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The Macroeconomic Uncertainty Premium in the Corporate Bond Market—Corrigendum

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In this corrigendum, we address three issues in Bali, Subrahmanyam, and Wen (BSW) (2021). First, we included in BSW an inaccurate description of the database employed, which we now correct. Second, we correct the description of one of the control variables, bond illiquidity, employed in BSW. Finally, in light of the shortcomings of the Bai, Bali, and Wen (BBW) (2019) factors that are highlighted by Dickerson, Mueller, and Robotti (2023), we replace the 4-factor model of BBW with alternative factor models.

Turning first to the description of the database employed in BSW (2021), in addition to the enhanced version of TRACE and Mergent FISD described in BSW, the data set was compiled from the following sources: Datastream, the National Association of Insurance Commissioners database (NAIC), and Bloomberg. Among these databases, the Datastream provides prices based on dealer quotes; NAIC reports transaction information by insurance companies; Bloomberg provides daily bond prices; the enhanced TRACE records prices based on real transactions. The corporate bond datasets cover different sample periods; from July 2002 to Dec. 2017 for enhanced TRACE with 937,947 observations, from July 2002 to June 2014 for Datastream with 168,052 observations, from July 2002 to July 2013 for NAIC with 154,026 observations, and from July 2002 to Dec. 2014 for Bloomberg with 133,571 observations, for a total of 1,393,596 unique observations. We employed data in BSW beyond that available from TRACE to allow for a more comprehensive analysis, because TRACE initially applied to only a subset of corporate bonds.

Turning next to the description of the bond illiquidity control variable, we provide a more accurate description of ILLIQ used in BSW (2021). Specifically, ILLIQ in BSW was described as the bond-level illiquidity computed as the auto-covariance of the daily price changes within each month following Bao et al. (2011), when at least 5 daily return pairs (each separated by no more than 5 trading days) are available (the part after the comma was inadvertently omitted). We also want to clarify that when at least 5 daily return pairs were not available within a

TABLE 2

Univariate Portfolios of Corporate Bonds Sorted by Uncertainty Beta, Corrected

Quintile portfolios shown in Table 2 are formed every month by sorting corporate bonds based on the uncertainty beta (β^{UNC}) estimated from the following regression controlling for the bond market portfolio:

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t^{UNC}} \cdot + \Delta UNC_t + \beta_{i,t}^{MKT} \cdot MKT_t + \varepsilon_{i,t},$$

where β^{UNC} is the individual bond exposure to the change in the economic uncertainty index (ΔUNC). Quintile 1 is the portfolio with the lowest β^{UNC} and Quintile 5 is the portfolio with the highest β^{UNC}. The portfolios are value-weighted using amounts outstanding as weights. The table reports the average β^{UNC}, the next-month average excess return, the 5-factor alpha from stock market factors, the 1-factor alpha from the bond market factor, and the 6-factor alpha for each quintile. The last 8 columns report average portfolio characteristics including the bond market beta (β^{Bond}), default beta (β^{DEF}), term beta (β^{TERM}), market volatility beta (β^{VIX}), illiquidity (ILLIQ), credit rating, time-to-maturity (years), and amount outstanding (size, in \$billion) for each quintile. The last row shows the differences in average β^{UNC}, monthly average returns, the differences in alphas with respect to the factor models. The 5-factor model with stock market factors includes the excess stock market return (MKT^{Stock}), the size factor (SMB), the book-to-market factor (HML), the stock momentum factor (MOM), and the liquidity risk factor (LIQ). The 1-factor model includes the excess bond market return (MKT^{Bond}). The 6-factor model combines 5 stock market factors and the bond market factor. The average returns and alphas are defined in monthly percentage terms. Newey-West adjusted *t*-statistics are given in parentheses. The sample period is from July 2004 to Dec. 2017.

						Average Portfolio Characteristics							
Quintiles	Average β^{UNC}	Average Return	5-Factor Stock Alpha	1-Factor Bond Alpha	6-Factor Alpha	β^{MKT}	β^{DEF}	β^{ERM}	β^{VIX}	ILLIQ	Rating	Maturity	Size
Low	−1.34	1.31 (4.85)	1.20 (4.19)	0.87 (2.85)	0.92 (2.92)	0.84	6.10	2.71	−0.04	5.09	11.90	9.31	0.36
2	−0.36	0.57 (3.96)	0.45 (2.95)	0.24 (1.69)	0.27 (1.74)	0.30	3.22	0.54	0.02	1.99	8.65	8.66	0.48
3	−0.11	0.44 (4.33)	0.34 (3.02)	0.20 (1.92)	0.23 (2.02)	0.22	3.81	0.22	0.03	1.24	7.76	7.77	0.54
4	0.06	0.37 (2.01)	0.28 (2.73)	0.17 (1.62)	0.2 (1.79)	0.19	3.12	0.15	0.02	1.15	7.64	8.62	0.51
High	0.42	0.56 (3.44)	0.46 (3.47)	0.33 (2.31)	0.36 (2.44)	0.28	2.24	0.56	0.02	2.11	8.12	12.95	0.42
High − Low *t*-stat	1.75 (10.26)	−0.76 (−3.24)	−0.74 (−2.85)	−0.54 (−2.10)	−0.56 (−2.03)								

