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Modelling and measuring business risk and the resiliency of retail banks☆

Mohamed Chaffai[a], Michel Dietsch[b,*]

[a] Université de Sfax, Tunisia
[b] Université de Strasbourg and ACPR - Banque de France, France

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ABSTRACT

The recent banking crisis has revealed the existence of strong resiliency factors in the retail banking business model. On average, retail banks suffered less than other financial institutions from unexpected market changes. This paper proposes a new methodology to measure retail banks' business risk, which is defined as the risk of adverse and unexpected changes in banks' profits coming from sudden changes in the banks' activities. This methodology is based on the efficiency frontier methodology, and, more specifically, on the duality property between the directional distance function and the profit function. Using the distance function to compute banks' profitability, we take the distance to the frontier of best practices as a measure of profit inefficiency, i.e. of unexpected losses related to underperformance. In this approach, shifts in the efficiency frontier induced by adverse shocks to banks' volumes serve as a measure of business risk. This measure of profit volatility allows a measurement to be made of the impact of volume changes on banks' profits. This method is applied to a database containing half yearly regulatory accounting reports over the 1993–2011 period for a sample of quite all French banks running a retail banking business model. Our results verify a low level of business risk in retail banking, thus confirming the resiliency of the retail banks' business model.

1. Introduction: business risk concept and measurement

Every firm is subject to business risk. Business risk refers to potential losses due to adverse, unexpected changes in business volume, margins and costs. These losses can be the result of changes in customer preferences, an increase in competitive pressures or other changes in a bank's environment. Thus, business risk also corresponds to managerial risks, and it depends on the firm's capacity to adapt its policy to unexpected events and changes. In banking, business risk is a non-financial risk that is linked to the uncertainty of earnings not associated with financial risks (market, credit, ALM risks) or other types of non-financial risk (operational risk). Banks' business risk must not overlap with these other risks, not does it incorporate interest rate risk, default risk or credit risk because these risks are already taken into account in other forms of risk.

The banking sector devoted little attention to business risk before the subprime crisis. As mentioned in a 2007 economic capital survey, "management of business risk still lags behind core financial risks" (IFRI/CRO, 2007). The survey demonstrated that business risk is considered an important risk type – over 85% of participants include it in their economic capital frameworks, and the average impact is 10% of the aggregate economic capital requirement. However, business risk is probably also the risk type that is being debated most actively at present, with discussions focusing on the most appropriate measurement approach. A variety of approaches are taken to reflect business risk, and the level of sophistication generally appears to be less pronounced than in the case of core financial risks. For this key 'non-financial' risk, "a range of different capital calculation approaches can be employed that could lead to significantly different results and, as a result, management incentives". Overall, there is no clear convergence in the approach to measuring business risk.

One reason for this lack of attention to business risk in the banking industry is that in the booming financial markets of the 1990s and 2000s, business risk hardly seemed to be a significant risk

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* Corresponding author at: LARGE, Université de Strasbourg, IEP, 47, avenue de la Forêt Noire, 67000 Strasbourg, France. Tel.: +33 607148326.
E-mail addresses: michel.dietsch@unistra.fr, Michel.DIETSCH@acpr.banque-fr, michel.dietsch@urs.u-strasbg.fr (M. Dietsch).

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for banks. But the recent subprime crisis demonstrated that banks can suffer from this business risk more than non-financial firms. Indeed, during the crisis, the extinction of some bank activities can be considered to be the consequence of business risk. For example, activity in the markets for syndicated loans, structured products and IPOs dropped substantially, or even disappeared altogether, due largely to severe asset depreciations and strong financial market disruptions. Consequently, the revenues of most investment banks declined sharply. The relatively flexible cost structure of investment banks allowed them to adjust costs quickly, but business risk casts doubt on the resiliency of this bank business model.

By contrast, the recent crisis has revealed the existence of stronger resiliency factors in the retail banking business model. Even if retail banking is characterized by a relatively rigid cost structure, most deposit-taking banks focused on retail banking businesses have come through the recent crisis quite well. By transforming local deposits into lending in the areas where people live and work, retail banks benefit from a quite stable financing structure which allows them to maintain lending activities in period of stress. They can act as "shock absorbers" rather than transmitters of risk to the financial system and the real economy. This is because they are exposed to a low level of credit risk on average, even if credit risk concentrations – especially in the real estate sector – could be an issue, and also because they can better manage funding liquidity risk. Overall, the recent crisis has shown that the specification of business risk sources varies across banks' activities and business models.

