth is the annualized change in real GDP. Global and International (ex-US) are an equal-weighted average of the countries GDP and yield curve slope. Confidence intervals are based on Newey-West adjusted t-statistics to account for overlapping data.

Finally, we address a question we have not seen much covered in the literature: How well do yield curves predict *relative* GDP growth across countries? **Exhibit 5** shows results of panel regressions that isolate the cross-country dimension, which may be more relevant to cross-country allocation strategies. We see clear statistical evidence that countries with steeper yield curves (like Germany today[8]) tend to experience faster future GDP growth than countries with flatter curves (like the U.S. today). Focusing on "1st Year," a 1% steeper slope than average (across countries) forecasts 0.3% greater

7 T-statistics are not explicitly reported in the chart; a larger t-statistic is implied by a narrower confidence interval (compared to the coefficient magnitude). If whiskers are clear of the axis, the t-statistic is greater than +/-1.96.

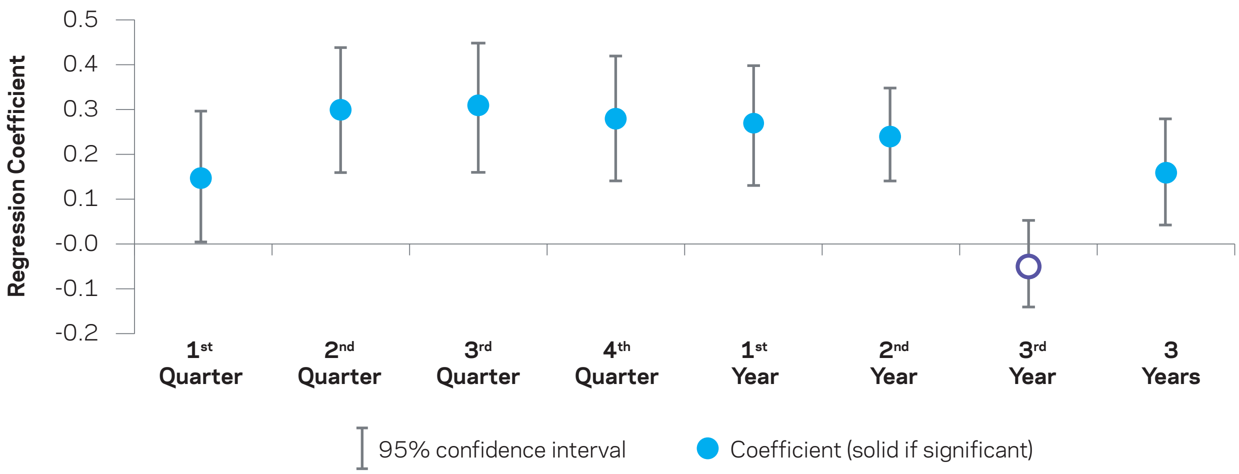
8 Appendix 1 shows that all countries have relatively flat yield curves (and in many cases negative yields), but there is still cross-country variation in slopes.

than average subsequent one-year real GDP growth. Importantly, these results are purely complementary to Exhibit 2B (and 4), which was about predicting time series variation in U.S. (and international) growth rates.

Economic and statistical significance in both cases are of comparable magnitude. As with the country-by-country regressions, this result strengthens our conviction in the efficacy of the yield curve for predicting future growth.

Exhibit 5

Panel Regression Evidence of Predictability in *Relative* GDP Growth Rates Based on Curve Slopes across Six Countries, Results for Multiple Horizons



Sources: AQR, Global Financial Data. Pooled panel regressions with time fixed effects, based on quarterly data from December 31st 1968 to June 30th 2019. Government yield curve slope is 10-year government bond yield minus 3-month yield, and real GDP growth is the annualized change in real GDP over each horizon. Confidence intervals are based on Newey-West adjusted t-statistics to account for overlapping data.

Part 2: Predicting Asset Returns

Our second major topic is the yield curve's ability to predict *returns*. We focus on a one-year horizon and begin with U.S. equity market timing and duration timing. We broaden this analysis to cover six countries, first single-country return predictions (for timing) followed by panel regressions and trading rule analysis, which let us assess relative return predictability (for cross-country allocation strategies).

