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The dynamic effect of corporate financial hedging on firm value: The case of Indian MNCs

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Abstract

This paper explores the effect of financial instruments for exchange rate hedging on a firm's value in the presence of non-operating profit or loss from foreign exchange transactions. This study uses Tobin's Q ratio as a proxy for firm value and a two-step generalized method of moments (GMM) model to estimate the effect of financial hedging. Our dynamic panel analysis using extensive data on 61 Indian multinational corporations (MNCs) in 2009–2020 shows that financial hedging instruments, such as foreign currency derivatives (FCD) and foreign currency–denominated debt (FDD), enhance firm value by 16.91% and 10.21%, respectively. The results of the robustness test confirm the findings.

Keywords: FCD; FDD; Financial hedging; Firm value; FXPROFIT

1. Introduction

Opening up the economy leads to a dramatic increase in the number of corporations that set up a business around the world. Their business activities are not limited to importing and exporting but, rather, extend to global sourcing, production, and marketing. Consequently, multinational firms (MNCs) can exploit opportunities due to their large-scale operations and enable them to enhance firm value. These benefits for firms are accompanied by greater exposure to risk, including those due to exchange rate uncertainty, affecting future cash flows and firm value. Marshall (2000) shows that MNCs emphasize managing exchange rate risk. The findings of this study on variability in managing exchange rate risk by MNCs worldwide provide evidence that, out of 53 Asian-Pacific MNCs, 16 prioritized exchange rate risk exposure. It also shows that MNCs based in developed countries such as the UK and the US see foreign exchange risk management as just as crucial as business risk management. The evidence also indicates that MNCs employ several financial and nonfinancial risk management measures to reduce or hedge their exposure to exchange rate volatility. When firms are positively exposed to exchange rate volatility or negatively exposed to it through exchange rate pass-through activities, these firms can manage exchange rate volatility through internal transactions with foreign subsidiaries, currency derivatives, and foreign currency debt financing (Bae et al., 2018).

In this paper, we show the impact of financial hedging on a firm's value while mitigating the exchange rate risk through financial measures. The use of derivative instruments is more prevalent among firms to manage exchange rate risk. Other strategies, such as accepting debt denominated in foreign currency and operational adjustments, also enable firms to mitigate exchange rate risk. The (Modigliani & Miller, 1958) theorem shows that in the presence of a perfect capital market, the use of risk management measures is irrelevant to firm value. However, many studies suggest that the derivatives used can

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serve as a value-enhancing activity when some assumptions proposed by MM are relaxed.

Several empirical works on this topic have focused on identifying the factors responsible for exchange rate hedging (Allayannis & Ofek, 2001; Géczy et al., 1997; Graham & Rogers, 2000; Hagelin, 2003). However, few of them identify the relationship between hedging with derivatives and firm value. Moreover, few studies quantify the possible changes in firm value if exchange rate hedging has a positive or negative relationship with it. The direct impact of financial measures for exchange rate hedging on corporate value has recently attracted some attention. Further findings in these empirical studies are not consistent across countries. For example, Allayannis and Weston (2001), using a sample of US firms, show an average of 5.4% higher firm value at firms that employ derivatives than those that do not. Similarly, numerous empirical studies show the positive impact of financial hedging on a firm's value. Later, Clark and Judge (2008) and Tessema (2016), in response to the same research question of the impact of financial hedging on a firm's value, find an insignificant effect, and Nguyen and Faff (2010) study findings evidence 18% of the negative impact of financial hedging on a firm's value.

A large volume of literature explores the relationship between financial hedging and firm value, most of which focuses on the use of derivatives to hedge exchange rates. Moreover, the findings are based mainly on the US and other developed countries, with few studies on emerging economies. This paper examines the value-enhancing effect of financial measures used for exchange rate hedging. We focus on financial techniques such as using exchange rate derivatives and debt denominated in foreign currency.

This paper makes four contributions to the existing literature. First, this is the first attempt to examine the impact of financial hedging on increases in firm value at Indian MNCs. A few studies have used a sample of Indian MNCs but do not offer a comprehensive picture of the Indian conditions. For example, Bartram et al. (2011) explore the determinants of financial hedging with a sample of 6888 MNCs from 47 countries, of which 40 firms were in India. In a similar manner, Allayannis et al. (2012) studied 1546 samples from around the world to investigate the association between firm value, financial hedging, and corporate governance. However, only three of those samples were from India. Most empirical studies in this domain focus on countries in the Americas, Europe, and other developed economies. Thus, we fill this gap and address the question of the hedging effect on a firm value at Indian MNCs. At the same time, our findings can be generalized to other emerging economies with managed-float exchange rate regimes, such as Indonesia, Malaysia, Pakistan, and Paraguay.

Second, many previous studies focus on financial hedging only with derivatives. Among them, Alam and Gupta (2018) investigate the value effect of financial hedging, limiting the use of derivative instruments by Indian firms when dealing with exchange rate exposure. The finding also shows that the use of derivative instruments by a firm has a positive effect on firm value only at the time of the financial crisis in 2008, which did not show a clear picture of the hedging practice effect. In contrast, it shows only the use of derivatives. Our work covers foreign currency–dominated debt (FDD) by firms to hedge exchange rate risk from 2009 to 2020. Few studies document the use of foreign currency derivatives (FCD) and foreign currency–dominated debt (FDD) for hedging exchange rates and their impact on firm value. Their findings fail to provide conclusive evidence. For example, Allayannis et al. (2001) show the use of debt and derivative contracts for hedging but do not show the magnitude of the value added to the firm value with the two measures. Clark and Judge (2009) show evidence of value added by FCD of 11–34%, whereas Hadian and Adaoglu (2020) show a negative effect on firm value of 8.19–13.12%. In addition, many previous studies use dummy variables to measure financial hedging. In contrast, we consider the intensity of hedging and the ratio of the hedging instrument's value to total sales as a proxy for financial hedging. Doing so makes our findings more robust because it is more appropriate to evaluate the extent of hedging effects on firm value than decide whether to engage in hedging.

