Economic Modelling 28 (2011) 2137–2142

Contents lists available at ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/ecmod

Operational risk as a function of the state of the economy ☆

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ARTICLE INFO

Article history:
Accepted 24 May 2011

JEL classification:
F31

Keywords:
Operational risk
Structural time series modelling
Frequency
Severity

ABSTRACT

This paper examines the frequency and severity of the operational losses incurred by U.S. firms during the period 1990–2007, as reported by Fitch Risk. The losses are examined in relation to the state of the U.S. economy as represented by the unemployment rate, which is the macroeconomic variable that is most intuitively appealing in terms of association with the incidence of operational losses. The results of structural time series modelling reveal that while total severity and average severity are positively related to the unemployment rate, the frequency of losses is not.

1. Introduction

Operational risk is the risk of losses arising from the failure of people, processes and systems, and from external events. A view has been put forward repeatedly that, unlike market risk and credit risk, operational risk is idiosyncratic in the sense that when it hits one firm, it does not spread to other firms. This view implies the absence of contagion and that operational risk is firm-specific, not systemic. Lewis and Lantsman (2005) describe operational risk as being idiosyncratic because "the risk of loss tends to be uncorrelated with general market forces". This, the argument goes, is not a characteristic of market risk and credit risk: a market downturn affects all firms, and default by the customers of one firm has adverse implications for its ability to meet its obligations to other firms. Danielsson et al. (2001) criticise the Basel II Accord by arguing against the need to regulate operational risk on the grounds that it is idiosyncratic.[1]

One reason why operational risk is thought to be idiosyncratic is that it is not related to the state of the economy, in the sense that the frequency and severity of losses do not depend on whether the economy is in a boom or recession.[2] This is the essence of the argument put forward by Lewis and Lantsman (2005) who suggest that operational risk is "uncorrelated with general market forces". The objective of this paper is to find out if the frequency and severity of operational losses are related to the state of the economy, using the unemployment rate as a proxy for the macroeconomic environment and a reference cyclical variable. The use of unemployment rate in preference to other cyclical variables is motivated by some of the propositions put forward to explain why operational risk is related to the state of the economy. These propositions are discussed in the following section.

2. Intuition, theory and empirical evidence

Very little work has been done to model operational risk in terms of macroeconomic variables, perhaps because of the belief that operational losses are either "Black Swans" or because they are determined mainly by firm-specific factors.[3] Size has been the most widely used firm-specific explanatory variable, perhaps because Basel II suggests that size is important. Under the basic indicators approach of Pillar 1 of Basel II, banks are required to calculate regulatory capital against

☆ I am grateful to a referee for some useful comments on an earlier draft. Work on this paper was supported by an ARC Discovery grant.

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[1] Apart from being portrayed as idiosyncratic, operational risk is thought to be different from credit risk and market risk in that it is one-sided, indistinguishable from other risks, and transferable via insurance. Moosa (2007) presents arguments against these propositions, suggesting that operational risk is not independent of the state of the economy, which is the issue addressed in this paper.

[2] In the operational risk literature, it is often the case that the words "risk" and "loss" are used interchangeably. Although the two concepts are related, there is a significant difference between them. Risk is an *ex ante* concept in the sense that it is a source of potential loss. This implies that exposure to risk may or may not produce losses. Loss, on the other hand, is an *ex post* concept, in the sense that it may materialise as a result of exposure to risk. On this issue, see Moosa (2008).

[3] "Black Swans" are low-frequency, high-severity loss events. Firm-specific factors include, *inter alia*, size, liquidity and leverage.

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doi:10.1016/j.econmod.2011.05.011

operational risk as 15% of gross income, which is a measure of size. However, it is often suggested that neither the empirical evidence, nor theory and not even intuition supports the importance of size as a determinant of operational losses.[4]

Moosa (2008), on the other hand, argues that operational risk depends on the state of the economy, citing the following examples to substantiate the argument: (i) credit card fraud is more prevalent when consumer spending is strong; (ii) the risk of rogue trading is higher when financial markets are booming; and (iii) the legal action associated with employee termination and counterparty bankruptcies is more likely when the economy is in recession.

Likewise, Chernobai et al. (2007) suggest three reasons why operational risk is related to the state of the economy: (i) operational losses rise during economic downturns because firms reduce spending on internal controls; and (ii) when unemployment is on the rise, the incidence of external fraud goes up; and (iii) anticipation or threats of redundancy boost the tendency of some employees to indulge in internal fraud and promote negligence – or at least indifference and lack of enthusiasm – that may cause operational losses.

