

Missing Recessions: Revisiting the Term Spread's Predictive Power

Menzie D. CHINN*

UNIVERSITY OF WISCONSIN, MADISON AND NBER

LAURENT FERRARA**

SKEMA BUSINESS SCHOOL – UNIVERSITY CÔTE D'AZUR

October 9, 2026

Abstract: The failure of a recession to materialize in 2024 has forced a reappraisal of the term spread as the most reliable recession predictor for the US. In this paper, we re-evaluate the predictive power of the term spread, and explain the false positive signal in terms of sample specificity, simultaneity, and omitted variables, focusing on the United States, but including other advanced economies for which the term spread has proven to be a useful predictor in the past. We confirm that prior to the 2020 recession, the yield curve was an accurate predictor of recessions in the US, Canada, and Germany, but proved less accurate thereafter. For the US, accounting for term premia does not improve prediction appreciably, while taking into account expectations of future unemployment does. More definitively, in line with Borio, et al. (2020), we find inclusion of the debt service ratio reconciles the failure of a recession to appear in 2024 after the strong yield curve inversion observed at the end of 2022, for both the US and Germany.

Key words: yield curve, term spread, expectations hypothesis of the term structure, recession, debt service ratio.

JEL classification: C22, E37, E43

Acknowledgments: We thank Min-Jung Jun for research assistance, Dora Fan Xia for graciously providing data, James Hamilton, Steve Kamin and conference participants at the International Symposium on Forecasting (U.VA, June 2023), and two referees for helpful comments. The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the organizations the authors are associated with.

* Chinn: mchinn@lafollette.wisc.edu

** Ferrara: laurent.ferrara@skema.edu

1. Introduction

Yield curve inversions have been highlighted as reliable predictors of recessions or economic downturns in the United States as well as other countries. The 2020 recession was preceded by a yield curve inversion, although that recession is now typically viewed as a happenstance, given the pandemic would've induced a recession regardless of the underlying conditions of the economy. Toward the end of 2022, the US yield curve again inverted, prompting forecasts of an incipient recession; however that recession never materialized. Figure 1 displays the yield spread, the difference between long (10 years) and short term (3 months) government interest rates for the United States.

The motivation for this study is hence manifold. First, policymakers often need to make decisions today based on observable factors, including financial variables, and the recent miss by the term spread suggests a need to explain this outcome.

Second, a change in the stylized fact of term spread as recession predictor might signal changes in the monetary transmission mechanism. In particular, the advent of unconventional monetary policies – including quantitative/credit easing, as well as forward guidance – might have altered the information contained in spreads.

The paper is organized in the following fashion. In Section 2, we lay out a framework for examining what determines the long-term interest rate relative to the short one, and relate that to the extant literature on the yield curve as a predictor of recessions and economic activity. In Section 3, we examine the predictions of a basic term spread specification estimated over the pre-pandemic period to explain recessions

up to 2026. In Section 4, we examine the US experience in light of theories put forward in Section 2. In Section 5, we repeat the exercise, but for Canada and Germany, and Section 6 concludes.

2. Background

2.1 Theoretical Framework

Following previous literature, this paper focuses on the yield spread defined as the 10-year government bond yield less the 3-month Treasury yield (or closest equivalent for countries other than the United States).¹

The linkage between the long-term and short-term interest rates can be decomposed in the following way:

$$(1) \quad i_t^n = \frac{(i_t + i_{t+1}^e + \dots + i_{t+n-1}^e)}{n} + tp_t^n$$

where i_t^n is the interest rate on a bond of maturity n at time t , i_{t+j}^e is the expected interest rate on a one period bond for period $t+j$, based on information available at time t , and tp_t^n is the term premium for the n -period bond at time t (which in turn can be decomposed into risk and liquidity premia, according to Hamilton and Kim, 2002).

This specification nests the expectations hypothesis of the term structure (EHTS,

¹ Using aggregate Euro area data, Moneta (2003) found that the 10-year/3-month spread specification performed better than any other pair of yield maturities that included two of the following: 3-month, 1-year, 2-year, 5-year, 10-year.

corresponding to the first term on the right-hand side of Equation (1)), and a more general model where the term premium (corresponding to the second term of Equation (1)) arises either because long-term bonds have different liquidity characteristics than short-term ones, and/or because they have different risk characteristics than short-term ones.

The EHTS merely posits that the yield on a long-term bond is the average of the one period interest rates expected over the lifetime of the long-term bond. The liquidity premium theory allows that there will be supply and demand conditions that pertain specifically to bonds of that maturity. The presence of idiosyncratic effects associated with a certain maturity of bond is sometimes linked to the “preferred habitat theory”, the idea that certain investors prefer purchasing assets of specific maturities. Traditionally, the term premium is positive ($tp > 0$) given the greater risk associated with long-term bonds from interest rate or inflation risk, or lower liquidity. Hence, the traditional view held yield curve will slope upward when short rates are expected to be constant over time.

The term spread is given by:

$$(2) \quad spread_t = i_t^n - i_t$$

For the sake of simplicity, we consider the case where $tp_t^n = 0$ (i.e., the EHTS explains all variation in long rates). Suppose further that expected short rates are lower than the short rate today. Then the long rate will be lower than the short rate (i.e., the

yield curve inverts). Since low interest rates are typically associated with decreased economic activity, an inverted yield curve should imply an expected downturn, especially given that $tp_t^n > 0$, then an inversion of the curve should imply a downturn *a fortiori*.^{2 3}

2.2. Selective Literature Review

The literature on the usefulness of the term spread in forecasting recessions and future growth is extensive and we review only a subset. Some early studies date to the late 1980s; Harvey (1988, 1989), Stock and Watson (1989), Nai-Fu Chen (1991), Estrella and Hardouvelis (1991) among others, suggested that an inverted yield curve (or negative term spread) could signal an impending recession.

Subsequent research has examined whether the relationship between the term spread and future economic growth held up in countries other than the United States. Harvey (1991), Davis and Henry (1994), Plosser and Rouwenhorst (1994), Bonser-Neal and Morley (1997), Kozicki (1997), Estrella and Mishkin (1997) and Estrella, Rodrigues and Schich (2003) studied non-US OECD countries using post-1970 data, and generally

² Minoiu, Schneider and Wei (2023) propose a different channel for the spread predicting future economic activity. A steepening curve increases bank profitability and hence bank lending, thereby spurring growth.

³ More recently, the term premium has become the focus of increased attention, since there have been bouts of expected deflation – rather than inflation – which could in theory result in a negative term premium. Moreover, to the extent that credit easing measures, such as purchases of long-term securities, have been widely employed in the past decade and a half, and are effective, they too might have affected the previously documented relationship between term spreads and subsequent recessions and growth.

conclude that the term spread can be used to some extent in predicting future economic growth. However out-of-sample studies conducted by Davis and Fagan (1997) and Smets and Tsatsaronis (1997) using, respectively, U.S. and German data, and European data, found that parameter estimates are unstable over time. Moreover, the estimated regressions exhibited poor forecasting capabilities. More recently, Haubrich (2021) has reviewed some of these large country analyses.