Third, we contribute to the existing literature on the effect of non-operating profit or losses due to foreign exchange transactions on firm value. For instance, Bae et al. (2016) looked at a sample of Korean firms, controlled for the impact of foreign exchange profit or loss, and found that only foreign debt affects firm value. Similarly, Hadian and Adaoglu (2020) investigate Malaysian MNCs that hedge with FCD and FDD as part of long-term operational hedging, finding that an operational hedging strategy has an insignificant impact on firm value. Moreover, the macroeconomic environment in Malaysia differs from that in other emerging economies because, according to a report by the World Bank (2020), its economy depends heavily on the export performance of oil and gas, electronics, and electrical goods. The study's time frame includes the period of the Asian financial crisis in 2008, which may create doubt about the validity of the relationship between foreign exchange profit and loss and firm value. Comparatively, the Indian economy is more stable than that of other emerging economies. India achieved a high macroeconomic stability ranking (90 out of 100, ranking 41st out of 141 economies) in the World Economic Forum's (WEF's) Global Competitiveness Index (2020). India is the world's largest market for manufactured goods and services and ranks third out of 141 economies for market size according to the WEF's Global Competitiveness Index. Therefore, this study also looks for contributions and validation in the literature on the value impacts of exchange rate risk by firms exclusively through financial measures such as using FCDs and FDDs after controlling for foreign exchange profit or loss for Indian MNCs.

Finally, we adopted a dynamic panel methodology proposed by Arellano and Bover (1995) and Arellano (2004), which is famous in the name of the generalized method of moments (GMM). According to them, this method enables endogeneity problems to be controlled for and addresses unobservable heterogeneity. Many previous studies used pooled ordinary least squares (OLS) and fixed effect estimator methodologies, assuming that currency hedging is strictly exogenous. Furthermore, the OLS estimator does not consider the possible

relationship between past firm value and current firm value in exchange rate hedging, which is a crucial concern and emphasizes the importance of controlling for endogeneity when studying the relationship between hedging and firm value (Jin & Jorion, 2006; Magee, 2013; Seok et al., 2020). According to Seok et al. (2020), the endogeneity problem occurs because control variables that determine the firm value or unobservable firm-specific factors are not considered in the regression model. Júnior and Laham (2008) state that another reason for endogeneity is the possibility of reverse causality between hedging and Tobin's Q: a high Tobin's Q reflects the firm's higher investment opportunity. Thus, according to the theory of optimal hedging (Stulz, 1984), these firms have more incentives for hedging. In this way, a positive relationship would indicate that firms with higher growth opportunities are incentivized to use derivatives rather than using derivatives to increase firm value.

Moreover, many studies show the effect of exchange rate hedging on firm value with an assumption of strict exogeneity, which is not feasible. Indeed, the result obtained may be inconsistent and biased if this assumption does not hold well. Therefore, we use a dynamic panel approach with a one-lagged dependent variable as an explanatory variable in the regression equation to control for exogeneity. At the same time, following Arellano and Bond (1991), we also include instrumental variables in our analysis.

The remainder of this paper proceeds as follows. Following this introduction, Section 2 presents reviews of the existing literature. Then, Section 3 describes the research design, including the sample, model, methodology, variables, and their measurement. The empirical results and discussion are given in Section 4, including the robustness testing results. Finally, Section 5 offers our conclusions and suggestions for future research.

2. Literature review

2.1. Theoretical review

In a perfect market, firm risk management decisions do not change the firm's value (Modigliani & Miller, 1958). However, friction, such as transaction costs, agency problems, taxes, and information asymmetry, creates a scenario in which leveraging and risk management can directly affect the volatility of cash flows. When the price falls, producers lose potential revenue if they do not use contracts or options to hedge against the price volatility risk. Similarly, when a firm's income surges, the firm's tax liability increases in the context of a convex tax schedule. In this case, hedging can help the firm to even out its cash flow and avoid volatility in the cash flow exacerbated by the tax regime.

The theoretical literature on adding value through a risk management strategy discusses three main channels. First, risk management strategy hedging reduces financial distress and avoids underinvestment. High cash-flow volatility can cause a difference between the available liquidity and fixed payment obligations. Thus, managers need to consider and use hedging for risk management. Smith and Stulz (1985) analyze the impact of hedging on expected bankruptcy costs. They find that hedging can reduce the impact of a firm's financial distress cost and lower its expected bankruptcy costs, thereby increasing its debt capacity and firm value. Mayer and Smith (1990) also find that the firm reduces cash flow volatility through hedging, which can reduce bankruptcy costs and minimize the loss of tax shields.

From a theoretical perspective, Froot et al. (1993) note that hedging can help companies to maintain internal funds available for good investment opportunities and thus avoid underinvestment. Without risk management, firms are sometimes forced to pursue less optimal investment opportunities because a low cash flow may prevent firms from pursuing optimal investment opportunities. Therefore, everything else being equal, the more difficulties that firms face in obtaining external financing, the less adequate their cash flow, which results in a higher hedge premium paid by the firm, which can negatively affect firm value.

Second, hedging is used to reduce expected tax costs. Smith and Stulz (1985) discuss the tax-induced explanation of risk management. In a convex tax schedule, the firm can employ risk management to reduce the volatility of taxable income that expected tax liabilities would otherwise exacerbate. The firm tends to hedge when it has high leverage, shorter debt maturity, lower interest coverage, less liquidity, and high dividend yields because it wants and needs a stable cash flow. Therefore, reduced volatility in taxable income generates higher firm value.

Third, hedging can ease a manager's risk exposure (Smith & Stulz, 1985). According to Smith and Stulz (1985), risk-averse managers use risk management hedging if they have a direct interest in business earnings and if it is too costly to hedge their accounts. Smith and Stulz (1985) note that managers who hold more of their firm's stocks emphasize risk management more than those who hold more options. The reason is that stocks give managers a linear payoff, whereas options provide convex payoffs. DeMarzo and Duffie (1995) point out that hedging can signal managerial ability to external investors. Among empirical studies, Tufano (1996) finds that firms whose managers hold more options use less risk management, and firms whose managers hold more stocks use more risk management. This finding is the same as the prediction by Smith and Stulz (1985).

Moreover, the research suggests that firms can generate value for the firm by reducing these frictions through hedging, known as a hedging premium. Indeed, the positive effect of hedging on firm value is reported in many empirical studies because a firm's hedging decision can minimize friction and risk. For instance, financial hedging reduces financial distress and risk (Gilje & Taillard, 2017; Laing et al., 2020; Smith & Stulz, 1985). Hedging is also associated with tax incentives (Donohoe, 2015; Smith & Stulz, 1985), and it minimizes cash flow volatility and underinvestment problems (Altuntas et al., 2017; Froot et al., 1993). Similarly, the findings in a few studies show the value enhancement effect of financial derivatives (Allayannis & Weston, 2001; Clark & Judge, 2009; Nova et al., 2015).

