

# **Subordinated Bonds as an Instrument of Banking Supervision: How to Improve Market Signal Quality**

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## **Abstract**

There is a growing number of proposals to use subordinated bonds in banking supervision. We address two points which have been neglected so far and which may be important in order to evaluate the costs and benefits of subordinated bonds correctly. First, we suggest perpetual subordinated bonds, since this may make the bond market more liquid and reduce the required liquidity premium, thus enhancing the information function of yields and prices. Second, we show that subordinated bondholders may benefit from risk-increasing activities when the bank faces financial distress, whereas depositors—and bank supervisors—are interested in decreasing risk. Thus, there should be an upper bound on subordinated debt.

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# **Subordinated Bonds as an Instrument of Banking Supervision: How to Improve Market Signal Quality**

## **1. Introduction**

The regulation of large banks has been set in motion on an international level. In June 1999, the *Basel Committee on Banking Supervision* (1999) published a proposal suggesting a fundamental reform of the 1988 Basel Accord. The proposal is based on three main “pillars:”

- further development of the 1988 Accord in order to establish a new Accord on minimum capital requirements for banks,
- enlarging the role of supervisory authorities in monitoring banks’ equity and their internal risk-controlling models,
- strengthening market forces for supervisory purposes (market discipline) in terms of supporting both investors’ ability to *monitor* changes in bank condition and the ability to *influence* a bank’s actions (see for this distinction, *Bliss/Flannery* 2001).

In the 1999 proposal, the third pillar, market discipline, paled in comparison to the other pillars. It is interesting to note how its scope has grown in the amended proposal of January 2001 (*Basel Committee on Banking Supervision* 2001; see *Hall* 2001 for a detailed history of the Basel Accord from 1988 to 2001): the recommendations for transparency and disclosure are now more numerous and described in greater detail; besides recommendations there are now also *requirements*; and the interplay between the three pillars is stressed, characterizing them as “three complementary elements” that are “mutually reinforcing” (*Basel Committee on Banking Supervision* 2001, p. 1, 3 (a)).

We strongly approve of the idea of integrating market forces more widely in banking regulation (see *Barth et al.* 2002 for empirical support of this current). As the supervisory provisions become more and more detailed and complicated, regulation costs increase sharply—for both supervisory authorities and banks. Moreover, regulations with respect to the first two pillars may provide incentives for banks to look for ways evading the intended consequences. For instance, banks may be tempted to do regulatory capital arbitrage by some forms of securitization (*Benink/Wihlborg* 2002) or may lack

incentives to correctly assess credit risk (*Kirstein* 2002). Finally, supervisory authorities may not react quickly enough to innovations and the changing environment of financial markets. The goal of banking regulation—a stable banking system—may be reached by more efficiently utilizing the information and expertise of thousands of market participants as reflected in yields and prices. There is growing evidence that investors can assess financial firm’s true condition quite well (see, for instance, the review by *Flannery* 1998).

However, “market discipline” is still a misnomer for the third pillar, even in the amended proposal. It is revealing that the *Bank for International Settlements* (2001, p. 136) in its annual report labels the pillar “disclosure” rather than market discipline. As the *European Central Bank* (2001, p. 74) correctly emphasizes, “disclosure is not a sufficient condition for market discipline. Banks’ stakeholders need to have adequate incentives to monitor banks and impose discipline on managers. An adequate number of creditors who are not covered by deposit insurance appears to be the most important factor generating market discipline.”

The current favorite in the discussion of how to close the gap between mere disclosure proposals and serious market discipline is an obligation of larger banks to issue a substantial amount of subordinated debt. *Board of Governors* (2000, p. 3) define subordinated debt as “unsecured debt that has an original weighted average maturity of not less than five years; is subordinated as to payment of principal and interest to all other indebtedness of the bank, including deposits; is not supported by any form of credit enhancement, including a guarantee or standby letter of credit; and is not held in whole or in part by any affiliate or institution-affiliated party of the insured depository institution or bank holding company.”<sup>1</sup>

At the root of the concept, theory suggests a relationship between issuer standing and bond prices and yields.<sup>2</sup> Empirical studies confirm the existence of such a relationship in general, as well as for the

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<sup>1</sup> We refer to subordinated *debt* as the general term and use the narrower term subordinated *bond* when the discussion is focused on the availability of a market for or market data of subordinated debt.

<sup>2</sup> In what follows, we confine our discussion to yields and yield spreads, skipping the parallel discussion on prices.

specific case of subordinated bonds, but the studies also document other factors besides issuer standing that determine yields (for surveys, see, for example, *Board of Governors* 2000, Appendix C, and *Bliss* 2001, p. 29-32). From a regulatory point of view, subordinated debt is particularly attractive because regulators and holders of subordinated debt are assumed to share parallel incentives: holders of subordinated debt have a stimulus to care for the soundness of the bank because their funds serve as a loss absorber second only to equity. In contrast to shareholders, however, holders of subordinated debt usually are interested in a less risky investment policy because of the quite limited upward potential of debt. Trading among parties with such incentives should result in a market that represents the risk position of the issuing bank, particularly reflected in yields and yield spreads.

Several objectives are attached to a subordinated debt policy: improving market discipline; stimulating improved transparency and disclosure at banks; increasing the size of the financial cushion provided to the deposit insurance and other bail-out institutions; and reducing the tendency for bank supervisors to forbear their resolution of a troubled institution (*Board of Governors* 2000, p. v-ix, 24-36).

Usually, a distinction is made between direct and indirect market discipline (*Board of Governors* 1999, p. 2; *Evanoff/Wall* 2000, p. 41). Direct discipline is exerted by the terms of the bond when it is issued, i.e., it is a task of the primary market. Indirect discipline is at work when private market participants and regulatory authorities use signals from the market for subordinated bonds in order to evaluate the issuer's financial standing. Private market participants, for example, could use this information to determine the yield they require for other liabilities of the same bank. Regulators could attach deposit insurance premiums or special inspections of banks to it. Information for this purpose is expected to be mainly supplied by the secondary market, but the primary market might contribute useful information as well. Provided that investors who consider themselves to be insufficiently informed require a risk premium, there are two effects that induce the issuer to improve its information policy: the risk premium not only raises the cost of capital, but it also makes the force of other channels of indirect discipline more perceptible. Through these connections, subordinated bonds support the disclosure proposed in pillar three of Basel II.

In the course of time, a bulk of proposals has accumulated. The proposals differ both in their underlying rationale and in their design. *Bliss* (2001, p. 26) distinguishes three *rationales* underlying the subordinated debt proposals: subordinated debtholders directly affect a bank's investment policy; yields on subordinated bonds supply regulators (and other market participants as well) with additional information of a bank's soundness; and regulatory action or bank portfolio restructuring are automatically triggered by yields and yield spreads on subordinated bonds. Concerning the *design*, one must consider the following features: which banks should be obliged to issue subordinated bonds; the volume of subordinated bonds; their issuing frequency; their time to maturity; whether there should be upper limits for their yields; and whether they should include put options for the holders of subordinated bonds (see *Board of Governors* 2000, p. 37-56, for a recent discussion of design features).

Since comprehensive surveys of subordinated debt proposals of recent date are available (see, e.g., *Board of Governors* 1999, 2000; *Evanoff/Wall* 2000 (a); *Lang/Robertson* 2002), this paper will neither replicate these efforts nor put forward a new full proposal. Instead, we will emphasize two questions concerning the signaling and monitoring function of bond yields that are important when using subordinated debt in banking supervision, but which seemingly have been neglected in the literature so far. First, how can security design support the development of a market for subordinated bonds that produces signals of bank soundness of adequate quality, and second, which incentive problems are inherent to subordinated debt affecting signaling quality and how to overcome them.