Focusing on recessions, Sabes and Sahuc (2023) find the term spread has predictive power in the euro area, Germany, France, Italy and Spain, with Germany being particularly well explained. Hao and Ng (2011) found the term spread the best predictor of Canadian recessions among static single variable probit models. Other studies of a cross-country nature have relied upon panel analyses.⁴

Recent research has stressed the usefulness of additional variables in predicting growth, in particular financial variables (see for example Bellégo and Ferrara, 2012, for the euro area, or Adrian et al., 2019, for the U.S.). The reason is obvious: most financial variables have the desirable properties of being easily observed and subject to minimal revision over time.

Typically, the rationale for the inclusion of specific additional financial variables is empirical, rather than theoretical. The first includes financial conditions indices, which

⁴ These include Gebka and Wohar (2018) or Borio, Drehman and Xia (2018), or Hasse and Lajaunie (2022) (the latter for short horizon, including a lagged dependent variable).

seek to summarize a whole set of developments across different financial markets, rather than just the bond market. Papers seeking to predict growth (rather than recession) include such indices that often include financial conditions indicators (Hatzius, et al., 2010). However, since the extant evidence suggests more impact in the lower tail of output growth (Adrian et al., 2019; Plagborg-Møller et al., 2020; Arrigoni et al., 2022), we eschew use of this indicator.⁵

The second set includes measures of the financial cycle. Borio et al. (2020) argue that the evolution of this cycle, measured using credit growth, credit-to-GDP and housing prices, can better predict recessions (as does a related measure, the private sector debt-service ratio).⁶

3. Predicting Recessions, Pre-2020

3.1 Data and models

In Chinn and Kucko (2015), the authors focused on developed countries, including the US and Canada, large European countries, and Japan. These are also countries where the interest rates represent market-determined rates in liquid financial markets. The term spread did not prove to be a universally successful predictor of

⁵ Furthermore, as noted in Caballero et al. (2026), updated measures like FCI* tend to move contemporaneously with recession, rather than leading recessions.

⁶ We omit a third set – the foreign term spread – investigated in Ahmed and Chinn (2024), as its inclusion does explain the 2024 false positive.

recessions, and indeed, in the pre-pandemic era, the term spread shows up as a reliable predictor, on a country-by-country basis, for only the US, Canada and Germany.

We repeat these regressions and report the results in Table 1 for the 10yr-3mo term spread,⁷ using monthly data, over the period 1973M01-2018M12 (so the prediction horizon extends to just before the pandemic, 2019M12), for eight countries.

We define US recessions (peak-to-trough) as those determined by the NBER Business Cycle Dating Committee, and we use the Economic Cycle Research Institute (ECRI) dating chronologies for other countries. The ECRI uses a methodology that is similar to that used by the NBER, and indeed the ECRI and US recession chronologies match.⁸

Following the literature, the models we use are expressed as follows:

$$(3) \quad Pr(R_{t+k} = 1) = \varphi(\beta_0 + \beta_1 Spread_t + \beta_2 3mo_t + X_t \Gamma)$$

where t is the current time period, k is the forecast horizon and $\varphi(\cdot)$ denotes the standard normal cumulative distribution function, and X is a vector of variables including estimated term premium, the change in the expected unemployment rate, and the debt

⁷ We focus on the 10 year-3 month term spread as it has a record as being one of the most successful term spreads in terms of recession prediction, and its use allows for comparability against a wide number of studies. Moreover, the 3 month tracks the Fed funds rate (with perhaps one notable exception, as discussed in Section 4, regarding the 2022 experience).

⁸ As a robustness check, we examine whether our conclusions regarding the spread's predictive power is sensitive to alternative recession chronologies, as discussed at the end of Section 4.

service ratio. We examine the results for the horizon of one year, i.e., that is $k=12$ months.

We first focus on the simplest specification incorporating yield curve, particularly the first two parameters, namely the level and slope of the curve. For instance, while multiple studies find the yield curve alone is a useful predictor of recessions, Wright (2006) argues there is no reason to believe that an increase in the short-term interest rate should have the same consequence as a decrease in the long-term rate.

Table 1 displays the results from the probit model estimates for each country. One remarkable point is that the model containing the spread as well as the spread plus short rate is successful at predicting recessions for the US, Canada and Germany, according to the Pseudo- R^2 statistic (which does not penalize for increased model size). This result mirrors those found in Bernard and Gerlach (1998), as well as Chinn and Kucko (2015).

Interestingly, results for the remaining countries are starkly different. The spread and short rate are essentially unimportant for determining UK recessions. In two countries – Italy and Japan – the spread has the wrong sign, and significantly so. Thus, a different explanation has to be put forward for this correlation. For Italy, one could point to sovereign risk. For Japan, one might conjecture that the country's extended

experience with the zero lower bound has resulted in term spreads signaling different behavior than in the other economies.⁹

Figures 2, 3, and 4 present the predicted probability of recessions based on the regressions presented in Table 1, for the US, Canada and Germany. The predicted probabilities for 2020M1-2026M04 are out of sample forecasts.

Using a 35% threshold, the estimate based on the 1973-2019 period identifies every recession in the US, including the 2020 recession (which in some sense, one might not want to predict, given the pandemic). The same threshold captures two ECRI-identified recessions for Canada, but misses the 2008 recession. For Germany, five recessions are correctly predicted, whereas the 2020 recession is again missed. Hence, observers who predicted a recession in 2024 on the basis of the pre-2019 correlations could be excused for being overconfident in their prognostications.

In sum, the conventional rule turns out to have been misleading. In all three cases, the 1973-2019 sample probit regressions provided a false positive for 2024 using the 35% threshold (and for the US and Germany using the 50% threshold).

4. Accounting for the False Positives

⁹ Chinn and Kucko (2015) and Ishii (2022) obtain similar results for Japanese recessions.

Let's recall that the probit models only provide probabilities; it could be that there was a high probability of recession, and it's merely the case that a recession didn't occur.¹⁰ On the other hand, this is a fairly unsatisfying response to the failure of this indicator.

It's also unsatisfying to appeal to parameter instability, without further identifying the source of the instability. One approach is to investigate more deeply the rationale for why the term spread – recession correlation exists. To do so, one can appeal to a simple two-period model of the term spread, imbedded in a Taylor rule and a Phillips curve.

For a two-period model, the long-term interest rate is given by:

$$(4) \quad i_t^2 = 0.5(i_t^1 + i_{t+1}^1) + tp_t^2$$

The standard static Taylor rule is given by:

$$(5) \quad i_t^1 = \gamma_0 + \gamma_1 u_t + \gamma_2 \pi_t ,$$

where u_t is the unemployment gap, and the γ_0 is a constant that equals the real equilibrium rate plus $(1-\gamma_2)\pi^*$, and π^* is the target inflation rate.