Why should we expect the yield curve to predict future asset returns? Inasmuch as the yield curve predicts future economic growth, which impacts stock and bond prices, we may expect the yield curve to forecast stock and bond returns. For example, a flat or inverted yield curve, which tends to be associated with slow economic growth in the future, may predict weaker performance of risk assets, like equities. By this logic, one might expect a flat or inverted yield curve to forecast stronger performance of government bonds, assuming long-term bond yields decline in periods of weakening economic activity. For government bonds, however, another force is simultaneously at work. The yield curve slope is a measure of the carry of a bond: the expected excess return assuming its yield doesn't change. Given widespread evidence that carry forecasts returns in many asset classes,[9] it makes sense to expect that inverted or flat curves tend to predict lower bond returns. The net impact of growth-and-carry-related predictability on bonds is an empirical question.

Timing a Single Market

Exhibit 6A-B show broadly similar patterns for U.S. equities and Treasuries as we saw for future growth in Exhibit 2: a clearly positive, but not monotonic, relationship between next-year median returns and yield curve slope quintiles (see diamonds within each box). While an inverted yield curve has been bad news for future equity and Treasury returns, the charts reveal meaningful variation in future outcomes starting from different slope levels (wide boxes and whiskers). For example, the median outcome in an inverted curve environment is meaningfully better than the 10th percentile outcome for stocks and bonds in the steepest yield curve environment. In other words, history suggests we should not be overconfident in using the yield curve as a market timing indicator.[10]

Exhibits 6C-D provide international evidence using predictive regressions like those in Exhibit 4. While the evidence for the yield curve's ability to predict future GDP growth was quite robust across countries, the international evidence on return predictability is more mixed. For both equities and bonds, although the signs are all positive, the coefficients are not statistically significant for any country outside the U.S. Averaging data across the six countries ("Global"), the coefficients are (just barely) statistically significant.

What drives the predictability of the yield curve for asset returns? For example, does a flatter yield curve predict tepid stock returns *because* it predicts slower economic growth, or is some other mechanism at work? For bonds, since a flatter yield curve has indeed forecasted lower bond returns (the estimated coefficients are uniformly positive across countries), the information for subsequent bond returns embedded in the yield curve slope about bond carry seems decisively more important than the information embedded in the slope about future economic growth. Since these components tend to offset, we may ask whether controlling for future economic growth, the slope of the curve is an even stronger predictor of bond returns.

To address these questions for stocks and bonds, we run bivariate regressions of subsequent stock and bond returns onto the *lagged* yield curve slope and *contemporaneous* real GDP growth. For bonds, we find consistently negative coefficients on contemporaneous growth (bonds do well when growth is weak and vice versa) as well as coefficients (and t-statistics) on slope that are significantly higher than in the univariate case. As expected, controlling for the offsetting growth effect, the carry-related predictability for bonds is thus even stronger. For stocks, controlling for economic growth doesn't meaningfully alter the relationship between slope and subsequent asset returns. These results are available on request.

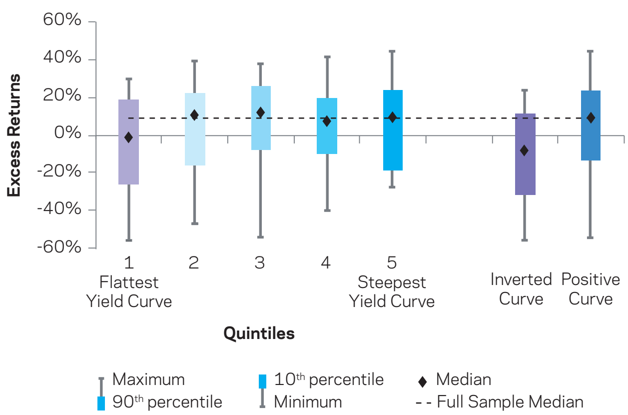
9 See, for example, Ilmanen (2011), Koijen et al. (2017), Brooks-Moskowitz (2017).

10 We also conducted multiple regressions predicting U.S. equity market and Treasury returns. First, we explored the rate expectations and bond risk premium channels based on an estimated split using the Adrian et al. (2013) term structure model. Both channels appear to have comparable predictive ability. This result was surprising for Treasuries; we had expected the bond risk premium channel to dominate because the yield curve slope or bond carry is a simple proxy of the ex-ante bond risk premium. (Any curve decomposition result is model-specific, though.) Second, we found the level of short rates was not a major determinant (when the bill rate was added as an equity or Treasury return predictor together with yield curve slope, the rate level's coefficient was insignificant). Third, when we regressed future equity and Treasury returns on spreads measuring the front-end (2y-3m) and back-end (10y-2y) slopes, the predictive ability was due to both parts.

