

Online Appendix for
“Information in Financial Contracts:
Evidence from Securitization Agreements”

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Appendix C: Additional Figures and Tables

Table C.1: Multivariate Regression: Dependent variable is Uniqueness Score (U_{ij})

	(1)	(2)	(3)	(4)	(5)	(6)
Average Loan Balance	0.00925 (0.00751)	0.0110 (0.00849)	0.0600*** (0.00689)	0.0759*** (0.00665)	0.00322*** (0.00109)	0.00368*** (0.00114)
Average Duration	-0.00337 (0.0179)	-0.00855 (0.0169)	0.0916*** (0.00882)	0.0672*** (0.00869)	-0.0143*** (0.00195)	-0.0169*** (0.00200)
Average Loan Interest Rate	-0.0131 (0.0184)	-0.0146 (0.0167)	-0.235*** (0.0216)	-0.0902*** (0.0244)	0.00889*** (0.00379)	-0.00552 (0.00476)
Average Loan LTV	0.217*** (0.0261)	0.172*** (0.0302)	0.326*** (0.0271)	0.135*** (0.0272)	0.210*** (0.00415)	0.175*** (0.00444)
HHI : PropertyType	0.00329 (0.00682)	0.00820 (0.00712)	0.0708*** (0.00974)	0.0924*** (0.00908)	-0.00479*** (0.00170)	-0.00119 (0.00170)
HHI: Geographic (MSA)	0.0113*** (0.00396)	0.0109*** (0.00382)	0.0249*** (0.00573)	0.0207*** (0.00524)	0.00901*** (0.000986)	0.00892*** (0.000974)
% Retail Properties	-0.00254 (0.00531)	-0.000578 (0.00590)	0.0505*** (0.00625)	0.0541*** (0.00590)	-0.00720*** (0.00115)	-0.00607*** (0.00118)
StDev of Ln(LoanBalance)	0.00621 (0.0103)	0.00345 (0.00955)	0.0844*** (0.0151)	0.0538*** (0.0140)	0.000988 (0.00256)	0.000935 (0.00256)
StDev of Ln(Duration)	-0.000645 (0.00384)	-0.00150 (0.00383)	-0.0130** (0.00601)	-0.0130** (0.00565)	0.000323 (0.00108)	-0.000805 (0.00107)
StDev of Interest Rate	0.000516 (0.00526)	0.00657 (0.00550)	-0.0321*** (0.00675)	-0.0183*** (0.00645)	0.00300** (0.00125)	0.00868*** (0.00131)
StDev of LTV	-0.0387*** (0.00682)	-0.0318*** (0.00682)	-0.0610*** (0.00928)	-0.0401*** (0.00862)	-0.0408*** (0.00151)	-0.0349*** (0.00152)
No. of Loans in Deal	0.000721 (0.00408)	-0.00809* (0.00442)	-0.00613 (0.00608)	-0.0279*** (0.00615)	-0.00132 (0.000987)	-0.00913*** (0.00105)
North Region Exposure	-0.00159 (0.00206)	0.000337 (0.00203)	0.00420 (0.00370)	0.00619* (0.00339)	-0.00232*** (0.000700)	-0.000862 (0.000697)
South Region Exposure	0.00582 (0.00459)	0.00260 (0.00482)	-0.00280 (0.00612)	-0.0212*** (0.00542)	0.00674*** (0.00116)	0.00477*** (0.00118)
West Region Exposure	-0.00479 (0.00385)	-0.00434 (0.00395)	0.0103** (0.00506)	0.0142*** (0.00448)	-0.00636*** (0.000975)	-0.00651*** (0.000965)
Midwest Exposure	0.000876 (0.000661)	0.000547 (0.000612)	-0.00360 (0.00329)	-0.00248 (0.00302)	0.000949 (0.000604)	0.000552 (0.000597)
Deal-Pair Same Year	-0.217*** (0.0193)		-0.540*** (0.0117)		-0.190*** (0.00226)	
AAA Subordination	-0.000658*** (0.000197)	0.000489** (0.000193)	-0.00266*** (0.000335)	0.00203*** (0.000420)	-0.000512*** (5.88e-05)	0.000426*** (7.61e-05)
Different Affiliation Pattern: Mstr-Spl Serv.	0.000597 (0.00479)	0.00140 (0.00476)	0.0485*** (0.00426)	0.0518*** (0.00409)	-0.00320*** (0.000775)	-0.00223*** (0.000768)
Different Affiliation Pattern: Mstr Serv.-Undrwrtr	0.00617 (0.0152)	0.0103 (0.0154)	0.0871*** (0.0102)	0.0828*** (0.00902)	-0.00283** (0.00141)	-7.08e-05 (0.00140)
Observations	223,391	223,391	16,866	16,866	206,525	206,525
R-squared	0.462	0.478	0.513	0.605	0.393	0.408
No. of Deals	669	669	667	667	669	669
Sample	Combined	Combined	Same U'writer	Same U'writer	Diff U'writer	Diff U'writer
UWFE	Yes	Yes	Yes	Yes	Yes	Yes
Year Diff FE	Yes	No	Yes	No	Yes	No
Year Pair FE	No	Yes	No	Yes	No	Yes
SErrors	Cluster UW-Pair	Cluster UW-Pair	Robust	Robust	Cluster UW-Pair	Cluster UW-Pair

