Corporate bond yields

29 March 2020

Regression models

- Dependent variable is the average RBA BBB 10 year spread across two months.
  - The RBA reports an end of month spread.
  - To mitigate estimation error I compute the average from the end of the prior month and the current month as a proxy for an average during the month.
- Independent variables are the average daily spread in a month between Thomson Reuters corporate bond yields and the 10-year government bond yield
  - For example, the “BBB 7 year spread” is the average daily spread between the BBB 7 year yield and the 10-year government bond yield.
- 3 time periods based upon historical data availability
  - May 2013 to February 2020
    - 82 months
    - Sample size = 48 months with BBB 10 year spreads available
    - 46 months are from May 2015 to February 2020 (remaining 2 months are from May 2013 to June 2013)
  - August 2010 to February 2020
    - 115 months
    - Sample size = 114 months with BBB 7 year spreads available
  - April 2007 to February 2020 (incorporates Global Financial Crisis)
    - 155 months
    - Sample size = 154 months with A 5 year spreads available

Models that include BBB 10 year spreads

- Sample: 48 months from May 2013 to February 2020
- Base model: RBA spread = 0.38% + 0.76 × BBB 10 year spread with R-square = 45%
- Maximum R-square = 95%

Model	Int	BBB10	BBB9	BBB8	BBB7	BBB6	BBB5	BBB4	BBB3	BBB2	A9	A8	A7	A6	A5	A4	A3	A2	RSQ	N
1	0.38	0.76																	53.15	48
2	0.32	0.43	0.38																53.74	48
3	0.36	2.10	-3.44	2.20															58.03	48
4	0.35	2.06	-3.44	2.38	-0.15														58.05	48
5	0.49	1.55	-2.43	2.01	-2.89	2.85													62.69	48
6	1.19	-2.80	1.93	2.83	3.08	-12.13	8.28												82.58	48
7	1.12	-2.62	1.72	2.98	0.03	-4.19	0.98	2.32											83.54	48
8	1.00	-2.14	1.59	2.57	0.20	-5.87	5.67	-2.46	1.68										84.01	48
9	0.78	-1.05	1.47	0.67	0.33	-0.43	-4.13	6.41	-3.87	1.82									87.95	48
10	0.73	-1.05	1.50	0.63	0.24	-0.21	-4.30	6.46	-3.87	1.81	0.03								87.96	48
11	0.46	0.01	-1.79	3.23	1.32	-4.10	-0.27	3.18	-1.45	0.73	-1.30	1.96							93.62	48
12	0.31	-0.58	-0.80	2.82	1.25	-5.09	2.05	1.59	-0.51	0.40	-1.24	3.96	-2.35						94.18	48
13	0.35	-0.32	-1.46	3.45	1.25	-5.19	1.48	1.99	-0.61	0.28	-1.39	4.93	-4.71	1.79					94.40	48
14	0.30	-0.44	-0.96	2.90	1.19	-4.49	0.78	2.51	-1.05	0.57	-1.20	5.28	-7.05	4.99	-1.55				94.50	48
15	0.28	-0.57	-0.89	3.19	0.93	-4.44	0.54	2.76	-0.95	0.34	-1.24	5.10	-7.55	9.32	-7.99	3.03			94.75	48
16	0.30	-0.35	-1.24	3.37	0.92	-4.16	-0.04	3.10	-1.09	0.33	-1.30	5.29	-8.05	9.36	-6.59	1.30	0.75		94.79	48
17	**0.51**	**-0.37**	**-2.06**	**4.72**	**1.44**	**-5.47**	**-0.73**	**4.58**	**-1.45**	**0.03**	**-1.72**	**6.11**	**-7.91**	**7.72**	**-6.12**	**3.55**	**-2.21**	**1.42**	**95.08**	**48**

Models that include BBB 7 year spreads

- Sample: 114 months from August 2010 to February 2020
- Base model: RBA spread = 1.01% + 0.71 × BBB 7 year spread with R-square = 45%
- Maximum R-square = 74%