However, views about the positive effect of financial hedging on firm value are inconclusive (Grima & Thalassinos, 2020). Moreover, hedging harms a firm value while considering its related cost, called a hedging discount. The negative effect of hedging may be due to corporate administration, maximization of a manager's self-utility, and hedging costs that exceed its gain. For example, Hagelin et al. (2007) highlight that using foreign currency derivatives can lower firm value because using them satisfies managerial interests. At the same time, the higher cost of monitoring and agency problems is also responsible for the adverse effects of financial hedging through currency derivatives (Fauver & Naranjo, 2010).

Three theories explain the different motives for corporate hedging. The first theory, the managerial risk aversion theory, highlights that the sole purpose of hedging is to increase a manager's self-functional effectiveness. According to this theory, a risk-averse manager performs hedging to protect invested personal wealth and human capital in the firm because the cost of hedging from their account exceeds that of the firm. Moreover, this practice can either have no effect or reduce the firm's value, which supports the notion of a hedging discount.

Unlike the first theory, the second theory of shareholder value maximization states that hedging is a value-enhancing activity if it minimizes the various frictions that influence a firm's cash flows. However, the success of corporate hedging rewards in limiting frictions; this approach suggests that firms can enhance their worth through hedging, supporting the concept of value addition.

The third and oldest theory, Modigliani and Miller's theory on hedging, states that corporate hedging does not influence firm value. Nevertheless, assumptions of this theory are valid only in a perfect market without any disagreement. However, the actual market is imperfect because of various dissimilarities—for example, tax regimes, transaction costs, clashes among management and shareholders, and the jaggedness of information. However, the proposition is academically significant because it distinguishes the need for firms to engage in hedging to focus on the genuine wellspring of significant additions to value.

2.2. Empirical reviews

This section summarizes the empirical findings of studies that test the relationship between different financial measures of hedging and firm value.

2.2.1. Relation between currency derivatives and firm value

Allayannis and Weston (2001), the first empirical study, show the direct effect of currency derivatives use on firm value and find, on average, 4.87% higher firm value. Similarly, Bartram et al. (2006) provide strong evidence of the value enhancement of hedging. This study finds that corporate hedging increases firm value using a sample of 6888 nonfinancial companies from 47 countries worldwide. Most previous studies document that firms enhance their value by using derivatives in a developed market, such as the US and Western Europe. Some recent studies test this relation for the different emerging markets individually. For instance, Júnior and Laham (2008) consider Brazil in their study. Other emerging economies—such as Pakistan (Afza & Alam, 2011), Columbia (Gómez-González et al., 2012), Turkey (Akpınar & Fettahoğlu, 2016a), China (Luo & Wang, 2018), and Bangladesh (Choi et al., 2020)—are considered individually to test the relation between derivative use and firm value.

Over the past two decades, most studies have focused on financial hedging with derivative contracts but found enormous changes in firm value.[1] However, the findings of these studies lead to mixed conclusions. For example, the most pioneering study shows that using currency derivatives enhances, on average, 4.87% of the value of US multinational corporations (Allayannis & Weston, 2001). Kim et al. (2006) find that firms in the US market added value of 5.1–5.4%. Moreover, studies on Western European markets show a similar increase in value increments. For example, Belghitar et al. (2008) find an increase in value of 8–15%, whereas Clark and Judge (2008) find an increase of 11–34%, and Panaretou (2014) an increase of 6%. Similarly, findings in other countries are from 1.53% for Spanish firms (Vivel Bua et al., 2015) to 31.4% for Chinese firms (Luo & Wang, 2018).

By contrast, based on the managerial utility theory, some researchers argue that using derivatives does not create value for the firm. Nguyen and Faff (2007) show that using currency derivatives reduces the firm value by 39% in Australian companies. However (Khediri & Folus, 2010), see no effect in a sample of firms in France. Similarly, Aytutk et al. (2016) find that hedging with currency derivatives generates a value of less than 1%, and Akpinar and Fettahoğlu (2016a, 2016b) show the ineffectiveness of hedging by Turkish firms. Moreover, financial hedging enables Korean firms to reduce risk exposure but does not generate higher value for firms with high exposure (Bae et al., 2018). Finally, Alam and Gupta (2018), looking at India, and Choi et al. (2020), examining Bangladesh, show the conditional effect of hedging with derivative contracts on firm value. The empirical findings on the value-enhancing effect of financial hedging with derivative instruments are mixed.

2.2.2. Relation between foreign currency debt and firm value

Furthermore, several empirical studies have also suggested using foreign currency debt as an alternative method of financial hedging.[2] However, the findings on the relationship between hedging with foreign currency debt and firm value in those studies are inconclusive. For example, they are examining Spanish firms, Vivel Búa et al. (2015) document a 1.53% increase in firm value by hedging with foreign currency debt.

[1] Allayannis & Weston, 2001; Ayturk et al., 2016; Bae et al., 2016; Clark & Judge, 2009; Danisman & Demirel, 2019; Giraldo-Prieto, Uribe, Bermejo, & Herrera, 2017; Graham & Rogers, 2002; Hagelin, 2003; Kuzmina & Kuznetsova, 2018; Nguyen & Faff, 2007; Vivel Búa et al., 2015.

[2] Evidence that companies use FC debt to hedge FC risk is found by Aabo (2006), Allayannis and Ofek (2001), Bae & Kwon (2013), Clark and Judge (2009), Elliott et al. (2003), Keloharju & Niskanen (2001), Kedia & Mozumdar (2003), Nguyen & Faff (2006), and Vivel Búa et al. (2015).

By contrast, Bae et al. (2016) show that a firm's value declines by 15.1% when Korean firms use foreign currency debt solely for hedging purposes. Likewise, Clark and Judge (2009) see no effect on firm value from hedging with foreign currency debt by companies in the UK. Finally, few studies focus on the combined effect of foreign currency derivatives and debts, and their findings are inconclusive regarding the value-enhancing effect. For instance, Clark and Judge (2009) show that firm value increases by around 14% in UK nonfinancial companies that use foreign currency debt and derivatives together for hedging currency. However, Clark and Judge (2008) find that no hedging premium is associated with foreign currency debt except when combined with derivatives.

2.2.3. Provisional contribution

These theoretical and empirical arguments in existing studies show that the individual and combined effect on firm value of foreign currency derivatives (FCD) and foreign currency debt (FDD) is inconclusive. The effect of financial hedging measures in prior studies is controversial, and our study on Indian firms provides new empirical findings. Moreover, unlike most previous studies on developed and advanced emerging markets, this work focuses on India, the most rapidly growing economy.

