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# Foreign Currency Derivatives Use, Firm Value and the Effect of the Exposure Profile: Evidence from France

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**ABSTRACT**

This paper investigates the relationship between foreign currency (FC) derivatives use and firm value on a sample of 176 large, non-financial French firms. The results show that derivatives use is a significant determinant of French firm value and that this effect is concentrated in the larger firms. Importantly, they also show that the effect is sensitive to the firm's exposure profile. It is over 1.5 times higher for firms with higher levels of exposure and it is over 5.5 times higher for firms with exposure to depreciations of the euro than it is for firms with exposure to appreciations.

*JEL Classification:* *F31; G32*

*Keywords:* *Foreign currency exposure; Foreign currency hedging; Derivatives; Firm value*

## I. INTRODUCTION

This paper studies the relationship between firm value, exchange rate fluctuations and corporate hedging with foreign currency (FC) derivatives. More specifically, it investigates whether FC derivatives use creates value for French firms and explores whether factors such as firm size, exposure levels and types of exposure affect the value creation. Indeed, corporate use of FC derivatives has become standard practice for firms with foreign operations or commercial interests and is well documented in the corporate hedging literature. For US firms, there are studies such as Géczy et al. (1997), Goldberg et al. (1998), Graham and Rogers (2000) and Allayannis and Ofek (2001). Studies of non-US firms include Berkman and Bradbury (1996) on New Zealand firms, Nguyen and Faff (2003) and Heaney and Winata (2005) on Australian firms, Hagelin (2003) on Swedish firms and Pramborg (2005) on Swedish and Korean firms, Bartram et al. (2009) on firms of 48 different countries. The International Swaps and Derivatives Association (ISDA) 2003 derivative usage survey reports that 92% of the world's 500 largest companies representing a wide range of geographic regions and industry sectors use derivatives for risk management on a regular basis. However, the conception and implementation of a FC hedging strategy requires a commitment of financial, physical and human resources that can represent significant costs for the firm. According to the positive theory of corporate hedging developed by Smith and Stulz (1985), corporate hedging can be justified only if imperfect capital markets create conditions where the benefits of hedging are high enough to offset these costs and actually add value to the firm.

There are several powerful reasons why corporate hedging with derivatives can create firm value. Smith and Stulz (1985), Mayers and Smith (1987), Stultz (1996) and Graham and Smith (1999) refer to the reduced corporate tax liability generated by less volatile profits and a convex tax structure. Smith and Stultz (1985), Mayers and Smith (1987), Bessembinder (1991), Froot et al. (1993), and Mello et al. (1995) point to the reduced cost of underinvestment due to a reduction in the agency conflict between bondholders and shareholders or to an increased facility for financing investment projects with internal funds that reduces recourse to costly external financing. Stulz (1996), Ross (1997) and Leland (1998) argue that the reduced probability of financial distress reduces the costs of financial distress and facilitates higher leverage, which in turn generates greater tax shield benefits that can increase firm value.

There are also reasons why hedging may decrease firm value. In the arguments for increased firm value it is assumed that derivatives are used for hedging purposes and are effective in decreasing the firm's exposure. If this is not the case, hedging can decrease firm value. For example, derivatives can be used for speculation, which, in principle, should increase exposure and could lead to loss of firm value. Copeland and Joshi (1996) and Hagelin and Pramborg (2004) also point to the possibility that the risk management program is ineffective in reducing risk. Indeed, given the complex relationships between exchange rates and other economic factors, such as relative prices, income, expenditure, interest rates, supply and demand, to mention only a few, anticipating the overall consequences of FC hedging with derivatives is difficult, at best. Even an effective derivatives program may not generate enough value to offset the considerable costs involved in its conception and implementation. Another problem concerns management motives. Tufano (1998) shows that if firms consider value-

reducing investment opportunities, management can hedge to preserve capital for investment in negative NPV projects. The hedging prevents monitoring from external capital providers, thereby enabling management to fund (value-reducing) projects with its protected capital.

Thus, the practical effect of FC derivatives use on firm value boils down to an empirical problem and, here, the results are mixed. Allayannis and Weston (2001) examine the relation between foreign currency hedging and Tobin's Q. They conclude that hedging is associated with higher firm value. Guay and Kothari (2003) question the validity of the Allayannis and Weston results by illustrating that the majority of firms using derivatives would not gain economically significant cash flow (or market value) benefits in the event of extreme movements in underlying market prices. In general, they conclude that derivative positions held by non-financial firms are small in economic magnitude, making it difficult to interpret the implications of some prior research using derivatives. Jin and Jorion (2006) in a study of 119 US oil and gas producers find no evidence that hedging has any significant positive effect on firm value while Carter et al. (2006) in their study of 28 US airlines find that firm value is positively related to hedging future jet fuel requirements. Bartram et al. (2009) find a significant positive value effect for all derivatives users taken together but perversely only for firms without any financial price exposure. When broken down according to hedging type, no value effects are found for FC derivative users.

