Rating Banks:
Risk and Uncertainty in an Opaque Industry

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Abstract

The pattern of disagreement between bond raters suggests that bank and insurance firms are inherently more *opaque* than other firms. Moody's and S&P split more frequently over these financial intermediaries and the splits are more lopsided, as theory here predicts. Uncertainty over the banks stems from their assets, loans and trading assets in particular, the risks of which are hard to observe or easy to change. Banks' high leverage, which invites agency problems, compounds the uncertainty over their assets. Our findings bear on both the existence and reform of bank regulation.

JEL Codes: G20, G21, G28.

Introduction

Why do we regulate and protect banks? Why not leave it to the savers and investors who put their money in banks? The regulators' rationale goes something like this. Banks are black boxes: money goes in, and money goes out, but the risks taken in the process of intermediation are hard to observe from outside the bank. Absent the steadying hand of government--deposit and payments insurance, lender of last resort, supervision and regulation of bank risk taking--the opacity of banks exposes the entire financial system to bank runs, contagion, and other strains of "systemic" risk.

Take away opacity and the whole story unravels. Were banks as transparent as other firms, runs on "risky" banks would never infect the "safe" ones and the preventative of deposit insurance would be unnecessary. Without deposit insurance and the excessive risk taking it invites, government supervision and regulation of banks would also redundant; that role could be left to the market. Nor would we need a discount window and lender of last resort, since fully transparent banks could borrow at open market rates that fairly reflected the their risk.[1]

As yet, opacity is more presumption than fact. There seems not to be a single piece of evidence suggesting banking firms are somehow harder to fathom any other sort of firm.[2] The issue looms even larger today as regulators from around the world consider the reform of the regulatory structure of banks. Among the proposed "pillars" of reform are increased market discipline of banks, *via* mandatory issuance of subordinated debt by banks or their holding companies, and increased transparency of banks, *via* increased disclosure. Given the presumed opacity of banks, how strong are these pillars? How much of the burden of bank discipline can supervisors expect to shift to the market? Can banks *become* transparent, or is opacity to some degree inherent to the business?

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[1]Even the link between monetary policy and bank lending depends on how accurately the market can observe the risk of banks. When the Fed drains reserves, banks could maintain their lending by issuing *uninsured* debt that does not require reserves, such as large CDS or debentures. (Romer and Romer 1990). But if that debt is mispriced (because investors cannot observe the risk of banks), better banks will reduce their lending following a tightening in monetary policy (Stein 1995).

[2] Flannery et al (1999) is the only other paper that even takes up the issue and their conclusion, based on the trading patterns of matched pairs of banks and non-banks, is largely negative: ". . . justifying special treatment of banking firms requires some market failure other than extreme opacity" (p. 25).

This paper investigates the relative opacity of banks using disagreement between the major bond rating agencies--Moody's and S&P--as a proxy for uncertainty.[3]   The empirical strategy is simple. If the supposed opacity of banks makes their risk harder to quantify, we should observe more frequent and wider disagreement over banks' bonds.   The only subtlety is whether to expect the splits should be symmetric, or lopsided, with one or the other agency lower on average. Using a simple model, we show that the greater uncertainty in more opaque sectors will lead to more lopsided splits, at least if one agency tends to rate more conservatively in general. Intuitively, the heightened uncertainty in more opaque sectors implies more risk of overrating *and* underrating, but since the conservative rater worries more about overrating (by definition), he errs further on the safe side in the more opaque sectors.

 From a policy perspective, it is also important to understand the source of uncertainty over banks. Is opacity *inherent* to banking, in which case intervention might be justified, or is opacity the result of intervention? There is the view that deposit insurance, the discount window, and the occasional bank bailout have *made* banks opaque by protecting them from market discipline. From this perspective, the veil between banks and the market is simply the downside of the government safety net.

The timing of disagreement we find between raters is suggestive on this point, but not definitive. Splits over banks-- big banks especially-- increased markedly after 1986 and the demise of "too big to fail" (Flannery and Sorescu 1990).   While this timing makes sense, it forces the question: was it the banks themselves raters were increasingly unsure about after 1986, or was it the regulators and their commitment to the new *laissez faire* policy?

Intermediation and agency theory point to the unique mix of assets and leverage at banks as a source of fundamental uncertainty about bank risk.[4]   As "delegated monitors," banks are supposed to

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[3] Disagreement between forecasters has been used to gauge uncertainty about macroeconomic variables. See citations in Bomberger (1996). Opacity, with its underlying premise of informational asymmetries, seems more closely related to "uncertainty" as in Knight (1921), than to risk.

[4] A classic text for financial analysts puts it this way: "Probably in no other field involving such large public interests is there more uncertainty for the investor (than in banking). .. partly because of the difficulty in valuing loans and discounts...and partly because... any fluctuation in the value of the assets bulk so large for the small net worth." (Guthman 1953, p. 494)

lend to less known borrowers requiring intensive screening and monitoring (Diamond 1983). Lending to opaque borrowers, however, may cause opaque banks. The trading assets at the money center banks in the U.S. may be another source of uncertainty. These assets are not necessarily opaque in the same way loans are, but they are extremely liquid and hence "slippery;" trading positions are easily and instantaneously changed, which makes them hard to monitor. Trading, as Myers and Ragan (1997) put it, is the "dark side" of liquidity for banks. The high leverage at banks may compound the uncertainty over their assets; their assets present bankers with ample opportunities for risk or asset substitution, and their high leverage inclines them to do so (Jensen and Meckling 1976).

Using ratings on nearly 8000 new bonds issued between 1983 and 1993, we find that raters split substantially more over banks and insurance firms than over other types of firms, and the splits over these intermediaries are more lopsided, as the model here predicts. Disagreement over the banks is traced directly to their assets, loans and trading assets in particular. Fixed assets, like premises, tend to reduce disagreement between the raters, but of course, such assets are rare at banks. Capital, another scarce banking resource, also tends to less disagreement, both directly and indirectly, through its interaction with various assets. Banking firms are more opaque than other sorts of firms, I conclude, and the veil between them and outsiders seems inherent to the business.

2. Disagreement Over Bank Bonds

We investigate the pattern of disagreement between Moody's and S&P using their initial ratings on ratings on 7,862 new bonds issued publicly by U.S. firms between January 1983 and July 1993. The data were collected by staff at the Federal Reserve Board from a variety of public sources, including *Bond Digest, Investors' Weekly,* etc.[5] The initial data set included over 9000 issues, but after excluding bonds with unusual features, the final data set numbered 7,862 issues.[6] Note that we

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[5] A Board staff member provided the data to me, and I will share it with anyone who asks for it. The data are no longer maintained.

[6] Following Cantor and Packer (1996), issues under $10 million were excluded, as were issues with significant equity features, equipment trusts, collateralized mortgage obligations, government guaranteed issues, variable rate issues, ESOP, lease certificates, and foreign issues.

use only the *initial* rating on each issue; tracking the ratings over time introduces noise due to asynchronous changes in ratings over time. The rating scales for each agency and their interpretations are reported in Table 1. The letter ratings were mapped into numerical values as shown. To avoid confusion later, note that lower numerical ratings imply *higher* risk.

The data are summarized in Table 2. The bank issues were broken out for comparison with other non-bank issues. The latter were further divided into one digit SIC categories or aggregates or subsets thereof.[7]

The issues by banks were considerably better rated than average, almost two notches better.[8] The bank issues were also somewhat shorter in maturity and smaller in face value. Note the variance differences as well. The *between* variance was lower for banks than for non-banks, indicating more clustering of the bank ratings around the mean. The *within* variance was higher for banks, however, suggesting that individual bank risk changes more over time.

Table 3 reports a variety of measures of disagreement between the raters. These statistics are provided only for informal, unconditional comparisons across sectors; formal tests that control for the differences just noted come after.

Virtually every measure of disagreement in Table 3 suggests greater uncertainty over banks and their sister intermediary, insurance firms. The gap between the mean rating for each agency was four times higher for banks than for the typical non-bank issue. Only insurance companies, perhaps the most bank-like sector in the economy, had a larger average rating gap than banks.[9] The rank correlation between ratings, though high overall sectors, is lowest for bank and insurance issues.

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[7] Agriculture, forestry, fishing, and construction were combined because those sectors issues so few bonds individually. Trade, retail and wholesale, were also combined. Finance, insurance, and real estate were subdivided into banks, insurance, and other finance and real estate.

[8] "Bank" includes the holding company.

[9] Insurers' primary assets are privately placed, long-term loans that resemble bank loans in contractual terms (Carey et al. 1993). Differences on the liability side may explain why insurers appear even more opaque than banks; the indemnity risk at insurers may be more uncertain to outsiders the liquidity risks at depository institutions like banks.