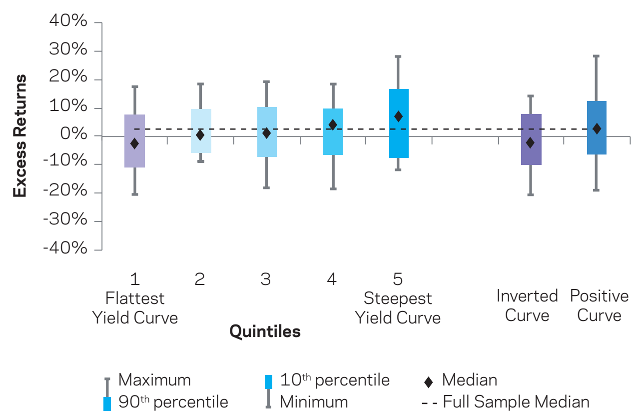
Exhibit 6

Has the Yield Curve Predicted Next-Year Equity and Bond Returns?

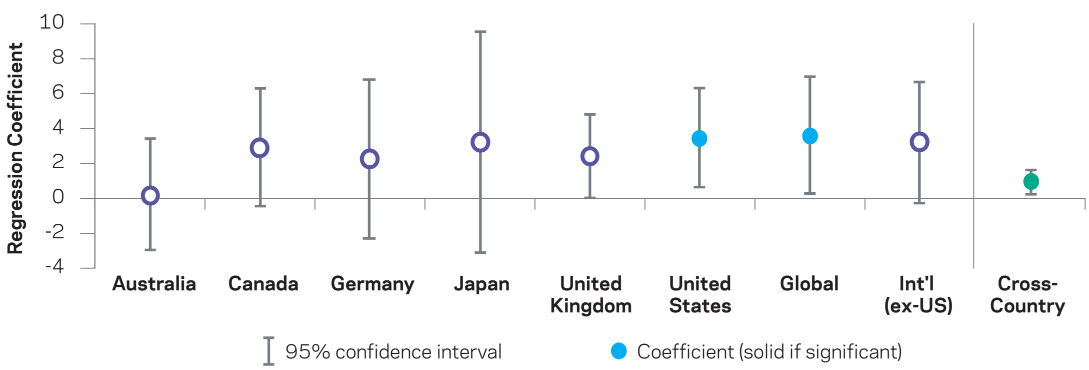
A. U.S. Equities



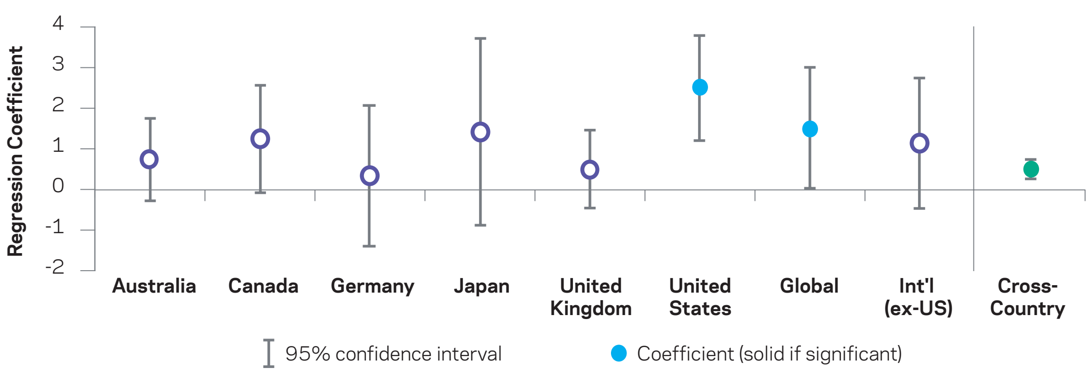
B. U.S. 10-Year Treasuries



C. International Equity Returns vs. Local Yield Curve Slope



D. International Bond Returns vs. Local Yield Curve Slope



Sources: AQR, Global Financial Data, DataStream, MSCI, Bloomberg. Monthly data from December 31st 1968 to June 30th 2019. Government yield curve slope is 10-year government bond yield minus 3-month yield. 10-year government bond returns for G6 countries are defined as DataStream 10-Year Total Return indices and, prior to DataStream availability, Global Financial Data Total Return indices. Equity returns for G6 countries are defined as MSCI Total Return indices and, prior to MSCI availability, Global Financial Data Total Return indices, except for the U.S. which is defined as S&P 500 Total Return and is sourced from Ibbotson prior to Bloomberg availability. Returns are excess of local currency Global Financial Data T-Bill Total Return indices. Box-whisker plot shows realized next-year excess returns distribution for equity and bond where quintiles are based on in-sample yield curve slope. Inverted curve and positive curve shows the next-year excess returns distribution for equity and bond where when the yield curve slope is negative or positive respectively. See legend on Exhibit 2A for description of box-whisker chart. Confidence intervals are based on Newey-West adjusted t-statistics to account for overlapping data. Past performance is not a guarantee of future performance. Please read important disclosures in the Appendix.

Cross-Country Allocation

We now turn to equity and bond market return predictability *across* our six countries. The goal is to distinguish time series predictability from cross-sectional predictability — and as a byproduct assess the usefulness of using the yield curve slope to take cross-country asset allocation views. The results of pooled panel regressions (rightmost panel in Exhibit 6C-D), like those in Exhibit 5 for growth, are promising, especially for bonds. Recall the one-year horizon single-country regressions were statistically significant only in the U.S. Predicting relative returns *across* countries using the yield curve slope, however, we see strongly statistically significant results, with t-statistics of 4.0 for bonds and 2.6 for stocks.[11] These results suggest that cross-country trading based on relative yield curve steepness may be a profitable investment strategy.

