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Do banks' overnight borrowing rates lead their CDS price? Evidence from the Eurosystem☆

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ABSTRACT

We construct a measure of a bank's relative creditworthiness from the Eurosystem's proprietary interbank loan data: average overnight borrowing rate relative to an overnight rate index (AOR). We then investigate the dynamic relationship between AOR and the credit default swap price relative to the corresponding market index of 60 banks during 2008–2013. Price discovery mainly takes place in the CDS market, but AOR also contributes to it. The lagged daily changes of AOR help predict CDS. This indicates that AOR includes private information, which the CDS market does not immediately incorporate. We further show that the private information advantage is concentrated on days of market stress and on banks, which mainly borrow from relationship lender banks. Such borrower banks are typically smaller, have weaker ratings, and are likely to reside in crisis countries. Competent authorities can use AOR as a complementary indicator of banks' concurrent health.

1. Introduction

In the wake of the recent financial crises, the need to understand the functioning of inter-bank money markets has grown considerably. Money market data may also be a source of early-warning indicators for future banking problems. We contribute to the quest for early-warning indicators by forming a measure of a bank's creditworthiness: its average overnight money market borrowing rate relative to an overnight rate index (henceforth AOR). We then investigate whether this spread provides timely information of changes in the bank's creditworthiness in addition to the leading market-based indicator, the bank's CDS price relative to a market-wide CDS index for European financial institutions (henceforth CDS).[1]

We use the proprietary database of the Eurosystem's overnight money market, which operates in the so-called TARGET2 large value payment system (Trans-European Automated Real-time Gross Settlement Express Transfer System 2). The overnight market is the shortest-term component of the interbank money market through which banks manage their liquidity. It is the key transmission channel for monetary policy in major central banks including the European Central Bank (ECB) and the US Federal Reserve. At the

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[1] Specifically, we form AOR and CDS by deducting the Euro OverNight Index Average (EONIA) from a bank's average overnight borrowing rate and, respectively, the iTraxx-index for European financials from the bank's CDS price.

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shortest maturity, the money market is a liquid credit market with high frequency of observations.[2]

Earlier research has already considered whether interest rates on overnight loans taken by a bank, typically from a number of other banks, reflect the borrower bank's creditworthiness. Furfine (2001) has shown with the Fed Funds data that the overnight borrowing rates do indeed reflect accounting measures of the bank's credit risk. However, to the best of our knowledge previous research has not considered how efficiently and fast these markets react to changes in credit risk.

We choose CDS as a benchmark because it is a leading *public* indicator of the credit risk of both corporations and banks (see e.g. Blanco et al., 2005, Longstaff et al., 2005, Forte and Peña, 2009, Norden and Weber, 2009, and Annaert et al., 2012; see also Arora et al., 2012 and Berg 2010). In spite of their maturity mismatch and the effect of the term structure of credit risk, new information about bank creditworthiness should push both AOR and CDS in the same direction.[3] Note that by defining AOR and CDS in relation to the respective market indices, we control for the term structure of interest rates and effectively separate the bank-specific part of overnight rates and CDS prices from general market conditions such as liquidity conditions.[4]

AOR is not publicly observable (other than to the borrower bank itself and the competent authorities of the Eurosystem). Moreover, many of the overnight interbank loans are results of longer-term lending relationships (cf. e.g. Cocco et al., 2009, Bräuning and Fecht 2012, Abbassi et al. 2014, and Affinito 2012) in which the lender may have acquired *private* information of the borrower. It is hence possible that AOR aggregates private information of the borrower bank's condition, which CDS has not yet incorporated. Such a situation can prevail so long as the informed lenders choose not to trade on their private information in the CDS market in such a way that their information would be immediately and fully revealed via CDS.[5] Moreover, CDS prices are quotes rather than actual transactions, which is another reason why AOR may reflect changes in a bank's creditworthiness faster than CDS given that the bank is willing and able to borrow in the interbank market.[6]

Our data cover the period from the beginning of June 2008 to the end of June 2013, comprising 60 banks, 1300 business days, and around 470,000 loan transactions with average value of about 100 million EUR. These yield approximately 46,000 daily AOR observations.

To investigate AOR's contribution to information concerning a bank in addition to CDS, we use two conventional price discovery measures, which are based on the vector error correction (VEC) framework (Hasbrouck 1995 and Gonzalo and Granger 1995), and Granger causality tests in a standard VAR model. We use the VEC and the VAR models as complementary approaches because we find that AOR is stationary and the evidence of co-integration between AOR and CDS is mixed. We use daily changes of AOR and CDS and estimate the models both for the panel of 60 banks and for individual banks.

