Documentation for government bond yield curve decompositions

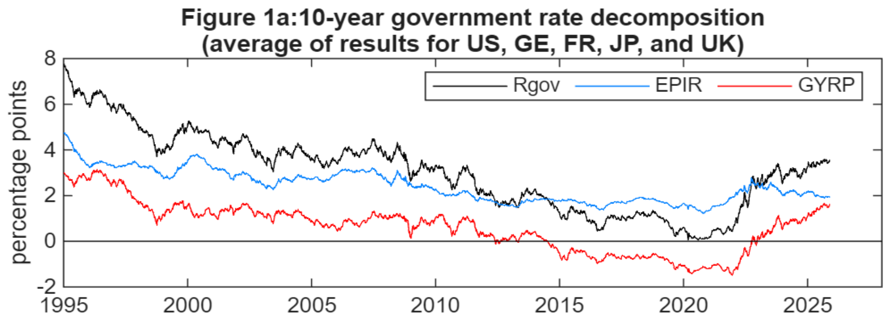
Leo Krippner, 27 November 2025

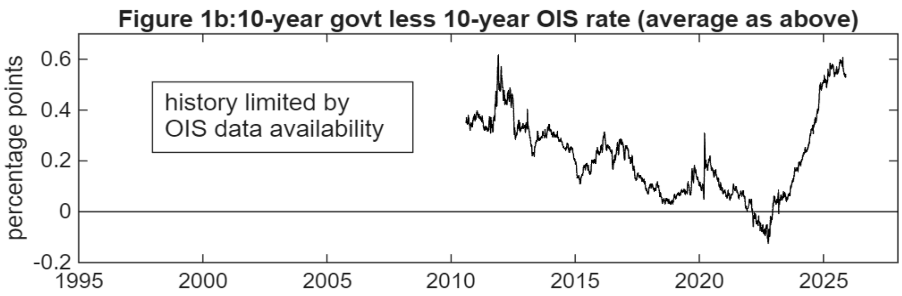
A. This note documents and illustrates the government bond yield curve decompositions for the United States, Germany, France, Japan, and the United Kingdom that I have added this month to my regular updates (https://www.ljkmfa.com/visitors/, "Yield curve decompositions" tab).

B. Figure 1a illustrates collectively for the above countries that the Government Yield Risk Premium (GYRP) component has accounted for almost three percentage points (pps) of the net rise in government 10-year rates since their 2020/21 lows. The Expected Policy Interest Rate (EPIR) component initially made a large contribution, as central banks responded to post-COVID inflation, but that is now partially offset by PIR cuts (apart from Japan).

C. Figure 1b shows that the GYRP has risen more than the 10-year risk premium from the Overnight Indexed Swap (OIS) results I regularly update. 10-year government bonds now have 0.6 pps of interest cost beyond generic influences accounted for in the OIS yield curve.

D. The government yield curve decomposition results will be included in my regular monthly updates, allowing the components of government yields to be monitored on an ongoing basis.





1 Introduction

In my regular yield curve decomposition results, this month I have added results for government yields in the United States, Germany, France, Japan, and the United Kingdom. One prompt is increasing commentary about the causes and effects of rising government bond yields; e.g. The Economist, "Soaring bond yields threaten trouble", 25 May 2025, and "Across the rich world, fiscal crises loom", 13 October 2025. A particular concern is the potential for detrimental feedback loops, i.e. higher interest costs $\Rightarrow$ larger fiscal deficits $\Rightarrow$ more borrowing $\Rightarrow$ higher interest rates, etc.

The main purpose of this note is to document and illustrate the government yield curve decomposition results. In general, decomposing a yield curve into its interest rate expectation and risk premium components provides a useful perspective for interpreting its historical evolution, because each of the components may be assessed with respect to their typical drivers. For example, monetary policy is an influence on the interest rate expectation component of rates on the yield curve, while inflation uncertainty is an influence on the risk premium. A more comprehensive discussion of typical component drivers is contained in my note Krippner (28 March 2022), "Unwind of negative bond risk premium to underpin rising yields", downloadable from https://www.ljkmfa.com/visitors/.