3. Research design

3.1. Sample

Our sample is selected from India's first broad-based stock market index, representing the top 500 companies and 96.1% of total market capitalization, that is, the NIFTY500. We would omit firms from the sample if they engaged directly or indirectly in financial services, as their intention to use derivatives differs from that of nonfinancial firms. Similarly, we omit firms with significant holdings by the Indian government or public sector undertaking because their decisions are based not on market demand but, rather, on government policies. Further, following Dunning (1973), we omit firms that do not operate in more than one foreign country through an active subsidiary.

The sample covers the period 2009–2020 because, after the global financial crisis in 2008, firms frequently used derivatives for hedging. The initial sample includes 86 Indian MNCs with at least one active nonfinancial foreign subsidiary, which represents about 20% of the listed nonfinancial firms operating in the Indian market from 2009 to 2020.

An Indian MNC is considered a hedger if the firm discloses foreign currency derivatives and foreign debt used only for hedging purposes in its annual report. The objective of this study is to investigate the effect of financial hedging. Further, we identify MNCs that are significantly affected by exchange rate variability. For this purpose, we consider a 20% cutoff of holdings in a foreign subsidiary and 10% of companies' foreign sales. Consequently, we obtain a final sample of 61 nonfinancial MNCs, which is about 12% of the initial sample of 500 firms. Information related to foreign involvement, such as subsidiary holdings, foreign sales, use of derivatives and their notional value, the realized profits or losses on foreign exchange (FX) transactions, profits and losses in FX translation, and other financial ratios in this study, were captured manually from the annual report.[3]

3.2. Model and methodology

3.2.1. Regression models and variable construction

Equations (1) and (2), the two main multivariable equations, examine the effect of financial hedging on firm value in this study. We measure the explained variable by the natural log of Tobin's Q, that is, LNQt, which is used as a proxy for firm value and calculated following the classical definition in prior studies (Allayannis et al., 2012; Jin & Jorion, 2006).[4]

$$LNQ_{i,t} = \beta_0 + \beta_1 LNQ_{i.(t-1)} + \sum_{p=1}^{2} \beta_{1+p} Fin_{Hedging}{}_{p.i.t}^{1+p} + \beta_4 FXPROFIT_{i.t} + \sum_{r=1}^{7} \beta_{4+r} X_{r,i,t}^{4+r} + \sum_{y=1}^{12} \beta_{11+y} Y_{y,i,t}^{11+y} + \varepsilon_{i,t} \quad (1)$$

$$LNQ_{i,t} = \beta_0 + \beta_1 LNQ_{i.(t-1)} + \sum_{p=1}^{2} \beta_{1+p} Fin_{Hedging}{}_{p.i.t}^{1+p} + \beta_4 FXPROFIT_{tsa\,i.t} + \beta_5 FXPROFIT_{tsl\,i,t} + \sum_{r=1}^{7} \beta_{5+r} X_{r,i,t}^{5+r} + \sum_{y=1}^{12} \beta_{12+y} Y_{y,i,t}^{12+y} + \varepsilon_{i,t} \quad (2)$$

where β denotes the estimated coefficient, p depicts the number of financial hedging variables, X denotes a bundle of control variables, and i and t denote the firm and year, respectively.

Empirical evidence in prior studies (Hadian & Adaoglu, 2020; Luo & Wang, 2018; Santos et al., 2017) shows the presence of reverse causality between LNQ and financial hedging; we show this as well in Equations (1) and (2). Thus, because of endogeneity problems, our empirical results might be biased. Therefore, to prohibit any feedback between the current and prior value of Tobin's Q, we employ a dynamic panel data methodology in which a one-period lag in the explained variable (LNQt) is an explanatory variable. Financial hedging reflects the foreign currency derivatives and foreign debt over the year as the ratio of the notional value of foreign currency derivatives and foreign currency–denominated debt to total sales, called FCDVAL and FDDVAL, respectively, which are principal explanatory variables in the two equations. Another main explanatory variable is the FX profit or loss ratio (FXPROFIT) in Equation (1) and its two components, FXPROFIT_tsa and FXPROFIT_tsl, in Equation (2). FXPROFIT is measured by dividing the value obtained from

[3] The notes to the consolidated financial statement are investigated to obtain information related to foreign exchange profit and loss transactions.

[4] Tobin's Q is the ratio of the resulting value from the book value of assets minus the book value of equity plus the equity's market value to the asset's book value. It is expressed by the following equation: *Tobin's Q = (BV of Assets - BV of Equity + MV of Equity)/(BV of Assets).*

differences between the sum of profits on foreign exchange transactions and translation and the sum of losses on foreign exchange transactions and translation by total sales. Consistent with Choi et al. (2020) and Hadian and Adaoglu (2020), to separate the effect of foreign exchange translation and transaction profit or loss, we divide it into two components in Equation (2): the foreign exchange transaction ratio (FXPROFIT_tsa) and foreign exchange translation ratio (FXPROFIT_tsl). The ratio of the difference in the value obtained from the sum of profits and losses on foreign exchange transactions and total sales is used to measure FXPROFIT_tsa.

Similarly, to measure FXPROFIT_tsl, we use the ratio of the difference in the sum of profits and the sum of losses of foreign exchange translation to total sales. FXPROFIT shows the combined effect of foreign exchange transactions and translation gains and losses. To investigate the relationship between financial hedging and firm value, we include a set of control variables based on a theoretical relationship, as discussed below, in Equations (1) and (2), denoted X (Table 1).

