Overrated credit risk: three essays on credit risk in turbulent times
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Introduction

Despite the long history of debt contracts and their simple structure, debt markets in general do not attract a lot of media attention. Typically, non-professional investors would track the performance of a stock market index, but only few would track the credit spreads on AA rated corporate bonds. However, when debt markets make it to the news headlines, it is usually because of bad news. This is not surprising since debt market instruments usually have only a limited upside and a large potential downside. This was no different when debt markets started to hit the news headlines more regularly from the summer of 2007 on, bringing tidings of the largest financial havoc since the great depression.

Each chapter in this dissertation will be related to trends in credit markets that contributed to the onset of the crisis. To place the chapters in the proper context, I will therefore give a short description of the evolution of credit markets and the associated build-up of the crisis. Throughout I will emphasize how the chapters in this thesis relate to the larger picture described below.

1.1 Financial regulation

As mentioned before, debt markets usually hit the news when they experience problems. Problems in debt markets can very quickly lead to problems affecting the real economy. The reason for this is that banks are major intermediaries in these markets and banks are vital in supplying credit to practically all entities in an economy. However, most banks are privately held and have a for-profit nature. Since shareholders have limited liability and it is hard to coordinate actions for a substantial part of the debtholders (namely depositors), a bank has an incentive to engage in excessive risk taking thereby expropriating debtholders. Moreover, the
excessive risk taking is sub-optimal from a social welfare perspective since bank failures cause negative externalities on the economy as a whole. This insight led to the development of several forms of financial regulation. An important part of the regulation implemented was the institution of the so called Basel accords developed by the Bank for International Settlements. The first Basel accord dates from 1988 and was a first step towards requiring banks to hold capital based on the risk of the asset side of their balance sheet. This accord however suffered from the crudeness of its risk categories. For example, a AAA rated corporate bond would require substantially more capital than a Turkish government bond, whereas the latter is likely to be riskier. The lack of risk-sensitivity of the first Basel accord led to a practice called regulatory arbitrage. This entails selling off safe credit exposure with a relatively high capital consumption while keeping risky debt with a relatively low capital consumption. To fix this loophole, in recent years, a second Basel accord has been developed with more risk sensitive capital charges.

1.2 Credit Derivatives

Since profit for a bank originates to a large extent from fees, most banks would be happy to engage in large volumes of loan-making but afterward get rid of the loans on the balance sheet to free up capital for new loans, especially for the loans that require much capital relative to their expected return. To this extent, credit derivatives have been developed, which have been explicitly accommodated within existing regulation by an amendment to the first Basel accord. The two most popular credit derivatives are Credit Default Swaps (CDSs) and Collateralized Debt Obligations (CDOs). Both are used to transfer credit risk. Below I will discuss the workings of these credit derivatives.

1.2.1 The CDS market

The CDS is the simplest of the two. It is basically an insurance against losses due to default on a loan or bond. In ideal conditions a CDS can be replicated with a credit risky bond and a floating rate treasury. Since a CDS is a derivative, it is relatively easy to short credit risk by buying a CDS, something that is rather difficult and costly in the corporate bond market and impossible with bank loans. This is exactly what one wants to do to get rid of credit risk on the balance sheet. Therefore the CDS market expanded quickly and attracted many participants. Another benefit of this market that is often referred to is its liquidity. Illiquidity
1.2. CREDIT DERIVATIVES

has always been a feature of the corporate bond market (see for example Chen, Lesmond and Wei (2007) and De Jong and Driessen (2005)). However, the relatively standardized CDS contracts with equal access for short and long investors to the market led in general to more liquidity than in the corporate bond market. Consequently, several studies, like for example Blanco, Brennan and Marsh (2005) and Longstaff, Mithal and Neis (2005) have ignored liquidity effects in CDS markets and have used CDS spreads as pure measures of (priced) credit risk. Still, liquidity has always been orders of magnitude smaller than in the equity market. Therefore, liquidity in the CDS market might still be an important factor for pricing, as it also is in the more liquid equity market (see for example Amihud and Mendelson (1986) and Acharya and Pedersen (2005)). In contrast to the stock and bond markets which are in positive net supply, the CDS market is a derivative market which is in zero net supply. Consequently, a liquidity effect on pricing in this market should be the result of the tolerance towards liquidity of the one side of the market relative to the other, rather than the average tolerance towards liquidity of the whole market. Chapter 2 develops theory for the pricing of expected liquidity and exposure to liquidity risk in markets with substantial short selling, thus including derivatives markets. The pricing of liquidity depends crucially on the wealth, risk aversion and investment horizon of long versus short investors, whereas for the pricing of liquidity risk also the exposure to non-tradable background risk is important. While the asset pricing equilibrium model is applicable to all assets with substantial short-selling, the impact of liquidity on pricing differs between positive net supply assets like stocks and bonds on the one hand and zero net supply assets like derivative contracts on the other. The model is also taken to the data in the CDS markets and indeed finds a strong effect of liquidity on pricing. In particular, higher expected liquidity costs lead to a higher spread to be pocketed by the protection seller.
1.2.2 The CDO market