Section 2 concerns the first question. Surprisingly, all proposals praise the potential merits of *market* discipline but hardly refer to the question of how to ensure sufficient market quality, i.e., how to enhance the information function of yields. Sufficient market quality is a prerequisite for all theoretical distinctions which have been advanced, such as direct and indirect market discipline or market monitoring and market influence. Thus, each proposal requires, e.g., a certain minimum amount of subordinated bond volume in order to make the market more liquid and reduce the noise contained in yields. Obviously, the more severe the consequences attached to subordinated bond market data are, the more advanced market quality should be. But empirical evidence indicates that

adequate market quality cannot be taken for granted. Available proposals suggest the mandatory issue of subordinated bonds with a *finite term to maturity*. This causes a dilemma due to the simultaneously complementary and conflicting relationship in the nexus of issuing frequency and issue size, and primary and secondary market quality. The secondary market is the natural device for continuously providing market signals. But at present, subordinated bond issues at the U.S. primary market deliver valuable information which the existing secondary market is not able to supply (information effect of the primary market). Moreover, in some proposals, regulatory measures such as forced asset restructuring are automatically triggered by primary market data (trigger function of the primary market). One line of reasoning, therefore, is to increase the issuing frequency to record the primary market signals more often. But observing a certain minimum term to maturity, this would lead to smaller bond sizes and thus further deteriorate secondary market quality. Moving in the opposite direction, i.e., larger but fewer issues, would foster the secondary market at the cost of the primary market, which currently is reported to provide quite valuable information (*Board of Governors 1999*, p. 16). In a nutshell, the available proposals assume an either-or choice between the primary and secondary markets.

Our concept promises to break up this unpleasant setting by proposing a security design that supports the emergence of so strong a secondary market that it can take charge of the tasks currently allotted to the primary market. We suggest that each bank only have a *single* subordinated bond outstanding with an *infinite term to maturity*. If there is a change in the required volume of subordinated debt—e.g., measured as a percentage of risk-weighted assets—the bank could simply sell or purchase securities of its already outstanding bond. Obviously, this construction avoids fragmentation and hence increases secondary market quality. In this situation, the information effect of the primary market loses much of its appeal. And the same holds for automatic triggers that would be better attached to secondary market data with their resulting superior quality. Moreover, the concept allows for great flexibility.

Section 3 addresses three incentive problems that may distort yields and undermine the supervision purpose of subordinated debt. First, banks may have an incentive for “window-dressing,” i.e., publishing favorable information. Second, politicians or public authorities may have an incentive to

salvage banks that are likely to fail. Thus, the yields of subordinated debt may not reflect the “true” risk exposure. The same holds true for insurance systems that insure the *bank* rather than the bank’s deposits. Third, subordinated bondholders may benefit from risk-*increasing* activities when the bank faces financial distress.<sup>3</sup> The proposals and the current discussion hardly consider this point. For instance, *Hancock/Kwast* (2001, p. 152) state: “[subordinated] bondholders are exposed to loss, but do not benefit from any upside gains that accrue to risk-taking.” (For similar statements, see *Haubrich* 1998, p. 2, *European Shadow Financial Regulatory Committee* 1999, p. 209.) Recent research by *Blum* (2002) suggests that subordinated debt might induce the bank’s shareholders to take even higher risk than under full deposit insurance. *Blum*, however, does not consider the perspective of junior bondholders. In a more general setting, *Black/Cox* (1976) demonstrated that the value of junior debt may increase with the firm’s risk, whereas the value of senior debt does not. Thus, with regard to banks, subordinated bondholders may not act on behalf of not (sufficiently) insured bank depositors when the bank is in financial distress and there is too much subordinated debt. Hence, we suggest the establishment of an *upper* bound of subordinated debt. To our knowledge, no proposal has considered an upper bound so far.

This article proceeds with an elaboration of our two main points, market signal quality (section 2) and incentive problems (section 3), and concludes with section 4.

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<sup>3</sup> Thus, the model may explain the empirical finding of *DeYoung* et al. (2001) showing that prices of subordinated bonds may not correlate negatively to changes in the bank’s condition.

## **2. Market Discipline, Market Signal Quality, and Security Design**

### **2.1. Market Signal Quality and the Use of Subordinated Bonds in Banking Regulation**

Market quality is an intuitive idea rather than a precise concept supplying a single quantitative measure. According to *Fama* (1970), in an efficient market (strong form), market prices permanently reflect all relevant information. In our case, a high-quality market generates yields and prices that are high-quality signals of a bank's soundness. Common wisdom in finance holds that liquidity is the key for high-quality market signals. These ideas can be found in the proposals. Supporters of subordinated bonds require the secondary market to be liquid and efficient and the securities to be actively traded, such that accurate prices are almost permanently and publicly available (*Evanoff* 1993, p. 358; *Board of Governors* 1999, p. 5, 24, 32; *U.S. Shadow Financial Regulatory Committee* 2000, p. 22f.).

The *U.S. Shadow Financial Regulatory Committee* (2000, p. 23) underlines the importance of the signal quality generated in the market for subordinated bonds: “[T]he use of market prices as a regulatory tool will only be desirable if the prices and yields of the debt instruments reflect information about [the soundness of] the banks that issue them.” This condition holds for all proposals put forward in the literature. The market signal quality required must increase as the regulatory consequences attached to it become more far reaching. For example, regulatory action that is automatically triggered by market data calls for a better quality than a concept where regulatory authorities use market data as an additional source of information.

A short glance at existing bond markets is sufficient to demonstrate that market quality cannot be taken for granted; instead, it must be dealt with in concepts that use subordinated bonds in banking regulation.<sup>4</sup> Most proposals concentrate on yield spreads—either between the bond of the bank under

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<sup>4</sup> Recent surveys of empirical studies dealing with the quality of yields and prices in bond markets in general and in subordinated bond markets in particular can be found in *Board of Governors* (2000, p. 70-76), *Evanoff/Wall* (2000, p. 10-22 (a)), and *Bliss* (2001, p. 29-32).

investigation and a default-risk-free bond, or among the subordinated bonds issued by different banks. It is well known that default risk spreads can be quite volatile even during calmer market periods.<sup>5</sup>

The experiences with markets for subordinated bonds also emphasize that market quality cannot be taken for granted. In its comprehensive report, the *Study Group of the Federal Reserve System (Board of Governors 1999)* analyzes in detail the market for subordinated bonds issued by banks as it has evolved in the U.S.<sup>6</sup> without particular regulatory incentive. With respect to the *primary market*, there is the impression that a pending issue usually increases the issuer's willingness to give information to the public (*ibid.*, p. 16). As a consequence, the price quality of subordinated bonds that are already outstanding is said to increase. If an issuer does not come to the primary market with a new subordinated bond for a longer time, liquidity and therefore price quality of its outstanding subordinated bonds in the secondary market decreases (*ibid.*, p. 46, 48f.).

The *secondary market* for the bonds of the fifteen to twenty largest issuers is reported to be significantly more liquid than those of the other issuers (*ibid.*, p. 25). But even in the large issuers segment, often only bids and asks, but not transaction prices, seem to be available.<sup>7</sup> Moreover, reliable publicly available sources for price information are hard to find (*ibid.*, p. 49).<sup>8</sup> The liquidity of subordinated bonds is reported to increase—as could be expected—with the volume outstanding. However, despite the problems mentioned above, the study also concludes that during normal market

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<sup>5</sup> See *Bliss* (2001, p. 29-32) for a discussion of possible factors other than differences in individual issuer risk that can drive yield spreads and hence render their interpretation more difficult.

<sup>6</sup> Available research concentrates on the U.S. market. *Sironi* (2000; 2001; 2002), *Gropp/Richards* (2001), and *Gropp et al.* (2002) provide examples of the scarce empirical analyses of the market for subordinated bonds issued by European banks.

<sup>7</sup> See *Gropp/Richards* (2001, p. 13, 15) and *Gropp et al.* (2002, p. 19, 30) for similar European evidence. It can be added that during difficult market periods only wide and therefore unattractive bid-ask spreads are available; *Board of Governors* (1999, p. 49). *Sironi* (2000, p. 7) reports the same problem with respect to the European secondary market.