Additionally undertaking a decomposition for the government yield curve risk produces a risk premium component specific to government bond yields. Influences on that component include the current and expected volume of government borrowing associated with the fiscal deficits, central bank sales of government bonds associated with quantitative tightening, and safety/liquidity demand in periods of financial market stress. The government-specific risk premium component may also include credit risk associated with potential default.

Section 2 of this note contains a series of comments describing how the government yield curve decomposition results are obtained, and also how they relate to the Overnight Indexed Swap (OIS) yield curve results that I regularly provide. Krippner (2022) already includes an overview of the latter, i.e. concepts, terminology, method, and data, so I refer readers to that document and I also reference it myself in this note. Section 3 plots the government yield curve decomposition results for selected maturities, and I use those perspectives for discussing historical trends and notable points since 2020/21.

I don't include a section in this note on the outlook for yields based on yield curve components. It suffices to say here that generic risk premiums in OIS yield curves will likely remain elevated because the influences discussed in Krippner (2022) that increased those risk premiums remain similar to that note, particularly the environment of inflation uncertainty and the reduced hedging benefit of interest rate securities relative to equities. And the additional risk premium specific to the government yield curve will likely edge higher, given ongoing fiscal deficits at present and the longer-term challenges for governments from aspects such as ageing populations and defence spending.

2 Yield curve decomposition description

The government yield curve decomposition results I have added to my regular monthly updates are for the following countries: the United States (US), Germany (GE), France (FR), Japan (JP), and the United Kingdom (UK). Within each of those sheets "D. XX Daily", the first set of results is for the OIS rates of the given country (subject to the explanation on data further below), which continues the regular monthly updates I provide. The second set of results is for the government yields of the given country. The maturities for both sets of results are 2, 5, 10, and 30 years.

The government yield curves of both Germany and France are associated with the Euro Area (EA) OIS curve, so the latter decomposition is repeated in both the GE and FR sheets. The Euro Area OIS curve is also contained in the EA sheet, which continues the arrangement for the regular updates. There is no associated EA government yield curve.

There are no changes to the Canada (CA), Australia (AU), and New Zealand (NZ) yield curve decomposition results. These have always been for government yields, because the necessary OIS yield curve data are not available for those countries.

In Krippner (2022), I used the terminology "R model" and Bond Yield Risk Premium (BYRP) as generic expressions to respectively denote the fitted interest rate and its risk premium component.

To avoid ambiguity between the two sets of results, here I use "Rgov" and "GYRP" respectively to denote the fitted yield and the risk premium component of government yields, and "ROIS" and "ORRP" to denote the fitted OIS rate and risk premium component of OIS rates. For reasons I discuss shortly below, the Expected Policy Interest Rate (EPIR) component is identical within the OIS and government yield curve decomposition for each country. Also identical is the decomposition of EPIR into a Long-horizon Natural Interest Rate (LNIR, nominal), and the EPIR gap [EPIR – LNIR], hence EPIR = LNIR + [EPIR – LNIR].

The decomposition of rates on the OIS yield curve is therefore:

$$\text{ROIS}(t,\tau) = \text{LNIR}(t) + [\text{EPIR}(t,\tau) - \text{LNIR}(t)] + \text{ORRP}(t,\tau) \tag{1}$$

which is the same as Krippner (2022) apart from the change in notation, i.e. the fitted rate and risk premium names, and here I have explicitly added time t and time-to-maturity τ to clearly differentiate the decompositions at different points in time and at different maturities on the yield curve. Also note that LNIR(t) only varies over time and not by maturity, i.e. all decompositions ROIS(t,τ) at time t use LNIR(t). The decomposition of yields on the government yield curve is:

$$\text{Rgov}(t,\tau) = \text{LNIR}(t) + [\text{EPIR}(t,\tau) - \text{LNIR}(t,\tau)] + \text{GYRP}(t,\tau) \tag{2}$$

All yield curve decomposition results are provided for 2-, 5-, 10-, and 30-year times-to-maturity, as illustrated in section 3.

