RATINGS PERFORMANCE, REGULATION AND THE GREAT DEPRESSION:

LESSONS FROM FOREIGN GOVERNMENT SECURITIES

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Abstract

During the 1930s, rating agencies took up a central role in regulatory supervision that they still have today. We study the process through which they received this regulatory license. The proximate cause for this changeover was the economic shock of the Great Depression. Exploring the performance of rating agencies in assessing the risks of sovereign debt, an important segment of the bond market, we show that superior forecasting capacities cannot explain the agencies' growing importance. We argue that the agencies' perceived lack of conflicts of interest (in contrast to other financial intermediaries) was a major factor in bringing them to the forefront of a new regulatory regime.

> "Standard Statistics […] did not grow to be the world largest statistical and investment advisory organization by giving inaccurate information and unsound advice. Rather, its growth may be attributed to the fact that it has conscientiously – and successfully – endeavoured to furnish reliable information and advice which, while by no means devoid of error, is right far more often than it is wrong"
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> Advertisement by Standard Statistics, A rating corporation,
> Wall Street Journal, June 17, 1931

The role of rating agencies in setting the stage for the financial market turmoil that erupted in mid-2007 has been hotly debated as of late. While arguments had for some time been made that the ratings process for structured financial instruments exacerbated conflicts of interest (Partnoy 2001, 2006), the origins of the recent crisis in securitisations of sub-prime mortgages has provided further impetus to these concerns and a multitude of proposals for revised regulatory oversight of rating agencies have surfaced across the globe.[1]

Credit rating agencies have long been a lightning rod for criticism when financial markets were perceived to have failed. Following the East Asian crisis of 1997, many observers suggested that ratings agencies had amplified business fluctuations through hasty downgrades (Reisen & Von Maltzan 1999, Ferri, Liu & Stiglitz 1999). Rating agencies came again under scrutiny following the Enron debacle: some argued that the agencies had waited too long to voice doubt about the ailing conglomerate.[2] This was followed by the adoption of the *Credit Rating Agency Reform Act* of 2006, which was

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[1] . The agreement reached between rating agencies and New York's Attorney General's Andrew Cuomo last June lends credence to this view as it was meant to prevent "ratings shopping", in which new issuers play off rating agencies against each other in order to elicit the most generous credit rating. See "Status Cuomo; Credit-rating agencies", *The Economist*, June 5, 2008.

[2] . "Market watch; Post-Enron, All Eyes On Rating Agencies" Gretchen Morgenson, *The New York Times*, December 16, 2001.

intended to increase competition in the rating industry.[3] By contrast, many of today's critics view competition among agencies as a mechanism that contributed to a lowering of rating agency standards.[4]

The debates of the past decade raise the question of how and why rating agencies came to be used as a basis of regulatory frameworks in the first place. Given the recurring criticisms of agencies whenever financial markets fall into turmoil, such a decision may appear to have been ill advised.[5] The irony, however, is that rating agencies were discovered by regulators precisely in a period of deep distrust towards the market mechanism. The collapse of stock and bond markets that followed the Great Crash of 1929 had led to accusations of "banksterism". Banks, it was said, had failed to address the conflicts of interest between their role as gatekeepers and the fees they earned from selling securities to the public.[6] It may have been of importance that some people within the rating industry had publicly expressed concerns about the conflicted role of banking intermediaries.

It was against this backdrop that the Office of the Comptroller of the Currency (OCC) - a department of United States Treasury that was in charge of supervising nationally chartered banks - took an emergency decision in 1931 that depended heavily on rating agency judgements. In the midst of a wave of defaults and plummeting bond prices in 1931, the OCC instituted formulae based on credit ratings to book the value of US national banks' bond portfolios. The role of rating agencies was extended in 1936 when the OCC restricted the purchase by banks of securities with lower credit ratings. So while the current financial crisis has raised questions about the widespread reliance of regulations on rating agency judgements, it was the financial crisis of the 1930s that led regulators to start depending on rating agencies in the first place.

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[3] . See Hill (2004) for a sceptical appraisal.

[4] . See *Financial Times*, October 23rd 2008, on Waxman and Congressional hearings of rating agencies. Quote on competition bearing the blame. For an early discussion of the potential impact of ratings competition in structured finance ratings, see Cantor and Packer (1994).

[5] . As of December 3rd, 2008, the SEC (Securities and Exchange Commission) had not dropped explicit references to credit ratings from its own rules (*Financial Times*, "SEC set to crack down on credit rating agencies", December, 4th, 2008).

[6] . This point was initially made in the context of sovereign debts but it was then extended to all sectors of originations; see U.S. Congress, Senate (1932), Mintz (1951).

In this article, our goal is to understand why rating agencies emerged from the Great Depression with a considerably enhanced status within the US financial system, securing regulatory license from banking supervisors. One hypothesis is that the agencies had outperformed markets and thus emerged as a natural tool for regulatory purposes. To address this question, we have gathered and analysed data on ratings and financial markets during the debt cycle of the 1920s and 1930s. We focus on foreign government securities in the New York Stock Exchange, or the sovereign debt market. While this market was smaller than the corporate debt market, it nonetheless provides a useful test case of the performance of rating agencies. According to the conventional wisdom of the day, the sovereign market was where the abuse of investors by underwriting banks was the most rampant, and thus where the agencies' role as a "conscience of lenders" might have been most valuable.

We find little evidence to support this view. Rating agencies do not appear to have performed particularly well relative to financial markets in seeing the incoming mess approaching or judging relative risks of borrowers. When we compare the predictive power of agency ratings with that of synthetic ratings based on market yields, we find little that suggests superior performance could have been a critical motive for the initial delegation of a regulatory license to ratings.

The alternative view we articulate is the following: during the 1920s, rating agencies operated in an environment that was radically different from that of today. While today's incentives have, at least in the minds of some critics, tarnished the credibility of rating agencies as much as that of banks, the conflicts of interest they faced during the interwar era–when the rating industry was in its infancy–were perceived as very different from those of banks. When problems hit in the 1930s, banks came under ferocious public criticism. But rating firms earned revenues from selling their *Manuals* instead of charging the concerns they rated. They were not at all involved in the origination of securities. Barriers to entry in the rating business did not appear particularly large. All of this protected the agencies against accusation of wrongdoing and they were not a target of public criticism and litigation. Therefore, the agencies

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were in the early 1930s a ready-made alternative to certification of asset quality by banks. And since the key problem of the time was one of complete distrust in the ability of markets and private financial institutions to set prices correctly, ratings became a valuable and politically acceptable tool in the hands of regulators.

This paper stands at the confines of neighbouring literatures. The pioneering paper by West (1973) suggests an incidence of investment grade status for cross sections post WWII but not those before – assuming that the OCC regulations of the 1930s took some time to develop their full effects. Another set of relevant work comprises studies of the performance of ratings over various time periods. Hickman (1958) and (1960) examined performance of American corporate bonds in 1900-1943, looking at default rates across rating categories. Related works include Atkinson (1967) and Altman (1989). Today, rating agencies regularly report similar evidence in their bond default studies, some of which look back as early as 1920 (e.g. see Moody's (1997)). Moody's (2003), S&P (2007), and Fitch (2007) provide extensions of default studies to sovereign ratings. In general, research has documented a consistently negative association between default rates and credit rating categories.

Another relevant branch of research is the macroeconomic history literature that has studied the interwar sovereign debt boom and bust cycle although it has ignored ratings and explored various aspects of the international debt crisis of the 1920s (Winkler (1933), Lewis (1938), Rippy (1950), Mintz (1951), Wigmore (1985), Eichengreen and Portes (1988)). Yet another variety of papers questioned the wisdom of the Glass-Steagall Act's separation of commercial and investment banking using Moody's ratings as judges (Cleveland and Huertas 1986, Kroszner and Rajan 1994). Findings in this article may bring interesting light to these research concerns.

The remainder of the paper is organized as follows. Section I documents the rating agencies' emergence as an instrument for regulatory intervention in the 1930s. Section II discusses the dataset, the differences in rating policies among agencies, and the surge in sovereign defaults across many rating classes during the 1930s. Section

III reviews some conventional criteria for judging credit agencies performance, applies these to our new dataset and provides some insights on the performance of sovereign ratings in the interwar period. Section IV revisits rationales for the increased regulatory use of ratings in the 1930s. In conclusion, we provide some lessons that may be useful for the current debate.

Section I. The Rise of Rating's Regulatory License in the Interwar

Partnoy (2001, p. 5) portrays the business of rating as a fairly minor one until the 1920s. He notes that "early rating agencies were small and only marginally profitable", and suggests that rating agencies were only propelled to the forefront of financial markets with the emergence and receipt of a "regulatory license" in the 1930s. This was when regulators began to rely on ratings, effectively providing the agencies with property rights over certain forms of quality certification. At that time, the agencies were probably less fundamental a part of the financial system. Certainly they did not enjoy the kind of prestige or power that recently led a well-known columnist to compare them (favourably) with a "superpower".[7]

On the other hand, the relevance of ratings in that early period should not be discounted. An early paper by Babson (1910) surveys sources of information available to investors and gives emphasis to the rating agencies among the seven main sources available. He does mention three leading manuals and argues that "every stock exchange firm, bond dealer and bank should have all three publications each year" although he had a preference for Moody's. He carried on that "all those publications are ably managed and worthy of the support of all."

During the 1920s, growth in ratings demand and supply was obviously fuelled by the 1920s' boom in the New York securities markets. It coincided with a diversification of the products agencies offered to the market. By the time the stock market crash of 1929 occurred, the agencies had already secured attention in standard descriptions of the

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[7] . Thomas L. Friedman, interview, *Newshour* with Jim Lehrer, PBS, February 1996.

operation of the NYSE (Dice 1926). This and other anecdotal evidence suggest that there was a rising demand for informed opinion about sovereign and other credit risks.

Harold (1938) provides extensive evidence of a growing use of ratings by investors and government agencies.[8] He suggests that the relatively high price of the *Manuals* and their availability on bank facilities limited individual demand for subscription to the manuals but states that institutional investors were important customers.[9] He refers to Fowler (1928) and Robinson (1929) who describe how some investment trusts created during the 1920s used ratings to provide investors with reassurance on the solidity of their portfolio.[10] That trusts gave ratings producers a kind of de facto trustee status suggests that they must have been perceived as somewhat reliable. Against this backdrop, the gradual emergence of regulatory uses of ratings and its acceleration after the surge in defaults and bond market collapse in 1931 is less of a discontinuity than Partnoy argues.

The increased regulatory reliance on ratings occurred in the midst of a fragmented banking system in the US, where different authorities were in charge of supervising different institutions. National banks had a federal charter and were supervised by the Office of the Comptroller of the Currency, an independent agency under the formal authority the Federal Treasury. State banks had a State charter and were supervised by State authorities. All banks that decided to become members of the Federal Reserve System got also to be supervised by the Federal Reserve Banks.[11] But all bodies came to rely on ratings in the 1930s.

The initial use of ratings in financial supervision addressed the question of how credit risky securities should be valued. The post-1929 asset price deflation created balance sheet problems for US financial institutions. According to Osterhus (1931), the Federal Reserve Bank of

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[8] . Harold (1938) is the principal source on this. This is where we draw most of the evidence in this section.

[9] . Harold (1938), p. 25.

[10] . Robinson (1929), pp. 557-8. For instance, the United States Shares Corporation, created in 1927, advertised the following prudential rules for its investment policy: no securities rated below Moody's B; at most 10% securities below Moody's Ba; at most 50% below Moody's Baa; at least 20% of securities above A.

[11] . See White (2009) for a recent survey.

New York began in 1930 weighing reporting banks' bond portfolio quality using established ratings.[12] A frequently discussed move was the OCC's ruling, announced in the press as taking place on September 11, 1931. At the time bond prices were plummeting in the wake of the German financial crisis and a run on Sterling. The OCC ruling was reported to state that all Federal, State, and Municipal US securities, as well as other domestic and foreign securities belonging to any of the top four categories of ratings could be booked by banks at face value (Harold 1938), while other securities and defaulted bonds should continue to be marked to market. According to the *Wall Street Journal*, the regulation really formalized the administrative guidance already introduced in 1930, and was supported and endorsed by market participants.[13] Harold's classic account (1938) heavily emphasizes the September 1931 ruling as of critical importance to the credit rating industry, as have subsequent authors.[14]

Several points regarding the decision, however, are worth mentioning. First, secondary sources are agnostic as to whether the ruling referred to the ratings of any specific agency. The language used in the press is a reference to "statistical corporations". Second, it seems, again from these sources, that ratings could come from any of the agencies, implying that the highest rating was used, in contrast with modern practice.[15] Third, as far as we can tell, the unpublished decision did not

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[12] . Similar to many haircuts for reserving applied today, as well as the risk-weighted asset approach to assessing bank capital requirements (e.g. the standardized approach of the Basel II framework), weights varied with credit quality. In the procedure documented by Osterhus, the weights applied were 100% for securities rated in the top two categories, 90%, 80%, 50% and 10% respectively for the next four rating categories, and 0% after that.

[13] . Harold (1938) quotes a "mimeographed ruling" by J. W. Pole, which he may have seen. We corresponded with the archivist of the OCC and it looks like the document would have to be recovered from primary sources, if it survived at all. The sources that are still accessible to us are the *New York Sun* of September 11, 1931, the *Wall Street Journal* of September 12, 1931. Harold (1938) gives the *Commercial and Financial Chronicle (CFC)* of September 12. However, the *CFC* essentially reprinted parts of the *New York Sun* article. A later article supporting the move was "New York Banks agree on Values", *Wall Street Journal*, December 31, 1931.

[14] . Cantor and Packer (1994), Partnoy (2001), Sylla (2002). It is of interest that after having made an article on the front page of the Wall Street Journal and another one inside the *New York Sun*, which was then picked up by the *Commercial and Financial Chronicle*, coverage of the OCC 1931 ruling soon dissipated. To be sure, the month of September 1931 was a busy one for financial news.

