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Abstract:

This study proposes an information asymmetry hypothesis to examine why bank credit ratings vary among countries even when bank financial ratios remain constant. Countries are divided among those with low and high information asymmetry. The former include high-income countries, those in North America and West Europe regions, and those with strong institutional environment quality, whereas the latter group possess the opposite characteristics. This study hypothesizes that the influences of financial ratios on ratings are enhanced in low information asymmetry countries but reduced in countries with high information asymmetry. The sample includes the long-term credit ratings issued by Standard and Poor's from 86 countries during 2002–2008. The estimated results show that the effects of financial ratios on ratings are significantly affected by information asymmetries. Countries wishing to improve the credit ratings of their banks thus should reduce information asymmetry.

JEL classification: G21; G32; G38
Keywords: Bank rating; Financial ratio; Information asymmetry; Institutional quality

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1. Introduction

The study of how credit ratings are determined has attracted considerable attention recently. Early investigations of this area typically used financial ratios to explain and predict ratings and their changes.[1] Recent works have identified two plausible "credit rating inconsistencies". First, the same firm sometimes receives different ratings when rated by different rating agencies (Ederington 1985; Beattie and Searle 1992; Moon and Stotsky 1993; Cantor and Packer 1994). This is considered an inconsistency because given full information disclosure the same firm should receive roughly equivalent ratings regardless of rating agency.[2] The second inconsistency is that rating agencies issue different ratings for firms that have the same financial ratios but are located in different countries. That is, two firms with identical financial performance will not necessarily receive identical ratings.

This study attempts to identify the causes of the second inconsistency. As identified in previous works, both asset opaqueness and information asymmetry cause split ratings (Jewell and Livingston 1998; Livingston et al. 2006, 2007). However, a direct test of the latter is unavailable. This study examines a rich data of commercial banks from 86 countries during 2002-2008. Analyzing rating inconsistency is also of particular interest for banks and their supervisors because reliable assessment of the creditworthiness of obligors is an important precondition for the stability of a financial system as an inadequately high exposure to credit risk has been one of the leading sources for problems in financial institutions worldwide for many decades (Basel Committee on Banking Supervision 2000 and 2005). As a consequence, the analysis of the inconsistency of banks' ratings across different obligor groups has also gained importance in academic research (Carey 2001; Jacobson et al. 2006).

[1] Horrigan (1966); West (1970); Pogue and Soldofsky (1969); Pinches and Mingo (1973, 1975); Altman and Katz (1976); Kaplan and Urwitz (1979), Cluff and Farnham (1984), and Ederington (1985); Blume et al. (1998); Estrella et al. (2000); Tabakis and Vinci (2002)

[2] For example, Morgan (2002) finds that the same banks or insurance companies have a high probability of being assigned different ratings when rated by different agencies, and states that this split rating results from opaqueness in bank assets.

This paper proposes an *information asymmetry hypothesis* to investigate why ratings differ among banks with similar financial ratios in different countries. We posit that when a bank is located in an industrialized country, or in a country with strong institutional environment quality, the financial ratios are more likely to reflect bank intrinsic value. Accordingly, little asymmetric information exists between rating agencies and banks in these countries. In contrast, these asymmetric information problems are more acute in developing economies and countries with weak institutional environment quality, making banks' financial ratios more susceptible than those in developed countries (Vives 2006). The poor financial quality of such banks leads rating agencies to doubt the credibility of financial statements and thus issue lower ratings despite identical financial ratios. Accordingly, different ratings may be issued to two banks with similar financial ratios where one is located in a country with low information asymmetry while the other is in a country with high information asymmetry.

The study makes three main contributions to the literature. First, this study demonstrates how information asymmetry influences the relationship between individual financial ratio and bank credit rating in a systematical way. Past studies, though mentioned the information asymmetry, do not examine it empirically. For example, Rojas-Suarez (2001) discussed the asymmetric information but did not proceed empirical studies. Ferri and Liu (2004) found non-financial firm ratings are explained by institutional quality but did not directly explore the information asymmetry, nor did they use banking sample. Next, our bank rating model uses the most comprehensive data set from 86 c ountries during 2002-2008. By contrast, previous studies use less number of sample countries and the focus is on non-financial firms (Ferri et al. 2001; Ferri and Liu 2004; Purda 2003; Poon 2003).While Poon and Firth (2005) and Poon et al. (2009) investigate banks ratings, their focus is on whether unsolicited ratings are downward bias. Third, we consider the possible influence of local and international accounting standards used by different banks. Recently, the

increasing studies have investigated the influence of different accounting standards on accounting quality. Our model takes them into account to avoid the missing third variable problem.

The remainder of this paper is organized as follows. Section 2 is literature review. Section 3 outlines and discusses the methodology. Section 4 describes data sources and descriptive statistical analysis. The results are reported in Section 5 and section 6 is the robust testing. Section 7 summarizes the conclusions.