The estimates for the OIS curve components in equation 1 are obtained using the framework and data discussed in section 3 of Krippner (2022). In brief, I use my three-factor shadow/lower-bound yield model estimated with yield curve data out to 30-year maturities and survey data for interest rate expectations over multi-year horizons from professional forecasters.

The LNIR used in the model estimation (and in subsequent decompositions) is based on survey data for long-horizon expectations of GDP growth and inflation, which is a simple proxy to account for the gradual decline in the real natural interest rate and the inflation component of long-horizon expectations of interest rates over the sample period.

The LNIR, EPIR, and the EPIR gap results from the OIS curve are then used in the government yield curve decomposition. Specifically, I calculate government risk premiums as fitted government rates less the expected policy rate components from the OIS curve. OIS rates are for derivatives that settle on actual PIRs, so the EPIR estimated from the OIS curve should in principle best embed expectations for the path of the PIR path.

Given the EPIR and LNIR components are identical within both decompositions, the only differences between the two sets of results are the fitted rates (i.e. ROIS or Rgov) and their associated risk premiums (i.e. GYRP or ORRP, which are the fitted rates less the common expected policy components). The advantage of this arrangement is that ROIS less Rgov, or equivalently GYRP less ORRP, gives the additional risk premium component in the government yield relative to the OIS rate. However, that difference is only valid in the latter part of the sample due to the limitations of available OIS yield curve data that I now discuss.

Complete yield curve data for OIS rates are not available in the first 10-15 years of the sample; specifically before 4-Jan-2006 for the US, 28-May-2008 for the EA, 6-Aug-2009 for JP, and 30-May-2008 for the UK. Before those dates only government yield curve data, from 1995, are available. Hence, to create the longest-possible sample of data for estimating the OIS yield curve models, I have used government rates as a proxy for the OIS rates from 1995, and spliced those with the OIS data over the year from the date of the OIS data available. Specifically, for example, US yield curve data are government rates prior to 4-Jan-2006, OIS rates from 4-Jan-2007, and a pro-rata splice of government and OIS data between 4-Jan-2006.

The implications of the splicing above is that prior to the availability of OIS data the ROIS series is approximately equal to Rgov series, and the GYRP series is approximately equal to the ORRP series. This does not matter much for the outright decompositions; either Rgov or ROIS along with their respective risk premiums have essentially the same profiles relative to the ranges they have moved in over the sample. However, when comparing Rgov to ROIS, or GYRP to ORRP, that is only valid from the end of the splicing period, i.e. a year after the OIS data becomes available. The Rgov less ROIS series for each country in the following section are only plotted for the latter part of the sample to reflect the OIS data limitation. For the collective results in the front-page figure and section 3, the comparison is only valid from 6-Aug-2010, i.e. a year after JP OIS data becomes available.

3 Results and discussion

The composite figures 2 to 5 on the following pages respectively plot the decomposition results for 2-, 5-, 10-, and 30-year government yields for each of the countries previously mentioned and repeated here for convenience, i.e.: the United States (US), Germany (GE), France (FR), Japan (JP), and the United Kingdom (UK). The G5 results are equal-weighted average of the results for those five countries.

For each country, the decomposition results in the left-side subplot are the quantities previously given in equation 2 and repeated here for convenience, i.e.:

$$\text{Rgov}(t,\tau) = \text{LNIR}(t) + [\text{EPIR}(t,\tau) - \text{LNIR}(t,\tau)] + \text{GYRP}(t,\tau) \tag{3}$$

For comparability between countries and maturities, all of these subplots have the same axis scale. As previously explained, the outright profiles of the Rgov and ROIS, and GYRP and ORRP are very similar relative to their historical ranges, which is why I have only plotted the government results in these figures.