[15] . Harold (1938), p. 27. A complication also arises from the fact that one agency – Poor's -- reported a number of what Harold (1938, p. 74) called "super-ratings" that only applied

initially use the modern terms of "investment grade" and "speculative grade", but instead associated "high grade" with ratings in the top four categories, and by this channel "low grade" to the categories below.[16] Finally, the "cut-off" implied by the ruling was less conservative than what we can infer from the language of the agencies themselves, since agency descriptions of their ratings associated very safe securities with the top three categories only. The language used to describe securities in the fourth category emphasizes the risks involved and imply that they ought to be dealt with by informed agents only.[17]

In subsequent years, similar trends could be observed in the supervision of members of the Federal Reserve System. State superintendents started relying more and more on ratings. Similarly, authorities supervising insurance companies began using ratings.[18] Regulatory reliance on ratings soon intensified to include the proscription of the purchase of securities with low ratings. The Banking Act of 1935 vested the Comptroller of the Currency with the power to identify "investment securities" that institutions under its supervision would be enabled to buy. A similar arrangement was made for State banks that were members of the Federal Reserve System under Federal Reserve rules.[19] In February 1936, the OCC ruled that national banks were now prevented from buying securities viewed as "distinctly and predominantly speculative". No rating was provided for what would be a "speculative" security, but the now wide-spread term "speculative" was thus embedded in regulation.[20] A footnote stated

to top US securities and other "impregnable securities". If the criterion of focusing on the top four categories was applied literally, very few securities would be eligible for booking at face value using Poor's ratings. On the other hand, we have not seen the unpublished mimeographed document and we cannot rule out that the ruling did adjust for this. With regard to modern practice, see, for example, the standardised approach of the Basel 2 framework, whereby in the case of multiple ratings, the second highest rating is recommended for the calculation of risk weights (BIS 2006).

[16] . See *Wall Street Journal*, September 12, 1931. However, Harold (1938, p. 28) describes the OCC's decision as identifying an "investment grade" category.

[17] . For instance, bonds have "moderate investment merit", "require close discrimination", are "business-men bonds", etc. See *Fitch Bond Book 1930*, *Moody's Manual of Investment 1929*, *Poor's Ratings 1925*, *Standard Bond Description 1924.*

[18] . Harold (1938), p. 29.

[19] . Harold (1938), p. 29.

[20] . "Comptroller unlikely to define 'Speculative' securities", *Wall Street Journal*, April 29, 1936.

that "the terms employed herein may be found in recognized rating manuals, and where there is doubt as to the eligibility of a security for purchase, such eligibility must be supported by not less than two rating manuals".[21]

While there was initially some doubt regarding the exact cut-off associated with the 1936 ruling (some observers suggested the cut-off was at a higher rating level than the previous one), it gradually emerged that the target was again between the top four and lower grades. Greater conservativeness was rather reflected in the implicit move from the top rating to the second best rating as the one which "counted" (when there were multiple ratings), and in the formal prevention of *any* purchase of a security not over the cut-off. The new regulation represented a significant new constraint, for the percentage of securities falling below the agencies' fourth category had increased enormously between 1931 and 1936.[22] An estimation performed by the Securities Tabulating Corporation of New York at the time showed that around half of the bonds traded in the NYSE could no longer be purchased.[23] By 1936, speculative securities, as they are now known, outnumbered higher grade ones.

Unlike the provision of 1931, the 1936 ruling triggered strong protests from the banking and finance industry.[24] Bond prices were rallying, and bankers did not want to be excluded. In addition, they argued that the new ruling penalized smaller companies who were not covered by rating agencies. Bankers also did not hesitate to criticize ratings as metrics of credit risk: they noted that relying on ratings could create a deceptive sense of security, and that ratings tended to be backward looking. There was also criticism that the agencies' past record did not

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[21] . Harold (1938), p. 30.
[22] . In September 1931, the percentage of foreign securities falling in the top four notches, according to "current ratings" (i.e. latest pending annual rating as we collected them) was 95.0% (Fitch), 90.1% (Moody's), 81.2% (Poor's) and 75.2% (Standard Statistics). At the date of the second ruling, the percentages were 45.4%, 50.5% 49.5% and 43.3% respectively. Source: authors' calculations based on Fitch, Moody's, Poor's and Standard Statistics manuals (various years).
[23] . Harold (1938), p. 31.
[24] . "Banks oppose eligibility rules for investments", *Wall Street Journal*, March 13, 1936; "Security regulations opposed by bankers", *Wall Street Journal*, June 25, 1936.

suggest they had outsmarted markets.[25] One resolution from a bankers' association quoted by Harold (1938, p. 32) stated that "delegation of the judgement as to what constitutes a sound investment is unprecedented in our history and wholly unwarranted by [the agencies] records in the past". The OCC had eventually to back off somewhat, and provided banks with slightly greater freedom over the identification of speculative securities.[26] To conclude, not only did the 1930s usher in the emergence of a central role for rating agencies in financial supervision, but the decade also provided a preview of future criticism opposing this role.

Section II. Regulatory environment and performance

Recent commentators have suggested or implied that the regulatory license rating agencies received in the 1930s drastically modified the set of incentives facing rating agencies. For instance, Goodhart (2008) writes that "in the early 1930s, incentives for [Statistical Ratings Organizations] to produce reliable information for investors were complicated by introducing ratings into the regulatory process." Partnoy (2001, p.5) also suggests that the advent of a regulatory license dramatically changed the rules of the game: "Throughout the 1920s, credit ratings were financed entirely from subscription fees, and rating agencies competed to acquire their respective reputations for independence, integrity, and reliability. In a market with low-cost barriers to entry, a rating agency issued inaccurate ratings at its peril. Every time an agency assigned a rating, that agency's name, integrity, and credibility were subject to inspection and critique by the entire investment community. Reputational considerations would have been especially acute in such an environment." While agencies' reputations are also at stake today, the existence of competing concerns, namely, the provision of fees by issuers being rated as a result of the issuer-pay

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[25] . "Security regulations opposed by bankers", *Wall Street Journal*, June 25, 1936.
[26] . "Banks given more discretion over investment", *Wall Street Journal*, May 23, 1936. One is reminded of the poem published in 1903 by the Anglo-Colorado Mining Guide: "In modern speculation/Your language you must choose./It's an "investment" if you win/ But "gambling" if you lose".

business model, present countervailing pressures. Thus, implicit in the modern notion that regulatory usage hampers ratings performance is the view that the rating agencies must have done better previous to the change in the regulatory environment.[27]

For a long time, economists have largely ignored the relevance of ratings and scholarly research on the matter has remained sparse. Lawyers were first to recognize their relevance (see Hunt 2009 for a recent survey). One argument is that the value of debt rating agencies lies in their ability to convince financial purchasers of the validity and accuracy of their ratings (Choi 1998, Schwarcz 2002). This argument is related to earlier insights in economic theory suggesting that the formation of reputations can help support quality provision in markets where information problems would otherwise preclude it (Shapiro 1983, Klein and Leffler 1984, and more recently Bar-Isaac and Tadelis forthcoming). This arises as a dominant strategy in a repeated game, because sellers with a reputation for quality can extract future rents from current investment in reputations. These arguments are articulated in a somewhat different context than that of rating agencies, which operate in two sided markets where intermediaries can charge either borrowers or lenders or both.

The incidence of competition on the reputation story is subtle. On the one hand, competition may decrease the expected revenues from reputational capital and reduce reliability. On the other hand stand arguments that emphasize the increased disciplinary role of competition as it creates an endogenous outside option that promote reliability. In this context a de facto (as opposed to de jure) oligopoly with a credible entry threat may turn out to be optimal. Bolton, Freixas and Shapiro (2008) provide a recent theoretical perspective focusing on important aspects of current regulatory proposals. They suggest that rating agencies have an incentive to inflate ratings when there are more naïve investors or when reputation costs are lower. They argue that

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[27] . By contrast, Boot et al (2006) argue that institutional rigidities, such as restrictions to hold only investment-grade securities, can stabilize an equilibrium where credit ratings serve as a welfare-enhancing coordinating mechanism for firms and their investors.

Cuomo's plan does not prevent shopping around and thus does not fully eliminate conflicts of interests.

Empirical research on the matter is still underdeveloped. One exception is Becker and Milbourn (2008) who provide an empirical study on the effects of increased market share by Fitch since 1970 in what they describe as the previous Moody's-Standard and Poor's duopoly. They suggest that the rise of Fitch had a negative impact on the disciplining effects of reputation. They find that in this instance, competition leads to more issuer-friendly and less informative ratings and conclude that competition can impede the reputational mechanism. On the other hand, Flandreau and Flores (2009) provide evidence of the relevance of reputational forces and repeat play in the historical context of signalling sovereign debt by reputation conscious underwriters. It is not clear, however, whether this argument can apply to rating agencies.

The interwar experience does provide a setting that is different from the modern rules of the game. The payment model that prevailed interwar was based on selling the manuals or investment letters rather than charging issuers.[28] The gradual emergence of a ratings based regulatory framework, although it created an incentive for issuers to secure high ratings, did not provide immediate means to shop around since the decision to rate a company was still consumer driven (i.e. it met the demand of investors for information on available financial products). Moreover, the threat of entry was probably more credible during these years, as already suggested by Partnoy (2001).

Thus the interwar period offers an interesting environment where the relevance of some of the important contentions can be examined. On

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[28] . Although the fact that many issuers were also subscribers of the volumes was occasionally pointed out as a source of conflict of interest, with non-subscribers being under threat of receiving poorer grades. This may have played a bigger role for mercantile agencies, who sold ratings on firms for firms, rather than for rating agencies who sold ratings to investors and intermediaries. Note that one firm (Poor's) includes publicities in its manuals and this may have provided a channel for rewarding issuers or intermediaries who included substantial amounts of publicities. Poor's volumes included mostly underwriters' publicity (American Bank Note Co, NY; Bankers Trust Co., NY; Bonbright & Co., NY; Dillon, Read & Co., NY; JP Morgan, NY; Payne, Webber & Co., Boston; Pynchon & Co, NY; Tobey & Kirk, NY; White, J.G. & Co., NY; etc.). It would be interesting in itself to try and correlate the amount of publicity in Poor's volumes with differences between Poor's ratings and those of other firms.

top of this, history provides us with a particularly interesting crisis experience with many parallels with today's crisis. Between 1920 and 1929, the New York bond market experienced a classic boom-bust debt cycle. Total bond issuance grew rapidly, both for foreign government and other bonds (Figure 1). Foreign issues peaked in 1924 when they were more than 25% of domestic corporate issuance. By contrast domestic corporate issuance reached a maximum in 1927. Bond issuance then contracted dramatically after 1930, following the stock market crash and credit crunch. This was followed by a wave of defaults.

In this paper, we seek to take a closer look at this question by organizing an explicit horse race of ratings reliability among different agencies and between these agencies and yield premia. Yield premia are a natural benchmark, because the standard charge of the time against bankers was that they had manipulated bond prices bringing bad bonds to market at too low a yield before leaving investors to deal with the mess. It is natural in this context to ask whether the rating industry as a whole might have been seen as an islet of serious opinions in a sea of "banksters".

We are going to focus on sovereign bonds. While Figure 1 shows them to be a fraction of the overall market for new fixed income securities,[29] they nonetheless are an interesting population to study owing to particularly nasty experience that they went through. Average default rates for "investment grade" and "speculative grade" corporate securities for 1930-34 are 0.56% and 8.42% respectively. Comparable numbers for sovereign securities are 5.6% and 31.1%.[30] The extent of the sovereign debt disaster is something of a statistical bounty -- robustness of statistical work on the performance of rating agencies is increased when the number of default events is increased. We also mention the specific role sovereign debt played in mobilizing public opinion against

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[29] . Foreign government bonds issued over the entire decade amounted to $4.3 US billion, slightly more than 15% of the total issuance of domestic corporate bonds. The largest sovereign issuers were Canada ($575 US million), Argentina ($462 US m), Chile ($304 US m), France ($300 US m) and Belgium ($289 US m).

[30] . Source: Corporate: Moody's (2008); Sovereign: authors' computations. There are some limitations to strict comparability and the numbers are mostly for heuristic purpose. Details available from the authors.

alleged bankers' abuses. The *US Senate Committee on Finance hearings on the Sale of Foreign Bonds* was convened in 1931 to discuss sovereign bond market only a few weeks after the Office of the Comptroller of the Currency's ruling on the role of ratings for booking bonds. Its focus (as suggested by its name) was on sovereign debt as particularly obvious failure of the market mechanism. Obviously, we recognize that it would be most interesting to replicate our computations for corporate securities.

We are not aware of earlier empirical research on ratings agencies in the interwar. A notable exception is West (1973) who argues that after the 1930s yield spreads for bonds with lower credit ratings were larger than could be explained by fundamental factors. He suggests that this owes to the emergence of the frameworks arrangements of the 1930s which against these bonds. In his study, however, it is not until well after WWII that the "effect" of ratings was being felt. We also mention the work of Gaillard (2008) who studies the determinants of Moody's sovereign ratings during the 1920s. A surprising feature of his study is that the determinants of interwar ratings resembled closely (by types, elasticity and significance) post-WWII, post-OCC rulings era ratings studied by Cantor and Packer (1996).[31]

Section III. The Provision of Ratings in the Interwar Era

Rating in the interwar: snapshots at the industry

As we indicated, when our story begins, rating was a well-established branch of business. Corporate rating had already a long history dating back to 1857 when Bradstreet's *Book of Commercial Reports* was first released.[32] At about the same time and later on, systematic descriptions of securities were provided by a number of publishing agencies

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[31] . Among the 25 key criteria listed by Moody's (1924) as relevant indicators, Gaillard (2008) shows that wealth, monetary stability, external debt, past default and institutional quality show up as particularly large and statistically significant determinants of ratings during the 1920s. One possible interpretation is that regulatory environments do not radically influence the rating outlook

[32] . Bradstreet's Books did contain a list of companies; there was a complementary system of key to reports so that the listings of the reports could be converted to ratings.

although no ratings as such were given. These publications included Henry Varnum Poor's *Manual of the Railroads of the United States* (first published 1868),[33] the *Manual of Statistics* – whose subtitle was *A Stock exchange handbook* (first published 1879),[34] or Moody's *Manual of Industrial and Miscellaneous Securities* first published 1900.

