Earnings Management and Stock Exposure to Exchange Rate Risk

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Abstract

This study proposes an earnings management hypothesis to explain the lack of prevailing evidence of significant relationship between exchange rate risk and stock returns of U.S. corporations. In particular, we examine whether the earnings management activities undertaken by managers mitigate firm exchange rate exposure. Consistent with our hypothesis, we find that firms engaged with greater earnings management activities, especially those of income smoothing, tend to exhibit significantly lower exchange rate exposure. This association tends to be particularly strong when the currency movements are adverse to the firm earnings. Our results also have implications for the information contents about earnings quality shed from the correlation between accrual changes and cash flow changes.

1. Introduction

Foreign currency exchange rate risk affects a firm's operating and financing activities and therefore the associated cash flows. Most prior studies, however, failed to find a significant relation between foreign exchange rate fluctuations and stock returns of U.S. corporations [e.g., Jorion (1990), Amihud (1994) and Bodnar and Gentry (1993), Bartov and Bodnar (1994), Griffin and Stulz (2001) and Doidge et al. (2002)].[1] Various explanations have been suggested to resolve this paradox, including the use of hedging instruments [Rawls and Smithson (1989), Dolde (1993), Geczy et al. (1997), He and Ng (1998), and Allayannis and Ofek (2001)], the delayed reaction of the stock price to the exchange rate fluctuations [Bartov and Bodnar (1994), Chow et al. (1997a,b), Griffin and Stulz (2001), and Bodnar and Wong (2003)] and possible sample selection problems [Bartov and Bodnar (1994)]. Nonetheless, only limited success has been reached.

This paper attempts to offer another explanation to this puzzle, thanks to the recent advances in the earnings management literature. In particular, we argue that earnings management by corporate managers contributes to the insignificant association between exchange rate changes and stock returns.

Exchange rate changes affect a firm's financial position. Gains or losses due to favorable or adverse exchange rate movements appear in a firm's financial report and lead to earnings performance deviating from corporate target. Although the impact of unexpected exchange rate changes can be mitigated through the usage of foreign currency derivatives, however, certain firms also argue in their accounting report that they cannot and do not want to fully eliminate their exchange rate risk. For this reason, a firm has incentives to reduce the impact of unexpected exchange rate fluctuations through earnings management strategies when its currency risk exposure is not hedged or not well-managed. If a firm does employ earnings management to window dress reported operating results, investors will not be able to timely and

[1] One exception is the evidence presented by Williamson (2001), which finds significant competitive effects of exchange rate shocks between Japanese and the U.S. automotive industries. In terms of international evidence, Bodnar and Gentry (1993) and He and Ng (1998) find more significant exchange rate exposure for Canadian and Japanese firms. Doidge et al. (2002) find that exchange rate movements are economically significant in terms of firm value for international markets. Griffin and Stulz (2001) find that the common industry effect across countries is several times larger than the competition effect of exchange rate shocks on U.S. industries. The exchange rate effects for other countries are larger, but are still generally small.

accurately evaluate its exchange rate exposure because the actual impact of exchange rate changes on firm value will not even be released in the future. This then leads to the absence of a significant relation between exchange rate fluctuations and stock returns. In view of this possibility, we hypothesize that those firms employing greater levels of earnings management will reduce more of their exchange rate exposure that is assessed by the stock market. Further analyses will be developed later in this paper to present such possibility.

Dumas (1978), Hodder (1982), and Adler and Dumas (1984) define a firm's exchange rate exposure as the sensitivity of a firm's market value to unexpected exchange rate variations. Following Adler and Dumas (1984), we measure a firm's exchange-rate exposure as the regression coefficient of the firm's stock returns on the foreign exchange rate(s) changes while controlling for the Fama-French three factors (1993). The lagged as well as the contemporaneous exchange rate change is included in the regression model to incorporate the possible delay in the market's reaction to exchange rate fluctuations. Using a sample of non-financial *COMPUSTAT* firms, we find that only about 22 percent of our sample firms have significant contemporaneous exposure coefficients and about 18 percent of the sample firms have significant lagged exposure coefficients. This preliminary result is consistent with existing studies and also conforms to our earnings management hypothesis, which implies that the impact of exchange rate changes will not be fully reflected from either current or future stock prices if continued earnings management is at work. The combination of contemporaneous and lagged exposure coefficients is then used to measure a firm's combined exchange rate exposure as suggested by Bartov and Bodnar (1994).