A general observation across countries and maturities is that yields have fallen over the sample period. From the decompositions, a material contribution is the gradual decline in LNIRs, about two percentage points (pps) for most countries, which is in turn due to persistent declines in neutral real interest rates and long-horizon inflation expectations over the sample period. There has also been a net decline in GYRPs, associated with aspects such as lower inflation uncertainty. But the GYRP has increased markedly from around the 2020/21 lows, by about three pps for G5 10-year yields, and notably by four pps for the UK specifically. The EPIR gap generally cycles around zero, i.e. the expected PIR path cycles around the LNIR, reflecting changing stances of monetary policy. Sections 4 and 5 of Krippner (2022) contain a more comprehensive discussion of historical trends and underlying influences.

Comparing between maturities, it is apparent that shorter-maturity yields have larger contributions from the EPIR gap and smaller contributions from the GYRP, and vice-versa for longer maturities. Indeed, as explained over the following two paragraphs, most of the movements in 30-year yields over periods of several years should in principle be attributable to movements in the GYRP.

The EPIR gap pattern noted above reflects that deviations of the PIR path from the LNIR can readily be expected to persist for horizons of several years, or even longer during the lower-bound periods following the Global Financial Crisis and COVID onset, i.e. the long period of accommodative monetary policy around those periods is evident in the EPIR gap for 2- and 5-year yields. But the PIR path will be expected to revert to the LNIR for longer horizons. That mean reversion is consistent with the interest rate expectation survey data which is incorporated into the estimation for my models.

The practical implication of mean reversion in the PIR path is that the EPIR gap component for 30-year bonds, i.e. the average of the expected PIR path relative to the LNIR over the next 30 years, will always be close to zero. Movements in 30-year yields will therefore essentially reflect movements in the LNIR and the GYRP. However, like any measure of neutral interest rates in general, the LNIR I use tends to evolve slowly over time. Specifically, for example, LNIRs have remained fairly steady since 2020/21, with little change in long-horizon expectations of GDP growth and inflation (the latter remaining around central bank inflation targets). Shorter-term movements in the 30-year yield, such as the change since 2020/21, are therefore mostly due to movements in the GYRP.

The right-side subplot for each country is Rgov$(t,\tau)-$ ROIS(t,τ) which, as previously explained, is equivalent to GYRP$(t,\tau)-$ ORRP(t,τ). In other words, the difference between Rgov to ROIS rates in my decompositions is attributable to the difference in their risk premiums, i.e. the specific risk premium component in government yields relative to the generic risk premium for interest rates that is already accounted for within the respective OIS rates. Note that the differences are only plotted for the part of the samples where a valid comparison can be made, as explained in the last two paragraphs of section 2. Again, for comparability between countries and maturities, all of these subplots have the same axis scale.

A general observation across countries and particularly for longer maturities is that Rgov is on average higher than ROIS, hence the GYRP is on average higher than the ORRP. The difference essentially reflects that OIS instruments are a safer form of interest rate investment than government bonds. Specifically, OIS instruments are derivatives with no principal investment and with collateral exchange to ensure that neither counterparty develops a credit exposure to the other. Government bonds are physical securities, so the investor has credit exposure to the issuer until the principal is returned at the bond's maturity. The figures show there are periods when Rgov is lower than ROIS, particularly for shorter maturities. This typically occurs when government bonds offer a safety/liquidity benefit, such as during a time of financial market stress (e.g. from the impact of COVID).

Since 2020/21 government yields have risen by more than OIS rates. For the 10-year yield, the G5 increase relative to the G5 10-year OIS rate since October 2022 is 0.6 pps, and notably 1.0 pps for France since that time. Hence, in addition to the increase in the generic risk premium for Euro Area 10-year interest rates since 2020/21 (about 2.5 pps based on the OIS decomposition), the French 10-year government bond yield now also has an extra 1.0 pps. Note that the extra spread for France was even higher around the Euro Area sovereign debt crisis early in the available sample period.