- *Foreign sales ratio (FSALESR)*: Generally, a firm with geographically diversified sales faces higher foreign exchange risk (Allayannis & Weston, 2001; Da Silva Jorge & Gomes Augusto, 2011). Therefore, the ratio between foreign sales and total sales is a proxy for firms' dependence on foreign sales. The evidence of the effect of foreign sales on firm value is ambiguous. Studies by Allayannis and Weston (2001), Choi et al. (2020), and Denis et al. (2002) report a negative effect. In contrast, Bodnar et al. (1997) and Morck and Yeung (1991) reported a positive association between firm value and foreign sales. The effect of this ratio on firm value depends on the effectiveness of corporate hedging. Therefore, the ratio of foreign sales is used as a control variable and expected to have either a positive or negative sign.
- *Firm Size (FSIZE):* Some studies have shown that the size of a firm affects managerial decisions regarding international operations because small firms might not accumulate as many resources as large firms for managing international facilities (Dunning, 1980). A large body of empirical literature has mixed results on the relationship between firm size and firm value. For example, Bae et al. (2016) and Júnior et al. (2008) show a positive impact of firm size on firm value. However, Allayannis and Weston (2001) and Vivel Búa et al. (2015) find a negative relationship between them. Thus, firm size is used as a control variable, proxied by the natural log of total assets.
- *Firm Leverage (FLEVERAGE):* It is universally accepted that firm value is affected by capital structure. Empirical studies present unclear evidence on the effect of leverage. For example, Allayannis and Weston (2001) and Clark and Judge (2008) find that leverage has a positive impact on Tobin's Q. In contrast, Danisman and Demirel (2019) and Júnior et al. (2008) find a negative impact. Thus, the ratio of total debts to assets is used to proxy for firm leverage.
- *Firm profitability (FPROFR):* A firm's profitability is one of the essential criteria that risk-averse investors consider in making an investment decision. Investors are more likely to pay more for a profitable firm than a firm operating at a loss. Thus, firm profitability is likely to have a positive effect on firm value (Allayannis & Weston, 2001). Therefore, the ratio between net profit and total assets is used as a control variable.
- *Firm liquidity (FLIQR):* The literature has ambiguous findings on the association between firm liquidity and Tobin's Q. The available studies explain that firms might not receive financing from external fixed-cost sources because they have sufficient internal sources for funding. Projects with a positive net present value imply there may be a positive association between liquidity and firm value (Gay et al., 2011; Géczy et al., 1997; Graham & Rogers, 2002). In contrast, Allayannis and Weston (2001) show that liquidity harms firm value. Therefore, the ratio of current assets and current liability proxies for firm liquidity is a control variable.
- *Firm growth opportunity (FGROWTHR):* Many studies find that growth opportunities have a positive impact on firm value (Allayannis & Weston, 2001; Júnior & Laham, 2008; Kim et al., 2006; Vivel Búa et al., 2015). Thus, the one-year net revenue growth rate is used as a proxy for firm growth, with the expectation of a positive sign.
- *Firm investment opportunity (FCPEX):* Future investment opportunities affect firm value (Myers, 1977). Allayannis and Weston (2001) and Géczy et al. (1997) show that firms that engage in hedging have more opportunities for obtaining investment than non-hedger firms. Thus, it is crucial to control investment opportunities. The ratio of capital expenditure to total sales is used as a proxy, with the expectation of a positive sign (Yermack, 1996).

3.2.2. Experimental approach

One primary empirical challenge is that both measures of financial hedging are endogenous variables, possibly influenced by unobserved factors such as corporate strategy. Therefore, to determine the effect of endogeneity and heterogeneity, we apply a dynamic panel regression analysis, as suggested in prior studies (Arellano, 2004; Arellano & Bover, 1995). Using a static linear regression model with panel data, the fixed effect estimations in studies (Allayannis & Weston, 2001) correct for heterogeneity but fail to address endogeneity problems. Traditional panel models such as pooled-OLS, fixed-effects, and random-effects models are constructed based on the assumption that the independent variable in the regression model should have extrinsic rigidity and disregard any feedback between firm value and financial hedging. However, financial hedging as a predetermined variable is probably endogenous because it is correlated with passing errors. Thus, this study uses a one-period lag in the explained variables as regressors in a dynamic model to deal with the endogeneity problem (Arellano & Bond, 1991).

This study applies a two-step system GMM estimation model to achieve the research objective. This model is more robust and delivers a more coherent estimation related to non-uniform variance and the issue of autocorrelation (Roodman, 2009). Arellano and Bond (1991) and Arellano and Bover

(1995) propose an estimation method in which a good set variable is an instrumental variable (IV) used for addressing the issue of endogeneity. They also select appropriate synchronous instruments in the GMM estimation. As reported by Arellano and Bond (1991), two lagged regressors can be used as IVs in the model. Following this study, we use two-period lags in all regressors as IVs to achieve our research objective. The two-step GMM estimation enables us to test the effectiveness of all instruments with over-discrimination constraint specification tests (Hansen, 1982). The autocorrelation (AR) specification assumes no serial correlation in the error terms of the residual of the first derivative. If both specification tests fail to reject their null hypothesis, it is appropriate to use a two-step GMM estimation (Magee, 2013).

4. Findings and discussion

4.1. Descriptive statistics for hedging instruments

Table 2 shows the descriptive statistics of users and non-users of foreign currency derivatives and debt from 2009 to 2020. Panel A (Table 2) lists the use of foreign exchange derivatives, and the average of derivative users and non-users increases to 80.60% and 19.40%, respectively. It shows the active participation of Indian MNCs in the derivative market, as their international operations lead to exposure to exchange rate variability. Likewise, Panel B (Table 2) shows the percentages of foreign currency debt users and non-user firms. The

Table 1
Measurement of model variables and expected signs.

Variables	Definitions	Expected sign	Measurement
Explained Variable			
LNQ_t	Ln (Tobin's Q)		(book value of total assets – book value of equity + market value of equity)/book value of total assets
Explanatory Variable			
FCDVAL	FC Derivatives	+/−	Sum of the notional value of foreign currency derivatives contracts/total sales
FDDVAL	FC-denominated debt	+/−	Sum of the notional value of the foreign currency–denominated debt/total sales
FXPROFIT	Foreign exchange profits and losses ratio	+/−	(FX transaction & translation gains - FX transaction & translation losses)/total sales
FXPROFIT_tsa	FX transaction ratio	+/−	FX transaction/total sales
FXPROFIT_tsl	FX translation ratio	+/−	FX translation/total sales
Control Variable			
FSALESR	Foreign sales	+/−	Foreign revenue/total revenue
FSIZE	Firm size	+/−	Natural log of total assets
FLEVERAGE	Leverage	+/−	Total debt/total assets
FPROFR	Profitability	+	Net profit/total assets
FLIQR	Liquidity	+/−	Current assets/current liabilities
FGROWTHR	Growth rate	+	One-year net revenue growth rate
FCPEX	Investment Opportunity	+	Capital expenditure/total sales

