



## Does multinationality matter? Implications of operational hedging for the exchange risk exposure<sup>☆</sup>

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### ARTICLE INFO

#### Article history:

Received 1 September 2008

Accepted 18 April 2009

Available online 24 April 2009

#### JEL classifications:

G3

F2

#### Keywords:

Exchange risk exposure

Multinational corporations

Corporate risk management

Operational hedging

Financial hedging

### ABSTRACT

An important issue in global corporate risk management is whether the multinationality of a firm matters in terms of its effect on exchange risk exposure. In this paper, we examine the exchange risk exposure of US firms during 1983–2006, comparing multinational and non-multinational firms and focusing on the role of operational hedging. Since MNCs and non-multinationals differ in size and other characteristics, we construct matched samples of MNCs and non-multinationals based on the propensity score method. We find that the multinationality in fact matters for a firm's exchange exposure but not in the way usually presumed – the exchange risk exposures are actually smaller and less significant for MNCs than non-multinationals. The results are robust with respect to different samples and model specifications. There is evidence that operational hedging decreases a firm's exchange risk exposure and increases its stock returns. The effective deployment of operational risk management strategies provides one reason why MNCs may have insignificant exchange risk exposure estimates.

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### 1. Introduction

An important issue in global corporate risk management is whether the multinationality of a firm influences its exchange risk exposure. Existing studies of corporate exchange risk exposure (e.g., Jorion, 1990; Choi and Prasad, 1995; Allayannis and Ofek, 2001; Bodnar and Wong, 2003; Faff and Marshall, 2005) generally suggest that a firm's exchange exposure increases with a measure of its international operations. This underscores a popular presumption (e.g., textbooks by Eiteman et al., 2006; Shapiro, 2006) that multinational corporations (MNC) – with their higher degree of international operations – generally face greater exchange risk exposure than non-multinational firms. Multinationals are directly exposed to exchange risk through their international assets and liabilities as well as operating cash flows and hence are subject to both accounting and economic exchange exposures at home

and abroad. Non-multinational firms, on the other hand, only encounter indirect competitive exposures at home (or transaction exposures if they engage in international trade with domestic production). It follows that MNCs would have higher exchange risk exposures than non-multinationals if the combined accounting and economic exposures faced by the multinationals are greater than the domestic economic (or transaction) exposure of non-multinationals.

Theoretically, the opposite result, however, is also possible since the exchange exposure is not domicile-specific, but operation-specific. Marston (2001) develops a theoretical model where a purely domestic firm faces exchange risk because of competition with international firms and where MNCs may have smaller exposure elasticities than non-multinationals involved in domestic production and international trade. Hodder (1982) devises a model where the firm's exchange exposure depends on foreign liabilities as well as assets. Choi (1986, 1989) argues that, depending on the operating characteristics of the firms and the markets in which they operate, the accounting and economic effects of foreign operations (as well as the domestic and foreign economic exposure effects) may partially cancel out. These models suggest a theoretical possibility that the net exchange exposure faced by multinational firms may be greater or smaller than that of non-multinationals. Moreover, multinational firms – compared to comparable non-multinational firms – may possess superior capability for reducing

<sup>☆</sup> An earlier version of this paper was presented at the 2007 Financial Management Association and Southern Finance Association meetings. Helpful comments and suggestions were received from Raj Aggarwal, Ed Boyer, John Doukas, Delroy Hunter, James Landi, Brian Lucey, Colm Kearney, Chris Pantzalis, and Stephen Treanor. Partial supports from the Center for International Business Education and Research at Temple are gratefully acknowledged.

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exchange risk through financial hedging (e.g., Allayannis and Ofek, 2001) and operational strategies (e.g., Pantzalis et al., 2001).<sup>1</sup> This may contribute to a lowering of the measured, ex-post exchange risk faced by multinational firms. The issue of how the exchange risk exposures differ for multinationals versus other firms is thus an empirical one.

Numerous studies examine the exchange risk exposure of US firms at the market level, but little work has been done on the comparison of exchange risk exposures of US multinational versus non-multinational firms using a disaggregate sample.<sup>2</sup> Regarding non-US firms, He and Ng (1998) find no evidence of economically significant exchange exposures for Japanese MNCs for the period of 1979–1993. Considering time variability, Doukas et al. (1999), however, report that the exchange risk premium is larger for Japanese multinational and export firms than domestic firms for the period of 1975–1995, confirming the positive association between exchange exposure and international operations. Little empirical work has been done on the impact of operational hedging.

In this paper, we examine the exchange risk exposure of US firms comparing multinational and non-multinational firms and focusing on the role of operational hedging for the period of 1983–2006. Since multinational and non-multinational firms differ not only in terms of where their productive assets are but also in terms of their firm sizes and other characteristics, we adopt the propensity score method used by Villalonga (2004) to construct matched MNC and non-MNC samples. We find that the multinationality matters for exchange exposure, but not in the way usually presumed. The exchange risk exposure is actually significant for non-multinationals but not for MNCs even for the matched sample. The exchange risk coefficients are also larger, in absolute magnitude, for non-multinationals than for multinationals. The results are robust with respect to different samples and model specifications as well as estimation methods.