The Phillips Curve is expressed as:

$$(6) \quad \pi_t = \beta_0 + \beta_1 u_t + \beta_2 \pi_t^e + \beta_3 z_t,$$

¹⁰ For instance, one could argue that the magnitude of the AI boom (with associated investment and wealth effects) was not anticipated by markets as of late 2022.

where z is a cost shock. Substituting Phillips curve into the Taylor rule (lead one period), and then substituting into the second year interest rate, one finds that the term spread incorporates expected unemployment, inflation in period two.

$$(7) \quad spread_t = 0.5(-i_t^1 + [\] + (\gamma_1 + \gamma_2\beta_1)u_{t+1}^e + \gamma_2\beta_2\pi_{t+1}^e + \gamma_2\beta_3z_{t+1}^e) + tp_t^2,$$

where $[\]$ is a constant incorporating constants from the Phillips curve and Taylor rule.

Based on this previous equation, if the future probability of recession is a function of expected future unemployment, inflation, and supply shocks, then omission of these variables will bias the results as the spread is on the right-hand side of the regression equation. The same is true for the term premium, if term premium (associated with inflation risk) is correlated with recessions. The omission doesn't matter if these variables are retaining the same correlation with the spread over time; however, if there is a break in the correlation, then the resulting bias might lead to a decrease in the predictive power of the equation.

We rely upon this insight to discipline the set of variables we augment the term spread with. These include an estimate of the term premium, and proxies for expected unemployment.

In Table 2, we examine different permutations of equation (7). In column 2, the results from the basic specification estimated over the entire sample are reported. Compared to the results from estimation over the restricted (pre-pandemic) sample

(column 1) we find little difference. The coefficients retain their signs and statistical significance, but the pseudo- R^2 declines, reflecting the decreased explanatory power during the 2020-2026 period.

Focusing on the implications of equation (7), the term spread incorporates the term premium; if the term premium is correlated with an omitted determinant of the likelihood of recession, then the failure to decompose the term spread into EHTS and term premium components might lead to bias.

We rely on the NY Fed's measure of the term premium, due to Adrian, Crump and Moench (2017). Including the term premium does not result in a noticeable increase in the proportion of variance explained, as shown in column 3. Moreover, the coefficient on the term premium is not in itself statistically significant, while the term spread coefficient is now more significant. Most importantly, as shown in Figure 5, this specification does not reduce the predicted probability of a recession in 2023-24.

Equation (7) suggests that the term spread is correlated with future inflation and future unemployment; these are both likely correlated respectively with expected inflation and expected unemployment. We include a proxy measure for expectations for

unemployment in the next 12 months, that is, whether unemployment is expected to be higher (lower) or much higher (much lower) in a year.^{11 12}

The results of this specification are shown in column 4, where the Fed funds rate is substituted for the short rate. The gap between the Fed funds and 3-month yield is particularly large during this period of extreme negative term spread, so using the Fed funds rate shrinks the spread in absolute value. While the term spread is statistically significant, the key variable – the expected change in the unemployment rate – is significant at the 10% marginal significant level. However, the goodness of fit is relatively unchanged.

The combination of using the Fed funds rate and adding in the expected unemployment rate reduces the probability of recession from around 0.47 to 0.34 in May 2024, as shown in Figure 5 (using the 3-month Treasury yield instead of the Fed funds, but including the expected unemployment rate change, only reduces the probability to 0.44). Hence, the distinctive behavior of the Fed funds-3 month Treasury yield in late 2022-23 in conjunction with omitted expectations could rationalize the misprediction of a 2024 recession.

¹¹ In principle, both expected inflation and expected unemployment should enter; however, inclusion of both measures simultaneously resulted in statistically insignificant coefficients on both; hence we rely on unemployment.

¹² The measure is the University of Michigan Survey of Consumers measure of more or less unemployment in one year, where “much higher” is given twice as much weight as “higher”, etc.

There is another candidate for an omitted variable: the debt service ratio. Borio, Drehmann and Xia (2020) examine aggregate financial cycle variables and argue that the most important determinant of recession is a variable summarizing the “financial cycle”. Whereas they construct a composite and focus on a “cyclical financial factor”, they also note that the debt-service ratio for the private non-financial sector is a good proxy measure.

The rationale for inclusion of this variable can be motivated on the grounds that the debt service ratio is a function of the longer-term interest rate, as is (mechanically) the spread. On economic grounds, it makes sense that the debt service ratio is, at least partly, a determinant of the recession likelihood.

In order to examine this proposition, we utilize the debt-service ratio compiled by Borio et al. (2020) and updated by the BIS, interpolated to the monthly frequency.¹³ The results of augmenting the term spread/short rate model with the debt service ratio are reported in Column 5 of Table 2. The first thing to note is that the goodness of fit statistics improves substantially – to 0.57 – while the debt service ratio coefficient is highly significant. While the debt service ratio is empirically the most important variable, the spread retains its importance.

¹³ The quarterly series are interpolated to monthly using a one-sided process that forces the quarter’s last month value to match the quarterly value. This procedure ensures that the interpolated series does not incorporate future information.

The predictions from this specification are shown in the teal line in Figure 5. This set of estimates, using a 50% threshold, predicts each recession within the sample period (which starts in 1985 due to data constraints) but does not provide a false positive for the 2024 period.

Consequently, one could explain the failure of the term spread to signal a non-appearing recession as a case of omitted variable bias. In this interpretation, the correct specification includes the debt service ratio. For this explanation to be sustained, it should be the case that the correlation between the spread (included) and the debt service ratio (excluded) changes going from one sample period to the next. For the 1985-2019 period, the correlation between the two is -0.27, while for the 2020-2026 period, it is -0.69.

5. Canada and Germany: Non-Recessions Explained

Previous studies of the term spread's ability to predict recessions across countries have found mixed results. Chinn and Kucko (2015), using data up to 2012, found that the spread was a useful recession predictor for US, Canada and Germany.

The challenge is to determine whether the same explanations applied to the US experience are relevant to recent Canadian and German experiences. The term spread inverted starting toward the end of 2022, and reached maximum inversion, by 1.7-1.8 percentage points, at the end of 2023/beginning of 2024, slightly later than in the US. As shown in Figures 2 and 3, the pre-pandemic basic specification estimates indicate a high likelihood of recession in 2024.

In Table 3, we repeat for Canada the modifications applied to the US specification, for those cases where the data are available. Column 1 reports the results of the basic specification (term spread, short rate) for the pre-pandemic period, column 2 the results for the entire sample, column 3 the estimates for the specification that includes the term premium (for a short sample), and column 5 the results from term spread augmented by the debt-service ratio. Column 4 is empty because no survey data on expected unemployment of sufficient length is available (at least to our knowledge).