2. Literature Review

2.1 Credit rating determinants

External credit ratings can be regarded as comprehensive measures of risk, because they incorporate all of the risk factors that are perceived to be relevant by rating agencies. Early investigations of this area typically used financial ratios to explain and predict ratings and their changes. For example, the model of Horrigan (1966), incorporating six financial variables,[3] predicted Moody's ratings with approximately 58% accuracy and S&P ratings with approximately 52% accuracy. Furthermore, West (1970) added market information, such as bond market value as the explanatory variable, improving the prediction accuracy of Moody's ratings from 58% to 62%. Also, Pinches and Mingo (1973, 1975) and Altman and Katz (1976) found that approximately two-thirds of ratings can be predicted on the basis of a small number of financial statistics. Pogue and Soldofsky (1969), Kaplan and Urwitz (1979), Cluff and Farnham (1984), and Ederington (1985) demonstrated similar results.

Recently, Blume et al. (1998) found that accounting ratios and market risk data were stronger determinants of larger corporations' ratings. Similarly, Estrella et al. (2000) examined the predictive power of capital ratios on US bank failures and found a strong connection between capital ratios and external debt ratings, such that balance sheet and size data could replicate a major part of the debt ratings from S&P.

[3] These six financial ratios are working capital to sales, net worth to total debt, sales to net worth, net operating profit to sales, total assets, and subordinated dummy.

Tabakis and Vinci (2002) analysed ratings from S&P, Moody's, and Fitch related to 67 European banks and found that the agencies' ratings depend on balance sheet information, the country of incorporation, and the bank's specialisation. Other studies investigated the impact of corporate governance on the debt rating and on the financing cost of the debt issues (Sengupta 1998; Bhojraj and Sengupta 2003; Bradley et al. 2008).

Many methodologies have been developed in recent years which analyze the external rating process such as linear regression (Horrigan 1996; West 1970), linear discriminant analysis (Pinch and Mingo 1973, 1975), logit and probit (Altman and Katz 1976; Jackson and Boyd 1988) ordered logit and ordered probit (Kamstra et al. 2001; Altman and Rijken 2004; Amato and Furfine 2004; Alejandro and Analía 2008; Bellotti et al. 2011b), artifical intelligence techniques (Dutta and Shekhar 1988; Surkan and Singleton 1990; Kim et al. 1993; Kwon et al. 1997). Kim (2005), Huang et al. (2004) and Lee (2007) show that artificial intelligence techniques (particularly neural networks and support vector machines) do not provide superior predictions of bond ratings compared with standard ordered-choice methods.

2.2 Credit rating inconsistency

Prior literatures indicated rating inconsistency phenomenon exists. For example, Cantor and Falkenstein (2001) compared default rates for US and non-US issues that have received speculative grade ratings from Moody's. Since the one-year default rate for the US firms was 3.3%, higher than the 1.8% for the non-US firms, it implies that foreign firms received overly harsh ratings from Moody's. They explain that the data is somewhat biased because most foreign firms have been rated recently during a period of low overall default rates, whereas the US firms were rated during a period of turbulent economic conditions. Nickell et al. (2000) investigated the differences in Moody's rating transition matrices for issuers domiciled in various countries. They found that while firms from the US and the UK displayed similar rating transitions, Japanese firms with relatively low ratings exhibited considerably more consistent

ratings. Restated, the tendency of Japanese firms to change ratings was markedly less than that of their US counterparts.

Purda (2003) attempts to explain the rating inconsistency by adding country explanatory variables. Using ratings data of six developed countries (Canada, France, Germany, Japan, the UK, and the US), he suggests the difference in ratings is reduced once national economic cycle is considered. Purda further considers the legal infrastructure of creditor protection and the rule of law of La Porta et al. (1998, LLSV) to explain the differences; but some of his results are counter-intuitive. Specifically, nations with good rule of law receive better ratings, yet so too do those with poor creditor protection. Ferri and Liu (2004) examined a sample of 563 non-financial firms from 45 countries and found that in developed countries, financial ratios can comprise almost all the information content of firm credit ratings, while in developing countries, ratings are heavily dependent on sovereign risks and financial ratios play a negligible role. They also found that the quality of institutions (proxied by the rule of law index) and of information disclosure can partly explain differences in rating behavior. Rojas-Suarez (2001) also found that regarding the explanation of credit ratings, financial ratios are more relevant in industrialized countries than emerging markets. Analyzing 265 firms from different industries in 15 countries, Poon (2003) found that rating agencies weight the same financial variables differently when assigning ratings to Japanese and non-Japanese issuers. The results indicated that S&P may assign profitability a higher degree of importance and a lower level of significance to short-term debt to total debt when determining the ratings of Japanese issuers.

Some literatures indicated that country-specific variables affect credit rating determinants but they did not show how they affect credit ratings. For example, Caporale et al. (2011) model EU countries' bank ratings using financial variables and allowing for intercept and slope heterogeneity. They found that country-specific factors (in the form of heterogeneous intercepts) are a crucial determinant of ratings.

