



## **Online-Appendix**

# „The Impact of Biodiversity Risk on Banks' Credit Default Swap Spread Changes“

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Junior Management Science 11(1) (2026) 74-106

## Appendix

The Appendix contains supplementary information about the data and the regression results presented in this thesis.

### A.1 Sample Distribution

This table shows the distribution of banks within the sample by continent as well as the CDS contract clause that is used in the sample. Total banks in the sample: N = 39.

<b>North America (N = 10)</b>	<b>Clause</b>		<b>Europe (N = 16)</b>	<b>Clause</b>
American Express Co	XR		Banco de Sabadell SA	MM
Bank of America Corp	XR		Banco Santander SA	MM
Capital One NA	XR		Bank of Ireland	MM
Citigroup Inc	XR		BNP Paribas SA	MM
JPMorgan Chase & Co	XR		Commerzbank AG	MM
KeyCorp	XR		Danske Bank A/S	MM
Morgan Stanley	XR		Deutsche Bank AG	MM
PNC Financial Services Group Inc	XR		HSBC Holdings PLC	MM
US Bancorp	XR		Lloyds Bank PLC	MM
Wells Fargo & Co	XR		Natwest Group PLC	MM
<b>Asia (N = 9)</b>			Raiffeisen Bank International AG	MM
Akbank TAS	CR		Skandinaviska Enskilda Banken AB	MM
Aozora Bank Ltd.	CR		Societe Generale SA	MM
Bank of China Ltd	CR		Standard Chartered PLC	MM
Cathay United Bank Co Ltd	CR		Svenska Handelsbanken AB	MM
Ind. & Comm. Bank of China Asia Ltd	CR		UniCredit SpA	MM
Kookmin Bank	CR		<b>Australia (N = 3)</b>	
Shinhan Bank	CR		Commonwealth Bank of Australia	MR
Turkiye Is Bankasi AS	CR		National Australia Bank Ltd	MR
Woori Bank	CR		Westpac Banking Corp	MR
<b>South America (N = 1)</b>				
Banco do Brasil	CR			

## A.2 Rating Scale of Credit Ratings

This table includes the rating scale used to match sovereign credit ratings with a numerical score.

<b>Fitch Ratings</b>	<b>Score</b>
AAA	17
AA+	16
AA	15
AA-	14
A+	13
A	12
A-	11
BBB+	10
BBB	9
BBB-	8
BB+	7
BB	6
BB-	5
B+	4
B	3
B-	2
CCC +	1
all below	0

### A.3 Summary Statistics for the Sample with lagged Balance Sheet Variables

This table shows the summary statistics for the variables used in the baseline regression with lagged balance sheet variables. The sample includes a total of 1,248 quarterly observations for 39 banks between 2015 and 2023, excluding the year 2020. All variables except biodiversity and sovereign credit rating are winsorized at the 1% and 99% level.

<b>Summary Statistics</b>						
<b>Baseline Sample</b> <i>N = 1,248</i>	Mean	St. Dev.	Min	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile	Max
Δ CDS (%)	1.784	22.785	-41.954	-13.212	10.838	80.107
Biodiversity (standardized)	0.000	1.000	-1.916	-0.692	0.680	2.100
Δ Leverage (%)	0.017	0.679	-1.949	-0.316	0.340	2.537
Δ Asset Quality (%)	-2.948	10.958	-32.518	-8.874	2.480	32.033
Δ Bank Size (%)	0.014	0.236	-0.736	-0.109	0.149	0.610
Δ Funding Stability (%)	0.933	5.123	-14.488	-1.563	2.960	18.731
Δ Cost Efficiency (%)	1.245	18.717	-41.857	-8.859	7.081	74.039
Δ Market Sensitivity (%)	15.445	54.195	-54.757	-8.830	17.562	329.719
Δ Bank Volatility (%)	2.756	33.325	-48.946	-19.813	20.301	113.394
Δ Index Return (%)	1.812	7.215	15.412	2.588	6.750	21.060
Index Volatility (%)	0.958	0.374	0.386	0.693	1.143	3.2343
Yield Curve Slope	0.574	0.687	-2.058	0.216	1.079	2.018
Δ Sovereign Credit Rating	-0.02	0.189	-2.000	0.000	0.000	1.000

#### A.4 Correlation Matrix for the Sample with lagged Balance Sheet Variables

This table shows the pooled Pearson correlation for the variables used in the baseline regression with lagged balance sheet variables. The sample includes a total of 1,248 quarterly observations for 39 banks between 2015 and 2023, excluding the year 2020. Depicted are the explanatory variables as used in the regression, winsorized at the 1% and 99% level.