<sup>8</sup> See also *Hancock/Kwast* (2001). They compare the subordinated bond market data provided by two data vendors and two broker-dealers. The study reveals differences in yield data and yield spread data of an order that cannot be easily neglected.

periods, the yields—with some qualifications—do reflect the differences between the issuers' risks (*ibid.*, 16, 46). But the chairman of the *Study Group*, *Kwast*, describes the quality of subordinated bond market data as insufficient to attach automatic triggers of regulatory action to them (*Euromoney* 2000, p. 146). The FRS follow-up study by *Hancock/Kwast* (2001) confirms the general impression: Liquidity of a subordinated bond is positively related to issue size and issuer size, and to the general condition of the bond market, and is negatively related to the bond's age.

**Result 1:** In summary, the point to recognize is that those who support the use of subordinated bonds in banking regulation are aware of the fact that market quality is a crucial aspect of this concept. In addition, experiences with existing markets clearly give evidence that a sufficient market quality does not emerge on its own. For instance, based on his own empirical research of the U.S. corporate bond market, *Saunders* (2001, p. 193) recommends to drop the subordinated debt proposal due to poor market quality and use equity market data in banking supervision instead.<sup>9</sup> Given this situation, one should expect that developing a market for subordinated bonds of a sufficient quality is a major point in the proposals. But it is not. This issue is hardly discussed in the U.S. proposals and analyses. No reference to market microstructure research, which especially deals with market organization, can be found (for the basics of market microstructure research see, e.g., *O'Hara* 1995, and *Stoll* 1999). Another issue that has not yet received much attention concerns the effects that the design of a subordinated bond can have on its trading volume and hence on signal quality.

In the following section, we will propose a *security design* that promises to improve market and signal quality. *Market organization design*, e.g., an obligation for issuers to hire a market maker for their bond, is another promising field to improve market quality but is beyond the scope of this article.

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<sup>9</sup> Recently, empirical analyses of the stock market as a source for banking supervision information have become more numerous; see, e.g., *González-Rivera/Nickerson* (2002) and *Gropp et al.* (2002). Besides the liquidity of the market, the difference in claim structure contributes to the attraction of stocks. The latter may have the effect that the information signals of stocks and subordinated bonds could be partially complementary.

## **2.2. Proposition of a Security Design to Improve Market Quality: Subordinated Bonds with Infinite Maturity**

All proposals seem to put forward subordinated bonds with a finite maturity. Thus, one has to determine both time to maturity and issuing frequency. In these proposals, it is the task of the *secondary market* to continuously provide information of sufficient quality via yields and yield spreads (market monitoring). The concepts assign to the *primary market* several functions as well. It is mainly regarded as a device to generate additional relevant information on the issuer (information effect, market monitoring). The U.S. market actually fulfilled this task more or less according to the results presented in the previous section. Moreover, as a part of the market *influence*, the issue terms should have an immediate effect on the issuer. This function is of particular importance in those concepts that suggest regulatory measures—such as forced asset restructuring—be automatically triggered by primary market data (trigger function of the primary market). But the *Study Group*, which does not propose automatic triggers, holds that direct discipline (market influence) plays a minor role due to the small share of subordinated debt in a bank's total capital (*Board of Governors* 1999, p. 33).

This causes the *Study Group*, which generally avoids delivering opinions and recommendations, to carefully propose the co-existence of the primary and secondary market (*ibid.*, p. 24). However, there is not only a complementary relationship between primary and secondary markets. A competitive aspect must be observed as well: other things being equal, if issuing frequency is increased, the positive effects mentioned above would occur more often. But there are also negative side effects. Assuming no other changes, a higher issuing frequency reduces the volume of a single security. But the bond volume should not fall below a certain minimum, which would make it difficult to establish a secondary market of sufficient quality (*ibid.*, p. 32).<sup>10</sup> In addition, issuing costs would increase disproportionately due to fixed costs (*Haubrich* 1998, p. 2). It is for this reason that some proposals argue that mandatory issue of subordinated bonds should be confined to larger banks (*U.S. Shadow Financial Regulatory Committee* 2000, p. 20).

There are several ways to deal with this relationship. For instance, the proposal of the *U.S. Shadow Financial Regulatory Committee* (2000, p. 23) grants banks a certain latitude: if the secondary market does not meet the specified quality issuing duties will be tightened. At least once each quarter an information signal of sufficient quality has to be produced in the primary market. A second way to resolve the situation could be to expand issuers' duties with respect to current disclosure. If these duties obliged the issuers to disclose those pieces of information that lead to an information effect in the primary market, the primary market information effect would lose significance and the secondary market quality would be improved. However, it is plausible to assume that the information effect is partly caused by implicit information, e.g., information implied in the timing and the terms of an issue, which would be difficult to deal with in regulatory terms.

Finally, we would like to submit a new proposal with respect to the security design, which to our knowledge has not been put forward so far. The *Study Group (Board of Governors 1999, p. 33)* as well as the *U.S. Shadow Financial Regulatory Committee* (2000, p. 23) seem to be resigned to the fact that you can have either a primary market—with a higher, but still limited issuing frequency—or a secondary market of sufficient quality, but not both at the same time. In what follows, a proposal of subordinated bonds with an *infinite time to maturity* will be discussed, a model that promises to break up the either-or choice.

The starting point of the following analysis is the situation of subordinated bonds with a finite time to maturity. For both the primary and secondary market, it is plausible to assume that the bigger the outstanding volume of a bond, the lower the required liquidity premium and the better the information quality. The optimum issuing frequency and bond volume has to be determined. Figure 1 illustrates this situation. The more frequently a bank issues a subordinated bond, the more frequently the primary market information effect occurs—the existence of which shall be assumed temporarily. The information effect temporarily lifts the aggregated information level of the primary and secondary

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<sup>10</sup> One option would be to shorten the time to maturity. But the proposals regard a certain minimum time to maturity as necessary to deny the holders of those securities—in contrast to depositors—the chance to quickly take their money away from the issuing bank; *Board of Governors* (1999, p. 3, 34f., 36).

market (V1).<sup>11</sup> An increase in bond size should improve the information quality of the secondary market (V2). At a first stage, the same holds for the primary market at the—fewer—issuing dates. But since the basic information level (on the secondary market) is higher, it is not clear whether the information peaks in this situation show a different level than in the situation with a higher issuing frequency (V2a, b).

### **Figure 1 about here**

The following proposal will be analyzed: the subordinated debt of a bank consists of *only a single bond* with an *infinite term to maturity*. The bank must have the required minimum volume outstanding, either permanently or at certain dates. If it has to increase outstanding volume, it sells securities at arm's length that are *identical* to those already outstanding. “Old” securities and those just sold share the same identification number. It is *not* an issue of a *new* bond but a re-opening of the original bond.<sup>12</sup> It is a change in the volume of the already outstanding bond issued some time before. Each bank has only a single subordinated bond outstanding. The bank may purchase its own securities if the outstanding volume exceeds the required volume. Put differently, there is *de facto* no longer a primary market, but only a secondary one. The outstanding volume and the homogeneity of an issuer's outstanding subordinated bond are maximized since there is only a single subordinated bond outstanding per bank. This design achieves the optimum for the secondary market because there is no fragmentation with respect to the subordinated bond of a single bank. In Figure 1, this effect causes the information quality of the secondary market to rise. Therefore, the line (V3a, b) is above the line for secondary market information quality in the case of a limited time to maturity and a low issuing frequency. The question remains open as to whether this line is above or beneath the information peaks in the case of few issuing dates. There are no information peaks in this line because this version lacks a primary market.

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<sup>11</sup> The information peaks only serve for demonstration purposes and are not intended to provide exact numbers. a and b of a version illustrate two of many possible graphs of a version. Solid and dashed lines serve to improve readability, but do not have a meaning with regard to the content.