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Table 1: A Synopsis of S&P's Long-term Letter Ratings and Numerical Ratings

S&P's long-term credit ratings	Numerical	Number of bank-year observations
AAA	17	32
AA+	16	37
AA	15	206
AA−	14	424
A+	13	463
A	12	440
A−	11	434
BBB+	10	332
BBB	9	184
BBB−	8	149
BB+	7	114
BB	6	106
BB−	5	108
B+	4	111
B	3	75
B−	2	77
CCC+, CCC, CCC−, D, SD	1	55

Note:
Credit ratings are the long-term issuer credit ratings compiled by Standard & Poor's and reported on BankScope database. The ratings range from AAA (highest rating) to D (lowest rating). From ratings AA to CCC, S&P rating agency adds a plus (+) and a minus (−) to represent the strength and weakness in a grade of rating for every issuer.

Table 2: Summary of Variables, Descriptions and Data Sources

Variables	Descriptions	Sources
Dependent Variables:		
Rating	S&P's long-term ratings of commercial banks. All bank credit ratings are coded as 17 ordinal values, where 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 and CCC+ or CCC+ below=1.	BankScope
Explanatory Variables:		
Profitability	The average of the ratio of net income to total assets over the past three years	BankScope
Liquidity	The average of the ratio of liquid assets to deposits and short-term funding over the past three years	BankScope
Capital	The average of the ratio of capital adequacy ratio over the past three years	BankScope
Efficiency	The average of the ratio of cost to income over the past three years	BankScope
Quality	The average of the ratio of loan loss provisions to net interest revenues over the past three years	BankScope
Lnasset	The average of natural logarithm of total assets over the past three years	BankScope
SCR	All sovereign credit ratings are coded as 17 ordinal values, where 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 and CCC+ or CCC+ below=1.	BankScope
Proxies for Information Asymmetry:		
Country Development Level: Income		
HIC	Dummy variable, 1 if the bank is located in a high-income country, 0, otherwise	WDI
MIC	Dummy variable, 1 if the bank is located in a middle-income country, 0, otherwise	WDI
INDUSTRY	Dummy variable,1 if the bank is located in an industrial country, 0, otherwise	IFS
EMERGING	Dummy variable, 1 if the bank is located in a country from East Europe and Central Asia, East Asia and Pacific, Latin American and Caribbean region, 0, otherwise	WDI
Institutional Environment Quality		
LAWORDER	Indicative of law and order tradition, ranging from 1 to 6, the higher score representing the better a country's law and order.	ICRG
BUREAU	Indicative of quality of the bureaucracy, on a scale of 1 to 4, with higher scores representing more efficient of the bureaucracy.	ICRG
INTEGRITY	Indicative of a country's corruption level, on a scale of 1 to 6, with higher scores for lower levels of corruption.	ICRG
DISCLOSE	Indicative of a country's information quality, on a scale of 0 to10, with higher scores for higher information quality.	Chan-Lee and Ahn (2001)

Notes:
BankScope: FitchIBCA Bankscope CD-Rom (2002, 2003, 2004, 2005, 2006, 2007, 2008)
WDI: World Development Indicators Database (2006)
ICRG: International Country Risk Guidelines (2004)

Table 3: Distribution of Banks with Ratings Across Regions and Countries and SCR in 2008

Region	Country	Number of Bank-Year Observation	Sovereign Credit Rating
North America	Canada	66	AAA
	USA	764	AAA
Europe	Austria	14	AAA
	Belgium	23	AA+
	Cyprus	1	A
	Denmark	21	AAA
	Finland	20	AAA
	France	208	AAA
	Germany	66	AAA
	Greece	36	A
	Iceland	2	A+
	Ireland	85	AAA
	Italy	129	A+
	Liechtenstein	9	AAA
	Luxembourg	54	AAA
	Monaco	3	na
	Netherlands	53	AAA
	Norway	17	AAA
	Portugal	18	AA-
	Spain	56	AAA
	Switzerland	29	AAA
	Sweden	23	AAA
	Turkey	33	BB-
	United Kingdom	102	AAA
Oceania	Australia	127	AAA
	New Zealand	36	AA+
	Papua New Guinea	3	B+
Far East and Central Asia	China	29	A
	Georgia Rep of	2	B+
	Hong Kong	48	AA
	India	22	BBB-
	Indonesia	23	BB-
	Japan	236	AA
	Kazakhstan	41	BBB
	Korea	61	A
	Malaysia	26	A-
	Philippine	22	BB-
	Singapore	23	AAA
	Taiwan	66	AA-
	Thailand	42	BBB+
	Vietnam	1	BB
South and Central America	Argentina	13	B+
	Bahamas	9	A-
	Bermuda	10	AA
	Bolivia	9	B-
	Brazil	88	BB+
	Chile	33	A
	Colombia	6	BB+
	Costa Rico	3	BB
	El Salvador	17	BB+
	Guatemala	2	BB
	Jamaica	7	B
	Mexico	49	A
	Panama	17	BB
	Peru	8	BB+
	Puerto Rico	3	na
	Trinidad And Tobago	11	A-
	Uruguay	19	B+
	Venezuela	1	BB-
Middle East	Bahrain	18	A
	Israel	14	A-
	Jordan	1	BB
	Kuwait	26	A+
	Lebanon	20	B-
	Oman	4	A
	Qatar	6	AA-
	Saudi Arabia	16	AA-
	United Arab Emirates	11	AA
Eastern Europe	Bulgaria	29	BBB+
	Croatia	7	BBB
	Czech Rep.	25	A
	Estonia	1	A
	Hungary	4	A-
	Latvia	2	BBB+
	Lithuania	2	A
	Poland	5	A-
	Romania	8	BBB-
	Russian Federation	132	BBB+
	Slovakia	11	A
	Slovenia	4	AA
	Ukraine	7	BB-
Africa	Egypt	14	BB+

