Preliminary and Incomplete

Domestic and International Term Spreads and Recessions

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Abstract: We examine the importance of the foreign term spread in predicting recessions in eight high income countries. The focus on the foreign spread is motivated by the increasing importance of international factors in both real and financial activity, as well as the fact that the term spread might be influenced by sovereign default risk in certain cases. The foreign term spread, variously defined, enters in as expected, as long as the debt-service ratio, a proxy for a financial cycle, is included. We also find some evidence that accounting for sovereign default risk modifies the term spread effect for Italy. Finally, we find some evidence that pooling data over countries for which the preferred model works (US, Canada, Germany) yields more accurate estimates of recession probabilities.

Key words: yield curve, term premium, expectations hypothesis of the term premium, recession

JEL classification: C22, E37, E43

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1. Introduction

The term spread is widely viewed as a reliable – or the most -- reliable predictor among a set of unreliable recession predictors in the United States. The rationale for why the term spread should act as predictor is fairly straightforward: on the eve of a recession, the central bank raises the policy rate to cool off an overheated economy, which then induces a slowdown or recession. Given the central bank's reaction function, the central bank then reduces the policy rate. Market participants anticipate this future rate reduction, so that the long term rate declines relative to (the currently raised) policy rate. In other words, the yield curve flattens or inverts, and the term spread declines.

Ahmed and Chinn (2024) find that US GDP growth is even more successfully predicted if the domestic interest rate spread is augmented by the foreign (GDP weighted) term spread. This finding is robust to alternative specifications, and poses a challenge to the traditional story for why domestic term spreads are predictive.

In this paper, we investigate the extent to which foreign term spreads might contain information regarding the advent of recessions, and indeed why in certain cases are more predictive of recession than domestic term spreads. In order to pursue this investigation, we examine the record for eight advanced economies, over the 1988-2026 period.

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, and relate that to the extant literature on the yield curve as a predictor of

recessions. Controlling for an additional critical factor – namely the debt service ratio – we then analyze whether foreign term spreads provide additional predictive power.

The background is reviewed briefly in Section 2, while in Section 3, the data and the empirical tests we implement for predicting recessions in are described. Section 4 examines some extensions. Section 5 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)[2].

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

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

[2] 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.

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

It's convention to assume default risk is zero, particularly for the US, but also for other high income countries. However, recent developments have brought into question how generalizable this assumption is. This means that a sovereign default risk

premium (*sdp*) might enter into the long term interest rate, and in particular a premium that is time varying:

$$(2) \qquad i_t^n = \frac{(i_t + i_{t+1}^e + \ldots + i_{t+n-1}^e)}{n} + tp_t^n + sdp_t^n$$

To begin with, let's consider the case where $tp_t^n = 0$ and $sdp_t^n = 0$ (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 $tp_t^n > 0$, and on average rises with horizon n, then an inversion of the curve should imply a downturn *a fortiori*.[3] [4]

Allowing for a non-zero sovereign default risk premium does not necessarily invalidate the use of the term spread as a recession predictor in a time series context. However, if the sovereign default premium is time varying, this condition might obscure the relationship between term spread and recession likelihood, particularly since the premium is likely to rise with maturity (longer term debt is riskier). Consider the

[3] 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.

[4] 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.

following: When the term spread rises because of higher expected future short rates, then recession is less likely. However, when the term spread rises because of a rising sovereign default risk premium (which depresses consumption and investment), recession is more likely.

Even without sovereign default risk, the foreign spread might contain information regarding future recessions to the extent that the foreign spread is informative regarding foreign or global output, which influences domestic output through trade and financial links.

The fact that recessions are not randomly distributed over time across countries adds impetus to investigating cross-country links. For instance, a diffusion index for the eight economies in our sample shows distinct clumping over time, as shown in Figure 1.

Domestic spreads themselves are highly correlated across countries, ranging from a low of -0.12 to a high of 0.83 correlation (Table 1). There's also cross-time correlation, with the data unable to reject the null of no Granger causality in many cases, as shown in Table 2. Suggestively, one can't reject the null of no causality going from Italian spreads to other spreads, while Japanese spreads do not appear to be Granger caused by other spreads, save Canadian and German.

2.2. *Selective Literature Review*

The literature examining the usefulness of the term spread in forecasting recessions and economic growth is extensive. Harvey (1988, 1989), Estrella and Hardouvelis (1991) among others, suggested that an inverted yield curve (or negative term spread) could signal an impending recession. Investigations of the term spread on economic growth are even more numerous, including Stock and Watson (1989), and Chen (1991), although in their survey, Wheelock and Wohar (2009) found the link to recessions stronger than that to growth.

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 conclude that the term spread can be used to some extent in predicting future economic growth. More recently, Haubrich (2021) has reviewed some of these multi-country 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.[5]

A commonality among these studies is that in general only domestic term spreads are considered for explaining recessions and growth. This presumption seems less tenable in a period of high financial and economic integration. Plosser and Rouwenhorst (1994) found evidence that foreign term spreads were helpful for predicting growth in the US, UK and Germany, above and beyond respective domestic spreads. More recently, Ahmed and Chinn (2023) find a foreign (trade weighted) term spread is incrementally helpful for explaining US GDP growth.

Evidence that recessions are predicted by foreign term spreads is more limited. Bernard and Gerlach (1998) examine eight high income countries. They find that foreign term spreads do predict recessions, and moreover the US term spread is incrementally helpful for explaining UK recessions four quarters ahead, and the German spread for Canada, Japan, and the US.

F3. Recession Prediction

3.1 *Data and models*

[5] 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).

Our focus is on the developed countries that have historically been examined, including the US and Canada, large European countries, and Japan, over the 1988-2026 period. These are also countries where the interest rates represent market-determined rates in liquid financial markets.

We examine recessions (peak-to-trough) as determined by the NBER Business Cycle Dating Committee (for the US) or the Economic Cycle Research Institute (ECRI), which uses a similar methodology to that of the NBER. Note that in our examination of recessions, we do not take a stand on any recessions occurring past 2026M04, given that it's possible that some countries enter into recession in 2026.

Following the literature, the models we use are of this following form:

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

where t is the current time period, k is the forecast horizon and $\varphi(.)$ denotes the standard normal cumulative distribution function, and X is a vector of variables including the debt service ratio and foreign term spread.

3.2 *The Domestic Term Spread*

We first focus on the yield curve, in particular 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 when using aggregate euro area data, Wright (2006) argued 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 2 displays the results from the probit model estimates for each country with the short rate for *k=12* months. One remarkable point is that the spread and spread plus short rate is most successful at predicting recessions for the Canada, Germany, Sweden, and US according to the Pseudo-R^2 statistic (which does not penalize for increased model size). This result mirrors those found in Chinn and Kucko (2015).[8] Interestingly, these results hold if one omits the pandemic and post-pandemic period.