Model	Int	BBB10	BBB9	BBB8	BBB7	BBB6	BBB5	BBB4	BBB3	BBB2	A9	A8	A7	A6	A5	A4	A3	A2	RSQ	N
1	1.01				0.71														44.59	114
2	0.98				1.04	-0.34													44.89	114
3	1.12				3.72	-6.23	3.21												53.66	114
4	1.12				3.95	-6.83	3.76	-0.17											53.66	114
5	1.26				7.06	-18.63	20.16	-10.61	2.71										57.16	114
6	1.32				7.75	-17.42	11.82	0.97	-3.89	1.46									59.63	114
7	0.94				8.21	-17.83	10.33	2.88	-4.90	1.53			0.73						62.11	114
8	0.46				7.88	-19.04	15.41	-2.86	-1.71	1.12			3.86	-3.64					65.96	114
9	0.79				5.75	-13.36	9.91	-0.89	-1.82	0.96			9.03	-14.56	5.92				71.68	114
10	0.90				5.19	-11.82	8.61	-0.68	-1.66	0.95			5.88	-5.45	-3.40	3.29			72.54	114
11	0.91				5.27	-11.51	7.97	-0.29	-1.79	0.98			5.12	-5.60	0.87	-2.23	2.12		73.02	114
12	**0.90**				**4.42**	**-9.49**	**6.09**	**0.31**	**-1.71**	**1.02**			**4.18**	**-5.01**	**4.63**	**-8.94**	**6.97**	**-1.52**	**73.87**	**114**

Models that include A 5 year spreads

- Sample: 154 months from April 2007 to February 2020
- Base model: RBA spread = 1.30% + 0.76 × A 5 year spread with R-square = 32%
- Maximum R-square = 57%

Model	Int	BBB10	BBB9	BBB8	BBB7	BBB6	BBB5	BBB4	BBB3	BBB2	A9	A8	A7	A6	A5	A4	A3	A2	RSQ	N
1	1.30														0.76				31.69	154
2	1.02														0.43	0.38			32.37	154
3	1.42														2.10	-3.44	2.20		56.80	154
4	**1.35**														**2.06**	**-3.44**	**2.38**	**-0.15**	**56.91**	**154**