Table 2
Descriptive statistics of hedging instruments.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2009-20 Average
Panel A. Use of Derivatives													
Users	50	49	49	50	49	49	49	49	49	49	49	49	
Non-users	11	12	12	11	12	12	12	12	12	12	12	12	
Observation	61	61	61	61	61	61	61	61	61	61	61	61	
Percentage Users	81.97	80.33	80.33	81.97	80.33	80.33	80.33	80.33	80.33	80.33	80.33	80.33	80.60
Non-users	18.03	19.67	19.67	18.03	19.67	19.67	19.67	19.67	19.67	19.67	19.67	19.67	19.40
Panel B. Use of Debt													
Users	24	24	24	25	24	24	24	24	24	24	24	24	
Non-users	37	37	37	36	37	37	37	37	37	37	37	37	
Observation	61	61	61	61	61	61	61	61	61	61	61	61	
Percentage Users	39.34	39.34	39.34	40.98	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.48
Non-users	60.66	60.66	60.66	59.02	60.66	60.66	60.66	60.66	60.66	60.66	60.66	60.66	60.52
Panel C. Financial Hedging													
Only FC Derivative users	27	26	26	27	26	26	26	26	26	26	26	26	26.17
Percentage	44.26	42.62	42.62	44.26	42.62	42.62	42.62	42.62	42.62	42.62	42.62	42.62	42.90
Only FC debt users	1	1	1	1	1	1	1	1	1	1	1	1	1.00
Percentage	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64
FC derivatives and FC debts													
User	23	23	23	23	23	23	23	23	23	23	23	23	23.00
Percentage Users	67.65	37.70	37.70	37.70	37.70	37.70	37.70	37.70	37.70	37.70	37.70	37.70	40.20
Non-users	10	11	11	10	11	11	11	11	11	11	11	11	10.83
Percentage Non-Users	16.39	18.03	18.03	16.39	18.03	18.03	18.03	18.03	18.03	18.03	18.03	18.03	17.76

average of users and non-users of foreign currency debt is 39.48% and 60.52% of the sample.

In the same way, Panel C shows the summary statistics for both hedging instruments, showing that 42.90% of sample Indian MNCs use only derivatives. Only one firm uses foreign currency debt, and 40.20% uses derivatives and debt as hedging instruments for foreign exchange exposure. Less than 20% of the sample MNCs do not use any hedging instruments.

4.2. Descriptive statistics and correlation matrix of the model variable

Table 3 shows the descriptive statistics for the sample Indian MNC firms from 2009 to 2020. Tobin's Q is calculated for all 732 firm-year observations (61 firms per year × 12 years). The mean and median for firm value (LNQ_t) are 0.66 and 0.64, respectively. Concerning financial hedging, the mean value of foreign currency derivatives (0.35) is higher than that of foreign currency debt (0.0218). The benefit of selecting Tobin's Q is that it facilitates comparisons between firms more than comparisons based on stock returns and accounting indicators that require risk adjustment and normalization.

However, the maximum notional value of derivative contracts is 2.176, which indicates that the notional value of derivative contracts is higher than that of sales. According to Vivel Búa et al. (2015), the notional value of derivatives measures the intensity of derivative use; as such, the net notional value is not available in many cases. In addition, Kerkvliet et al. (1991) show that the optimal hedging ratio value for MNCs might differ significantly from the standard value of 0.9 or above in a firm-specific environment. It also shows that the optimal hedge ratio is significantly below 0.9 and even zero or less and above 0.9 and higher if MNCs with foreign subsidiaries have to earn negative and positive streams related to exchange rate movement, respectively.

Table 4 presents the ordinary Pearson's correlation between the model variables. It shows that FCDVAL, FDDVAL, FXPROFIT_tsl, FSIZE, and FLEVERAGE negatively relate to Tobin's Q. In contrast, other explanatory variables, such as FXPROFIT, FXPROFIT_tsa, and control variables, such as FSIZE and FLEVERAGE, have a positive relation. The table shows a high correlation between FXPROFIT, FXPROFIT_tsa, and FXPROFIT_tsl; these variables are used in two different equations separately.

Table 3
Descriptive statistics of model variables.

Variable	Mean	Median	Std. Dev.	Min	Max
Explained Variable					
LNQt	0.6608	0.6462	0.6685	−2.6721	3.2468
Explanatory Variables					
FCDVAL	0.3505	0.2870	0.3303	0.0000	2.1760
FDDVAL	0.0218	0.0000	0.0335	0.0000	0.5423
FXPROFIT	0.0381	0.0000	1.0174	−2.3483	3.3483
FXPROFIT_tsa	0.1894	0.0000	0.6578	−0.5355	0.8129
FXPROFIT_tsl	0.1513	0.0000	0.5362	−0.3534	4.2658
Control Variables					
FSALESR	0.5873	0.6024	0.2654	0.1324	1.0000
FSIZE	9.0129	8.8486	1.4942	5.4674	12.7109
FLEVERAGE	0.2014	0.1866	0.1659	0.0000	0.7706
FLIQR	2.0036	1.6417	1.1849	0.2635	8.2168
FPROFR	0.0922	0.0870	0.0820	−0.2354	0.7965
FGROWTHR	0.1651	0.1126	0.9115	−0.6938	23.0647
FCPEX	0.1020	0.0559	0.1782	0.0000	1.9219

4.3. Estimating results and discussions

The model estimation includes the ratio of the notional value of foreign currency derivatives to total sales and the nominal value of foreign currency debt to total sales. Table 5 (Model 1) shows the model estimation with FXPROFIT and then adds control variables in the regression (Model 2). Similarly, Table 6 (Model 3) shows the model estimation with FXPROFIT_tsl and FXPROFIT_tsa together at first and then adds control variables in the regression (Model 4). The estimated results in Table 5 are consistent with the value-enhancing theory, indicating that firms engage in financial hedging with foreign currency derivatives and debt to manage their exchange risk exposure to reward shareholders with higher valuations. The findings show a positive and significant association between both hedging instruments and Tobin's Q with FXPROFIT (Table 5) and FXPROFIT_tsl and FXPROFIT_tsa (Table 6), regardless of whether the control variable is included. Hansen's *p*-values are between 0.10 and 0.40 for all models in Tables 5 and 6, which indicates that all instruments remain valid (Roodman, 2009).

Table 5 shows that the variables for both hedging instruments positively affect firm value. The results for FXPROFIT are negative and statistically significant, in line with Bae et al. (2016). At the same time, control variables are statistically significant at the 1% level. The result of this study found in the line of Allayannis and Weston (2001) that the firm's size has negative. A firm with higher profitability has a high value; the coefficient of leverage (ratio of debt to total assets) has a positive sign at the 5% level, indicating that firms with more leverage have higher firm value.

Not all firms use derivatives, and the results in Table 5 show that FCDVAL positively impacts firm value. Thus, we estimate the average additional value from hedging with derivatives by adjusting the FCDVAL estimation factors. Table 2 shows that an average of 80.60% of the sample MNCs are users in the entire sample period. For example, to estimate the average additional value of financial hedging with derivatives, the coefficient for FCDVAL, as estimated in Table 5 (Model 2), is multiplied by the mean value of FCD users—that is, the mean of FCDVAL in Table 3 is divided by the average of the derivative user (0.3505/0.8060 = 0.4349). The estimated results of the regression model with control variables the coefficient of 0.3286 estimated for FCDVAL in 16.91% (i.e., $0.4349 \times ((e^{0.3286}-1) \times 100)$) value addition for FCDVAL.