Note: This table reports the estimated coefficients for the regression equation:

$$U_{i,j} = \alpha + \beta|\Delta X_{ij}| + \Gamma + \epsilon \tag{1}$$

where $U_{i,j}$ is the deal-pair uniqueness score, ΔX_{ij} is the differences in observable deal-pair characteristics and Γ is the set of fixed-effects used. In Columns (1) and (2), we restrict attention to deal pairs with the same underwriter (D_u) while in Columns (3) and (4) we consider deal pairs with different underwriters (D_{-u}). Columns (5) and (6) show results from estimating this regression on the full sample of deal-pairs. Columns (1), (3), (5) control for the differences in origination time between the two deals in a pair (year difference fixed effect) and the earlier of the two origination years in the deal pair. Columns (2), (4) and (6) control directly for each possible combination of deal-pair origination years. We use either underwriter fixed effects (Columns (1) and (2)) or underwriter-pair fixed-effects (Columns (4) to (6)) to control for uniqueness scores driven by an underwriter's idiosyncratic tastes for particular contract types. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table C.2: Multivariate Regression with Deal Fixed-Effects

	(1)	(2)
	Uniqueness	Uniqueness
Average Loan Balance	0.0157** (0.00749)	0.0164** (0.00723)
Average Duration	0.0401*** (0.0144)	0.0278* (0.0149)
Average Loan Interest Rate	-0.0691*** (0.0171)	-0.0656*** (0.0195)
Average Loan LTV	0.443*** (0.0784)	0.470*** (0.0795)
HHI : PropertyType	-0.0128** (0.00600)	-0.0141** (0.00613)
HHI: Geographic (MSA)	0.0169*** (0.00518)	0.0175*** (0.00509)
North Region Exposure	0.00164 (0.00112)	0.00177 (0.00113)
South Region Exposure	-0.00320 (0.00359)	-0.00285 (0.00371)
West Region Exposure	-0.00364 (0.00319)	-0.00327 (0.00313)
Midwest Exposure	0.000321 (0.000590)	0.000247 (0.000571)
% Retail Properties	-0.00143 (0.00595)	-0.00135 (0.00587)
StDev of Ln(LoanBalance)	0.00218 (0.0123)	0.00357 (0.0121)
StDev of Ln(Duration)	0.00218 (0.00304)	0.00142 (0.00306)
StDev of Interest Rate	0.00821* (0.00442)	0.00566 (0.00437)
StDev of LTV	-0.0276*** (0.00805)	-0.0336*** (0.00793)
No. of Loans in Deal	-0.0234*** (0.00364)	-0.0175*** (0.00369)
Deal-Pair Same Year	-0.0349 (0.0264)	-0.220*** (0.0683)
AAA Subordination	3.95e-05 (0.000167)	0.000576*** (0.000199)
Different Affiliation Pattern: Mstr-Splc Serv.	0.00455 (0.00306)	0.00444 (0.00303)
Different Affiliation Pattern: Mstr Serv.-Undrwrtr	0.0551* (0.0281)	0.0545* (0.0280)
Observations	223,391	223,391
R-squared	0.513	0.517
No. of Deals	669	669
Sample	Combined	Combined
UWFE	Yes	Yes
Year Diff FE	Yes	No
Year Pair FE	No	Yes
SErrors	Cluster UW-Pair	Cluster UW-Pair