The spread is essentially unimportant for determining UK recessions. In two countries – Italy and Japan – the spread has the wrong sign, and significantly so. A different explanation has to be forwarded 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.[10]

3.3 The foreign term spread

To assess the international aspect of recession prediction, we add the foreign term spread, calculated as the GDP weighted average of US, euro area, UK, and Japanese interest rate spreads, as a regressor, following Ahmed and Chinn (2024). As shown in Table 3, for this sample period (1988-2026), the foreign term spread is

[8] Hamilton and Kim (2002) suggest the term premium, separately from the term spread, has predictive power for growth. Since we do not have comparable estimates of term premia across countries, we do not pursue this avenue.

[10] Chinn and Kucko (2015) and Ishii (2022) obtain similar results for Japanese recessions.

statistically significant, in the anticipated direction, in Canada, Italy, Sweden and the US, and is more statistically important than the domestic term spread for the first three countries. For the United States, the results are consistent with the finding that foreign term spreads are important determinants of growth.

Indeed, in both the Canadian and Swedish cases, the foreign term spread is statistically significant, while the domestic is not. To the extent that Canada and Sweden constitute quintessential small open economies, this is perhaps unsurprising.

In the case of Italy, the domestic spread retains its positive coefficient, while the foreign has an expected negative sign. This finding is consistent with a globalized view of domestic growth, insofar Italy relies upon international trade.

Interestingly, the UK responds to the foreign term spread only at the 15% msl, in seeming contrast to Bernard and Gerlach (1998). If the US spread is used, the result is weaker. On the other hand, France does respond to the foreign spread if the German spread is used instead of a global rate.

Recent work has established that recessions exhibit a linkage to financial cycles, defined as systematic movements in credit variables (Borio, 2014). Omission from a regression of such factors will induce bias in estimated coefficients if such cycles are both correlated with included term spread variables, and also empirically determine recessions. Hence, we augment the regressions with the debt-service ratio for nonfinancial firms.

Borio, Drehmann and Xia (2020) examine both aggregate financial cycle variables, as well as the debt-service ratio, focusing on panel results. We utilize the debt-service ratio compiled by Borio et al. (2020) and updated by the BIS, interpolated to monthly frequency.[11]

The goodness of fit statistics reported in Table 4 improve substantially in those cases where the debt-service ratio coefficient enters with statistical significance. This point is strongest for the UK where the Pseudo-R^2 rises from essentially zero to 0.4 (the debt service ratio is the only statistically significant coefficient), while the goodness of fit statistics for the US and Italy triple. Hence, regardless of the importance of the foreign term spread, controlling for the debt service ratio is important in obtaining adequate fits.

3.4 *Assessing the gain from foreign term spreads*

In order to assess the gain from including the foreign term spread, we examine the estimated recession probabilities. In the discussion, we take the 2020 recession as one that should not necessarily be predicted by a term spread model, given the pandemic was unanticipated at a one year horizon. Figure 2 depicts the predicted 12-month-ahead recession probabilities for each country using a baseline (spread and short

[11] 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.

rate) specification, one including the foreign term spread, and specification including the debt service ratio as a control variable.

Turning to the familiar case of the United States, we replicate several outstanding findings. The term spread model (with short rate) catches the 1990-91 and 2001 recessions using a 40% threshold, while missing the 2008-09 and Covid recessions, but predicting a 2023-24 recession. Including the foreign term spread does not change the predictions appreciably. However, the full specification is more successful, indicating a prediction of the first two recessions using a 70% threshold, with no false positives apparent. Taken literally, the results suggest that had no pandemic occurred, the US would have avoided a recession in 2020. Most importantly, the full model does not provide a false positive signal for 2023-24.

The Canadian term spread has similar predictive power to that of the US. That being said, there are only two recessions (excluding the covid recession) in the sample period. One has to use a relatively low threshold (20%) to predict the two recessions, and in addition, there is a false positive in 2001. On the other hand, the full specification, using a 30% threshold, captures both recessions (with false positives in 2001 and 2023-24).

The term spread plus short rate possesses some predictive power in Germany. A 35% threshold for Germany catches three recessions. The full specification in some sense provides more satisfactory results, insofar as all three recessions are predicted

using a 40% threshold (missing the 2020 recession). On the other hand, a false positive is signaled for 2023-24.

For Sweden, the term spread has accurately signalled one recession using the 40% threshold, but missed the 2008 recession, while failing to provide a false positive for 2023-24. Adding the foreign term spread, however, results in a false positive for the latest period (unless a German spread is used as the foreign term spread).

France, Japan, and the UK are three countries for which the probit regressions indicated little explanatory power for the term spread. For the UK in the full specification, only the debt service ratio is statistically significant, and the short rate in Italy. Depending on interpretation, two or three of three UK recessions are predicted by the full specification, using a 40% threshold. Less success is obtained with any specification for France and Japan. In other words, neither domestic nor foreign term spreads seem to be useful for predicting recessions in these countries.

Italy is an interesting case. The term spread has the wrong sign, and yet the specification including both domestic and foreign term spreads fail to catch one of three recessions (using the 40% threshold), while providing one false positive (in 1995). However, controlling for debt service, four recessions (including the covid recession) are signalled, as well as one false positive (1990). No recession is signalled for 2023-24.

A useful comparison of models with binary outcomes can be done through the so-called Receiver Operator Characteristic (ROC), also referred to as the “area under the

curve" (AUC), see for example recent applications in Ferrari Minesso et al. (2023) or Vrontos et al. (2023). The ROC curve is obtained by plotting the share of model's correct predictions (the true positive rate) vs the share of model's incorrect predictions (the false positive rate), for various thresholds. The idea is to assess the distance of this curve with respect to the 45-degree line that corresponds to the ROC value for a model with random assignment. This AUC measure allows an evaluation of the quality of the model for all the thresholds: the higher the AUC, the better the quality of the model.

Figures 3a and 3b present the AUC measures for the 8 countries in the panel, over the 1995-2022 period. Previous results are reinforced by those graphs. We note that the model with domestic and foreign term spreads, debt service ratio (along with a financial conditions index) largely improve other models, especially for UK, US, Sweden and Italy. It is noteworthy that the DSR and foreign spread variables lead to a strong improvement in the goodness of fit according to AUC measures. The quality of the model for Japan is especially low, as already mentioned.

4. Additional Results

One argument for why the foreign term spread might be a better predictor of recessions than the domestic is that the domestic spread might incorporate default risk. In order to assess this for Italy, a country for which our model didn't work well, we orthogonalize the default component of the Italian spread by regressing it on the 10 year CDS price for Italian sovereign debt, 2008M08-2026M09.

