The Quarterly Review of Economics and Finance 65 (2017) 128–136

Contents lists available at ScienceDirect

The Quarterly Review of Economics and Finance

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

Does Corporate Derivative Use Reduce Stock Price Exposure? Evidence From UK Firms

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ARTICLE INFO

Article history:
Received 20 May 2016
Received in revised form 5 December 2016
Accepted 12 February 2017
Available online 17 February 2017

JEL classification:
G3
M4

Keywords:
Corporate hedge
Financial derivatives
Risk management

ABSTRACT

This paper explores the potential impacts of corporate derivatives use on stock return volatility and market risk. Using a sample of more than 3000 firm-years in the United Kingdom between 2003 and 2009, we find that a firm's derivatives use is instrumental in reducing its standard deviation of weekly stock returns and systematic risk. This phenomenon is particularly pronounced for firms with foreign currency or interest rate derivatives. Further, we find that the adverse effects of corporate derivatives use on equity return volatility and market risk were significantly greater during the financial crisis of 2007–2009 when firms, on average, were more susceptible to stock price exposures. Ancillary analyses suggest that firms that use foreign currency along with interest rate derivatives benefit from an additional reduction in the volatility of stock returns and systematic risk. These results are robust to numerous controls, including firm size, diversification effects, financial leverage, growth opportunity, industry attributes, self-selection biases, foreign sales, and macroeconomic effects. As a whole, our findings suggest that firms are more likely to use financial derivatives for risk management than for trading purposes.

1. Introduction

The connection between corporate derivatives use and risk exposure has been widely discussed in the financial economics literature. On the one hand, theoretical models on corporate hedging argue that firms adopt financial derivatives in an effort to reduce significantly their financial exposures, thus lowering the likelihood of financial distress and mitigating the underinvestment problem (Froot, Scharfstein, & Stein, 1993; Smith & Stulz, 1985). On the other hand, managers may use derivatives to speculate on the fluctuations in interest rates, exchange rates, or commodity prices, because the equity holders' claims to a levered firm's cash flow have an option-like payoffs that are increasing in firm volatility (Jensen & Meckling, 1976). Thus, the question of whether derivatives use increases or decreases firm risk is an empirical issue that requires an in-depth investigation.

In the 1998 Wharton Survey, Bodnar, Hayt, and Marston find that U.S. firms overwhelmingly use financial derivatives to hedge firm commitments. Geczy, Minton, and Schrand (1997) and Haushalter (2000) report empirical evidence that firms are more likely to use derivatives when they have an incentive to manage risk. Similarly, Sinkey and Carter (2000) uncover evidence that banks with riskier capital structure, larger maturity mismatches between assets and liabilities, greater net loan-offs, or lower net interest margins are more likely to use derivative instruments. Allayannis, Ihrig and Weston (2001) add that geographically dispersed firms are more likely to use exchange rate derivatives to hedge risks and that operational hedging strategies benefit shareholders only when combined with financial hedging strategies. On the other hand, Tufano (1996) finds that corporate derivatives use in the gold mining industry is consistent with theories of managerial risk aversion. Further, Faulkender (2005) and Chenenko and Faulkender (2011) suggest that speculation or myopia might drive a firm's use of interest rate derivatives.

Existing empirical evidence about the effect of derivatives use on firms' risk exposure is surprisingly limited and inconclusive. Moreover, prior studies typically focus on U.S. firms. For instance, Guay (1999) finds that firms experience a significant volatility reduction when they start using derivatives. However, Petersen and Thiagarajan (2000) and Hentschel and Kothari (2001) document a weak association between derivatives use and a firm's equity price exposure. The mixed U.S. evidence warrants a further investigation into this important subject.

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http://dx.doi.org/10.1016/j.qref.2017.02.004
1062-9769/

Consequently, we feel compelled to provide additional evidence on this crucial issue by shedding light on the firms domiciled in the United Kingdom before and during the financial crisis of 2007–2009. We focus on UK firms over the sample period of 2003–2009 for three reasons. First, prior studies primarily study the use of derivatives among US firms.[1] The robustness of their results needs to be verified by supplementary analyses for other major OECD countries, such as the U.K., which operates the world's largest OTC derivatives business and is among the top 5 countries in the world for market capitalization.[2] Second, the disclosure requirements have enhanced the quality of available information on UK firms' derivatives use, thereby providing us with an opportunity to conduct more sophisticated tests at the firm level.[3] Put differently, such publicly available information would enable us to avoid the nonresponse bias typical of survey-based samples and to yield results that are more readily generalizable to a large cross-section of firms. Finally, the inclusion of the financial crisis period enables us to further investigate the potentially asymmetric effects of a firm's derivatives use on its standard deviation of equity returns and market risk between good times and bad times.

Using a sample of 3360 non-financial firm-years over the period of 2003–2009, we examine whether corporate derivatives use lowers a firm's equity return volatility and systematic risk. Studying the annual reports for our sample firms, we find that nearly 2000 firm-years are users of interest rate, foreign currency, or commodity derivatives, accounting for about 60% of our firm-year observations. In both univariate and multivariate analyses, we find that stock price exposure and market risk are remarkably lower for derivative users than for non-users.