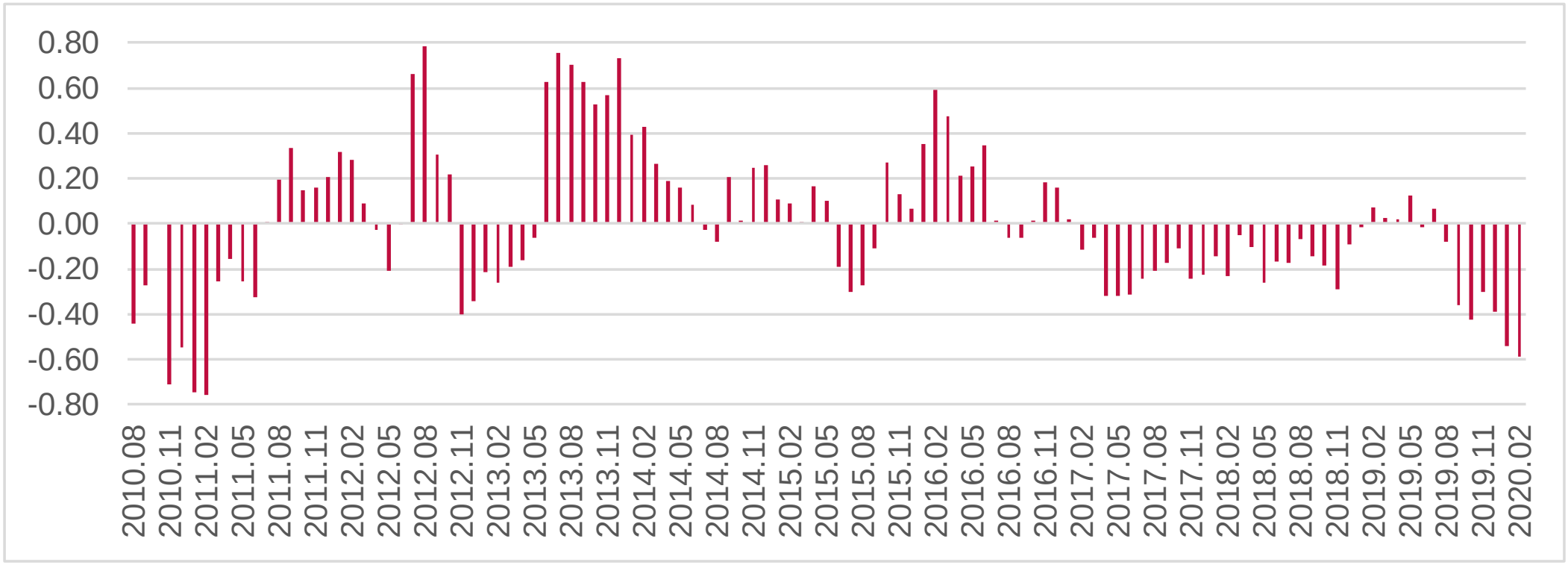
Model comparison

- Model with A 5 year yields has longest history but lowest explanatory power
- Should BBB 7 year yields be incorporated? Yes
  - Common sample that includes BBB 7 year yields and A 5 year yields has 114 observations
  - Explanatory power increases from 55% to 74% by incorporating BBB yields.
- Should BBB 10 year yields be incorporated? Yes (judgement call)
  - Common sample that includes BBB 10 year yields and BBB 7 year yields has 48 observations (down from 114)
  - Benefit: Better fit in recent data
    - Explanatory power increases from 91% to 95%
    - The BBB 7 year model has persistently overstated the RBA spread in the most recent 7 months (considered next)
  - Cost: Coefficients are estimated from 48 months of data versus 114 months
    - 46 data points are from May 2015 to February 2020
    - Remaining 2 data points are from May 2013 to June 2013
    - Risk is that a model estimated primarily from one recent time period is unrepresentative of a future time period

Model	Int	BBB10	BBB9	BBB8	BBB7	BBB6	BBB5	BBB4	BBB3	BBB2	A9	A8	A7	A6	A5	A4	A3	A2	RSQ	N
BBB10	0.51	-0.37	-2.06	4.72	1.44	-5.47	-0.73	4.58	-1.45	0.03	-1.72	6.11	-7.91	7.72	-6.12	3.55	-2.21	1.42	95.08	48
BBB7	0.03				0.37	0.89	-3.28	4.35	-2.67	1.74			-2.11	8.58	-8.14	0.90	2.61	-1.56	91.25	48
A5	0.09														4.68	-6.94	6.63	-2.18	71.03	48
BBB7	0.90				4.42	-9.49	6.09	0.31	-1.71	1.02					4.63	-8.94	6.97	-1.52	73.87	114
A5	1.61														4.10	-8.95	7.64	-1.98	55.18	114

