

Economic Consequences of Bias in Fair Value Prices: Evidence from the Korean Bond Markets

Doyeon Kim (University of Hong Kong)

with

Daniel Aobdia (Pennsylvania State University)

Derrald Stice (University of Hong Kong)



香 港 大 學

THE UNIVERSITY OF HONG KONG

Research Questions

- How does competition affect information content?
 - Does an increase in competition among third-party specialists affect the bias in information?
- Are there any economic consequences of bias in information?
 - How does the information bias affect liquidity?



What are Bond Pricing Agencies?

- Three BPAs were established after the Asian financial crisis in the early 2000s.
- Provide fair value prices of all OTC-traded financial securities on a daily basis to financial institutions.
- Intended to..
 - increase the liquidity in the bond markets;
 - better risk management;
 - attract foreign investors by reducing uncertainty;
 - evaluate performance of fund managers.



Regulatory Environment

- All financial institutions that trade and hold financial assets are regulated to receive fair value prices from BPAs daily.
- What do financial institutions do with these fair value prices?
 - Prices are used for bookkeeping, risk management, and for pricing funds.



Entry of Fourth Bond Pricing Agency

- FN Pricing was established as a subsidiary of FN Guide in 2011.
- First started providing fair value prices in 2012.
- Barrier to entry is quite low.



FnPricing vs. Other BPAs



Conflict of Interest

- BPAs have incentive to provide more *favorable* prices to maintain their client base.
 - BPAs have an investor-pays business model.
 - Financial institutions can *choose* who to receive fair value prices from.
 - Managers at the financial institutions are evaluated and compensated based on the end-of-month fair value prices.
- BPAs face legal, financial, and reputational costs in the case of mispricing.



Hypothesis

- Bias in fair value prices may decrease with competition if BPAs:
 - compete by providing more accurate estimates;
 - are concerned about legal, financial, and reputational costs.
- Bias in fair value prices may increase with competition if BPAs:
 - compete by providing more favorable prices.

