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ASYMMETRIC CORPORATE EXPOSURES TO FOREIGN EXCHANGE RATE CHANGES

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Research examining firms' economic exposures to exchange rate movements has not differentiated periods of foreign currency appreciation and depreciation when estimating exposure coefficients. Recent theoretical developments regarding real options and pricing-to-market suggest corporate exposures may be asymmetric (i.e., the financial performance impact of a foreign currency appreciation may not be offset by the currency's depreciation). Our empirical analysis indicates that for the small percentage of U.S. manufacturing firms exposed to currency appreciations or depreciations, their exposures are asymmetric. © 1998 John Wiley & Sons, Ltd.

INTRODUCTION

Although economic exposure refers to the sensitivity of the real value of a company to fluctuations in any environmental contingency, it has been addressed most frequently in the context of changes in foreign exchange rates (e.g., Adler and Dumas, 1984; Garner and Shapiro, 1984; Shapiro, 1992). Real, rather than nominal, exchange rate movements can have an impact on the competitive position of a company, affecting expected cash flows and, hence, the market value of the firm.[1] An economic valuation perspective on exposure is consonant with strategic management researchers' interest in factors having long-term cash flow implications that accounting-derived measures fail to capture (e.g., Lubatkin and Shrieves, 1986).

Several authors have recently contributed empirical research on the estimation of corporate economic exposures to foreign exchange rate movements using bivariate regression models. Booth and Rotenberg (1990) considered the effects of movements in the Canadian dollar relative to the U.S. dollar on the stock returns of Canadian companies. Amihud (1994), Bodnar and Gentry (1993), and Jorion (1990) estimated economic exposure coefficients for U.S. corporations using trade-weighted sums of major currencies as their foreign exchange proxies.

Underlying previous studies is the assumption that the financial performance effects associated with exchange rate appreciation and depreciation are symmetric. By contrast, real option and pricing-to-market arguments about the strategies of multinational corporations challenge the assumption of exposure symmetry. If firms use real options to hedge economic exposures to foreign exchange rate movements, we should observe different exposure coefficients for periods of foreign currency appreciation and depreciation. Similarly, research on pricing-to-market identifies plausible conditions under which firms' pricing

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[1]While the distinction between real and nominal exchange rates is important to the definition of economic exposure, this distinction is less important in empirical estimation of exposures because real and nominal exchange rates are highly correlated.

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decisions in international markets may result in asymmetric pay-offs for currency appreciations and depreciations.

The present study examines whether corporations experience asymmetric exposures to foreign exchange rate appreciation and depreciation. The next section discusses the implications of options and pricing-to-market for corporate economic exposures. The empirical portion of the study examines exposure patterns in U.S. manufacturing firms and the extent to which U.S. corporations exhibit exposure patterns consistent with option theory and pricing-to-market behavior. The paper concludes with a discussion of the empirical results, strategic management implications, and opportunities for further research.

THEORETICAL BACKGROUND

Option theory

Kogut (1983) observed multinational corporations (MNCs) possess options to shift input sourcing, production, and marketing activities within their networks of subsidiaries. Kogut and Kulatilaka (1994) modeled the option value associated with managing a geographically dispersed set of subsidiaries as a coordinated network. In their model, a MNC shifts production among manufacturing plants in different countries in response to movements in foreign exchange rates. Such production flexibility constitutes a real option which adds value to a MNC. The contention that strategic flexibility adds value is contingent upon underlying assumptions about the costs and benefits of hedging. Shifting manufacturing, sourcing, or other activities would not be optimal if hedging costs exceed the gains associated with changing a firm's international configuration. An important empirical issue is whether the financial benefits of such strategic hedging exceed its costs.

Real option theory suggests operational flexibility allows the firm to selectively exploit currency movements to its advantage while sheltering the firm during periods when exposure would adversely affect firm value. Consider, for example, firms with options on assets with real valuations tied to movements in the real value of the Japanese yen. Option theory predicts that corporate exposure coefficients will differ depending on whether the yen appreciates or depreciates. Having a call option on an asset that appreciates with the real value of the yen would be consistent with a positive exposure coefficient ($\beta_j > 0$) when the yen appreciates but no exposure ($\beta_j = 0$) when the yen depreciates. Alternatively, having a put option on an asset that appreciates with the real value of the yen would be consistent with a negative exposure coefficient ($\beta_j < 0$) when the yen depreciates but no exposure ($\beta_j = 0$) otherwise.