In light of the arguments for and against hedging generated value creation, these mixed results suggest that there might be a more complicated relationship between FC derivatives use and value creation than the foregoing studies could detect. For example, as mentioned above, there is a question of whether smaller or larger firms can benefit more from derivatives use. The size and type of the exposure could also affect the outcome. Larger exposures might lend themselves to higher marginal gains through derivatives use than smaller ones. However, larger exposures might also affect more areas of the firm, resulting in more complex combinations that could be difficult to manage. Where types of exposure are concerned, exchange rate theory clearly shows that the effects of a variation in the exchange rate is a complex affair, affecting relative prices, income distribution, resource allocation and levels of output and consumption, and are not necessarily symmetrical for appreciations and devaluations. Thus, the effect of a depreciating currency might be easier or harder to manage than the effect of an appreciating currency.[1] Although all the foregoing studies considered size as a possible explanatory variable for value creation, none of them considered the possible effect of firm size on the effectiveness of derivatives use and no distinction was made between different levels and types of exposure.

In this paper, we aim to control for the effects of firm size and the level and type of exposure and investigate the relationship between firm value and FC derivatives use over a more recent period for France, a market that has not yet been examined.[2] We use a sample of 176 of the largest French non financial firms for the year 2004. The French data for this period is well adapted to the value testing we propose. The data is recent and, in 2004, the transitional year for the application of the International Accounting Standards 32 and 39 that require disclosure on hedging practices and derivatives use, most French firms began compliance by making formerly unreported information available.[3] As one of the largest economies in the world, France has a large number of firms with substantial foreign operations, the economy is highly industrialized and open

and its capital markets are developed and generally unrestricted. Thus, the financing and hedging decisions by the firms in our sample are likely to reflect economic and financial criteria rather than the result of constraints imposed by shallow domestic capital markets, bureaucratic controls and the like.

The main novelty of this paper is that we investigate whether the size of the firm and its exposure profile influence the relationship between FC derivatives use and firm value. More specifically, besides dividing the sample by firm size we also estimate the FC exposure for the firms in our sample and break it down into high/low exposure and depreciation/appreciation exposure. We then investigate whether different firm sizes and levels and types of exposure affect the impact of FC derivatives use on value creation.

The contributions of this paper take several directions. First, we provide evidence that FC derivatives use is a significant, positive determinant of firm value as measured by Tobin's Q and that this effect is concentrated in the larger firms. Second, our results show that derivatives use by firms with higher levels of exposure creates more value than those with lower levels and, third, that the use of derivatives by firms with exposure to depreciations of the euro creates nearly six times as much value as those with exposure to appreciations.

The rest of the paper is organized as follows. Section II describes the sample. Section III analyses the effect of FC derivatives use on firm value. Section IV concludes.

## II. DATA AND METHODOLOGY

The sample in this study is drawn from the 240 largest French non-financial firms. Data on FC exposure, FC risk management and derivatives use was collected manually from annual reports published in 2004. Twenty-five firms that reported no FC exposure were excluded and 39 firms were excluded due to missing data reported by Thomson One Banker, leaving a total of 176 firms in the final sample. The stock return data are from DataStream.

Panel A of Table 1 presents the industry classification of the firms in the sample based on Campbell (1996). The sample spans 11 industries. At 22.16% and 20.45% of the sample respectively, services and consumer durables have the highest representation while petroleum (1.14%), transportation (2.27%), and construction (3.41%) have the lowest. Panel B of table 1 provides the descriptive statistics of the key characteristics of the firms in the sample. Book value of total long term debt averages about EUR 1117.51 million and ranges from zero to EUR 41175 million. The firms have average total assets of EUR 4986.22 million, ranging from EUR 4.632 million to EUR 89207 million. Finally, the firms have average turnover of EUR 4264.60 million with a minimum of EUR 2.51 million and a maximum of EUR 122700 million. Average net income is about EUR 143.90 million.

Following Allayannis and Weston (2001), Pramborg (2005) and others, we measure firm value as Tobin's Q, defined as the book value of total assets minus the book value of equity plus the market value of equity divided by the book value of total assets. The numerator approximates the market value of the firm and the denominator approximates the replacement cost of assets. The distribution of Tobin's Q in the sample is skewed with a median value of 1.27873 and a mean of 1.57601. To correct

for this, we use the natural logarithm of Tobin's Q. Using the natural logarithm has the additional advantage that changes in this variable can be interpreted as percent changes in firm value.[4]

**Table 1**
Sample description

This table presents characteristics of the 176 firms in the sample. The sample consists of non-financial firms exposed to currency risk as reported in their 2004 annual report. Financial data is for consolidated firms, taken from Thomson One Banker and the firms' annual reports. All data are as of the end of fiscal year, 2004.