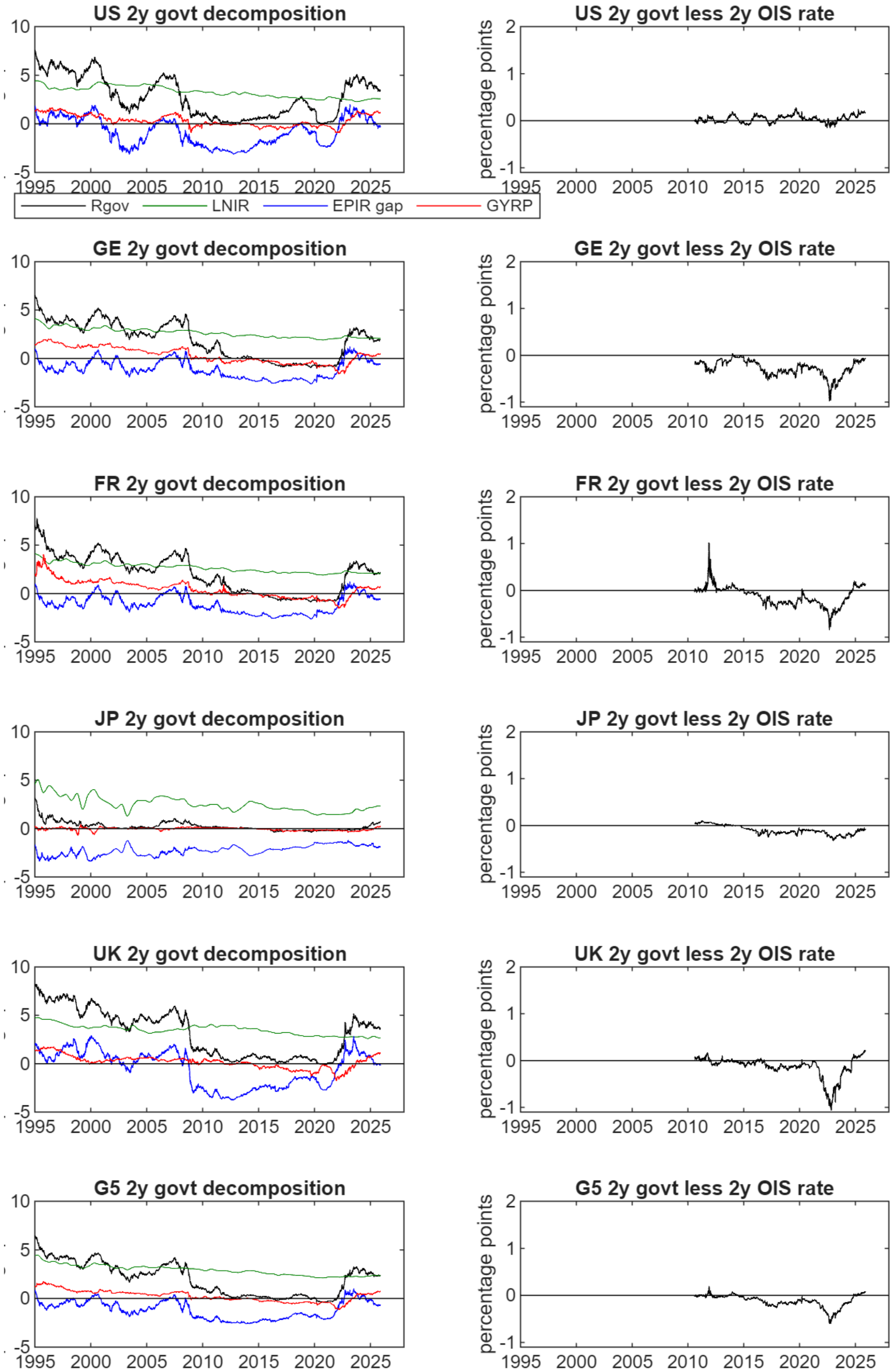


Figure 2: Decomposition of 2-year government yields and comparison to 2-year OIS rates.