Characteristics as homogenous as possible across the bonds of a single issuer and across several issuers are regarded to be advantageous. It is argued that homogeneity fosters liquidity and efficiency and therefore enhances interpretation and comparability of secondary market yields (*Board of Governors* 1999, p. 15f., 33-35; *Evanoff/Wall* 2001, p. 140; *Flannery* 2001, p. 114). In addition, it is said that there is a matching problem with those subordinated bonds that have evolved without regulatory impetus: differing terms of the bonds impede the calculation of high-quality spreads (see, e.g., *Evanoff/Wall* 2002, p. 1006f.). As a consequence, it suggests itself to reflect on the security design in proposals for the use of subordinated bonds in regulation to minimize such problems. Hence the supervisory authority may consider granting the banks only very limited leeway with respect to the design of their subordinated bonds. Our proposal would easily allow for cross-issuer homogeneity in subordinated bond design. Taking this view, an identical interest rate over the infinite life span obligatory for all issuers may be preferred. If it is also ensured that a default risk-free issuer, usually the government, issues an identical bond with a volume that facilitates the development of a good secondary market and possibly also of a forward market, regulatory intentions would be strongly supported. In this case, the subordinated bonds of banks could easily be compared among each other and to a default risk-free benchmark.

But cross-issuer homogeneity—including the default risk-free benchmark—can also be attained in connection with a limited period of fixed interest rate. (Time to maturity remains infinite.) Assume a fixed rate for six months, i.e., every six months the interest rate can be changed. Accordingly, two annual interest rate adjustment dates are needed, e.g., March 31 and September 30, which are valid for all subordinated bonds under consideration. On March 31, the (governmental) issuer lays down the coupon of the benchmark bond valid for the next six months. On the same day, all other issuers adjust their subordinated bonds and adopt the benchmark bond's coupon. If a bank sells additional securities of its subordinated bond, say in June, these securities carry the same coupon which will also be adjusted on September 30, and the same accrued interest as those securities of this bond which were

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<sup>12</sup> Re-opening of government securities is common in Germany and in the U.S. as well; for the latter see the empirical study by *Fleming* (2002).

already outstanding. In other words, those securities already outstanding at the last coupon adjustment date are identical with those securities that are sold after the coupon rate adjustment date.<sup>13</sup> However, it must be kept in mind that those requirements would mean a massive intervention into banks' business and would have to be considered as regulatory cost. In addition, the trade-off has to be considered between the benefits of encompassing mandatory cross-issuer homogeneity and the loss of information implied in bond issue terms and timing when issuers have greater leeway.

*Study Group* and *U.S. Shadow Financial Regulatory Committee* do not want to be deprived of a primary market because they ascribe two effects to it: the information effect, which, however, should lose significance if the quality of the secondary market increases, and the threat to the bank of being forced to reduce or restructure its business volume if it fails to issue subordinated bonds. In its version above, our proposal of eternal subordinated bonds misses the primary market. However, some of the primary market's functions can be integrated into our concept. For this purpose, a bank could be obliged to sell at arm's length a certain share in its required subordinated bond (re-opening) at certain dates, say 10% of the required volume every six months. Again, the exact mode (frequency, amount) should be optimized on the basis of empirical findings and will therefore not be discussed in any further detail here. If the mandatory regular sale leads to an overfulfillment, the bank is of course entitled to purchase back the amount of its bond not necessary for regulatory reasons. Contrary to the proposals in the literature, *identical* securities would be traded at the "primary" and the secondary market. Actually, there is no primary market in the usual sense, since the bank sells additional securities of the bond that was already outstanding. Hence, each new security sale by the bank does not contribute to the fragmentation of the secondary market. Moreover, regular sales might "rejuvenate" a bond and act as a counterforce to the negative effect a bond's age has on market quality (for empirical evidence, see, for instance, *Elton et al. (2000)* and *Hancock/Kwast (2001)*).<sup>14</sup> Our

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<sup>13</sup> These considerations serve to demonstrate the flexibility and possible extensions of our concept. The actual security design should be optimized on the basis of empirical findings; for recent research, see *Elton et al. (2000)* and *Fan et al. (2002)*.

<sup>14</sup> One could object that the age problem is particularly grave for eternal bonds. But there are also counter-effects: Re-opening a bond should intensify the general interest in that security and provide some new

proposal decouples the connection between outstanding total volume, issuing frequency, and the volume of single bonds of a certain issuer, which formerly led to the partially competitive relation between the primary and secondary market. However, there are higher issuing costs in this version of the proposal than in the former version without a mandatory regular securities sale.

Graphically, this version of our concept has the following consequences represented by (V4a, b) in Figure 1. Compared with (V3a, b), information peaks re-emerge. But the peaks should be lower than in former cases, because the basic level—the information quality of the secondary market—is higher and, possibly, because a regular sale is different from a new issue. The information quality of the secondary market in isolation might be slightly lower than in the situation without mandatory regular sale, if the information activities of bond issuers, bondholders, and bond traders concentrate on the sale dates—this is exactly what the information effect implies—or if the secondary market suffers from the buy-back of securities by the issuer because it occurs during a short period of time. On the other hand, if issuers are likely to come into a situation where they have to buy back larger amounts of their bond, this might be an incentive for them to foster the quality of the secondary market in their bond. If there is indeed a reduction in secondary market quality for eternal subordinated bonds with mandatory regular sale compared to the version without this obligation, the decisive issue is whether “primary market” effects overcompensate this loss. This would definitely not be true if the aggregated line with mandatory regular sale is always beneath the line without this obligation (in Figure 1 beneath V3b). Whether V3 or V4 is more advantageous is an empirical question and must remain unsolved

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information about the issuer. The information effect might be smaller than in case of issuing a new bond. But nevertheless, the mandatory sale will have at least some information effect, since the bank has to convince new buyers and since the terms of the obligatory sale will have some impact on the yield of the complete issue. The latter will be of particular importance for the bank if, e.g., severe supervisory consequences are attached to the yield. And even if the information effect of the mandatory sale is still considered insufficient there remains the option to introduce disclosure obligations for the mandatory sale similar to those for new issues. Moreover, market quality problems are, all else being equal, more severe for off-the-run bonds (the on-the-run bond is the most recently issued bond of a certain maturity of a certain issuer) than for on-the-run-bonds (*Fleming, 2002*). In a way, the eternal bond is always on the run.

here. (In Figure 1 this is illustrated by (V3b vs. V4a), where sometimes one line is above the other and vice versa.)

The above discussion follows the U.S. line of reasoning insofar as it considers the information effect of the primary market. We also indicate that its importance compared to today's situation should decrease markedly if subordinated bonds are given a stronger role in banking supervision. In this case, the version "eternal bond without mandatory regular sale" would be preferred. In Figure 1, the less pronounced information effect causes lower information peaks in (V4a, b).

Figure 1 does not contain the second effect attributed to the primary market—its automatic-trigger function. This threat, which is usually attached to an upper limit of the yield or the yield spread (risk premium), could also be realized with secondary market data: for instance, an obligation of the issuer to buy back some securities of its outstanding subordinated bond can be triggered by the secondary market yield or yield spread exceeding a critical value. Given that regulatory provisions connect the outstanding volume of the subordinated bond and the bank's assets, e.g., by expressing the bond volume as a percentage of the (risk-weighted) assets, the buy-back obligation could force the bank to restructure its assets. And for the concept proposed here, there seems to be a good chance that this measure would be triggered by better data than that available at the primary market.

