



A factor analysis approach to measuring European loan and bond market integration

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ABSTRACT

By using an existing and a new convergence measure, this paper assesses whether bank loan and bond interest rates are converging for the non-financial corporate sector across the euro area. Whilst we find evidence for complete bond market integration, the market for bank loans remains segmented, albeit to various degrees depending on the type and size of the loan. Factor analysis reveals that rates on large loans and small loans with long rate fixation periods have weakly converged in the sense that, up to a fixed effect, their evolution is driven by common factors only. In contrast, the price evolution of small loans with short rate fixation periods is still affected by country-specific dynamic factors. There are few signs that bank loan rates are becoming more uniform with time.

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1. Introduction

One of the key objectives of the creation of a single market in Europe has been to level the playing field in the corporate sector in order to enhance competition and innovation. This is equally true with respect to finance. Despite the introduction of the euro and the liberalisation and harmonisation of the regulatory side of the financial services industry as a result of two banking directives and the Financial Services Action Plan (FSAP), retail banking remains, however, largely a national affair. Cross-border retail lending generally accounts for less than 1% of total lending (see [Gropp and Kashyap, 2009](#)). This de facto national segmentation justifies the use of national bank lending rates to assess whether or not the costs of corporate debt financing are converging across the euro area. This paper aims at precisely that.

Previous studies (see, among others, [Adam et al., 2002](#); [Bael et al., 2004](#); [Kleimeier and Sander, 2006](#); [Vajanne, 2007](#)) so far have found evidence for falling cross-country variance in loan rates (σ -convergence) but little or ambiguous evidence for stationarity of loan rate spreads to a benchmark (lack of β -convergence). On the

one hand, σ -convergence suggests that the process of bank market integration is ongoing. On the other hand, the β -convergence results do not exclude the fact that loan rates may drift apart. For example, by estimating cointegration relationships [Kleimeier and Sander \(2006\)](#) find that all bi-lateral relationships between German rates and other national rates are unstable, showing absence of convergence.

We introduce an additional convergence measure to reassess whether retail bank market integration is absent, ongoing, or complete. Note that both the σ -convergence and β -convergence criteria capture long-term trends. There is also the question of whether rates move synchronously in their short-term fluctuations. Such correlation would be the result of national rates following common external factors, for example the European Central Bank (ECB) refinancing rate. In an integrated market national factors should not play a significant role, insofar as they are unrelated to country-specific risk or heterogeneity in demand for financial services.

This brings us to the concept of factor convergence. Factor analysis is applied to decompose the loan rates in a number of latent factors where each factor is multiplied by country-specific factor sensitivities, so-called ‘factor loadings’. Loan rates are said to exhibit (weak) factor convergence when all factor loadings are significant and all loadings associated with one common factor have the same sign. There are, then, no statistically significant

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country-specific dynamic factors. Factor convergence is complete when factor loadings are the same for all countries (=strong factor convergence). Factor convergence is absent when some factor loadings (of a significant factor) are insignificant or of different sign. Note that factor convergence captures the synchronisation of interest rate movements but ignores time-invariant differences in the absolute levels. The latent factors are found by maximum likelihood factor analysis following Jöreskog (1969). Strong factor convergence implies complete β -convergence, and vice versa, in the sense that one can find a benchmark rate for which all spreads are stationary and white noise. In contrast, weak factor convergence does not necessarily imply β -convergence, neither complete nor incomplete. Nor does incomplete β -convergence, i.e. when spreads are stationary but auto-correlated, imply weak factor convergence.

This study tests the law of one price in the corporate loan market from a lender's point of view.¹ The threat of foreign entry and competition from alternative funding sources such as bond financing can be the driving factors enforcing this law. Gropp and Kashyap (2009) suggest analysing the convergence of bank profits rather than prices of financial products.² They argue that the absence of homogeneous loan pricing does not imply absence of retail banking integration due to differences in tax systems, borrowers' preferences, etc., meaning that the reason for price differences should not necessarily be sought on the supply side. This seems a valid point concerning part of the cross-country differences in loan rates.

In addition to differences in tax and legal systems, interest rate differences may stem from a variety of other factors. First, national bank loan portfolios may differ in their risk profile. Idiosyncratic risk is diversified but systematic (countrywide) risk may differ, especially when the share of small businesses in the loan portfolio is high. Second, differences in inflation expectations may affect nominal rates. This effect is likely to be increasing in the share of local bank investors, because real returns must take into account consumer price inflation in the investor's country of residence. International investors holding well-diversified portfolios are less affected by cross-country differences in both inflation and risk. Third, there can be heterogeneity in loan products across countries due, for instance, to differences in collateral practices (see ECB, 2006). Fourth, there can be differences in deposit rates. This could lead to differences in loan rates even if the interest mark-up was the same. Finally, there can be differences in competitive conditions (see Maudos and de Guevara, 2004) or cost efficiency (see, among others, Casu et al., 2004; Schure et al., 2004) in banking.

