

# Global Rates Strategy

## Introducing Tactical 10-year UST Rates Scorecard

### Interest Rates

Global  
Interest Rate Strategy

#### UBS Tactical UST Duration Scorecard helps us predict near-term UST rate bias

We introduce a tactical 10-year UST duration scorecard to help us predict 1-week ahead change in 10-year US rates. While we backtest the model thoroughly to evaluate the robustness of our approach, our hope is to use the model as a guide for weekly US yield changes. For long-term yield changes we rely on our fundamental view of the economy and monetary policy expectation (see [UST 10-year forecast update](#)). The reason for introducing this model is to help us avoid near-term behavioural biases. We see the model as one near-term perspective on the US bond market. In the scorecard model, specifically we use five categories of factors and identify 13 indicator variables. The five factors group into financial conditions, monetary policy, valuation, foreign demand and technical variables.

#### How do we aggregate the scorecard?

We aggregate four financial conditions variables, two monetary policy variables, two valuation variables, three foreign demand variables and two technical variables (**Figure 3**). We generally form an indicator by looking at a 1-month change in the underlying variable. For example, if DM equities go up over the past month, we assign a -1 to indicate sell USTs, and vice versa. Given that there are 13 total variables, it could result in aggregated signal strength in a range of +13 to -13. Higher absolute signal corresponds to higher backtested P&L. From the aggregate signal, we look to report only weekly long/short bias with normalized conviction score. Conviction will range from 0% to 100%: 100% for maximum near-term conviction while 0% says zero conviction. As of October 26, for the week ahead, the model predicts SELL on UST with a 15% conviction (see **Figure 1**).

#### How are the results?

Since 2004, the model delivers out of sample hit-ratios of close to 55%; positive gains were seen even with lower hit ratios. In the back-test, the model had negative performance in three out of the 13 years. Average yearly gains were close to 50bp. High signal strength corresponds to higher expected gains and hit-ratios. Thus, there appears to be value in signal conviction. Again, we do not treat the model as a trading system, rather as a guide to near-term outright duration bias. Given that the model is somewhat backward looking, it cannot foresee unpredictable or new information. We do an out-of-sample maximum loss study and we find that during the 10 largest losses, the model didn't anticipate event risks, such as the Obama tax cut or the announcement of sub-prime losses by a large bank in 2007. However, as an important way to utilize the model, investors can see large unexpected losses as signals for new and important fundamental factors in the markets.

**Figure 1: Tactical UBS 10-year rate scorecard indication for the week ahead, as of October 26, 2016**

Security	Overall Buy/Sell Indicator Oct-26-2016
10-Year Treasury	SELL
Aggregate Signal (-13 to 13)	-2
Total Signal Strength (confidence, %)	15%

Source: UBS calculations

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## Market review and need for a tactical model

Recently, we have put forth [a detailed view](#) on why we expect long-end US rates (particularly 30-year TIPS) to rally over the medium term and we also [have long argued](#) that equilibrium real rates have declined and are likely to remain low. But the markets clearly trade in a more random manner on a week-to-week basis.

Thus, it makes it imperative for bond investors to have a tactical duration (long or short or neutral) indicator. During these short horizon holding periods, it is difficult to keep all the factors in mind at once and therefore we introduce a tactical bond market scorecard to help us forecast week-to-week yield changes.

## Introducing US 10-year yield scorecard model

We have built and back-tested a tactical duration scorecard model (**Figure 2**), which we hope will serve as a guide to investors on a week-to-week basis for UST duration bias. Specifically, the out-of sample back-test results showed this model has a statistically significant prediction record over the past 10 years. We recognize that past performance is no guarantee of future results, but we aim to publish this model on a weekly basis as a perspective and use it as a guide for near-term market bias. In this note, we review the latest output and details of this model.

As of August 19, 2016 (Friday's close), the UBS UST duration scorecard is saying to short 10-year Treasuries for the week ahead, with a normalized signal conviction of 15% (two out of 13 indicators, 2/13. 0% is neutral or zero conviction on the direction of rates one week ahead). Based on this output, the model expects UST rates to sell off in the coming week. As shown in **Figure 2**, we tally changes in a total of 13 indicators to form a one-week-ahead US 10-year rate direction view. The technique is similar to the ensemble methods used in data prediction competition. Effectively, in this case, we aggregate 13 independent indicators.