If firms do not possess options for managing foreign exchange exposures, we would observe symmetric exposures for both appreciation and depreciation of foreign currencies. We might also observe many firms with no exposure, regardless of movements in the real values of foreign currencies.

By splitting time series data into periods of currency appreciation and periods of depreciation, we can estimate two exposure coefficients for a firm. Given three possible exposure coefficient values for yen appreciation ($R_{¥}(t) > 0$) and yen depreciation ($R_{¥}(t) < 0$), there are nine possible exposure coefficient combinations, as summarized in Table 1. Of these nine combinations, two (cells II and VI) are consistent with the use of options to hedge exposure, two indicate symmetric exposure (cells I and IX), and one combination indicates no significant exposure (cell V). Based on previous research on U.S. firms' economic exposures to foreign exchange rates using the assumption of symmetric exposures (e.g., Miller

Table 1. Possible combinations of foreign exchange exposures[a]

$R_{¥}(t) > 0$	$R_{¥}(t) < 0$		
	$\beta_j > 0$	$\beta_j = 0$	$\beta_j < 0$
$\beta_j > 0$	I. Symmetric exposure	II. Option P-T-M (sales constraint)	III. ∅
$\beta_j = 0$	IV. ∅	V. No exposure	VI. Option
$\beta_j < 0$	VII. ∅	VIII. P-T-M (build market share)	IX. Symmetric exposure

[a] $R_{¥}(t)$ is the percentage change in the real dollar spot price of the Japanese yen in month t, and β_j is the associated coefficient for firm j. Cells designated by ∅ indicate the expectation that no firms will fall into these categories. Pricing-to-market exposure patterns are indicated by P-T-M.

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and Reuer, 1998), we would expect most firms to fall in the center cell, indicating no significant exposure. The upper right-hand cell (III) indicates a firm that benefits from any movement in the Canadian dollar away from its current real value. Such a position, referred to as a 'straddle,' is unlikely to be undertaken because of the high costs of such hedging. The three lower left-hand cells (IV, VII, and VIII) indicate firms that are adversely affected by exchange rate changes, but fail to realize any symmetric benefit when exchange rates move in the opposite direction. These cells indicate poor management of currency risk.

Pricing-to-market

Rangan and Lawrence (1993) found U.S. MNCs' price–cost margins increased with the nominal dollar value of a weighted average of exchange rates for nine countries. Their findings were consistent with pricing-to-market. While the positive coefficient was significant during the period of dollar depreciation (1986–89), it was not significant during the period of dollar appreciation (1983–85). Their empirical results provided evidence for asymmetric pricing behavior and indicated U.S. firms generally benefit from dollar depreciation but are unharmed by dollar appreciation.

Knetter (1994) considered two alternative scenarios that could give rise to asymmetric markups on exported goods. One possibility is that the marketing capacity of exporters in international markets is limited. Limited distribution capacity or quotas in export markets could present a binding constraint on sales volume. Due to a sales volume constraint, export managers choose larger (home currency) markups during periods of foreign currency appreciation than markdowns during periods of foreign currency depreciation. A second explanation for asymmetric pricing responses is that exporters may seek to protect their market shares by reducing home-currency margins during periods of foreign currency depreciation. Also consistent with a strategy of building market share would be relatively constant home-currency margins during periods of foreign currency appreciation, thereby allowing the local currency price of the product to fall.

These two explanations for asymmetry between price markups and markdowns give rise to differing patterns of firm exposure coefficients. In the presence of a binding sales volume constraint, home-currency margins will be constant during periods of foreign currency depreciation and rise during periods of foreign currency appreciation. Assuming stock market returns respond to varying accounting returns, we would observe no significant economic exposure to decreases in the dollar price of a foreign currency and a positive exposure to foreign currency appreciation (cell II). By contrast, the market share explanation predicts exporters maintain constant margins during periods of foreign currency appreciation and decrease their margins during periods of foreign currency depreciation. If the stock market responds to these changing margins on foreign sales, we would observe no significant exposure to appreciation in the dollar value of a foreign currency ($\beta_j = 0$) and a positive exposure coefficient ($\beta_j > 0$) during periods of depreciation of the foreign currency (cell VIII).