The adjusted R2 from a regression of spread on CDS price is 0.54. Using the residual as an instrumented spread, we find the that the Italian spread no longer has a large positive coefficient of 90 (t-stat 5.4) but rather halved to 54 (t-stat 2.3). Unfortunately, with such a circumscribed sample period, the adjusted spread does not appreciably alter recession predictions for Italy.

We also assess the cross sectional explanatory power of our models, by pooling US, Canada and Germany, three countries for which the model works well. Table 6 reports the results of the three specifications applied to the same time period used before. The domestic only specification fits fairly well, with coefficients as expected. Adding in the foreign term spread confirms a role for the foreign term spread, although the proportion of variance explained does not rise.

Adding in the debt service ratio yields a correctly signed coefficient, and a boost to the pseudo R squared. The panel probit regression predicted recession probabilities for the full specification is shown in Figure 4. These estimates share the attribute that – for Canada and Germany – false positives are signaled for 2023-24. Hence, We confirm a role for the foreign term spread, but in and of themselves, inclusion of foreign term spreads do not mitigate the problem with the term spread misprediction after the last inversion.

5. Conclusion

This paper has explored the importance of the term spread in forecasting recessions. Generally speaking, in-sample results suggest the term spread is indeed important and has significant predictive 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).

We also find that adding variables like the foreign term spread and the debt service ratio often leads to a strong improvement in the goodness-of-fit of models as measured by the Pseudo-R^2 or the area under the ROC curve (AUC). Full models for Canada, Germany and the US turn out to be extremely good at the 12 month horizon.

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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.

Debt-Service Ratio in % is from Bank for International Settlements for 1999-2022. For 1985-98, personal communication from Dora Fan Xia. For 1970-1984, data from Drehmann et al. (2024). Monthly data obtained by linearly interpolating.

Table 1

Correlation								
t-Statistic	SPREAD_CA	SPREAD_FR	SPREAD_GY	SPREAD_IT	SPREAD_JP	SPREAD_SN	SPREAD_UK	SPREAD_US
SPREAD_CA	1.000							

SPREAD_FR	0.548	1.000						
	14.037	-----						
SPREAD_GY	0.553	0.870	1.000					
	14.222	37.814	-----					
SPREAD_IT	0.270	0.557	0.354	1.000				
	6.005	14.364	8.105	-----				
SPREAD_JP	0.553	0.335	0.502	-0.116	1.000			
	14.188	7.609	12.434	-2.504	-----			
SPREAD_SN	0.555	0.767	0.833	0.413	0.425	1.000		
	14.292	25.548	32.181	9.692	10.055	-----		
SPREAD_UK	0.758	0.555	0.499	0.593	0.382	0.529	1.000	
	24.892	14.260	12.318	15.743	8.852	13.349	-----	
SPREAD_US	0.707	0.236	0.311	0.273	0.123	0.261	0.517	1.000
	21.378	5.197	6.992	6.077	2.653	5.794	12.922	-----

Notes: Correlation coefficients (t statistics for correlation coefficient equal zero below).

Table 2: Granger Causality Tests

	Source								
Target		CA	FR	GY	IT	JP	SN	UK	US
	CA		0.003	0.002	0.097	0.005	0.002	0.071	0.039
	FR	0.004		0.793	0.592	0.119	0.119	0.004	0.049
	GY	0.001	0.000		0.003	0.048	0.000	0.000	0.021
	IT	0.000	0.133	0.954		0.891	0.965	0.623	0.066
	JP	0.018	0.022	0.043	0.264		0.055	0.008	0.025
	SN	0.000	0.001	0.018	0.024	0.359		0.001	0.017
	UK	0.001	0.000	0.003	0.000	0.257	0.000		0.415
	US	0.001	0.212	0.226	0.005	0.112	0.017	0.300	

Notes: Each entry is the p-value for for i country spread causes column j country spread. Specification uses 2 leads and lags.

Table 2: Domestic Term Spread Probit Regression, 1988-2026M04

coefficient	CA	FR	GY	IT	JP	SN	UK	US
constant	**-1.376**	**-1.446**	**-1.492**	**-1.532**	**-1.008**	**-1.357**	**-1.319**	**-1.516**
	0.202	0.188	0.154	0.174	0.115	0.145	0.167	0.249
spread	**-54.340**	**-18.911**	**-20.067**	**29.158**	**44.634**	**-22.861**	-5.094	**-33.007**
	10.278	8.881	7.237	5.781	8.653	6.575	6.724	9.124
3 mo rate	**7.129**	**7.591**	**22.829**	**5.350**	**9.563**	**9.195**	**6.197**	**14.007**
	3.469	3.118	3.023	1.837	3.427	2.008	2.804	4.520
Pseudo R sq.	0.35	0.10	0.25	0.06	0.05	0.20	0.06	0.17
N	448	448	448	448	448	448	448	450

Notes: Probit regression coefficients (standard errors below). Bold face denotes significance at 5% level.

Table 3: Domestic and Foreign Term Spread Probit Regression, 1988-2026M04

coefficient	CA	FR	GY	IT	JP	SN	UK	US
constant	**-1.423**	**-1.435**	**-1.505**	**-1.453**	**-1.018**	**-1.149**	**-1.355**	**-1.392**
	0.209	0.190	0.160	0.175	0.127	0.150	0.176	0.248
spread	-31.781	-16.195	**-21.134**	**38.218**	**43.957**	4.438	-11.674	**-24.282**
	20.385	11.018	8.185	6.531	9.300	8.535	11.223	8.953
3 mo rate	**11.001**	**8.086**	**22.665**	**6.581**	**9.530**	**13.549**	4.740	**12.104**
	4.642	3.328	3.076	1.866	3.432	2.351	3.449	4.583
FTS	**-32.890**	-5.055	2.401	**-27.662**	1.406	**-74.814**	10.593	**-38.578**
	26.716	11.991	8.513	8.798	7.087	13.238	14.412	12.358
Pseudo R sq.	0.36	0.10	0.25	0.08	0.05	0.30	0.06	0.21
N	448	448	448	448	448	448	448	450

Notes: Probit regression coefficients (standard errors below). Bold face denotes significance at 5% level.

Table 4: Domestic and Foreign Term Spread Probit Regression, Debt Service Ratio Control, 1988-2026M04

coefficient	CA	FR	GY	IT	JP	SN	UK	US
constant	2.150	-2.865	**-8.835**	**-9.823**	**-2.780**	**-2.929**	**-9.417**	**-17.932**
	1.346	1.749	1.270	0.987	0.481	0.784	0.904	2.246
spread	**-40.500**	-10.442	**-23.764**	**30.615**	-2.476	11.648	18.984	**-104.813**
	22.634	13.003	9.217	8.055	15.277	9.464	16.439	19.787
3 mo rate	**10.853**	**11.259**	**14.776**	0.715	**-21.696**	**10.738**	4.099	**-33.210**
	5.160	5.078	3.597	2.092	8.916	2.605	4.945	8.992
FTS	-44.582	-3.228	**-34.233**	**-88.442**	4.672	**-74.945**	-30.596	**-52.148**
	28.467	12.211	10.998	14.425	7.290	13.479	20.547	20.879
DSR	**-15.772**	7.217	**59.289**	**81.490**	**13.392**	**8.036**	**52.468**	**113.998**
	5.903	8.755	10.182	9.108	3.509	3.451	5.709	15.016
Pseudo R sq.	0.38	0.11	0.34	0.33	0.08	0.31	0.38	0.58
N	448	448	448	448	448	448	448	450

Notes: Probit regression coefficients (standard errors below). Bold face denotes significance at 5% level.