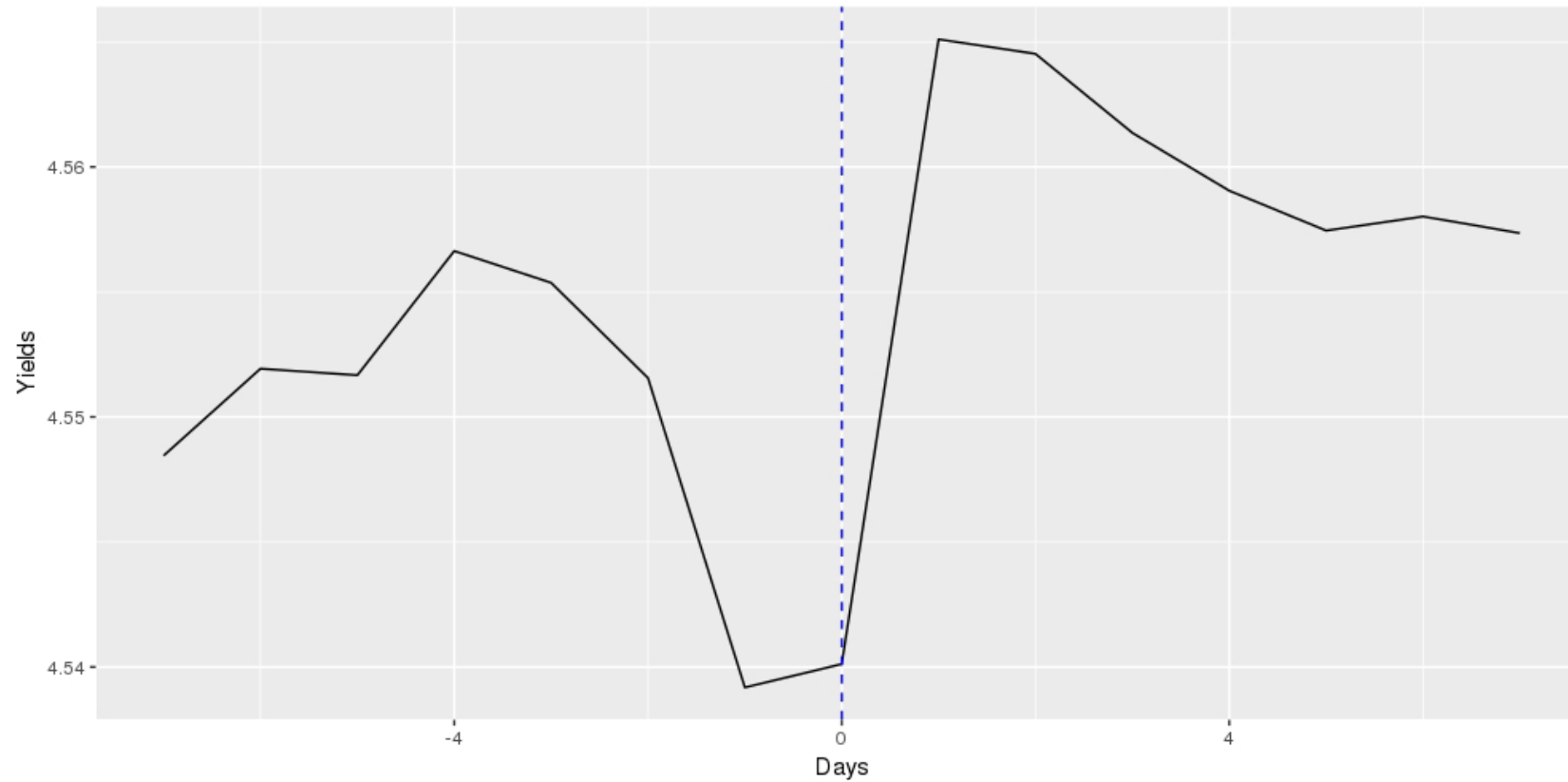


Research Design

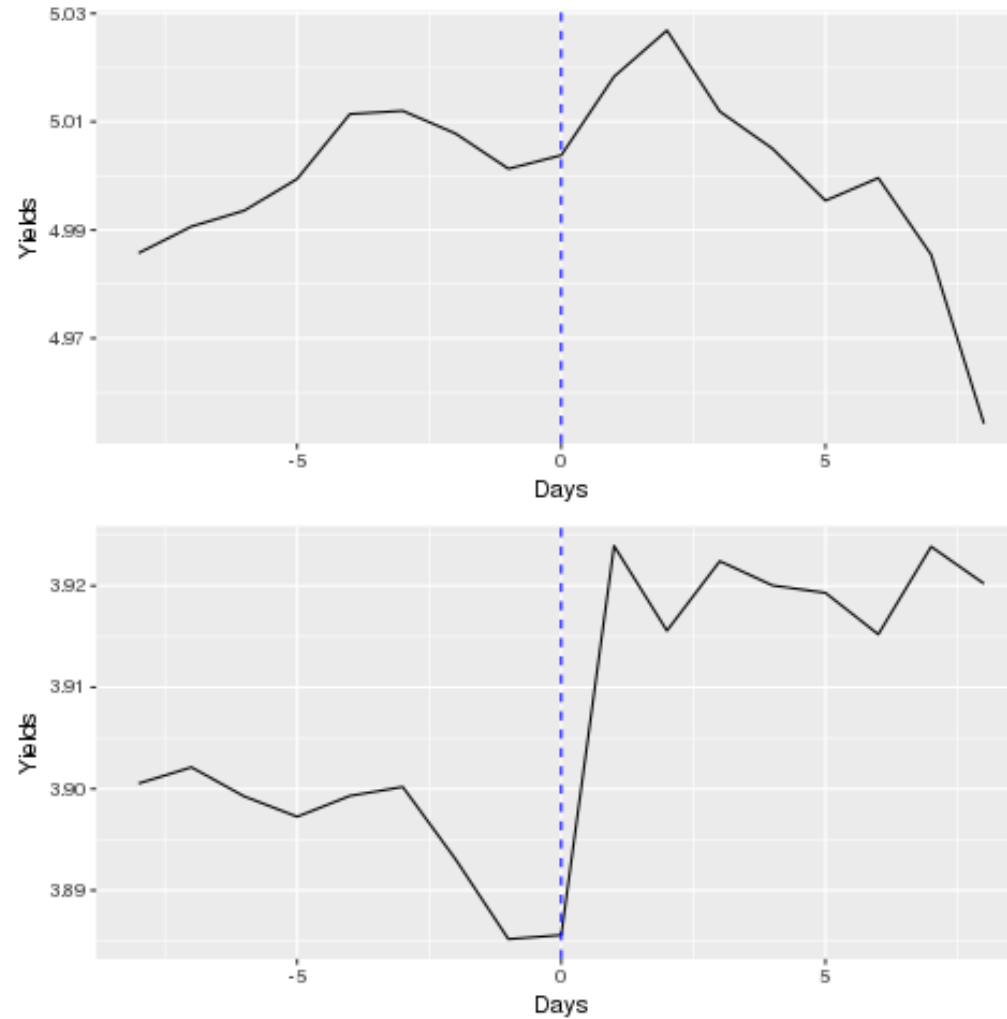
- Employ a difference-in-differences research design by exploiting a unique setting of BPAs in Korea.
- Use the entry of the fourth BPA in an oligopolistic market as a shock to competition.
- Use the variation in the incentives of BPAs to bias prices at different periods of the month.
 - Control group: Middle of the month yields.
 - Treatment group: End of the month yields.