month, ILLIQ was computed following Roll (1984) using monthly returns requiring at least the past 24 and at most the past 36 months of data.

Three tables (Tables 2, 3, and 4) in BSW (2021) contained results that relied on the BBW (2019) factors. In this corrigendum, we report results that correspond to Tables 2, 3, and 4 in BSW that replace the 4-factor model of BBW (2019) with the 1-factor CAPM that includes only the bond market factor, following the suggestion of Dickerson et al. (2023). We also replaced the 9-factor model originally used in Tables 2, 3, and 4 of BSW with the 6-factor model that includes the bond market portfolio as well as the 5 stock market factors.[1] Thus, when estimating the alpha of β^{UNC}-sorted portfolios in this corrigendum, we present results from i) the 1-factor CAPM and ii) the 6-factor model that combines the 5 stock market factors and the bond market factor.

The updated Table 2 of this corrigendum presents the univariate portfolio results using the original database of BSW. Specifically, the 1-factor and 6-factor risk-adjusted returns (alphas) are presented for each quintile. The results show that the 1-factor bond alpha difference between quintiles 5 and 1 is negative and significant at −0.54% per month with a *t*-statistic of −2.10. The fifth column in Table 2 presents a significant 6-factor alpha difference of −0.56% per month

[1]The 5 stock market factors include the excess return on the market portfolio, proxied by the value-weighted CRSP index (MKT^{Stock}), a size factor (SMB), a book-to-market factor (HML), a momentum factor (MOM^{Stock}, and a liquidity risk factor (LIQ^{Stock}), following Fama and French (1993), Carhart (1997), and Pastor and Stambaugh (2003).

TABLE 3

Bivariate Portfolios of Corporate Bonds Sorted by Uncertainty Beta (β^{UNC}) and Downside Risk Beta (β^{DRF}), Corrected

Independent bivariate portfolios shown in Table 3 are formed by sorting corporate bonds into quintile portfolios based on the downside risk beta (β^{DRF}) and uncertainty beta (β^{UNC}). For each bond and each month in our sample, we estimate the downside risk beta from the monthly rolling regressions of excess bond returns on the downside risk factor over a 36-month fixed window while controlling for the bond market factor (MKT^{Bond}). We then independently sort all bonds into quintile portfolios based on an ascending sort of β^{UNC} and β^{DRF}. The portfolios are value-weighted using amounts outstanding as weights. The table reports the 5×5 next-month average returns and the 6-factor alphas for each of the 25 portfolios. Average returns and alphas are defined in monthly percentage terms. Newey-West adjusted *t*-statistics are given in parentheses.

	Low β^{UNC}	2	3	4	High β^{UNC}	High β^{UNC} − Low β^{UNC}
Panel A. Average Return						
Low β^{DRF}	1.01	0.57	0.46	0.46	0.76	−0.24
	(2.20)	(2.31)	(2.16)	(2.33)	(2.78)	(−0.83)
2	0.79	0.37	0.27	0.29	0.42	−0.37
	(2.20)	(2.08)	(2.27)	(2.55)	(2.67)	(−1.31)
3	0.91	0.40	0.27	0.22	0.30	−0.60
	(2.85)	(2.62)	(2.77)	(2.66)	(2.53)	(−2.30)
4	0.95	0.32	0.28	0.20	0.19	−0.75
	(2.56)	(2.15)	(2.96)	(2.81)	(1.80)	(−2.35)
High β^{DRF}	1.53	0.60	0.35	0.24	0.53	−1.00
	(3.45)	(2.64)	(2.25)	(2.11)	(3.17)	(−2.98)
Panel B. 6-Factor Alpha						
Low β^{DRF}	0.84	0.50	0.36	0.37	0.69	−0.15
	(1.69)	(1.85)	(1.56)	(1.61)	(2.34)	(−0.39)
2	0.63	0.23	0.16	0.22	0.34	−0.29
	(1.65)	(1.25)	(1.27)	(1.69)	(1.87)	(−0.82)
3	0.80	0.28	0.19	0.16	0.24	−0.56
	(2.49)	(1.71)	(1.70)	(1.65)	(1.71)	(−1.90)
4	0.75	0.16	0.18	0.14	0.14	−0.61
	(2.00)	(1.10)	(1.83)	(1.86)	(1.16)	(−1.73)
High β^{DRF}	1.18	0.35	0.16	0.13	0.38	−0.80
	(3.01)	(1.68)	(1.02)	(1.07)	(2.36)	(−2.50)