Past empirical research on pricing-to-market has focused on aggregate trade data at the industry or country level. Such research designs potentially mask differences in corporate pricing strategies which can give rise to heterogeneous corporate exposures within industries. In focusing on firm valuation effects, this study differs from previous pricing-to-market research examining changes in accounting margins due to foreign exchange rate movements.

METHODOLOGY

Firms' economic exposures to exchange rates depend on many factors: the countries to which the firms export, the configuration of their international operations, the locations of suppliers and competitors, and so forth. Hence, only with in-depth analyses of such factors for each firm would it be possible to form *a priori* assessments of the currencies to which they are exposed. In large-sample research, the only practical approach is to include a representative set of currencies in order to make comparisons of exposure coefficients among firms.

Miller and Reuer's (1998) factor analysis of 12 currencies for major U.S. trading partners demonstrated that three orthogonal factors captured an adequate proportion of the variance in real foreign exchange rate changes for 12 major

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U.S. trading partners.[2] Three currencies—the Canadian dollar, Japanese yen, and Mexican peso—were selected as proxies for each of the three factors based on their importance to aggregate U.S. export–import activity. Firms' monthly real stock returns were regressed on monthly percentage changes in the real dollar spot price of each of these currencies.[3] In order to assess possible asymmetries in firms' foreign exchange rate exposures, equations were estimated for all months in which the regressor currency appreciated relative to the U.S. dollar for the years 1988–92. These same equations were then estimated for all months in which the regressor currency depreciated *vis-à-vis* the U.S. dollar for the same years. After assessing the sign and significance of exposure coefficients for each firm through the use of *t*-tests, we constructed matrices like Table 1 for each of the three currencies indicating the relative frequency of firms displaying the nine possible exposure profiles discussed earlier.

The Center for Research in Security Prices (CRSP) data files provided nominal monthly holding period stock returns for all manufacturing firms that SIC codes in the range 3000–3999. Firms that had any missing returns over the 5-year estimation period 1988–92 were eliminated from the analysis, providing a sample of 239 companies.

The International Monetary Fund's *International Financial Statistics* CD-ROM supplied monthly data on the dollar price of the three currencies. The real dollar value of each exchange rate was obtained by adjusting for the monthly consumer price index (CPI) in the foreign country relative to the U.S. CPI. U.S. price level data provided by the *IFS* data base were used to convert nominal monthly stock returns to real returns.

The three bivariate regression models reflect the specifications found in most finance research. A shortcoming of simple bivariate models is the biases introduced into exposure coefficient estimates when movements in exchange rates are correlated (Miller, 1998). Oxelheim and Wihlborg (1987) argued that models estimating firms' economic exposures to exchange rates should also incorporate macroeconomic variables that covary with exchange rates.

Hence, we also estimated a multivariate macroeconomic model by regressing firms' real monthly stock returns on real monthly value-weighted stock portfolio returns, the percentage change in the real U.S. treasury bill rate, and the monthly percentage changes in the real values of the three currencies.[4] Nominal monthly value-weighted market portfolio returns were obtained from the CRSP data files. The value-weighted portfolio returns include all distributions and exclude American Depository Receipts (ADRs). CPI data from *IFS* were used to deflate the monthly market portfolio returns to real returns. *IFS* also provided the necessary data to calculate the percentage change in the real U.S. Treasury bill rate.

The multivariate equation was used to calculate six parameter estimates for each firm to assess the possibility of asymmetric exposures to each of the three currencies. For each of the currencies in the model, separate coefficient estimates were generated by estimating the full multivariate model for all months from 1988 to 1992 in which the particular currency appreciated and depreciated relative to the U.S. dollar. As before, we constructed matrices similar to Table 1 for each of the currencies by assessing the sign and significance of individual parameter estimates through the use of simple *t*-tests.