Table 5: Domestic and US/German Term Spread Probit Regression, Debt Service Ratio Control, 1988-2026M04

coefficient	CA	FR	GY	IT	JP	SN	UK	US
constant	**3.996**	**-6.244**	**-7.027**	**-3.896**	**-2.663**	-2.509	**-9.370**	**-17.391**
	1.651	1.255	1.150	1.201	0.472	0.784	0.911	2.167
spread	**-137.427**	82.602	**-38.269**	**55.230**	4.492	**25.230**	2.393	**-93.185**
	28.352	26.508	9.300	7.757	15.467	11.896	15.331	18.666
3 mo rate	-7.826	**11.839**	**9.546**	**2.750**	**-20.823**	**10.053**	1.059	**-23.967**
	5.994	4.414	4.220	2.233	8.857	2.569	5.446	8.038
FTS	**48.941**	**-110.975**	**13.095**	**-64.583**	-4.517	**-64.018**	-3.066	**-32.039**
	16.050	25.568	6.792	10.422	6.556	13.986	11.386	17.009
	US	GY	US	GY	US	GY	US	GY
DSR	**-22.746**	**33.628**	**36.601**	**17.825**	**12.888**	4.704	**51.459**	**107.961**
	7.045	9.546	7.534	8.991	3.498	3.488	5.673	14.188
Pseudo R sq.	0.40	0.22	0.31	0.18	0.08	0.28	0.38	0.57
N	448	448	448	448	448	448	448	450

Notes: Probit regression coefficients (standard errors below). Bold face denotes significance at 5% level.

Table 6: Panel Probit Regressions, 1988-2026M04, US, Canada, Germany

coefficient	Domestic	Dom & Intl	Full
spread	**-31.945**	**-25.492**	**-25.649**
	4.836	5.513	5.717
3 mo rate	**16.088**	**16.961**	**13.846**
	1.951	1.991	2.061
FTS		**-14.071**	**-15.137**
		6.200	6.378
DSR			**23.094**
			3.655
Pseudo R Sq	0.27	0.27	0.31
N	1346	1346	1346

Notes: Country fixed effects regressions. Bold face denotes significance at 5% level.

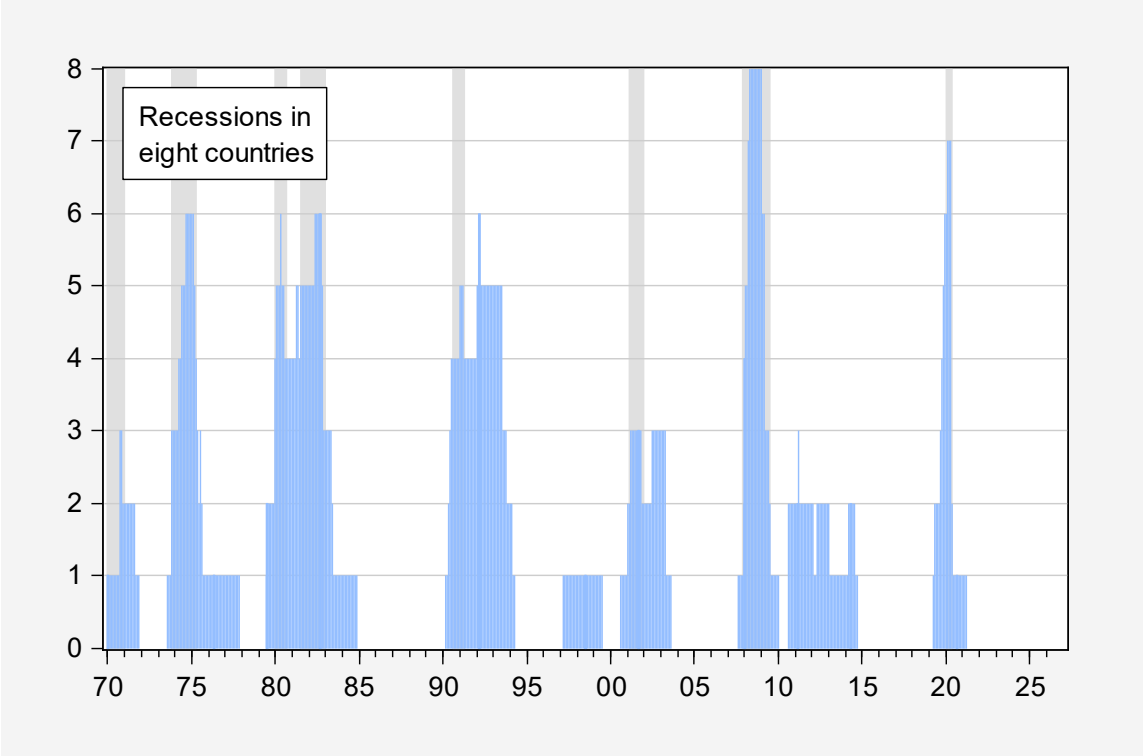


Figure 1. Recessions in eight countries per month. NBER defined peak-to-trough US recession dates shaded gray.