**Panel A: Industry classification of the sample firms using the Campbell (1996) classification**

| Industry | SIC code | Number of firms | Percentage of total |
|---|---|---|---|
| Petroleum | 13, 29 | 2 | 1.14 |
| Consumer durables | 25, 30, 36, 37, 50, 55, 57 | 36 | 20.45 |
| Basic industry | 10, 12, 14, 24, 26, 28, 33 | 21 | 11.93 |
| Food and tobacco | 1, 2, 9, 20, 21, 54 | 9 | 5.11 |
| Construction | 15, 16, 17, 32, 52 | 6 | 3.41 |
| Capital goods | 34, 35, 38 | 20 | 11.36 |
| Transportation | 40, 41, 42, 44, 45, 47 | 4 | 2.27 |
| Utilities | 46, 48, 49 | 11 | 6.25 |
| Textiles and Trade | 22, 23, 31, 51, 53, 56, 59 | 12 | 6.82 |
| Services | 72, 73, 75, 76, 80, 82, 87, 89 | 39 | 22.16 |
| Leisure | 27, 58, 70, 78, 79 | 15 | 8.52 |
| Total | | 176 | 100.00 |

**Panel B: Descriptive statistics of the sample (Values in millions of Euros)**

| Variable | Min | Q1 | Median | Mean | Q3 | Max |
|---|---|---|---|---|---|---|
| Total Long Term Debt | 0 | 3.63 | 28.45 | 1,117.51 | 196.42 | 41,175 |
| Total Assets | 4.63 | 83.19 | 325.75 | 4,986.22 | 1,409.92 | 89,207 |
| Sales | 2.51 | 87.73 | 349.89 | 4,264.60 | 1,460.25 | 122,700 |
| Net Income | -3.61 | 0.69 | 8.34 | 143.90 | 43.85 | 9,612 |

**Panel C: Summary statistics of variables**

This panel presents the summary statistics of the variables. Tobin's Q is defined as the ratio of the market value of assets to the replacement cost of assets. The market value is equal to the book value of total assets minus book value of equity plus market value of equity and the replacement cost of assets is proxied by the book value of total assets. LNTobin's Q is the natural logarithm of Tobin's Q. CAPEX is the ratio of total capital expenditure to total assets. DY is the dividend per share divided by the share price. ROA is the ratio of Earnings Before Interest And Taxes to Total assets. SIZE is the natural logarithm of the firm's total assets. LEVERAGE is long-term debt to total assets.

| Variable | Min | Q1 | Median | Mean | Q3 | Max |
|---|---|---|---|---|---|---|
| LNTobin's Q | -0.48 | 0.09 | 0.25 | 0.32 | 0.46 | 1.43 |
| CAPEX | 0.49 | 1.88 | 3.25 | 4.53 | 5.43 | 17.94 |
| DY | 0 | 0 | 11.57 | 21.56 | 30.72 | 103.51 |
| ROA | -0.12 | 0.03 | 0.054 | 0.054 | 0.09 | 0.177 |
| SIZE | 16.73 | 18.23 | 19.60 | 19.88 | 21.07 | 24.15 |
| LEVERAGE | 0.00 | 0.04 | 0.145 | 0.12 | 0.21 | 0.84 |

We employ a multivariate approach to investigate the value effects of FC derivatives hedging on Tobin's Q. To account for factors other than FC derivatives hedging that can affect firm value, we follow Allayannis and Weston (2001) and control for size, profitability, leverage, investment opportunities, ability to access financial markets, liquidity and industry.

The proxy for firm size is the natural logarithm of total assets, denoted as SIZE.[5] Studies, such as Nance et al. (1993), Mian (1996) and Géczy et al. (1997), have found that large firms are more likely to use derivatives due to the high start-up costs necessary to develop a hedging program. However, the evidence is ambiguous as to how size affects firm value (e.g., see Peltzman, 1977; and Allayannis and Weston, 2001). Thus, we have no prior on the sign of the relationship between firm size and Tobin's Q.

The proxy for profitability is return on assets (ROA), the ratio of Earnings Before Interest and Taxes to Total assets, and, because the marketplace is likely to reward more profitable firms with higher values, we expect ROA to be positively related to Tobin's Q.

The ratio of long-term debt to total assets, denoted as LEVERAGE, proxies for leverage. Since a firm's capital structure may be positively related to its value through the tax shield on the one hand and negatively related through a higher probability of financial distress on the other (see, for example, Haushalter, 2000; and Graham and Rogers, 2002), we have no expectation on the sign of the relationship between LEVERAGE and Tobin's Q.

We use the ratio of capital expenditures to sales, denoted CAPEX, as a proxy for investment opportunities. Froot et al. (1993) and Géczy et al. (1997) argue that firms that hedge are more likely to have more investment opportunities and Allayannis and Weston (2001) find weak evidence of a positive relation between CAPEX and firm value. We expect a positive relationship between CAPEX and Tobin's Q.