Bias in End of Month Yields?



Yields – Before and After FnPricing



Regression Specification

- Issuer-level regression:

$$Y_{i,j,t} = \beta_0 + \beta_1 EndMonth_{i,j,t} + \beta_2 Post_t \times EndMonth_{i,j,t} \\ + \gamma X_{i,t} + \delta_t + \lambda_i + \epsilon_{i,j,t}$$

- $Y_{i,j,t}$ is the three-year yield from the term structure.
- Include issuer fixed effects, year-month fixed effects, and cluster at the issuer level.



Sample

- Sample period
 - October 2010 – September 2013.
 - Three-year period centered around April 2012.
- Use the average 3Y yields of the existing three BPAs.
- Corporate bonds with investment grades.



Data

- Infomax
 - Corporate bond term structures.
 - Corporate bond trades and issuances.
- KOSCOM
 - Firm fundamentals for control variables.



Result: Competition and Bias

	<i>Dependent variable:</i>		
	Three-Year Yield		
	(1)	(2)	(3)
EndMonth	0.017*** (0.002)	0.025*** (0.004)	0.031*** (0.003)
EndMonth $\times$ Post	-0.049*** (0.003)	-0.057*** (0.005)	-0.069*** (0.004)
Controls	No	Yes	Yes
Firm FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
Rating FE	No	No	Yes
Observations	21,608	13,668	13,668
Adjusted R ²	0.932	0.951	0.968

Note:

*p<0.1; **p<0.05; ***p<0.01



How do BPAs Bias Prices?

- Cross-sectional tests:
 - Traded vs. not traded.
 - Liquid vs. illiquid.
 - Higher vs. lower credit ratings.



Cross-sectional Analysis: Not Traded

	<i>Dependent variable:</i>		
	Three-Year Yield		
	(1)	(2)	(3)
EndMonth	−0.003 (0.017)	0.006 (0.015)	0.027** (0.011)
NotTraded	0.119* (0.066)	0.080 (0.052)	0.054 (0.033)
EndMonth × Post	0.060* (0.033)	0.022 (0.024)	−0.034 (0.021)
Post × NotTraded	−0.287** (0.126)	−0.213** (0.104)	−0.153** (0.064)
EndMonth × NotTraded	0.022 (0.019)	0.038** (0.018)	0.011 (0.013)
EndMonth × Post × NotTraded	−0.112*** (0.034)	−0.098*** (0.027)	−0.039* (0.024)
Controls	No	Yes	Yes
Firm FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
Rating FE	No	No	Yes
Observations	21,608	13,668	13,668
Adjusted R ²	0.933	0.951	0.968
<i>Note:</i> *p<0.1; **p<0.05; ***p<0.01			

- Bias is *higher* for issuers that are *less traded* at the end of the month.



Cross-sectional Analysis: Liquidity

	<i>Dependent variable:</i>		
	Three-Year Yield		
	(1)	(2)	(3)
EndMonth	−0.016 (0.030)	−0.045** (0.022)	−0.004 (0.019)
LowTurnover	0.135*** (0.050)	0.041 (0.034)	0.029 (0.031)
EndMonth × Post	0.120** (0.055)	0.115*** (0.043)	0.041 (0.042)
Post × LowTurnover	−0.194** (0.089)	−0.107 (0.073)	−0.104* (0.062)
EndMonth × LowTurnover	0.032 (0.034)	0.079*** (0.025)	0.039* (0.021)
EndMonth × Post × LowTurnover	−0.174*** (0.057)	−0.186*** (0.046)	−0.116*** (0.044)
Controls	No	Yes	Yes
Firm FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
Rating FE	No	No	Yes
Observations	21,608	13,668	13,668
Adjusted R ²	0.933	0.951	0.968

Note:

*p<0.1; **p<0.05; ***p<0.01

- Bias is *higher* for issuers that are *less liquid* at the end of the month.