In addition to these analyses for the entire sample of manufacturing firms, similar disaggregate analyses were also conducted at the 2-digit SIC level using the bivariate and multivariate estimation models described above. These supplemental analyses permitted comparisons of firms' exposure patterns across industries.

[2]The three-factor loading pattern was similar using either real or nominal exchange rates.

[3]The real dollar price of a currency at time t is given by: $e'(t) = e_t[P_f(t)/P_h(t)]$, where e_t is the nominal dollar price of the currency at time t, $P_f(t)$ is the foreign country's consumer price level at time t, and $P_h(t)$ is the U.S. consumer price level at time t (Shapiro, 1992: 155). Real stock returns are computed as $[(1 + r_n)/(1 + i_h)] - 1$, where r_n is the nominal stock (or market portfolio) return, and i_h is the inflation rate given by the percentage change in the U.S. consumer price level (Brealey and Myers, 1991: 559).

[4]The real U.S. Treasury bill rate is given by: $r_r = [(1 + r_n)/(1 + i_h)] - 1$, where r_n is the nominal U.S. Treasury bill rate, and i_h is the inflation rate given by the percentage change in the U.S. consumer price level (Brealey and Myers, 1991: 559). The percentage change in the real U.S. Treasury bill rate is given by: $R_r = [r_r(t) - r_r(t-1)]/r_r(t-1)$.

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RESULTS

Table 2 summarizes the results from estimating the bivariate models. As anticipated, the vast majority of U.S. manufacturers were not exposed to either currency appreciations or depreciations. At the 0.05 level, the proportions of firms exposed to either appreciations or depreciations of the Canadian dollar, Japanese yen, and Mexican peso are 8.8 percent, 13.4 percent, and 11.7 percent, respectively. The table provides evidence that manufacturing firms' economic exposures to foreign exchange rate movements are rarely symmetric for currency appreciations and depreciations. No firms exhibit symmetric exposures to the Canadian dollar or Mexican peso, and only two firms are symmetrically exposed to Japanese yen appreciations and depreciations.

The results presented in Table 2 suggest that where asymmetries exist in economic exposures to foreign exchange rate movements, these asymmetries generally correspond to the predictions of option theory and pricing-to-market behavior. The number of firms in the 'option' cells (i.e., cells II or VI) are 20, 25, and 25 for the Canadian

Table 2. Combinations of foreign exchange exposures for bivariate estimation models[a]

Canadian dollar

$R_{C\$}(t) > 0$	$R_{C\$}(t) < 0$			Row total
	$\beta_j > 0$	$\beta_j = 0$	$\beta_j < 0$	
$\beta_j > 0$	0 (0)	18 (0.075)	0 (0)	18 (0.075)
$\beta_j = 0$	1 (0.004)	218 (0.912)	2 (0.008)	221 (0.925)
$\beta_j < 0$	0 (0)	0 (0)	0 (0)	0 (0)
Column total	1 (0.004)	236 (0.987)	2 (0.008)	239 (1)

Japanese yen

$R_{¥}(t) > 0$	$R_{¥}(t) < 0$			Row total
	$\beta_j > 0$	$\beta_j = 0$	$\beta_j < 0$	
$\beta_j > 0$	0 (0)	1 (0.004)	0 (0)	1 (0.004)
$\beta_j = 0$	0 (0)	207 (0.866)	24 (0.100)	231 (0.967)
$\beta_j < 0$	0 (0)	5 (0.021)	2 (0.008)	7 (0.029)
Column total	0 (0)	213 (0.891)	26 (0.109)	239 (1)

Mexican peso

$R_{P}(t) > 0$	$R_{P}(t) < 0$			Row total
	$\beta_j > 0$	$\beta_j = 0$	$\beta_j < 0$	
$\beta_j > 0$	0 (0)	19 (0.080)	0 (0)	19 (0.080)
$\beta_j = 0$	1 (0.004)	211 (0.883)	6 (0.025)	218 (0.912)
$\beta_j < 0$	0 (0)	2 (0.008)	0 (0)	2 (0.008)
Column total	1 (0.004)	232 (0.971)	6 (0.025)	239 (1)

[a]The first cell entry denotes the cell frequency when $\alpha = 0.05$. The entry in parentheses denotes the relative cell frequency when $\alpha = 0.05$. Column and row percentages may not sum exactly to the totals due to rounding. $R_{C\$}(t)$ is the percentage change in the real dollar spot price of the Canadian dollar in month t. Similarly, $R_{¥}(t)$ and $R_{P}(t)$ represent the percentage change in the real dollar spot prices of the Japanese yen and Mexican peso in month t, respectively.