The dividend yield, denoted as DY, proxies for access to financial markets. Jin and Jorion (2006), argue that "if hedgers have limited access to financial markets, their Q ratios may be high because they are constrained to take on only those projects with the highest NPVs". To proxy for a firm's ability to access financial markets, they use a dividend dummy that equals one if the firm paid dividends on common equity in the current year and zero otherwise. Given this interpretation, they expect the coefficient to be negative. Allayannis and Weston (2001) also used dividends to proxy for financial constraints, arguing that if hedgers forego projects because they are not able to obtain the necessary financing, their Tobin's Q may remain high because they undertake only positive NPV projects (see also Lang and Stulz 1994, and Servaes 1996). On the other hand, dividends can be viewed as a positive signal from management, which should imply a positive coefficient". For example, Fazzari et al. (1988) argue that the greater

the dividend yield is the lower is the probability that the firm is financially constrained. Thus, we have no prior expectation on the sign of the relationship between DY and Tobin's Q.

We use the Quick Ratio (QUICK) that measures the ratio of cash accounts and marketable securities to short term liabilities to proxy for liquidity. Firms that are cash constrained may have higher Tobin's Qs because they are more likely to invest in predominantly positive NPV projects. This follows from the free cash flow argument of Jensen (1986) that firms with excess free cash flow are more likely to invest in projects with negative NPV. We expect a negative relationship between QUICK and Tobin's Q.

Finally, to account for value effects due to conditions specific to individual industries, we created 10 dummy variables denoted $D_{ij}$ (j=1..,10) using the Campbell (1996) classification that groups firms into 11 distinct industries. $D_{ij}$ takes the value of one if the firm i belongs to the industry j and 0 otherwise. [6]

The statistics on FC derivatives use for the firms in the sample are presented in Table 2. Panel A shows that 58.52% of firms disclose that they use FC derivatives and 41.48% are classified as non-users. Panel B provides descriptive statistics of the extent of derivatives use represented by the total FC derivatives notional value deflated by total assets (DERIV). The average of DERIV is 0.0632 for all firms in the sample. For the sub-sample of FC derivatives users, DERIV averages 0.1079 and ranges from 0.00005 to 1.0111.

**Table 2**
Foreign currency derivatives use

This table describes the use of FC derivatives for the sample of 176 firms that are deemed to have FC exposure as of year-end 2004. Panel A provides data on the number of FC hedging firms and non FC hedging firms. Panel B reports statistics for the extent of derivatives use by firm. The extent of derivatives use is calculated as the ratio of total notional derivative value deflated by total assets.

**Panel A: Number of derivatives users and non users**

| | Number of firms | Percentage of total |
|---|---|---|
| Total Sample | 176 | 100.00 |
| Derivatives Users | 103 | 58.52 |
| Non Users | 73 | 41.48 |

**Panel B: Extent of Derivatives use: Notional Amount of FC derivatives /Total Assets (DERIV)**

| | All Firms | Derivatives Users |
|---|---|---|
| Number of Observations | 176 | 103 |
| Minimum | 0 | 4.96127E-05 |
| q1 | 0 | 0.0216 |
| Mean | 0.0632 | 0.1079 |
| Median | 0.0137 | 0.0471 |
| q3 | 0.0535 | 0.1057 |
| Maximum | 1.0111 | 1.0111 |
| Standard Deviation | 0.1379 | 0.1666 |

## III. EMPIRICAL RESULTS

The results presented in column 3 of Table 3 suggest that the variable DERIV is a significant, positive determinant of firm value for French firms, which is evidence that FC derivatives use is value enhancing.[7] Interestingly, LEVERAGE, the proxy for financial distress, is not a significant explanatory variable for firm value and, in other results not reported here, we also find that derivatives use has no statistically significant effect on LEVERAGE. This is counter evidence to the argument that hedging increases firm value by increasing debt capacity and the tax subsidy.

**Table 3**
Multivariate analysis of value effects of foreign currency derivatives use

The regression is run using ordinary least squares. The sample consists of 176 French non-financial firms. Financial data and data on derivatives use are as of the end of fiscal year 2004. The p-values, based on White's heteroscedasticity-consistent robust standard errors, are between parentheses. The dependant variable is the natural logarithm of Tobin's Q at the end of 2004 for each firm. CAPEX is the ratio of total capital expenditure to total assets. DY is the dividend per share divided by the share price. QUICK is the ratio of cash accounts and marketable securities to short term liabilities. ROA is the ratio of Earnings Before Interest And Taxes to Total assets. SIZE is the natural logarithm of the firm's total assets. LEVERAGE is long-term debt to total assets. DERIV is defined as the notional amount of FC derivatives divided by total assets. We include 10 industry dummies, $D_{ij}$ takes the value of one if the firm i belongs to the industry j and 0 otherwise.
$^{***}$, $^{**}$, $^{*}$ denote significance at the 1%, 5%, and 10% levels, respectively.