	Morocco	9	BB+
	Nigeria	4	BB-
	South Africa	14	BBB+
	Tunisia	9	BBB
All Regions	All Countries	3347	--

Note:
Data obtained from FitchIBCA Bankscope CD-Rom

Table 4: Distribution of Credit Ratings for Banks across Regions

S&P long-term credit rating	North America	Europe	Oceania	Far East and Central Asia	South and Central America	Middle East	Eastern Europe	Africa	Number of bank-year observation
Investment Grade									
AAA	12	20							32
AA+	16	20	1						37
AA	59	111	32	4					206
AA–	162	185	64	11	2				424
A+	201	198	5	52	2	4	1		463
A	138	181	14	66	11	24	6		440
A–	91	160	7	119	19	26	12		434
BBB+	84	61	15	119	9	26	12	6	332
BBB	42	18	16	67	17	6	14	4	184
BBB–	13	6	9	40	45	10	20	6	149
Speculative Grade									
BB+	3	1		49	26		16	19	114
BB	2	4		29	47		16	8	106
BB–	2	24		17	40		18	7	108
B+	5	6	1	30	40		29		111
B		1	2	24	20	3	25		75
B–		5		12	12	17	31		77
CCC+		1			2		17		20
CCC				1			16		17
CCC–							3		3
D					4		1		5
SD					10				10
	830	1002	166	640	306	116	237	50	3347

Note:
Data obtained from FitchIBCA Bankscope CD-Rom

Table 5: Correlation Matrices of Information Asymmetry Variables

	HIC	MIC	INDUSTRY	EMERGING	LAWORDER	BUREAU	INTEGRITY
HIC							
MIC	-0.978						
INDUSTRY	0.780	-0.764					
EMERGING	-0.807	0.821	-0.716				
LAWORDER	0.681	-0.674	0.611	-0.654			
BUREAU	0.742	-0.740	0.755	-0.636	0.681		
INTEGRITY	0.688	-0.673	0.719	-0.578	0.678	0.841	
DISCLOSE	0.668	-0.650	0.631	-0.592	0.524	0.783	0.742

Note:

Two set variables are included to examine whether asymmetric information can affect the relationship between financial ratios and credit ratings. The first set is the development level of a country, including HIC, MIC, INDUSTRY and EMERGING. HIC is an indicator variable taking on the value of 1 if the country stems from high-income countries and 0 otherwise. MIC is an indicator variable taking on the value of 1 if the country stems from middle-income countries. INDUSTRY is an indicator variable taking on the value of 1 if the bank is located in an industrial country and 0 otherwise. EMERGING is an indicator variable taking on the value of 1 if the bank is located in emerging market economies and 0 otherwise. The second set is the institutional environment quality of a country, including LAWORDER, BUREAU, INTEGRITY and DISCLOSE. LAWORDER is a country's law and order index, ranging from1 to 6, the higher score representing the better a country's law and order. BUREAU is an index of a country's quality of bureaucracy, ranging from 1 to 4, with higher scores representing more efficient of the bureaucracy. INTEGRITY is an index of corruption, ranging from 1 to 6, with higher scores for lower levels of corruption. DISCLOSE is a country's information quality, on a scale of 0 to10, with higher scores for higher information quality

Table 6: Basic Statistics of Financial Ratios and Information Asymmetry for Each Grade of Rating

Variables	Rating						
	AAA	AA	A	BBB	BB	B	CCC
Panel A FINANCIAL INFORMATION							
Profitability	0.64	1.16	0.98	0.99	1.26	1.55	-0.24
Liquidity	25.13	23.38	21.77	27.58	32.26	37.65	51.67
Capital	24.33	13.24	15.18	14.01	15.37	19.59	31.84
Efficiency	45.23	58.11	59.37	60.00	60.33	70.14	61.80
Quality	12.86	13.43	16.32	26.87	39.79	21.05	12.87
Lnasset	8.59	7.65	7.32	7.09	6.81	6.22	5.84
Panel B SOVEREIGN RATING							
AAA	1.00	0.84	0.63	0.30	0.03	0.03	0.00
AA	0.00	0.14	0.25	0.25	0.05	0.00	0.00
A	0.00	0.01	0.12	0.25	0.05	0.00	0.00
BBB	0.00	0.00	0.00	0.17	0.31	0.33	0.38
BB	0.00	0.00	0.00	0.03	0.54	0.25	0.22
B	0.00	0.00	0.00	0.00	0.02	0.38	0.15
CCC	0.00	0.00	0.00	0.00	0.00	0.01	0.25
Panel C ECONOMIC DEVELOPMENT							
INDUSTRY	1.00	0.96	0.83	0.53	0.07	0.03	0.00
HIC	1.00	1.00	0.96	0.72	0.14	0.05	0.00
MIC	0.00	0.00	0.04	0.27	0.81	0.95	1.00
EMERGING	0.00	0.00	0.06	0.28	0.62	0.75	0.98
Panel D INSTITUTIONAL ENVIRONMENT QUALITY							
LAWORDER	5.53	5.35	5.02	4.52	3.54	3.32	3.58
BUREAU	3.91	3.79	3.60	3.24	2.26	1.89	1.56
INTEGRITY	4.75	4.37	3.88	3.30	2.30	1.96	2.13
DISCLOSE	7.16	7.70	7.18	6.36	3.36	2.22	1.31
Number of banks	32	667	1337	665	328	263	55