Note: This table reports the estimated coefficients for the regression equation:

$$U_{i,j} = \alpha + \beta|\Delta X_{ij}| + \Gamma + DealFE + \epsilon$$

where $U_{i,j}$ is the deal-pair uniqueness score, ΔX_{ij} is the differences in observable deal-pair characteristics and Γ is the set of fixed-effects used. The analysis is conducted on the sample of all deal pairs. Γ therefore

includes underwriter pair fixed-effects, and either year-difference fixed effects (Column (1)) or year-pair fixed-effects Column (2)). Importantly, the analysis includes Deal Fixed Effects, i.e., an indicator variable for each deal which equals 1 if that deal is present in a pair. Standard errors are clustered by Underwriter Pair ***
p<0.01, ** p<0.05, * p<0.1

Table C.3: CMBS Outcomes with Deal Fixed-Effects

	All Deal Pairs	
	(1)	(2)
Panel A: Serious Delinquency		
5-year Cumulative Delinquency Rate	0.446** (0.192)	0.445** (0.174)
10-year Cumulative Delinquency Rate	2.570*** (0.487)	2.455*** (0.503)
Panel B: Default (Transfer to Special Servicer)		
5-year Cumulative Default Rate	0.873*** (0.267)	0.878*** (0.245)
10-year Cumulative Default Rate	2.156*** (0.506)	2.051*** (0.514)
Panel C: Cumulative Loss Rate		
5-year	0.0119 (0.0264)	0.0009 (0.0233)
10-year	0.433*** (0.144)	0.422*** (0.142)
Panel D: Deal Pricing at Origination		
Coupon	0.0255 (0.0342)	0.00937 (0.0327)
Panel E: Weighted-Average Bond IRR		
High Rated Bonds	0.452 (0.727)	0.571 (0.776)
Medium Rated Bonds	1.806*** (0.685)	1.493** (0.659)
Low Rated Bonds	7.619*** (1.755)	6.817*** (1.741)
Deal Characteristic Controls	Yes	Yes
Year-difference Fixed Effects	Yes	No
Year-pair Fixed Effects	No	Yes
Underwriter-Pair Fixed Effects	Yes	Yes

Notes: This table reports the regression coefficient estimate for the deal-pair uniqueness score (U_{ij}) from the equation:

$$|Y_{d,u,t} - Y_{i,j,k}| = \alpha + \beta U_{i,j} + \gamma |\Delta X_{ij}| + \Gamma + DealFE + \epsilon.$$

where $U_{i,j}$ is the deal-pair uniqueness score, ΔX_{ij} is the differences in observable deal-pair characteristics and Γ is the set of fixed-effects used. The analysis is conducted on the sample of all deal pairs. Γ therefore includes underwriter pair fixed-effects, and either year-difference fixed effects (Column (1)) or year-pair fixed-effects Column (2)). Importantly, the analysis includes Deal Fixed Effects, i.e., an indicator variable for each deal which equals 1 if that deal is present in a pair. The control variables (ΔX_{ij}) are listed in Online Appendix Table C.1. The dependent variables are in percentage and all specifications include underwriter fixed effects, and year-pair fixed effects. Standard errors are clustered by underwriter pair and appear in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table C.4: CMBS Outcomes: Different Underwriter Pairs