**Figure 2: UBS Research tactical 10-year rate view, as of Friday, August 19, 2016**

Security	Overall one week ahead Buy/Sell Indicator Aug-19-2016
10-Year Treasury	SELL
Individual Factor 10-year Treasuries Buy/Sell Signal	
Factor	Signal
Is there Labor Slack?	BUY
Core PCE below 2%?	BUY
Germany 10-year	BUY
UK 10-year	BUY
US Equities	SELL
EM Equities	SELL
Oil	SELL
USD	SELL
Term Premium	SELL
2s10s (Roll-down)	SELL
Japan 10-year	SELL
TY Call/Put volume	SELL
Low Liquidity (December?)	Neutral
<b>Total Signal Strength (-13 to 13, Sell/Buy)</b>	<b>-2</b>
<b>Buy or Sell 10-year Treasuries?</b>	<b>SELL</b>
<b>Normalized Signal Conviction (%)*</b>	<b>15</b>

Source: UBS research, Bloomberg. \*Note: 50% level here is zero conviction.

Below, we start by discussing why we espouse a higher frequency tactical model and why we build an aggregate-indicator-based model as oppose to a linear factor model. Next, we discuss specific factors, along with the results of the model. We also highlight shortfalls of this model and how it can be used in conjunction with portfolio managers' macro analysis and market foresight.

### Intuition for a check list model

In his 2009 book *Kluge*, Cognitive Psychologist Gary Marcus noted the shortcomings of the human brain in rational decision-making. Along this point, Daniel Kahneman has noted that "Experts are uniformly inferior to algorithms in every domain that has a significant degree of uncertainty or unpredictability, ranging from deciding winners in football games to predicting longevity of cancer patients. One has to accept financial markets are no exception to the rule." This point was also emphasized in *The Checklist Manifesto* by Atul Gawande, where he noted that hospitals that used checklists had significantly lower rates of critical mistakes.

We have worked diligently to form our long-term view of long duration, but realize that, on a week-to-week basis, markets can take a random path as data can be revised, to a surprise against our fundamental view, or the global central banks can change their reaction function. Thus, we think it is important to have a tactical model to trade near-term (week-to-week) movements in the bond market. In this spirit, we have designed a UST bond market scorecard to help us in forecasting weekly US bond market movements.

Specifically, we build a checklist scorecard model to make it easy for us and investors to track the indicators that feed into this model. We use 13 variables and aggregate the score. See **Figure 3** for our checklist factors.

**Figure 3: Check List, UST 10-year duration scorecard**

Factor Grouping	Factor	Check List	If Yes? Buy/Sell (+1 or -1) Treasuries	Specific Index Used
Financial Conditions	US Equities	Did US equities go up last month?	Sell	One month return of S&P 500
	EM Equities	Did EM equities go up last month?	Sell	One month return of EEM US Equity
	Oil	Did Oil go up last month?	Sell	One month return of 3rd WTI (CL3)
	USD	Did DXY go up last month?	Buy	One month return of DXY Index
Monetary Policy	Labour Slack?	Is there labor market slack?	Buy	US Unemployment rate minus CBO's NAIUR estimate
	PCE?	Is core PCE below 2%?	Buy	Y/Y Core PCE below 2%
Valuation	Term Premium	Is ACM term premium negative?	Sell	Federal Reserve ACM 10-year term premium
	2s10s (Roll-down)	Is the 2s10s nominal curve steepening?	Buy	One month change in 2s10s UST curve
Global Demand	Germany 10-year	Are German bonds selling off?	Sell	One month change in German 10-year yield
	Japan 10-year	Are Japanese bonds selling off?	Sell	One month change in Japan 10-year yield
	UK 10-year	Are UK bonds selling off?	Sell	One month change in UK 10-year yield
Technical	Low Liquidity (December?)	Are we in December?	Sell	Calendar Month == December?
	TY Call/Put volume	Is the Treasury futures call/put volume ratio increasing?	Buy	One month change in 10-year Treasury futures call to put trading volume ratio

Source: UBS Research

We prefer to use the simple checklist approach in building our scorecard rather than a linear regression model. This is because we find that coefficients of linear models tend to be time-varying and some relationships are just not linear.