So far, we have underlined the advantages of an infinite term to maturity, however, there may be drawbacks as well. To take some excess volume of his subordinated bond from the market an issuer cannot simply wait for the bond to mature in the case of an infinite term to maturity. One may object that bond repurchases might become too expensive for the issuer if his demand meets an insufficient supply, e.g., because the bonds are locked in portfolios.<sup>15</sup>

One could argue that this is a minor problem related to the expected benefits — for five reasons: First, it is to be expected that such considerations can induce banks, all other things being equal, to avoid

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<sup>15</sup> This problem would be particularly severe in concepts with an *upper* bound for subordinated bond volume (as we propose in the next section) since the market knows that the issuer *must* buy back some of his bonds, and in the above version of our concept with a mandatory regular bond sale which almost inevitably will cause some need for bond repurchases.

building up large excess volume. Second, the need for voluntary repurchases may not be as large as it may seem at first sight because banks have a lot of other means available to steer their interest rate position.<sup>16</sup> Third, this problem provides an additional incentive for the issuer to care for market quality: He suffers from too high buy prices and cannot take advantage of the lower yield spreads since they are obviously inaccurate signals of the issuer's soundness.<sup>17</sup> Fourth, with the serious implementation of subordinated bonds as a regulatory tool, the emergence of a fully-fledged market for subordinated bonds, i.e. a market including derivatives, security lending, etc., can be expected.<sup>18</sup> Then the power of arbitrage should be sufficient to prevent extremely distorted yields. Fifth, for the near future unless markets have not sufficiently developed, one could make subordinated bonds callable in order to allow for repurchases. But option elements complicate the interpretation of market signals. Therefore it is essential to construct the call right in a manner that reduces signal quality as little as possible.<sup>19</sup>

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<sup>16</sup> In its report about the existing U.S. subordinated bond market, the *Study Group* notes that the issuers usually use swaps to transform the characteristics of their bonds into a liability position with the characteristics they prefer; *Board of Governors of the Federal Reserve System* (1999, p. 35).

<sup>17</sup> Concepts that attach grave consequences to yield spreads, e.g., as automatic triggers for regulatory action, must include a market signal quality indicator. Only when its standard is met the yield spread is an eligible signal. Such considerations are beyond the scope of this section, which is confined to security design.

<sup>18</sup> See *Evanoff/Wall* (2002, p. 1007) for a related argument. They criticize that the weaknesses of the subordinated bond market as it has evolved without regulatory impetus are used as arguments against subordinated-debt proposals without taking into account that the implementation of such a proposal would change market conditions markedly.

<sup>19</sup> For this purpose there should be identical call clauses for all issuers. A further aspect is that the holder of an exercised bond will suffer from transaction costs. Since the exercise probability of a bond will only loosely be connected with the issuer's soundness, there is the danger that a factor unrelated with the issuer's soundness will be reflected in the yield spread. To minimize this effect one could think of obliging the issuer to come in for the transaction costs of those bondholders whose bonds are exercised, possibly including reinvestment costs. Finally, an idea how to keep homogeneity high and reduce the danger of market manipulation will be sketched: The regulatory authority announces twice a year without previous notice that bond issuers are allowed to call their bonds during the following week at market price. To avoid manipulation it is a *calculated* "market" price (for the sake of convenience this line of reasoning is continued with yields instead of prices): For instance, at the day

**Result 2:** To sum up our concept, if a bank was obliged to comply with the required amount of subordinated debt by supplying a single, eternal subordinated bond, secondary market liquidity is likely to increase considerably. In combination with the regulatory duty to regularly sell a certain percentage of the required volume, those two effects which the U.S. literature ascribes to the primary market can be integrated into our concept. However, it is by no means clear that this is necessary. The information effect is presumably small, and the forced restructuring of assets can be attained with secondary market data as well. The proposal of eternal subordinated bonds can be applied in a flexible way. It can be very interventionist with cross-issuer homogeneity as an extreme case. In a context where the supervisory authority follows a different rationale and observes subordinated bonds as an additional source of information, but grants the banks greater latitude, eternal subordinated bonds can be understood as an additional option for banks to foster the secondary market quality of their bond.

### **3. Incentive Problems and Market Signal Quality**

#### **3.1. Incentives of the Bank Shareholders to Influence Bond Yields and Prices**

The main argument for the use of subordinated bonds is that bondholders may evaluate the bank's risk more precisely because they directly bear the costs of wrong evaluations (*Calomiris* 1999, p. 1510f.). How do they get information? A single bondholder may not have an incentive to monitor because of the free rider problem. The bank could reduce monitoring costs by self-binding devices, e.g., by covenants restricting risky activities such as mergers.<sup>20</sup> Moreover, it could provide information on its own. However, there may be an incentive for "window-dressing" since this may reduce the cost of capital.

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*before* the announcement the yield of bank's A bond is 5.60% and the yield of the risk-free reference bond is 5.00%. The "exercise price" of the call in the following week equals the yield of the reference bond on that day plus the spread *on the day before the announcement*. If, for example, the yield of the reference bond amounts to 5.10% on the first day of the repurchase week the "exercise price" for this day is 5.70%. Thus, the current market situation is reflected in the reference bond's yield, which should be less prone to manipulation than the bank bond' yield.

The more serious the bank's financial condition, the more there is an incentive for window-dressing in order to manipulate bond yields and prices. Bank holding companies with a major stake in banks may have inside information and possibly could evaluate the bonds correctly; however, since there are close ties and collusion is possible, they are not supposed to hold subordinated bonds (*Board of Governors* 1999, p. 33). In almost all proposals, there is the idea that an objective evaluation is only possible with *arm's length* debt held by outside bondholders. However, outside bondholders depend on the information provided by the bank or by rating agencies when the bonds are issued. Rating agencies may provide more reliable information; however, they may be tempted to evaluate the bonds with a bias when the gains from expected additional orders exceed the possible reputational loss (*Board of Governors* 1999, p. 56, *Krahnert/Weber* 2001, p. 19). Even if rating agencies evaluate objectively, different rating agencies may provide different ratings (*Morgan/Stiroh* 1999). Then outside investors may have an interpretation problem.

In most Western countries there are legal provisions to mitigate the problem of asymmetric information on capital markets. In Germany, for instance, corporations listed at the stock or bond market are obliged to disclose corporate news immediately (§ 15 *Wertpapierhandelsgesetz* [German Securities Trading Act]). Perhaps it would even be efficient to oblige bank insiders (e.g., top management or major stockholders) to hold subordinated bonds and to allow insiders to trade these bonds. Informational efficiency in the market for subordinated bank debt might improve. However, this is not compatible with the principle of *arm's length* debt. Second, insider trading may have adverse impacts, e.g., outsiders may demand a higher premium or leave the market.

**Result 3:** The bank shareholders or management may have an incentive to disclose favorable rather than true information. The problem of window-dressing may be mitigated by legal disclosure requirements. Yet, one could ask whether insider trading would be desirable in order to improve informational efficiency.

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<sup>20</sup> See *Smith/Warner* (1979).

### **3.2. Incentives of Public Authorities to Prevent Banks from Failing and How This May Influence the Yields and Prices of Subordinated Debt**

If a bank is in financial distress, public authorities might have an incentive to (partially) cover a bank's losses. This can take different forms: subsidies to the bank in case of distress, warranties to the benefit of bank depositors, or a takeover of the bank by municipal, state, or even federal government. In some cases, precautions are guaranteed explicitly *ex ante*, i.e., before financial distress occurs,<sup>21</sup> such as the so-called “*Gewährträgerhaftung*” in Germany, where the municipal or state government guarantees coverage of potential losses of saving and loans associations or publicly held banks.<sup>22</sup> Sometimes there are also implicit, non-contractual guarantees that can be derived from the *attitude* of public and/or supervisory authorities. Thus, in the U.S. the government may cover a bank's losses when the bank is *too big to fail* (Benston/Kaufman 1997). The U.S. government spent billions during the crisis of savings and loan associations in 1989 after the deposit insurance system went bankrupt. In August 2001, the government of Berlin spent about 1.1 billion US-\$ in order to cover huge losses of the *Bankgesellschaft Berlin*.

When public authorities tend to subsidize banks in financial distress, the default risk of depositors *and* subordinated creditors is reduced. However, when there is little or no default risk, subordinated bonds are not useful for supervisory purposes. The required risk premium will be too low and the bond price will not reflect the bank's true risk. The signaling function of yields and prices is limited. Additionally, when subordinated creditors expect the subsidies, there is less incentive to monitor the bank. Thus, the governance function of subordinated bondholders will be supported when public authorities credibly commit not to subsidize in case of a bank's financial distress.

However, this form of commitment is not credible. The crisis of one bank may lead to a contagious depositor run, which paralyzes the whole economy, at least for a certain while, and induces high social

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<sup>21</sup> Calomiris (1999, p. 1507) deals with the difference between implicit promises and explicit guarantees.