Following the study of Leuz, Nanda, and Wysocki (2003), we apply four earnings management measures to capture the extent to which a firm manipulates reported earnings.[2] Two of these measures, denoted as *EM1* and *EM2* in the paper, are developed to capture the degree of earnings management intended to smooth a firm's reported earnings. A third measure, *EM3*, considers the average magnitude of

[2] Leuz, Nanda, and Wysocki (2003) develop four country-level earnings management measures which do not adapt to our firm-level analyses.

discretionary accruals over a specific period. The fourth measure, *EM4*, assesses a firm's tendency to avoid reporting small losses.

The descriptive analysis indicates that all four earnings management measures are strongly related to firm exchange rate exposure, nonetheless in different directions. Firms that are more aggressive in smoothing their incomes, as measured by *EM1* and *EM2*, or that are more averse to report small losses, as assessed by *EM4*, tend to show lower exchange rate exposure, the finding of which is consistent with our hypothesis. To the contrary of our expectation, those firms with higher level of discretionary accruals (*EM3*) exhibit higher exchange rate exposure. Further analysis is required to resolve this inconsistency.

After controlling for other corporate factors of exchange rate exposures, the panel regressions find that a more aggressive earnings management as revealed by the level of income smoothing (*EM1* and *EM2*) or by the tendency of avoiding small loss reporting (*EM4*) does show to be associated with lower exchange rate exposures. This evidence is consistent with our hypothesis that earnings management mitigates firm exchange rate risk exposures. However, the other earnings management measure that proxies for the magnitude of discretionary accruals (*EM3*) still demonstrates a positive relationship between earnings management and stock return exchange rate exposure, a result inconsistent with our hypothesis. These results are not materially changed when other sample is considered, e.g. large firms, small firms and firms with zero foreign sales reporting. We re-examine the relation between firm exchange rate exposure and the earnings management measures at a fixed point in time, i.e., for single sample window one at a time. The two income smoothing measures become the only measures exhibiting a prevailingly significant result, a result consistent with our hypothesis.

Finally, we examine whether the effect of earnings management on firm exchange rate exposure remains the same during favorable and unfavorable periods of currency movements. Two hypotheses are proposed to explain a firm's earnings management behaviors and their impact on the observed exchange rate exposure. Our evidence indicates that the effects of earnings management activities, especially those

aiming to smooth reported income, become more pronounced during adverse operating conditions. This is consistent with the opportunistic earnings management hypothesis, which suggests that firms tend to engage in more earnings management to stabilize their reported earnings during unfavorable periods, however, they may choose not to mask the beneficial operating results of favorable periods.

This paper contributes to the literature by offering a plausible explanation for the failure of finding strong evidence of priced exchange rate risk for U.S. stocks. In addition, our empirical results provide implications for the information contents of the correlation between accruals and cash flows. To a certain extent, the result from our second income smoothing measure is consistent with the argument that a greater correlation between accruals and cash flows implies earnings management.

The remainder of this paper is organized as follows. Section 2 describes our methodology to measure firm exchange rate exposure and earnings management. Section 3 examines the effect of earnings management on firm exchange rate exposure and Section 4 concludes.

2. Measuring exchange-rate exposure and earnings management

Inconsistent with common intuition and expectation, existing empirical studies do not find significant evidence that the currency exchange rate risk is priced for U.S. corporations. This paper proposes to explain this paradox with the earnings management activities employed by firms. Since the behaviors of manipulating earnings would mask a firm's real performance subject to unexpected exchange rate movements, investors may not evaluate accurately and timely the impact of exchange rate changes on a firm's market value. This then leads to the observed weak linkage between exchange rate changes and contemporaneous stock returns. This section describes the measure of firm exchange rate exposure and the proxy variables to assess the extent to which managers manipulate earnings using their financial reporting decisions.

2.1 Estimating a firm's exchange-rate exposure

Dumas (1978), Hodder (1982), and Adler and Dumas (1984) define a firm's exchange rate exposure as the sensitivity of a firm's market value to unexpected exchange rate variations.[3] Adler and Dumas (1984) thereupon suggest that a firm's exchange-rate exposure can be best measured as the regression coefficient of the firm's market value on the contemporaneous foreign exchange rate(s). Jorion (1990) further includes the market return in the regression equation to measure the exchange rate exposure.[4]

This study modifies the previous market-model based regression and instead employs the three-factor model suggested by Fama and French (1993). Moreover, as Amihud (1994) and Bartov and Bodnar (1994) document that lagged changes in foreign currency exchange rate demonstrate a significant effect on contemporaneous stock returns, we also include the lagged exchange rate change in the regression equation to incorporate the possible delay in the market's reaction to exchange rate fluctuations. The regression model used in this study to estimate a firm's exchange-rate exposure is as follows.

$$R_{it} - R_{ft} = \beta_i^0 + \beta_i^{fx} FX_t + \beta_i^{lagged-fx} FX_{t-1} + \beta_i^m (R_{mt} - R_{ft}) + \beta_i^{SMB} SMB_t + \beta_i^{HML} HML_t + \varepsilon_{it} \qquad (1)$$