Innovation in securities reporting came when Moody's *Analyses of Railroad Investments* began rating railroad securities in 1909. Poor's followed suit in 1916. New entrants in the rating industry during the 1920s included Fitch and Standard Statistics in 1922. Standard Statistics had been established in the 1900s as a provider of "card index", which gave information on securities through card systems, which purchasers received and could file in matching drawers so that the latest information would always be available (the other important firm in this line of business was Babson System). In the 1920s, Standard Statistics began providing ratings as part of new high frequency publications. This is a suggestion that investors valued summary assessments of outlooks.[35]

These moves reflected the increased scope of businesses involved in information provision. Between 1900 and 1925, they sought to become "advisory agencies" and tied data to advice.[36] Other outputs that emerged at the same time were business forecasts, which were commented in the press.[37] In this segment, other shops not devoted to rating, such as Irving Fischer's consultancy created in 1930, or Babson

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[33] . This annual provided details on the performance of railway lines and companies, Chandler (1956).

[34] . In July 1904, a *New York Times* ad described the Manual as one of the books most often consulted in a busy office". The manual was "10140 pages but handy in both bulk and arrangements". Information is given in regard to the organization, history, capital, bonds, and other details of the great transportation systems of the United States, Canada, Mexico", *New York Times*, July 2, 1904.

[35] . We ignore whether Standard Statistics card system provided ratings through its cards at an earlier date..

[36] . For instance in 1907, the Stock Department of Babson System published *Investments: What and When to Buy, The use of statistics in accumulating a fortune* (published as Lamar 1907).

[37] . For instance, Moody's Investors Service stated on January 4, 1929 that the "prosperity which has characterized this country with only moderate setbacks since 1923 is likely to continue without great variation well into the future", *New York Times*, Jan 4, 1929

System competed.[38] Of course, it is hard to disentangle the value for subscribers, of having a well-documented source book from that encapsulated in the provision of summary grades, explicit buying or selling recommendations, or business conditions indicators or forecasts. In effect, the little information we could collect on pricing suggests changing schedules, with joint products and cross subsidy being the rule and changing very rapidly over time. Another challenge is that the higher frequency publications have survived in scattered locations, when they have survived at all. Finally, we have no data to relate the revenues from these various sources to the agencies overall profitability. As a result, there is a cap to what can be learned about the agencies output, competition and pricing policies. However, we find plenty of indirect evidence of efforts and competition. All in all this suggests a concern over brand and performance as we proceed to show.

Output and signals

We now take a look at rating of securities. To provide a summary outlook of what the agencies did, when, and for what price, Table 1 describes the interwar situation with a more acute focus on 1930.[39] It is important to emphasize that several of these firms have little or nothing to do with their successors bearing the same or similar names, so that everything that we are about to say has historical significance only.

Statistical agencies covered securities through a variety of tools. On the one hand there was the reference instrument, which in the case of Fitch, Moody's and Poor's was the manual. We understand that for Standard Statistics, the reference was a card system (although some book-like tools were later produced) so that direct comparison with the others is not feasible. Comparison of the number of pages in the volumes for the three agencies with volumes reveals a clear lead by Moody's, whose thicker books were also more expensive. Moody's also fully

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[38] . On business forecasting in the US during the interwar, see Favero (2007). On the performance of academic forecasting shops see Dominguez et al. (1988). The links between the various part of the business were closed and there are mentions of Babson getting invested in Poor's as it ran into difficulties in the 1930s. For once thing, Poor's Publishing Company moves to Wellesley, MA, home of Babson College and Babson System.

[39] . Constructing this Table has involved an amount of guesswork and we have tried to make it as explicit as possible through notes and references.

distinguished between Municipal & Government, Banks and Finance Companies, Industrials, Public Utilities and Railroads while competitors had more aggregated products. This may be put in relation with the Babson's remark, before WWI (Babson 1910, p. 622) that Moody's was the leading manual because of the scope of its coverage.

Another advantage of Moody's, according to Babson, was its higher frequency cumulative supplement "which was intended to keep the main book or manual up to date throughout the year". It grew into Moody's *Investment letter*, a formula that was later copied by Fitch and Poor's. We remark that prices for this service were similar across agencies. Card systems were by construction designed to keep readers up to date so Standard Statistics can be seen as having been a leader too in this area. When it came to designing an additional product, it opted for still higher frequency (daily). This service was slightly more expensive. It too came to be copied by other agencies during the 1930s. Fitch for instance, launched in 1933 a product that did cost 180 USD per year, similar therefore to the cost of the daily coverage by Standard Statistics. In general from our perusal of sources and advertisement, we observe a gradual increase in the frequency of updates is observed over time (weekly, semi-weekly, or daily products are launched). It can be taken as an indicator of the increased demand for the agencies products. We note that the process did not begin with the 1931 OCC regulation.

There is also evidence of efforts and competition to cover new products as they were launched or as they began attracting interest. For instance, regarding the specific segment of the market that will interest us later on, we find that Moody's started reviewing sovereign and sub-sovereign entities in its annual *Governments and Municipals* handbook in 1918. This was when the market for such securities was in its infancy. The move was followed by other rating services that already existed or were being created. Poor's began sovereign ratings in 1922, Fitch and Standard Statistics in 1924.

In an age of largely free capital mobility, New York was not the only market available for US investment. Other markets of greater or lesser importance to US investors could also be covered. One prominent

example is the London market where a lot of non-dollar international sovereign bonds were traded. We found that Moody's covered instruments traded in that market in contrast with Fitch, Poor's, and Standard Statistics who focused on New York. We also found that Moody's rated a higher number of domestic currency local bonds not listed in either New York or London, than Poor's and Standard Statistics (Fitch Bond Books only compiled US dollar denominated securities and we doubt that its other publications covered such instruments).

Another interesting feature that we identified in the case of one firm (Standard Statistics) is the posting of several names from prestigious universities as part of the "contributing editors" of the firm.[40] Moody's did employ Max Winkler, a PhD economist, but did not boast "connexion" with academic economists, "professors" who appear as associate editors of Standard Statistics. Fitch and Poor's did not bother. On the one hand, Standard Statistics was an established competitor in the business of selling statistical information. On the other hand, it was new to the game of selling ratings. It is hard to tell whether this signalling strategy was meant to compensate for the lack of reputation in this additional line of business, or whether this kept with a policy that sought to associate Standard Statistics with cutting edge research.[41] In a somewhat related vein – since it appears occasionally in advertisements -- we also note the international reach of Moody's that was established very early on with a branch in London. Fitch was later. Again, Standard Statistics advertises a large network of branches signalling a strong global presence and information. This is important to bear in mind, as the rest of the paper will deal with international debt.

All in all, it seems that a fair characterization of the general landscape could be as follows. Moody's was the incumbent, Fitch and Poor's were

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[40] . In February 1922, the *Standard Daily Trade Service* publication indicated "Contributing editors: Eugene E. Agger, Associate Professor of Economics, Columbia University; Lewis H. Haney, Director, Bureau of Business Research, NYU; DR Scott, Professor of Economics in the University of Missouri; Consulting economist: H.J. Davenport, Professor of Economics, Cornell University".

[41] . Standard Statistics (1931).

followers. Standard Statistics, finally, coming from a different background, was perhaps seeking to acquire a strong foothold in this business, taking advantage of its large investment in reputation for rigorous security data tracking. The implication, in any case is that some entrepreneurs believed that rating was valued by investors.[42] Although limitations on the available information puts a limit on what may be derived from the data, it is important to keep these transactions in mind, when we will come to assessing performance.

Symbology

Unlike today's readily comparable scales, rating symbols were a challenge to match across agencies. The A, B, C, and [D] ranking was common to all four agencies, but different firms used different keys for granularity, although always sorted out through three sub-rankings. For instance, to decompose the top A category, Fitch used AAA, AA, A, Moody's Aaa, Aa, A, Poor's A**, A*, A, and Standard A1+, A1, A. Complications included Moody's lack of a letter D letter and Poor's initial use of a "super-rating" category above A** that was "practically inapplicable" (Harold 1938, p. 74) to most securities and discontinued in 1939. Granularity was coarser than it is now. This may be consistent with models that predict that agencies with a reputation yet to establish may not favour overly precise ratings. More precise information increases current payoffs from providing investors with more information, but also increases the probability that errors destroy reputation.

Harold (1938) gives product differentiation as one likely reason why agencies did not initially seek consistency. Differentiation would have also enabled agencies to interpret own forecast errors simply as owing to the different "meaning" of their symbols. The role of signal precision in reputation acquisition is studied in Bolton et al. (2008). That said, the use of ratings in regulation implied at some level that the ratings could be compared. The OCC's reference to the top four ratings was an explicit recognition of an implicit correspondence across rating agencies' keys. This usage may have provided incentives to agencies to

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[42] . Think also of the connection between Babson and Poor's alluded to above.

make their ratings categories more consistent with each other over time.[43]

Based on the language used by agencies[44] to describe the meaning of the ratings and by his own extensive survey of market participants, Harold (1938) establishes a "majority interpretation" of the correspondence across the individual agency ratings (Table 3). This equivalence system is consistent with later evolution, which produced a convergence across rating keys. Unless we state otherwise Harold's majority interpretation is the key that we use in this article. It is important to emphasize however, that in most of the analysis that follows, a strict correspondence across ratings is not needed.

Section IV. Sovereign Rating Outlook in the Interwar Era

Our Data

In order to construct our dataset for annual sovereign ratings by the four agencies during the interwar, we have proceeded as follows: for Fitch, Moody's, and Poor's, for which a consistent series of annual volumes was located, we have collected as the rating for a given year, say 1929, the rating provided in that volume. Regarding Standard statistics, for which we could only locate higher frequency (monthly) publications that only contained updates, we started from the end and worked our way backward recording as the rating of, say 1929 the one that was pending on December of that year. If there had been no revision since, say, May 1927, then the same rating applied to 1927,

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[43] . We do not know whether the OCC's decision of 1931 adjusted for Poor's super ratings. If it did not, it may have persuaded investors not to refer to Poor's manuals because that would have forced them to do more write offs. This may explain that Poor's deleted its super-ratings (A*****, A****, and A***) in the late 1930s. The reduction of Poor's rating range downgraded top bonds (U.S. Government, British, and Canadian bonds in 1938 and 1939) and amalgamated them into the new current highest rating.

[44] . At the top, Fitch described AAA securities as "highest", while Moody's Aaa were "highest", Poor's A** "very high" and Standard's A1+ "highest class", suggesting a fairly good match. At the bottom, the D letter meant "slight or nil" to Fitch, "practically valueless" to Poor's and "doubtful value" to Standard. Intermediary cases may have involved some overlap, however. For instance, Fitch's B was "speculative" while Standard's B was "semi-speculative" ("speculative" was C1+).

1928 and 1929. Table 2 summarizes relevant information on how the ratings dataset was constructed.

Figure 2 shows the number of sovereign securities listed on the NYSE in 1929 and the number of these securities that were covered by the agencies' publications during that year (1929). Listing in the NYSE resulted either from offerings on that market or cross listing of securities initially traded abroad. Coverage of instruments listed in the NYSE by Moody's, Poor's and Standard Statistics was close to exhaustive (missing securities would usually be covered in the next volume). Fitch was slightly less complete (about 90%), had thinner and less detailed volumes than the others. Bonds omitted by Fitch generally had very low grades from the other agencies. This is consistent with Fitch's relatively junior status, already noted. When comparisons are made, we use the intersection between the four rating populations, meaning that it coincides with Fitch's, except when it made sense to treat unrated securities as a group. In other cases, each agency's own entire population of ratings is taken into account.

Ratings Composition

Previous writers have emphasized the deteriorating quality of the portfolio of sovereign bonds issued in the NYSE before 1929 (Mintz 1951) but an examination of ratings composition reveals a sharp deterioration in quality after 1930. The evolution of the distribution of outstanding ratings per category is tracked for two rating agencies in Figure 3.[45] For Moody's, while only about one-fifth of the issues were rated Ba and below in 1930, that number had risen to 40% by 1933. The case of Fitch shows an even more dramatic change: while on average less than 15% of their 1930 ratings were BB and below, by 1933 more than 60% were in that category.

Since new issues of foreign government securities were essentially discontinued after 1930, and rating agencies did thus not increase their coverage, the sharp deterioration in rating composition reflected the

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[45] . As the lists of securities rated by the two agencies were not identical, differences may represent differences in composition of issues rating as well as differences in the ratings assigned to common borrowers. However, the charts do not differ greatly if only jointly rated issues are used.

greater number of downgrades than upgrades. Figure 4 tracks upgrades and downgrades for the four agencies and shows there were very few upgrades and a large number of downgrades between 1931 and 1934. In 1932, Fitch downgraded 90 percent of their foreign government securities, Moody's 80 percent, and Standard Statistics and Poor's close to 50%.

To the extent that the agencies remained upbeat during the 1920s, with upgrades outnumbering downgrades (see Figure 4) and revised drastically their perception after 1931, questions about the stability of ratings through the cycle may be raised by the early experience of sovereign rating. On the other hand, it may simply reveal that the bond market collapse of 1931 was just as unpredictable for rating agencies as it was for markets. In any case, this suggests that the modern tendency for ratings to follow the trend noted by Reinhart (2002) is also a feature of its early, regulation free stages. The next section takes a closer look at the record and assesses in greater detail the performance of the rating agencies.

Section V. Ratings and Defaults

Ratings at and before default

An obvious indicator of the level of ratings reliability assumed in the use of letter-grade cut-offs is the extent that agency ratings are able to anticipate actual defaults. To what extent did the levels of ratings as well as their movement ahead of default events reflect the risks? To what extent were investors alerted by the rating agencies?