The kappa statistics in Table 3 are a measure of disagreement used in biometrics. Kappa essentially locates raters along a spectrum between complete disagreement (kappa = 0) and complete agreement (kappa = 1).[10] The range of kappa in Table 3 suggests a continuum of uncertainty across sectors as well, with banks and insurers at one end and the more asset backed borrowers or bonds at the other. Kappa for banks was only 0.3, compared to 0.45 for other (non-bank) issues as a whole. Kappa for insurers was only 0.09, the lowest of all sectors. The relatively high Kappa for utility issues makes sense; utilities are very capital intensive, their cash flow is largely exogenous (which reduces agency problems), and they are regulated. If ever there were a candidate for "most transparent," utilities would surely be a contender. The highest kappa was in other finance and real estate. Issues from the finance companies and real estate investment trusts in this sector were mostly "asset backed" bonds secured by a specific and homogeneous collection of assets that are "locked up" in a special purpose vehicle. This structure, which reduces the risk of asset substitution, evidently makes the securities very safe (see Table 2) and very certain to outsiders.[11]

The last and most obvious measure of disagreement reported in Table 3 is the percentage of "split" ratings, where the ratings by each agency differ by one or more notches. The frequency of splits across sectors suggests the same continuum of uncertainty as some of the other measures. Splits were relatively frequent in banking and insurance and relatively rare in utilities and in other finance and real estate. The width of the splits over banks--the mean absolute difference between ratings-- was also relatively large for banks and insurers.

2.1. Regression results

To test whether the frequency and extent of disagreement between raters was higher for bank issues, we estimated probit and ordered probit regression equations:

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[10] Kappa = $[p - E(p)]/[100-E(p)]$, where p is the percent of the bonds where the raters agree and $E(p)$ is the proportion of agreement expected at random, given the distribution of ratings. See Stata (1999, vol. 2) for references.

[11] The low kappas and high rate of splits mining, trade, and agriculture, forestry, etc. issues are less notable as those issues were all very risky.

$$disagreement_{itk} = f(average\ rating_{it}, maturity_{it}, face\ value_{it}, year_t, issuer\ type_k) + e_{itk}$$

The dependent variable is either of two measures of t disagreement between the raters: a 0/1 indicator variable, SPLIT, or the absolute difference between ratings: 0, 1, 2, 3 +. Both the frequency and the extent of disagreement are intended to measure uncertainty about characteristics of an issue and about the type of issuer. Uncertainty may depend on the level of risk, hence the average of Moody's and S&Ps ratings on the right side. *A priori,* we expect more uncertainty over riskier issues, implying a positive sign on *average rating*. Given risk, we expect more uncertainty over longer-term issues, implying a positive sign on *maturity* as well. *Face value* is almost surely correlated positively with firm size (a common proxy for agency problems), leading us to expect negative coefficient on that variable. The issuer's type, bank or other, is indicated by a dummy variable for each sector. Dummies for the year of issuance are included as well, but not reported (we investigate timing later). Summary statistics on all the regression variables (except the year dummies) are in Table 3.

The regression results are in Table 4. The ordered probit estimates in columns 4-6 are slightly more significant, but the estimates with SPLIT as the dependent variable are very similar and much easier to interpret (column 1 - 3). These "dprobit" (Stata 1999) are like partial derivatives; they indicate the change in the probability of split rating associated with a small change in the continuous variables around their mean.

The probability of disagreement increases with the risk and maturity of an issue, as expected, and decreases with the size of the issue. While these variables were included primarily as controls, their relationship to the dependent variable supports the maintained hypothesis that bond rater disagreement manifests raters' uncertainty about risk.

The agencies do indeed disagree more frequently and more widely over banks. Conditional on the average rating and other characteristics of an issue, the probability of a split over bank issues was about 18 percent than for non-bank issues. This difference is higher than the 12 percent difference in Table 3 because the unconditional difference there did not control for the higher average rating and shorter maturity on bank issues, both of which tend to mitigate the uncertainty over banks.

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Column 2 allows a pairwise comparison between banks and the other sectors. The estimates on each sector dummies measure the difference in the probability of a split between that sector and the omitted sector. Only the insurance sector generated more frequent disagreement than banks.[12] The disagreement gap between banks and other sectors ranged from 13 percent for manufacturing to 25 percent for other finance and real estate.

The regression in Column 3 controls for the variance in ratings for each issuer. Recall that this within variance was relatively high for banks, which might explain some of the marginal uncertainty surrounding bank risk. In fact, disagreement between raters is positively correlated with the within variance, and with this variable included, maturity and face value tend to pale in significance.[13] The coefficients on the sector dummy do not change markedly, however, nor does the bottom line: bond raters disagree more over bank (and insurance) issues.

2.2. Symmetric or Lopsided Disagreement?

The disagreement between raters over banks is not symmetric, as one might expect, but lopsided, with one rater lower on average than the other. After documenting this fact, I develop a simple model to interpret it. The splits will be lop-sided in general if one rater happens to be more "conservative" than the other. The asymmetry between raters will be more pronounced, moreover, in more opaque sectors.

Moody's ratings tended to be lower here, not just for banks, but in general.[14] Of the eight sectors where the average ratings differed in Table 3, Moody's average was lower in six, substantially so for the insurance sector. The hypothesis that Moody's mean rating of all non-bank issues was equal to the mean for S&P can be rejected at the seven percent level. The one-tailed hypothesis that

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[12] The low rate of issuance and high rate of split in mining are obviously related, although it is hard to say which fact explains the other. In a study of financial constraints in oil and gas mining, Reiss (1989) makes the firms in those industries sound opaque. Investors are warned in prospectuses about the "difficulty of assessing a project's risks" (p. 20) and he notes that these firms primary asset--their oil and gas reserves-- make uncertain security for bond holders since "outsiders have a hard time determining the market value of a firm's reserves . . ." (p. 23).

[13] The sector dummies help control for differences in between variances across sectors.

[14] Cantor and Packer (1994) noted this fact as well.

Moody's mean rating was *lower* than S&Ps (in numerical terms) can be rejected at the one percent level.

The lopsided aspect of the splits is visible in Chart 1. Splits on investment grade bonds (under 11) typically occurred when Moody's rating was above S&P's, both for banks and other issues as well. Splits in the speculative range usually had S&P on top. The underlying cumulative distributions for each agency are reported separately in Table 5, with the largest gaps between them highlighted. Moody's distribution is furthest below S&Ps at four. The equality of the distributions at that point, or the hypothesis that Moody's is *above* S&P's, can be rejected at the five percent level. While the gap between the distributions is larger for the split-rated bank bonds (column 3), it is significant for other split-rated issues as well (column 4). Lop-sided splits are not unique to banks in this range, in other words, just more lop-sided. The crossing points the other way are different for banks and non-banks. Moody's distribution of ratings on non-bank issues is furthest *above* S&P's at 15, and the gap there is significant. The crossing point for banks is at six, but the gap there is *not* significant.

2.2.1 A Model Predicting More Lopsided Splits in More Opaque Sectors

If one agency rates more conservative than the other, the splits between them will obviously be lopsided. The splits will be *more* lopsided, moreover, in the more opaque sectors. Here is the idea. Uncertainty about the precise risk of a firm will cause the raters to overrate some relatively risky firms and underrate some relatively safe firms. "Conservative" raters, by definition, worry more about overrating so they choose to err on the safe side by applying tougher standards. The difference in standards causes lopsided splits generally, across all sectors that is. Splits are more lopsided in more opaque sectors, however, because the heightened risk of overrating causes the more conservative rater to apply even tougher in that sector. In essence, conservative raters err further on the safe side in more opaque sectors, implying more lopsided splits.

The ratings model developed here to illustrate this idea is very simple; it is certainly *not* intended as a complete model of the rating process. The intuition above seems compelling, however, suggesting that it hold in more elaborate settings as wells.

The basic problem for each rater is to choose a cutoff value for converting their noisy numerical estimates of default risk into letter ratings. Let D denote the true probability of default. The issuer knows this parameter but outsiders, like the raters, must estimate D. Let $F(D)$ denote the distribution of estimates for each rater and let f denote the associated density function.. The wider this density around, the greater the uncertainty surrounding the risk of an issue. Rather than reveal their noisy estimates of D, raters publish letter ratings. The optimal number of ratings would be an interesting problem, but we assume just two ratings here: A or B. The raters use a cutoff rule to convert their estimates of to ratings: $D \leq c \Rightarrow A$; $D > c \Rightarrow B$. Given c, the probability (rating = A) ^{o} $P(A) = F(D)$ and $P(B) = 1 - F(c)$.[15]

The uncertainty surrounding the true risk of an issue will cause *mis*ratings; some relatively safe bonds will be underrated and some relatively risky bonds will be overrated. These mistakes are costly to the raters; issuers of underrated bonds will object to their rating, as will the investors in overrated issues (once they learn the truth).   For simplicity, overrating and underrating are defined here in an *ex post* sense, in terms of default; we will say an issue was overrated if, given an *A* rating, the issuer defaults.   An issue was underrated if, given a *B* rating, the issuer does *not* default.[16]   Raters here are basically trying to sort bonds into "risky" and "safe" categories; if the default rate on the risky *B* bond is *too* low, the classification starts to lose meaning and the raters start to lose business.