Notes:

1. The sample year is from 2002 to 2008 across 86 countries. The financial ratios employed here are the average of the past three years to minimize the business cycle effect. The term *Profitability* is the average ratio of net income to total assets, *Liquidity* stands for the average ratio of liquid assets to customer and short-term funding, *Capital* is the average ratio of required capital to risky assets. *Efficiency* denotes the average ratio of cost to income, and *Quality* is the average ratio of loan loss provisions to net interest revenues. *Lnasset* is defined as the average ratio of natural logarithm of total assets.
2. In Panel B, we present sovereign credit ratings across different bank credit ratings. The sovereign credit ratings are categorized into AAA, AA, A, BBB, BB, B, and CCC.
3. In Panel C, the set is the development level of a country, including HIC, MIC, INDUSTRY and EMERGING. HIC is an indicator variable taking on the value of 1 if the country stems from high-income countries and 0 otherwise. MIC is an indicator variable taking on the value of 1 if the country stems from middle-income countries. INDUSTRY is an indicator variable taking on the value of 1 if the bank is located in an industrial country and 0 otherwise. EMERGING is an indicator variable taking on the value of 1 if the bank is located in emerging market economies and 0 otherwise.
4. In Panel D, the set is the institutional environment quality of a country, including LAWORDER, BUREAU, INTEGRITY and DISCLOSE. LAWORDER is a country's law and order index, ranging from1 to 6, the higher score representing the better a country's law and order. BUREAU is an index of a country's quality of bureaucracy, ranging from 1 to 4, with higher scores representing more efficient of the bureaucracy. INTEGRITY is an index of corruption, ranging from 1 to 6, with higher scores for lower levels of corruption. DISCLOSE is a country's information quality, on a scale of 0 to10, with higher scores for higher information quality.

Table 7: Credit Ratings Determinants—Information Asymmetry Variables: INCOME

Explanatory Variables	Ordered-Logit Model				
	(A)	(B)	(C)	(D)	(E)
Profitability	0.121***	0.020	0.037	0.182***	0.179***
	(3.93)	(0.50)	(0.91)	(3.81)	(3.46)
Liquidity	0.006***	0.006***	0.006***	0.010***	0.010***
	(7.45)	(5.72)	(5.78)	(4.62)	(4.58)
Capital	0.026***	0.032***	0.028***	0.022***	0.022***
	(6.32)	(4.32)	(3.61)	(4.58)	(4.54)
Efficiency	-0.006**	-0.007**	-0.005	-0.005*	-0.007**
	(-2.53)	(-2.02)	(-1.54)	(-1.67)	(-2.32)
Quality	-0.006***	0.000	-0.003*	-0.011***	-0.012***
	(-4.60)	(0.24)	(-1.72)	(-5.81)	(-6.29)
HIC×*Profitability*		0.158**			
		(2.39)			
HIC×*Liquidity*		0.005*			
		(1.88)			
HIC×*Capital*		0.000			
		(0.03)			
HIC×*Efficiency*		-0.011*			
		(-1.66)			
HIC×*Quality*		-0.013***			
		(-4.88)			
INDUSTRY×*Profitability*			0.183**		
			(2.49)		
INDUSTRY×*Liquidity*			0.004*		
			(1.77)		
INDUSTRY×*Capital*			0.005		
			(0.51)		
INDUSTRY×*Efficiency*			-0.002		
			(-0.53)		
INDUSTRY×*Quality*			-0.008***		
			(-2.91)		
MIC×*Profitability*				-0.179***	
				(-2.74)	
MIC×*Liquidity*				-0.004*	
				(-1.85)	
MIC×*Capital*				-0.006	
				(-0.68)	
MIC×*Efficiency*				-0.007	
				(-1.30)	
MIC×*Quality*				0.012***	
				(4.35)	
EMERGING×*Profitability*					-0.162**
					(-2.47)
EMERGING×*Liquidity*					-0.004*
					(-1.71)
EMERGING×*Capital*					0.012
					(1.33)
EMERGING×*Efficiency*					-0.000
					(-0.07)
EMERGING×*Quality*					0.013***
					(4.87)
Lnasset	1.790***	1.822***	1.825***	1.812***	1.825***
	(23.77)	(24.13)	(24.02)	(24.05)	(24.16)
SCR	0.749***	0.778***	0.784***	0.769***	0.776***
	(10.21)	(10.60)	(10.69)	(10.44)	(10.57)
Year Dummies	YES	YES	YES	YES	YES
Country Dummies	YES	YES	YES	YES	YES
R-Squared	0.296	0.299	0.297	0.298	0.299
Observation	2615	2615	2615	2615	2615
Log likelihood	-4509.4241	-4490.7416	-4497.8554	-4493.8814	-4490.9404