	(1)	(2)	(3)	(4)
	10Yr Default	10Yr Default	10Yr Spcl Trnsfr	10Yr Spcl Trnsfr
AAA subordination	0.0467*** (0.0142)	0.208*** (0.0518)	0.107*** (0.0150)	0.233*** (0.0403)
Uniqueness × AAA Subord.		-0.226*** (0.0771)		-0.177*** (0.0589)
Mstr-Spcl Diff Affil	-0.0875 (0.224)	-0.429 (0.694)	-0.0198 (0.250)	-0.806 (0.610)
Uniq × Mstr-Spcl Diff. Affil		0.480 (1.082)		1.093 (0.981)
Mstr-Undrwrtr Diff Affil	-1.146*** (0.316)	-0.475 (0.816)	-0.581 (0.374)	-1.321 (0.833)
Uniq × Mstr-Uwrtr Diff. Affil		-0.964 (1.527)		1.063 (1.353)
Uniqueness	1.573*** (0.413)	3.012*** (0.722)	1.337** (0.566)	2.114*** (0.632)
Observations	80,535	80,535	80,535	80,535
R-squared	0.289	0.290	0.323	0.324
Sample	Diff U'writer	Diff U'writer	Diff U'writer	Diff U'writer
UWFE	Yes	Yes	Yes	Yes
Year Diff FE	No	No	No	No
Year Pair FE	Yes	Yes	Yes	Yes
SErrors	Cluster UW-Pair	Cluster UW-Pair	Cluster UW-Pair	Cluster UW-Pair

Notes: This table reports the regression coefficient estimate for the deal-pair uniqueness score (U_{ij}) from the equation:

$$|Y_{d,u,t} - Y_{i,j,k}| = \alpha + \beta U_{i,j} + \gamma |\Delta X_{ij}| + \Gamma + \epsilon.$$

where $U_{i,j}$ is the deal-pair uniqueness score, ΔX_{ij} is the differences in observable deal-pair characteristics and Γ is the set of fixed-effects used. The specifications are identical to those in Column (4) from Table 2; i.e., they restrict deal pairs to those with different underwriters, and use underwriter pair fixed effects and year pair fixed effects. Columns (1) and (2) consider differences in 10-year serious delinquency rates. Columns (3) and (4) consider differences in rates of transfers to special servicing. In Columns (1) and (3) we examine the relationship between pairwise differences in default rates and differences in AAA subordination and in affiliation patterns. In Columns (2) and (4) we augment our specification with the interaction of these variables. Standard errors are clustered by underwriter pair and appear in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table C.5: Deal-pair mean outcome differences by uniqueness score ($U_{i,j}$) deciles

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Same Underwriter Sample (D_u)										
Diff. in 5Yr Default	3.207	4.543	5.685	8.130	7.112	5.634	5.365	6.666	7.099	6.493
Diff. in 10Yr Default	4.107	6.528	8.535	13.721	13.287	10.258	8.999	12.191	13.044	14.515
Diff. in 5Yr Transfer to Spcl. Serv.	3.692	5.241	6.699	9.648	8.784	7.075	6.752	8.063	8.702	7.985
Diff. in 10Yr Transfer to Spcl. Serv.	4.711	7.250	9.228	14.719	14.272	11.074	9.778	12.926	14.414	15.556
Diff. in 5Yr. Cumul. Bond Loss	1.069	1.019	1.011	1.125	1.178	1.155	1.134	1.428	2.114	1.607
Diff. in 10Yr. Cumul. Bond Loss	3.130	3.264	3.420	3.725	4.281	4.195	3.922	4.143	4.029	3.563
Diff. in Coupon	0.675	0.944	1.160	1.377	1.451	1.267	1.148	1.529	1.746	2.063
Diff. in Senior IRR	18.292	18.870	21.805	22.950	25.647	27.180	25.631	27.110	30.038	24.084
Diff. in Mezz IRR	5.373	6.286	9.564	7.632	10.615	14.206	13.029	24.260	36.259	18.018
Diff. in Jnr. IRR	16.748	22.802	28.220	22.429	27.568	34.410	32.641	49.048	68.308	38.808
Observations	1979	1945	1917	1867	1756	1834	1878	1908	1924	1910