Let the costs overrating and underrating be denoted by C^o and C^u. A rater is relatively conservative, we will say, if they worry more about overrating than about underrating: $C^u < C^o$. All we really need for our point here to go through is that this ratio can differ across raters, which does not seem unreasonable; these are essentially utility parameters, and the raters are different people working at different agencies.

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[15] The distribution of estimates is assumed to be the same as the distribution across a sector.

[16] It is much easier to defining these events in an *ex* post sense, in terms of default, than in an *ex ante* sense, which would require two distributions for , one actual and one observed. The latter analysis quickly gets complicated.

Given their respective costs, each agency chooses a cutoff value that minimizes the expected costs of overrating and underrating. We do not bother with subscripts, so bear in mind that these costs vary across raters. Letting D denote default, the optimal cutoff solves:

$$\arg\min_{c\in[0,1]} E(c) = C^o P(D \mid A) + C^u P(\sim D \mid B) \quad subject\ to$$

$$P(D \mid A) \equiv \int_0^c \mathbf{r} f(\mathbf{r}) / F(c)$$

$$P(\sim D \mid B) \equiv \int_c^1 (1 - \mathbf{r}) f(\mathbf{r}) / [1 - F(c)]$$

The constraints are just the definitions of overrating and underrating. Note that as the cutoff c increases, the probability of overrating rises and the probability of underrating falls. The rate of change in both cases is less than unity in absolute value. Note the limiting values of these probabilities as well: $c \to 0$ $\Rightarrow$ P(D|A) $\to$ 0 and P(~D|B) $\to$ 1; $c \to 1 \Rightarrow$ P(D|A) $\to$ 1 and P(~D|A) $\to$ 0.

The first-order condition determining the optimal cutoff is:

$$\frac{C^u}{C^o} = \frac{1 - F(c)}{F(c)} \ x \ \frac{c - P(D \mid A)}{1 - c - P(\sim D \mid B)} \qquad (1)$$

A rater with symmetric costs ($C^u = C^o$) sets $c = \bar{\rho}$. Dividing the distribution down the middle implies equal fractions of A and B ratings and equal probabilities of overrating and underrating. A more conservative rater ($C^u < C^o$) chooses a lower cutoff value, as the figure (top) illustrates. Clearly, $c = \rho$is *not* optimal for the more conservative *m;* dividing the distribution equally implies too many *A's* and too many overrated issues. Rater *m* lowers his cutoff until the ratio of costs on the left side of (1) equals the product of ratios on the right.

Split ratings occur whenever the estimates of **D** by each rater fall on opposite sides of their respective cutoffs. If their cutoffs were the same, splits would still occur but the *average* rating by each

agency would be the same, i.e., the splits would be symmetric. Differences between the cutoffs will produce lop-sided splits, with the more conservative rater, of course, on the downside more often. A larger gap between their cutoffs implies more lop-sided splits.

Increased uncertainty drives the raters' cutoffs further apart, implying even more lopsided splits in more opaque sectors (figure, bottom). The greater uncertainty in sector y implies a wider density around the mean, and hence, a flatter distribution F.[17] Heightened uncertainty in y implies greater risk of both underrating and overrating--that is what uncertainty means. The response of each rater to the uncertainty in y depends on the ratio C^u/C^o for each rater. Rater s does not change his cutoff, as the costs of overrating and underrating are symmetric. The more conservative m is more sensitive to the increased risk of overrating in y, so he lowers his cutoff (compared to x). The larger gap between the cutoffs implies even more lopsided splits in the more opaque sector, precisely as observed above.

2.3 The Demise of "Too Big to Fail" and the Onset of Uncertainty

Disagreement between the raters over banks increased markedly in 1987 (Chart 2, top).[18] Before 1987, the proportion of split-rated issues by banks was approximately the same as in other industries, even a bit lower. The only outlier in those early years was the insurance sector. After 1986, the picture changes. Split-rated issues become increasingly common in banking and increasingly *un*common in other industries.[19] Splits in banking were about as common as in insurance by 1993, and much higher than in other sectors.

The demise of "too big to fail" and federal bank regulators' implicit promise to bailout the largest U.S. banks--and their holding companies--could explain the heightened uncertainty about banks after 1986. Flannery and Sorescu (1996) trace the rise and fall of this doctrine. Shortly after the Continental Illinois Bank bailout in 1984, the Currency Comptroller admitted to Congress that he

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[17] Note that the mean of has not changed, just the variance; the distribution for y is a mean preserving spread of the distribution for x.

[18] I thank the referee for recommending that I investigate this issue.

[19] The downward trend in other sectors after 1986 could reflect the unwinding of uncertainty associated with the severe recession in 1981-82.

considered the largest U.S. banks simply "too big to fail" (without unacceptably hazards to the financial system). Stock returns of the lucky eleven banks actually named as such rose abnormally following this remarkable announcement (O'Hara and Shaw 1990), suggesting the implicit guarantee to bank holding company investors was valued in the market.[20] The certainty associated with this guarantee also explains the high rate of consensus between bond raters over this era.   The demise of TBTF began around 1986, when regulators devised ways to save the bank without sparing the holding company.[21] As stocks and bonds are typically issued by the holding company, this innovation substantially weakened the implicit government guarantee to holders of these claims. In fact, the relationship between bank bond spreads and risk tightened considerably after 1986 (Flannery and Sorescu 1996), suggesting that investors were trying to heed the risks of their bank holdings.[22]

Trying perhaps, but not necessarily succeeding; increased disagreement between bond raters after 1986 suggests that evaluating bank risk was not trivial for the agencies. Disagreement between the raters after 1986 was even more pronounced over the erstwhile TBTF banks (chart 2, lower), suggesting that shift in regulatory policy did indeed contribute to raters' uncertainty after 1986.

The obvious question here is whether it was the banks raters were unsure about, or the regulators? The credibility of the policy shift away from TBTF was not unquestioned; raters may simply had differing estimates about regulators' resolve to actually permit a very large U.S. bank to fail. Perhaps raters were disagreeing about the probability of a bailout, in other words, and not the

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[20] The comptroller did not actually name banks, but the Wall Street Journal did: Bank America, Bankers Trust, Chase Manhattan, Chemical Bank, Citicorp, Continental Illinois, First Chicago, JP Morgan, Manufacturers Hanover, Security Pacific, Wells Fargo (O'Hara and Shaw 1990).

[21] When First National Bank of Oklahoma City failed in July 1986, the FDIC underwrote a transaction whereby the purchaser of the failing bank accepted the obligations of the *bank* only; the holding company of the bank defaulted on its notes and debentures. Many of the bank and thrift failures after that event involved losses to the bondholders of the holding company.

[22] Avery et al. (1988) documented the weak link between bank holding company bond spreads and risk during the very early 1980s. Gorton and Santomero (1990) confirm their findings.

probability of default. To show that the uncertainty over banks was in fact the banks *per se*, disagreement between the raters must be linked to the assets of the banks themselves.

3. The Opacity of Banks' Assets

Drawing from the intermediation and agency literature, this section argues that the unique nature of banks assets, combined with their high leverage, create fundamental uncertainty for investors and analysts. Analysts are quoted throughout this section to reinforce the theory, but the real evidence comes later.

3.1. What's Different About Banks?

At the most basic level, it is the financial nature of their assets that distinguishes banks from other firms. The heart of a bank is a vault with a lot of paper in it: loan documents, securities, and cash. Compared to other firms, banks hold very few assets that are physically fixed--bolted to the floor--in other words. The absence of fixed assets may invite asset substitution and other agency problems between the banks' owners and managers and its creditors. Financial assets generally may create collateral uncertainty for bank investors.