Also from a practical perspective, we find that it is easier to communicate the checklist than coefficients of linear regression models. Additionally, we think this base model can serve as a benchmark that allows to add/remove indicators easily. In essence, we see our model as an aggregation of 13 simple models (i.e. if equities are up, sell bonds; if inflation is below 2%, buy bonds etc...). The inspiration for aggregating simple models comes from data science competition website such as Kaggle, where winners typically ensemble over 100 prediction models to form a final view.

### **Intuition for higher frequency tactical trading**

In addition, higher frequency investing is usually attractive for investors because it requires less expertise or edge in the market. For example, the fundamental Law of Active Management states that the proxy for an investment manager's skill is the information ratio, which is defined as skill times the square root of breadth (number of trades per unit of time):

$$\text{Information Ratio} = \text{Skill} * \text{Breadth}^{0.5}$$

*Breadth = number of independent trades per unit time*

Based on this equation, one can attain a higher information ratio by either increasing skill and/or number of independent trades. And if one increases breadth – number of trades per unit of time – she or he will require less skill, all else equal.

Such a higher frequency checklist model is not ideal for every investor, particularly because it is not forward looking. It will not capture genuinely new information, for example, unanticipated changes in domestic/global monetary policy and fundamental macro indicators.

Nonetheless, we hope the factor and results analysis discussed below will convince investors that the model can serve as a useful guide in assessing the near-term duration bias (long or short) in the bond market. Next, we discuss why we chose the factors that we did to form the scorecard model.

### **Why did we choose the checklist factors we did?**

First, there are many factors which drive the market on a week-to-week basis and their significance is time varying. The list we have gathered here is not all inclusive, but represents a general class of factors that one could consider relevant for the bond market. Specifically, we have divided the factors into five subgroups: financial conditions, monetary policy, valuation, global demand and technical.

#### **Financial condition variables: DM/EM equity, oil and DXY dollar returns**

By now, market participants understand that financial conditions matter for the Fed in terms of monetary policy as it might alter the Fed's economic projections and the dispersion around them. In a 2010 [speech](#), the NY Fed President noted that the stable linkage between the Fed funds rate and financial conditions means that these indicators provide additional information about real activity and are also relevant in deciding the Fed funds rate. Using this view point as a guide, we have narrowed to four financial conditions factors which matter for rates: US equities, EM equities, Oil futures and the dollar.

We found that one-month changes in each of these factors correlated to appropriate direction change in 10-year yields during the following week. That is when the US or EM equities fell over the month, the following week US Treasuries were more likely to rally. If oil prices increased over the past month, US yields were more likely to increase and vice versa for the dollar index (DXY index).

The hit-ratio in terms of predicting the direction of the next one-week yield change (see **Figure 4**) of these financial condition variables independently was over 50%. Although t-stats were not implying 95% confidence, the beta of independent variable -1/1 (Sell/Buy) to dependent variable +1/-1 (Yields move up/Yields move down) was negative. If the signal was to sell USTs or -1, from equities having risen over the past month, then a probable outcome was that 10-year yields would move higher in the subsequent week. As such the negative betas are consistent with intuitive understanding of the bond market, i.e. bond returns are negatively correlated with stock returns. Next, we discuss the role of monetary policy variables in determining the direction of rates in future.

### Monetary Policy Variables: Labour market slack and inflation shortfall

Similar to financial conditions variables, we have used the following two monetary policy indicator variables which are consistent with the Fed's dual mandate: 1) Is there labour market slack? 2) Is core PCE below the Fed's 2% inflation objective? We have defined labour market slack as when the latest known unemployment rate is above the CBO's natural rate of unemployment. If this is true, then, all else equal, the Fed is likely to keep rates lower for longer and so one should long USTs and vice versa. In the second factor, we look at whether Y/Y core PCE is below the Fed's stated 2% PCE inflation objective. If it is, then the Fed is likely to keep rates lower for longer, and we chose to long USTs and vice versa.