On the other hand, Chernobai et al. (2007) suggest that tougher regulatory oversight and investor scrutiny during recessions may reduce operational losses, meaning that operational losses may decline when the economy is weak. This line of reasoning is based on the proposition that the intensity of regulation is cyclical, which is not supported by the stylised facts presented by the history of regulation in the U.S. Philippon and Reshef (2008) trace an index of deregulation in the U.S. back to 1909, demonstrating that there was no change in the intensity of regulation between 1909 and 1933. The Great Depression brought with it a major change in the regulatory regime, which was intensified even further in the 1950s. Thereafter there was no change in the regulatory regime until 1980. Since then the regulatory environment has been relaxed persistently. No cyclical pattern in regulation is evident throughout this period. It seems that regulatory changes occur following a major crisis, as what happened in the 1930s or in the aftermath of the global financial crisis. Otherwise, significant regulatory changes occur as a result of a major shift in the prevailing ideology, which was the motivation for the wholesale deregulation initiated by President Reagan and Prime Minister Thatcher in the early 1980s. These two major episodes of regulatory change fall outside our sample period, which means that they do not have a direct bearing on our analysis. What is important for the purpose of the following analysis is that changes in regulation do not exhibit a cyclical pattern, which casts some doubt on the effect of regulatory changes on the cyclical behaviour of operational risk.[5]

There are, therefore, reasons to believe that operational risk and losses are procyclical (higher in a strong economy), and others to believe that they are countercyclical (lower in a strong economy). Table 1 summarises these explanations, which mostly pertain to the failure of people, hence providing justification for using the unemployment rate as the explanatory variable representing the state of the economy. We will come back to this point at the end of this section.

Table 1
Hypothetical cyclical behaviour of operational losses.

Pro/Counter	Possible explanation
Procyclical	Credit card fraud is more rampant in a strong economy
Procyclical	Financial markets flourish in a strong economy, boosting the tendency to indulge in unauthorised trading
Procyclical	A weak economy triggers tougher regulatory oversight and increased investor scrutiny, hence losses are contained
Countercyclical	Legal action associated with employment termination and counterparty bankruptcies is more prevalent in a weak economy
Countercyclical	Firms reduce spending on internal controls, making it more difficult to detect fraud
Countercyclical	External fraud is more prevalent when unemployment is high
Countercyclical	Anticipated loss of jobs encourages fraud and negligence

The use of macroeconomic variables to explain the frequency and severity of operational losses follows from using them to predict the probability of default in studies of credit risk. For example, Helwege and Kleinman (1997) model one-year default rates over the period of 1981–1994 using a number of variables, including the GDP growth rate. Duffie et al. (2007) predict default intensities over the period 1980–2004, using the 3-month Treasury bill rate and the one-year return on the S&P 500 index. However, very little work has been done to explain operational losses in terms of macroeconomic variables, with the notable exception of Chernobai et al. (2007). They analyse 1159 loss events endured by 160 U.S. banks over the period 1980–2003 in terms of both firm-specific features and macroeconomic variables. They conclude that "while there is some evidence that operational losses are more frequent and more severe during economic downturns, overall the macroeconomic environment tends to be less important than firm-specific characteristics such as size, leverage, volatility, profitability and the number of employees". They find the arrival intensity of operational losses to be significantly related to the growth rate, implying that losses are more frequent during recessions—that is, operational losses are countercyclical.

An explanation is warranted as to the choice of the unemployment rate – as opposed to industrial production, for example – to represent the state of the economy or the business cycle. The reason is simple: operational risk is associated most intuitively with the failure of people, and unemployment is about people. The connection between unemployment and operational risk is easy to see: people become more like a potential source of operational losses when they are out of work or when they are threatened with the loss of their jobs. Two of the three explanations suggested by Chernobai et al. (2007) for the connection between operational risk and the state of the economy pertain directly to the failure of people as a result of unemployment or the threat of being unemployed. The third explanation is about the failure of processes and systems (internal controls), but that is also related to people — when internal controls are weak, more operational losses are incurred as a result of the failure of people, which intensifies when unemployment is high or rising. The explanations presented in Table 1 are about fraud, unauthorised trading, legal action, and negligence, all of which pertain to people and unemployment. It is less intuitive to relate these factors to industrial production, or any other coincident indicator of the business cycle, if it is chosen to represent the state of the economy.

3. Methodology

The methodology used in this paper is based on the structural time series model of Harvey (1989, 1997). The univariate version of the

[4] Herring (2002) casts doubt on the usefulness of the basic indicators approach for the calculation of regulatory capital as a percentage of gross income (a proxy for size). He argues that it is doubtful if this indicator (gross income) captures even the scale of an institution's operations adequately and that it has no tenuous link to the risk of an expected loss due to internal or external events. Pezier (2003) suggests that the connection between gross income (hence size) and operational risk is loose: gross income is about the past whereas operational risk is about the future. de Fontnouvelle et al. (2005) describe measurement based on a volume indicator as measurement in "an *ad hoc* manner". Jobst (2007) argues that relating operational risk exposure to business volume amounts to an incomplete regulatory measure that engenders misleading conclusions about operational risk exposure and the associated capital charges. Shih et al. (2000) concluded that size accounts for a very small portion of the variability in loss severity.

[5] While tightening of regulation is correlated with financial crises, particularly if they prove to have a profound macroeconomic impact, changes in economic activity are unlikely to drive regulatory changes unless there was a perception that inadequate regulation was to blame for any given recession.