Going from pre-pandemic sample to full sample with the basic specification, the findings are similar – the spread enters with a statistically significant negative coefficient – but the proportion of variation explained declines. As shown in Figure 6, the full

sample specification does not predict a 2025 recession using a 50% threshold, but also fails to predict the 2008 recession.

Adding the term premium¹⁴ restricts the sample to beginning in 1995; the proportion of variation explained drops considerably. In addition, the spread has an unexpected sign, while the term premium itself is not statistically significant. The predicted recession probability is lower for the 2024 recession (Figure 6), but also fails to predict the 2008 recession.

Augmenting the model that includes the spread and short rate with the debt service ratio results in an increase in the proportion of variation explained. The spread has the anticipated sign, while the debt-service ratio does not (although the estimate is not statically significant). In terms of prediction, this specification provides recession probabilities similar to those from the basic pre-pandemic specification. In sum, for Canada, we do not obtain an insight into why the false positive for 2024 occurred.

Turning to the results for Germany, in Table 4, we find the term spread and short rate specifications have relatively high proportion of variation explained, both for the pre-pandemic and full sample (columns 1 and 2). Both coefficients have expected signs, with statistical significance. Moreover, as shown in Figure 7, all recessions save the 2020

¹⁴ This is a series constructed by the Bank of Canada, following the Adrian, Crump and Moench (2017) methodology.

recession are predicted using a 40% threshold. But a false positive is also recorded for 2024 using this same threshold.

Including the expected unemployment change¹⁵ (column 4) yields results with slightly greater proportion of variation explained (0.29 relative to a basic specification estimated over the same sample period at 0.19). The term spread, short rate and expected unemployment enter with statistical significance, although the last coefficient does not enter with the anticipated sign. The recession predictions are much the same as the basic specification, however, with a false positive still registered for 2024, using the 40% threshold.

Finally, including the debt-service ratio (column 5) raises the pseudo-R² relative to a basic specification estimated over the same sample period (0.33 vs. 0.19). All coefficients enter with expected and statistically significant coefficients, including the debt-service ratio.

As shown in Figure 7, this specification predicts all the German recessions (save the 2020 recession), while failing to signal a false positive in 2024. Hence, this specification is as successful as that for the United States, insofar as rationalizing the failure of the term spread as recession predictor.

¹⁵ This is the differential measure (increase minus decrease, in %) provided by the European Commission.

For Canada and Germany, we have relied on the ECRI chronologies. For the US, the NBER chronology – which matches the ECRI for our sample period -- is widely accepted, but the same is not necessarily the case for Canada and Germany. In order to examine whether our results are sensitive to choice of recession chronology, we compare the estimates from the basic specification obtained using ECRI dates vs. alternatives. For Canada, we use the CD Howe and Cross dates (updated by Hao and Ng 2011), while for Germany, we use the German Council of Economic Experts dates. The dating chronologies are similar. Pre-pandemic recession date correlations for Canada are 0.73 to 0.90, and really only differ for the 2008-09 recession. For Germany, the correlation is 0.74, but the primary difference is the duration of the post-unification recession.

Table 5 reports the comparison of results. For Canada, the alternative recession dates are better explained than the ECRI dates, using only the term spread and short rate. In addition, the specification using the Cross dates implies a lower probability of recession in 2024 – but also fails more expressly in predicting the 2008 recession.

For Germany, using the alternative recession chronology results in a lower probability ascribed to a recession in 2024, but also implies missed recession calls for the 2001 and 2008 recessions. Hence, in both cases, the adoption of alternative recession chronologies does not resurrect the reputation of the term spread as recession predictor.

6. Conclusion

Prior to the 2024, the term spread was considered the most reliable recession predictor for the United States. It was also considered a reliable indicator for several countries in earlier periods, but most strongly for Canada and Germany (as early as Bernard and Gerlach, 1998).

In-sample results suggest the term spread indeed remains important and has explanatory power when recessions over a one-year time horizon are considered, even in a recent period where the conventional wisdom holds for decreased explanatory power (e.g., Chinn and Kucko, 2015).

However, the actual predictive power for the United States has clearly declined, with the false positive recorded for 2024. Neither accounting for the term premium nor expected unemployment changes appreciably the overall pattern of results, although the latter specification reduces the estimated probability of recession in 2024 (while missing the 2008 recession).

The most successful modification, however, involves the inclusion of the debt service ratio. All US recessions in the sample period (save the 2020) are predicted, while no false positive is signaled for a 2024 recession. Hence, recessions in the United States are well predicted by both the term spread *and* this proxy for the credit cycle. This same explanation seems to rationalize Germany's experience. In contrast, for Canada, we have no convincing explanation for why a 2024 recession was incorrectly predicted.

References

- Adrian, Tobias, Nina Boyarchenko, and Domenico Giannone. 2019. Vulnerable growth. *American Economic Review*, 109(4), pp. 1236–1289.
- Ahmed, Rashad, and Menzie D. Chinn. 2024. “Do Foreign Yield Curves Predict US Recessions and GDP Growth?” *Journal of Money, Credit and Banking*.
- Arrigoni, Simone, Alina Bobasu, and Fabrizio Venditti. 2022. "Measuring financial conditions using equal weights combination." *IMF Economic Review*, 70, no. 4 (2022), pp. 668-697.
- Bellégo, Christophe, and Laurent Ferrara. “Macro-financial linkages and business cycles: A factor-augmented probit approach”, *Economic Modelling*, 29, pp. 1793-1797.
- Bernard, Henri, and Stefan Gerlach. 1988. "Does the term structure predict recessions? The international evidence." *International Journal of Finance & Economics* 3, no. 3: 195-215.
- Bonser-Neal, Catherine and Timothy R. Morley. 1997. “Does the Yield Spread Predict Real Economic Activity? A Multicountry Analysis,” *Federal Reserve Bank of Kansas City Economic Review*, 82(3), pp. 37-53.
- Borio, Claudio, Mathias Drehmann, and Fan Dora Xia. 2020. "Forecasting recessions: The importance of the financial cycle." *Journal of Macroeconomics*, 66: 103258.
- Caballero, Ricardo J., Tomas Caravello, and Alp Simsek. "Financial conditions targeting." NBER working paper w33206 (2026).
- Chen, Nai-Fu. 1991. “Financial Investment Opportunities and the Macroeconomy,” *Journal of Finance*, 46(2), pp. 529-54.
- Chinn, Menzie, and Kavan Kucko. 2015. "The predictive power of the yield curve across countries and time." *International Finance* 18, (2): 129-156.
- Davis, E. Philip and Gabriel Fagan. 1997. “Are Financial Spreads Useful Indicators of Future Inflation and Output Growth in EU Countries?” *Journal of Applied Econometrics*, 12, pp. 701-14.
- Davis, E. Philip and S.G.B. Henry. 1994. “The Use of Financial Spreads as Indicator Variables: Evidence for the United Kingdom and Germany,” *IMF Staff Papers*, 41, pp. 517-25.