We thus set to collect default from the usual sources, namely Moody's and the Annual Reports of the Foreign Bondholders Protective Council (FBPC). As is well known, the 1930s wave of sovereign defaults was unprecedented. Our new data supports this (Figure 5). By December 1939, more than half of countries that had borrowed on the NYSE in the 1920s had defaulted, accounting for 48% of the amount of sovereign and quasi-sovereign securities issued there. And more than four-fifths of the amount of sovereign and quasi-sovereign bonds issued in the

1920s that defaulted in the 1930s did so between 1931 and 1933. The coincidence between the wave of defaults and the deterioration of the rating outlook documented above suggests that defaults were a powerful driver of the observed dynamics.[46]

Figures 6 and 7 provide insights.[47] Defaults surged across many rating classes. Figure 6 shows the composition of ratings for the four rating agencies at the time of default for 41 defaults of the sample. So-called "high-grade" ratings provided little guarantee against default during the financial crisis. After 1930, defaults surged across all rating classes. More than one-half of all default were rated high-grade (the equivalent of BBB or higher) by at least one agency at the time of default. In the case of individual agencies, for Fitch and Poor's, 39% of the defaulting issues were rated high-grade at the time of default. In the case of Moody's, fully 45% were rated high-grade. This contrasts notably with the general default experience of the last two decades of the 20th century.[48] Standard Statistics had "only" 25% of the defaulting issues rated high-grade at the time of default.

The incidence of high-grade defaults at the time was not merely due to bonds at the fourth highest letter grade level. A good chunk of the high-grade defaults occurred at ratings even higher than the fourth highest letter grade level: defaults of A grade (or equivalent) or higher accounted for up to 23% (Poor's) of the high-grade defaults. [49]

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[46] . For agencies other than Moody's, defaulted securities were recorded as C or D-rated securities and maintained as part of the rated security population.

[47] . Technically, the low frequency of the rating snapshots and the fact that they were not taken at the same time, finally combined with the relatively low absolute number of defaults, implies that some agencies might have had an informational advantage by being the "last to predict". While probably irrelevant at long horizon, this may be a problem for ratings at default. We thus checked whether the timing of defaults and that of rating pictures gave a systematic advantage to any agency. The average numbers of months elapsed between the latest available rating and the dates of default are 4.9 for Fitch, 5.4 for Poor's, 6.2 for Standard Statistics, and 6.8 for Moody's respectively (authors'computations). If anything, Fitch and Poor's have a mild advantage.

[48] . For instance, Cantor and Mann (2003) state that the average Moody's rating for defaulting issues during 1983-2001 is CCC.

[49] . No bond was granted the top rating (AAA/Aaa/A**/A1+) at the time of default. One bond that was top rated prior to default (the 1924 German bond, rated AAA by Fitch four years before its default). Two securities were rated in the second top category at the time of default: the Dominican bonds rated AA by Fitch. Several bonds were rated in this category before their default (the Dominican bonds (Fitch and Standard Statistics), the 1924 German bond (Moody's), the 1930 Cuban bond (Poor's), the 1928 Panama bond

Even starker results obtain when we move a bit further back in time, and check the ratings of defaulted issues one year ahead of default (Figure 7). Between 39% (Standard Statistics) and 66% (Moody's) of the defaulting bonds were rated high-grade one-year ahead of default. This compares to an average Moody's rating one-year prior to default of B in the 1983-2001 sample mentioned above. Again, there are many future defaulters rated A grade (or equivalent) or above one-year ahead of time (more than half the high-grade defaulters).

Correspondence of ratings to default rates[50]

Default rates, which control for the quantity of issues outstanding in different ratings classes, provide another take on the issue of ratings reliability. The use of ratings in regulations assumes, at some level, that ratings provide a good measure of the absolute risks of default, or the degree of probability of default or expected loss associated with a particular rating category. However, evidence for recent periods does suggest agency ratings have not been a particularly reliable guide to absolute credit risks over time – the likelihood of default associated with any particular rating tends to drift over time (Cantor and Packer, 1994).

As might be expected, variability is present in default rates on various horizons in the interwar era (Tables 4-6). For example, the 1-year high grade default rate for Fitch which averages 3% in the years 1928 to 1937 ranges between 0 and 16% for individual years; at the longer horizon of 5-years, the high-grade default rate ranges for Moody's ranges between 2 and 32%. This variability is much greater than that documented in the post-era – likely indicative of the degree to which the financial crisis and great depression were completely unanticipated and beyond cyclical norms.

(Fitch, Poor's, Standard Statistics)). Many bonds were rated A by the agencies at the time of default or few years before.

[50] . The default rates and the accuracy ratios reported in the following two sections and in Tables 3-7 were also calculated for a smaller issuer-basis sample, whereby only one bond (either the most junior or the one for which the most data were available) was taken into the sample per country. None of the results reported in the following two sections differed significantly for the smaller sample.

In addition to variability, the default rates at all horizons show high default rates for high-grade credits, nearly an order of magnitude difference at all horizons relative to recent experience. For instance, the *average* high-grade one-year default rate (for the years 1928-1937) of between 2-4% for the four rating agencies (Table 4) dwarfs Moody's *worst* single-year default rate for investment-grade credit during 1983-2001 of 0.5%. Similarly high-grade default rates at the three year horizon (for the years 1928-1937) that average between 8-13% for the four rating agencies (Table 5) correspond to a worst year of 2% in the recent Moody's rated sample cited above.

Neither do the default tables provide ringing support for the notion implied by the use of multiple agency ratings in regulation that the absolute scales of the ratings agencies – i.e. the correspondence of their ratings to default – were strictly comparable in the interwar era. Moody's 1 and 3-year Baa default rates of 15% and 35% corresponded to ranges for the other three agencies of between 5-8% and 16-20%, respectively. The degree and consistency of the differential may be indicative of the fact that in the interwar era, before the correspondence of ratings implied by regulation was well-established, Moody's could well have thought of their Baa rating as corresponding to a higher default rate than the other ratings agencies thought of their BBB-equivalent.[51] Another example is provided by Standard's higher-grade rating default rates, which were consistently lower than those of the other three agencies at all time horizons, suggestive of either a different cut-off for Standard Statistics than the other three agencies for high grade credits (in conflict with what external observers perceived) or of a more pessimistic outlook than other agencies.

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[51] . In the post-war era; if anything, evidence suggests that Moody's ratings likely corresponded to a stricter scale than those of some other agencies (Cantor and Packer, 1997).

Section VI. Performance and Accuracy Ratios

Measuring relative performance

The above discussion focused on the variability and levels of absolute risk at different rating levels. In fact, Moody's and other rating agencies have for some time indicated that relative rating accuracy is the primary objective of their rating systems (e.g. Cantor and Mann, 2003). To be useful, ratings at a minimum should be able to provide a good ordering of relative default risk among different credits. Since for the most part relative creditworthiness does not change dramatically over time, producing consistent relative rankings allows rating agencies to maintain greater ratings stability through the business cycle, with relatively infrequent and small changes that are unlikely to be reversed in a short period of time.[52]

One indicator of the ability of rating agencies to order relative risks is the degree to which default rates tend to increase as ratings decline. Almost all academic studies on the topic show a strong negative relationship between the two at relevant time-horizons. Tables 4-6–despite the documented variability in default rates over time and across agencies--are all consistent with default rates rising as ratings decline at the 1, 3 and 5 year time horizons for all years before and during the financial crisis.

However, documenting the simple existence of a negative relation between ratings and default rates or recovery rates is probably unsurprising and a fairly weak test of ratings reliability. Further, it does little to distinguish between the discriminatory power of one rating system versus another. A more precise assessment of a rating system is provided by the so-called cumulative accuracy profile (CAP) and associated accuracy ratio, which is described in Cantor and Mann (2003).

Like default rates, CAPs and accuracy ratios can be calculated for any cohort of securities at a single point in time for any given time horizon.

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[52] . Noting that many clients prefer ratings that are stable as well as accurate, Cantor and Mann (2007) explicitly analyze the trade-off between ratings accuracy and stability. We do not assess ratings stability in this study.

As shown in Figure 8 below, the CAP curve indicates the share of total defaults among the borrowers as a function of the share of the lowest-rated borrowers in the sample. Namely, for any given share of the lowest-rated borrowers in the sample (e.g. the lowest 10% of the sample), the CAP curve charts what percent of defaults in the sample they account for (e.g. 50%). The more the CAP curve veers towards the upper-left hand corner close to the vertical and horizontal axes, the greater the proportion of defaults that occurs in the lowest rating categories.

This representation of ratings performance is independent of the particular scales used by agencies as well as the absolute level of default rates. Comparison then only requires using identical cohorts of securities across identical time periods. It is made by graphing different ratings system on the same chart and looking for the one that always provides a higher proportion of defaults for ratings in ascending order. This is the case for ratings system 1 in Figure 8, which dominates both ratings system 2 and 3. Of course, it can be the case that different curves provide ambiguous signals about their relative accuracy. This is when different parts of the curve lie closer to the upper left-hand corner, depending upon the portion of the rating scale that is examined. This is the situation for ratings system 2 and 3, which cannot be compared to one another.

However, it is possible to distil the information of any cumulative accuracy profile into a single statistic, called the accuracy ratio. This is the ratio of the area between the CAP curve and the 45 degree line on the one hand, and the maximum possible space between the 45 degree line on the other hand, which can be estimated through an equation discussed in the appendix.

The accuracy ratio has a number of attractive properties: a) it is always larger for any curve that lies unambiguously above another; b) it effectively varies between -1 and 1, much like a correlation measure, where 1 represents maximum accuracy when all defaulters are assigned the lowest ratings, and c) it is invariant to changes to the aggregate

default rate that do not also change the ratings distribution of the share of defaults.[53]

Results

In what follows, we compare the performance of the four agencies' separate ratings, an average of their ratings, and a measure of "market" ratings. For the last measures, we use a method detailed in Breger et al. (2003) to transform yield spreads (collected using prices in the *Wall Street Journal*) into ratings. The need to match the population of ratings across the four agencies produces a set of 120 bonds, though only a subset of these are used for any single cohort since bonds enter in and exit the sample due to new issuance, redemption, default and so forth. The need to match agency ratings against synthetic ratings derived from yields produces a more limited set of around 70 bonds (for which prices are available), though again only a subset of the 70 applies to any single cohort.

We consider three horizons (one year, three years and five years). Moreover, to capture the performance over the wave of interwar defaults and downgrades we examine the one year ahead predictive performance of the various ratings between 1931 and 1936 (since there were no defaults in 1935, one year accuracy ratios cannot be calculated for that year). We look at the three years ahead performance for the (non-overlapping) cohorts of 1929, 1932, and 1935. And finally the five years ahead performance is examined for the non-overlapping cohorts of 1929 and 1934.

The results in Table 7 show that, quite apart from the issues of absolute scale differences discussed above, there were striking differences in accuracy in the ranking of relative credits among the agencies. Moody's and Standard Statistics had the highest accuracy ratios (AR) among the 4 agencies in 50% and 40% of the cohorts examined, respectively, and

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[53] . There are other schemes reducing the CAP to a single number with the above properties, but the key identifying assumption of the accuracy ratio of equation (1) is that the ratio, as calculated, weighs errors on the high end of the rating scheme equivalently to errors on the low end of rating scheme. Equivalently, the cost of having a defaulting borrower highly rated (type 1 error) is weighed equally to the cost having a non-defaulter rated too low (type 2 error).

one of these two agencies accounted for the second highest ratio in 50% of the cases. The performance comparison of ratings was for the most part invariant to time horizon. Differences in the accuracy ratios could be substantial: for example, the mean accuracy ratio over all cohorts at the five-year horizon ranged from 60% for the highest performing rating agency to 52% for the lowest.[54]

In an indication that the individual rating agencies might be getting separate, valuable, signals about the creditworthiness of sovereign borrowers, the accuracy ratios of the consolidated ratings (average rating) were often superior to those of each of the single agencies. The average rating scored higher on average than all of the individual agency ratings at the three and five-year horizons, with a mean accuracy ratio higher than each of the single agencies.

Finally, with regard to market versus rating agency rankings of relative risk, we report the difference between the accuracy ratios of the agency ratings, and synthetic ratings derived from market prices for the same cohorts in Table 8. (A negative number in any cell indicates that the agency ratings had lower accuracy ratios than the yield-based metrics.) The results suggest that market-based ratings modestly outperform agency ratings at the one- and three-year horizons, having a higher AR in about 16 of the 25 cases (4 agency ratings plus average rating over five separate years) at the one-year horizon, and a higher AR in two-thirds of the cases at the three-year horizon. At the longer 5-year horizon, actual agency ratings appear to outperform the yield implied ratings (YIRs), though only modestly.[55] That said, the difference in the accuracy ratios between ratings and yield-implied ratings at all maturities, while large for specific years and specific agencies, is relatively small when the mean is taken across all the cohort years. In sum, there does not seem to be anything specific or exceptional about

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[54] . Mean and median accuracy ratios were calculated over all available yearly cohorts, and thus contain overlapping observations at horizons greater than one-year.

[55] . As reported in Table 7, though the accuracy ratio tends to be higher for actual agency ratings than yield-based ratings for the two selected cohorts at the five-year horizon, the mean difference calculated across all annual cohorts find agency ratings to (slightly) outperform market yields only in the case of Moody's ratings. The improvement in the ratings performance relative to the YIRs at longer maturities parallels the results for more recent samples using Moody's ratings (Cantor and Mann, 2003).

the performance of rating agencies in assessing relative credit risk over the interwar period compared to what could have been inferred from market prices. At the same time, they were still pretty new to the game and this is only half surprising.

Section VII. Ratings vs. Bankers

In the previous discussion, we have recurrently alluded to the bad reputation that bankers acquired in the midst of the interwar financial collapse. Theory suggests that in a poor information environment, intermediaries can provide valuable signals on the quality of the assets they market. Historically, before ratings existed, bankers assumed an important role as providers of certifying services for the benefit of investors.