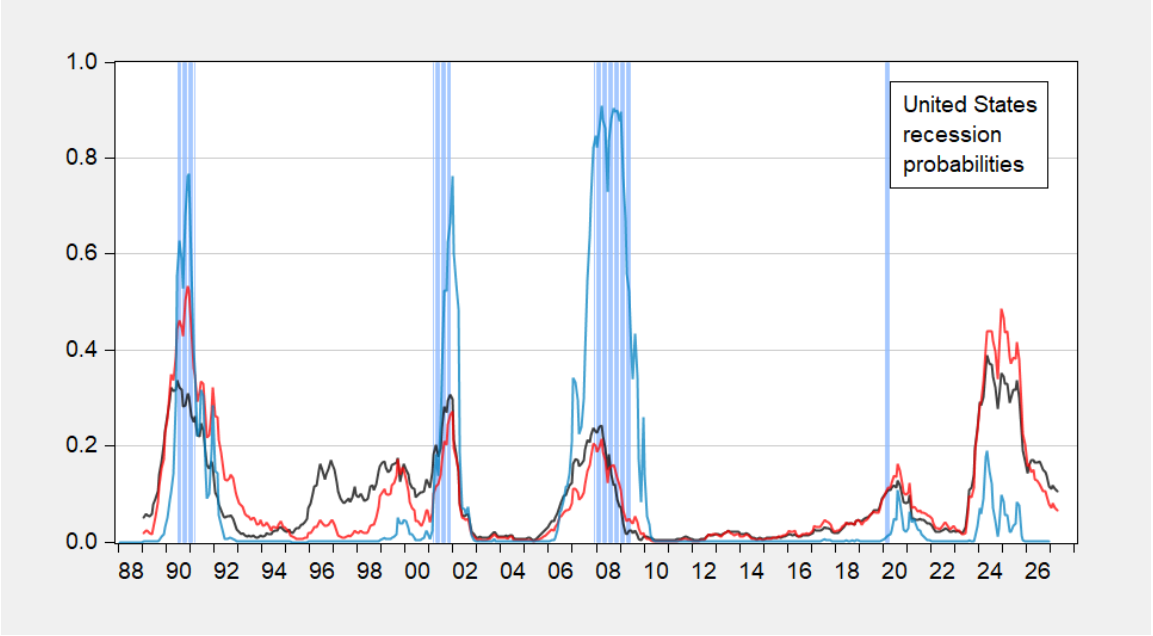


Figure 2.a: US probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

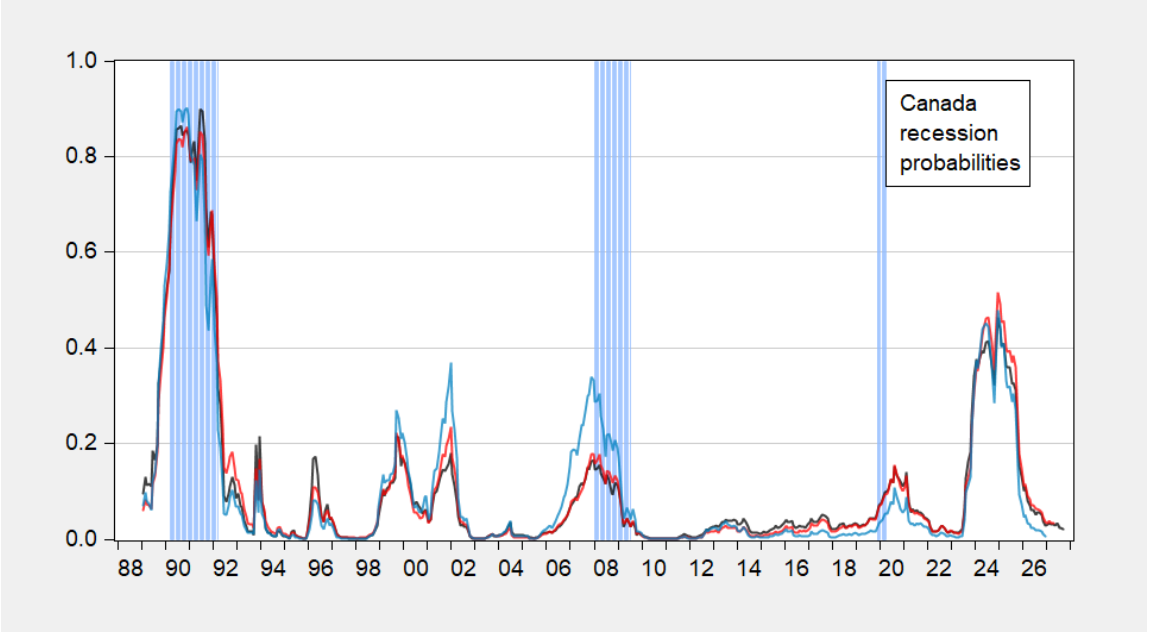


Figure 2.b: Canada probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

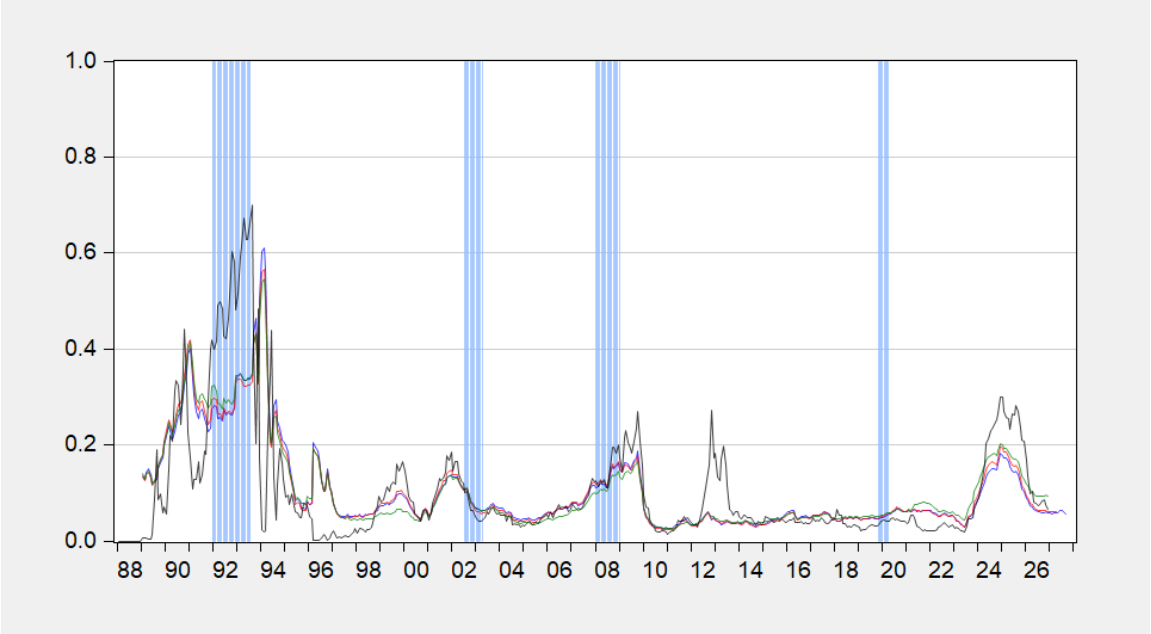


Figure 2.c: France probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