- Estrella, Arturo and Gikas Hardouvelis. 1991. "The Term Structure as a Predictor of Real Economic Activity," *Journal of Finance* 46(2), pp.555-76
- Estrella, Arturo and Frederic S. Mishkin. 1997. "The Predictive Power of the Term Structure of Interest Rates in Europe and the United States: Implications for the European Central Bank," *European Economic Review* 41, pp. 1375-401.
- Estrella, Arturo; Anthony P. Rodrigues and Sebastian Schich. 2003. "How Stable is the Predictive power of the Yield Curve? Evidence from Germany and the United States," *Review of Economics and Statistics* 85:3.
- Gebka, Bartosz, and Mark E. Wohar. 2018. "The predictive power of the yield spread for future economic expansions: Evidence from a new approach." *Economic Modelling*, 75, pp. 181-195.
- Giglio, Stefano, Bryan Kelly, and Seth Pruitt. 2016. "Systemic risk and the macroeconomy: An empirical evaluation." *Journal of Financial Economics* 119, no. 3: 457-471.
- Hamilton, James D., and Dong H. Kim. 2002. "A re-examination of the predictability of the yield spread for real economic activity." *Journal of Money, Credit, and Banking*, 34, no. 2, pp. 340-360.
- Hao, Lili, and Eric CY Ng. 2011. "Predicting Canadian recessions using dynamic probit modelling approaches." *Canadian Journal of Economics/Revue canadienne d'économie* 44, no. 4: 1297-1330.
- Harvey, Campbell R. 1988. "The Real Term Structure and Consumption Growth," *Journal of Financial Economics* 22, pp. 305-333.
- Harvey, Campbell R. 1989. "Forecasts of Economic Growth from the Bond and Stock Markets," *Financial Analyst Journal* 45(5), pp. 38-45.
- Harvey, Campbell R. 1991. "The Term Structure and World Economic Growth," *Journal of Fixed Income* (June), pp. 7-19.
- Hasse, Jean-Baptiste, and Quentin Lajaunie. 2022. "Does the yield curve signal recessions? New evidence from an international panel data analysis." *The Quarterly Review of Economics and Finance*, 84, pp. 9-22.

- Hatzius, Jan, Peter Hooper, Frederic S. Mishkin, Kermit L. Schoenholtz, and Mark W. Watson. "Financial conditions indexes: A fresh look after the financial crisis", No. w16150, National Bureau of Economic Research, 2010.19.
- Haubrich, Joseph G. "Does the yield curve predict output?." *Annual Review of Financial Economics* 13, no. 1 (2021): 341-362.
- Ishii, Hokuto. 2022. "Predicting Recessions and Information about Yield Curves and Stock Markets in Japan". Vol. 2. Discussion Paper Series, School of Policy Studies, Chukyo University.
- Kozicki, Sharon. 1997. "Predicting Real Growth and Inflation with the Yield Spread," *Federal Reserve Bank Kansas City Economic Review* 82, pp. 39-57.
- Minoiu, Camelia, Andres Schneider, and Min Wei. 2023, "Why does the yield curve predict GDP growth? The role of banks." *Mimeo*.
- Moneta, Fabio. 2003. "Does the Yield Spread Predict Recessions in the Euro Area?". *European Central Bank Working Paper Series* 294.
- Plagborg-Møller, M., Reichlin, L., Ricco, G., & Hasenzagl, T. 2020. "When is growth at risk?" *Brookings Paper on Economic Activity*.
- Plosser, Charles I. and K. Geert Rouwenhorst. 1994. "International Term Structures and Real Economic Growth," *Journal of Monetary Economics* 33, pp. 133-56.
- Sabes, David, and Jean-Guillaume Sahuc. 2023. "Do yield curve inversions predict recessions in the euro area?" *Finance Research Letters*, 52: 103416.
- Smets, Frank and Kostas Tsatsaronis. 1997. "Why Does the Yield Curve Predict Economic Activity? Dissecting the Evidence for Germany and the United States," *BIS Working Paper* 49.
- Stock, James and Mark Watson. 1989. "New Indexes of Coincident and Leading Economic Indicators," *NBER Macroeconomics Annual* Vol. 4, pp. 351-394.
- Wright, Jonathan. 2006. "The Yield Curve and Predicting Recessions," *Finance and Economic Discussion Series* No. 2006-07, Federal Reserve Board, 2006.

Data Appendix

The data are monthly frequency, except where noted.

The interest rate data are drawn from OECD.

- The US ten year series is the constant maturity series from the Treasury, while the three month yield is the Treasury yield in the secondary market.

Recession indicator variable (peak-to-trough):

- For US, from the NBER.
- For all other countries, the baseline indicator is drawn from Economic Cycle Research Institute (ECRI).
- Alternative indicator for Canada: CD Howe, Cross as updated by Hao and Ng.
- Alternative indicator for Germany: German Council of Economic Experts.

Term premium:

- US: NY Fed Adrian, Crump and Moench (2017)
- Canada: Bank of Canada.

More unemployment differential

- European Commission for Germany,
- University of Michigan Survey of Consumers for US

Debt-Service Ratio in % is from Bank for International Settlements for 1999-2022. For 1985-98, personal communication from Dora Fan Xia. Linearly interpolated, using quarterly to monthly last month.

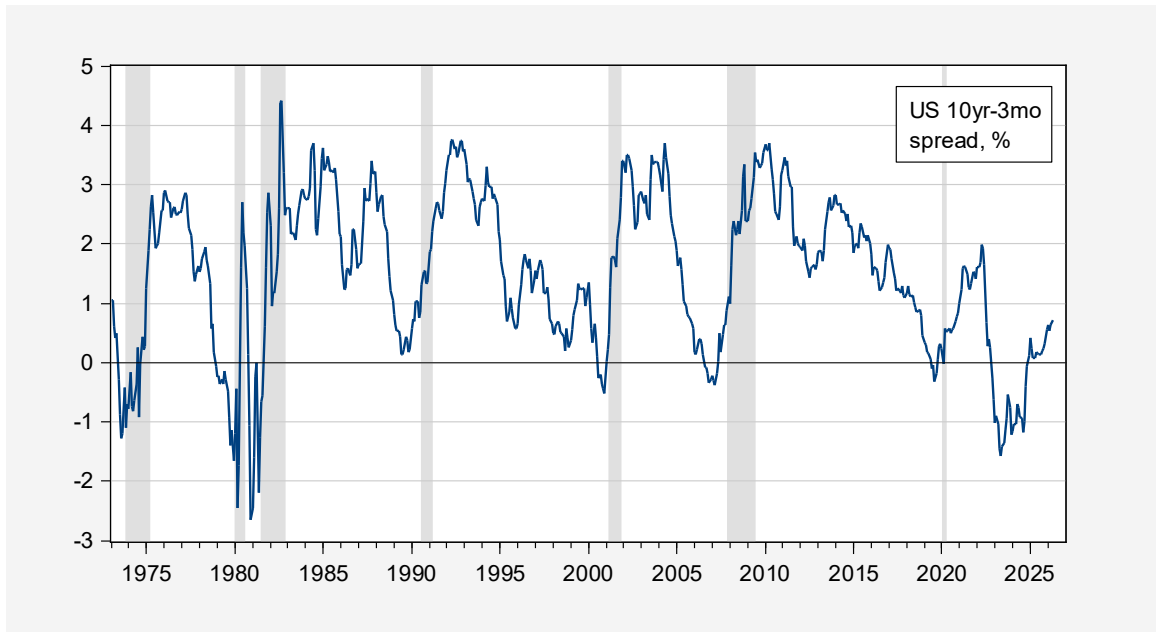


Figure 1. US ten year-three month spread.