**Figure 4: Back-testing results of the 10y US rates tactical model**

Factor Grouping	Factor	Check List	Hit Ratio of predicting 10-year UST Yield change 1 week ahead	Beta	T-Stat
Financial Conditions	US Equities	Did US equities go up last month?	0.51	-0.03	-0.65
	EM Equities	Did EM equities go up last month?	0.54	-0.08	-1.97
	Oil	Did Oil go up last month?	0.52	-0.04	-1.08
	USD	Did DXY go up last month?	0.52	-0.04	-1.12
Monetary Policy	Labor Slack?	Is there labor market slack?	0.52	-0.04	-0.98
	PCE?	Is core PCE below 2%?	0.51	-0.03	-0.65
Valuation	Term Premium	Is ACM term premium negative?	0.53	-0.06	-1.50
	2s10s (Roll-down)	Is then 2s10s nominal curve steepening?	0.51	-0.02	-0.50
Global Demand	Germany 10-year	Are German bonds selling off?	0.51	-0.02	-0.42
	Japan 10-year	Are Japanese bonds selling off?	0.50	-0.01	-0.19
	UK 10-year	Are UK bonds selling off?	0.50	-0.01	-0.15
Technical	Low Liquidity (December?)	Are we in December?	0.68	-0.37	-2.80
	TY Call/Put volume	Is Treasury futures call/put ratio increasing?	0.54	-0.08	-2.04
<b>Aggregate Scorecard Signal</b>		Sum of all indicators	0.55	-0.09	-2.21

Source: UBS calculations

We find hit-ratios of these variables to be more than 50% (see **Figure 4**) with respect to weekly changes in UST yields, but - as one would expect - these are not high frequency variables and t-stats are low. Nonetheless, when these variables are aggregated with other ones, they provide uncorrelated information which is helpful in decision making. Clearly, the monetary policy is very dependent on these variables. One key knock against this approach is that it does not take into account the magnitude of monetary policy variable shortfall. Albeit, we do not think this magnitude of labour market or inflation shortfall is as relevant for predicting week to week changes. Again for the sake of simplicity, we assign a broad 1 (UST bull) or -1 (UST bear) indicator here.

#### **Valuation variables: Term premium and 2s10s roll-down**

For fundamental investors, another key factor for trading nominal yields is valuation. Here we use two valuation variables: [NY Fed's ACM Term Premium](#)<sup>1</sup> and one-month change in 2s10s yield curve. Simply stated, term premium represents the extra compensation (positive or negative) investors demand for holding longer-tenor USTs. The term premium is estimated using affine term structure model. If this term premium is negative, it should mean that bonds are rich and investors are paying a premium to hold longer-dated bonds and vice versa. Thus, if term premium is negative, our indicator scores -1 and +1 when term premium is positive.

The second valuation factor is changes in the 2s10s nominal yield curve. If the yield curve steepens, there is more roll/carry in the curve so investors should desire to buy USTs further out in the curve (+1, Buy UST indicator). And if the yield curve flattens, investors are not getting sufficient yield for taking more duration risk, so they should want to sell (-1, Sell UST indicator). Once again, in the back-testing results, hit ratios are above 50% for these two variables and signs are in line with the intuitive underlying relationship (see **Figure 4**).