To judge the economic significance of our results, **Exhibit 7** compares simple trading rule "horse races" for market timing and cross-sectional strategies. The market timing rule eschews any country-specific information and takes on a long position in the global average of all six markets every month when the global average yield curve is steeper than its historical average (using an expanding mean starting in the late 1960s) and a short position when the curve is flatter than its historical average. The cross-sectional strategy invests each month in a long/short country portfolio that is long the three countries with the steepest curves (with weights inversely proportional to rank) and short the three countries with the flattest curves.

- For equity markets, the 50-year annualized Sharpe ratio of the pure market timing strategy is 0.10, while the cross-sectional strategy earns a Sharpe ratio of 0.21.[12] Both strategies were lowly correlated with global equity markets. Incidentally, the cross-sectional strategy had a higher Sharpe ratio in the second half of our sample than in the first (0.31 vs 0.16).

- For government bond markets, all the trading rules give comparable Sharpe ratios, and higher than for equities. The Sharpe ratio of the pure market timing strategy is 0.43, while that of the cross-sectional strategy is 0.42. Both strategies were lowly correlated with global bond markets. As with equities, the cross-sectional strategy had a higher Sharpe ratio in the second half of our sample than in the first (0.66 vs 0.30).

We conclude from Exhibits 6-7 that the yield curve's predictive information can be at least as useful for equity and bond country allocation strategies as for market timing.

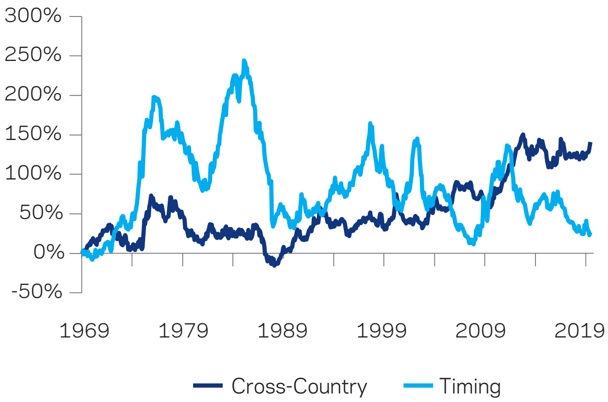
11 The estimated coefficients may appear low compared to single-country results. But keep in mind in this cross-sectional exercise we are predicting relative returns across countries, as opposed to absolute returns within a country or globally. There is less variation to explain in the former than in the latter.

12 Two alternative market timing rules we explored run similar strategies country-by-country, comparing their current yield curve to historical average — either a global average or the local curve — and then average the results across the six countries. These two alternative timing strategies achieved Sharpe ratios of 0.23 and 0.09 for global equities (and Sharpe ratios of 0.46 and 0.43 for global bonds, below). We also compared the U.S. yield curve slope timing signal to value and momentum signals using the framework described in "Market Timing: Sin a Little" by Asness et al. (2017). We found yield curve slope to be standalone at least as useful market timing signal as value or momentum, and it was modestly additive to the combination of value and momentum timing described in that article, for both U.S. equities and U.S. Treasuries.