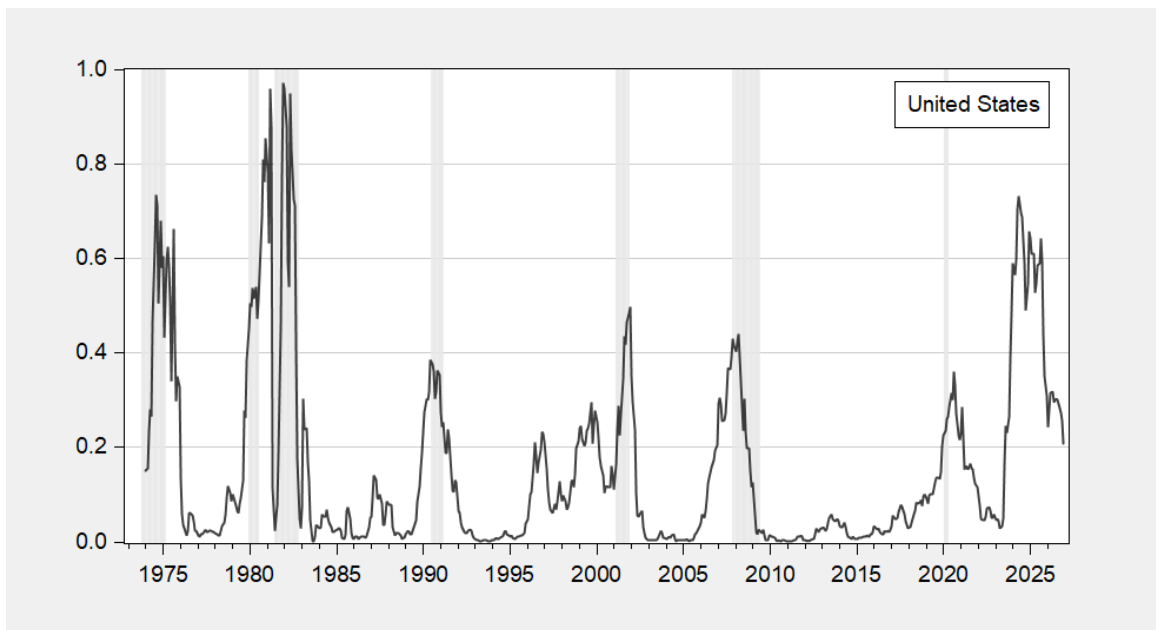


Figure 2. US recession probabilities using term spread, pre-pandemic sample. Notes: Estimated recession probabilities pertain to predicted date, not to date of prediction.

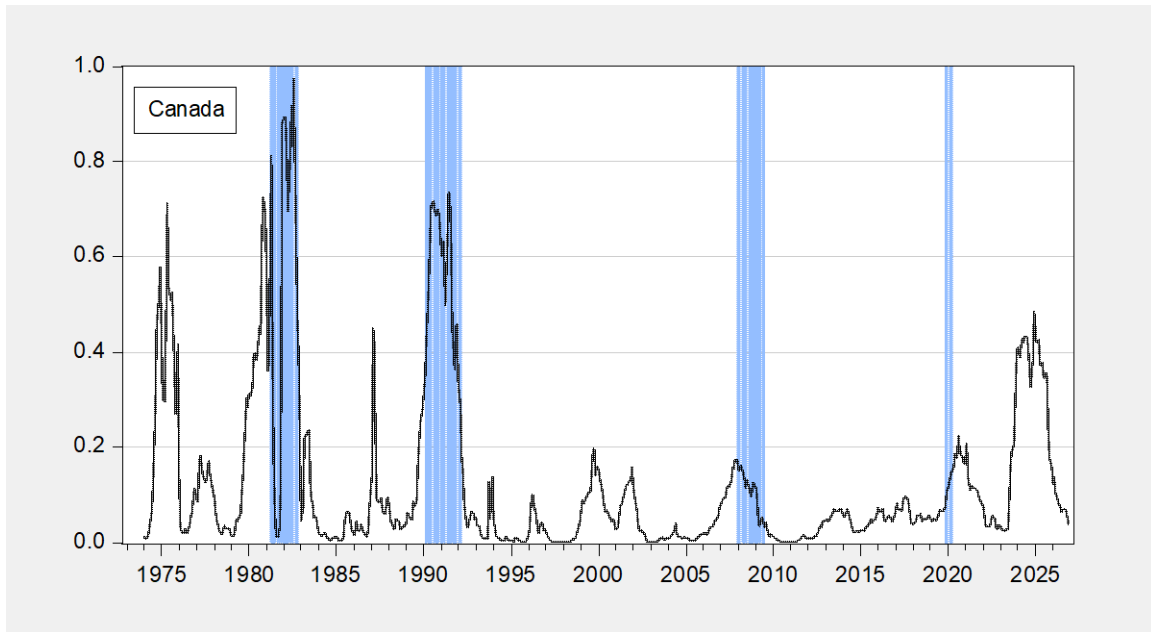


Figure 3. Canadian recession probabilities using term spread, pre-pandemic sample. Notes: Estimated recession probabilities pertain to predicted date, not to date of prediction.