The particular financial assets held by banks may invite agency problems as well. Primary among their assets are loans to smaller, more opaque borrowers identified as the *raison d etre* for banks (Diamond 1984). In theory, savers delegate this monitoring role to banks or other intermediaries so that each and every saver need not monitor borrowers directly. This delegated monitoring role may be efficient from a capital allocation perspective, but bank opacity may be an inevitable consequence: Lending to opaque borrowers may cause opaque banks.[23] Moody's analysts readily admit the difficulty of evaluating bank loan quality:

> The assessment of a bank's asset quality is both the most important and the most difficult
> element of bank analysis. Perhaps the biggest risk in holding a bank security is that the
> institution as substantial unrecognized asset quality problems. . . As there can be no
> objective standard in this area, the analyst must exercise his or her judgement using

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[23] Whether banks are better informed about the *aggregate* risk in their loan portfolio, however, depends on if banks fully diversify their loan portfolios. If banks are able to fully the diversify the idiosyncratic risk of their loans, outsiders only have to agree on the aggregate risk that banks are unable to shed. Krasa and Villamil (1992) present a model in which limited diversification is optimal because of monitoring costs associated with diversified portfolios.

what can only be impressionistic information. *The analyst cannot examine each loan."* (Moody's Special Comment, 1993, p. 3, emphasis added)

Trading assets are another potential source of uncertainty for bank outsiders. Unlike bank loans, trading assets are necessarily transparent, and hence, liquid. The trouble with trading is that positions are slippery; traders can change positions so rapidly that outsiders cannot keep track. Myers and Ragan (1997) call this the "paradox of liquidity;" liquidity enables trading and trading is hard to monitor. Hentschel and Smith (1996) also stress the agency risks associated with trading, not just between owners and creditors, but between traders and their principals: managers and shareholders.[24] Traders are motivated to take excessive risk because of the asymmetric incentives they typically face; they share the upside, via bonuses, but downside liability is limited. Trading positions are relatively easy to conceal, they further note, by the use of leverage (which minimizes the detectable impact on cash flow). Analysts, Moody's again,

admit the uncertainty surrounding trading activity: ". . . monitoring traders can be cumbersome . . . (the) manager or auditor may be potentially at a lost about what is going on (Moody's Special Comment, 1992, p. 4).

Compounding the inherent uncertainty over these sorts of assets is the high leverage at banks. Apart from the inherent risks associated with high leverage, it may also invite agency problems, as shareholders are of leveraged firms are inclined to take more risk than creditors bargained for (Jensen and Meckling 1976). Banks can effect this asset substitution by following riskier loan underwriting and trading strategies. Analysts recognize the role of capital as a risk mitigating or signaling device:

> Capital levels provide a readily accessible indication as to where
> management wishes to place the bank on the risk/return continuum...
> Banks with high capital levels tend to have good asset quality and
> conservative strategies, while those with low capital levels often are
> aggressive and risk-prone. This is not an infallible tool, but it is accurate
> often enough to be useful (Moody's Special Comment, 1993, p.5).

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[24] Catastrophic trading losses at banks highlight the agency risks of "rogue" traders. Baring, a venerable British bank, was bankrupted by a single trader. At Daiwa Bank, a senior bond trader managed to lose over $1 billion while maintaining secret accounts for eleven years (Hentschel and Smith 1996).

3.2. Disagreement over Bank Assets

To test whether banks' assets generate uncertainty for raters, we now combine the ratings data on bank holding companies (BHC) with detailed data on their assets. The asset data are from the regulatory Call Report BHCs must file (form Y9C). Issues after 1986:2, when the Call Reports became quarterly, were matched with balance sheet data from the quarter before issuance. Issues before 1986:2 were matched with call report data from one or two quarters before issuance, whichever was available. Complete data were available for 532 bonds issued by 96 different BHCs or their subsidiaries.

The assets are summarized in Table 6. Loans and leases make up the bulk of banks' assets, followed by securities and cash and deposits. Trading assets comprise only a small share of total assets on average, but the range of values is large; trading has become a big business indeed for roughly a dozen, large "trading" banks.[25] Taken together, these and the other financial assets account for over 90 percent of all bank assets on average. Fixed assets, by contrast, make up only about three percent of assets. Banks' have their premises and the real estate they collect on defaulted loans ("other real estate"). Note the high leverage at banks as well; the capital-to-asset ratio averaged only 6.3 percent, much lower than for non-banks as a whole.

To test how variation in the mix of banks' assets affects uncertainty about its risk, we regress the absolute difference between the ratings (0,1, 2 +) on these various asset shares.[26] The regression included the average rating and other issue characteristics, as well as year dummies for the years of issuance. Estimation was by ordered probit. The results are in Table 7.

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[25] Included in the trading account are "the assets held for resale by a bank holding company that regularly engages in trading activities. Assets in trading accounts are to are generally held for a short period of time. Trading accounts...contain only instruments purchased with the intent to resell." (Instructions for Federal Call Reports, form Y9-C). Also included are gains and losses on derivative contracts--options, futures, etc. The notional amounts of these contracts are counted *off*-balance sheet. Securities to be held to maturity are counted in the securities line of the balance sheet.

[26] The 18 differences of three notches and one difference of four were rounded to 2. Not rounding does not change the results. Using SPLIT instead of the absolute difference produces very similar results.

Disagreement between raters is positively related to the average (numerical) rating on bank issues, as was found for issues generally. Face value enters negatively, as before, but is only weakly significant here. Maturity is insignificant. The year dummy coefficients confirm the marked increase in disagreement after 1986 and the demise of "too big to fail."

Of primary interest is how variation in the asset shares across banks affects disagreement between the raters. The excluded asset is securities, which makes it the benchmark; the other asset coefficients indicate how substitution into that asset *out* of securities affects the difference between ratings. As a whole, the mix of assets does matter; a *Chi*-squared test easily rejects that the coefficients are jointly zero. The total of assets matters as well, although the alternating signs on total assets and its square suggest a quadratic (two-edged) relationship between bank size and uncertainty.[27]

The individual assets coefficients are consistent with theories just discussed. Loans and leases enter negatively, implying more disagreement between raters as banks substitute loans for securities. Trading also increases the likelihood of disagreement, as do increased holdings of cash and deposits. Although not predicted, the latter result seems consistent with the results on trading; cash is by definition the most liquid of assets, with all the attendant risks of agency problems.[28]

Banks' more fixed assets tend to resolve uncertainty.[29] *Premises* is negative and significant. *Other real estate* also enters negatively, though the coefficient is insignificant. The opposite signs on

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[27] Size may be a two-edged sword for analysts; bigger banks may be better diversified, meaning less concern about the idiosyncratic risks at each bank, but greater size also means analysts must consider managers' ability to cope with more complex, less focused operations. See Demsetz and Strahan (1997) for evidence on bank size, diversification, and risk.

[28] Jensen's (1986) free cash-flow hypothesis provides another explanation: creditors (or analysts) may be nervous when the see excessive cash holding, since they cannot be sure how the managers will dispose of the cash. This cash result holds even if the banks with very high cash holdings are excluded. Simply accounting for cash can be tricky, as Guthman (1953, p. 76) warns in his guide to financial analysts: "Cash on hand has been distorted by the inexpert and the unscrupulous to mean a variety of items. It has been stretched to include "IOU's" to employees loans to officers, advances to salesman, and similar noncash items. Cash-on-Hand...should be comparatively small; if it is not, the possibility of some such error as is here indicated should be considered."

[29] While the coefficients are premises and other real estate arean order larger than on loans, recall that the mean and standard deviations of the former are an order smaller. Note that *other real estate* also enters negatively, although the coefficient is insignificant.

trading and premises have a nice symmetry, since on the spectrum of agency risks, these two assets seem like the endpoints. The rub, of course, is that fixed assets are rare at banks as a whole.

Disagreement between the raters is also decreasing in the level of capital, also as expected. The link here between capital and rater disagreement presumably reflects the role of capital role in resolving uncertainty; the risk-reducing role of capital should be picked up with the average rating.[30]

3.2.1. Capital Mitigates Uncertainty

The potential for capital to resolve uncertainty implies an interaction between banks' capital positions and outsiders' uncertainty about their risk. If capital mitigates the agency problems associated with banks more opaque or slippery assets, the impact of increased lending and trading on rater uncertainty should be less pronounced at more highly capitalized banks. To investigate, the sample of bank issues was divided at the median capital-to-asset ratio of the issuers and regression above was estimated separately for the low-capital and high-capital issuers.

The results in Table 8 largely support the hypothesis. Loans and leases cause disagreement between bond raters only if the bonds are issued by relatively poorly capitalized banks. Likewise with trading; trading assets are more likely to cause bonds split only at the banks with below median capital ratios. The effects of *premises* are very similar across high capital and low capital banks, but increases in the banks' other fixed asset (*other real estate)* reduces the disagreement only the poorly capitalized banks. The effect of changes in overall asset size also depends on capitalization; assets enter significantly for the low-capital banks, but not the high-capital banks. The coefficients on the bond characteristics were not significantly different across the two sets of banks. The equivalence of the year dummy coefficients across the two sets cannot be rejected (except for 1985), but the increased disagreement after 1986 appears somewhat more pronounced at the low-capital banks.

3.2.2. Fixed effects

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[30] The average numerical rating is in fact strongly, negatively correlated with bank capital.

A regression with a fixed effect for each issuer is estimated as a final robustness check. Adding a fixed effect tells us if whether is variation in the mix of assets across or within banks behind the results in Table 7. Trading assets, for example, are concentrated among a dozen or so "trading" banks so there is a question of whether it is trading *per se* that confuses the raters, or whether trading simply signals some other difference about these banks. Adding fixed effects to an ordered probit equation is not trivial, however, so instead we report OLS estimates with and without a fixed effect (Table 9).