#### **Global bond variables: UK, Germany and JGB one-month yield changes**

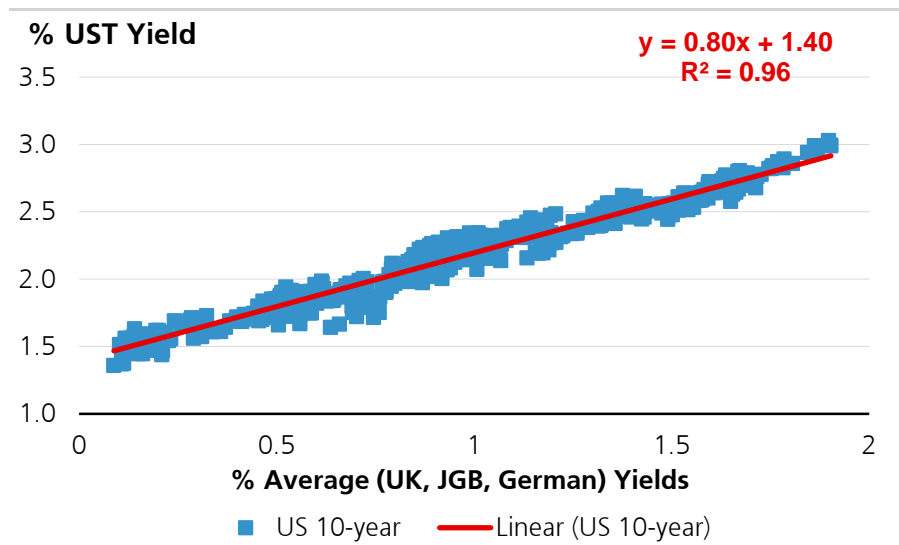
Over the past few years, investors have seen that the global developed world bond market has become the biggest driver of long-end US yields (see [Helicopter turns submarine: Japan's bond sell-off and its global effects](#)). **Figure 5** shows that average UK, JGB and German Yields can well explain the level of UST yields. Thus, in our aggregate scorecard model, we included the following indicator: one-month change in 10-year JGB yields, one-month change in 10-year German yields and one-month change in 10-year UK yields.

If yields in any of those regions declined over the past month, we expected 10-year US yields to decline in sympathy during the subsequent week. Clearly, yields likely moved together, but we are trying to forecast an out-of-sample yield change. As can be seen in **Figure 4**, the hit ratio of such indicators was over 50% and expected gain per signal was close to 1bp for each variable.

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<sup>1</sup> ACM term premium: Term premium in the 10y UST yields estimated from the model developed by New York Fed economists Tobias Adrian, Richard Crump, and Emanuel Moench (or "ACM").

**Figure 5: The level of 10-year UST Yields is correlated to average of UK, JGB and German 10-year yields**

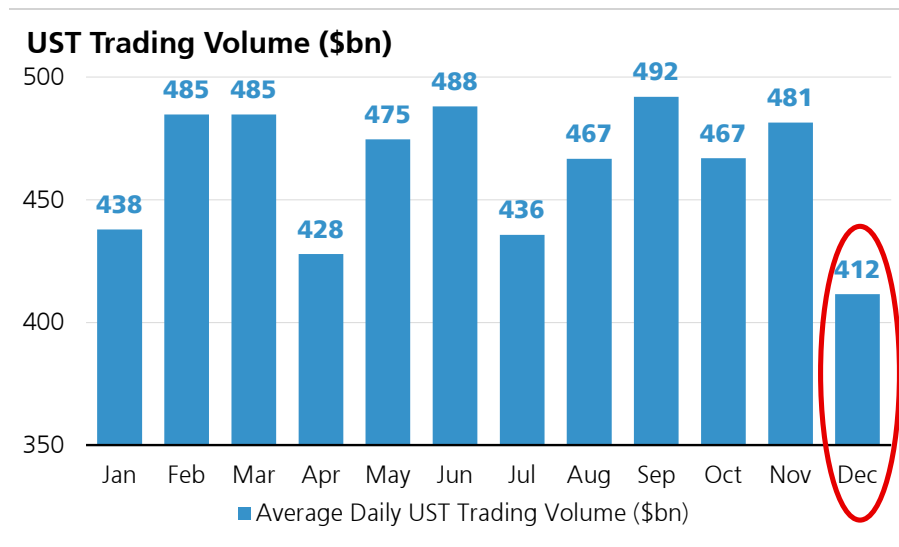


Source: UBS, Bloomberg

**Technical variables: December illiquidity and changes in Treasury futures Call/Put ratio**

As strategists, we often hear that fundamental analysis is good and helps to predict the long-term trend. However, fundamental analysts tend to ignore short-term factors, such as positioning and liquidity that drive short-term variations. Indeed, these factors are difficult to capture, but we have found some indicators that work well. We identify two simple technical factors: 1) one-month change in Treasury futures call/put volume ratio, and 2) are we in the month of December? With respect to the first factor, we found that a one-month change in Treasury futures call/put ratio is one of the strongest indicators of near-term change in yields, as we get a hit-ratio close to 54% for this variable.