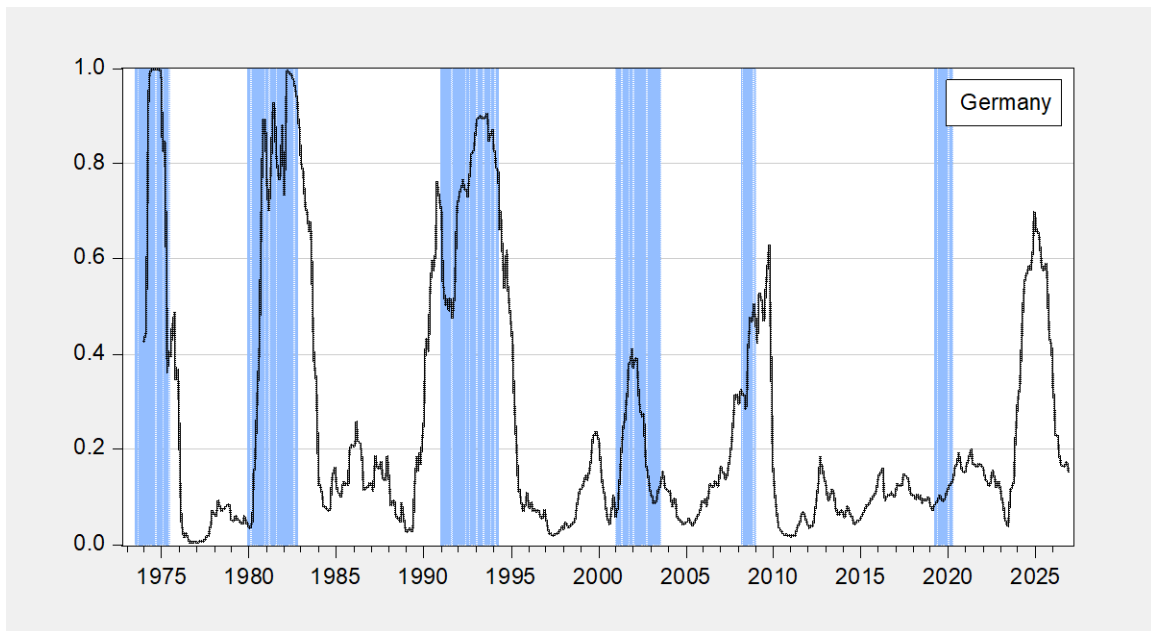


Figure 4. German recession probabilities using term spread, pre-pandemic sample. Notes: Estimated recession probabilities pertain to predicted date, not to date of prediction.

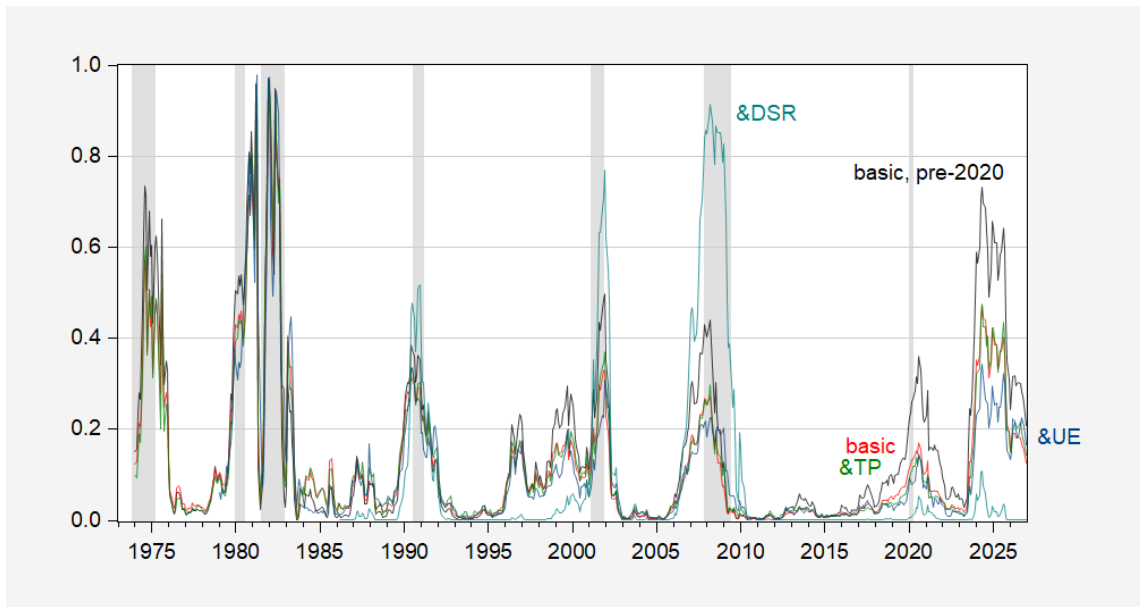


Figure 5. United States recession probabilities. Notes: Estimated recession probabilities pertain to predicted date, not to date of prediction.

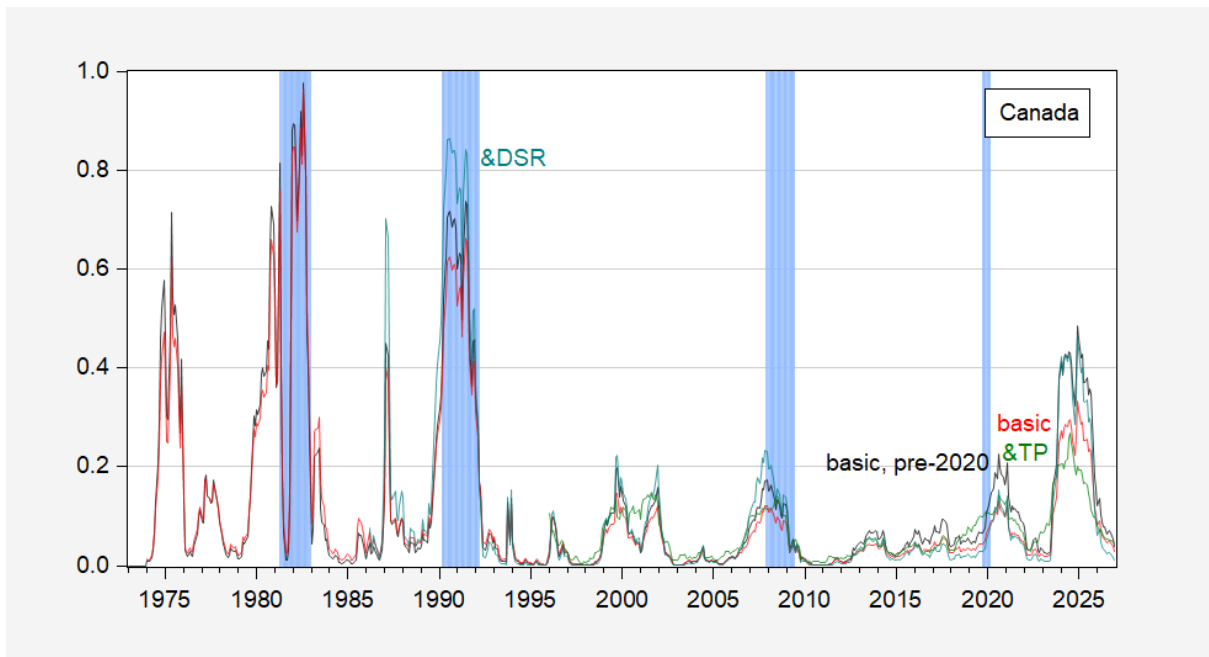


Figure 6. Canadian recession probabilities. Notes: Estimated recession probabilities pertain to predicted date, not to date of prediction.