To understand why MNCs would have an insignificant exchange risk exposure, we further estimate the effect of operational hedging on the exchange exposure and stock returns. The results show that the effect of operational hedging, after controlling for financial hedging and other firm-specific variables, is significant in both lowering the exchange risk betas and in increasing stock returns. The effective deployment of operational risk management strategies provides one reason why MNCs may have insignificant exchange exposure despite their significant international operations.

The rest of the paper is organized as follows: Section 2 describes the data used in empirical work. Section 3 provides a benchmark estimation of exchange exposure for the undifferentiated total sample. Section 4 is our main section that estimates the exchange exposure for a matched sub-sample of MNCs and non-MNCs. Section 5 examines the effects of operational and financial hedging on the exchange risk exposure and stock returns, and Section 6 discusses our conclusions.

<sup>1</sup> If multinational firms are bigger than non-multinationals, firm size can influence the exchange risk exposures. Larger firms may have economies of scale in risk management (Nance et al., 1993), but smaller firms may have more incentives to hedge because of greater bankruptcy potentials. In this paper, MNC and non-MNC samples are matched by firm size, industry and other firm characteristics by a propensity score method.

<sup>2</sup> For studies on exchange exposure of industrial US firms using undifferentiated total samples, see Adler and Dumas (1984), Jorion (1990), Bodnar and Gentry (1993), Bartov and Bodnar (1994), Choi and Prasad (1995), Prasad and Rajan (1995), Chow et al. (1997a, 1997b), Domingues and Tesar (2001), Allayannis and Ofek (2001), Allayannis and Weston (2001), Koutmos and Martin (2003), Choi and Kim (2003), and Bodnar and Wong (2003). For similar undifferentiated studies for non-US firms, see, e.g., Bartram (2004), Faff and Marshall (2005), Muller and Verschoor (2006b, 2007), and Chue and Cook (2008).

## 2. Data and descriptive statistics

We use firm-specific multinational and non-multinational corporate data for the US to estimate the exchange risk exposures based on monthly data for the period from January 1983 to December 2003. We also study the impacts of financial and operating hedging based on annual data during the period of 2000–2006 when firms reported fair values for derivatives in their financial statements according to the FASB 133 enacted in 1999. The sample period used in exposure estimations covers 21 years of the flexible exchange rates with full economic and currency cycles after the oil shock and the high interest rate regime in the early Reagan era. Monthly time series of dividend-adjusted stock returns are obtained from the University of Chicago CRSP (Center for Research in Security Prices) tapes. A total of 889 firms with complete data for the entire sample period are selected. From this total sample, 240 multinational firms incorporated in the US are identified. Dunning (1973) defines an MNC as a firm that has production facilities located in more than one country. Hence, a firm with foreign sales or profits but without any foreign production facilities is not an MNC. We follow the screening method used in the *Directory of Multinationals* (1998) and classify MNCs as firms that have over \$500 million foreign sales with at least three country representations in the *Compustat* (North America) database as of the end of 1996, which is close to the midpoint of our sample period.<sup>3</sup> As will be discussed in more detail, a matched MNC and non-MNC sample is also created using the propensity score method used by Villalonga (2004).

Given the aggregation problem indicated by Khoo (1994), Choi and Prasad (1995), and Muller and Verschoor (2006a), we estimate the exchange risk exposure at a firm level. The results are presented by groups of MNCs versus non-MNCs and also by industry. In the industry analysis, we use the four-digit Standard Industrial Classification (SIC) code. However, due to the limited number of MNCs for certain industries during the period of 1983–2003, we streamlined major industry categories in the SIC code into six: agriculture, forestry and fishing, mining and construction (0100–1799), manufacturing (2000–3999), transportation, communication, electric, gas and sanitary services (4000–4991), wholesale and retail trade (5000–5999), finance, insurance and real estate (6000–6799), and services (7000–8900). Public administration (9000–9899) is excluded because of its unique characteristics. While we recognize that this broader industry categorization may mask some detailed industry characteristics, this breakdown provides us with sufficient sample space within each industry.

The exchange rate variable used is the Real Broad Index series, which is the price-adjusted value of the multilateral trade-weighted basket of 35 foreign currencies per one US dollar, as published in the *Federal Reserve Bulletin*. This is a new real multilateral exchange rate index series, prepared by the Fed, and replaces the discontinued G-10 effective exchange rate index. A reciprocal of this index is used to calculate the rate of changes in the dollar value of the composite foreign currency. In bilateral exchange rate models, the rate of change in inflation-adjusted, dollar/pound exchange rate and the dollar/100 yen exchange rate are used. The market return is measured by changes in value-weighted CRSP dividend-adjusted stock market index. Instrumental variables used in

<sup>3</sup> The actual list of MNCs in the *Directory of Multinationals* excludes financial companies and some high-tech firms in order to keep the total number of US and non-US multinational firms at 500. The *Directory* changed its definition of MNCs somewhat over the sample period. We have used the 1996 standard through the entire sample period. Our list of 240 US MNCs stems from the application of the *Directory* standard to the dataset obtained from *Compustat*. The *Directory of Multinationals* has been used to screen MNCs in existing work (e.g., Fatemi, 1984) and (Doukas and Travlos, 1988)) and is superior to an alternative specification such as the foreign sales ratio.

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