Today, banking supervisors call for more attention to be paid to business risk. The Basel Banking Committee on Banking Supervision requires it to be taken into account in Pillar II, the internal regulatory framework of Basel II. Recent Basel III proposals aimed at strengthening the resiliency of the banking sector are heading in the same direction. Thus, the new regulatory framework is encouraging banks to look at this risk. Nevertheless, regulators concede that this risk is "hard to measure".

This paper proposes a new approach for modelling and measuring business risk based on the efficiency frontier methodology. More specifically, it exploits the duality property between the directional distance function and the profit function. Thus, any increase in one bank's distance to its efficiency frontier may be considered to be the consequence of a decline in that bank's profitability. Using this approach, we take the performance of the banks located in the last percentiles of inefficiency scores as illustrating the worst situation a bank will potentially encounter if unfavourable business risk factors materialize. The paper uses a unique database containing regulatory information about balance sheets and income statements for more than 90 French banks – mainly regional and cooperative banks – that can be identified as running a retail banking business model. Data are collected on a half-yearly frequency over the 1993–2011 period. This sample contains all banks belonging to major French banking groups.

It is organized as follows. Section 2 presents a survey of the current methods used to measure business risk. Section 3 outlines the proposed directional distance function methodology. Section 4 presents the data and the specification of the frontier. Section 5 discusses the results and Section 6 concludes.

2. Survey of current methods used to measure business risk

While current estimation methodologies of business risk use purely statistical models, we propose a structural model which is based on recent developments in the production and cost theory applied to the banking sector.

2.1. Earnings-at-risk methodologies

The current methods used to model business risk can be classified in two categories: the benchmark approach and the earning-at-risk (EaR) approach.

The first one proposes to compute specific earnings risk for each business unit of a given bank by taking specialized banks as benchmarks. In other words, the earnings volatility of different bank business models is derived from the assessment of specialized banks' earnings volatility. Thus, it consists in finding a panel of specialized banks and taking information about their earnings volatility as a proxy for the volatility of the corresponding business line in a universal bank.

The second method, the EaR method, compares a bank's earnings volatility with the rigidity of operating costs, and measures business risk in terms of the volatility of bank net income. It consists in computing historical earnings volatility with banks' internal data (long-term time series on volumes, margins, revenues or costs) and in transforming this volatility into a measure of earning-at-risk (EaR). The simplest way to obtain such a measure of business risk is to assume a specific distribution for the profit components, to then compute the earnings at a given level of confidence, a sort of "worst case" earnings, and finally to determine the loss under these assumptions. As a first step, the probability distribution of revenues from fees and commissions and revenues from interest are built, and a given quantile is chosen. Then, as a second step, operating costs are assumed to be totally constant in the short run (with a one-year horizon, in fact), and they are subtracted from expected revenues to determine expected earnings. However, an extension of the approach could decompose costs into fixed and variable costs.

Using a statistical approach, Klaus Böcker (2008) proposed a stochastic model to determine the EaR and quantify business risk. He suggested a multivariate continuous-time model for the future cash flows of the different earnings' components chosen. Under this model specification, he computed the value of the EaR on the basis of the distribution property of the chosen equation of earnings' components. Then, he determined a dynamic relation between the EaR measure and the capital-at-risk measure (the economic capital needed for business risk).

One weakness in this EaR approach is that it is quite demanding in terms of the length of the time period. Another weakness is that it requires business risk to be isolated from other forms of risk. Indeed, revenue volatility could be strongly driven by other types of risks. But it is not so easy to isolate different risk sources.

2.2. A structural approach to business risk

Here, we propose an alternative measure of business risk based on a structural approach to modelling bank technology and measuring bank performance. As noted by Hughes and Mester (2010) this approach is choice-theoretic, and it relies on a theoretical model of the banking firm and the concepts of cost minimization or profit maximization. In this approach, the bank is viewed as a firm whose main objectives are to solve information problems in lenders-borrowers' relationships, to manage risks and to provide liquidity services to the economy. As demonstrated in the banking literature, commercial bank's uniqueness or superiority over other financial firms is largely derived from its high leveraged capital structure, e.g. the funding of informationally opaque borrowers with short term deposits. Such foundations help to understand the business model of retail banks and to choose accordingly the inputs and outputs in the bank production.

When discussing the economic performance of a producer, it is common to describe it as being more or less "efficient". The firm's