<sup>22</sup> In the U.S., the *Federal Deposit Insurance Corporation (FDIC)* is the main deposit insurance institution which set up a fund to which 99% of all U.S. commercial banks contribute premiums. The premium depends on the bank's risk. There is an explicit guarantee for the fund of the U.S. Treasury. In Germany, the deposit insurance system is privately organized. See *Deutsche Bundesbank* (2000).

costs (Calomiris 1999, p. 1501f.). Public subsidies may be reasonable from this point of view.<sup>23</sup> Moreover, there is a public choice argument. Even when a contagious bank run is not likely to occur, politicians or political parties may be tempted to promise subsidies in a bank crisis if this serves their particular interests, for instance, improving their political reputation or the chances to win the next election.<sup>24</sup> In particular, the crisis of a large bank is prone to intense media attention, increasing the probability of state subsidies in direct proportion to the size of the bank in financial distress (*too big to fail*). Indeed, the subordinated bonds of *too-big-to-fail* banks show rather low risk premiums that do not entirely reflect the bank's real risk (Flannery/Sorescu 1996 and Sironi 2000).

**Result 4:** Since public authorities cannot credibly commit not to subsidize banks at all, at least they should commit *not* to cover the losses of subordinated creditors. Consequently, privately organized insurance systems should cover neither bank's losses nor losses of subordinated debtholders.<sup>25</sup>

### 3.3. Risk Incentive of Subordinated Bondholders

Subordinated bondholders can provide a monitoring role on behalf of unsecured bank depositors. The basic assumption—hardly discussed in the literature—is that subordinated bondholders act in the interest of unsecured depositors and bank supervisors; see, for instance, Haubrich (1998, p. 2), European Shadow Financial Regulatory Committee (1999, p. 209), Handelsblatt (1999), Euromoney (2000, p. 145), and Hancock/Kwast (2001). However, there may be a conflict of interest between these two creditor groups. When the default risk of the subordinated bondholders is sufficiently high they may benefit from a more risky investment policy, whereas unsecured depositors are interested in

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<sup>23</sup> Expected subsidies may distort incentives *ex ante*, e.g., may induce a risk incentive, since bank shareholders profit from gains entirely but share losses with the public.

<sup>24</sup> In some countries, especially in developing countries, banks have considerable power to influence government authorities; see Calomiris (1999, p. 1505).

<sup>25</sup> Currently, the German insurance systems of both saving and loan associations and cooperative banks cover the bank's losses rather than the depositors' losses.

lower risk.<sup>26</sup> Thus, shareholders and subordinated bondholders may share the same interest with respect to the bank's asset risk. Risk-shifting, however, may devalue the claims of unsecured depositors, as the following simple model shows.<sup>27</sup> We assume:

(A1) The bank management can keep or increase the risk level in the situation of financial distress ( $t=0$ ). The index  $s$  ("safe") stands for maintaining the less risky investment policy, index  $r$  for the more risky policy. The future value of the bank assets in  $t=1$  is uncertain and amounts to  $\tilde{v}_i$  (for  $i = r,s$ ) with the following distribution—depending on the chosen risk level:

$V_r; V_s$  with probability  $p_r$  and  $p_s$ , respectively ( $1 > p_i > 0; i = r,s$ ) and

$\underline{V}$  with probability  $(1 - p_r)$  and  $(1 - p_s)$ , respectively.

We assume:  $V_r > V_s > \underline{V} \geq 0$ . In the failure state, both investment policies yield the same value. In the success state, the bank value is higher, choosing the more risky policy ( $V_r > V_s$ ); however, probability of success is lower:  $p_r < p_s$ .

*Expected* value ( $\mu$ ) is higher when the less risky policy is kept, i.e., the less risky policy leads to a higher social surplus considering risk neutrality:

$$\mu(\tilde{v}_s) = p_s(V_s - \underline{V}) + \underline{V} > \mu(\tilde{v}_r) = p_r(V_r - \underline{V}) + \underline{V}$$

$$\text{or } p_s V_s > p_r V_r.$$

(A2) The bank management fully acts in the interest of bank shareholders. The shareholders cannot be held liable with their private fortune. There is no deposit insurance. The claim of the unsecured depositors has a face value of  $F_{Dep}$  ( $V_r > V_s > F_{Dep} > \underline{V} > 0$ ) in  $t=1$ , the subordinated bondholders have a claim of  $F_{Sub}$  ( $F_{Sub} > 0$ ). Thus, independently of the investment policy, the depositors only face a default risk in the failure state.

(A3) The bank shareholders (index:  $Sha$ ), depositors, and subordinated creditors are risk neutral and each try to maximize expected wealth. The market interest rate for risk-free investment is 0%.

(A4) The depositors cannot observe investment policy. They cannot contract upon investment policy before  $t=0$  either, since all the details cannot entirely be foreseen in advance or investment policy is not verifiable.

Keeping the less risky investment policy, shareholders, depositors, and subordinated creditors yield the following expected returns:

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<sup>26</sup> *Gorton/Santomero* (1990) show that the value of subordinated bank loans may increase with the bank's risk. However, they do not consider the cases where risk-shifting is value-decreasing, and they do not check for risk in the sense of *Rothschild/Stiglitz* (1970). They do not relate their findings to the important signaling function of subordinated bond's prices. Finally, they do not derive an upper bound of subordinated debt for supervisory purposes.

<sup>27</sup> The formal framework refers to *Stiglitz/Weiss* (1981).

$$\mu_s(\tilde{\mathbf{R}}_{\text{Dep}}) = p_s F_{\text{Dep}} + (1 - p_s) \underline{\mathbf{V}} \quad (1.1)$$

$$\mu_s(\tilde{\mathbf{R}}_{\text{Sub}}) = \begin{cases} p_s F_{\text{Sub}} & , F_{\text{Dep}} + F_{\text{Sub}} \leq V_s \text{ or } F_{\text{Sub}} \leq V_s - F_{\text{Dep}} \\ p_s (V_s - F_{\text{Dep}}) & , F_{\text{Sub}} > V_s - F_{\text{Dep}} \end{cases} \quad (1.2)$$

$$\mu_s(\tilde{\mathbf{R}}_{\text{Sha}}) = \begin{cases} p_s (V_s - F_{\text{Dep}} - F_{\text{Sub}}) & , F_{\text{Sub}} \leq V_s - F_{\text{Dep}} \\ 0 & , F_{\text{Sub}} > V_s - F_{\text{Dep}} \end{cases} \quad (1.3)$$

Expected returns differ with the more risky investment policy:

$$\mu_r(\tilde{\mathbf{R}}_{\text{Dep}}) = p_r F_{\text{Dep}} + (1 - p_r) \underline{\mathbf{V}} \quad (2.1)$$

$$\mu_r(\tilde{\mathbf{R}}_{\text{Sub}}) = \begin{cases} p_r F_{\text{Sub}} & , F_{\text{Sub}} \leq V_r - F_{\text{Dep}} \\ p_r (V_r - F_{\text{Dep}}) & , F_{\text{Sub}} > V_r - F_{\text{Dep}} \end{cases} \quad (2.2)$$

$$\mu_r(\tilde{\mathbf{R}}_{\text{Sha}}) = \begin{cases} p_r (V_r - F_{\text{Dep}} - F_{\text{Sub}}) & , F_{\text{Sub}} \leq V_r - F_{\text{Dep}} \\ 0 & , F_{\text{Sub}} > V_r - F_{\text{Dep}} \end{cases} \quad (2.3)$$