Adding a fixed effect leaves most of the results unchanged. Substitutions of loans and leases for securities with a bank increases disagreement between raters, as do substitutions of cash and trading assets for securities. Increased capital within a bank reduces disagreements, with or without the fixed effect, but the within estimates (with the fixed estimates) are more significant.

Adding the fixed effect reverses the sign on premises, however. Variation in premises between banks, in other words, tends to reduce disagreement between the raters. That result is consistent with the earlier, probit estimates. Increased premises *within* a bank, however, tends to increase disagreement, perhaps because of the uncertainty associated with bank (via acquisitions of banks with branch networks). In any case, variation across banks seems like the relevant experiment here, and those results square with the idea that fixed assets tend to reduce the uncertainty associated with asset substitution. Note that *other real estate—*the other fixed asset at banks--is significantly negative with the fixed effect included.

4. Conclusion

Disagreement between bond raters makes a good proxy for the uncertainty associated with asymmetric information and other such frictions.[31] Splits between Moody's and S&P increase with average of the two ratings, as one would expect if risk and uncertainty are positively related. Disagreement between raters also increases with maturity (given risk), but decreases with the size of the issue, presumably because the smaller issues are by smaller, more opaque firms.

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[31] Bonaccorsi di Patti and Dell' Aricia (2000) use split bond ratings to investigate how information asymmetries between bank and borrower affect the birth of new firms in Italy.

The pattern of disagreement across sectors suggests a continuum of opacity, with the more asset-backed sectors or securities at the transparent end and the financial intermediaries--banks and insurers--at the other. Utilities and the assets backed bonds favored by finance companies generated relatively little disagreement between raters, suggesting the risk of these industries (or securities) are relatively easy to quantify. The raters were much more likely to differ over insurance and banking firms' bonds. The splits over the intermediaries was also more lop-sided, the predicted by the model of ratings under uncertainty developed here. The timing was right as well; splits over banks increased markedly after 1986, consistent with Flannery and Sorescus' (1990) thesis that the demise of "too big to fail," after that date forced investors and raters to heed the risk of banks more closely.

In any given year, the disagreement over banks can be traced to their assets, suggesting the veil is to some extent inherent to the business. Loans--the defining asset of a bank--are a significant source of disagreement between raters, as are the trading assets that are prominent on the books of the dozen or so large, trading banks. Trading assets are not necessarily opaque and illiquid, like loans, they are extremely liquid and "slippery;" trading positions can change instantaneously, which makes them hard to monitor from outside the bank. Cash also creates splits between the raters, while premises or banks' other fixed assets tend to reduce disagreement; the vault, in other words, matters more than the cash it contains, presumably because cash can disappear but the vault is hard to move. Short of nailing down more of their assets, some degree of uncertainty over banks seems inevitable.

The relative opacity of banks provides some justification for government intervention in the banking market, since runs, contagion, and other strains of systemic risk stem ultimately from the opacity of banks' assets. Saying that does not imply necessarily imply that the current regulatory structure is optimal, of course. The push for increased market discipline and disclosure may shed light. But reformers should remember what they are dealing with. To use a popular metaphor: banks may be the black holes of the financial universe; hugely powerful and influential, but to some irreducible extent--unfathomable.

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Table 1

Moody's and S&P Bond Rating Symbols, Numeric Equivalent , and Interpretation

Moody's	S&P	Number	Interpretation
Investment Grade			
AAA	Aaa	1	Highest quality
AA+	Aa1	2	High quality
AA	Aa2	3	
AA-	Aa3	4	
A+	A1	5	Strong payment capacity
A	A2	6	
A-	A3	7	
BBB+	Baa1	8	Adequate payment
BBB	Baa2	9	capacity
BBB-	Baa3	10	
Speculative Grade			
BB+	Bal	11	
BB	Ba2	12	Likely to fulfill obligations;
BB-	Ba3	13	ongoing uncertainty
B+	B1	14	
B	B2	15	
B-	B3	16	High risk obligations

Source: Cantor and Packer (1994)

Table 2

Summary statistics on ratings and other characteristics of new bonds issued between 1983 and 1993, by type of issuer

Type of issuer	Number issues	Number issuers	Average rating [2]	St. dev. in ratings: [2] between	within	Average maturity (years)	Average face value ($ millions)
Bank	848	220	5.29	2.98	1.20	8.4	158.8
Other	7014	2410	7.14	5.48	0.94	13.5	176.8
Agriculture, Forestry, Fishing, Construction	40	29	12.36	3.65	0.42	11.2	131.9
Manufacturing	1858	661	8.52	4.49	1.03	14.2	201.0
Mining	107	43	10.92	3.13	0.74	14.3	172.9
Retail and Wholesale Trade	511	217	10.08	3.86	1.05	14.7	147.6
Services	341	161	10.72	3.34	1.37	12.8	125.5
Transportation	182	63	9.41	4.11	1.26	15.3	165.4
Public Utilities	1884	360	6.93	3.89	0.86	19.1	133.7
Insurance	150	69	6.23	4.31	0.83	14.0	138.1
Other Finance and Real Estate	1941	810	4.15	3.19	0.80	6.6	217.3

[1] Mean of numerical values of Moody's and S&P's rating. Higher value indicates lower rating (see Table 1).

[2] Standard deviation of average of Moody's and S&P's ratings of each issue. Within st. dev. calculated for same issuer across issues.

Between st. dev. calculated across issuers.

Table 3
Measures of Disagreement Between Bond Raters Over New Issues Between 1983 and 1993, by Sector

Type of Issuer	# Issues	Mean rating: Moody's	S&P	Corr(Moodys,S&P)	Expected Agreement	Kappa	Moody's ¹ S&P (% of issues)	Moody's < S&P (% of split issues)	Distribution |Moodys - S&P|: mean	(% of issues) 1	2	3+
Bank Issues	848	5.5	5.1	0.91	10.63	0.30	62.9	31.9	0.83	44.81	15.57	2.48
Other Issues	7014	7.2	7.1	0.97	8.29	0.45	50.0	49.9	0.65	38.80	9.27	2.67
Agriculture, Forestry, Fishing, Construction	40	12.5	12.2	0.96	14.62	0.30	60.0	33.3	0.73	50.00	7.50	2.50
Manufacturing	1858	8.5	8.6	0.97	7.96	0.39	56.3	56.2	0.74	42.30	10.76	3.22
Mining	107	11.1	10.8	0.95	7.37	0.23	71.0	35.5	0.93	50.47	18.69	1.86
Retail and Wholesale Trade	511	10.1	10.1	0.97	8.68	0.30	63.6	48.7	0.81	48.92	11.74	2.94
Services	341	10.7	10.7	0.97	9.29	0.38	56.3	44.8	0.68	45.75	9.68	0.88
Transportation	182	9.6	9.2	0.95	9.75	0.37	57.1	31.7	0.76	42.31	10.44	4.40
Public Utilities	1884	6.9	7.0	0.96	9.44	0.45	50.1	31.4	0.62	40.34	7.75	2.02
Insurance	150	6.7	5.8	0.94	10.16	0.09	81.3	17.2	1.33	44.67	22.00	14.67
Other Finance and Real Estate	1941	4.2	4.1	0.96	18.67	0.57	34.8	31.4	0.46	25.81	7.01	1.95

Higher numerical ratings correspond to lower grades (higher risk).

Expected agreement calculated using observed proportion of ratings by each rater.

Kappa = (expected agreement - actual agreement)/(100 - expected agreement)

Table 4: Disagreement Over Bank Bond Issues
Regression equations relating bond rater disagreement to characteristics of the issue and to the type of issuer.
Columns 1-3 report "dprobit" estimates: the difference in the probability of a split rating across sectors, or the
change in the probability associated with a small change in each bond characteristics around its mean.
Columns 4-6 report ordered probit estimates. Standard errors are reported in parenthesis. All equations estimated
using new bonds issued over 1983 and 1993. All regression include dummies indicating the year of issue.