TABLE 4

Evidence from Credit Rating Downgrades, Corrected

Quintile portfolios shown in Table 4 are formed every month by sorting corporate bonds based on the uncertainty beta (β^{UNC}) estimated with equation (2). The portfolios are value-weighted using amounts outstanding as weights. Panels B to D report the average return and 6-factor alpha differences between the low- and high-β^{UNC} quintiles after eliminating the quintile of bonds with the largest rating downgrades over the past 12-, 24-, and 36-months. The sample period is from July 2004 to Dec. 2017.

	1-Month-Ahead		3-Month-Ahead		6-Month-Ahead		12-Month-Ahead	
	Average Return	6-Factor Alpha	Average Return	6-Factor Alpha	Average Return	6-Factor Alpha	Average Return	6-Factor Alpha
Panel B. Uncertainty Premium After Eliminating the Quintile of Bonds with the Largest Rating Downgrades over the Past 12 Months								
High β^{UNC} − Low β^{UNC}	−0.74	−0.43	−0.55	−0.30	−0.50	−0.32	−0.46	−0.20
t-stat	(−4.03)	(−2.55)	(−2.67)	(−2.02)	(−2.61)	(−2.07)	(−2.65)	(−1.56)
Panel C. Uncertainty Premium After Eliminating the Quintile of Bonds with the Largest Rating Downgrades over the Past 24 Months								
High β^{UNC} − Low β^{UNC}	−0.64	−0.33	−0.46	−0.25	−0.39	−0.32	−0.37	−0.20
t-stat	(−2.81)	(−1.66)	(−2.56)	(−1.39)	(−2.47)	(−1.71)	(−2.45)	(−1.32)
Panel D. Uncertainty Premium After Eliminating the Quintile of Bonds with the Largest Rating Downgrades over the Past 36 Months								
High β^{UNC} − Low β^{UNC}	−0.48	−0.20	−0.37	−0.16	−0.38	−0.15	−0.27	−0.12
t-stat	(−2.63)	(−1.20)	(−1.79)	(−1.12)	(−1.49)	(−0.98)	(−1.20)	(−0.65)

(t-stat = −2.03). We note here that the t-statistics from the 6-factor model are smaller than those reported in BSW.

Table 3 in BSW (2021) contained results based on the misaligned downside risk factor of BBW, and as a result, downside risk beta was incorrectly estimated. The updated Table 3 of this corrigendum presents the average return and 6-factor alpha differences between the low-β^{UNC} and high-β^{UNC} quintiles, after controlling for the downside risk beta (β^{DRF}) with respect to the correctly aligned downside risk factor constructed in Bai, Bali, and Wen (BBW) (2023). Consistent with the original findings in BSW, the average return and 6-factor alpha differences between the low-β^{UNC} and high-β^{UNC} are negative for all quintiles of β^{DRF} and the return/alpha spreads are economically large and significant for quintiles 3 to 5 of β^{DRF}. We should note that in Table 3 of the original BSW, in addition to β^{DRF} quintiles 3 to 5, the return (alpha) spread is significant for the second β^{DRF} quintile at the 10% (5%) level, which is no longer significant in Table 3 of this corrigendum. Overall, the findings in Table 3 indicate that the uncertainty beta provides incremental predictive power for future bond returns above and beyond the corrected downside risk beta.

The updated Panels B, C, and D of Table 4 present the 6-factor alpha spreads on the β^{UNC}-sorted portfolios after we remove the quintile of significantly downgraded bonds over the past 12, 24, and 36 months, respectively. Consistent with our original findings in BSW (2021), Panels B to D of Table 4 show that the magnitude of the uncertainty premium declines gradually when we progressively exclude bonds with higher credit risk. For the 6-factor alpha results, we acknowledge that most alpha estimates are smaller in absolute magnitude as compared to BSW, and some are no longer significant. Nonetheless, the 1-to-6-month ahead predictive power of the β^{UNC} spread remains significant for average returns as well as the 6-factor alpha in Panel B.