Correlation Matrix														
Baseline Sample (N = 1,248)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	Δ CDS (%)	1.000												
(2)	Biodiversity (standardized)	0.085	1.000											
(3)	Δ Leverage (%)	0.007	0.151	1.000										
(4)	Δ Asset Quality (%)	-0.077	0.013	-0.034	1.000									
(5)	Δ Bank Size (%)	-0.065	0.045	0.177	-0.080	1.000								
(6)	Δ Funding Stability (%)	-0.024	-0.092	-0.227	-0.130	-0.166	1.000							
(7)	Δ Cost Efficiency (%)	0.029	-0.147	0.032	-0.019	-0.157	0.096	1.000						
(8)	Δ Market Sensitivity (%)	-0.063	0.011	-0.030	0.213	-0.048	-0.104	-0.040	1.000					
(9)	Bank Volatility (%)	0.317	0.161	-0.017	-0.036	-0.077	0.028	0.010	-0.003	1.000				
(10)	Δ Index Return (%)	-0.482	-0.180	-0.039	0.026	0.042	0.010	0.020	0.062	-0.229	1.000			
(11)	Index Volatility (%)	0.362	0.069	-0.021	-0.016	-0.209	0.040	0.086	-0.074	0.353	-0.294	1.000		
(12)	Yield Curve Slope	0.062	-0.099	-0.065	-0.256	0.002	0.097	0.061	-0.455	0.028	-0.079	-0.070	1.000	
(13)	Δ Sovereign Credit Rating	0.039	-0.075	-0.015	-0.107	0.135	-0.018	-0.024	-0.058	0.027	-0.067	-0.040	0.192	1.000

## A.5 Baseline Regression Including the Year 2020

This table shows the baseline regression and the *Kunming* interaction for the sample including the year 2020 without lag. While the baseline results do change, the overall findings with the Kunming interaction are confirmed. The insignificance of *Biodiversity* in the baseline regression is likely caused by decreasing CDS spreads after an initial spike, in periods with high biodiversity index values during 2020. Figure 1 and Figure 2 provide data for reference.