	Dependent Variable = SPLIT[1]			Dependent Variable = |Moody's - S&P|[2]		
	(1)	(2)	(3)	(4)	(5)	(6)
Issue Characteristics:						
Average Rating[3]	0.024**	0.019**	0.015**	0.051**	0.043**	0.038**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Maturity	0.003**	0.001*	0.000	0.007**	0.004**	0.002
	(0.000)	(0.037)	(0.809)	(0.000)	(0.006)	(0.252)
Face Value (10 million)	-0.000**	-0.000**	0.000	-0.003**	-0.000**	0.000
	(0.000)	(0.000)	(0.527)	(0.000)	(0.000)	(0.281)
St Dev. In Rating	-		0.029**	-		0.067**
Within Issuer			(0.001)			(0.000)
Type of Issuer:						
Bank	0.182**	-	-	0.420**	-	-
	(0.000)			(0.000)		
Agriculture, Forestry,	-	-0.158	-0.135	-	-0.474*	-0.395
Fishing, Construction		(0.059)	(0.247)		(0.011)	(0.126)
Manufacturing	-	-0.125**	-0.115**	-	-0.296**	-0.269**
		(0.000)	(0.000)		(0.000)	(0.000)
Mining	-	-0.016	0.018	-	-0.115	-0.023
		(0.770)	(0.766)		(0.317)	(0.854)
Retail and	-	-0.093**	-0.056	-	-0.274**	-0.202**
Wholesale Trade		(0.002)	(0.098)		(0.000)	(0.006)
Services	-	-0.193**	-0.141**	-	-0.512**	-0.373**
		(0.000)	(0.000)		(0.000)	(0.000)
Transportation	-	-0.139**	-0.162**	-	-0.300*	-0.411**
		(0.001)	(0.000)		(0.001)	(0.000)
Public Utilities	-	-0.173**	-0.158**	-	-0.432**	-0.406**
		(0.000)	(0.000)		(0.000)	(0.000)
Insurance	-	0.197**	0.221**	-	0.546**	0.666**
		(0.000)	(0.000)		(0.000)	(0.000)
Other Finance	-	-0.258**	-0.164**	-	-0.586**	-0.382**
and Real Estate		(0.000)	(0.000)		(0.000)	(0.000)
Pseudo R^2	0.052	0.066	0.032	0.035	0.046	0.028
Number of Observations	7765	7765	6177	7765	7765	6177

** significant at 1%; * significant at 5%.   [1] SPLIT = 0 if Moody's = S&P; SPLIT = 1 if Moody's ~= S&P S&P. [2] 0,1,2,3 and higher

[3] Average of Moody's and Standard and Poor's ratings; higher rating indicates higher risk.

Table 5: Empirical Distributions of Ratings By Moody's and S&P

Reported is the percentage of bonds rated at or below each level by each rater.

Rating	All bonds		Bonds with split ratings		Bank bonds with split ratings		Other bonds with split ratings	
	Moody's	S&P	Moody's	S&P	Moody's	S&P	Moody's	S&P
1	11.09	11.04	1.06	0.97	1.31	1.88	1.03	0.83
2	13.75	13.81	4.26	4.38	9.76	9.38	3.42	3.62
3	20.26	23.12	9.50	15.07	18.39	31.14	8.15	12.63
4	27.44	31.26*	16.36	23.81*	29.46	45.22*	14.37	20.55*
5	41.39	43.06	32.96	36.20	53.10	57.04	29.90	33.04
6	55.41	56.02	47.29	48.48	66.04	65.10	44.44	45.95
7	62.73	63.69	56.22	58.08	70.92	81.24	53.99	54.56
8	69.38	69.42	64.59	64.66	82.55	88.74	61.86	61.00
9	77.44	76.65	73.05	71.52	92.31	94.75	70.13	67.99
10	81.60	82.12	77.28	78.30	97.19	98.12	74.26	75.29
11	83.29	83.87	79.76	80.90	97.56	98.69	77.05	78.19
12	84.72	84.48	82.33	81.86	98.31	98.87	79.90	79.28
13	87.59	86.57	86.14	84.16	99.06	99.25	84.18	81.87
14	90.55	89.93	90.03	88.81	99.44	99.62	88.60	87.17
15	96.95*	94.05	98.59*	92.95	100.00	100.00	98.38*	91.88
16	100.00	100.00	100.00	100.00	-	-	100.00	100.00
No. of bonds	7862	7862	4041	4041	533	533	3508	3508

The largest and smallest differences between the distributions are highlighted.

* Difference in distributions significant at 5 percent level, per Kolmogorov-Smirnov test.

Table 6 Assets and Capital of Bond Issuing Bank Holding Companies
Summary statistics calculated over 532 BHC-quarter observations comprising 96 distinct BHCs.
Balance sheet ratios were calculated the quarter before issuance (1987-93) or in the quarter
nearest issuance (1983-86).

	Mean	Std. Dev.	Min.	Max.
Total assets ($ billions)	0.66	0.6	0	2.23
Assets and capital *(% of total assets)*				
Loans & leases	63.09	12.23	21.78	88.62
Securities	11.77	8.06	1.56	41.12
Cash & deposits	11.59	5.79	2.17	43.16
Federal funds & repurchase agreements	3.32	2.96	0	17.24
Trading assets[1]	2.86	6.06	0	43.64
Premises	1.53	0.44	0.62	3.54
Other real estate[2]	0.36	0.4	0	2.59
Intangible assets	0.64	0.6	0	3.59
Other assets	4.84	4.88	0.01	21.65
Capital	5.69	1.3	3.06	9.89

Source: Bank Holding Company call reports (form Y9-C)

[1] Securities purchased with the intention of resale. Also included are
gains (losses) on derivative contracts based on such securities.

[2] Primarily property collected on defaulted loans and mortgages.

Table 7: Which Bank Assets Cause Disagreement Between Raters?

Ordered probit regression coefficients and p-values. The dependent variable is the absolute difference (0, 1, or 2) between Moody's and Standard & Poors' ratings on a bond at the date of issuance. Estimated over 533 bonds issued by 96 bank holding companies between 1983-93.

Assets and capital (as % of total assets - securities excluded):	Coefficient	P-value
Loans & leases	0.027**	0.007
Cash & deposits	0.033*	0.018
Federal funds & repurchase agreements	4.90E-02	0.065
Trading assets	0.066**	0.000
Premises	-0.309*	0.026
Other real estate	-2.66E-01	0.142
Intangibles	-3.30E-02	0.752
Other assets	0.056**	0.011
Capital/total assets (%)	-0.157*	0.03
Total assets ($ billions)	- 0.001**	0.002
Total assets squared	0.008E-2**	0.000
Bond characteristics:		
Average of Moody's and S&P's ratings[1]	0.088**	0.002
Maturity	-0.001	0.921
Face value ($10 million)	-0.001	0.087
Year dummies (excluding 1983):		
1984	-0.065	-0.788
1985	-0.145	0.559
1986	0.028	0.911
1987	0.670**	0.014
1988	1.320**	0.000
1989	0.987**	0.002
1990	1.093	0.077
1991	0.891**	0.007
1992	1.085**	0.002
1993	1.099**	0.006

Pseudo R2 = 13.6%
Chi2 (8) for test of joint significance of asset shares = 54.51
Prob > Chi2 (8) = 0.000
Number of observations = 533

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[1] Higher rating indicates higher risk.
** Significantly different from zero at 1 percent.
* Significantly different from zero at 5 percent.

Table 8: Bank Capitalization and Disagreement Between Bond Raters

Reported are ordered probit estimates and *p* - values (in parenthesis). The dependent variable is the average absolute difference (0, 1, or 2) between ratings. The sample of 532 bank bonds was divided by the capital-to-asset ratio of the issuer at the issue date. Year dummies not reported.

Assets and Capital (% of total assets):[1]	Capital/Asset < Median	Capital/Asset > Median
Loans and Leases	0.108**	0.008^^
	(0.000)	(0.453)
Cash & deposits	0.094**	0.037*
	(0.010)	(0.030)
Fed. funds & repo's.	0.078	0.057
	(0.273)	(0.075)
Trading Assets	0.145**	0.027^^
	(0.000)	(0.243)
Premises	-0.236	-0.232
	(0.481)	(0.162)
Other real estate	-1.313**	0.390^^
	(0.002)	(0.156)
Intangibles	0.065	-0.002
	(0.837)	(0.987)
Other assets	0.134	0.022
	(0.440)	(0.477)
Capital	-0.190	-0.106
	(0.440)	(0.307)
Total assets ($ billions)	-0.003**	0.002^^
	(0.000)	(0.793)
Total assets squared	0.001e-1**	-0.002e-1^^
	(0.000)	(0.614)
Bond Characterisitics:		
Avg. rating (Moody's & S&P's)[2]	0.121	0.029
	(0.067)	(0.575)
Maturity	-0.004	0.005
	(0.812)	(0.764)
Face Value ($10 million)	-0.001	-0.002
	(0.188)	(0.109)
Number of Observations	266	266
Pseudo R^2	28.20%	9.40%
LR Chi^2 (24): all coefficients = 0	162.34	51.7
Prob > Chi^2 (24)	0.000	0.001
Chi^2 (9): coefficients on assets and capital all = 0	55.63	26.38
Prob > Chi^2(9)	0.000	0.002

[1] Asset coefficients indicates change in dependent as bank subsitutes that asset for securities.
** Significantly different from zero at 1%. * Significant at 5 %.
^^ Significantly different from Column 1 coefficient 1%.
^ Significantly different from the coefficient in Column 1 at 5%.