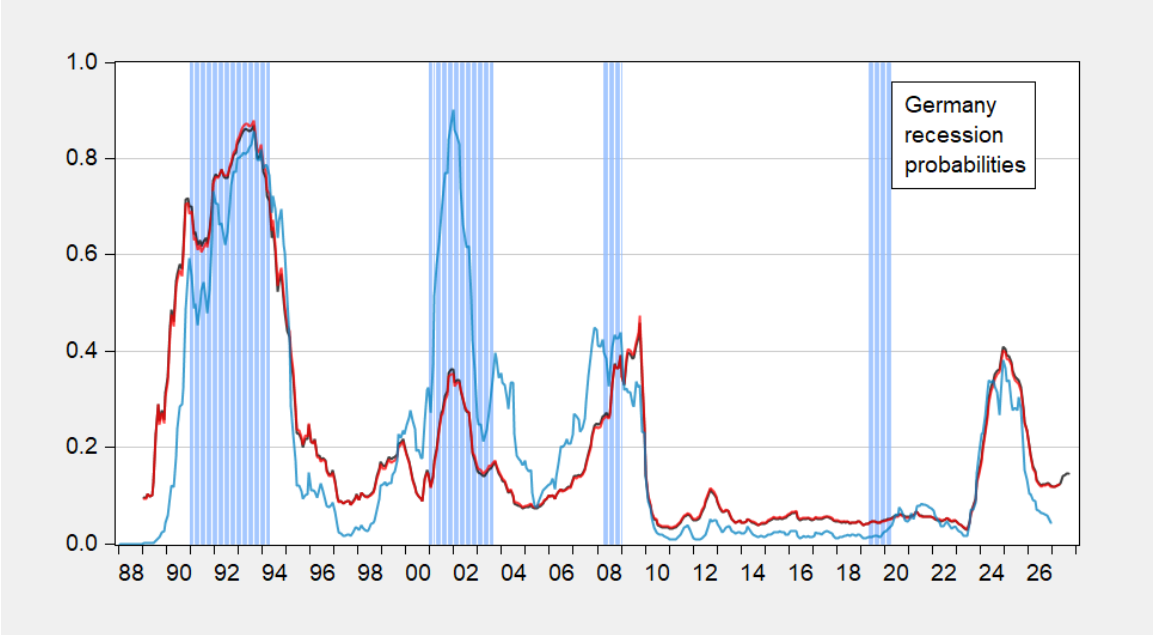


Figure 2.d: Germany probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

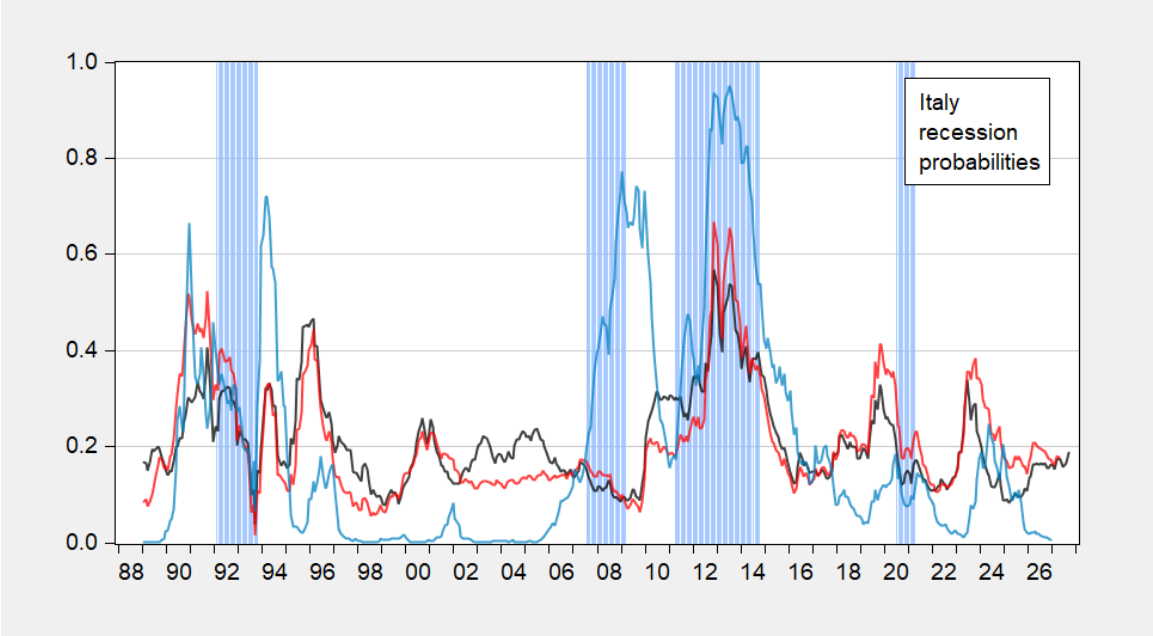


Figure 2.e: Italy probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

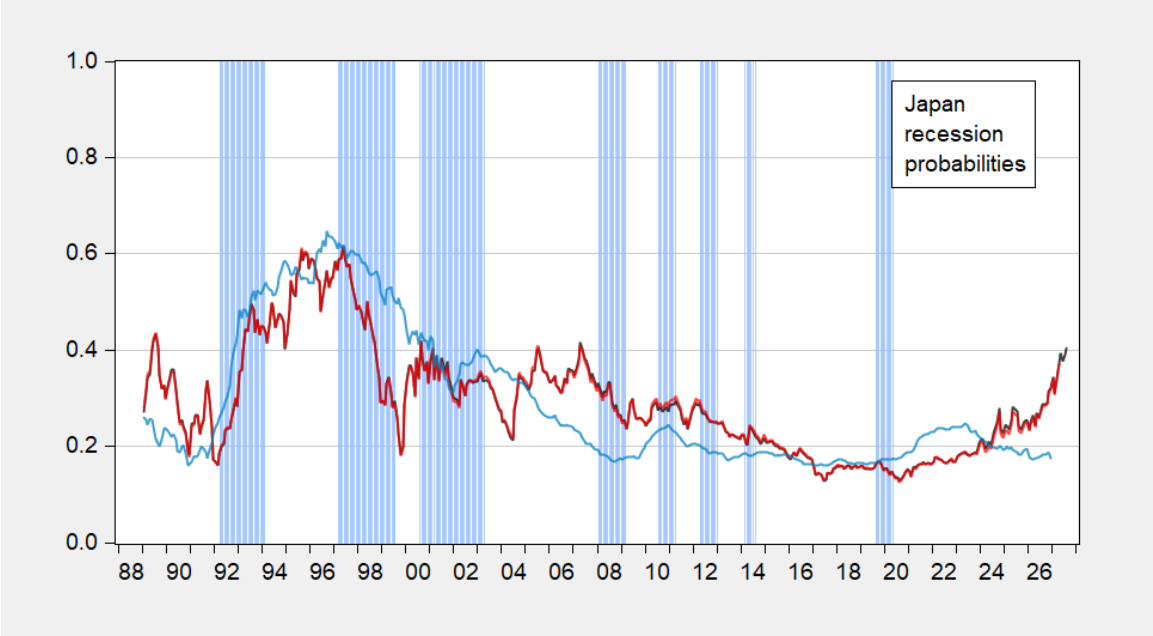


Figure 2.f: Japan probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