| | PREDICTED SIGN | **Total sample** | **Total assets < Median value of total assets** | **Total assets > Median value of total assets** |
|---|---|---|---|---|
| Number of observations | | 176 | 88 | 88 |
| INTERCEPT | | **0.6295**$^{*}$ | **1.8073**$^{*}$ | 0.2430 |
| | | **(0.094)** | **(0.094)** | (0.573) |
| CAPEX | - | 0.0096 | **0.0278**$^{***}$ | **-0.0162**$^{*}$ |
| | | (0.233) | **(0.006)** | **(0.107)** |
| DY | +/- | 0.0003 | **1.8073**$^{*}$ | 0.0002 |
| | | (0.749) | **(0.094)** | (0.823) |
| QUICK | + | **0.1932**$^{***}$ | **0.2086**$^{**}$ | 0.1655 |
| | | **(0.007)** | **(0.026)** | (0.117) |
| ROA | + | 0.0669 | -0.3542 | **1.8717**$^{*}$ |
| | | (0.914) | (0.653) | **(0.057)** |
| SIZE | +/- | **-0.0334**$^{*}$ | **-0.1023**$^{*}$ | -0.0154 |
| | | **(0.054)** | **(0.077)** | (0.419) |
| LEVERAGE | +/- | -0.1019 | 0.4235 | -0.1665 |
| | | (0.716) | (0.333) | (0.537) |
| DERIV | ? | **0.7670**$^{**}$ | 0.789 | **0.9314**$^{**}$ |
| | | **(0.039)** | (0.313) | **(0.028)** |
| INDUSTRY variables | | Yes | Yes | Yes |
| $R^2$ | | 0.1374 | 0.1861 | 0.2787 |
| ADJ $R^2$ | | 0.0956 | 0.1026 | 0.2047 |

Most empirical studies examine the relationship between firm size and hedging. There are, however, competing arguments for either a positive or negative relation between firm size and hedging activity. Smith and Stulz (1985) argue that the negative relationship between firm size and direct bankruptcy costs suggests that small firms have a greater incentive to hedge. Small firms are also faced with greater information asymmetries and higher financing transaction costs, which are likely to make external financing more expensive for smaller firms and, therefore, hedging more likely. Conversely, hedging activity offers significant information and transaction cost scale economies, implying that larger firms are more likely to hedge.

To control for the size effect, we segment the sample into two groups using the median book value of assets. The results presented in columns 4 and 5 of table 3 suggest that the potential benefits of hedging are concentrated in larger firms. For the larger firms, DERIV is significant at the 5% level while for the smaller firms it is not significant at any conventional level. This result supports the hypothesis that the larger firms can benefit from the economies of scale in information and transactions costs.

To investigate the argument that the value effect of derivatives use is sensitive to the currency exposure profile of the individual firms, we follow Jorion (1990) and measure the firm-specific exchange rate exposure by estimating a two-factor model:

$$R_{it} = \beta_{i0} + \beta_{im} R_{mt} + \beta_{ix} R_{xt} + \varepsilon_{it} \quad t = 1 \ldots T \tag{1}$$

where $R_{it}$ is the rate of return on the ith' firm's common stock, $R_{mt}$ is the rate of return on the market portfolio proxied by the MSCI index,[8] $R_{xt}$ is the rate of change in the trade-weighted Euro effective exchange rate index[9], and the coefficient $\beta_{ix}$ measures the firm's exchange rate exposure.[10] We then use the estimated exchange rate exposures to explore the relationship between firm value and the level and type of FC exposure.

We investigate whether the effect of derivatives use on firm value is sensitive to the firm's exposure profile, that is, the magnitude and direction of individual firm exposure. In the first instance, we divide the sample into a sub-sample of exposure levels (measured by the absolute value of $\beta_{ix}$ as in Allayannis and Ofek (2001)) greater than the median and a sub-sample of those less than the median. In the second instance, we divide the firms into a sub-sample of those with negative exposure coefficients (vulnerable to appreciations of the euro) and a sub-sample of those with positive exposure coefficients (vulnerable to depreciations of the euro). In columns 2 and 3 of Table 4, the results show that the value effect of DERIV is higher for firms with the larger exposure. It is also significant with a p-value of 0.081 while it is not significant at any conventional level for firms with lower exposure. This result suggests that derivatives use is more effective for firms with higher exposure levels.[11]

In columns 4 and 5 of table 4 the results show that the value effect of derivatives use is almost six times higher for firms with exposure to a depreciation of the euro than it is to those with exposure to an appreciation. It is also highly significant with a p-value of 0.013. This is evidence that FC derivatives use is more effective at value creation for depreciations of the euro.[12] Exactly why this is so is not immediately obvious. One possible explanation is that currency appreciation lends itself more

readily to alternative hedging vehicles, such as FC debt,[13] thereby spreading the value effects of hedging over a wider range of hedging strategies.

**Table 4**

The effect of the exposure profile on the relation between FC derivatives use and firm value

The regression is run using ordinary least squares. The sample consists of 176 French non-financial firms. Financial data and data on derivatives used are as of the end of fiscal year 2004. The p-values, based on White's heteroscedasticity-consistent robust standard errors, are between parentheses. The dependant variable is the natural logarithm of Tobin's Q at the end of 2004 for each firm. CAPEX is the ratio of total capital expenditure to total assets. DY is the dividend per share divided by the share price. QUICK is the ratio of cash accounts and marketable securities to short term liabilities. ROA is the ratio of Earnings Before Interest And Taxes to Total assets. SIZE is the natural logarithm of the firm's total assets. LEVERAGE is long-term debt to total assets. DERIV is defined as the notional amount of FC derivatives divided by total assets. We include 10 industry dummies, $D_{ij}$ takes the value of one if the firm i belongs to the industry j and 0 otherwise.