Table 9: Disagreement Over Bank Assets: OLS and Fixed Effect Estimates

The dependent variable is is the absolute difference between Moody's and Standard & Poor's bond ratings (0, 1, 2+). Reported are regression coefficients (p-values in parenthesis) Estimated over 532 bonds issued by 96 bank holding companies between 1983-93. Year dummies included in both regressions (not reported). Securities is the excluded asset.

Bank assets and capital (as % of total assets):[1]	Fixed effect	No fixed effect
Loans & leases	0.033**	0.014*
	(0.003)	(0.012)
Cash & deposits	0.070**	0.020*
	(0.000)	(0.012)
Federal funds & repurchase agreements	0.049*	0.028
	(0.014)	(0.065)
Trading assets	0.045**	0.033**
	(0.002)	(0.000)
Premises	0.339*	-0.170*
	(0.023)	(0.030)
Other real estate	-0.480**	-0.156
	(0.000)	(0.128)
Intangibles	0.058	-0.031
	(0.494)	(0.605)
Other assets	0.035*	0.034**
	(0.029)	(0.008)
Capital/total assets (%)	-0.161**	-0.078
	(0.006)	(0.053)
Total assets ($ billions)	- 0.020*	-0.007**
	(0.007)	(0.007)
Total assets squared	0.009Xe-2**	0.040**
	(0.000)	(0.000)
Bond characteristics:		
Rating (average of Moody's and S&P's)2	0.071*	0.057**
	(0.027)	(0.007)
Maturity	0.003	-0.001
	(0.578)	(0.808)
Face Value ($10 million)	-0.0001	-0.001
	(0.715)	(0.101)
Adjusted R2	0.216	0.216
Chi2 (8) for test of joint significance of asset shares	7.291	30.55
Prob > Chi2 (8)	0	0

[v] Higher rating indicates higher risk.

** Significantly different from zero at 1 percent or lower

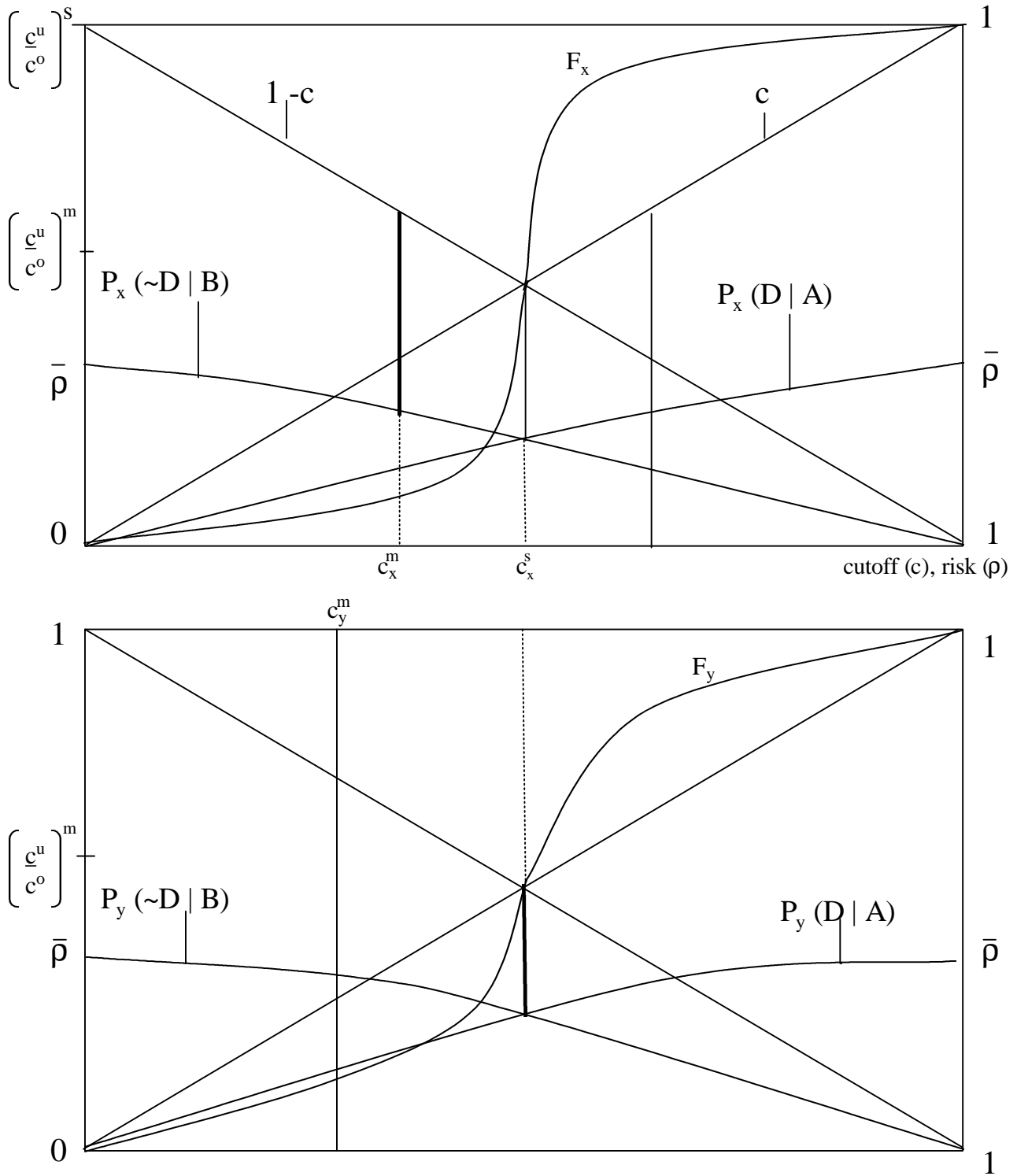*   Significantly different from zero between 1 and 5 percent

Figure 1: Greater uncertainty implies larger differences between raters' cutoffs, and hence, more lopsided splits.
Raters' estimates of the true risk of default (**D**) by firms in sector j are distributed $F_j(\mathbf{D})$. Estimates of **D** are converted to ratings using a cutoff rule: $\mathbf{D}$ # c $\curlyvee$ A; $\mathbf{D}$ > c $\curlyvee$ B. Each rater chooses a cutoff to minimize their expected cost of "overrating" (default on A rated bonds) and "underrating" (non-default on B rated bonds) in each sector. The optimal cutoff (omitting subscripts) solves $C^o/C^u = [c - P(D/A) / F(c)]/[1 - c - P(\sim D/B)]/[1 - F (c)]$, where C^o/C^u is the relative cost of overrating and underrating, $P(D/A)$ is the probability of overrating, and $P(\sim D/B)$ is the probability of underrating. Overrating is relatively costly to m, leading to more "conservative" cutoffs in both sectors. The cutoffs are further apart in the more opaque sector y (note the flatter F); s does not react to the heightened risk of overrating and underrating as the costs are symmetric; m reacts more to the higher risk of overrating in y by lowering its cutoff.

Chart 1: The Cumulative Distribution of Ratings on Split-Rated Issues: Moody's - S&P