This mechanism has been identified for European markets. Flandreau and Flores (2009) report evidence of a mapping of underwriters' prestige onto the grade of sovereign borrowers, with leading merchant houses such as Rothschild signalling lower default risks by sovereign borrowers. They show that during the early 19th century, sovereign securities underwritten by Rothschild proved more resilient than the others. This secured a leading market share for the prestigious underwriters and helped them consolidate their position.[56] During the interwar period, Lord Kindersley, of the house of Lazard (a "merchant bank" i.e. investment bank) in London, stated before the Macmillan Committee that "if we put our name to [an issue] we really say to the public: 'We have looked thoroughly into this, we thoroughly believe in it, and we can thoroughly recommend it".[57] He also questions whether such policies could be trustfully adopted in New York, owing to commercial banks' conflict of interest. US bankers interviewed during the Senate Committee on Finance Hearings on the Sale of Foreign Bonds insisted that they had strong incentives to signal properly the quality of investments to the subscribing public. The following

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[56] . In the late 19th century, some commercial banks, such as the Credit Lyonnais in France, developed powerful research and certification units as well as Chinese Wall policies in order to establish their credibility as certifiers of safe securities (Flandreau 2003).

[57] . Macmillan Committee, *Minutes of Evidence*, p. 77.

exchange, taken from the interview of Otto Kahn from Kuhn & Loeb is a typical illustration:

"[Kahn] I think that the banker is called upon to exercise a greater degree of care than pretty nearly anyone else who is dealing with the public, because he is dealing with a commodity as to which he is considered to be an expert adviser and as to which many people rely on his integrity. [Sen. Johnson]: And judgement? [Kahn] His integrity and judgement […] He must resolutely decline, whatever be the monetary inducement, to attach that trademark and that responsibility to any securities as to the soundness of which there is, or ought to be, any doubt in his own mind. If he does not do all that, he is not the kind of banker that deserves to live."[58]

So did US banks "deserve to live"? To address this question, we deepen our foray and compare the performance of rating agencies with that of bankers as providers of quality signals. The argument we examine is the following. We consider the null hypothesis that in the pre-rating era, underwriters performed certification roles. As a result, we ought to be able to treat underwriters' names as equivalent to ratings, with more prestigious houses being able to signal sounder investments. The alternative assumption, that bankers did not care, would have rating agencies outperforming the signals associated with bankers' brands.

To identify prestige, we have relied on the suggestion from Megginson and Weiss (1995) to use relative market shares. The argument is that in a context of serious information asymmetries, prestigious houses are more credible when they pre-commit than un-prestigious ones so that ex post, they secure a greater market share.[59] This is both owing to their greater seriousness and to the fact that the resolution of asymmetries of information is more complete for more serious securities (because prestigious houses market them), so that the market for quality bonds dominates in size the market for junk bonds.[60]

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[58] . U.S. Congress, Senate (1932),
[59] . For related measures and their discussion, see Carter and Manaster (1990); Carter and Dark (1989); Carter, Dark and Singh (1998).
[60] . The argument is also consistent with the evidence in Flandreau and Flores (2009) for the London market for sovereign debt in the early 19th century.

On this account we have already noted that, ex ante, the vast majority of the foreign government securities marketed in New York during the 1920s belonged the four to notches (later known as "investment grade") and this vindicates Otto Kahn at a broad level. Yet a more precise and interesting question is whether we can discern finer shades in the selection of securities for underwriting by bankers. In other words, we need a formal test of this "certification-by-name" accuracy. Practically, we use market shares to rank underwriters from the less prestigious (Chandler, Brown & Harriman, and Lisman) to the most (JP Morgan).[61] We can then compare the performance of this "rating" system with the agencies' by comparing cumulative accuracy profiles in the same fashion as before.[62]

This is done in Figure 9, which shows the Cumulative Accuracy Profile of a hypothetical market share/bankers' name based sorting out system and that of one rating agency. The selected agency is Moody's, because it is the one with the longest record and we are interested with rating at issue. We are confident however (and the previous section suggests) that results would not be affected by considering another agency. Figure 9 compares the two rating systems depending on whether the ranking and prestige measures are based on the number of bonds issued or on the volumes involved. All measures are roughly concave, which is consistent with all "rating systems" adding value, but the cumulative accuracy for bankers does display a somewhat less smooth profile with default rates again accelerating for prestigious houses (in other words it is not strictly concave).[63] As can be seen, no security initially rated with the highest mark defaulted. However, the most prestigious house (JP Morgan) while very safe was not default free.[64]

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[61] . Authors' computations. Brown Bros Harriman was born in January 1931, from the merger of W.A. Harriman et de Brown Bros.

[62] . The difference between this and the earlier exercises is that this time, the time horizon is not fixed but varies according to securities.

[63] . An interesting case is the penultimate "most prestigious bank" which contributed proportionately more to defaults. That this bank was a commercial bank (National City Bank) may have played an important role in the subsequent debates about the dangers with universal banks. This may shed light on the reasons for the Glass Steagall Act.

[64] . That the Dawes and Young loans to Germany account for the largest share of JP Morgan's defaulted securities may be taken as indicative of the liability that US diplomacy created for the signalling capacity of its banking system. We are grateful to Bob McCauley for having brought our attention to this point.

The fact that the accuracy profile for rating agencies dominates that for banks may be taken as prima facie evidence that the agencies had outperformed banks based signals. This finding may go some way towards explaining why the former were then used as an instrument to assess the quality of the portfolio held by national banks. The driving force behind the emergence of rating agencies may not have to do, strictly speaking, with the high performance of rating agencies, but more with a confidence crisis that undermined the credibility of bank based quality signals.

Section VIII. Conflicts of interest, legal franchise and regulatory license

Undoubtedly, the difficulties for predicting must have been enormous and the agencies were not strongly superior to the market. On the other hand we reckon that some of the earliest (albeit quite late) pessimistic assessments of the financial and economic outlook on the eve of the 1929 Crash came from the rating and economic information provision industry. In September 5, 1929 Roger Babson (whose professional career and personal investments were tied to ratings) made gloomy predictions that are less remembered than Irving Fisher's unwelcome remark on the 'permanent plateau', although they attracted much discussion at the time. In his words: "Wise investors will pay up their loans and avoid margin speculation at this time because a 'crash' of the stock market is inevitable.[65] Still, there were subsequent accusations that the forecasting record of the rating agencies was dismal and in June 1931, it led Standard Statistics to circulate throughout the world a booklet meant to refute such allegations.[66]

This conclusion leaves us with a puzzle. We still need to understand the rationale for the increased regulatory use of ratings in the 1930s. In what follows, we argue that ratings – and only ratings – met both a necessary and a sufficient condition to emerge as an instrument for supervision. As said, owing to different performance of the different

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[65] . The *New York Times*, September 6, 1929.
[66] . Standard Statistics (1931).

agencies, it is hard to conclude that the agencies "at large" outperformed. Moreover, in the midst of the 1931 crisis, there was still way too much smoke for any regulator or observer to be in a position similar to ours to make any such inference – and we found that the evidence was not unambiguous. And thus, why did they start relying on ratings?

Regulation and Forbearance in the 1930s

Our starting point is the following remark. Serious financial turmoil such as that of the 1930s or the current sub-prime crisis is characterized by failure of the price discovery mechanism. Distress sales and the withdrawal of many investors from financial markets not only result in severe price declines but often the inability to transact at any price. Not only are bad securities shunned, but so are fair ones and even good ones. The effects of such shocks to market liquidity are enormous and threaten economic stability.[67]

A solution is to provide support to good securities, since the deep discounts during crises or on occasion even the disappearance of liquidity altogether for these securities does not reflect a problem with their intrinsic value. This rationale goes back to early contributions to the theory of lending of last resort. Bagehot (1873/1919, p. 194-5) emphasized the benefits from lending freely on "good" securities.[68] Extensive support to holders of such securities would check unjustified price depreciation. Following Goodhart (1985), lending of last resort has been rationalized as a way to prevent fire sale liquidations transforming an illiquidity problem into one of insolvency. Identification of eligible bonds thus becomes the crux of crisis management. It is a peculiarly difficult issue, because it is in the nature of crises to cast doubt on the significance of previously well-established values. If all values go down, and if illiquidity quickly converts itself into insolvency, how are we to tell good from bad? We argue that two

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[67] . One implication of this may be that suggestion by authors such as Partnoy (2001) that regulation could rely on market prices are not practical, because failure of the market mechanism is where the story begins.

[68] . He found that British government debt and also prime corporate bonds ought to be eligible.

conditions must be met. The necessary condition is that the sorting of securities to handle the crisis is socially and politically acceptable. This means that a critical degree of consensus should exist on what a good security ought to be. Any sorting system that is robust to political criticism can become an eligible instrument of crisis management. The sufficient condition is that this system does exhibit a fair degree of separation, in normal times but more importantly in periods of crises, with the standard price discovery system, since it is this very system, which is said to malfunction. To summarize, what is needed to handle a crisis, is a kind of price system that is not the price system. If a solution to this "catch-22" problem does exist, then public authorities can lay to rest the malfunctioning parts of markets and restore order by relying on a parallel pricing system.

We argue that ratings provided a response. To see this, we need to show that relying on ratings as was done in the early 1930s provided a corrective to what was perceived as defective market pricing. For this, we use a randomly drawn sample of US corporate and foreign government securities rated in the third and fourth top categories on the day after the publication of the Comptroller of Currency's rule, and compute the nominal benefit from booking at face value as a percentage of mark-to-market valuations.

Our computations are made using Moody's third and fourth notches (A and Baa).[69] For corporate securities the wedge between is 16.7% (A) and 32.8% (Baa). For foreign government and sub-national securities, for which the collapse in prices had been reported to have been much worse, the boost is huge: 75.6% (A) and 82.1% (Baa).[70] In other words, in the midst of the crisis, ratings initially emerged as a powerful corrective to a financial panic that sent bond prices plummeting across the board. According to the *New York Sun*, quoting the Comptroller of Currency: "the banks have been permitted to enter in their assets the

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[69] . Similar results would obtain for other agencies.

[70] . Computations based on prices as of September 12, 1931 (*Wall Street Journal*, September 14, 1931). For details on how the sample was constructed, see Appendix. For a related interpretation, see Morton 1939. He argues that the use of ratings enabled banks to insulate themselves from the bond price debacle while ensuring the quality of their portfolio.

full value of [high grade] bonds […] Mr Pole stated that depreciation in these high grade securities has been due purely to market fluctuations, and that to permit banks to report them at face value is now and has always proved sound and reasonable."[71] Similarly the *Wall Street Journal* reported that "depreciation in high grade securities has been due purely to market conditions, and that to permit banks to report them at face value is […] sound and reasonable. […] Issues given the four highest ratings by statistical corporations did not have their intrinsic value impaired by market fluctuations."[72] We conclude that ratings met the sufficient condition described above, namely, they were a sorting instrument to correct a perceived failure of the price discovery mechanism, and as a result could help provide much needed forbearance in a system under acute stress.[73]

Regulation and conflicts of interests

The second part of our argument has to do with the social acceptability of ratings. Students of history are familiar with the blaming game that follows disasters. Crises, when they reveal wrongdoing, create pressures for political action. To the extent that the crisis is viewed to have been created by improper behaviour, then the offenders must be punished. And if it has been created by improper structures, these ought to be changed as well, but the key point is to identify some individuals that ought to be punished. The interwar stock market collapse and bond debacle provided plenty of opportunity for complaints. The soil for such accusation had been fertilized for a long time by concerns expressed publicly by senior voices such as Brandeis (later Justice Brandeis of the Supreme Court) an open critic of the agency problem associated with delegation of portfolio management to bankers (Brandeis 1914). Already before WWI, the Pujo Commission and investigation of the Money Trust had emphasized the conflicts of

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[71] . The *New York Sun*, September 11, 1931.

[72] . "75% of bonds valuations safe", *Wall Street Journal*, September 12, 1931.

[73] . The SEC took a similar measure in September 2008, allowing money market mutual funds to value A1-P1 securities on the basis of amortised cost in their calculation of their shadow prices for the purpose of assessing whether they had broken the buck. We are grateful to Robert McCauley for pointing this out to us.

interest posed by investment banks' underwriting and intermediation role.

During the 1920s some critics included some coming from the industry itself, noted that the originate and distribute model, whereby underwriting firms were receiving fees from the concerns whose bonds they floated, was flawed by inevitable conflicts of interest. Among the most vocal proponents of this view was Max Winkler. Winkler supervised foreign government bond ratings at Moody's. He left Moody's and launched his own series of manuals in 1928.[74] Later, he wrote what became a reference book on the 1920s sovereign bond market cycle in which he drew on his experience at Moody's (Winkler 1933). The debate over bankers' conflicts of interest during the 1930s is a critical aspect of the evolution of the rating industry during those years. During the 1930s concerns were expressed in newspapers and also in a succession of Senatorial commissions, starting with the Senate Committee on Finance hearings on the Sale of Foreign Bonds on the sale of foreign securities in the US and continuing with increasingly acrimonious overtones during the Pecora investigations into the causes of the Wall Street Crash of 1929. The recurrent, almost obsessive, theme of these hearings was concern with bankers' conflicts of interest (Benston 1990, p. 64). These included and were not limited to accusations such as the following: a) bankers had misled the public about the quality of securities to cash in short-term fees; b) bankers were connected to Republican administrations and committed to their foreign policies; c) bankers supported foreign defaults on long term debts (held by ordinary investors) to protect their own short term loans to foreign governments (still in their books).

The rampant distrust of normal financial intermediaries – sometimes called "banksters" – was so prevalent that it became a major theme of Franklin Delano Roosevelt's 1932 Presidential campaign. This distrust stands in contrast with the prevalent view of the rating agencies. As a result, bankers taken to task on specific bond issues they had underwritten gave contemporary ratings as proof of their sincerity.

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[74] . Winkler's *Manual of Foreign Corporations*, published by Overseas Statistics.