Subsequently, the FDDVAL coefficient has a positive sign in line with the findings by Vivel Búa et al. (2015), as displayed in Table 5 (Model 2). Moreover, it uses the same adjustment approach to determine the effects of FDDVAL on value as the FCDVAL coefficient. For instance, in model 2 on

Table 4
Ordinary correlation matrix.

Correlation Probability		1	2	3	4	5	6	7	8	9	10	11	12	13	14
LNQ_t	(1)	1.00													
		–													
$LNQ_{(t-1)}$	(2)	0.85	1.00												
		0.00	–												
FCDVAL	(3)	−0.20	−0.19	1.00											
		0.00	0.00	–											
FDDVAL	(4)	−0.16	−0.15	0.08	1.00										
		0.00	0.00	0.04	–										
FXPROFIT	(5)	0.03	−0.01	0.00	−0.02	1.00									
		0.49	0.83	0.94	0.65	–									
FXPROFIT_tsa	(6)	0.01	−0.01	−0.01	−0.01	0.88	1.00								
		0.74	0.79	0.85	0.80	0.00	–								
FXPROFIT_tsl	(7)	−0.03	0.00	−0.01	0.02	−0.82	−0.45	1.00							
		0.37	0.94	0.71	0.59	0.00	0.00	–							
FSALESR	(8)	0.06	0.07	−0.05	−0.08	0.00	0.01	0.02	1.00						
		0.10	0.05	0.20	0.05	0.99	0.72	0.69	–						
FSIZE	(9)	−0.00	0.09	0.10	0.18	−0.02	−0.03	0.00	0.01	1.00					
		0.97	0.03	0.01	0.00	0.60	0.47	0.91	0.80	–					
FLEVERAGE	(10)	−0.44	−0.44	0.23	0.25	−0.02	−0.02	0.01	−0.23	0.31	1.00				
		0.00	0.00	0.00	0.00	0.67	0.64	0.82	0.00	0.00	–				
FLIQR	(11)	0.30	0.31	−0.02	−0.19	0.01	0.02	0.00	0.26	−0.23	−0.45	1.00			
		0.00	0.00	0.59	0.00	0.75	0.58	0.94	0.00	0.00	0.00	–			
FPROFR	(12)	0.63	0.56	−0.19	−0.21	0.01	0.02	−0.00	0.30	−0.16	−0.58	0.43	1.00		
		0.00	0.00	0.00	0.00	0.70	0.61	0.91	0.00	0.00	0.00	0.00	–		
FGROWTHR	(13)	−0.00	−0.02	−0.03	0.02	0.07	0.08	−0.03	0.01	0.06	0.01	−0.01	0.03	1.00	
		1.00	0.69	0.38	0.53	0.09	0.04	0.50	0.90	0.12	0.90	0.90	0.41	–	
FCPEX	(14)	−0.18	−0.13	−0.03	0.01	0.00	−0.01	−0.02	0.19	0.05	0.19	−0.07	−0.22	0.04	1.00
		0.00	0.00	0.43	0.84	0.90	0.88	0.67	0.00	0.24	0.00	0.07	0.00	0.34	–

Table 5
Equation (1): Estimation results on the effect of financial hedging on firms' value using FXPROFIT.

Dependent Variable: LNQ_t				
	Model 1		Model 2	
	Coefficient	*t*-statistics	Coefficient	*t*-statistics
$LNQ_{(t-1)}$	0.5429	50.2781***	0.3081	18.5617***
FCDVAL	0.4517	4.3532***	0.3286	3.1187***
FDDVAL	1.0284	1.6024***	1.0472	2.6019**
FXPROFIT	−0.0353	−16.2521***	−0.0174	−4.0293***
FSALESR			−1.2416	−12.4783***
FSIZE			−0.0549	−3.7463***
FLEVERAGE			0.2973	2.1683**
FLIQR			−0.1083	−8.5952***
FPROFR			1.8711	13.6439***
FGROWTHR			0.0281	17.0589***
FCPEX			−0.5142	−5.6013***
Year dummies	YES		YES	
No of Obs.	549		549	
AR (1)		0.0214		0.0436
AR (2)		0.2737		0.2547
Hansen (*p*-value)		0.3060		0.2631

Notes: ***, **, and * significant at 1%, 5%, and 10%, respectively. We use two-step GMM estimations of the effect of financial hedging strategies on firm value. The AR(1) and AR(2) values are *z*-statistics. AR(1) is the first-order serial correlation, and AR(2) is the second-order correlation in the first-differenced residuals, asymptotically distributed as the null hypothesis of no serial correlation. Hansen (*p*-value) is the test of overidentifying restrictions.

average, FDDVAL hedging generates the additional value of 10.21%, or (0.0218/0.3948) × ($e^{1.0472}$–1) × 100. Overall, on average, an increase of one percentage point in FCDVAL and FDDVAL enhances firm value by 16.91% and 10.21%, respectively. These results show that MNCs that use the two instruments for financial hedging have different effects on value than those found in other studies (Hadian & Adaoglu, 2020; Vivel Búa et al., 2015). Interestingly, the Indian MNCs' foreign currency debt adds significantly to firm value, a finding that is the opposite of that in previous studies (Choi et al., 2019; Hadian & Adaoglu, 2020). The additional value can be attributed to appropriate hedging practices by firms or to the Reserve Bank of India (RBI)'s macroprudential policies on using foreign currency debt, which effectively mitigated risk from currency exposure.

Table 6
Equation (2): Estimation results on the effect of financial hedging on firms' value using FXPROFIT_tsa and FXPROFIT_tsl.

Dependent Variable: LNQ_t				
	Model 3		Model 4	
	Coefficient	*t*-statistics	Coefficient	*t*-statistics
$LNQ_{(t-1)}$	0.5377	62.8627***	0.3206	19.8173***
FCDVAL	0.4023	4.3980***	0.3198	2.4844**
FDDVAL	1.0168	5.4528***	1.0426	3.2021***
FXPROFIT_tsa	−0.1204	−30.7220***	−0.0836	−16.93863***
FXPROFIT_tsl	−0.0979	−13.8984***	−0.0859	−11.8261***
FSALESR			−1.1148	−9.8546***
FSIZE			−0.0416	−3.6795***
FLEVERAGE			0.3126	2.7309***
FLIQR			−0.1126	−6.1515***
FPROFR			1.8417	10.9437***
FGROWTHR			0.0291	3.9022***
FCPEX			−0.6073	−6.7079***
Year dummies	YES		YES	
No of Obs.	549		549	
AR (1)		0.0147		0.0016
AR (2)		0.3072		0.1268
Hansen (*p*-value)		0.2938		0.2068

Notes: ***, **, and * significant at 1%, 5%, and 10%, respectively. We use two-step GMM estimations on the effect of financial hedging strategies on firm value. The AR(1) and AR(2) values are *z*-statistics. AR(1) is the first-order serial correlation, and AR(2) is the second-order correlation in the first-differenced residuals, asymptotically distributed as the null hypothesis of no serial correlation. Hansen (*p*-value) is the test of overidentifying restrictions.