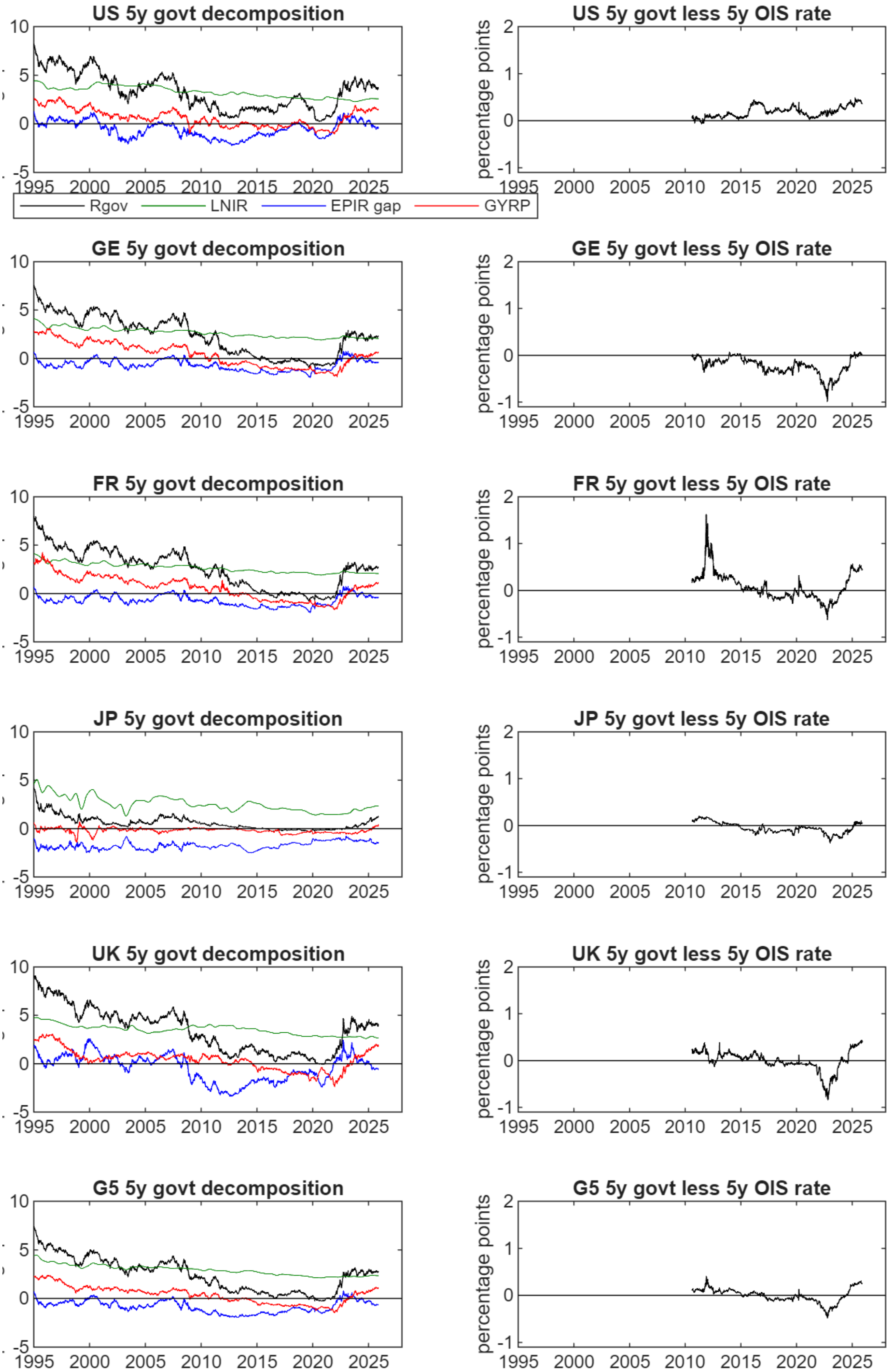


Figure 3: Decomposition of 5-year government yields and comparison to 5-year OIS rates.