During tranquil times, the overnight lenders of a bank may be less concerned about changes in the borrower bank's creditworthiness. However, because overnight loans are typically quite large and uncollateralized, AOR may become more informative of the borrower's credit risk in times of stress when lender banks become concerned of the asset quality and liability structure of the borrower bank.[7] As described, e.g., by Dang et al., (2015), a money-like debt instrument (overnight interbank loans in our case) can become sensitive to the issuing institution's asset quality when there are sufficiently bad public news concerning the asset quality. This can trigger private information acquisition among investors (the lender banks in our case). We investigate whether AOR is more informative when the underlying overnight loans are arguably more information sensitive. We do this by using conditioning variables, such as an indicator for days of market stress, which proxy for intensified information sensitivity of the overnight loans.

Our empirical results from the Granger causality framework show that in daily differences, using the panel of 60 banks, AOR leads CDS by up to two lags while there is no similar lead for CDS over AOR. The price discovery measures obtained from the VEC model indicate that although price discovery mainly takes place in the CDS market, AOR also contributes to it, and its contribution appears to intensify during periods of market stress. Bank-specific results vary considerably, and for individual banks, CDS may Granger cause AOR.

A further investigation in the Granger causality framework using the panel of banks reveals that AOR helps to predict CDS mainly during periods of market stress in the case of banks that are relatively dependent on relationship lender banks. These banks tend to have poorer ratings and come from crisis countries. These findings are consistent with the information sensitivity hypothesis, suggesting that private information, which makes AOR useful in predicting CDS, is most plentiful when the information sensitivity of overnight loans is elevated.

Our results have the following implications. First, by using the proprietary interbank overnight loan interest rate data, the Eurosystem authorities can extract information concerning banks' current condition, which complements the information obtained from banks' CDS prices.[8]

Second, our results provide rare evidence on the value of private information. It is not common to have data on private information signals, which bilaterally negotiated overnight loan rates

[2] Money market transaction data are available for longer maturities as well but we will focus on the overnight data because of the far bigger market size and liquidity, and because the accuracy of identifying interbank loans out of the entire population of large value payment transactions in the data base is highest in case of the overnight loans.

[3] We use the five-year CDS contract, which is the most liquid of the CDS contracts.

[4] Schwarz (2014) argues that during the financial crisis liquidity risk has explained the major part of the general rise in Euribor and sovereign interest rate spreads.

[5] The seminal paper on the theory of privately informed trading is Kyle (1985). We can consider the overnight loans market as a fragmented market whereas the CDS market is relatively more centralized. Our setting corresponds to a situation where both types of markets are open at the same time on the same asset but where prices are public knowledge only in the centralized market (the CDS market) while they are private knowledge in the fragmented market (overnight loans). As a result, information flows between the two markets may be asymmetric. We are not aware of theoretical papers which would exactly consider a setting of this kind although price formation in fragmented vs centralized markets has been studied e.g. by Wolinsky, 1990, and Biais, (1993). Studies on the upstairs and downstairs markets on stocks may also provide some guidance (see e.g. Booth et al., 2002). As Biais (1993, p. 175) puts it, "(a)n issue is whether inside traders can use the lack of transparency of fragmented markets to exploit their private information." Though compared to the stock market the CDS market is more of an insider market; see e.g. Acharya and Johnson, (2007), the quotes available in Bloomberg are in principle public. On strategic behavior of informed and uninformed traders, see also O'Hara (1997; chapters 4 and 5).

[6] In stressful times a bank may be denied credit for a "fair" rate at least by some banks in the interbank market so that the bank may opt for the central bank's liquidity facilities instead (provided it has sufficient collateral). Such unrealized overnight loan transactions could in themselves be quite informative. This phenomenon may hence create a bias against finding that AOR is more informative than CDS.

[7] Afonso, Kovner and Schoar (2011) using US overnight money market data find that "the day after Lehman Brothers' bankruptcy, loan terms become more sensitive to borrower characteristics". See also Angelini et al. (2011). Further, Covitz and Downing (2007) provide evidence from commercial paper spreads of non-financial companies that credit risk dominates liquidity risk even at very short maturities.

[8] Earlier literature which may have lacked access to sufficient CDS data, has also studied the role of bond and equity prices as leading indicators of bank fragility; see e.g. Gropp et al. (2004) and (2006).

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