Exhibit 7

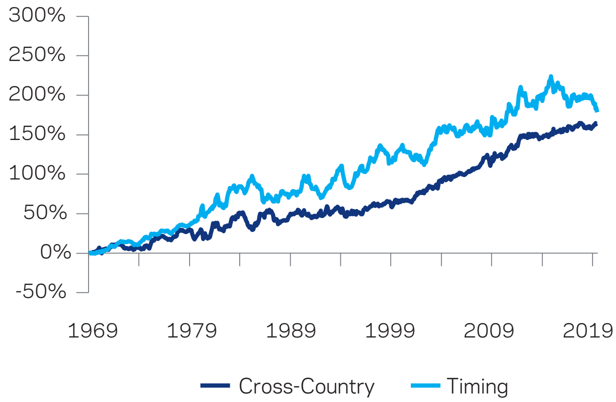
Evidence of Predictability in Directional (Timing) and Relative (Cross-Country) Equity and Bond Market Returns Based on Curve Slopes Across Six Countries

Hypothetical Cumulative Excess Returns of Equity Strategies



	Cross-Country	Timing
Excess Return	2.3%	1.3%
Volatility	11.0%	13.5%
Sharpe Ratio	0.21	0.10
Corr. to Global Equity	0.02	-0.10

Hypothetical Cumulative Excess Returns of Bond Strategies



	Cross-Country	Timing
Excess Return	2.0%	2.1%
Volatility	4.9%	5.0%
Sharpe Ratio	0.42	0.43
Corr. to Global Bonds	0.10	-0.11

Source: AQR, Global Financial Data, DataStream, MSCI, Ibbotson, Bloomberg. January 1, 1969 – June 30, 2019. For illustrative purposes only and not representative of an actual portfolio AQR manages. Government 10-year bond returns for G6 countries are defined as DataStream 10-Year Total Return indices and, prior to DataStream availability, Global Financial Data Total Return indices. Equity returns for G6 countries are defined as MSCI Total Return indices and, prior to MSCI availability, Global Financial Data Total Return indices, except for the U.S. which is defined as the S&P 500 Total Return and is sourced from Ibbotson prior to Bloomberg availability. The timing strategy is long or short G6 stocks or bonds based on whether the average global yield curve slope is above or below its historical mean. The cross-country strategy is long the 3 countries with the steepest yield curves, and short the 3 with the flattest yield curves. Returns are excess of local currency Global Financial Data T-Bill Total Return indices and gross of fees. For illustrative purposes only. Please read important disclosures at the end of this document. Hypothetical performance data has certain inherent limitations, some of which are discussed in the Appendix.

Conclusions and Current Implications

Our analysis concurs with many earlier studies in finding that the slope of the yield curve forecasts future economic growth (and recessions) in many countries over multiple horizons. We further show that yield curve steepness predicts future U.S. equity and bond market returns (steep curves have been good for both, inversions on average have been followed by negative excess returns). Patterns in other markets are weaker but have the same sign.

We strongly caution, however, that even the best predictive relationships come with wide uncertainty bands. While the yield curve has historically been among the more reliable predictors of recessions and U.S. market returns, our results show that realized outcomes are couched with uncertainty, and yield curve forecasts are best not used alone or aggressively. Where we use it in our investment strategies, we complement it with many other signals (value and momentum are always a good starting pair), and even in a multi-factor composite timing model we tend to only "sin a little," taking relatively small purely directional timing views.[13]

What are the implications for investors in late 2019? Yield curve inversion and its market implications is a hotly debated topic, also covered by our AQR colleagues.[14] The U.S. yield curve is inverted at the time of writing, signaling above-average recession probability as well as poor bond market carry. While many debate the possible reasons why the yield curve's bearish message may be attenuated today,[15] our interpretation is evergreen: Investors should pay attention to yield curves, but their predictions on future growth or market returns come with a lot of uncertainty, and they provide just one piece of the notoriously hard forecasting puzzle.

About the Portfolio Solutions Group

PSG provides thought leadership to the broader investment community and custom analyses to help AQR clients achieve better portfolio outcomes.