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dollar, Japanese yen, and Mexican peso, respectively. These numbers correspond to proportions of 8.4 percent, 10.5 percent, and 10.5 percent, respectively, for the entire sample of 239 firms. These results are consistent with patterns we would expect to observe if U.S. firms with significant exposures to foreign exchange rate movements manage their exposures in such a way as to take advantage of movements that increase shareholder returns but adequately hedge exchange rate movements detrimental to shareholder returns.

Table 2 also indicates that several firms have exposure profiles consistent with the two pricing-to-market explanations for asymmetric exposures. There is, of course, confounding in cell II in that it is not possible to differentiate whether option theory or pricing-to-market behavior accounts for firms in this cell. Eighteen firms fall into the pricing-to-market cells (i.e., cells II or VIII) for the Canadian dollar, representing 8.4 percent of the entire sample. For the firms exhibiting exposures to the Canadian dollar consistent with the pricing-to-market rationale, all firms fall in the cell indicating sales constraints rather than market share expansion or preservation objectives. Six firms fall into the pricing-to-market cells for the Japanese yen, constituting 2.5 percent of the entire sample. For the Mexican peso, 21 firms fall into the pricing-to-market cells (19 of which are in cell II), representing 8.8 percent of the overall sample.

The inclusion of months in which there were minor changes in real exchange rates could reduce the explanatory power of the three bivariate exposure models. To examine this possibility, three additional pairs of regressions were estimated focusing on months of relatively large currency appreciations or depreciations. Included in these regressions were data for those months in which the absolute value of the exchange rate percentage change exceeded half the standard deviation of the entire time series.[5] These analyses indicated that 7.9 percent of the sample was exposed to Canadian dollar movements, and 11.3 percent to Japanese yen fluctuations. Exposure patterns were largely consistent with those reported above, providing no evidence of exposure symmetry. This analysis was not performed for the Mexican peso because the peso's appreciation was greater than one-half of a standard deviation above its mean in only 8 months.

The bivariate models estimated contemporaneous effects of real exchange rate movements on stock returns. This specification assumed the effects of currency fluctuations are quickly incorporated into stock prices. While Amihud (1994) did not find evidence of lagged effects of currency movements on stock returns, we sought to allay concerns about assuming contemporaneous effects. One-, 2-, and 3-month lags were used for each of the three currencies, resulting in nine additional matrices similar to Table 1. Exposure patterns in the nine resulting matrices were generally consistent with the results contained in Table 2. There were only five observations with symmetric exposures for the nine matrices. All five observations were located in cell I for the 1-month lag using the Mexican peso. The overall proportion of exposed firms was lower in five of the nine matrices using lagged exchange rates, and the proportion of exposed firms decreased with longer lags.

Table 3 provides the results for the three-currency macroeconomic model. Again, as expected, the vast majority of firms are not exposed to foreign exchange rate fluctuations. Using the 0.05 significance criterion, 5.4 percent of the firms are exposed to appreciations or depreciations in the Canadian dollar, 12.5 percent to the Japanese yen, and 13.8 percent to the Mexican peso. The results for the multivariate estimation technique provide further evidence that firms are not symmetrically exposed to currency appreciations and depreciations. Only three firms are symmetrically exposed to Japanese yen appreciations and depreciations, and no firms are symmetrically exposed to appreciations and depreciations in the Canadian dollar or Mexican peso.