An important motivation for analysis done in Chapter 3 is the recent discussion about credit ratings in the market for CDOs and other similar products. Therefore, I will discuss the working of CDOs here as well. The CDO is a more complex credit derivative and can either be synthetically constructed from CDSs or be set up as a separate operating entity. The increased focus on credit risk regulation had led to increased research, both in academia as well as within financial institutions. Meanwhile, increased regulation and sophistication of bilateral corporate financial contracts had generated a high demand for high quality assets, because they could for example easily be pledged as collateral in a repo. To this end, a CDO was invented. The basic idea is very simple. A pool of loans, bonds or other credit risky instruments are selected. These form the asset side of the CDO. Next, investors can purchase tranches in the CDO with different seniority. During the life of the CDO, coupon income from the asset side is used to pay interest to the tranche holders in order of their seniority. If losses occur, they first accrue to the tranche with lowest seniority (equity tranche) and then move up the capital structure. Consequently, the tranche with the highest seniority (super senior tranche) is much safer than the underlying pool of assets. The whole process of slicing and dicing a portfolio of mainly illiquid loans is called securitization. In recent years, these securities have become increasingly popular. Not only regular loans were securitized this way, but also residential mortgages (a CDO on a pool of residential mortgages is called a Residential Mortgage Backed Security or RMBS), commercial mortgages (CMBS) and other tranches of CDOs (CDO squared) or even tranches of CDO squared (CDO cubed). Officially, the claim was that by selling off CDO tranches, risk was transferred out of the banking system, leading to a better diversification of risk across the society. In practice however, banks were trading these securities also amongst themselves or holding on to certain tranches. An important reason was that the total capital to be held for all tranches together was typically lower than the capital to be held for the original portfolio. Thus, there was another opportunity for regulatory arbitrage. This effectively led banks to engage in more risk taking by levering up, which in the boom time from 2004 up to 2007 has led to exceptionally high profits for banks. However, when markets collapsed afterwards, the lack of capital within banks contributed severely to the gravity of the crisis.
1.3 Credit Ratings

Credit ratings have been used for a long time in debt markets. After having emerged as independent evaluators for credit quality of railway bonds around the start of the twentieth century, credit rating agencies (CRAs) have started to cover the whole spectrum of corporate as well as sovereign debt. Whereas initially investors generated the demand for ratings, around the great depression, it was the Office of the Comptroller of the Currency (OCC) that spurred the development of rating agencies by making credit ratings input for regulation about investment restrictions. Up to the seventies, the rating agencies made money by selling books containing credit ratings to investors. Whereas initially investors demand created incentives for accuracy, the regulatory need for ratings reduced these incentives already somewhat. In the seventies, when the photocopiers became widely available and affordable, the business model of credit rating agencies changed to an issuer-pays-model. This means that debt issuers pay to have their debt rated. Although figures about rating fees are not freely available, anecdotal evidence reports fees of between 2 and 4 bps of notional issued. As around the great depression, the increase in regulation by the Basel accords as well as the sophistication of corporate credit and collateral arrangements has made credit ratings more and more important (see for example Partnoy (2001)). Also the capital to be held against CDO tranches was largely based on credit ratings. Since these products were substantially harder to evaluate, rating agencies charged substantially higher fees for rating CDOs, anecdotal evidence reports figures ranging between 13 to 16 bps of notional. The cutoff points in the capital structure of the CDOs became extremely important for the profitability of the CDO for the issuing bank and the CRAs were often actively involved in this process by giving advise rather than only doing the rating exercise at the end of the process. When the crisis hit and many highly rated CDO tranches suffered losses, issuing banks were accused of shopping for the best ratings while credit rating agencies were accused of competing on standards rather than price (see Skreta and Veldkamp (2009) for a theoretical motivation for excessive rating shopping in markets for structured products). However, due to the lack of data and the complexity of the products, these claims and accusations are hard to certify empirically. However, in the corporate bond market which is simpler in structure and for which more data is available, not all bonds are rated by the same credit rating agency, while corporate bonds are also subject to many regulations. This led to the natural question to explain the difference in CRA coverage of corporate bonds. Chapter 3 of this thesis investigates this
question. Several academic studies provide motivations for applying for an extra rating. For example, Guntay and Hackbart (2006) show that uncertainty about firm fundamentals leads to higher credit spreads, indicating a possible role for an extra rating agency to reduce uncertainty. Existing literature on unsolicited ratings like Bannier, Behr and Gütter (2009) and Poon and Firth (2005) finds that lower unsolicited than solicited ratings are due to rating shopping, suggesting that this could be going on for multiple ratings. Finally, Kisgen and Strahan (2009) show the importance of ratings related regulation by investigating the natural experiment when the rating agency Dominion was granted an official status. Chapter 3 first derives empirical predictions for the three motivations for acquiring extra ratings mentioned above. Empirically, almost all corporate bonds receive a rating from both Moody’s and S&P, while only 40% to 60% of the bonds are rated by Fitch. When testing the empirical predictions, the main driver for getting an extra rating turns out to be compliance by regulation, in particular to qualify as investment grade or to limit the possibility of losing this qualification. Evidence is found against hypotheses bringing forward information production or market-wide rating shopping as motives for obtaining extra ratings. Despite suggesting inefficiencies, these and additional findings are consistent with a framework in which the extra rating provides extra information about the information-sensitiveness of the bond rather than the credit quality and thereby resolves a partial market breakdown.