***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

| | **Degree of FC exposure** | | **Sign of FC exposure** | |
|---|---|---|---|---|
| | **Firms with absolute value of FC exposure coefficient < Median (0.86098)** | **Firms with absolute value of FC exposure coefficient > Median (0.86098)** | **Firms with negative FC exposure** | **Firms with positive FC exposure** |
| N. of observations | 88 | 88 | 131 | 45 |
| INTERCEPT | **1.1876** | -0.066 | **1.2008** | -0.6332 |
| | **(0.051)** | (0.884) | **(0.007)** | (0.341) |
| CAPEX | 0.0118 | 0.0045 | 0.0091 | 0.0200 |
| | (0.283) | (0.667) | (0.343) | (0.237) |
| DY | -0.0000 | 0.0001 | 0.0006 | -0.0015 |
| | (0.984) | (0.514) | (0.557) | (0.657) |
| QUICK | 0.0984 | **0.2993**$^{***}$ | **0.1742**$^{**}$ | **0.3920**$^{***}$ |
| | (0.371) | **(0.000)** | **(0.049)** | **(0.005)** |
| ROA | 0.9399 | -0.7504 | 0.352 | -0.2399 |
| | (0.330) | (0.381) | (0.634) | (0.797) |
| SIZE | **-0.0547**$^{**}$ | -0.0055 | **-0.0595**$^{***}$ | 0.0046 |
| | **(0.040)** | (0.818) | **(0.003)** | (0.883) |
| LEVERAGE | -0.2052 | -0.1312 | 0.0450 | -0.2220 |
| | (0.615) | (0.738) | (0.892) | (0.734) |
| DERIV | 0.7057 | **1.1082**$^{*}$ | 0.5407 | **3.0204**$^{***}$ |
| | (0.139) | **(0.081)** | (0.111) | **(0.013)** |
| INDUSTRY variables | Yes | Yes | Yes | Yes |
| $R^2$ | 0.1147 | 0.2750 | 0.1608 | 0.4348 |
| ADJ $R^2$ | 0.0239 | 0.2007 | 0.1049 | 0.3092 |

## IV. CONCLUSION

This paper investigates the relationship between FC derivatives use and value creation for a sample of 176 of the largest French non-financial firms for the year 2004. The paper first examines whether there is a significant relationship between firm value and derivatives use and if this relationship is affected by the size of the firm. The results from these tests show that derivatives use is a significant determinant of French firm value and that this effect is concentrated in the larger firms. In a second step, the paper investigates whether the exposure profile of the firms affects the relationship between derivatives use and firm value. To this end, firm specific exchange rate exposures were measured using the Jorion (1990) two-factor model. After establishing that relationship between firm value and derivatives use is not sensitive to the statistical significance of the estimated exposure coefficients, the sample was partitioned in two ways. In the first instance, the sample was divided into a sub-sample of exposure levels greater than the median and a sub-sample of those less than the median. In the second instance, it was divided into a sub-sample of firms with negative exposure coefficients (vulnerable to appreciations of the euro) and a sub-sample of firms with positive exposure coefficients (vulnerable to depreciations of the euro). The results show that the value effect of derivatives use is 1.5 times higher and significant for firms with the larger exposure while it is not significant at any conventional level for firms with lower exposure. This is evidence that derivatives use is more effective for firms with higher exposure levels. The results also show that the value effect of derivatives use is highly significant and almost six times higher for firms with exposure to a depreciation of the euro than it is to those with exposure to an appreciation. This is evidence that FC derivatives use is more effective at value creation for depreciations of the euro.

## ENDNOTES

1. For some of the original work on exchange rates and economic activity, see: Alexander (1959), Pearce (1961), Tsiang (1961) and Caves and Johnson (1968).
2. The two papers on French corporate derivatives use, Nguyen et al. (2007) and Capstaff et al. (2007), compare French corporate hedging practices before and after the introduction of the Euro. Although the derivatives use by French firms declines after the introduction of the Euro, it remains substantial.
3. Disclosure requirements of IAS32 include: risk management and hedging policies; hedge accounting policies and practices, and gains and losses from hedges; terms and conditions of, and accounting policies for, all financial instruments; information about exposure to interest rate risk and credit risk; fair values of all financial assets and financial liabilities, except those for which a reliable measure of fair value is not available. IAS39 requires that all financial assets and financial liabilities, including all derivatives and certain embedded derivatives, must be recognised on the balance sheet.
4. As a robustness check, we also do the tests using the level of Tobin's Q. The results, available on request, are substantially the same.
5. As a robustness check, we also use the log of total sales to proxy SIZE. The results, available on request, were substantially the same.