Benston (1990, p. 64) gives the example of the National City Company's CEO Charles Mitchell justification of Anaconda Investments before the Pecora investigations by pointing to the positive outlook Anaconda had received from Standard Statistics. Such a defence may have been suggested by the bank's lawyers. As early as 1897, court decisions quoted ratings as external evidence of the quality of investment recommendations.[75] Thus it would appear that judges saw ratings as opinions that were free of conflicts of interest, and this we argue was a powerful factor in causing their emergence as an instrument for regulatory control.

This legal perspective was precisely the one that Brandeis adopted when he referred to the problem of agency faced by financial advisers in his criticism of the Money Trust: "No man can serve two masters. The surprising fact is that a principle of equity so firmly rooted should have been departed from at all when dealing with corporations. For no rule of law has, in other connections, been more rigorously applied, then that which prohibits a trustee from occupying inconsistent positions, from dealing with himself, or from running his fiduciary position from personal profit. And a director of a corporation, is as obviously a trustee as person holding similar positions in an unincorporated association, or in a private trust estate, who are called specifically by that name. The courts have recognized this fully". (Brandeis 1914, p. 38). Obviously, the trustee problem was better addressed by a rating agency than by a banker.

In this background pointing to the initial high ratings provided a more credible case than pointing to the initial high prices bond has once commanded, because bankers faced the charge that they had manipulated prices. We thus argue that ratings not being tainted by *perceived* conflicts of interest (and here the emphasis is on the political perception of the existence of a conflict of interest, not on its reality) gave them a legal franchise that was a powerful factor for their subsequent regulatory license.[76] The key element is legal and political,

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[75] . Partnoy (2001, p. 19).
[76] . Compare with Partnoy (2001).

and has thus little to do with economic performance or track record as such.

Conclusions

The interwar period offers a rich environment where we can examine a number of contentions pertaining to the performance of rating agencies and the relation between this performance and the regulatory and competitive environment. This is because until the 1930s, ratings were not part of the supervisory frameworks and thus in principle without regulatory license. The two natural questions that emerge in this context are why ratings emerged as an instrument for regulatory control and whether rating agencies performed significantly better or worse in this environment.

Our main finding is that the performance of rating agencies during the interwar era was not exceptional by any standard. Ratings above subsequent regulatory cut-offs provided little guarantee against default during the financial crisis. Rating agencies generally did not exhibit forecasting capacities superior to those embedded in available market prices. While this probably means that the agencies like many other players in the financial industry did not see the interwar debacle coming, it is also consistent with the view that their forecasting capacities at the time were not particularly outstanding.

On the other hand, we also reported some evidence of market discipline and brand concerns in the form of Standard and Poor's tougher grades and signalling activity. Over certain horizons, their forecasts, along with those of Moody's, the market leader, tend to outperform yields, although assessing the statistical significance of this result is a limitation. Another finding that is important is that rating agencies clearly outperformed other forms of signalling such as market share related prestige although this turns out to have been a powerful signal in other historical environments (see Flandreau and Flores 2009).

These results will have to be challenged and extended, in particular with the help of data for corporate securities, but we think that they fit

well with earlier characterizations that have emphasized that the argument over bankers' conflicts of interest was overdone or that the main reasons for the defaults of the 1930s were the (unpredicted) decline in commodity prices that undermined the fiscal base of many sovereign borrowers.[77]

Another lesson from this paper has to do with regulatory dynamics. While some recent authors have emphasized the different set of incentives faced by rating agencies in the interwar period, they have not emphasized the implications that this may have had on the public's perception of the agencies. We argue that this played a crucial role in the interwar. Crises, when they reveal wrongdoing, or suggest that wrongdoing may have occurred, do sap important political and social institutions. The discredit in which the market economy found itself in the interwar years may well be related to the subsequent embracing of extreme ideologies, which sold themselves precisely as an alternative to the "defunct" 19th century liberal-bourgeois social compact. The irony is that distrust in bankers during the interwar years is both a cause of the emergence of ratings as a regulatory instrument, and a foreshadowing of some of the challenges now faced by the agencies.

In conclusion, the agencies' new role in the 1930s did not primarily result from any evidence of the superior forecasting qualities of ratings, although we found evidence of different performances between agencies which we may relate in a meaningful fashion to investment in reputation. More importantly, however, the agencies were pushed to the centre of the stage because they were perceived as being free from conflicts of interest. While bankers were said to have manipulated prices, the agencies provided a certification of quality that was not tainted by the rampant mistrust in financial intermediaries, and their opinions were used as benchmarks in legal cases. Second, in an environment where volatility hampered the ability of the market to perform effective price discovery, the top four ratings gave some basis for identifying "good collateral". The emergence of ratings as a regulatory instrument was a specific response to the specific financial

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[77] . Compare with Kroszner and Rajan (1994), Eichengreen and Portes (1989).

problems faced during the Great Depression, conditional upon their being politically acceptable.

The previous thoughts cast doubt on what we ought to expect from a revision of incentive frameworks. It may or may not be that some particularly ill-advised ratings were produced ahead of the latest crisis in part on account of defective incentive schemes plagued by conflicts of interest, but there is a long way to go between proving this claim and reaching the further conclusion that regulatory changes addressing such conflicts of interest ought to cure most of our modern problems and somehow make credit ratings more "perfect". Our results suggest, if anything, that a world where agency conflicts of interest are less pronounced is neither a world where crises are absent nor one where they are more predictable.

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Figure 1

Bond issuance on the NYSE (1920-1929)

In millions of US dollars
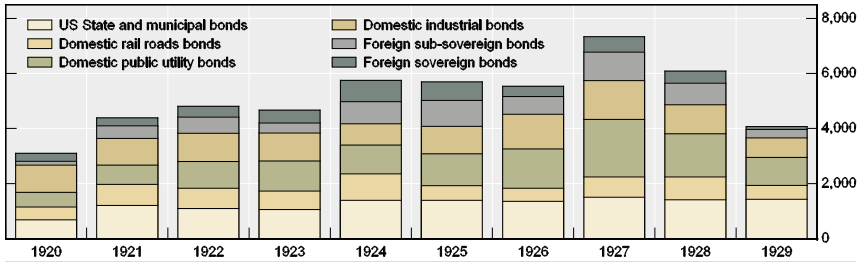
Source: Hickman (1953), pp.253-255, for domestic railroad, public utility, and industrial figures. Board of Governors of the Federal Reserve System (1943), p.487, for U.S. State and municipal figures. Authors' computations from Moody's Manuals for foreign sub-sovereign and sovereign figures.

Figure 2

Listed NYSE sovereign securities and rating agency coverage

Number of securities
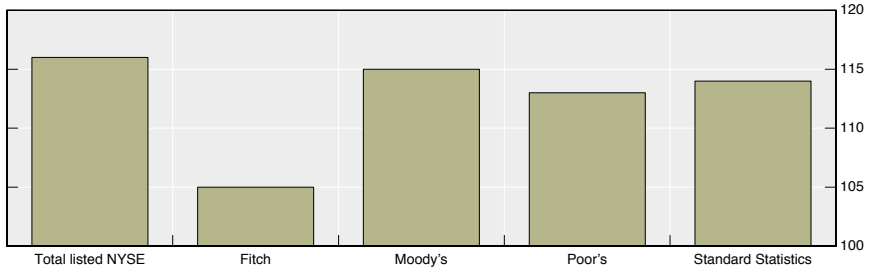
Source: Hickman (1953), rating agencies' manuals.

Figure 3

Ratings composition of sovereign bonds outstanding (1918-1937)

In per cent

Moody's

Fitch
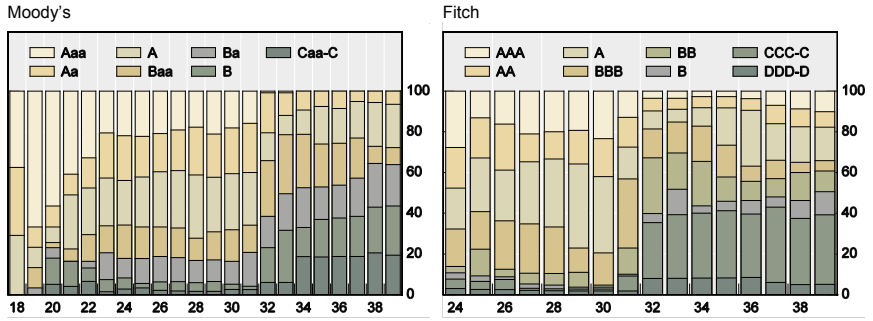
Source: Gaillard (2008).

Figure 4

Upgrades and downgrades as fraction of outstanding ratings[1]

In per cent
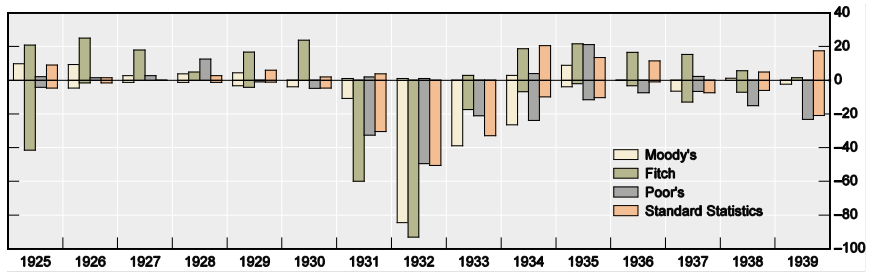
[1] Positive bars indicate upgrades, negative indicate downgrades.

Source: Author's computations.

Note: an upgrade (resp. downgrade) measures any upward (resp. downward) revision occurring during year.

Figure 5

Defaulted sovereign bonds (1920-1939)
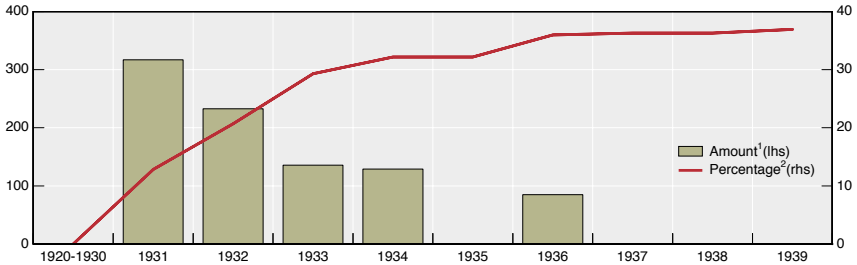
[1] In millions of US dollars, stock of defaulted bonds during that year. [2] Cumulative number of defaulted sovereign bonds from 1931 as percent of total sovereign bond issues 1920-1929. Sovereign bond withdrawn from sample as they mature.

Source: Moody's Manuals (various years).

Figure 6

Ratings composition at the time of default

(1920-1939, 44 defaulted issues)
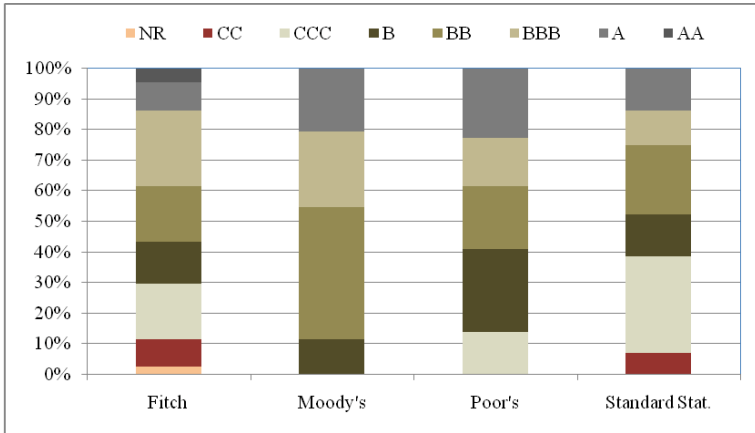
Source: Author's computations.

Figure 7

Ratings composition one year before the default

(1920-1939, 44 defaulted issues)
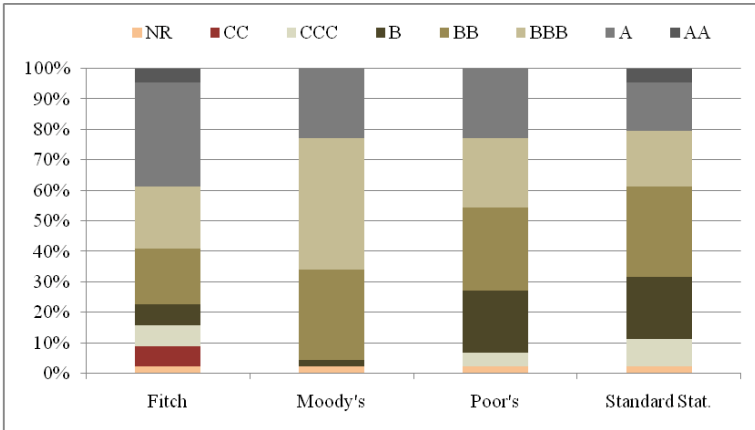
Source: Author's computations.

Figure 8

Cumulative Accuracy Profiles: 3 Cases
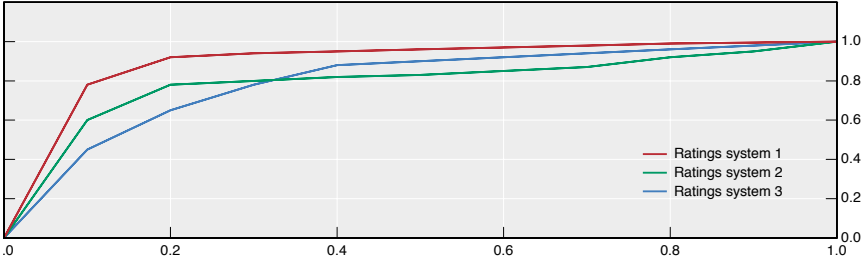
Figure 9

Cumulative Accuracy Profiles: Bankers vs. Agencies
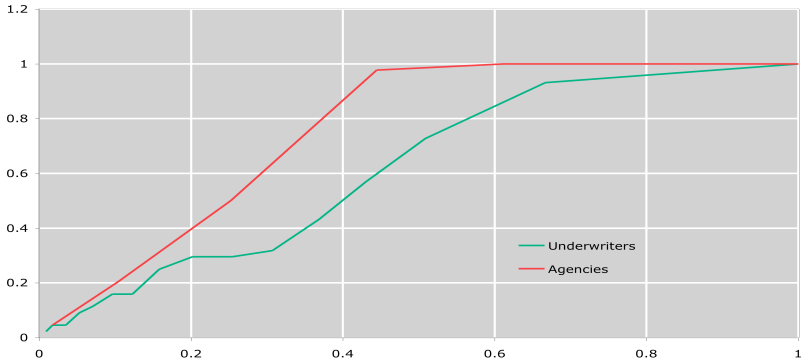
Source: Authors computations (see text). Underwriters' accuracy profile is computed on the basis of the number of loans brought to market and defaulted upon. Underwriters' market shares derived by authors from Moody's handbooks.