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel B: Different Underwriter Sample (D_{-u})										
Diff. in 5Yr Default	5.808	6.883	6.506	6.218	6.014	6.108	6.389	6.572	6.723	6.511
Diff. in 10Yr Default	8.899	11.454	11.673	11.517	11.754	12.183	12.897	13.622	14.495	15.346
Diff. in 5Yr Transfer to Spcl. Serv.	6.984	8.503	8.170	7.794	7.482	7.638	8.027	8.207	8.374	8.205
Diff. in 10Yr Transfer to Spcl. Serv.	9.339	12.164	12.509	12.235	12.351	12.947	13.807	14.571	15.555	16.479
Diff. in 5Yr. Cumul. Bond Loss	1.372	1.230	1.134	1.076	1.033	1.072	1.132	1.185	1.244	1.148
Diff. in 10Yr. Cumul. Bond Loss	3.382	3.929	4.010	3.926	3.768	3.881	4.068	4.305	4.498	4.671
Diff. in Coupon	1.062	1.215	1.244	1.292	1.443	1.565	1.655	1.788	1.934	2.103
Diff. in Senior IRR	23.149	24.857	23.043	20.946	21.191	20.370	20.905	23.315	24.143	24.168
Diff. in Mezz IRR	16.321	14.194	11.911	7.764	7.899	7.963	9.725	12.241	14.534	16.206
Diff. in Jnr. IRR	34.561	33.718	32.254	24.386	24.129	25.132	26.944	32.643	34.963	40.178
Observations	23430	23480	23239	23307	23387	23567	23127	23329	22933	22978

Appendix D: Additional analysis of separate articles

To provide further insights into the errors introduced by looking at only sections of the total document, we report additional results for our analysis of Articles 2 and 3 in Figures D.1, D.2, and D.3. These figures show that comparing the entire PSA significantly reduces mismeasurement of deal-pair differences relative to considering only a sub-section.¹

In Figure D.1, we first calculate the numerical deal-pair differences between comparisons of the Article 2s (matrix 1 to the left) and comparisons based on the full PSA documents (matrix 2 in the middle), respectively. Again, darker shades represent pairs that have greater differences, while lighter shading indicates deal pairs that are more similar. The results are displayed in the last matrix to the far right. Each cell in the resulting matrix and each point in the kernel density plot represent the numerical difference of $U(d_{1,article2}, d_{2,article2}) - U(d_{1,full}, d_{2,full})$. The density plot shows that 79% of the doc-pairs have Article 2 uniqueness scores that are much lower than the the full PSA uniqueness scores (indicating that the Article 2s are more similar to each other than the full document). Furthermore, we also note that only 5% of the Article 2 deal-pair uniqueness scores are greater than the full document scores. Thus, the density plot indicates that 84% of the Article 2 deal-pair comparisons are different from the full document comparison. The takeaway message is if we only focus on article 2, then our analysis is subject to a significant mismeasurement of the actual PSA differences, with a substantial bias toward concluding that deal-pairs are more similar to each other.

We then repeat the exercise in Figure D.2 showing the numerical deal-pair differences between comparisons of the Article 3s (matrix 1 to the left) and comparisons based on the full PSA documents (matrix 2 in the middle), respectively. The results are displayed in the last matrix to the far right. Each cell in the resulting matrix and each point in the kernel density plot represent the numerical difference $U(d_{1,article3}, d_{2,article3}) - U(d_{1,full}, d_{2,full})$. The density plot shows that 46% of the doc-pairs have Article 3 uniqueness scores that are lower than the the full PSA uniqueness scores (indicating that the Article 3s are more similar to each other than the full document). Furthermore, we also note that 22% of the Article 3 deal-pair uniqueness scores are greater than the full document scores. Thus, the density plot indicates that 68% of the Article 3 deal-pair comparisons are different from the full document comparison. As before, the key takeaway message is if we only focus on article 3, then our analysis is subject to a significant mismeasurement of the actual PSA differences, again with a substantial bias toward concluding that deal-pairs are more similar to each other.