The results provided in Table 3 show a very limited set of firms exhibit exposure patterns consistent with option theory. Twelve firms (5.0 percent of the entire sample) exhibit an exposure

[5]The distributions for the monthly percentage changes for the Canadian dollar and Japanese yen approximated normal distributions with zero means (within four significant digits). The number of months in which currency appreciations exceeded half the standard deviations were 16 for the Canadian dollar and 19 for the Japanese yen. The number of months in which currency deprecations exceeded half the standard deviations were 18 for the Canadian dollar and 17 for the Japanese yen.

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Table 3. Combinations of foreign exchange exposures for the multivariate estimation model[a]

Canadian dollar

$R_{C\$}(t) > 0$	$R_{C\$}(t) < 0$			Row total
	$\beta_j > 0$	$\beta_j = 0$	$\beta_j < 0$	
$\beta_j > 0$	0 (0)	7 (0.029)	0 (0)	7 (0.029)
$\beta_j = 0$	1 (0.004)	226 (0.946)	5 (0.021)	232 (0.971)
$\beta_j < 0$	0 (0)	0 (0)	0 (0)	0 (0)
Column total	1 (0.004)	233 (0.975)	5 (0.021)	239 (1)

Japanese yen

$R_{¥}(t) > 0$	$R_{¥}(t) < 0$			Row total
	$\beta_j > 0$	$\beta_j = 0$	$\beta_j < 0$	
$\beta_j > 0$	0 (0)	4 (0.017)	0 (0)	4 (0.017)
$\beta_j = 0$	1 (0.004)	209 (0.875)	10 (0.042)	220 (0.921)
$\beta_j < 0$	0 (0)	12 (0.050)	3 (0.013)	15 (0.063)
Column total	1 (0.004)	225 (0.941)	13 (0.054)	239 (1)

Mexican peso

$R_{P}(t) > 0$	$R_{P}(t) < 0$			Row total
	$\beta_j > 0$	$\beta_j = 0$	$\beta_j < 0$	
$\beta_j > 0$	0 (0)	5 (0.021)	0 (0)	5 (0.021)
$\beta_j = 0$	5 (0.021)	206 (0.862)	7 (0.029)	218 (0.912)
$\beta_j < 0$	0 (0)	16 (0.067)	0 (0)	16 (0.070)
Column total	5 (0.021)	227 (0.950)	7 (0.029)	239 (1)

[a]The first cell entry denotes the cell frequency when $\alpha = 0.05$. The entry in parentheses denotes the relative cell frequency when $\alpha = 0.05$. Column and row percentages may not sum exactly to the totals due to rounding. $R_{C\$}(t)$ is the percentage change in the real dollar spot price of the Canadian dollar in month t. Similarly, $R_{¥}(t)$ and $R_{P}(t)$ represent the percentage change in the real dollar spot prices of the Japanese yen and Mexican peso in month t, respectively.

profile *vis-à-vis* the Canadian dollar consistent with option theory. Fourteen firms (5.9%) exhibit an option-type exposure profile *vis-à-vis* the Japanese yen, and 12 firms (5.0%) exhibit an option-type exposure profile relative to the Japanese yen. This is very weak evidence for active management of foreign exchange exposures in ways that enhance shareholder returns.

Table 3 also reveals sets of firms exhibiting asymmetric exposures consistent with pricing-to-market explanations. Seven firms fall into pricing-to-market cells for the Canadian dollar, 16 firms for the Japanese yen, and 21 firms for the Mexican peso. More firms fall into cell II than cell VIII for the Canadian dollar (7 vs. 0), while more firms fall into cell VIII than cell II for the Japanese yen (12 vs. 4) and for the Mexican peso (16 vs. 5). Given this pattern of exposure asymmetries, the few U.S. firms engaging in pricing-to-market appear to increase margins when the Canadian dollar appreciates and focus on building market share in Japan and Mexico.