6. As a robustness check, we also created a dummy variable that assigns a value of 1 to 11 according to the firm's Campbell industry classification."
7. The results of a robustness test (not reported but available on request) for an omitted variable using a Heckman two-stage treatment effect reject the presence of an omitted variable.
8. Using the MSCI supposes that French financial markets are integrated into the international financial system. As a robustness test we also used the French SBF250 index. The results, available on request, are qualitatively similar.
9. By using a trade weighted index we follow Jorion (1990), Bodnar and Gentry (1993), He and Ng (1998), Allayannis and Ofek (2001). The trade weighted Euro effective exchange covers 22 currencies: in order of weighting they are Great Britain, USA, Japan, Switzerland, Sweden, China, Hong Kong, Taiwan, Denmark, South Korea, Poland, Singapore, Czech Republic, Russia, Turkey, Hungary, Malaysia, India, Norway, Canada, Thailand and Brazil. This group of countries covers almost 97% of all foreign trade between the Euro area and the rest of the world. The weights adopted are those calculated by the OECD, after a double weighting that takes into account not only direct foreign trade between two counties but also of the presence other competing third party countries. (This definition is given by Datastream's staff)
10. The results, not reported here but available on request, show that 38 firms (22% of the sample) have significant exchange rate exposure and are similar to other studies (e.g. Jorion (1990), 5.2%; Choi and Prasad (1995), 15%; He and Ng (1998), 25%; Nguyen et al. (2007) 32% significant exposure rates in the pre-euro year of 1996 and 11% in the post euro year of 2000.
11. A crosscheck shows that the result is not biased by an inordinate number of large firms. The sub-sample of high exposure firms is about equally divided between larger and smaller firms. It contains forty-seven firms with total assets superior to the median of 325753000 and forty below it.
12. A cross check shows that the result is not biased by an inordinate number of large firms or firms with high exposure coefficients. The sub-sample of positive coefficients contains only 15 firms with an exposure coefficient superior to 0.86098, the median of the FC exposure coefficients, and 19 firms with total assets greater than the median of 325753000.
13. A firm can hedge FC claims by borrowing in foreign currency and kills two birds with one stone: it hedges its FC claims and fulfils its financing requirements. To hedge FC liabilities a firm would have to lend in foreign currency which would increase its financing requirements.

## REFERENCES

Allayannis, G., and E. Ofek, 2001, "Exchange Rate Exposure, Hedging and the Use of Foreign Currency Derivatives," *Journal of International Money and Finance*, 20, 273–296

Allayannis, G., and J. Weston, 2001, "The Use of Foreign Currency Derivatives and Firm Market Value", *Review of Financial Studies*, 14, 243-276

Alexander, S.S., 1959, "Effects of A Devaluation: A Simplified Synthesis of Elasticities and Absorption Approaches", *American Economic Review*, 49, 22-42.

Bartov, E., and G.M. Bodnar, 1994, "Firm Valuation, Earnings Expectations, and the Exchange Rate Exposure Effect". *Journal of Finance*, 49, 1755–1785

Bartram, S., G.W. Brown, and F.R. Fehle, 2009, "International Evidence on Financial Derivatives Usage", *Financial Management*, 38, 1, 185-206

Berkman, H., and M.E. Bradbury, 1996, "Empirical Evidence on the Corporate Use of Derivatives", *Financial Management*, Summer, 5-13

Bessembinder, H., 1991, "Forward Contracts and Firm Value: Investment Incentive and Contracting Effects", *Journal of Financial and Quantitative Analysis*, 26, 519-532

Bodnar, G.M., and W.M. Gentry, 1993, "Exchange-Rate Exposure and Industry Characteristics: Evidence from Canada, Japan and the U.S", *Journal of International Money and Finance*, 12, 29–45

Bodnar, G.M., B. Dumas, and R.C. Marston, 2002, "Pass-through and Exposure", *Journal of Finance*, 57, 2002, 199–231

Campbell, J, "Understanding Risk and Return", 1996, *Journal of Political Economy*, 104, 298-345

Capstaff, J., A. Marshall, and J. Hutton, 2007, "The Introduction of the Euro and Derivatives Use in French Firms", *Journal of International Financial Management and Accounting*, 18, 1, 1-17

Carter, D.A., D.A. Rogers, and B.J. Simkins, 2006, "Does Hedging Affect Firm Value? Evidence from the US Airline Industry", *Financial Management*, 35, 1, Spring, 53-86

Caves, R.E., and H.G. Johnson, 1968, Readings in International Economics, (Homewood, Illinois: Irwin).