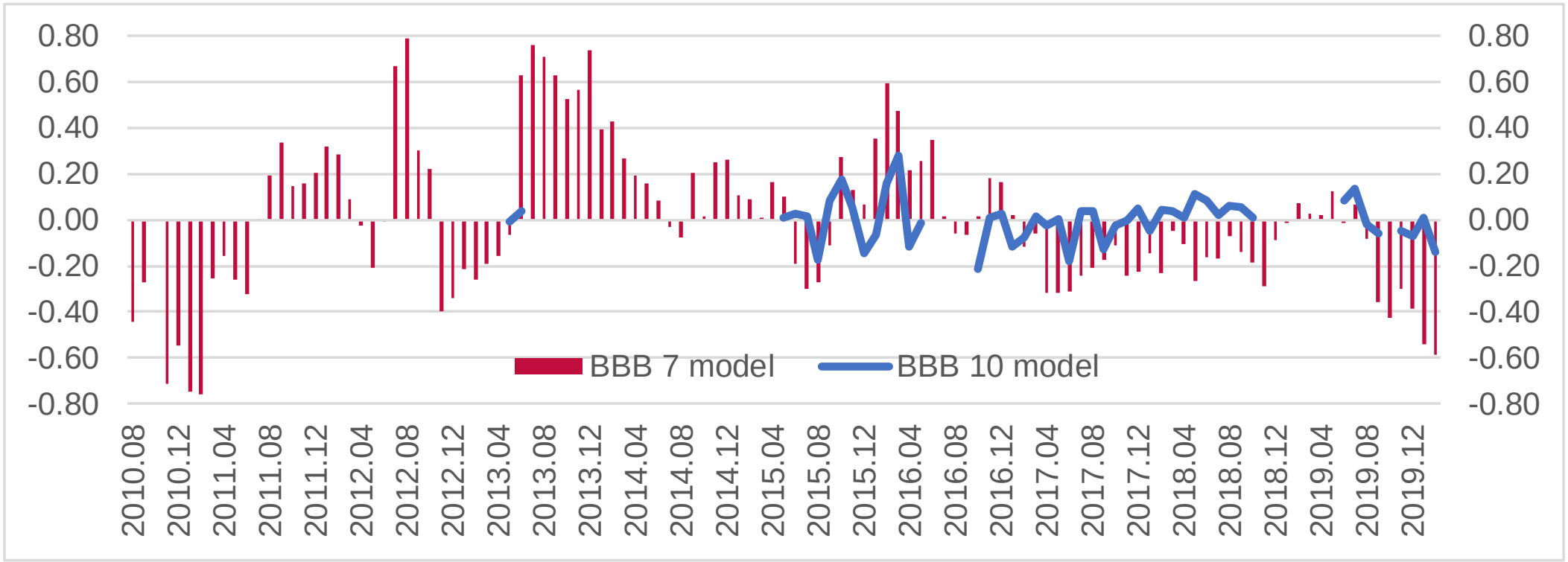
Residuals: BBB 7 year model (+ → actual > prediction)

- The mean squared error from the regression is 0.34. So the typical error from the model will be 0.34.
- For instance, if the true, but unobservable RBA corporate bond spread is 2.00%, the model could give an estimate of the RBA corporate bond spread within the range of 1.66% to 2.34% about 70 per cent of the time.
- The figure shows that the errors cluster in different time periods. Ideally, this should not occur.
  - In the last 7 months the model has over-estimated the RBA spread by an average of 0.38%
  - For 13 months from June 2013 to June 2014 the model under-estimated the RBA spread by an average of 0.47%.



Residuals: BBB 10 year model (+ → actual > prediction)

- The mean squared error from the regression is 0.12. So the typical error from the model will be 0.12.
- For instance, if the true, but unobservable RBA corporate bond spread is 2.00%, the model could give an estimate of the RBA corporate bond spread within the range of 1.88% to 2.12% about 70 per cent of the time.
- There is less of a cluster of negative residuals in the recent time period.
- Risk is that in future periods a model estimated from just 48 months of data is unrepresentative of that future period.



Conclusion

- Estimate the RBA BBB 10 year bond spread, on average during a month, with reference to the following average Thomson Reuters bond yields during a month minus the average 10-year government bond yield during the month.
  - BBB corporate bonds with maturity of 2-10 years
  - A corporate bonds with maturity of 2-9 years
- Explains 95% of the month to month variation in the RBA spread over a sample of 48 months within the window of March 2013 to February 2020 (including 46 months within the window of March 2015 to February 2020)
- Risk is that relying upon only data from the most recent months and a sample of 48 months is unrepresentative of more varied market conditions.