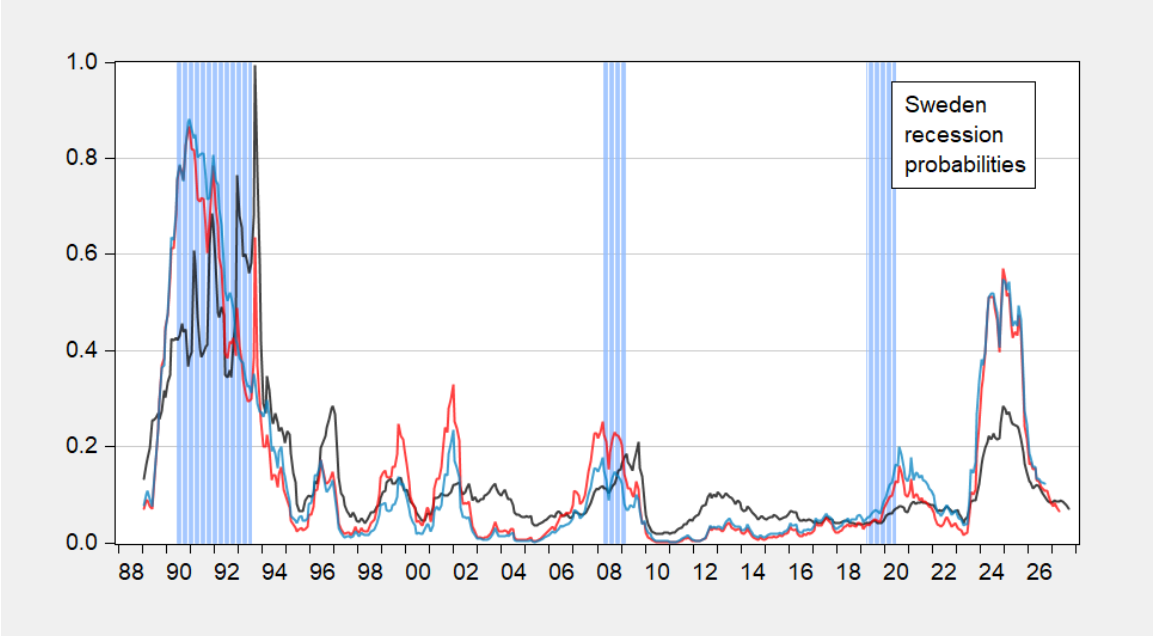


Figure 2.g: Sweden probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

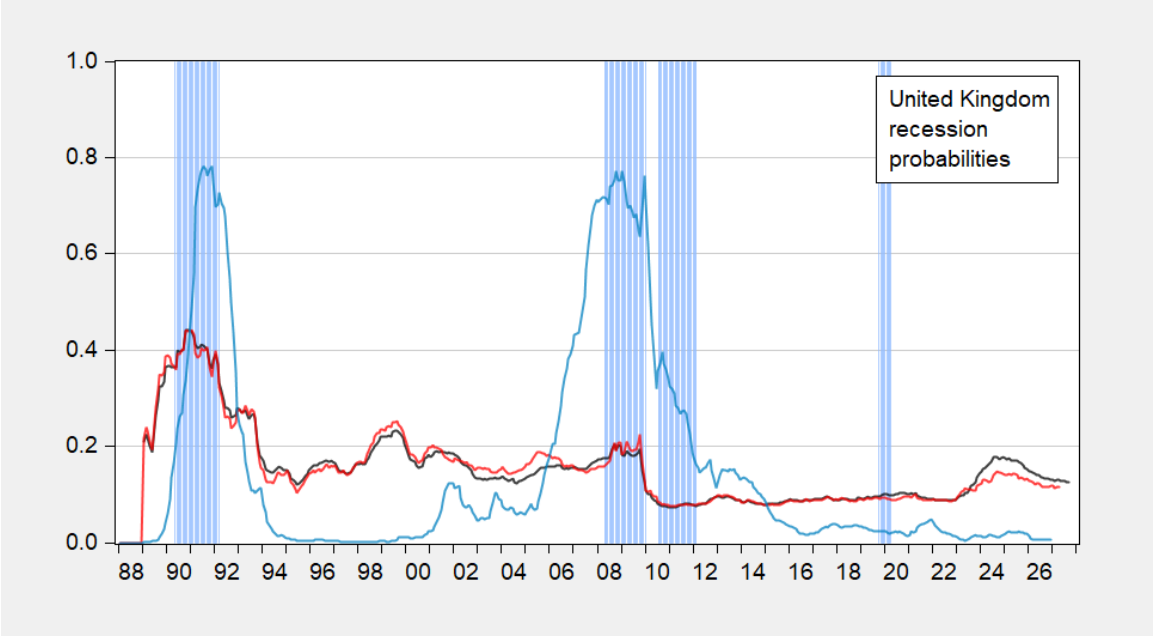


Figure 2.h: UK probability estimates for domestic term spread (black), domestic and foreign term spread (red), domestic and foreign term spread plus debt service ratio (blue). Peak to trough recession dates shaded light blue.

