

What lies beneath: Foreign exchange rate exposure, hedging and cash flows

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Abstract

This paper presents results from an in-depth analysis of the foreign exchange rate exposure of a large nonfinancial firm based on proprietary internal data including cash flows, derivatives and foreign currency debt, as well as external capital market data. While the operations of the multinational firm have significant exposure to foreign exchange rate risk due to foreign currency-based activities and international competition, corporate hedging mitigates this gross exposure. The analysis illustrates that the insignificance of foreign exchange rate exposures of comprehensive performance measures such as total cash flow can be explained by hedging at the firm level. Thus, the residual net exposure is economically and statistically small, even if the operating cash flows of the firm are significantly exposed to exchange rate risk. The results of the paper suggest that managers of nonfinancial firms with operations exposed to foreign exchange rate risk take savvy actions to reduce exposure to a level too low to allow its detection empirically.

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1. Introduction and motivation

Since many currencies became freely floating after the breakdown of the Bretton Woods system in the mid 1970s, changes in exchange rates have been a major risk to nonfinancial corporations around the world. Particularly for firms with foreign currency-based activities, such as imports and exports, corporate cash flows and thus firm value are a function of exchange rates, rendering the management of foreign exchange rate risk an important corporate objective and activity. To illustrate, higher cash flow volatility due to exchange rate risk may lead to reductions in firm value if firms face constraints on their internal financing and, as a consequence, incur either higher costs of raising external funds or opportunity costs of forgone

profitable investment projects (Froot et al., 1993). While the effect of exchange rate risk on the stock price of nonfinancial firms has been shown to depend on a variety of firm characteristics, such as the percentage of foreign sales (e.g. Jorion, 1990), firm size (e.g. Dukas et al., 1996), derivatives use (e.g. Allayannis and Ofek, 2001), leverage (e.g. He and Ng, 1998), firm liquidity (e.g. Bartram, 2004), and industry characteristics such as mark-ups (Allayannis and Ihrig, 2001), market share (Williamson, 2001), industry concentration (e.g. Bartram and Karolyi, 2006), most empirical studies report only a small number of firms with significant foreign exchange rate exposure. Consequently, researchers have come to conclude that, somewhat surprisingly, the effect of exchange rate changes on firm value is economically and statistically small (Griffin and Stulz, 2001).

To this end, this paper contributes to the literature by presenting an in-depth analysis of the foreign exchange rate exposure of the cash flows of a large nonfinancial corporation and its ability to hedge this exposure using proprietary

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corporate data including cash flows, derivatives and foreign currency debt. As Bodnar and Wong (2003) point out, the unavailability of suitable cash flow data makes the analysis of cash flow exposures generally impossible, and, as a consequence, studies of foreign exchange rate exposures typically use stock returns to proxy for changes in cash flows. Nevertheless, it is important to note that the early, mostly theoretical work on foreign exchange rate exposure is based on corporate cash flows (e.g. Bartram et al., 2005b; Flood and Lessard, 1986; Adler and Dumas, 1984; Hodder, 1982; Shapiro, 1975). These seminal papers relate firm value as the present value of all future cash flows as well as cash flow volatility to the extent of foreign business (such as exports and imports) or competition of the firm. Similarly, most of the theoretical motivations for corporate risk management of foreign exchange rate risk are based on cash flow volatility as well (Smith and Stulz, 1985; Froot et al., 1993). Given that it is difficult to tailor operational hedging to the particular needs of a firm, operating cash flow exposure is something many firms must live with, and they can try to hedge this exposure in financial markets. The paper analyzes a case where the success of such efforts can be evaluated based on data that are rarely available.

While the previous literature has documented the corporate use of different hedging tools in general, little detail is available for large samples of firms. Consequently, this paper documents and examines the nature and effects of corporate risk management practices in a way that cannot be employed for a large sample, showing in detail how non-financial firms conduct financial risk management and what the effects are on the sensitivity of cash flows and firm value with regards to exchange rate risk. In particular, the foreign currency-based activities of the firm are analyzed in order to identify the currencies that are the most important sources of exchange rate risk of the firm, yielding large gross exposures. For these currencies, foreign exchange rate exposures are estimated for different cash flows such as cash flows from operations, cash flows from investment activities, cash flows from financing activities and total (net) cash flows. In this context, the effect of operational hedging (foreign assets and operations) and financial hedging (foreign currency debt and derivatives) is considered. The results document that corporate cash flows are affected by foreign exchange rate risk, but that they are coordinated in a way that total (net) cash flows exhibit only small foreign exchange rate exposures and low cash flow volatility. Finally, stock price exposures are estimated for the same firm. Similar to total cash flows, the exposures of stock returns to the foreign exchange rates most important for the firm as well as to a foreign exchange rate index are economically and statistically small.

The paper thus illustrates how corporations use hedging tools to reduce the exposure of their operations to such an extent that the remaining net exposures are hard to identify in empirical analyses. The results are consistent with cash flow variability being a major concern of companies when

considering foreign exchange exposure, as documented in Bodnar et al. (1995). If hedging at the firm level increases value, firms with operations that are heavily affected by exchange rate changes (i.e. firms with large gross exposures) will engage in risk management activities to an extent that the residual exposure is small. Consequently, both firms with and without operations exposed to exchange rate risk are likely to show insignificant residual exposures.¹

The remainder of the paper is organized as follows. Section 2 discusses related research, while Section 3 describes the methodology used to estimate cash flow and stock price exposures. The company examined in the clinical study is characterized in Section 4, and Section 5 describes the data set. Section 6 presents and discusses the results, and Section 7 concludes.

2. Extant evidence of foreign exchange rate exposure

The early research on foreign exchange rate exposure goes back to seminal work by Adler and Dumas (1984), who define exchange rate exposure as the effect of unexpected changes in foreign exchange rates on cash flows and, by extension, firm value. Jorion (1990) first tested this phenomenon for a sample of 287 US multinational firms in a regression of stock returns on changes in a foreign exchange rate index and, as a control variable, the market index. The results show that only few firms, namely 15 (representing 5.2% of the sample), have a statistically significant foreign exchange rate exposure at the 5% significance level. These findings have been perceived as surprising and, thus, have motivated a large body of empirical work investigating the effect of exchange rate changes on stock returns using a variety of alternative approaches with regards to methodology and data (see Bartram and Bodnar (2007) for a review). In contrast, due to data unavailability, there exists only very sparse evidence regarding the effect of exchange rate risk on corporate cash flows. To illustrate, the foreign exchange rate exposure of Vulcan Materials Company is analyzed in a regression of changes of the company's quarterly operating cash flows on changes in the USD/GBP exchange rate (Garner and Shapiro, 1984). The results show economically and statistically small foreign exchange rate exposures. Oxelheim and Wihlborg (1995) use quarterly changes of total cash flow, commercial cash flow and sales revenue in their exposure analysis of Volvo Cars. They find that the financial

¹ While the evidence in this clinical paper is based on one single firm, the results and conclusions are in line with recent theoretical insights and empirical evidence for a global sample of manufacturing corporations documenting that firms are able to manage exchange rate risk via three complementary channels. First, firms pass part of exchange rate changes through to customers. Second, most global manufacturers utilize operational hedges (e.g. matching foreign sales with foreign production). Third, corporations employ financial risk management strategies such as issuing foreign currency denominated debt and entering into foreign exchange rate derivatives transactions (Bartram et al., 2005a).

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