Table 1. Products offered by the Agencies

	Fitch	Moody's	Poor's	Standard Statistics
Name of the Main Publication Compiling Ratings	Fitch Stock and Bond Manual	Moody's Manuals of Investments	Poor's Volumes	Standard [Statistics] Bond Books
Frequency of the Main Publication	Annual	Annual	Annual	Monthly
Thickness of Annual Publications if Applicable	1930: 2,500 pages (a)	1930: 10,000 pages (b)	1930: 6,000 pages (c)	Not applicable
Price	$35 (d)	$100 (e)	Unknown	Not applicable
Publications with Other Frequencies	Daily, Semi-Weekly, Weekly, Monthly, Quarterly (f)	Daily, Weekly, Monthly	Four times a week, Weekly, Quarterly	Daily, Weekly, Monthly
Other Publications Starting	Daily, Semi-Weekly, Weekly, Monthly: 1928 (g) Quarterly: 1935 (h)	Weekly, Monthly: 1910 (i) Daily: 1932 (j)	Weekly: 1932 Four times a week: 1934 (k) Quarterly: 1934 (k)	Daily, Weekly, Monthly: 1922 (l)
Specific Publication Dedicated to Qualitative Analysis	Not until 1928 (m)	Yes (n)	Not until 1932 (o)	Yes (p)
Name and Frequency of the Specific Publication Dedicated to Qualitative Analysis	"Fitch Revisions", Semi-Weekly (q)	"Moody's Investment Letters", Weekly	"Poor's Analytical Services – Bonds & Stocks", Weekly	"Standard Daily Trade Service", Daily
Price of the Specific Publication Dedicated to Qualitative Analysis	$150 (annual subscription) (r)	$150 (annual subscription) (r)	$120 (annual subscription) (s)	$180 (annual subscription) (t)
Academic Advisers Members of the Board	No	No (u)	No	Yes (Profs. Scott, Davenport and Parry) (v)
Offices/Representatives Outside the United States (interwar)	Not until 1933 (w)	Yes (x)	Unknown	Yes (y)
Locations of Foreign Offices/Representatives if Applicable	Montreal and London (z)	London (x)	N.A.	London, Berlin, Paris, Geneva, Stockholm, Brussels, Panama Canal Zone, La Paz, Buenos Aires, Santiago, Warsaw (y)
Listed Company	No	Yes, from 1928	No	No

(a) "Fitch Stock and Bond Manual 1930".
(b) Aggregation of "Moody's Railroad Manual 1930", "Moody's Industrial Manual 1930", "Moody's Public Utility Manual 1930", and "Moody's Government and Municipal Manual 1930".
(c) Estimation based on the consultation of various Poor's Volumes in 1929, 1930 and 1931.
(d) "Fitch Stock and Bond Manual 1930" price.
(e) Total sum of "Moody's Railroad Manual 1930", "Moody's Industrial Manual 1930", "Moody's Public Utility Manual 1930", and "Moody's Government and Municipal Manual 1930" prices.

(f) Fitch Bond Books' introductions indicate "Daily, Semi-Weekly, Weekly, Monthly, Quarterly" publications although we could not find these sources.
(g) First indication found in "Fitch Bond Book 1928".
(h) First indication found in "Fitch Bond Book 1935".
(i) Babson (1910).
(j) Based on the description of Moody's Manuals released in 1932.
(k) First indication in "Poor's Industry Service – News, Facts, Forecasts" (1934).
(l) First indication found in "Standard Daily Trade Service", February 1922.
(m) Based on the description of "Fitch Revisions" services found in "Fitch Bond Book 1928".
(n) Based on the consultation of "Moody's Manuals" and "Moody's Investment Letters" released from 1918.
(o) Based on the consultation of "Poor's Volumes" published from 1922 and "Poor's Analytical Services – Bonds & Stocks" released from 1932.
(p) Based on the consultation of "Standard Daily Trade Service" released from 1922.
(q) Based on the description of "Fitch Revisions" services found in "Fitch Bond Book 1929".
(r) Subscription prices in 1929.
(s) Subscription prices in 1923 (*Wall Street Journal*, July 6, 1923).
(t) Subscription prices in 1931.
(u) "Moody's Manuals" and "Investment Letters" published between 1922 and 1927 mention Max Winkler, PhD, but he is an employee of the agency.
(v) See "Standard Daily Trade Service" publications released in 1922.
(w) Found in "Fitch Bond Book 1933".
(x) Based on the consultation of "Moody's Manuals" and "Moody's Investment Letters" released from 1918.
(y) Based on the consultation of "Standard Daily Trade Service" released from 1922.
(z) Found in "Fitch Bond Book 1933" and "Fitch Bond Book 1938".

Table 2

Ratings: Data Source

	Fitch	Moody's	Poor's	Standard Statistics
Business Starting	1913	1900	1868	1922
Ratings begin	1924	1909	1916	1922
Sovereign Ratings Begin	1924	1918	1922	1924
Name of Source	Fitch Bond Book	Moody's Manual of Investments – American and Foreign Government Securities	Poor's bank, government and municipal volume	Standard [Statistics] Bond Book
Frequency of Our Source	Annual	Annual	Annual	Monthly
Month of publication	August	January	March	December(a)
Separate Sovereign Volume (interwar)	No	Yes	Varies	No
Periods available (interwar)	1924-1939	1918-1939	1922-1939	1924-1939
Periods we used	1927-1936	1927-1936	1927-1936	1927-1936

Source: Authors.

(a) The choice of December for Standard Statistics Monthly Source was arbitrary.

Table 3

Correspondence across ratings

Fitch	Moody's	Poor's	Standard	"Majority interpretation"
AAA	Aaa	A**	A1+	Highest
AA	Aa	A*	A1	High
A	A	A	A	Sound
BBB	Baa	B**	B1+	Good
BB	Ba	B*	B1	Fair
B	B	B	B	Somewhat speculative
CCC	Caa	C**	C1+	Speculative
CC	Ca	C*	C1	Highly speculative
C	C	C	C	Extremely speculative
DDD	--	D**	D1+	Low or weak
DD	--	D*	D1	Small or very weak
D	--	D	D	Practically valueless

Source: Harold 1938, p 75.

Table 4

1-year default rates (1928-1937)

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	Average 1928-37[1]
						Fitch					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	0	0	0	11	0	0	0	0	0	0	2
A	0	0	0	24	0	13	0	0	0	0	5
BBB	0	0	0	27	10	0	0	0	0	0	4
BB	0	0	0	0	56	0	13	0	25	0	9
B						33	0	0	0	25	10
CCC						80	33	0	50		56
IG	0	0	0	16	4	3	0	0	0	0	3
SG	0	0	0	0	56	23	10	0	25	13	16
						Moody's					
AAA	0	0	0	0	0	0	0				0
AA	0	0	0	0	0	0	0	0	0	0	0
A	0	0	0	28	5	0	0	0	0	0	4
BBB	0	0	0	35	36	20	6	0	10	0	10
BB	0	0	0	17	60	45	20	0	0	17	19
B							0	0	50	0	17
CCC											
IG	0	0	0	16	7	8	4	0	4	0	4
SG	0	0	0	17	60	45	17	0	13	14	18
						Poor's					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	0	0	0	0	0	0	0	0			0
A	0	0	0	18	4	8	0	0	0	0	4
BBB	0	0	0	30	4	0	0	0	5	0	5
BB	0	0	0	8	38	7	17	0	25	0	10
B	0	0	0	0	50	78	33	0	0	0	27
CCC							0	0	50	100	33
IG	0	0	0	17	3	4	0	0	2	0	3
SG	0	0	0	7	40	35	19	0	20	7	15
						Standard					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	0	0	0	0	0	0	0	0	0	0	0
A	0	0	0	16	0	0	0	0	0	0	3
BBB	0	0	0	13	5	15	0	0	0	0	4
BB	0	0	0	38	5	0	33	0	10	11	7
B	0	0	0	29	30	0	0	0	33	0	13
CCC				50	100	73	33	0	50	0	59
IG	0	0	0	9	2	5	0	0	0	0	2
SG	0	0	0	38	22	23	23	0	20	8	16

[1] Weighted by the number of issues.

Source: Authors' calculations.

Table 5

3-year default rates (1928-1937)

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	Average 1928-37[1]
						Fitch					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	0	0	6	16	6	0	0	0	0	0	5
A	0	17	28	45	25	13	0	0	0	0	18
BBB	0	26	64	60	30	0	0	0	0	0	18
BB	0	0	29	100	67	7	27	11	25	0	20
B						33	0	0	50	50	19
CCC						90	67	67	100		83
IG	0	13	22	31	19	3	0	0	0	0	13
SG	0	0	29	100	67	30	21	18	42	25	28
						Moody's					
AAA	0	0	0	0	0	0	0				0
AA	0	0	0	0	8	0	0	0	0	0	1
A	0	25	28	45	32	0	0	0	0	0	17
BBB	0	33	75	82	73	28	9	4	10	0	28
BB	0	0	40	50	60	55	40	25	33	33	37
B							100	50	50	0	50
CCC											
IG	0	13	22	30	22	11	5	2	4	0	13
SG	0	0	40	50	60	55	50	30	38	29	38
						Poor's					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	0	0	0	0	0	0	0	0			0
A	0	15	18	24	21	8	0	0	0	0	11
BBB	0	24	40	52	19	0	0	0	5	0	17
BB	0	0	45	69	69	29	25	7	25	0	31
B	0	0	0	0	50	78	67	20	25	20	39
CCC							100	100	100	100	100
IG	0	14	20	26	15	4	0	0	2	0	11
SG	0	0	42	60	67	48	38	19	40	14	36
						Standard					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	0	4	4	9	10	0	0	0	0	0	3
A	0	27	33	25	0	0	0	0	0	0	10
BBB	0	25	10	40	30	15	0	0	25	33	16
BB	0	18	64	50	11	5	50	13	20	11	22
B	0	0	71	86	80	33	25	33	33	0	51
CCC			83	100	82	67	100	50	0		78
IG	0	12	11	20	14	5	0	0	2	3	8
SG	0	14	67	71	41	31	46	27	27	8	37

[1] Weighted by the number of issues.

Source: Authors' calculations.

Table 6
5-year default rates (1928-1937)

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	Average 1928-37[1]
						Fitch					
AAA	0	0	0	4	0	0	0	0	0	0	1
AA	0	0	11	16	6	0	0	0	0	0	6
A	14	23	40	47	25	13	0	0	0	0	23
BBB	29	58	82	60	37	0	0	0	19	57	32
BB	67	50	43	100	78	15	27	11	25	0	28
B						33	0	0	50	75	24
CCC						100	100	100	100		100
IG	12	23	31	33	22	3	0	0	7	11	19
SG	67	50	43	100	78	38	24	23	42	38	37
						Moody's					
AAA	0	0	0	0	0	0	0				0
AA	0	0	4	4	8	0	0	0	0	0	2
A	13	42	52	48	32	0	0	0	5	7	25
BBB	88	83	81	82	91	32	9	4	20	22	41
BB	0	0	40	50	80	73	60	38	33	33	46
B							100	50	50	0	50
CCC											
IG	15	25	32	32	25	13	5	2	10	14	20
SG	0	0	40	50	80	73	67	40	38	29	46
						Poor's					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	0	0	0	0	0	0	0	0			0
A	10	15	24	26	21	8	0	0	0	0	13
BBB	13	52	64	57	19	0	0	0	20	17	27
BB	71	50	55	69	85	36	25	7	25	38	46
B	0	0	0	0	100	100	100	40	25	20	55
CCC							100	100	100	100	100
IG	8	22	30	28	15	4	0	0	9	6	15
SG	63	44	50	60	87	61	44	24	40	36	50
						Standard					
AAA	0	0	0	0	0	0	0	0	0	0	0
AA	5	4	8	9	10	0	0	0	0	0	5
A	13	47	61	25	0	0	0	0	0	0	16
BBB	13	33	30	53	30	15	0	0	25	100	23
BB	63	55	64	50	21	10	50	13	50	44	38
B	50	67	86	86	90	67	25	50	33	0	66
CCC				83	100	91	100	100	50	0	85
IG	7	17	21	23	14	5	0	0	2	9	12
SG	60	57	71	71	50	40	54	33	47	33	52

[1] Weighted by the number of issues.

Source: Authors' calculations.

Table 7

The accuracy ratios for agency ratings and average rating

	Fitch	Moody's	Poor's	Standard	Average rating
1-year horizon					
1931	0.30	0.49	0.27	0.46	0.45
1932	0.74	0.77	0.58	0.69	0.72
1933	0.70	0.63	0.58	0.63	0.64
1934	0.52	0.51	0.75	0.76	0.83
1936	0.85	0.61	0.71	0.85	0.72
Mean (1931-36)	0.62	0.60	0.58	0.68	0.67
Median (1931-36)	0.70	0.61	0.58	0.69	0.72
3-year horizon					
1929	0.40	0.54	0.31	0.41	0.51
1932	0.40	0.54	0.38	0.43	0.47
1935	0.70	0.70	0.80	0.84	0.85
Mean (1929-36)	0.53	0.60	0.54	0.59	0.63
Median (1929-36)	0.46	0.61	0.49	0.58	0.60
5-year horizon					
1929	0.49	0.57	0.48	0.51	0.57
1934	0.58	0.66	0.71	0.72	0.77
Mean (1928-36)	0.52	0.59	0.55	0.60	0.61
Median (1928-36)	0.55	0.57	0.54	0.61	0.58

Source: Author's calculations.