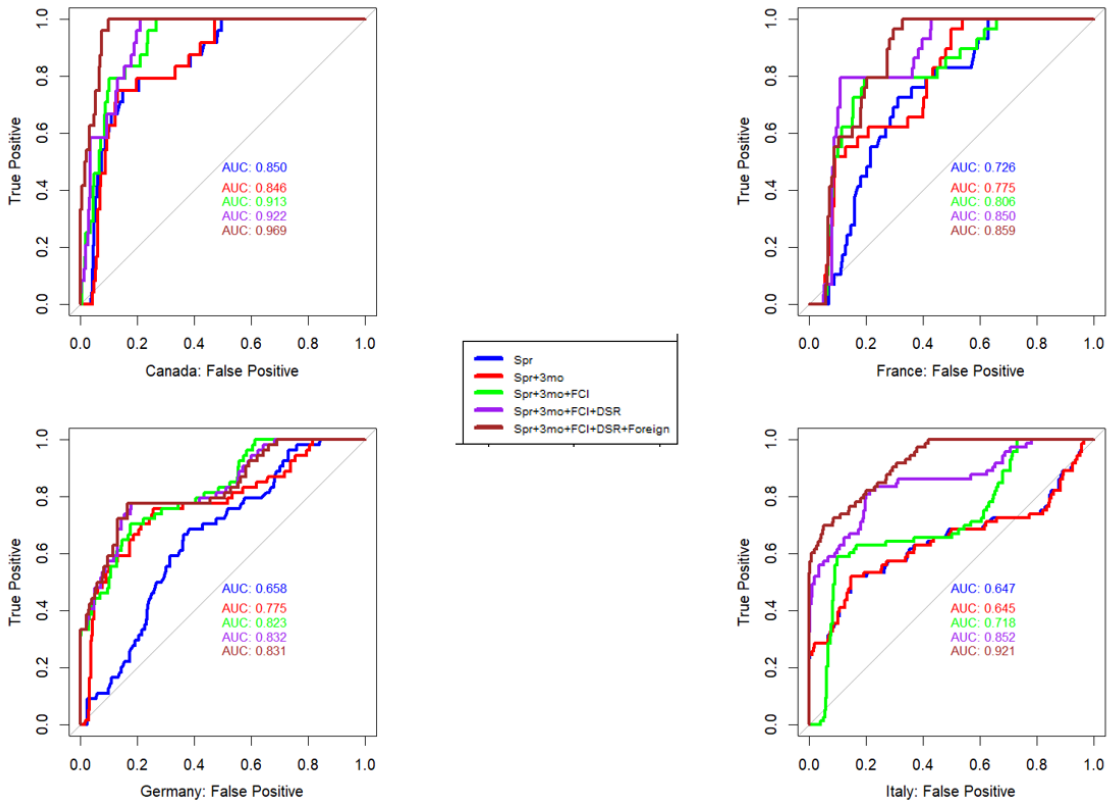


Figure 3.a: AUC measures for Canada, France, Germany and Italy

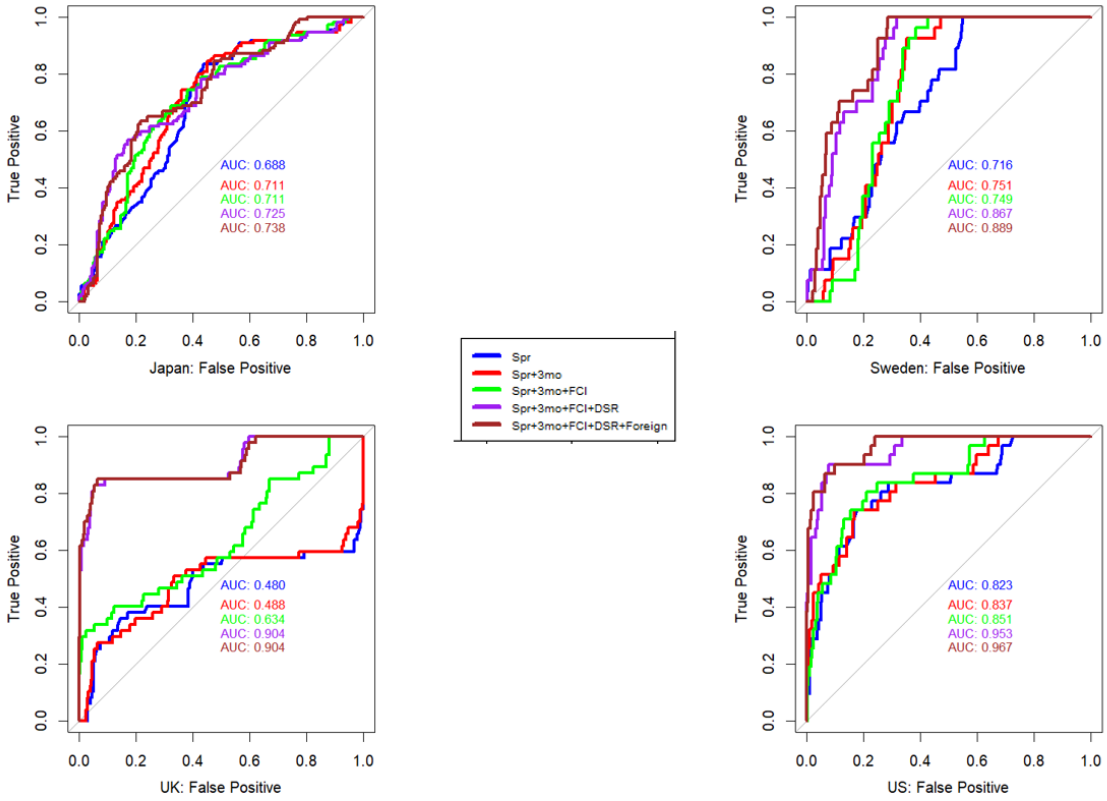
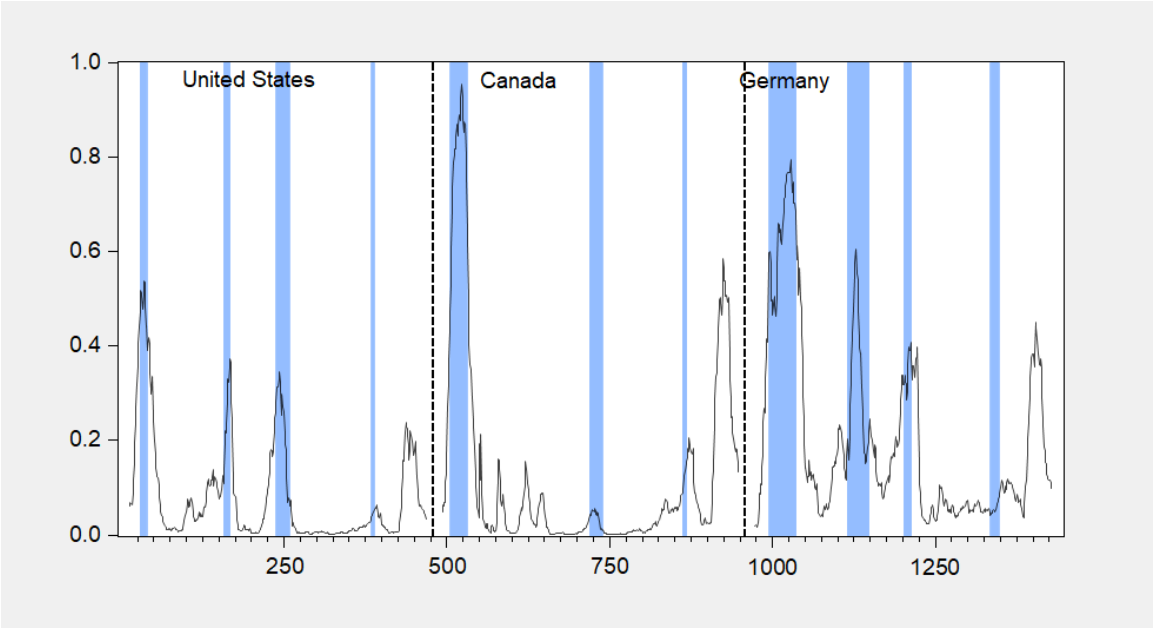


Figure 3.b: AUC measures for Japan, Sweden, UK and US

Figure 4: Panel Recession Probability Estimates



Notes: Probability estimates. Peak to trough recession dates shaded light blue.