Notes:

1. *t*-statistics are in parenthesis and White-consistent heteroscedasticity is used.
2. *, ** and *** denote the significance at the 10%, 5% and 1% level, respectively.
3. Dependent variables, *Rating*, are S&P long-term issuer ratings of commercial banks. We convert S&P long-term alphanumeric ratings into 17 numerical ratings, i.e., we let 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 and CCC+ or CCC+ below=1.
4. The financial ratios employed here are the average of the past three years to minimize the business

cycle effect. The term *Profitability* is the average ratio of net income to total assets, *Liquidity* stands for the average ratio of liquid assets to customer and short-term funding, *Capital* is the average ratio of required capital to risky assets. *Efficiency* denotes the average ratio of cost to income, and *Quality* is the average ratio of loan loss provisions to net interest revenues. *Lnasset* is defined as the average ratio of natural logarithm of total assets. *SCR* are sovereign credit ratings coded as 17 ordinal values, where 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 and CCC+ or CCC+ below=1.

5. The set of information asymmetry proxy is the development level of a country, including HIC, MIC, INDUSTRY and EMERGING. HIC is an indicator variable taking on the value of 1 if the country stems from high-income countries and 0 otherwise. MIC is an indicator variable taking on the value of 1 if the country stems from middle-income countries and 0 otherwise. INDUSTRY is an indicator variable taking on the value of 1 if the bank is located in an industrial country and 0 otherwise. EMERGING is an indicator variable taking on the value of 1 if the bank is located in emerging market economies and 0 otherwise.

Table 8: Credit Ratings Determinants—Information Asymmetry Variables: INSTITUTION

Explanatory Variables	Ordered-Logit Model				
	(A)	(B)	(C)	(D)	(E)
Profitability	-0.001	-0.195***	-0.046	-0.095*	0.107***
	(-0.01)	(-3.00)	(-0.68)	(-1.73)	(3.43)
Liquidity	-0.003	0.002	-0.003	0.004**	0.007***
	(-0.50)	(0.64)	(-1.27)	(2.08)	(6.66)
Capital	0.029	0.011	0.034**	0.018	-0.001
	(0.69)	(0.59)	(2.45)	(1.38)	(-0.06)
Efficiency	-0.043***	-0.028**	0.010*	0.006	0.003
	(-3.69)	(-2.84)	(1.67)	(0.62)	(0.76)
Quality	0.010**	0.012***	0.002	0.008**	0.001
	(2.07)	(2.71)	(0.62)	(2.45)	(0.38)
LAWORDER×*Profitability*	0.025				
	(0.83)				
LAWORDER×*Liquidity*	0.002*				
	(1.67)				
LAWORDER×*Capital*	0.001				
	(0.10)				
LAWORDER×*Efficiency*	-0.008*				
	(-1.94)				
LAWORDER×*Quality*	-0.004***				
	(-3.33)				
BUREAU×*Profitability*		0.120***			
		(4.40)			
BUREAU×*Liquidity*		0.002*			
		(1.68)			
BUREAU×*Capital*		0.003			
		(0.70)			
BUREAU×*Efficiency*		-0.004*			
		(-1.77)			
BUREAU×*Quality*		-0.006***			
		(-3.92)			
INTEGRITY×*Profitability*			0.051**		
			(2.31)		
INTEGRITY×*Liquidity*			0.002**		
			(2.22)		
INTEGRITY×*Capital*			0.003		
			(0.74)		
INTEGRITY×*Efficiency*			-0.004***		
			(-2.83)		
INTEGRITY×*Quality*			-0.003***		
			(-2.76)		
INSQUA×*Profitability*				0.060***	
				(3.57)	
INSQUA×*Liquidity*				0.001*	
				(1.76)	
INSQUA×*Capital*				0.001	
				(0.48)	
INSQUA×*Efficiency*				-0.002*	
				(-1.72)	
INSQUA×*Quality*				-0.004***	
				(-4.30)	
DISCLOSE×*Profitability*					0.009
					(0.39)
DISCLOSE×*Liquidity*					0.001*
					(1.65)
DISCLOSE×*Capital*					0.004***
					(2.85)
DISCLOSE×*Efficiency*					-0.002***
					(-3.15)
DISCLOSE×*Quality*					-0.002***
					(-3.35)
Lnasset	1.802***	1.821***	1.804***	1.824***	1.814***
	(23.85)	(24.08)	(23.91)	(24.11)	(24.00)
SCR	0.742***	0.753***	0.788***	0.779***	0.753***
	(9.95)	(10.21)	(10.76)	(10.71)	(10.27)
Year Dummies	YES	YES	YES	YES	YES
Country Dummies	YES	YES	YES	YES	YES
R-Squared	0.297	0.299	0.298	0.299	0.299
Observation	2615	2615	2615	2603	2615
Log likelihood	-4498.9094	-4485.7155	-4495.5678	-4470.5115	-4489.1748

Notes:

1. *t*-statistics are in parenthesis and White-consistent heteroscedasticity is used.
2. *, ** and *** denote the significance at the 10%, 5% and 1% level, respectively.
3. Dependent variables, *Rating*, are S&P long-term issuer ratings of commercial banks. We convert S&P long-term alphanumeric ratings into 17 numerical ratings, i.e., we let 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 and CCC+ or CCC+ below=1.
4. The financial ratios employed here are the average of the past three years to minimize the business cycle effect. The term *Profitability* is the average ratio of net income to total assets, *Liquidity* stands for the average ratio of liquid assets to customer and short-term funding, *Capital* is the average ratio of required capital to risky assets. *Efficiency* denotes the average ratio of cost to income, and *Quality* is the average ratio of loan loss provisions to net interest revenues. *Lnasset* is defined as the average ratio of natural logarithm of total assets. *SCR* are sovereign credit ratings coded as 17 ordinal values, where 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 and CCC+ or CCC+ below=1.
5. The set of information asymmetry proxy is institutional environment quality of a country, including LAWORDER, BUREAU, INTEGRITY, INSQUA and DISCLOSE. LAWORDER is a country's law and order index, ranging from1 to 6, the higher score representing the better a country's law and order. BUREAU is an index of a country's quality of bureaucracy, ranging from 1 to 4, with higher scores representing more efficient of the bureaucracy. INTEGRITY is an index of corruption, ranging from 1 to 6, with higher scores for lower levels of corruption. INSQUA is the average ratio of LAWORDER, BUREAU and INTEGRITY to proxy the whole institutional environment quality of a country. DISCLOSE is a country's information quality, on a scale of 0 to10, with higher scores for higher information quality.

Table 9: Robust Testing: Considering Different Accounting Standard

Explanatory Variables	Ordered-Logit Model			
	(A)	(B)	(C)	(D)
Profitability	-0.017	0.180***	-0.277***	-0.091*
	(-0.69)	(3.93)	(-2.70)	(-1.81)
Liquidity	0.001	0.011***	0.001	-0.007
	(1.64)	(3.27)	(0.16)	(-1.05)
Capital	0.010**	0.015**	-0.026	-0.001
	(2.01)	(2.44)	(-1.02)	(-0.06)
Efficiency	0.003*	0.002	0.039***	0.011**
	(1.85)	(0.78)	(5.45)	(2.06)
Quality	-0.004*	-0.008***	-0.019*	-0.012
	(-1.79)	(-3.94)	(-1.89)	(-1.59)
INDUSTRY×*Profitability*	0.083***			
	(2.63)			
INDUSTRY×*Liquidity*	0.005**			
	(2.24)			
INDUSTRY×*Capital*	0.001			
	(0.16)			
INDUSTRY×*Efficiency*	-0.004**			
	(-2.07)			
INDUSTRY×*Quality*	-0.001			
	(-0.25)			
EMERGING×*Profitability*		-0.296***		
		(-4.73)		
EMERGING×*Liquidity*		-0.008**		
		(-2.38)		
EMERGING×*Capital*		0.009		
		(0.80)		
EMERGING×*Efficiency*		0.001		
		(0.25)		
EMERGING×*Quality*		0.003*		
		(1.65)		
INSQUA×*Profitability*			0.093***	
			(3.17)	
INSQUA×*Liquidity*			0.001*	
			(1.76)	
INSQUA×*Capital*			0.012*	
			(1.93)	
INSQUA×*Efficiency*			-0.010***	
			(-5.54)	
INSQUA×*Quality*			0.003	
			(1.01)	
DISCLOSE×*Profitability*				0.030***
				(3.33)
DISCLOSE×*Liquidity*				0.003**
				(2.50)
DISCLOSE×*Capital*				0.003
				(1.47)
DISCLOSE×*Efficiency*				-0.002**
				(-2.16)
DISCLOSE×*Quality*				0.001
				(0.53)
Lnasset	0.905***	1.653***	1.716***	1.659***
	(21.10)	(20.25)	(21.06)	(19.06)
SCR	0.338***	0.589***	0.656***	0.578***
	(25.99)	(26.88)	(22.93)	(19.08)
IFRS	0.069	0.116	0.143	0.198
	(1.14)	(1.14)	(1.38)	(1.57)
USGAAP	-0.235	-0.400	-0.164	-0.309
	(-0.95)	(-0.79)	(-0.28)	(-0.52)
Year Dummies	YES	YES	YES	YES
Country Dummies	YES	YES	YES	YES
R-Squared	0.242	0.249	0.250	0.224
Observation	1531	1575	1567	1405

Note:

1. *t*-statistics are in parenthesis and White-consistent heteroscedasticity is used.
2. *, ** and *** denote the significance at the 10%, 5% and 1% level, respectively.
3. Dependent variables, *Rating*, are S&P long-term issuer ratings of commercial banks. We convert S&P long-term alphanumeric ratings into 17 numerical ratings, i.e., we let 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 and CCC+ or CCC+ below=1.