Table 8

Difference between the accuracy ratios for agency ratings and for yield-implied ratings

	Fitch	Moody's	Poor's	Standard	Average rating
1-year horizon					
1931	-0.18	-0.08	-0.37	-0.20	-0.18
1932	0.17	0.20	-0.07	0.00	0.05
1933	-0.05	-0.17	-0.18	-0.16	-0.13
1934	0.00	0.01	0.13	0.19	0.28
1936	-0.04	-0.12	-0.17	-0.02	-0.17
Mean (1931-36)	-0.02	-0.03	-0.13	-0.04	-0.03
Median (1931-36)	0.13	0.03	-0.06	0.00	0.05
3-year horizon					
1929	0.09	0.29	0.03	0.18	0.20
1932	-0.17	-0.04	-0.23	-0.16	-0.13
1935	-0.24	-0.12	-0.03	-0.03	-0.09
Mean (1929-36)	-0.09	0.03	-0.08	-0.02	-0.01
Median (1929-36)	-0.15	0.03	-0.14	-0.05	-0.01
5-year horizon					
1929	0.05	0.19	0.08	0.11	0.12
1934	-0.08	0.06	0.05	0.02	0.12
Mean (1928-36)	-0.08	0.02	-0.05	0.00	0.00
Median (1928-36)	-0.02	0.01	-0.05	0.02	-0.01

Source: Author's calculations.

1) Example of Moody's Ratings (Dominican Republic, 1927, p. 444 of the Manual):

444   MOODY'S MANUAL OF INVESTMENTS

the time at hand to take steps to assure the execution of the said Convention and to maintain domestic tranquillity in the Republic. The object of the occupation was not to destroy Dominican sovereignty, but to restore order.

The Military Government so established proceeded to reorganize the finances of the country and undertook the construction of roads and other public works.

To effect the settlement of the large floating indebtedness and the mass of claims, the Military Governor created "The Dominican Claims Commission of 1917" to pass on all claims and evidence of debt against the Dominican Republic. This Commission rendered a preliminary report showing that more than 8,800 claims had been presented representing a face value of about $15,000,000; that in all probability in liquidation of the awards to be made a sum much less than the face value would be required and estimated the said sum at $5,000,000.

To provide for payment of the Commission's awards, the Military Government issued Executive Order No. 193. This order recited that due to the abnormal condition existing throughout the world it was impracticable to negotiate a foreign loan; that the United States Government had consented to an increase of the Dominican debt for the purpose of liquidating the floating indebtedness when adjudicated by the Commission. It provided for the payment of all awards of said Commission in bonds of the Dominican Republic at par with accrued interest, except fractional amounts to be paid in cash. This bond issue amounted to $4,161,300.

Towards the end of 1926, the following announcement was made through the Dominican Legation at Washington, D. C.: "The Dominican Government, having complied with the terms of Article III of the Dominican-American Convention of December 27, 1924, will receive bids for the sale of the bonds corresponding to a ten million dollar loan that has been authorized by Act of Congress number 516 of October 9th, 1926, published in the Official Gazette number 3796 on the 16th of October, 1926. The commission appointed by said Act of Congress number 516, duly authorized by the President of the Republic, has decided to issue ten million dollars in bonds and now offer for sale five million dollars of bonds to the best bidder.

The above mentioned bonds will run for a period of fourteen years, will bear interest at the rate of not more than five and one-half per cent annually, redeemable at 101 and their redemption will begin on the first of October, 1930 at a rate of not less than one million ten thousand dollars a year.

The Dominican Government will have the privilege to call for redemption at any date after 1930, the bonds of this issue in whole or in part.

These bonds will be guaranteed by the Customs revenues in accordance with Article I of the Dominican-American Convention of December 27, 1924. The funds for the redemption of these bonds will be deposited with the Fiscal Agent that the Dominican Executive may appoint.

The bonds corresponding to this issue, as well as the ones previously issued, will be exempt from all taxes present or future.

Total public debt aggregated at the beginning of 1926, $12,276,350 against approximately $15,000,000 in 1923, $20,-812,691 in 1916, of which $4,292,344 represented floating indebtedness, and $11,277,250 on December 31, 1921. The total funded debt in 1926 amounted to about $13.72 per capita.

Title of Bond	Interest Payable	Maturity	Amount Outstanding	Rating
1. Dominican Rep. Customs 5s of 1908...........	F&A 1	1958—S. F.	$1,583,740*	A
2. Dominican Rep. Customs 5s of 1918...........	J&J 1	1938—S. F.	455,600	A
3. Dominican Rep. Customs 5½s of 1922.........	M&S 1	1942—S. F.	10,000,000	A

* As of Feb. 1, 1926.

2) Formula for the Accuracy Ratio (AR).

This formula is computed using the difference between the cumulative distribution of realizations and the cumulative distribution of ratings or:

$$AR = 2\left(\sum_{R_i = R_1,...,R_{max}} \frac{(D_{R_i} + D_{R_{i-1}})(N_{R_i} - N_{R_{i-1}})}{2DN} - 0.5 \right)$$

where

D = total number of defaults

N = total number of issuers

D_{R_i} = total number of defaults rated R_i and less

N_{R_i} = total number of issuers rated R_i and less

$D_0, N_0 = 0$

$R_i = R_1,...,R_{max}$ – ratings of a given agency

3) Formula for the Yield Implied Ratings

The goal is to compute the vector of brackets that minimize loss function P(b). In the following formula the (x)+ operator takes value zero when result within brackets is negative.

$$P(b) = \sum_{j} \left[w_j \left(s_j - b_{i(j)}^+ \right)^+ + w_j \left(b_{i(j)}^- - s_j \right)^+ \right]$$

Where:

$i(j)$ = agency rating index of issue j.

s_j = spread of issue j over US bonds (for simplicity, since our computations are annual, and one average US yield is considered, we have performed computations over yields rather than spreads, without loss of generality).

$b_{i(j)}^+$ = upper threshold for rating j by agency i.

$b_{i(j)}^-$ = lower threshold for rating j by agency i.

w_j = rate chosen i j to level off the contribution of each rating bucket

4) Table 4. Background data.

Name of the bond	Maturity	Date of default	Moody's rating at the time of default (date of the collection of the rating)	Poor's rating at the time of default (date of the collection of the rating)	Fitch rating at the time of default (date of the collection of the rating)	Standard Statistics rating at the time of default (date of the collection of the rating)
Bolivia 7s 1927	1958	01/01/1931	Baa (January 1930)	B** (March 1930)	BBB (July 1930)	C1+ (Dec. 1930)
Dominican Rep. 5,5s 1922	1942	01/01/1931	A (January 1930)	A (March 1930)	AA (July 1930)	B1+ (Dec. 1930)
Dominican Rep. 5,5s 1926	1940	01/01/1931	A (January 1930)	A (March 1930)	AA (July 1930)	B1 (Dec. 1930)
Bolivia Ext 7s 1928	1969	01/03/1931	Ba (January 1931)	B** (March 1931)	BBB (July 1930)	C1+ (Dec. 1930)
Bolivia Dollar 6s 1917	1940	01/04/1931	Ba (January 1931)	B** (March 1931)	BBB (July 1930)	B (Dec. 1930)
Peru Ext 6s 1928	1961	01/04/1931	Ba (January 1931)	B** (March 1931)	A (July 1930)	B1 (Dec. 1930)
Bolivia Ext 8s 1922	1947	01/05/1931	Ba (January 1931)	C** (March 1931)	BBB (July 1930)	B (Dec. 1930)
Peru Ext 6s 1927	1960	01/06/1931	Ba (January 1931)	B* (March 1931)	A (July 1930)	B1 (Dec. 1930)
Chile Ext 6s of 1927	1961	01/08/1931	A (January 1931)	A (March 1931)	BBB (July 1931)	A (Dec. 1930)
Chile Ext 6s of 1928	1961	01/09/1931	A (January 1931)	A (March 1931)	BBB (July 1931)	A (Dec. 1930)
Chile Ext 6s of 1929	1962	01/09/1931	A (January 1931)	A (March 1931)	BBB (July 1931)	A (Dec. 1930)
Peru Ext 7s 1927	1959	01/09/1931	Baa (January 1931)	B* (March 1931)	B (July 1931)	B1+ (Dec. 1930)
Chile Ext 6s 1926	1960	01/10/1931	A (January 1931)	A (March 1931)	BBB (July 1931)	A (Dec. 1930)
Chile Ext 7s 1922	1942	01/11/1931	A (January 1931)	A (March 1931)	BBB (July 1931)	A (Dec. 1930)
Chile Ext 6s 1930	1963	01/11/1931	A (January 1931)	A (March 1931)	NR (July 1931)	A (Dec. 1930)
Brazil Ext gold 8s 1921	1941	01/12/1931	Baa (January 1931)	B* (March 1931)	BB (July 1931)	C1+ (Dec. 1930)
Brazil Central Ry 7s 1922	1952	01/12/1931	Ba (January 1931)	B (March 1931)	BB (July 1931)	C1+ (Dec. 1930)
Chile Ext Ry 6s 1928	1961	01/01/1932	A (January 1931)	A (March 1931)	BBB (July 1931)	C1+ (Dec. 1931)
Brazil Ext 6,5s 1926	1957	01/04/1932	B (January 1932)	B (March 1932)	BB (July 1931)	C1+ (Dec. 1931)
Brazil Ext 6,5s 1927	1957	15/04/1932	B (January 1932)	C** (March 1932)	BB (July 1931)	C1+ (Dec. 1931)
Greece 7s 1924	1964	01/05/1932	Baa (January 1932)	B* (March 1932)	BBB (July 1931)	B1+ (Dec. 1931)
Salvador 7s 1924	1957	01/07/1932	Ba (January 1932)	C** (March 1932)	A (July 1931)	B (Dec. 1931)
Greece 6s 1928	1968	01/08/1932	Baa (January 1932)	B (March 1932)	CC (July 1932)	B1 (Dec. 1931)
Yugoslavia 8s 1922	1962	01/11/1932	Ba (January 1932)	B* (March 1932)	B (July 1932)	B (Dec. 1931)
Bulgaria Stab 7,5s 1928	1968	15/11/1932	Ba (January 1932)	B* (March 1932)	CCC (July 1932)	B (Dec. 1931)
Salvador Cust 1st 8s 1923	1948	01/01/1933	Baa (January 1932)	B (March 1932)	CCC (July 1932)	C1 (Dec. 1932)
Panama Ext 5s 1928	1963	15/05/1933	Ba (January 1933)	B** (March 1933)	A (July 1932)	B1+ (Dec. 1932)
Bulgaria 7s 1927	1967	01/07/1933	B (January 1933)	B (March 1933)	CCC (July 1932)	C1 (Dec. 1932)
Colombia Ext 6s 1927	1961	01/07/1933	Ba (January 1933)	B (March 1933)	CC (July 1932)	C1+ (Dec. 1932)
Uruguay 8s 1921	1946	01/08/1933	Ba (January 1933)	B (March 1933)	CCC (July 1933)	C1+ (Dec. 1932)
Costa Rica P Ry 7,5s 1927	1949	01/09/1933	B (January 1933)	C** (March 1933)	CCC (July 1933)	C1 (Dec. 1932)
Colombia Ext 6s 1928	1961	01/10/1933	Ba (January 1933)	B (March 1933)	CC (July 1933)	C1+ (Dec. 1932)
Uruguay Ext 6s 1926	1960	01/11/1933	Ba (January 1933)	B (March 1933)	CCC (July 1933)	C1+ (Dec. 1932)
Uruguay SF 6s 1930	1964	01/11/1933	Ba (January 1933)	B (March 1933)	CCC (July 1933)	C1+ (Dec. 1932)
Cuba PW 5,5s 1930	1945	31/12/1933	Ba (January 1933)	A (March 1933)	B (July 1933)	B (Dec. 1933)
Hungary 7,5s 1924	1944	01/02/1934	Ba (January 1934)	B (March 1933)	CCC (July 1933)	C1+ (Dec. 1933)
Germany 7s 1924	1949	15/10/1934	Baa (January 1934)	B* (March 1934)	BB (July 1934)	B1 (Dec. 1933)
Germany 5,5s 1930	1965	01/12/1934	Baa (January 1934)	B* (March 1934)	B (July 1934)	B1 (Dec. 1933)
Poland Ext 8s 1925	1950	01/06/1936	Baa (January 1936)	B** (March 1936)	BB (July 1935)	B1 (Dec. 1935)
Poland Ext 6s 1920	1940	01/10/1936	Baa (January 1936)	B* (March 1936)	BB (July 1936)	B1 (Dec. 1935)
Poland Ext Stab 7s 1927	1947	01/10/1936	Baa (January 1936)	B** (March 1936)	BB (July 1936)	B1 (Dec. 1935)
Costa Rica Ext 7s 1926	1951	01/11/1936	B (January 1936)	C** (March 1936)	CC (July 1936)	C1+ (Dec. 1935)
Brazil Fund 5s 1931	1951	01/11/1937	Ba (January 1937)	C** (March 1937)	B (July 1937)	B1 (Dec. 1936)
Austria 7s Inter 1930	1957	31/05/1938	Ba (January 1938)	B (March 1938)	B (July 1937)	B1+ (Dec. 1937)

Notes: 44 bonds in our sample defaulted in the 1930s. The average numbers of months elapsed between the dates of collection of the ratings and the dates of default are very near: 4.9 for Fitch, 5.4 for Poor's, 6.2 for Standard Statistics, and 6.8 for Moody's (authors'computations).