Using a sample comprised of bond transactions contained in TRACE, Dickerson et al. (2023) show that the economic uncertainty premium estimated with the 1-month change in the macroeconomic uncertainty index of Jurado et al. (2015) is not priced in corporate bonds. To shed further light on the findings of Dickerson et al. (2023), we examine the uncertainty premium using the publicly available WRDS corporate bond dataset, which is based only on TRACE observations. The data we use impose no filters on WRDS, except that we eliminate bonds with less than 1 year to maturity, as in the original BSW paper. We present the univariate portfolio results using both changes in the macroeconomic uncertainty index and its level, respectively, in Panels A and B of Table 8. We include the 1-month change in the index, as well as the 6- and 12-month changes. The latter are computed as the 1-month- ahead forecast of macroeconomic uncertainty in month t, minus its value 6 and 12 months ago, respectively. The results reported in Panel A of Table 8 indicate insignificant return and alpha spreads using the 1-month change in UNC index, which accords with the results in Dickerson et al. (2023). However, all the return and alpha spreads become economically and statistically significant using the 6-month change and the 12-month change in the UNC index.

Panel B of Table 8 shows that an alternative uncertainty beta estimated with respect to the level rather than the first difference of the 1-month-ahead forecast of macroeconomic uncertainty index is still priced, with the return and alpha spreads in the range of −0.32% and −0.63% per month.

TABLE 8

Univariate Portfolio Results Based on the WRDS Sample, Added

Panels A and B of Table 8 report the quintile portfolio results based on the sample of WRDS bond returns, where β^{UNC} is the individual bond exposure to the change of UNC and to the level of UNC, respectively. Quintile 1 is the portfolio with the lowest β^{UNC} and Quintile 5 is the portfolio with the highest β^{UNC}. The portfolios are value-weighted using amounts outstanding as weights. The table reports the next-month average excess return, the 5-factor alpha from stock market factors, the 1-factor alpha from the bond market factor, and the 6-factor alpha for each quintile. The last row shows the differences in average β^{UNC}, monthly average returns, the differences in alphas with respect to the factor models. Bond returns are directly from WRDS based on the variable "RET EOM". The average returns and alphas are defined in monthly percentage terms. The WRDS sample period is from August 2002 to Dec. 2021. Newey-West adjusted *t*-statistics are given in parentheses.

Panel A. WRDS Sample Using Changes in UNC

	1-Month Change		6-Month Change		12-Month Change	
	Average Return	6-Factor Alpha	Average Return	6-Factor Alpha	Average Return	6-Factor Alpha
Low	0.59	−0.01	0.83	0.18	0.85	0.18
2	0.42	0.07	0.46	0.10	0.47	0.12
3	0.29	0.02	0.30	0.02	0.32	0.03
4	0.33	0.01	0.30	−0.03	0.27	−0.05
High	0.55	0.00	0.35	−0.16	0.32	−0.18
High − Low	−0.04	−0.01	−0.47	−0.34	−0.52	−0.36
t-stat	(−0.27)	(−0.03)	(−2.36)	(−2.08)	(−2.14)	(−1.80)

Panel B. WRDS Sample Using the Level of UNC

Quintiles	Average Return	5-Factor Stock Alpha	1-Factor Bond Alpha	6-Factor Alpha
Low	0.90	0.59	0.14	0.22
2	0.46	0.35	0.07	0.13
3	0.31	0.18	0.02	0.02
4	0.28	0.12	−0.02	−0.06
High	0.27	0.01	−0.18	−0.23
High − Low	−0.63	−0.57	−0.32	−0.46
t-stat	(−2.85)	(−2.68)	(−1.99)	(−2.11)

Finally, to better understand why somewhat different results are obtained in the WRDS bond sample as compared to the sample employed in BSW, we examine the overlap (and lack thereof) in the datasets. We find that the WRDS dataset removes a number of small, illiquid bonds that were included amongst the TRACE observations in BSW, accounting for about 15% of the TRACE sample. These removed bonds have median size (e.g., amount outstanding) that fall below the fifth percentile of the size distribution of the WRDS sample, with a median bond illiquidity above the 80th percentile of the illiquidity distribution of the WRDS sample. As shown in Table 2 of this corrigendum, the size and illiquidity characteristics of β^{UNC}-sorted portfolios indicate that small and illiquid bonds on average have a larger, negative uncertainty beta (i.e., riskier bonds), earn significantly larger returns and alphas, and hence are the ones for which macroeconomic uncertainty is more prone to be priced. Nonetheless, as shown in Table 8, the 6- and 12-month change in the uncertainty index, along with the uncertainty index level, are still priced in the WRDS bond sample. Given that the macroeconomic uncertainty index in Jurado et al. (2015) is constructed using macroeconomic shocks, absent theory, it is not clear whether levels or first differences of the index are more appropriate.

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