One of the key questions in this research was whether particular firms have distinct strategies for managing foreign exchange exposures. We sought to determine whether a common set of

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firms exhibited exposure profiles consistent with option theory and pricing-to-market across the three currencies. We identified each firm falling into cells II, VI, and IX in the matrices in Tables 2 and 3. For the bivariate estimation approach, only two pairwise matches were found. Two firms were classified into cell II for both the Canadian dollar and the Mexican peso. No matches existed for cell VI or cell IX classifications across the three currencies. For the multivariate macroeconomic model, only one pairwise match was found. One firm was classified into cell VI for both the Japanese yen and Mexican peso. The evidence does not support the contention that firms' pricing-to-market strategies affect shareholder returns uniformly across currencies. Rather, these findings indicate currency-specific foreign exchange risk management practices, and the possibility that some asymmetric outcomes are random outcomes rather than the result of systematic risk management practices across currencies.

For both the bivariate and multivariate models, the patterns of exposures across 2-digit industry categories indicated variation within 2-digit industries, not just across industries. Finding divergence in exposure patterns among firms within these industry categories challenges previous economic exposure and pricing-to-market empirical research using portfolios of firms aggregated at the industry level.

DISCUSSION

The percentage of U.S. manufacturing firms exhibiting significant foreign exchange exposures was small. Those firms with significant exposures generally exhibited asymmetric exposure profiles consistent with predictions from option theory and pricing-to-market theory. However, the empirical evidence did not support the contention that some companies possess competencies and international investment configurations allowing them to profit from movements in the values of several different currencies.

The small number of firms with exposures consistent with option theory might indicate that the risk management strategies of U.S. manufacturers reflect greater attention to other uncertain environmental contingencies than to foreign exchange rates. For companies operating in multidomestic industries (i.e., those in which competition is largely independent across countries), concerns about exchange rate movements should be subordinate to more immediate concerns about domestic and firm-specific risks. From a normative perspective, the findings suggest possible unexploited opportunities for managing economic exposure through the use of real options associated with global flexibility.

The small percentage of firms with significant exposures may also reflect some of the research design choices made in this study. First, our dependent variable was shareholder returns rather than short-term cash flows, as advocated by others (e.g., Kohn, 1990; Lewent and Kearney, 1990). We would expect the effect of exchange rate movements on short-term cash flows to be much more direct than that on shareholder returns. Second, we considered the exposure of a broad sample of firms to three currencies rather than investigating the unique sets of currencies best explaining individual firms' returns. Third, our sample involved firms based in a large developed home country economy with a smaller proportion of exports and imports relative to total economic activity than many other nations. Future research could examine whether the percentage of firms with asymmetric exposures to currency fluctuations is higher for samples from smaller open economies.

While there was limited evidence for asymmetric exposures to foreign exchange movements, there was almost no empirical evidence that manufacturing firms are exposed to foreign exchange rate movements in a symmetric fashion. This finding challenges an assumption underlying the specifications of symmetric regression models of foreign exchange exposure found in prior research.

The empirical results provided in Tables 2 and 3 suggest that model specification is a concern for corporate assessment of economic exposures. When moving from the bivariate to the multivariate approach, our results indicate that the pattern of asymmetric exposures changed. Omitting controls for other foreign exchange rates and macroeconomic variables can result in different exposure patterns, as the two tables reveal. In general, Table 2 presents a more favorable picture of the capabilities of U.S. firms to take advantage of exchange rate movements and limit the impact of detrimental movements than does Table 3. This may indicate firms' assessment and hedging

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strategies focus on currencies in isolation from one another. Isolating individual currencies for purposes of exposure assessment and hedging is suboptimal when the environmental contingencies affecting returns are interrelated (Miller, 1998).

As the theoretical portion of this paper indicated, we initiated this study expecting to find some evidence of firm-specific effects on exposures across various currencies. We did find within-industry heterogeneity in exchange rate coefficients, yet the empirical results suggest firms do not possess foreign exchange risk management capabilities allowing them to benefit from movements in all three foreign currencies. Hence, there is no reason to attempt to explain the revealed exposure patterns using firm-level strategy variables. Rather, we need to examine the currency-specific nature of corporate foreign exchange risk management and pricing-to-market practices.

Foreign exchange rates are just one set of many environmental contingencies relevant to strategists. Examining asymmetries in exposure patterns would be an innovative approach to testing real option explanations of organizational responses to other environmental contingencies of interest to strategy researchers. These research directions would be interesting domains for contributions from strategic management to our understanding of corporate risk management.

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