Journal of Financial Stability 4 (2008) 258–274

Contents lists available at ScienceDirect

Journal of Financial Stability

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

Stress testing and corporate finance

O. de Bandt[a,*], C. Bruneau[b], W. El Amri[b]

[a] Banque de France, 46-1405 DAMEP, 39 rue Croix des Petits Champs, 75049 Paris Cedex 01, France
[b] Banque de France and University of Paris X (EconomiX), France

ARTICLE INFO

Article history:
Received 24 September 2007
Received in revised form 3 March 2008
Accepted 12 March 2008
Available online 21 March 2008

JEL classification:
G3
C33
E44

Keywords:
Corporate finance
Debt
Financial fragility
Stress tests
Panel data

ABSTRACT

The article contributes to the literature on financial fragility, studying how macroeconomic shocks affect supply and demand in the corporate debt market. We take into account the effect of the competitive environment, as well as the risk level, measured by companies' default rate. The model is estimated using data from the Harmonised BACH database of corporate accounts for large euro area countries on the 1993–2005 period, in order to carry out an illustrative stress testing exercise. We measure the impact of large macroeconomic shocks (a severe recession and a sharp increase in oil prices) on the equilibrium in the debt market.

In the last few years, "stress tests" have been applied to an increasing number of countries in order to assess the resilience of the financial system to large macroeconomic shocks (see Jones et al., 2004). The spirit of the exercise is to consider shocks that have a low – but non-zero – probability of occurrence, typically a large increase in interest rates, a severe recession hitting the economy, a large oil price shock or a significant foreign exchange shock, etc. One drawback of these tests is that they are rather mechanistic, focus on demand shocks to the financial sector and do not take into account of the effects of financial institutions on the real economy.

In the paper, we propose a way to improve upon the way stress tests are usually carried out, concentrating on the corporate segment of the debt market in the euro area. Such a market is important in itself since loans by euro area financial institutions to non-financial corporations amounted to 43%

* Corresponding author. Tel.: +33 1 42 92 28 80; fax: +33 1 42 92 49 50.
E-mail addresses: olivier.debandt@banque-france.fr (O. de Bandt), cbruneau@u-paris10.fr (C. Bruneau), widad.elamri@banque-france.fr (W. El Amri).

1572-3089/$ – see front matter
doi:10.1016/j.jfs.2008.03.001

of euro area GDP in 2005. The innovation of the paper is to distinguish explicitly between the demand for debt by corporate firms, and the supply of debt, notably by financial institutions. Of course, such an analysis is useful to study the transmission mechanism of monetary policy to the corporate sector, through the effect on its financial structure. However, its relevance is more direct in the context of "stress tests". Indeed, the debt market is the major channel of transmission of macroeconomic shocks to the financial sector. We follow the "balance sheet approach" (Sorge and Virolainen, 2006), but this is an "extended portfolio approach" since we assume that risk is time-varying, even if it remains exogenous. By carefully distinguishing between supply and demand for debt, the analysis allows to improve upon the usual practice of stress tests. However, feedbacks effects remain contemporaneous and include only the reaction of banks' supply to firms' demand (there is no dynamic "second round" effects).

In the paper we derive the equilibrium in the corporate debt market in terms of the interest rate and the volume of debt by non-financial corporations, estimating jointly a supply and a demand schedule for debt. Demand determinants (interest rates and activity variables) are rather standard – although they are derived from maximisation principles – but the modelling approach devotes significant attention to the supply side, with emphasis on the competitive conditions as well as on the risks faced by fund providers. Shocks to credit risks, by affecting the profitability of financial institutions may, as a consequence, also endanger financial stability (Davis and Stone, 2004; Ivaschenko, 2003).

To study the debt market, we rely on the EU Commission's Harmonised BACH database which provides detailed balance sheet and profit and loss accounts by sectors and size classes for several countries. Due to data availability, we concentrate on France, Germany, Italy and Spain on the 1993–2005 period.

The structure of the paper is the following. In Section 1, we sketch the theoretical model which is used to motivate the variables that we use in order to derive the supply and the demand for debt by corporate firms. The data are presented in Section 2. Section 3 discusses the empirical results. Section 4 illustrates how the model can be used for stress testing by considering the effect of a severe recession and an oil price shock. Section 5 concludes.

1. Basic model

In this section we briefly sketch a structural model for analysing the supply and demand for debt by non-financial companies in order to determine the equilibrium debt and interest rate. The demand for debt is rather standard, although it results from optimizing behaviour on the part of the firm. We also derive precisely the supply of debt. Our analysis is based on the equilibrium between supply and demand based on market clearing, following work on the effect of monetary policy on firms' financing conditions (Friedman and Kuttner, 1993; Kashiap et al., 1996 and more recently Bougeas et al., 2006). It is, however, useful to make reference to several other contributions to the literature that model the interactions between supply and demand in a disequilibrium framework. Ogawa and Suzuki (2000) for Japan model the "desired" level of debt by the ratio of debt to capital stock which depends positively on the ratio of sales to capital stock as well as the size of the firm, but negatively on the profit level, the access to the bond market, as well as the interest rate on debt. The maximum supply of debt depends on the availability of collateral. Atanasova and Wilson (2004) for the UK determine demand for bank loans as a positive function of size, activity – measured by sales – and as a negative function of the availability of substitutes to bank loans – measured by the level of internally generated cash flows, as well as trade credits – and the loan premium. On the other hand, supply depends positively on the level of collateral, and negatively on the tightness of monetary conditions. These variables will be used in our model.

1.1. Demand for debt by corporate firms

Our analysis concentrates on aggregate financial debt, which is the sum of bonds and bank loans, but we also take into account the existence of alternative sources of funds. Following Ogawa and Suzuki (2000) and Atanasova and Wilson (2004), demand for debt depends positively on activity and negatively on interest rates as well as alternative funds, which are mainly represented by