Cross-sectional Analysis: Credit Rating

	<i>Dependent variable:</i>	
	Three-Year Yield	
	(1)	(2)
Rating	−0.645*** (0.093)	−0.759*** (0.110)
EndMonth × Post	0.043* (0.022)	0.061** (0.027)
Post × Rating	0.006 (0.015)	−0.003 (0.019)
EndMonth × Rating	0.001*** (0.0001)	0.001*** (0.0002)
EndMonth × Post × Rating	−0.004*** (0.001)	−0.005*** (0.001)
Controls	No	Yes
Firm FE	Yes	Yes
Year-Month FE	Yes	Yes
Observations	19,662	13,668
Adjusted R ²	0.949	0.950

Note: *p<0.1; **p<0.05; ***p<0.01

- Bias is *higher* for issuers that have *higher credit ratings* at the end of the month.
- Bond with higher credit ratings are held by a larger number of financial institutions.
 - BPAs try to bias bonds that are held by most of their clients.



Economic Consequences: Liquidity

- If estimated prices are biased on the last day of the month, traders will have harder time agreeing on a transaction price on the first day of the following month.
- Regression specification:

$$Y_{i,j,t} = \beta_0 + \beta_1 FirstMonth_{i,j,t} + \beta_2 Post_t \times FirstMonth_{i,j,t} \\ + \gamma X_{i,t} + \delta_t + \lambda_i + \epsilon_{i,jt}$$



Results: Liquidity

	<i>Dependent variable:</i>		
	Liquidity		
	(1)	(2)	(3)
FirstMonth	0.011*** (0.003)	0.019*** (0.005)	0.019*** (0.005)
FirstMonth $\times$ Post	-0.013*** (0.003)	-0.028*** (0.007)	-0.028*** (0.007)
Controls	No	Yes	Yes
Firm FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
Rating FE	No	No	Yes
Observations	21,599	13,662	13,662
Adjusted R ²	0.006	0.008	0.008

Note:

*p<0.1; **p<0.05; ***p<0.01



Robustness – Disagreement

	<i>Dependent variable:</i>			
	Spread		Difference	
	(1)	(2)	(3)	(4)
EndMonth	−0.045** (0.020)	−0.061*** (0.020)	0.018 (0.034)	−0.232 (0.160)
EndMonth × Post	0.089** (0.036)	0.077** (0.032)	0.285* (0.149)	0.438** (0.209)
Controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes
Observations	5,898	4,905	5,898	4,905
Adjusted R ²	0.897	0.931	0.172	0.234

Note:

*p<0.1; **p<0.05; ***p<0.01

- *Spread* is calculated as the difference between the lowest and highest yield on a particular day.
- *Difference* is the difference between the average trade price and the fair value price provided by BPAs.
- The disagreement *increases* at the end of the month.



Robustness – Trading Activity

	<i>Dependent variable:</i>			
	Number of Trades		Total Trade Volume	
	(1)	(2)	(3)	(4)
EndMonth	0.061 (1.040)	−1.705 (1.506)	−544,596.800** (250,832.000)	−569,395.400* (299,479.100)
EndMonth × Post	29.271* (16.424)	36.404* (20.611)	30,713.580 (419,203.300)	261,063.100 (410,424.500)
Controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes
Observations	5,898	4,905	5,898	4,905
Adjusted R ²	0.111	0.121	0.427	0.483

Note:

*p<0.1; **p<0.05; ***p<0.01

- Individual bonds trade *more* at the end of the month.
- There is *no change* in the total volume traded.



Robustness – Distance to Default

	<i>Dependent variable:</i>		
	Credit Risk		
	(1)	(2)	(3)
BPA	1.991*** (0.161)	2.010*** (0.164)	2.010*** (0.164)
BPA × Post	−1.215*** (0.100)	−1.186*** (0.109)	−1.186*** (0.109)
Controls	No	Yes	Yes
Firm FE	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
Rating FE	No	No	Yes
Observations	213,844	184,738	184,738
Adjusted R ²	0.371	0.381	0.386

Note: *p<0.1; **p<0.05; ***p<0.01

- Calculate the expected default frequency (EDF) as the theoretical credit risk.
- Credit risk indicated by the yields provided by BPAs *decrease* relative to the EDF.



Conclusion

- We examine the effect of competition on the reporting behavior of BPAs.
- Increased competition leads to increased bias in fair value prices.
- Liquidity drops as a result of bias in information.
- Provides policy implications to regulators.



Thank you!