4. The financial ratios employed here are the average of the past three years to minimize the business cycle effect. The term *Profitability* is the average ratio of net income to total assets, *Liquidity* stands for the average ratio of liquid assets to customer and short-term funding, *Capital* is the average ratio of required capital to risky assets. *Efficiency* denotes the average ratio of cost to income, and *Quality* is the average ratio of loan loss provisions to net interest revenues. *Lnasset* is defined as the average ratio of natural logarithm of total assets. SCR are sovereign credit ratings coded as 17 ordinal values, where 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 and CCC+ or CCC+ below=1.
5. The information asymmetry proxy include INDUSTRY, EMERGING, INSQUA and DISCLOSE. INDUSTRY is an indicator variable taking on the value of 1 if the bank is located in an industrial country and 0 otherwise. EMERGING is an indicator variable taking on the value of 1 if the bank is located in emerging market economies and 0 otherwise. INSQUA is the average ratio of LAWORDER, BUREAU and INTEGRITY to proxy the whole institutional environment quality of a country. DISCLOSE is a country's information quality, on a scale of 0 to10, with higher scores for higher information quality.

Table 10: Robust Testing: Omitting CCC Rated Banks

Explanatory Variables	Ordered-Logit Model			
	(A)	(B)	(C)	(D)
Profitability	0.008	0.114***	-0.134***	-0.061**
	(0.39)	(6.16)	(-2.77)	(-2.36)
Liquidity	0.001*	0.003***	-0.001	-0.004*
	(1.80)	(4.35)	(-0.44)	(-1.70)
Capital	0.014***	0.010***	0.007	0.012**
	(4.23)	(5.15)	(0.82)	(2.43)
Efficiency	0.001	-0.001	0.009***	0.006***
	(0.61)	(-0.58)	(3.05)	(2.74)
Quality	-0.003***	-0.006***	0.002	-0.0005
	(-3.18)	(-7.32)	(0.84)	(-0.24)
INDUSTRY×*Profitability*	0.082***			
	(3.05)			
INDUSTRY×*Liquidity*	0.003***			
	(3.04)			
INDUSTRY×*Capital*	-0.004			
	(-1.20)			
INDUSTRY×*Efficiency*	-0.002**			
	(-2.08)			
INDUSTRY×*Quality*	-0.004***			
	(-3.12)			
EMERGING×*Profitability*		-0.151***		
		(-5.42)		
EMERGING×*Liquidity*		-0.002**		
		(-2.24)		
EMERGING×*Capital*		0.006		
		(1.48)		
EMERGING×*Efficiency*		-0.001		
		(-1.00)		
EMERGING×*Quality*		0.004***		
		(3.22)		
INSQUA×*Profitability*			0.053***	
			(4.13)	
INSQUA×*Liquidity*			0.001*	
			(1.79)	
INSQUA×*Capital*			0.001	
			(0.45)	
INSQUA×*Efficiency*			-0.002***	
			(-3.51)	
INSQUA×*Quality*			-0.002***	
			(-3.04)	
DISCLOSE×*Profitability*				0.021***
				(5.52)
DISCLOSE×*Liquidity*				0.001***
				(3.24)
DISCLOSE×*Capital*				-0.0004
				(-0.06)
DISCLOSE×*Efficiency*				-0.001***
				(-3.58)
DISCLOSE×*Quality*				-0.001**
				(-2.41)
Lnasset	0.800***	0.809***	0.811***	0.787***
	(24.50)	(24.82)	(25.03)	(19.06)
SCR	0.358***	0.342***	0.367***	0.353***
	(37.29)	(36.13)	(30.80)	(28.57)
Year Dummies	YES	YES	YES	YES
Country Dummies	YES	YES	YES	YES
R-Squared	0.230	0.231	0.231	0.200
Observation	2521	2590	2578	2339

Note:

1. *t*-statistics are in parenthesis and White-consistent heteroscedasticity is used.
2. *, ** and *** denote the significance at the 10%, 5% and 1% level, respectively.
3. Dependent variables, *Rating*, are S&P long-term issuer ratings of commercial banks. We convert S&P long-term alphanumeric ratings into 17 numerical ratings, i.e., we let 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 and CCC+ or CCC+ below=1.
4. The financial ratios employed here are the average of the past three years to minimize the business cycle effect. The term *Profitability* is the average ratio of net income to total assets, *Liquidity*

stands for the average ratio of liquid assets to customer and short-term funding, *Capital* is the average ratio of required capital to risky assets. *Efficiency* denotes the average ratio of cost to income, and *Quality* is the average ratio of loan loss provisions to net interest revenues. *Lnasset* is defined as the average ratio of natural logarithm of total assets. SCR are sovereign credit ratings coded as 17 ordinal values, where 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 and CCC+ or CCC+ below=1.

5. The information asymmetry proxy include INDUSTRY, EMERGING, INSQUA and DISCLOSE. INDUSTRY is an indicator variable taking on the value of 1 if the bank is located in an industrial country and 0 otherwise. EMERGING is an indicator variable taking on the value of 1 if the bank is located in emerging market economies and 0 otherwise. INSQUA is the average ratio of LAWORDER, BUREAU and INTEGRITY to proxy the whole institutional environment quality of a country. DISCLOSE is a country's information quality, on a scale of 0 to10, with higher scores for higher information quality.

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