1.4 Fair Value Accounting

Another factor that has often been referred to as a factor that aggravated the crisis is the fair value accounting practice introduced in recent years as laid out in IFRS and FASB rule 157. Since especially financial institutions are rather intransparent, recent investor protection oriented legislation aimed to improve transparency of balance sheets by showing assets at market-equivalent prices rather than historical cost. The degree to which this was required depended among others on the intended holding period of the asset. Typically, assets intended to be held to maturity could be held at historical cost, whereas trading assets and assets labeled as ”available-for-sale” would be reported at market value. The difference between trading assets and available-for-sale assets is that value changes in trading assets directly flow through the profit and loss statement whereas value changes for ”available-for-sale” assets are accumulated in a separate account on the balance sheet that is deducted from shareholders’ capital, but these value changes do not show up in the profit and loss statement. Typically, CDO tranches were labeled
available-for-sale, even though many of them were intended to be held till maturity, but the hold-to-maturity label would limit the use and flexibility of these assets. When the crisis hit, mainly the CDO tranches decreased in value significantly. Consequently shareholders’ equity shrank substantially leading to immediate capital shortages for many banks. This drop of available capital would be justified if the drop in market valuation of these securities was purely based on news about default and recovery rates (that is, cash flow news). However, when a substantial part of the drop in market value was due to risk aversion going up or outright panic (that is, discount rate news), bank capital may have suffered more than necessary since these factors do not immediately affect the long term solvency of the bank. Earlier work by Collin-Dufresne, Goldstein and Martin (2001) indeed shows that for corporate bonds, only a small fraction of the changes in credit spreads can be explained by changes in fundamentals. In equity markets, there is a large body of academic literature decomposing stock returns into cash-flow and discount rate news, starting from Campbell and Shiller (1988). These decompositions typically depending on predictive regressions in a VAR setup (see for example Campbell and Vuolteenaho (2004)) have recently been criticized by Chen and Zhao (2009), for example because persistent variables can lead to spurious results. Meanwhile, several contributions have been made to the estimation of the related so called fair value models (see for example Van Binsbergen and Koijen (Forthcoming)) that also originate from the results in Campbell and Shiller (1988). Chapter 4 builds up a framework to explore how unexpected corporate bond returns can be decomposed into a cash flow news and discount rate news part to shed more light on how both components affect debt markets. Theoretically, the influence of persistent variables should be substantially smaller due to the limited maturity of these securities. The approach developed works well for corporate bonds compared to the stock market, but in some cases still suffers from the disruptive effects of overly persistent state variables. Nevertheless, the limited maturity of corporate bonds reduces the impact of overly persistent state variables substantially. A variance decomposition shows that in general, a large part of corporate bond returns is due to discount rate news. A theoretical side result of this chapter allows a whole range of tools developed to estimate present value models for the stock market to be applied on the corporate bond market.