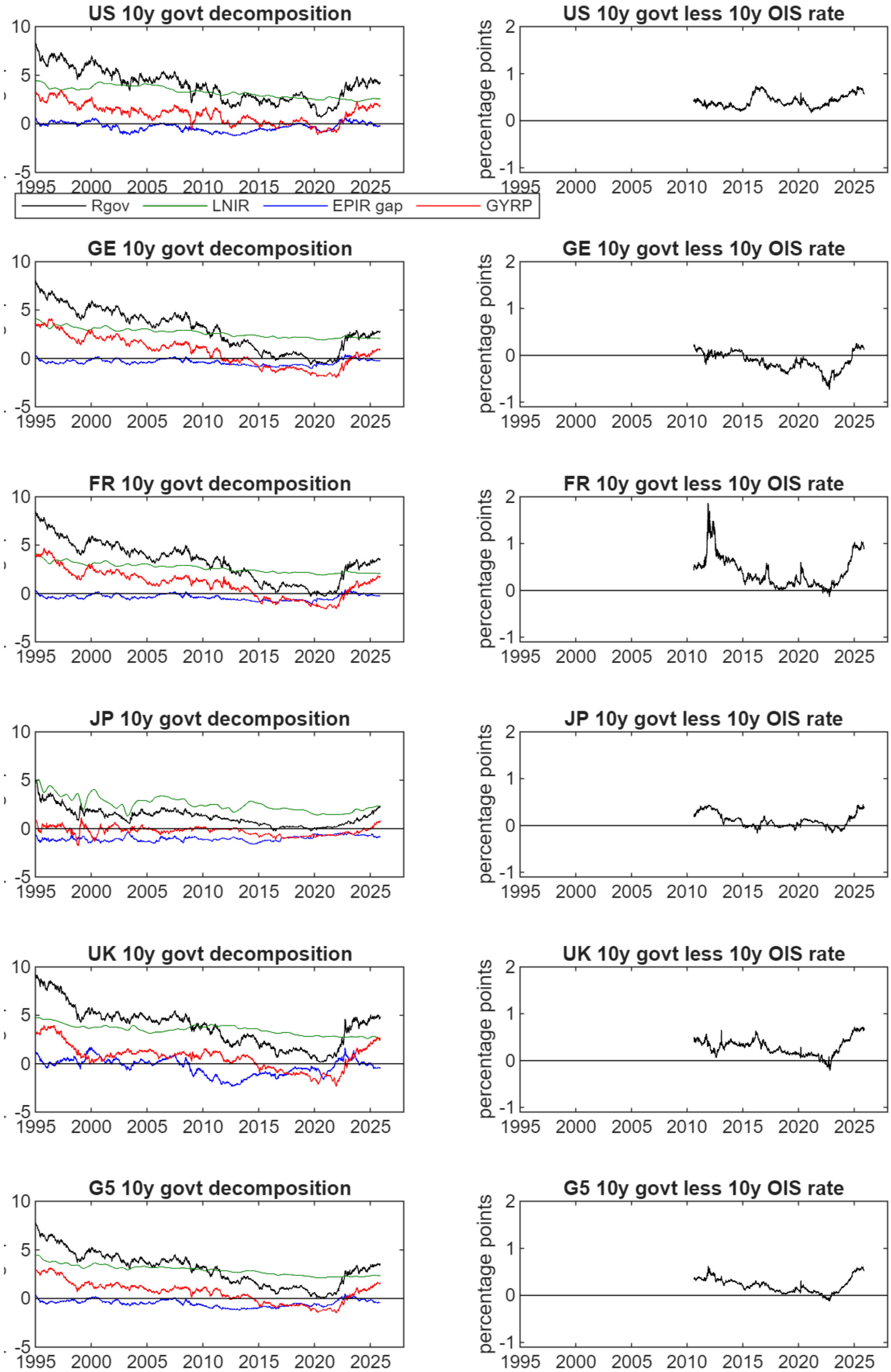


Figure 4: Decomposition of 10-year government yields and comparison to 10-year OIS rates.