A natural extension of these analyses is whether this result is applicable to the financial tsunami of 2007–2009. If a firm's derivatives use really plays a central role in reducing stock price volatility, we should also observe that the adverse effects of derivatives use on stock price exposures were more pronounced during the crisis when an average firm faced greater turmoil of stock markets. As anticipated, we provide evidence that derivatives users enjoyed greater risk reductions in stock prices in the crisis period of 2007–2009 than in the non-crisis period of 2003–2006. This evidence suggests that firms are less likely to trade financial derivatives for excessive risk taking. Rather, they appear to engage in derivative instruments for hedging purposes. However, not all types of derivative users benefit from financial derivatives usage. A further analysis shows that the results are mainly driven by the groups of foreign currency or interest rate derivative users. Our findings are robust to controlling for firm-specific attributes, including firm size, diversification effects, financial leverage, growth opportunity, industry composition, foreign sales, and macroeconomic impacts.

Further, we address the possible endogeneity bias by using Heckman's (1979) two-stage procedure. In the first stage specification, we run a binary probit regression to explore firms' incentives to use any type of financial derivatives, including interest rate, foreign currency, and commodity derivatives. The inverse Mills ratio, LAMDA, is calculated from this first stage regression and then used in the second stage regression to capture the self-selection bias. We find a significantly positive coefficient on LAMDA, implying that firms with a higher probability of using derivatives tend to have a higher stock return volatility and systematic risk. More importantly, we validate that, after controlling for the self-selection bias, foreign currency or interest rate derivatives uses continue to be inversely related to equity return volatility or market risk. However, we do not detect any systematic association between both risk measures and commodity derivatives use.

The rest of the paper is organized as follows. We describe empirical design in Section 2. Section 3 discusses the data and sample distribution. Section 4 contains empirical results. Section 5 concludes the paper.

2. Empirical design

In this section, we present our model specification for exploring the potential effect of corporate derivatives use on the firm's return volatility and market risk. The risk measures are conventionally regressed on derivatives use indicators along with other firm characteristics as control variables to investigate such possible impacts. However, the inclusion of firm characteristics without taking industry effects into account is likely to seriously bias the estimates. The underlying logic is that if derivatives users are concentrated in the industries that are characterized by lower stock return volatility or market risk, then the estimated effects are attributable to their industry-specific attributes. To mitigate this confounding effect, we follow Hentschel and Kothari (2001) and use two-digit SIC code to compute industry-level average values of all the variables and then deflate all the variables by their corresponding industry average values. In our model, all variables, except for the indicator variables, are industry-adjusted. Our baseline model is summarized as follows:

$$Y_{i,t} = \alpha_1 + \alpha_2 D_{i,t} + \alpha_3 X_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ is measured by equity return volatility or market risk for firm i during fiscal year t, $D_{i,t}$ is a derivatives use indicator variable, $X_{i,t}$ is a set of exogenous observable firm characteristics and time effects, $\alpha = \{\alpha_1, \alpha_2, \alpha_3\}$ is a vector of parameters to be estimated, and $\varepsilon_{i,t}$ is an error term.

$Y_{i,t}$ denotes the industry-adjusted standard deviation of weekly equity returns ($STD_{i,t}$) or the industry-adjusted weekly equity beta ($BETA_{i,t}$). $D_{i,t}$ is a variable of interest that consists of several measures of derivatives use, including $CD_{i,t}$, $IRD_{i,t}$, $FXD_{i,t}$, and $CMD_{i,t}$. $CD_{i,t}$ is a combined derivatives use indicator that takes a value of 1 if the firm uses interest rate, foreign currency, or commodity derivatives, and 0 otherwise. $IRD_{i,t}$ ($FXD_{i,t}$, $CMD_{i,t}$) is an interest rate (foreign currency, commodity) derivatives use indicator that is set to a value of 1 if the firm uses interest rate (foreign currency, commodity) derivatives, and 0 otherwise.

$X_{i,t}$ consists of a wide array of firm attributes and time effects. $DIV_{i,t}$ is set to the value of 1 if the firm operates in multisegments or in foreign countries with foreign sales for the given year, and 0

[1] A relatively small number of non-US studies are conducted for this line of inquiry. For example, Bodnar, Jong, and Macrae (2003) find that institutional differences play a significant role in derivatives use across US and Dutch firms. Their evidence calls for a further investigation into risk management practices in non-US firms. Examining a sample of New Zealand non-financial firms, Marsden and Prevost (2005) report that high growth firms with a greater proportion of outside directors are less likely to undertake financial derivatives. Their findings are consistent with the notion that corporate derivatives use can exacerbate agency conflicts in the circumstances under which shareholder and managerial interests are misaligned. Using a sample from the Financial Times list of the 1995 United Kingdom 500, Judge (2006) documents a link between the decision to hedge and the expected costs of financial distress. Allayannis, Lel, and Miller (2012) find that the use of foreign currency derivatives results in a significant value premium mainly for non-US firms with strong governance mechanisms. Belghitar, Clark, and Mefteh (2013) suggest that foreign currency derivatives use has no value implication for the largest French non-financial firms in the period of 2002–2005.

[2] See Bank for International Settlements (2001a,b) quarterly review and triennial surveys (2001, 2004, and 2007).

[3] According to Financial Reporting Standard No 13 (FRS 13) (effective on March 23, 1999), all publicly listed U.K. firms are required to disclose the use of derivative financial instruments. The companies must report their policies, objectives, and strategies for using derivative instruments. Additionally, they are required to provide information about how the associated risks are managed and the resulting impacts on their financial performance and conditions. Currently, the U.K. is implementing FRS 29 (IFRS 7), which became effective on January 1, 2007, with similar disclosure requirements.