	$\Delta$ CDS (%)					
	Baseline			Kunming		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	4.117 (2.511)	6.019** (2.703)	3.223 (2.753)	3.722 (2.647)	5.719* (2.859)	2.924 (2.914)
Biodiversity	0.199 (0.657)	0.125 (0.683)	0.124 (0.678)	-1.121 (0.884)	-1.209 (0.901)	-1.213 (0.893)
Kunming				5.431 (3.559)	5.231 (3.665)	5.238 (3.636)
Biodiversity x Kunming				2.318** (1.029)	2.322** (1.024)	2.328** (1.016)
$\Delta$ LEV	-0.368 (0.814)	-0.836 (0.847)	-0.838 (0.844)	-0.362 (0.816)	-0.827 (0.850)	-0.829 (0.846)
$\Delta$ AQ	-0.027 (0.035)	-0.039 (0.035)	-0.034 (0.034)	-0.026 (0.035)	-0.038 (0.035)	-0.033 (0.034)
$\Delta$ Size	-4.041* (2.386)	-2.734 (2.722)	-2.769 (2.629)	-4.014 (2.391)	-2.659 (2.725)	-2.696 (2.631)
$\Delta$ FS	0.086 (0.085)	0.043 (0.093)	0.050 (0.088)	0.087 (0.085)	0.044 (0.094)	0.051 (0.089)
$\Delta$ CE	-0.020 (0.037)	-0.014 (0.038)	-0.014 (0.038)	-0.020 (0.037)	-0.014 (0.038)	-0.014 (0.038)
$\Delta$ MS	0.028 (0.018)	0.025 (0.020)	0.024 (0.019)	0.027 (0.018)	0.025 (0.020)	0.024 (0.019)
$\Delta$ BVOL	0.159*** (0.028)	0.155*** (0.028)	0.155*** (0.028)	0.156*** (0.028)	0.152*** (0.028)	0.152*** (0.028)
$\Delta$ IDXRET	-1.230*** (0.129)	-1.244*** (0.125)	-1.244*** (0.124)	-1.241*** (0.130)	-1.257*** (0.125)	-1.257*** (0.124)
IDXVOL	5.814*** (1.584)	7.071*** (2.321)	7.038*** (2.297)	5.582*** (1.613)	6.705*** (2.362)	6.671*** (2.338)
Yield	1.150 (0.683)	2.317** (0.936)	2.326** (0.921)	1.116 (0.686)	2.286** (0.940)	2.295** (0.924)
$\Delta$ CR	-6.352 (3.927)	-6.072 (4.009)	-6.079 (3.976)	-6.212 (3.893)	-5.911 (3.984)	-5.918 (3.951)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	No	No	Yes	No
Country FE	No	No	Yes	No	No	Yes
Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,404	1,404	1,404	1,404	1,404	1,404
Adj. R <sup>2</sup>	0.506	0.497	0.504	0.506	0.498	0.504

Clustered Standard errors are given in parentheses and p-values are depicted as follows: (\*\*\*) < 0.01, (\*\*) < 0.05, (\*) < 0.1.

## A.6 VIF Statistic for the three-way Interactions in Chapter 6

This table shows the VIF statistics for the variables of the different regressions with triple interactions employed in chapter 6.

	VIF		
	Chapter 6.3	Chapter 6.4	Chapter 6.5
Biodiversity	12.372	9.227	9.909
$\Delta$ LEV	5.278	3.661	4.188
$\Delta$ AQ	4.484	3.594	8.646
$\Delta$ Size	9.807	5.657	7.446
$\Delta$ FS	3.250	3.287	3.872
$\Delta$ CE	8.601	7.516	7.657
$\Delta$ MS	6.784	7.273	7.431
$\Delta$ BVOL	5.296	2.760	3.262
$\Delta$ IDXRET	7.331	6.167	9.106
IDXVOL	8.509	8.309	5.007
Yield	5.235	6.539	13.509
$\Delta$ CR	7.772	5.620	5.395
Kunming	23.434	20.944	27.004
Biodiversity x Kunming	8.835	8.075	5.752
BioState <sub>med</sub>	10.895		
Biodiversity x BioState <sub>med</sub>	8.307		
Kunming x BioState <sub>med</sub>	6.925		
Biodiversity x Kunming x BioState <sub>med</sub>	4.196		
Green		3.615	
Biodiversity x Green		5.818	
Kunming x Green		7.533	
Biodiversity x Kunming x Green		7.545	
USA			15.581
Biodiversity x USA			5.774
Kunming x USA			7.676
Biodiversity x Kunming x USA			7.279

## A.7 Country Characteristics

This table shows the country characteristics for the variables of the interaction employed in Chapter Fehler! Verweisquelle konnte nicht gefunden werden. and the according robustness check.

	Country Characteristics	
	Ecosystem Vitality	Ecosystem Vulnerability
Median	49.6	0.463
Australia	62.5	0.373
Austria	77.6	0.281
Brazil	63.9	0.437
China	35.6	0.515
Denmark	62.7	0.236
France	67.8	0.284
Germany	80.1	0.280
Ireland	66.9	0.348
Italy	62.8	0.336
Japan	59.2	0.469
South Korea	48.8	0.586
Spain	67.8	0.280
Sweden	66.8	0.348
Taiwan	51.5	-
Turkiye	34.7	0.445
United Kingdom	72.8	0.280
United States of America	53.5	0.425