

# **Interest Rate Trends in a Global Context: Expanding the Evidence Base for Forecasting**

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## Motivation and significance

Social Security Trust Fund projections rely on assumptions about the long-run interest rate. Interest rates are used to discount the benefits stream, to assess fiscal sustainability, and to project income and outlays of the Trust Funds. It is well known that interest rates have fallen steadily since the early 1980s in advanced economies including the United States. Past forecasts largely missed this global, secular decline in interest rates and tended to predict rate reversals towards the historical average year after year.

This project has two major objectives. First, we review empirical studies on the global component of interest rates and provide a synthesis of methodologies that involve using cross-country data for US interest rate forecasting. Second, we provide an organizing framework for analyzing influences of domestic factors as well as global factors on the dynamics of the US interest rate. Ultimately, our analysis will improve our understanding of the factors that drive long-run interest rates and will inform us of the key variables – domestic and foreign – needed to forecast rates going forward.

## Possible drivers of long run interest rates

### *Labor market and productivity dynamics*

Economic researchers have identified a number of possible drivers of long run interest rates. Chief among them is the changing size, composition and productivity of the labor force. Labor productivity has been on a secular decline across the G7 since the 1980s. Such a decline reduces investment demand and coincides with the general decline in long run interest rates. Demographic factors are also likely to have an important impact on interest rates. Life expectancy in developed countries is projected to rise by about 25 years between 1950 to 2050 while the population growth

rate in developed economies is expected to fall to virtually zero. During the transition to an older, longer-lived population, there is a downward pressure on interest rates as workers save in anticipation of a longer retirement phase. The rising share of the elderly, however, would tend to reduce the total private saving and push the interest rate in the opposite direction. Even despite this, the combination of rising longevity and falling population growth would lead one to expect that the low rates observed today could persist in the longer run.

### *Government debt*

The rapid rise in government debt ratios in Europe and the United States after the global financial crisis should, in principle, put some upward pressure on long run interest rates. While concerns about solvency did produce spikes in risk premia for some countries in Europe, in general there is little evidence of a secular trend in long run rates due to the rise in public sector borrowing.

### *Demand for safe assets*

During the 2008 financial crisis, investors shifted their portfolios toward Treasuries to protect against risk. Changes in financial regulations after the crisis increased incentives for holding such safe assets by financial institutions, pensions and insurance companies. As a result, demand for Treasuries by domestic as well as foreign investors increased through the 2000s, helping to explain why bond prices have risen even as the supply of debt has expanded. Data on the ownership of U.S Treasury securities indicates that demand may have leveled off. If the supply of debt continues to increase as projected, higher interest rates are likely in the near horizon.

As markets have become increasingly globalized, changes in macroeconomic conditions in the rest of the world – emerging markets as well as other advanced economies – have become increasingly important for U.S. financial markets and the determination of the long run interest

rate. During the 2000s, economists pointed to “global imbalances” – the excess demand for safe assets in emerging markets – as a substantial demand-side pressure that kept interest rates down. The saving-investment gap ballooned in the years leading up to the global financial crisis, though IMF projections suggest that gap will be dramatically smaller in the years going forward, hence the downward pressure on world interest rates be diminished. Consistent with this pattern, China’s stock of foreign exchange reserves, a substantial fraction of which is in U.S. Treasuries, rose dramatically from zero to nearly \$4 trillion by 2014, but has declined to \$3 trillion since then.

We conclude that there is strong evidence that global trends in demographics, productivity, government debt, and demand for safe assets by private and institutional investors have an impact on the determination of long run interest rates. Therefore forecasts need to include both domestic as well as global factors. Next we describe the dataset and the methodology we use to estimate the role of global and domestic factors and their connection to macroeconomic fundamentals.

## Data

Our analysis utilizes yield curve data from 8 advanced economies over the period January 1990 to December 2018.<sup>1</sup> Data are drawn from national central banks and Datastream. The goal is to link time series characteristics of the yield curve to macroeconomic fundamentals. Therefore we also draw on macroeconomic time series, financial transactions data and forecasts of economic activity. The yield curves and the macroeconomic time series are used as inputs into a dynamic econometric model aimed at quantitatively assessing the forecasting performance of global economic indicators.

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<sup>1</sup> The 1990-2018 yield curve sample covers Australia, Canada, France, Germany, Japan, Switzerland, UK and US. Our database also includes yield curve samples for the European Union (2004-2018), India (2001-2018), and Korea (2008-2018).

## Summary of results

### *Yield curve co-movements after the 2008 financial crisis*

Using the principal component technique, we extract three common factors (i.e. linear combinations of yields at different maturities) that account for the maximum portion of observed variation in yields along the yield curve. In the finance literature, the three factors are commonly referred to as the “level”, “slope” and “curvature”, according to their relative impact on yields at different maturities. We extract the US factors separately from those in the other seven economies and analyze the correlations between the factors as well as changes in yield curve co-movements after the 2008 financial crisis. The level factors – capturing the common global downward trend in nominal interest rates – are strongly correlated across countries, and this correlation remains strong after the financial crisis. By contrast, the cross-country correlation of the slope factor has reversed its sign after the 2008 financial crisis. This result points to a changing nature of co-movement among the advanced economies’ yield curves over the past decade and underscores the importance of using the post-2008 sample in the estimation.

### *The role of global factors in US interest rate forecasting*

To quantify the impact of other countries’ yield curve movements on the US yield curve, we estimate a dynamic term structure FAVAR model. The model relates the US yield curve to three dynamic latent factors that, in turn, depend on three global yield curve factors. The goal of estimating the dynamic model is to perform a variance decomposition assessing the role of global factors in forecasting at different horizons and maturities. Our preliminary results indicate that that global factors tend to explain the long-term dynamics

of the yield curves and that they have relatively more impact on the long-term interest rates, explaining well over one-half of their variance. By contrast, domestic factors are more relevant for short-term movements in yield curves as well as short-term interest rates.

### *Forecasting performance of global economic indicators*

One of the goals of this project is to construct a set of economic indicators potentially useful in interest rate forecasting. At this point, we consider leading indicators of real economic activity by region (US, Europe, Asia) as well as foreign official purchases of US Treasury securities. Simple regression analysis shows that all three indicators are significant predictors of at least one US yield curve factor.

Our next step is to re-estimate the dynamic term structure model using economic indicators as explanatory variables. As a result, we will be able to calculate model-generated impulse responses in order to quantitatively assess the impact of a change in global economic conditions on the US yield curve – both over time and across maturities.

### Conclusion

This project presents an organizing framework for understanding global trends in nominal and real interest rates as well as commonalities in yield curve movements across countries. We obtained encouraging preliminary results indicating that global factors and foreign macroeconomic indicators have potential to inform the US interest rate forecasts.