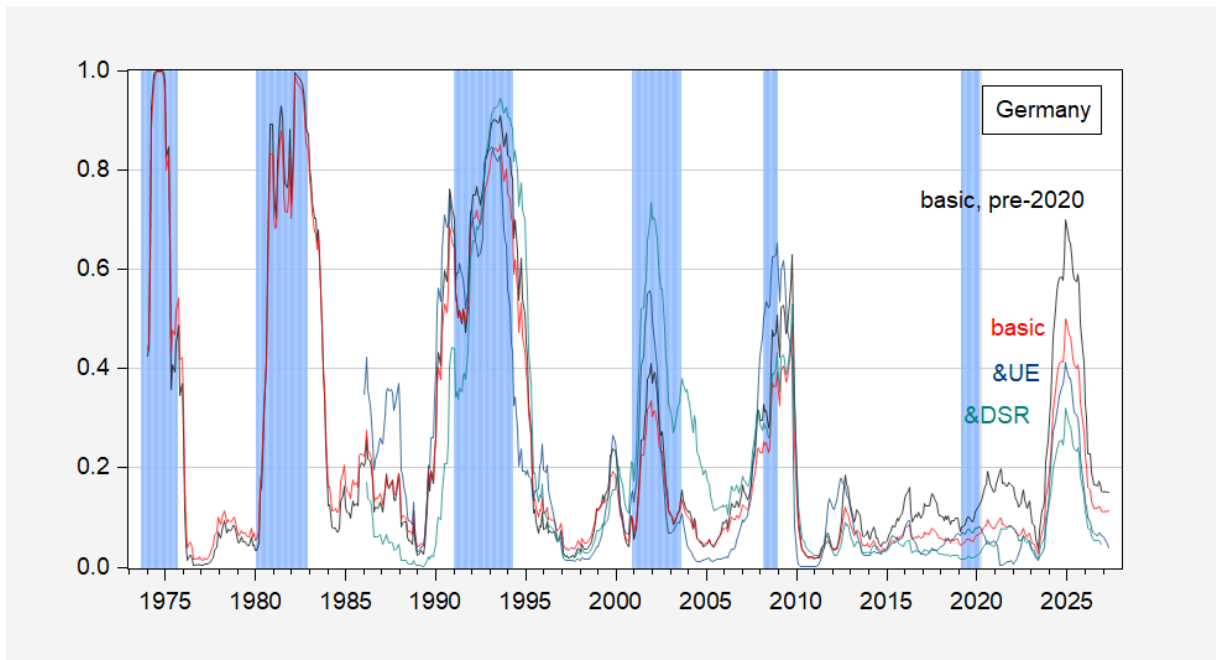


Figure 7. German recession probabilities. Notes: Estimated recession probabilities pertain to predicted date, not to date of prediction.

Table 1: Basic Specification, Pre Pandemic Sample

coefficient	CA	FR	GY	IT	JP	SN	UK	US
constant	-0.986	-1.745	-0.932	-1.677	-1.441	-1.020	-0.967	-0.667
	0.218	0.170	0.172	0.174	0.222	0.181	0.197	0.226
spread	-60.088	-7.865	-49.717	31.650	-10.871	-36.310	-16.702	-63.616
	8.599	5.608	6.967	5.246	25.151	7.400	7.432	8.299
3 mo rate	-1.661	12.224	13.903	8.204	220.801	2.867	0.251	5.578
	2.699	1.820	2.593	1.409	42.343	2.017	3.092	2.743
Pseudo R sq.	0.34	0.16	0.36	0.08	0.14	0.18	0.05	0.33
N	552	552	552	483	201	444	396	552

Notes: Probit regression coefficients (top entry), standard errors (bottom entry). Bold face denotes significance at 5% marginal significance level.

Table 2: US Regressions

	Basic, pre- 2019	Basic, full smpl	&TP, full smpl	&UE	&DSR
constant	-0.667	-1.302	-0.943	-1.425	-17.957
	0.226	0.176	0.299	0.207	2.173
term spread	-63.616	-42.753	-65.875	-37.652	102.766
	8.299	6.346	17.152	6.949	17.973
short rate	5.578	10.872	0.735	3.790	-26.305
	2.743	2.359	7.245	2.617	7.789
term premium			0.283		
			0.193		
exp UE				0.903	
				0.518	
DSR					111.746
					14.032
Pseudo R sq.	0.33	0.26	0.27	0.27	0.57
N	552	630	630	570	484

Notes: Probit regression coefficients (top entry), standard errors (bottom entry). Bold (*italic*) face denotes significance at 5%(10%) marginal significance level.

Table 3: Canada Regressions

coefficient	Basic, pre- 2019	Basic, full smpl	&TP, full smpl	&UE	&DSR
constant	-0.986	-1.359	-2.997		0.765
	0.218	0.170	1.141		1.329
term spread	-60.088	-46.937	61.287		-72.551
	8.599	7.044	63.070		12.898
short rate	-1.661	2.413	70.600		1.368
	2.699	2.170	45.607		3.517
term premium			-0.905		
			0.607		
exp UE					
DSR					-8.644
					5.649
Pseudo R sq.	0.34	0.29	0.08		0.34
N	628	628	364		482

Notes: Probit regression coefficients (top entry), standard errors (bottom entry). Bold face denotes significance at 5% marginal significance level.

Table 4: Germany Regressions

coefficient	Basic, pre- 2019	Basic, full smpl	+TP, full smpl	&UE	&DSR
constant	-0.932 0.172	-1.320 0.137		-1.006 0.180	-7.353 0.984
term spread	-49.717 6.967	-34.012 5.575		-24.234 7.512	-37.699 8.390
short rate	13.903 2.593	17.820 2.239		26.365 3.335	13.538 3.370
term premium					
exp UE				-2.632 0.579	
DSR					46.443 7.644
Pseudo R sq.	0.36	0.32		0.29	0.33
N	628	628		484	482

Notes: Probit regression coefficients (top entry), standard errors (bottom entry). Bold face denotes significance at 5% marginal significance level.

Table 5: Comparisons across Recession Chronologies

coefficient	Canada ECRI	Canada CD Howe	Canada Cross	Germany ECRI	Germany GCEE
constant	-1.359 0.170	-1.760 0.200	-1.981 0.223	-1.320 0.137	-1.468 0.150
term spread	-46.937 7.044	-47.217 7.459	-48.202 7.912	-34.012 5.575	-20.979 5.381
short rate	2.413 2.170	6.319 2.373	7.493 2.560	17.820 2.239	13.231 2.292
Pseudo R sq.	0.29	0.38	0.41	0.32	0.20
N	628	628	628	628	628

Notes: Probit regression coefficients (top entry), standard errors (bottom entry). Bold face denotes significance at 5% marginal significance level.