Finally, we show in Figure D.3 that the underestimations of deal-pair differences are significantly reduced once we combine Article 2 and Article 3 of the same deal (matrix 1 to the left) and their comparisons based on the full PSA documents (matrix 2 in the middle), respectively. The results are displayed in the last matrix to the far right. Each cell in the resulting matrix and each point in the kernel density distribution represents the numerical difference $U(d_{1,article2\&3}, d_{2,article2\&3}) - U(d_{1,full}, d_{2,full})$. First, we see that the distribution is now much tighter, implying that a uniqueness score for Articles 2 and 3 combined is more representative of the full PSA uniqueness score. However, 32% of all deal pairs still have

¹Consistent with section VII, we use the same language model to calculate deal-pair differences and the only difference is the underlying text being compared.

Article 2 plus 3 scores that are not representative of the full PSA score. This measurement error should diminish further as we add more articles.

More importantly, if we compare the difference matrices (to the right) across the three figures, we see the over-under measurements do not show consistency across articles. In other words, the deal-pair differences that are over-identified when comparing Articles 2, are not the same pairs that are over-identified when comparing Article 3. In summary, taking the whole PSA into consideration effectively eliminates mismeasurement issues.

Figure D.1: Comparison of Differences in PSA Articles 2 versus the Full PSA

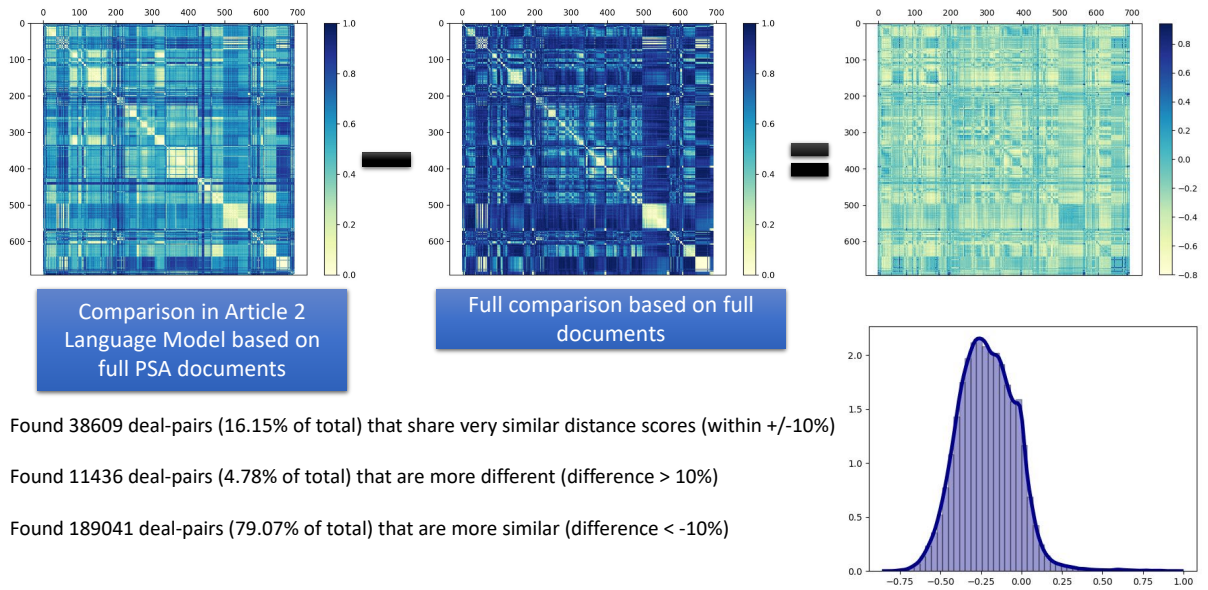


Figure D.2: Comparison of Differences in PSA Articles 3 versus the Full PSA

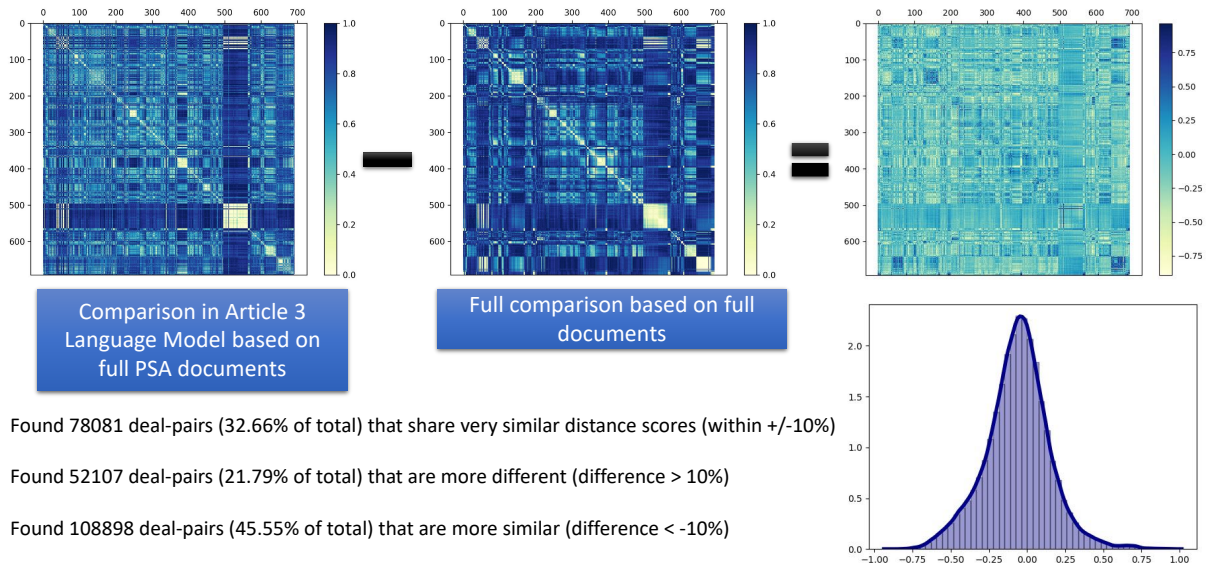
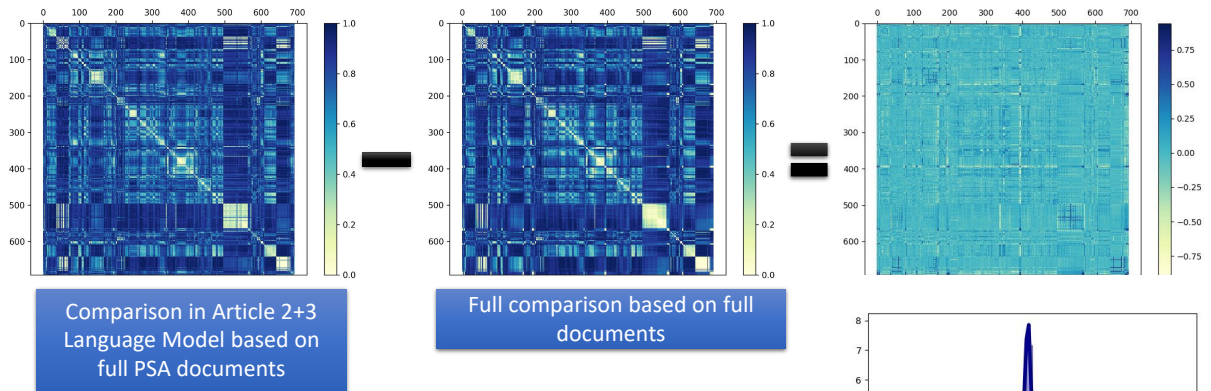


Figure D.3: Comparison of Differences in PSA Articles 2 & 3 versus the Full PSA



Found 162647 deal-pairs (68.03% of total) that share very similar distance scores (within +/-10%)

Found 38039 deal-pairs (15.91% of total) that are more different (difference > 10%)

Found 38400 deal-pairs (16.06% of total) that are more similar (difference < -10%)