**Figure 6: Primary dealer trading volume in USTs is lowest in December**



Source: UBS, NY Federal Reserve

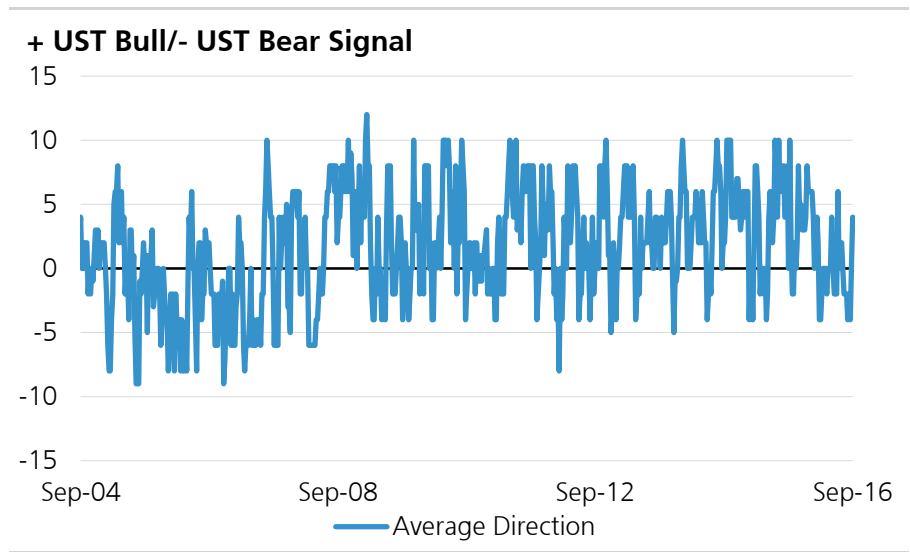
Effectively, an increase in call volume to put volume suggests USTs will rally and vice versa. The second factor we looked is a very blunt liquidity indicator. It is well known in the bond market, that December historically is the lowest liquidity month (see **Figure 6**) and bonds tend to sell off in December, as primary dealers do not have sufficient balance sheet. Thus, our indicator here is simple: if we are in December - liquidity shortage would lead to a bearish view on the UST, otherwise we take a neutral signal from this indicator. As seen in **Figure 4**, the hit ratio for this indicator is higher than 65%. We have backtested December indicator variable on weekly data for past 10 years, which means there are only 40 data points to test its efficacy. Nonetheless, we think liquidity matters for near-term trading.

**Aggregate all factors: Financial conditions + monetary policy + valuation + global bond market + technical**

As we noted earlier, the most important learning from modern data science prediction methods is that aggregating models or perspectives (ensembling) is quite important in making robust predictions. And indeed, when we combine all five factors or 13 variables in total, it leads to a robust 55% hit-ratio out of sample. The t-stat is 2.2, which indicates more than 95% confidence.

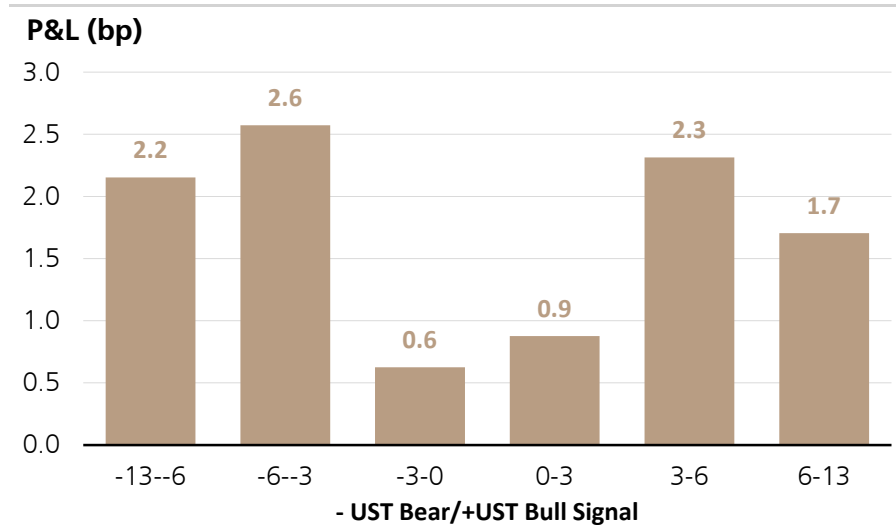
Moreover, the direction of the beta is consistent and a very low or negative signal suggesting selling bonds converts to high expected value. Likewise, a strongly positive signal suggesting buying bonds, converts to low expected value. At maximum, the aggregate score could be +13 while at minimum score should be -13. **Figure 7** shows the variation of signal over time. The maximum bull UST signal has been +12, which occurred in February 2009. The maximum short signal has been -9 and occurred in December 2006. Signal has generally been between +5 to -5, with a slightly bullish bias. The back-test period includes the 2008 financial crisis and generally worsening financial conditions. As such, it is not surprising that the historical back-test has had generally bullish bias.