Since the objective of this paper is to assess whether there is a level playing field in firm debt financing, and not to explain differences (as Affinito and Farabullini (2009) do), loan rates should not be adjusted for the latter two factors. However, we adjust loan rates for differences in systematic risk (first factor) and inflation (second factor) to the extent that these variables can explain variation in loan rates across countries and over time. Unfortunately there is no obvious way of adjusting national loan rates for heterogeneity in loan products (third factor). Country fixed effects could capture at least part of such heterogeneity, but could also be attributed to many other factors, including those for which one should not adjust such as bank inefficiency. Hence, no adjustment is made for the third factor. Finally, in many cases differences in rates on Non-Financial Corporations' (NFCs) deposits (fourth factor) cannot account for differences in loan rates. In fact for some countries

where loan rates are relatively high, deposit rates are relatively low. This means that mark-up differences can be even bigger than differences in loan rates. The cross-country relationship between deposit rates and loan rates is statistically insignificant, which made us decide to ignore deposit rates.

Thus, we suggest evaluating market integration against various measures of risk-adjusted price convergence. One approach is to test whether the median risk-adjusted interest rate level is the same across countries (α -convergence). The α -convergence measure captures time-invariant differences such as those caused by the tax and legal system. The σ -convergence and β -convergence measures capture some of the long-term aspects of the integration process while factor convergence also accounts for short-term movements. Although data limitations do not allow us to determine the precise reasons for possible incompleteness of bank market integration, the use of different convergence measures, in particular the factor convergence measure, could give some indication. For instance, if interest rates exhibit factor convergence but no α -convergence then explanations should rather be found in institutional differences than on the supply side.

We distinguish between small and large bank loans because small loans are dominated by small businesses which are more likely to suffer from monopolistic loan pricing than large scale enterprises (LSEs). In comparison to LSEs, small and medium-sized enterprises (SMEs) are often more information opaque. This makes the financing of SMEs especially challenging since asymmetric information may create adverse selection and moral hazard problems (see Akerlof, 1970). The sensitivity of firm growth to cashflow rises as firm size falls (see Carpenter and Petersen (2002) and Wagenvoort (2003) for evidence on firms in the USA and the European Union respectively), which may suggest that SMEs encounter finance constraints that prevent them from fully exploiting their growth potential. One way of reducing asymmetric information is to build long relationships with creditors. However, these bank-firm relationships can be exploited to extract monopoly rents from the firms.³ For instance, Degryse and Van Cayseele (2000) find for small European businesses that interest rates on loans tend to increase with the duration of a bank-firm relationship.

For the purpose of benchmarking, we also apply the various convergence measures to the primary euro-denominated corporate bond market. A sample of 828 plain-vanilla fixed coupon bonds issued between January 1999 and October 2008 by NFCs in France, Germany, Italy, the Netherlands, and the United Kingdom is compiled from the Dealogic Bondware data set. The yield to maturity of these bonds is adjusted for differences in credit risk before applying the convergence measures. In accordance with the findings of Gabbi and Sironi (2005), our empirical results suggest that the expected secondary market liquidity is not a significant determinant of primary market bond yields when liquidity is measured by bond size. Hence, despite finding evidence for a negative relationship between transaction issuance costs and bond size, there is no need to adjust the bond yields for liquidity.

Our analysis indicates that the primary euro-denominated bond market can be considered fully integrated since the introduction of the euro. Bond yields move synchronously, i.e. exhibit strong factor convergence, and median yields are equal across countries. In contrast, our results show that the market for bank loans remains segmented albeit to various degrees depending on the type and size of the loan. Small loans with short rate fixation periods are least integrated, indicating that SMEs do not experience a level playing field in their debt financing costs.

The plan of the paper is as follows. Section 2 formalises the different convergence measures and presents the adopted

¹ A lot of research is done on the integration of other financial markets for which high frequency data are available. For instance, Akram et al. (2009) test the law of one price in foreign exchange and money markets.

² This is not a solution for our case. Total bank profitability may not be informative about the corporate loan market since bank profitability is also driven by other business lines such as investment banking, residential mortgages, deposits and other financial services.

³ Boot (2000) provides a survey of relationship banking.

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