Thus, according to (1.1) – (2.3), risk-shifting changes the parties' expected returns:

$$\mu(\Delta\tilde{\mathbf{V}}_{\text{Dep}}) = \mu_r(\tilde{\mathbf{R}}_{\text{Dep}}) - \mu_s(\tilde{\mathbf{R}}_{\text{Dep}}) = -(p_s - p_r)(F_{\text{Dep}} - \underline{\mathbf{V}}) < 0 \quad (3.1)$$

$$\mu(\Delta\tilde{\mathbf{V}}_{\text{Sub}}) = \begin{cases} -(p_s - p_r)F_{\text{Sub}} < 0 & , F_{\text{Sub}} \leq V_s - F_{\text{Dep}} < V_r - F_{\text{Dep}} \\ p_r F_{\text{Sub}} - p_s (V_s - F_{\text{Dep}}) & , V_s - F_{\text{Dep}} < F_{\text{Sub}} \leq V_r - F_{\text{Dep}} \\ (p_s - p_r)F_{\text{Dep}} - (p_s V_s - p_r V_r) & , V_s - F_{\text{Dep}} < V_r - F_{\text{Dep}} < F_{\text{Sub}} \end{cases} \quad (3.2)$$

$$\mu(\Delta\tilde{\mathbf{V}}_{\text{Sha}}) = \begin{cases} (p_s - p_r)(F_{\text{Dep}} + F_{\text{Sub}}) - (p_s V_s - p_r V_r) & , F_{\text{Sub}} \leq V_s - F_{\text{Dep}} < V_r - F_{\text{Dep}} \\ p_r (V_r - F_{\text{Dep}} - F_{\text{Sub}}) > 0 & , V_s - F_{\text{Dep}} < F_{\text{Sub}} \leq V_r - F_{\text{Dep}} \\ 0 & , V_s - F_{\text{Dep}} < V_r - F_{\text{Dep}} < F_{\text{Sub}} \end{cases} \quad (3.3)$$

Choosing a higher risk level, the unsecured depositors lose (3.1), since the probability of failure and default increases. The shareholders may gain (3.3) and may have a risk incentive. The question is:

When do the subordinated creditors profit from risk-shifting? They gain, if

$$\mu(\Delta\tilde{\mathbf{V}}_{\text{Sub}}) > 0 \quad (4)$$

is valid. Condition (4) does not hold if bank assets are sufficiently valuable, i.e., if  $V_s \geq F_{\text{Dep}} + F_{\text{Sub}}$  or  $F_{\text{Sub}} \leq V_s - F_{\text{Dep}}$  is valid. Only when the subordinated creditors have a sufficiently large claim, i.e., for

$F_{\text{Sub}} > V_s - F_{\text{Dep}}$ , they benefit from risk-shifting.<sup>28</sup> From (3.2) we can derive that subordinated creditors are better off, if

$$F_{\text{Sub}} > \frac{p_s (V_s - F_{\text{Dep}})}{p_r} \quad \text{or} \quad (4.1)$$

$$F_{\text{Dep}} > V_s - \frac{p_r F_{\text{Sub}}}{p_s} \quad \text{or} \quad (4.2)$$

$$V_s < F_{\text{Dep}} + \frac{p_r F_{\text{Sub}}}{p_s} \quad (4.3)$$

holds. Other things being equal, subordinated creditors benefit from risk-increasing activities, if

- their claim is sufficiently large,
- the claim of unsecured depositors is sufficiently large,
- the value of bank assets is sufficiently low ( $V_s$ ).

If condition (4) holds, subordinated creditors will face a *decreasing* default risk, even though both the risk level and the probability of failure are higher. The unsecured depositors lose because their default risk increases.

If we modify assumption (A2) and consider deposit insurance for unsecured depositors, they are less affected by risk-shifting the more losses the insurance covers. When coverage is not limited, depositors do not care about investment policy. In this case, there is no conflict of interest between depositors and subordinated creditors. However, the subordinated creditors still have a risk incentive. In this case, the deposit insurance will lose if it does not sufficiently anticipate the risk incentive.<sup>29</sup>

If we modify (A2) and assume that bank (top) managers pursue their own goals, the risk incentive may be mitigated. For reputational concerns, they are likely to prevent bankruptcy and choose the low-risk

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<sup>28</sup> In fact, this means that total liabilities exceed the value of total assets. Applying the risk definition of *Rothschild/Stiglitz (1970)*, a risk incentive may even exist in the case where total liabilities do not exceed total assets (see the appendix).

<sup>29</sup> The insurance company could set up incentive schemes, e.g., it may link the premium to the bank's risk.

strategy with higher “survival” probability.<sup>30</sup> But when top managers hold stocks or stock options and salary heavily depends on the bank’s value, they tend to share the stockholder’s interest of risk-increasing activities.

*Kürsten* (1995) shows that the main results of the two-states model of *Stiglitz/Weiss* (1981) are not robust considering more general types of distributions and the risk definition by *Rothschild/Stiglitz* (1970). The riskier density function is a mean-preserving spread of the less risky one, i.e., it is dominated with respect to second-order stochastic dominance. Whether the subordinated creditors face a risk incentive or not depends on both the amount of junior and subordinated debt and the *exact* shape of the density and distribution functions (see appendix). Thus, subordinated creditors may have no risk incentive at all in some situations. On the other hand, they may be interested in risk-shifting even when the bank faces no financial stress at all. In principle, the results of the two-states framework should be interpreted carefully. However, the qualitative results of the two-states framework may still be valid in the case of normal distributions that are widely used in risk-management systems.

For banking supervisory purposes, the model contains two main results.

**Result 5:** Since subordinated creditors may benefit from activities increasing the bank’s risk, yields of subordinated bonds may be misleading signals on the bank’s condition: bond prices may go up despite of value-decreasing risk-shifting. Thus, banking supervision authorities would be unwise to exclusively rely on this market signal to constrain bank’s risk taking.

If they would do so, the bank’s shareholders may have a perverse incentive to increase risk because the prices of subordinated bonds may show an improving bank’s condition.<sup>31</sup>

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<sup>30</sup> Using the *Rothschild/Stiglitz* definition of risk, a higher risk does not necessarily decrease the probability of going bankrupt. For the definition, see the appendix.

<sup>31</sup> Other instruments of banking supervision may also aggravate the problem of excessive risk-taking. For instance, *Blum* (1999) demonstrates, that capital adequacy requirements may increase the risk of a bank’s credit portfolio. The model of *Kupiec* (2001) indicates that banks using the so-called standardized approach of internal ratings may have an incentive to increase the risk of their loan portfolio.

**Result 6:** Subordinated creditors may not share the interest of unsecured depositors and bank supervisors, but rather of stockholders if their claim exceeds a certain level.<sup>32</sup> Thus, for banking supervisory purposes there should also be an *upper* bound on the amount of subordinated debt and bonds.

So far, the proposals have only suggested a lower bound in order to obtain yields and prices that truly reflect the bank's exposure. An upper bound has not been suggested so far. Instead, one has the contrary impression that the advantages for banking supervisors and bank depositors increase along with the amount of subordinated bonds (*Board of Governors* 1999, p. 32f.).

#### **4. Conclusion**

There is a growing body of literature on the question of how to use the market mechanism for banking supervisory purposes. Neither legal provisions on equity requirements nor the Basel Capital Accord seems to address bank's real exposure very precisely. Provisions are becoming more and more complicated, causing the cost of this form of regulation to increase for both banks and banking supervisory authorities. Hence, it may be reasonable to look for alternatives, for instance, market forces. When banks are obliged to issue subordinated bonds, yields and prices on the primary and secondary market may reflect the bank's risk as evaluated by the market. In order to keep down the required risk premium, banks generally have an incentive to disclose information and not to choose too risky investments. The market then disciplines the bank's actions.

There are different proposals, especially from U.S. scholars and institutions, regarding how to use subordinated bonds for supervisory purposes. In this paper we address two points that have been neglected so far and which may be important in order to evaluate the costs and benefits of subordinated bonds correctly. Section 2 dealt with the discrepancy that proposals often point out the benefits of market forces. Surprisingly, they hardly discuss how to set up a bond market that provides

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<sup>32</sup> With regard to (3.3), the shareholders may face a risk incentive for even lower levels of subordinated debt (for

yields and prices that reliably reflect the bank's exposure. There are some historical examples where bond markets failed to provide "correct" signals. We suggest that banks should be obliged to issue perpetual subordinated bonds, since this may make the bond market more liquid and reduce the required liquidity premium, thus enhancing the information function of yields and prices.