Choi, J.J., and A.M. Prasad, 1995, "Exchange Risk Sensitivity and Its Determinants: A Firm and Industry Analysis of US Multinationals," *Financial Management*, 24, 77–88

Copeland, T.E., and Y. Joshi, 1996, "Why Derivatives Do not Reduce FX Risk?" *Corporate Finance*, 35-41

Dumas, B., 1978, "The Theory of the Trading Firm Revisited", *Journal of Finance*, 33, 1019–1029

Fazzari, S., R. Hubbard, and B. Petersen, 1988, "Finance Constraints and Corporate investment", *Brookings Papers on Economic Activity*, 1, 141-195

Froot, K.A., D.S. Scharfstein, and J.C. Stein, 1993, "Risk Management: Coordinating Corporate Investment and Financing Policies", *Journal of Finance*, 48, 1629-1658

Guay, W., and S.P. Kothari, 2003, "How Much Do Firms Hedge with Derivatives?", *Journal of Financial Economics*, 70, .423-461

Géczy, C., B.A. Minton, and C. Schrand, 1997, "Why Firms Use Currency Derivatives", *Journal of Finance*, 52, pp.1323–1354

Goldberg, S.R., J.H. Godwin, M.S. Kim, and C.A. Tritschler, 1998, "On the Determinants of Corporate Usage of Financial Derivatives", *Journal of International Financial Management and Accounting*, 9, 132-166

Graham, J.R., and C.W. Smith, Jr., 1999, "Tax Incentives to Hedge", *Journal of Finance*, 54, 2241-2262

Graham, J., and D. Rogers, 2000, "Do Firms Hedge in Response to Tax Incentives?", *Journal of Finance*, 57, 815–839

Hagelin, N., 2003, "Why Firms Hedge with Currency Derivatives: An Examination of Transaction and Translation Exposure", *Applied Financial Economics*, 13, 55–69

Hagelin, N., and B. Prambourg, 2004, "Hedging Foreign Exchange Exposure: Risk Reduction from Transaction and Translation Exposure", *Journal of International Financial Management and Accounting*, 15, 1, 1-20

He, J., and L.K. Ng, 1998, "The Foreign Exchange Exposure of Japanese Multinational Corporations", *Journal of Finance*, 53, 2, 733-753

Heaney, R.A., and H. Winata, 2005, "Use of Derivatives by Australian Companies", *Pacific-Basin Finance Journal*, 13, 4, 411-430

Yanbo, J., and P. Jorion, 2006, "Firm Value and Hedging: Evidence from U.S. Oil and Gas Producers", *Journal of Finance*, 61, 2, 893-919

Jorion, P., 1990, "The Exchange Rate Exposure of U.S. Multinationals", *Journal of Business*, 63, 331–345

Lang, L., and R. Stulz, 1994, "Tobin's Q, Corporate Diversification and Firm Performance," *Journal of Political Economy*, 102, 1248-1280

Leland, H., 1998, "Agency Costs, Risk Management, and Capital Structure", *Journal of Finance*, August, 1213-1243

Mayers, D., and C.W. Smith, 1987, "Corporate Insurance and the Underinvestment Decision", *Journal of Risk and Insurance*, 54, 45-54

Mello, A., J. Parsons and A. J. Triantis, 1995, "An Integrated Model of Multinational Flexibility and Financial Hedging", *Journal of International Economics*, 39, 27-51

Mian, S., 1996, "Evidence on Corporate Hedging Policy", *Journal of Financial and Quantitative Analysis* 31, 419–439

Nguyen, H., and R. Faff, 2003, "Can the Use of Foreign Currency Derivatives Explain Variations in Foreign Exchange Exposure? Evidence from Australian Companies", *Journal of Multinational Financial Management*, 13, 193–215

Nguyen, H., R.W. Faff, and A.P. Marshall, 2007, "Exchange Rate Exposure, Foreign Currency Derivatives and the Introduction of the Euro: French Evidence", *International Review of Economics and Finance*, 16, 563-577

Pearce, I.F., 1961, "The Problem of the Balance of Payments", *International Economic Review*, 2, 1, 1-28.

Peltzman, S., 1977, "The Gains and Losses from Industrial Concentration," *Journal of Law and Economics*, 20, 229-263

Pramborg, B., 2005, "Foreign Exchange Risk Management by Swedish and Korean Non-Financial Firms: A Comparative Survey", *Pacific Basin Finance Journal*, 13, 343–366

Ross, M., 1997, "Dynamic Optimal Risk Management and Dividend Policy under Optimal Capital Structure and Maturity", Working Paper, *Haas School of Business*, University of California, Berkeley

Servaes, H., 1996, "The Value of Diversification During the Conglomerate Merger Waves," *Journal of Finance*, 51, 1201-1225

Smith, C.W., and R. M. Stulz, 1985, "The Determinants of Firms' Hedging Policies", *Journal of Financial and Quantitative Analysis*, 20, 4, 391-405

Stulz, R., 1996, "Rethinking Risk Management", *Journal of Applied Corporate Finance*, 9, 3, 8–24

Tsiang, S.C., 1961, "The Role of Money in Trade Balance Stability: Synthesis of the Elasticity and Absorption Approaches", *American Economic Review*, 51, 912-936.

Tufano, P., 1998, "Agency Costs of Corporate Risk Management", *Financial Management*, 27, 1, 67-77