Table 6 presents the results of Models 5 and 6, FXPROFIT_tsa and FXPROFIT_tsl; we investigate two components of FXPROFIT, and the results are similar to those in Table 5: on average, after adjusting for estimated coefficients, FCDVAL and FDDVAL enhance firm value by 16.39% and 10.13%, respectively. The results also show that FXPROFIT_tsa and FXPROFIT_tsl are statistically significant, with a negative sign, which is similar to the results by Bae et al. (2016). All the control variables also have a significant effect, in line with the literature and consistent with the results in Table 5.

4.4. Robustness check

The robustness of the models is also tested by proxying for Tobin's Q with the ratio of the market price to the book value (P/B ratio). Table 7 shows the results of the robustness test for the two models. For all the models in Table 7, the Hansen

Table 7
Robustness test: Estimation results on the effect of financial hedging on firm value.

Dependent Variable: LN(P/B)R	Equation (1): Using FXPROFIT		Equation (2): Using FXPROFIT_tsa and FXPROFIT_tsl	
	Coefficient	*t*-statistics	Coefficient	*t*-statistics
$LN(P/B)R_{(t-1)}$	0.5039	20.5176***	0.3804	22.6667***
FCDVAL	1.0254	6.5393***	0.2636	2.2439**
FDDVAL	1.2114	2.1434**	0.9684	1.8013**
FXPROFIT	−0.0227	−3.3395***		
FXPROFIT_tsa			−0.1089	−7.9901***
FXPROFIT_tsl			−0.1304	−8.4175***
FSALESR	−1.6531	−14.7323***	−3.1406	−11.6176***
FSIZE	−0.1103	−3.7007***	−0.0436	−5.9523**
FLEVERAGE	0.8178	3.3982***	1.2267	4.3987***
FLIQR	−0.0899	−3.5982***	−0.2668	−7.1077***
FPROFR	1.9266	12.5168***	4.8577	9.4938***
FGROWTHR	0.0522	3.3664***	0.1093	6.8017***
FCPEX	−0.3767	−3.2394***	−0.7947	−6.0245***
Year dummies	YES		YES	
No of Obs.	549		549	
AR (1)		0.0005		0.0005
AR (2)		0.6845		0.6789
Hansen (*p*-value)		0.1999		0.2197

Notes: ***, **, and * significant at 1%, 5%, and 10%, respectively. We use two-step GMM estimations on the effect of financial hedging strategies on firm value. The AR(1) and AR(2) values are *z*-statistics. AR(1) is the first-order serial correlation, and AR(2) is the second-order correlation in the first-differenced residuals, asymptotically distributed as the null hypothesis of no serial correlation. Hansen (*p*-value) is the test of overidentifying restriction.

statistics are from 0.10 to 0.40; thus, all instruments remain valid. Moreover, in support of the null hypothesis, there is no serial correlation, as the value of first-order AR (1) is less than 0.05, and that of second-order AR (2) is more than 0.05 for all models.

The robustness test results are consistent with the results in Table 6, revealing that the strategy of using foreign currency derivatives and foreign currency–denominated debt positively affects firm value. The FXPROFIT coefficients remain statistically significant and negative. The results for the control variables in the robustness test support the results in Tables 5 and 6 The robustness test results for FXPRFOTI_tsa and FXPROFIT_tsl also support the results in Table 6. The estimated coefficients of FXPRFOTI_tsa, FXPROFIT_tsl, foreign sales ratio, size, leverage, liquidity, profitability, and other control variables are significant and consistent with the results in Table 6. The results of robustness testing support the main finding that derivatives and debt positively impact Indian MNCs' firm value.

5. Conclusion

Many existing studies have concentrated on explaining the determinants of currency risk exposure and using only derivatives to hedge this exposure. The effect of financial hedging on firm value is also tested with samples from developed and developing countries, but the findings are mixed. The finding of studies other than Vivel Búa et al. (2015) shows a positive association with derivatives but a negative association with foreign currency debt. However, they differ in the estimated amount of value creation.

This study uses a sample of Indian MNCs, a different dataset from the one used in a previous study with an Indian sample (Alam & Gupta, 2018), to test the association between the use of FCD and FDD for hedging and firm value. By integrating the literature on foreign currency exposure by MNCs with managing those exposures to create value for the firm, the two-step GMM dynamic panel model is used to control for endogeneity in FCD and FDD decisions.

Overall, the results of this study show that financial hedging for currency risk exposure with exchange rate derivatives and foreign currency debt has a positive impact on firm value. In particular, with respect to foreign exchange profits and losses, we confirm that the value of Indian MNCs rises by 16.91% from using FCD and 10.21% from using FDD, measuring firm value by Tobin's Q. The results also show that the magnitude of hedging by FCD and FDD affects firm value in the same direction, but the magnitude of the effect comes from derivatives more than foreign debt.

Moreover, this study demonstrates that the contribution of financial hedging to firm value changes based on the notional value of instruments used for hedging. Thus, if we consider a dummy variable for the decision to hedge, as in preceding studies, we obtain biased results because we count on a homogeneous remedy of firms, irrespective of the notional value of FCD and FDD. We managed for hassle thru a “dynamic panel framework” that includes a one-period lag in firm value as an explanatory variable. Following Arellano and Bover (1995), we also use instrumental variables, and our results are robust to the control variables and another measure of Tobin's Q.

Overall, our findings have important implications for MNCs managers and policymakers. The first is the importance of exchange rate risk management using FCD and FDD to increase firm value. Second, this study can be standard for other countries with an open economy and a managed floating exchange rate system. Finally, the suggestion is that managers of MNCs in emerging economies design their hedging strategy with a proper combination of FCDs and FDDs and proactively adjust the position in derivative contracts to add value.

The primary limitation of this paper is due to the availability of information. Although we sought to obtain more samples on the Indian market, the results are limited by the sample selection criteria based on the literature and data available from annual reports. We cannot investigate other distinctive firm characteristics, such as foreign investment in various geographic locations via the subsidiary network, which can be a natural hedging strategy and affect firm value. This study could be extended by considering operation hedging and developing a new empirical model.

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