Plotted is the percentage of split-rated issues rated at each level or lower by Moody's less the percentage so rated by S&P.
Distributions calculated over 4041 split-rated bonds issued between 1983-93. Table 5 reports the distributions.
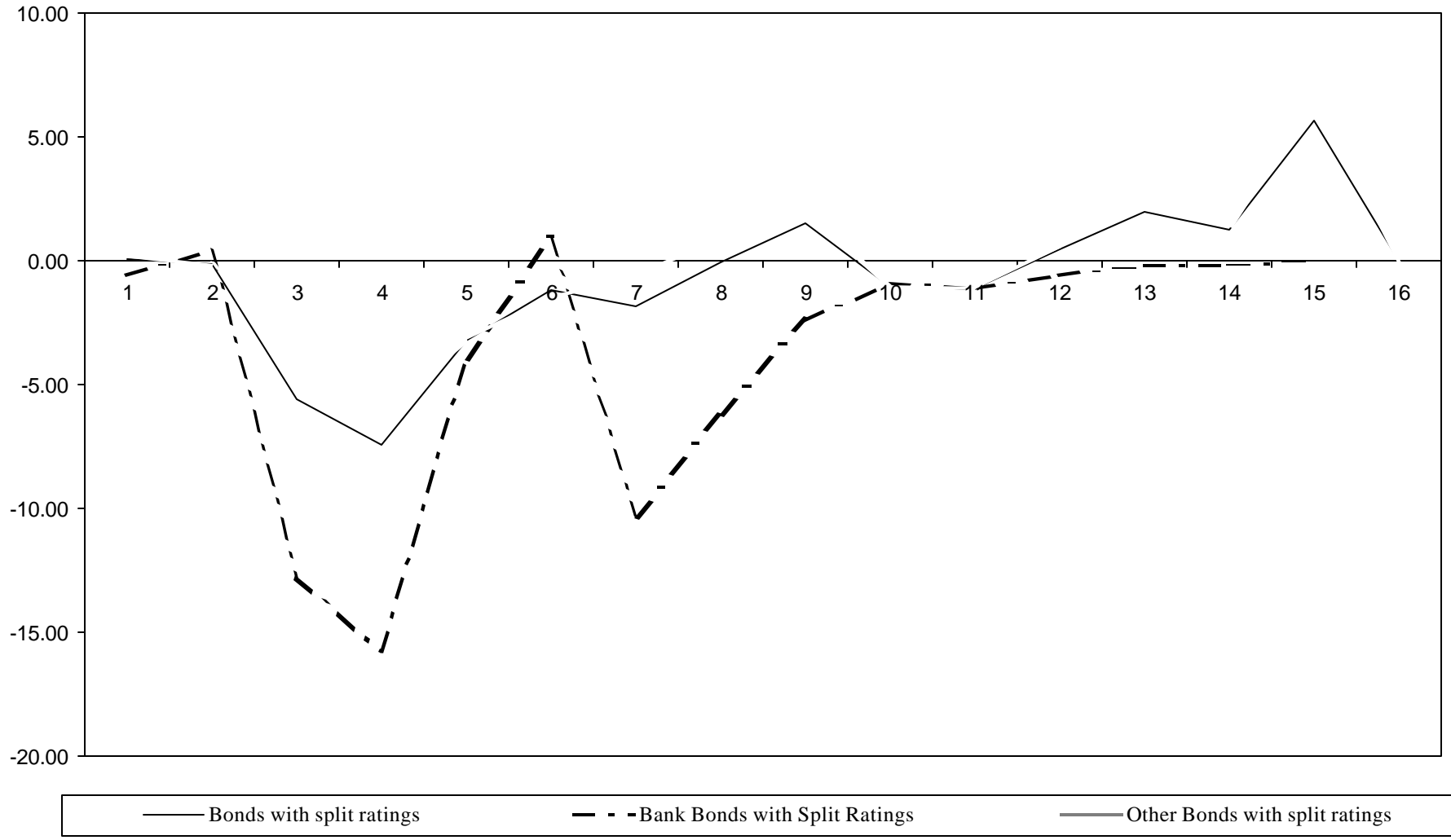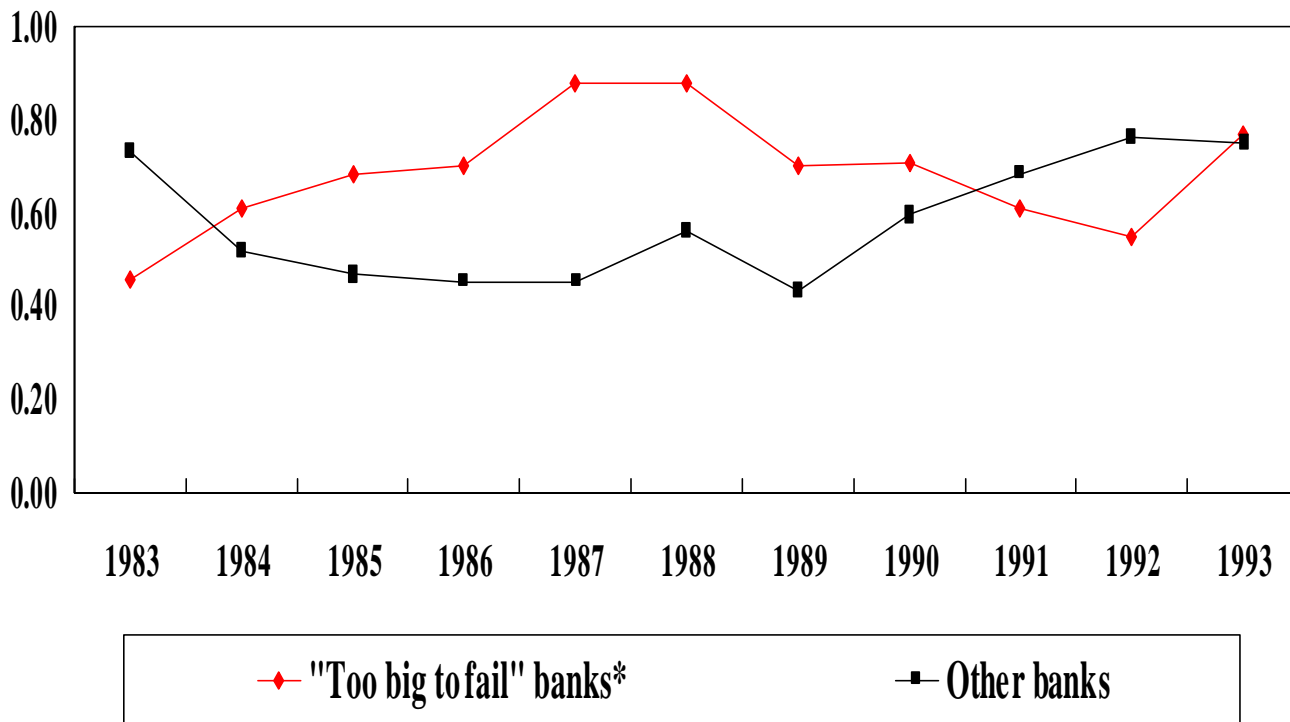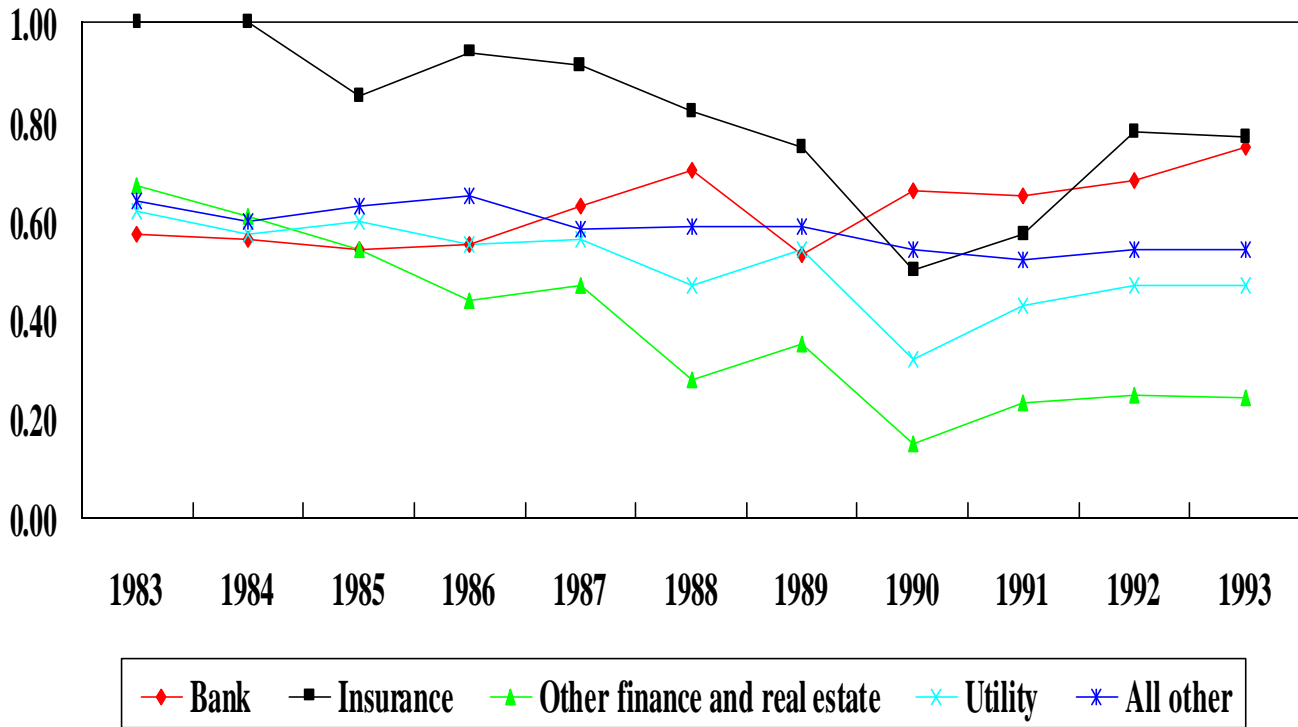

Legend: Bonds with split ratings — Bank Bonds with Split Ratings — Other Bonds with split ratings

Chart 2: Fraction of split-rated bond issues over 1983-93, by type of issuer

Legend: Bank | Insurance | Other finance and real estate | Utility | All other

Legend: "Too big to fail" banks* | Other banks

* As identified in O'Hara and Shaw (1990); see note 19.