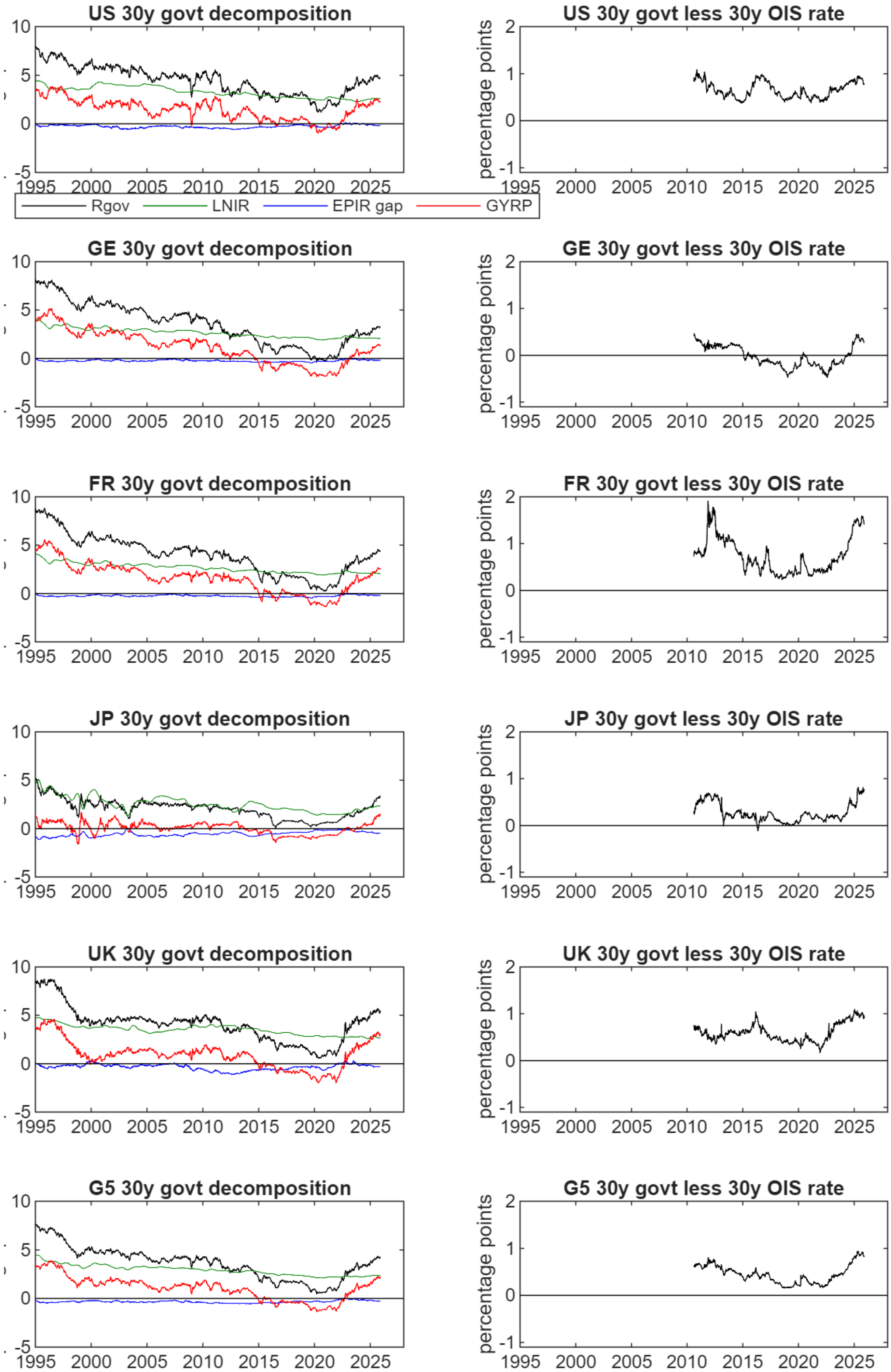


Figure 5: Decomposition of 30-year government yields and comparison to 30-year OIS rates.