In section 3 we addressed special incentive problems that may affect bond yields and prices, thereby impairing the information function. First, the bank (shareholders or management) may have an incentive to disclose favorable rather than true information. The problem of window-dressing may be mitigated by legal disclosure requirements. Second, public authorities may be tempted to (partially) cover a bank's losses, especially when the bank is *too big to fail*. Since subordinated creditors would profit from subsidies, market prices and yields would be distorted. Thus, public authorities should reliably commit to cover neither a bank's losses nor the losses of subordinated bondholders. Privately organized insurance systems with the aim of rescuing banks rather than covering depositors' losses may have to be adjusted. Third, when there is sufficient subordinated debt, subordinated bondholders may benefit from risk-increasing activities whereas depositors may lose. Thus, prices of subordinated bonds may go up though the bank's condition and the depositors may be worse off. In such scenarios, bond prices are a misleading signal for banking supervision authorities. Thus, we suggest an upper bound on subordinated debt.

The academic discussion on subordinated bonds as a banking supervisory instrument has just started, especially in Europe. This paper shows some problems with this instrument and provides some ideas on how to solve them. Using market forces for supervisory purposes seems to be an interesting alternative for regulation. Provisions on subordinated bonds also incur costs. Future research may check the costs and benefits more precisely before such bonds are used as a supervisory tool (see the approach of *Board of Governors* 2000). But the potential benefits justify some effort: when it turns out that market discipline is an efficient tool of banking supervision, one should ask whether other important financial institutions (e.g., clearing houses) should be obliged to issue subordinated bonds.

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$F_{\text{Sub}} \leq V_s - F_{\text{Dep}}$ ), when the following condition holds:  $F_{\text{Dep}} + F_{\text{Sub}} > \frac{P_s V_s - P_r V_r}{P_s - P_r}$ .

## Appendix

Increasing the risk in the sense of *Rothschild/Stiglitz* (1970) implies a higher expected default risk of risky debt. The random variable  $\tilde{X}_r$  is riskier than  $\tilde{X}_s$  (s for “safe”), if the following integral conditions (5.1) and (5.2) hold (see *Rothschild/Stiglitz* 1970, p. 225-231):

$$\int_{\underline{x}}^{\bar{x}} [G_r(z) - G_s(z)] dz \geq 0 \quad \forall x \in [\underline{x}, \bar{x}], \quad (5.1)$$

denoting  $G_s$  and  $G_r$  the distribution function of  $\tilde{X}_r$  and  $\tilde{X}_s$ , respectively,

$$\int_{\underline{x}}^{\bar{x}} [G_r(z) - G_s(z)] dz = 0 \quad \text{i.e., the mean of } \tilde{X}_r \text{ and } \tilde{X}_s \text{ is the same.} \quad (5.2)$$

Condition (5.1) implies that the integral of the distribution function of the riskier random variable  $\tilde{X}_r$  is never smaller and may be larger than the integral of  $G_s$ —for every defined interval.<sup>33</sup> Considering only one creditor class with face value  $F$ , the integral between the lower bound  $x = \underline{x}$  and  $x = F$  corresponds to the creditor’s expected default risk (DR):

$$DR = \int_{\underline{x}}^F G(z) dz \quad \text{for } \underline{x} < F < \bar{x} \quad (6)$$

Due to (5.1), the integral of the riskier variable equals or exceeds the integral of the less risky one for every debt face value  $F$  ( $\underline{x} < F < \bar{x}$ ). Thus, expected default risk is never smaller and may be higher with the riskier distribution.

When there are different creditor ranks, e.g., junior and senior debt ( $F_J, F_{Sen}$ ), for instance, unsecured and subordinated debt, risk-increasing tends to increase expected default risk of senior debt. However, expected default risk of junior debt ( $DR_J$ ) is affected ambiguously. Considering  $\underline{x} < F_{Sen} < F_{Sen} + F_J < \bar{x}$  and (5.1) – (5.2), we yield:

$$DR_J^{G_r} - DR_J^{G_s} = \int_{F_{Sen}}^{F_{Sen} + F_J} [G_r(z) - G_s(z)] dz \quad (7)$$

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<sup>33</sup> The lower integral boundary is defined by the minimum outcome of the riskier random variable.

$$= \int_{\underline{x}}^{F_{\text{Sen}} + F_J} [G_r(z) - G_s(z)] dz - \int_{\underline{x}}^{F_{\text{Sen}}} [G_r(z) - G_s(z)] dz \left\{ \begin{array}{l} < \\ = \\ > \end{array} \right\} 0$$

We cannot generally determine the sign of (7), since both integrals are non-negative and the left integral does not necessarily have a larger value than the right one. Obviously, the sign of (7) may be negative, even if  $F_{\text{Sen}} + F_J < (\tilde{X}_S)$  holds where  $\tilde{X}_S$  denotes the expected value. Put differently, the subordinated creditors may gain from risk-increasing, even when there is no financial distress at all. We only can derive precise conclusions if (a)  $F_{\text{Sen}} \leq \underline{x}$  or (b)  $F_{\text{Sen}} + F_J \geq \bar{x}$  holds. With respect to case (a), the (depositor's) senior debt is not risky, i.e., the second integral yields zero. Risk increasing devalues the junior claims of subordinated creditors. With regard to case (b), the bank's stockholders do not receive any return. Thus, junior creditors benefit from risk-increasing activities at the cost of senior creditors.

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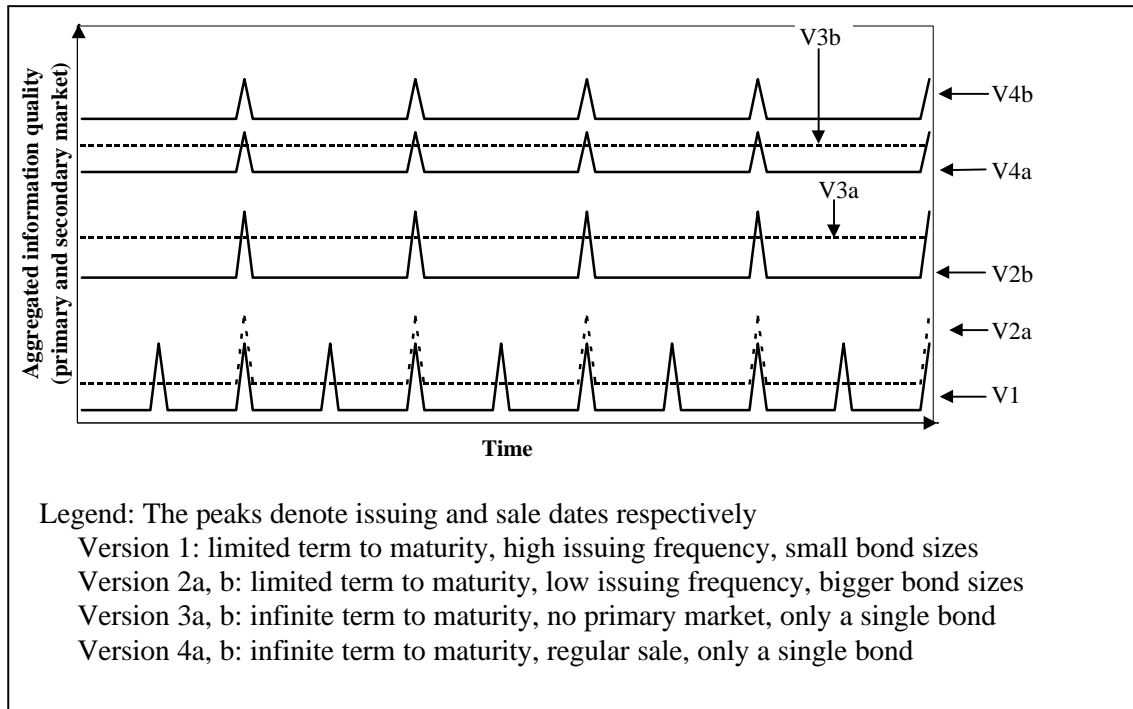
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**Figure 1**



**Figure 1: Information Quality of Different Issuing Versions**