**Figure 7: UBS UST Duration Scorecard signal time-series**



Source: UBS calculations

**Figure 8: UST Bull/Bear P&L (bp) broken down by UBS UST Duration Scorecard Signal Buckets**



Source: UBS calculations, Bloomberg

### Results align with intuition

Finally, the most-awaited figure - **Figure 8** - shows that signal conviction (+13 to -13) broken by buckets corresponds to P&L magnitude equivalence. That is, high absolute signal converts to higher magnitude of gain.

**Figure 9** shows the cumulative P&L of the duration scorecard. The cumulative P&L profile looks positive but there are periods of drawdowns with respect to a previous high watermark. Most notably they occurred in 2005 and 2009.

**Figure 9: UBS UST Duration Scorecard P&L profile**



Source: UBS calculations

**Figure 10** tabulates hit ratio by year and basis points gained per year. We see that hit ratio for any given year has been as high as 61% (2015) or as low as 40% (2005). In three out of last 13 years the model has delivered lower returns. Specifically, 2005, 2007 and 2009 were negative years for the model. Average expected loss during those years was about -50bp whereas average expected gain during the positive years was about 50bp.

**Figure 10: UBS duration scorecard hit ratio & cumulative gain by year**

Year	Hit Ratio (%)	Cumulative Gain (bp)
2016	43	4
2015	61	95
2014	60	54
2013	59	17
2012	60	87
2011	60	121
2010	50	15
2009	48	-75
2008	55	222
2007	51	-22
2006	58	82
2005	40	-43
2004	60	101

Source: UBS calculations

So as can be seen, the skew of returns in bp gained is much more positive. In 2016 the hit ratio was low, but cumulative gains were slightly positive. It is possible for hit ratio to be low but gains are still positive. This is because the P&L is a function of expected value: Hit-ratio \* P&L. Thus, for the times we called the market correctly, expected P&L must have been high enough to offset the negative P&L incurred via calling the market incorrectly.

**Figure 11** below summarizes the results of our regression of combined indicator versus one-week yields change. Next, we discuss the output of our scorecard and lessons learned from periods when the model had its largest losses.

**Figure 11: The UBS weekly 10-year duration scorecard model results and statistics summary**

Statistic	Value	Description
<b>Regression</b>		1-Week ahead Yield Direction =Coefficient*Combined Indicator +Error Term
<b>Coefficient</b>	-0.09	The average change of Yield Direction for 1 unit change of Combined Indicator.
<b>T Statistics</b>	-2.21	The ratio of Coefficient and its standard error. The greater absolute value of t Statistics implies a more significant relationship between the dependent variable and independent variable.
<b>P Value</b>	0.03	The probability that Coefficient is equal to zero. A value below 0.05 implies a strong statistical relationship.
<b>Buy Hit Ratio</b>	0.56	The ratio of correct buy signals and total buy signals.
<b>Sell Hit Ratio</b>	0.51	The ratio of correct sell signals and total sell signals.
<b>Overall Hit Ratio</b>	0.55	The ratio of correct signals and total signals.
<b>Average Buy Move (bp)</b>	-1.33	The average change of yield when receiving a buy signal.
<b>Average Sell Move (bp)</b>	0.41	The average change of yield when receiving a sell signal.