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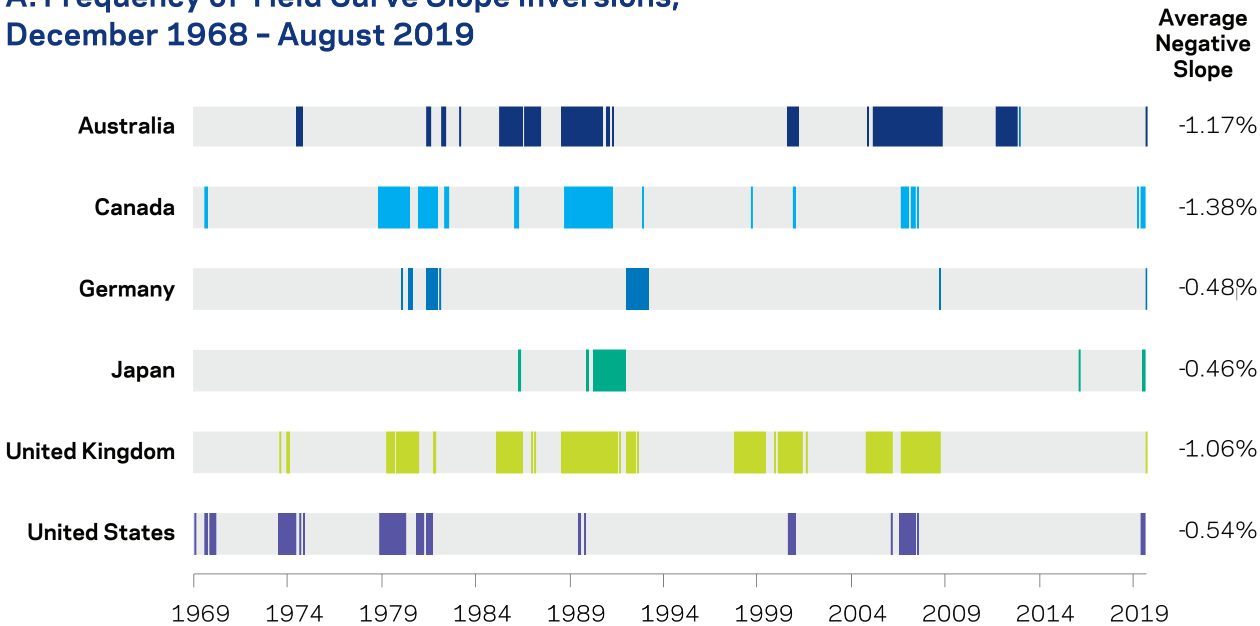
13 See "Market Timing: Sin a Little" by Asness et al. (2017). The title is a wordplay which associates timing with sin, based on a perhaps apocryphal Paul Samuelson comment.
14 See AQR Chief Investment Quarterly (2019), the AQR Curious Investor Podcast (2019), and Asness (2019).
15 It could be argued that the recent mild curve inversion is U.S.-specific and may have a less bearish impact on growth because global monetary policies remain easy (low and even negative rates in many countries, upward-sloping curves and continued quantitative easing in some countries), with even the Fed switching into easing mode in 2019. However, our regressions did not find results supporting these particular claims; they merely highlighted the large uncertainty in any forecasts.

Appendices

Exhibit A1

A. Frequency of Yield Curve Slope Inversions, December 1968 – August 2019



B. Characteristics of Yield Curve Slope Across G6 Countries, December 1968 – August 2019

	Australia	Canada	Germany	Japan	United Kingdom	United States	G6 Average
Average Slope (%)	0.8	1.1	1.8	1.4	1.1	1.5	1.3
Range (%)	-4.6 to 5.0	-4.4 to 4.4	-1.6 to 5.3	-1.0 to 3.4	-4.0 to 6.3	-1.9 to 4.1	-2.0 to 3.3
% of Months Inverted	22%	15%	5%	5%	29%	12%	8%
Slope as of Aug-2019 (%)	-0.1	-0.5	0.0	-0.1	-0.3	-0.5	-0.2
Percentile of Slope	19%	10%	5%	4%	22%	5%	5%

Source: AQR, Global Financial Data. Quarterly data from December 31st 1968 to June 30th 2019. Government yield curve slope is the yield on 10-year government bond minus 3-month yields for G6 countries. Colored bars denotes periods when the yield slope was negative for each country. For illustrative purposes only. Please read important disclosures at the end of this document. Past performance is not a guarantee of future performance results.

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