## DISTANCE TO DEFAULT AS A MEASURE OF BANKING SECTOR FRAGILITY

In making financial stability assessments, market indicators can complement traditional analysis of balance sheet indicators. As market indicators are based on securities prices which themselves contain the collective expectations of numerous market participants regarding the underlying fundamentals governing valuations, they are a potentially rich and comprehensive source of information, and have the important advantage of being forward-looking. If market participants take sufficient account of risks and vulnerabilities, such indicators can shed light on perceptions of the robustness of the financial system. Furthermore, their availability at very high frequencies facilitates continuous assessment. Nevertheless, it is important to bear in mind that the potential for securities prices to depart from the underlying fundamentals calls for caution: analysis of market-based indicators should not be a substitute for formal balance sheet analysis. This Box examines the indicator properties of the so-called distance to default, a market-based indicator which provides a quantitative measure that can provide early indications of financial distress and fragility.[1]

The distance to default provides a measure of the distance – in asset value standard deviations – of the current market value of assets in a company from a specified default point. It is derived using information on the market value of assets, a pre-specified default point and the uncertainty of the market value of assets, and represents a yardstick of business risk. In the absence of information on the market value of assets, the value of equity and debt in the company are typically used as proxies. When calculating the distance to default, one of the main assumptions is that the company is expected to honour in full its debt obligations to bondholders when the debt matures. If the obligation is not met, then the bondholders take over the company and the shareholders receive nothing. It is further assumed that the shareholders of the company would choose to refuse to meet the obligations of the company if its assets were to be valued less than its debt. If, on the other hand, the value of the company's assets exceeds the value of debt, the shareholders can choose to pay the debt and retain ownership rights over the assets. Intuitively, therefore, the equity of a company can be modelled as a call option on the assets of the company.[2] Given this relationship, it is possible to make use of the Black-Scholes option pricing model to derive the level and volatility of the market value of assets from the observed market value of equity, volatility of equity and debt.[3] The value of equity is reflected by the company's stock price, while the debt figures can be obtained from public accounts.

The distance to default is derived as the difference between the current market value of assets and the default point, scaled by the volatility of the asset value. The market value of assets is a measure of the expected future cash flow from the assets in the company, while the volatility can be used to measure how uncertain this cash flow is. An increasing valuation of the assets in a company, reflected through increasing stock prices, will thus increase the distance to default

1 See R. Gropp, J. Vesala and G. Vulpes, "Equity and Bond Market Signals as Leading Indicators of Bank Fragility", *Journal of Money, Credit and Banking,* Forthcoming.

2 See R. Merton (1974), "An Analytical Derivation of the Cost of Deposit Insurance and Loan Guarantees", *Journal of Banking and Finance,* 1, pp. 3-11.

3 See Black and Scholes, ibid.

for the company. Underlying a higher distance to default could also be decreasing volatility because of lower levels of uncertainty about the value of assets.

The distance to default can be estimated for non-financial and financial institutions. When assessing the risks in the euro area banking sector, the distance to default for the largest banks in the euro area can provide some useful information. Chart B14.1 illustrates patterns in the distance to default for a group of large euro area banks since 1992. This long time series makes it possible to see how the measure reacts in periods of financial distress. The distance to default for the analysed banks decreased significantly in 1998 at the time of the Russian crisis and the near-collapse of LTCM. It also declined in 2002 because of general uncertainty in the financial markets about the implications of various high-profile accounting scandals. Banks with the lowest distance to default reacted more strongly than the average.

**Chart B14.1 Distance to default for large euro area banks**



median
10th percentile
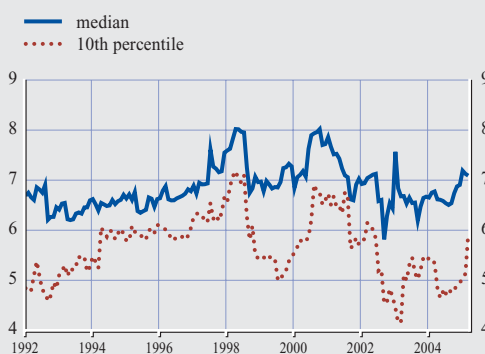
Sources: Moody's KMV and ECB calculations.