Source: UBS calculations, Bloomberg

## Discussing the output

As noted above, the model aggregates the results of 13 factors in the checklist, which each independently suggests whether to buy or sell bonds. The score can range from +13 or -13. In order to make it easy to understand the output, we have normalized the aggregate buy/sell score in percentage terms and signal direction. Our baseline or neutral confidence is 0%, and the model score adds to this number.

Our final output consists of Buy/Sell 10-year Treasury recommendation with 0% to 100% confidence. A 0% confidence basically means that the aggregate score of all 13 factors is zero. If, for example, aggregated score is -4 (out of total -13), recommendation is to sell Treasuries and the model's confidence level would be 31%  $(-4/-13)$ .

An example output as of August 26, 2016 is shown in **Figure 12**. As an aggregate, the output suggests to sell 10-year Treasuries for the week ahead with a confidence level of 31%. In terms of individual factors, both monetary policy factors are indicating to long Treasuries while the steeper curve and the rally in UK bond market suggest to buy Treasuries.

Eight other factors are saying to sell treasuries and one technical factor (are we in December, low liquidity) is neutral. Thus, the aggregate score adds to -4 (four buys + -8 sells + zero for neutral). As explained above, this translates to sell signal with a confidence level of 31%.

We have refrained from adding cutoffs to the total score because we did not want to data mine - even if the final aggregate of 13 signals was low, we wanted to understand what the market bias was at each point.

**Figure 12: UBS 10-year UST scorecard output as of August 26, 2016**

Security	Overall Buy/Sell Indicator Aug-26-2016
10-Year Treasury	SELL
Individual Factor 10-year Treasuries Buy/Sell Signal	
Factor	Signal
Is there Labor Slack?	BUY
Is core PCE below 2%?	BUY
2s10s (Roll-down)	BUY
UK 10-year	BUY
US Equities	SELL
EM Equities	SELL
Oil	SELL
USD	SELL
Term Premium	SELL
Germany 10-year	SELL
Japan 10-year	SELL
TY Call/Put volume	SELL
Low Liquidity (December?)	Neutral
Aggregate Signal (-13 to 13, Sell/Buy)	-4
Buy or Sell 10-year Treasuries?	SELL
Normalized Signal Conviction (%)	31

Source: UBS Research

## When is the model wrong? Learn the new relevant factor from the loss

Perhaps the most interesting learning we had from the model was to analyse the periods when the model was wrong. **Figure 13** shows losses by magnitude and events surrounding those losses. As can be seen in this figure, the taper tantrum, European sovereign debt crisis, subprime losses, Fed easing and turns in payroll data surprises were the key reasons for the model's underperformance. A lot of these events can be classified as known or unknown unknowns. Simply stated, new information is hard to predict via this backward-looking model. For instance, if we could have predicted subprime losses, that would certainly override this model. Subprime loss experienced by this model preceded the 2008 financial crisis by almost one year.

However, all is not lost; one should use the model's failure as a guide. For example, the first subprime loss warning was captured by the model in October 2007, almost one year prior to the financial crisis. This miss on sub-prime losses would have indicated to someone following the model that this is genuinely new information worth paying attention to. So we tend to see large unexpected loss from the model as a market feedback guide. It typically signals new and important fundamental factors in the market.

**Figure 13: Largest model losses? Which event did the model not predict?**

Model Recommendation Week	Events which were coincident to model loss	Loss (bp)
6/21/2013	Taper Tantrum	-40
7/17/2009	Upbeat housing data	-34
7/1/2011	manufacturing data	-32
2/6/2015	payroll surprise	-32
12/10/2010	extension of tax cuts	-31
1/23/2009	Expectation of stimulus and increased debt issuance	-30
2/29/2008	Subprime loss announcement	-29
10/19/2007	Subprime loss concerns	-29
6/5/2015	Payroll surprise	-29
11/4/2011	Euro sovereign debt crisis	-28

Source: UBS calculations

## Valuation Method and Risk Statement

Risks include, but are not limited to, market risk, credit risk, interest rate risk, liquidity risk, inflation risk, and exchange rate risk. Furthermore, valuations may be adversely affected during times of high market volatility and thin liquidity.

Past performance is not indicative of future returns. Investing in securities globally poses risks. Valuations can be impacted by changes in the macroeconomic landscape as well as financial market stability.

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