In the regression, R_{it} is the stock return of firm i in period t, R_{ft} is the risk-free rate in period t, FX_t is the percentage change of the trade-weighted exchange rate index, measured as foreign currency per one unit of U.S. dollar in period t, FX_{t-1} is the lagged percentage change in the exchange rate, R_{mt} is the return on the market portfolio, SMB_t is the difference in the returns between value-weighed portfolios of small and big stocks, and HML_t is the difference in the returns between value-weighted portfolios of high

[3] Adler and Dumas (1984) define exchange rate exposure without suggesting there exists certain causation between stock prices and exchange rates, instead, both variables are endogenously determined. However, it can be safely assumed that exchange rates are exogenous for an individual firm [see also He and Ng (1998) and Allayannis and Ofek (2001)].

[4] Many other related studies applied similar methodology. See, e.g. Jorion (1990, 1991), Amihud (1994), Bodnar and Gentry (1993), Allayannis (1996), He and Ng (1998), Allayannis and Ofek (2001) and Doidge, Griffin and Williamson (2002).

book-to-market stocks and low book-to-market stocks.[5]

To estimate stock return exchange-rate exposure, the selection of an appropriate measurement of foreign currency exchange rate, e.g. a trade-weighted exchange rate index or a bilateral currency exchange rate, has been a debatable question. It is common for a firm exposed to more than one currency [e.g., see Adler and Dumas (1984)]. However, the simultaneous inclusion of multiple bilateral exchange rates could encounter a multi-collinearity problem. This paper thus chooses to use the Bank of England nominal trade-weighted exchange rate index to estimate the exchange rate exposures. The nominal, instead of real, exchange rate is applied here. This follows the considerations that the gains and losses from foreign currency transactions recognized in the accounting report are determined primarily based on nominal exchange rate changes and that the strategies employed by firms to mitigate the effect of adverse exchange rate fluctuations are more likely considered on nominal basis.

Adler and Dumas (1984) suggest that the exchange-rate exposure may vary over time.[6] This study estimates each firm's exchange-rate exposure over a three-year sample window with monthly return data and re-estimates the exposures as the 3-year window rolls forward. Five-year sample windows are also tested and the results are not materially changed.

In equation (1), β_i^{fx} measures the contemporaneous exchange rate exposure of firm *i* for the specific three-year sample window while $\beta_i^{lagged-fx}$ measures the lagged response of exchange rate changes on the stock return.[7] Bartov and Bodnar (1994) demonstrate that lagged dollar changes are a significant variable in explaining current abnormal returns of their sample firms and suggest to use the combination of β_i^{fx} and $\beta_i^{lagged-fx}$ to measure the possible effect of given dollar changes. In light of this, we use the sum of β_i^{fx} and $\beta_i^{lagged-fx}$ to measure the exchange rate exposure of firm *i*. Note that an increase (a decrease) in the

[5] We would like to thank Professor Fama and French for sharing the three-factor data on French's website.
[6] See also Jorin (1990) and Allayannis (1997)
[7] The coefficients in equation (1) are estimated based on ordinary least-squares regression, and the standard errors are adjusted for heteroskedasticity and autocorrelation.

BOE trade-weighted index indicates a U.S. dollar appreciation (depreciation). Firms with positive combined exposures are regarded as net importers since the dollar appreciation is expected to show favorable (positive) effect on the firm stock returns. Conversely, firms with negative combined exposures are regarded as net exporters since the dollar appreciation is expected to have adverse (negative) effect on the firm stock returns.

2.2 Measures of the Engagement of Earnings Management

This paper attempts to offer another explanation, based on firms' engagement of earnings management, for the lack of strong evidence of significant relationship between dollar fluctuations and stock returns. Exchange rate shocks affect the sales and costs of products and thus a firm's long-term operating cash flows. Exchange rate movements also affect the domestic value of a cash flow when it is denominated in foreign currency. A firm may adopt business hedging or financial hedging schemes to reduce the effect of exchange rate shocks on operating performance. The literature on optimal hedging theory has offered firm characteristics that are associated with those firms with strong motivation to hedge.

However, firms often cannot or will not fully hedge away their exchange rate risk due to either implementation constraints or possible negative effect on firm performance. CEOs of these firms thus have strong incentives to conceal the impact of unexpected exchange rate fluctuations through earnings management. If managers do undertake earnings management activities to window-dress their reported operating performance, investors cannot accurately and timely evaluate a firm's exchange rate exposure. This then leads to the documented insignificant contemporaneous relations between exchange rate changes and stock returns. We thus hypothesize that those firms engaged with greater magnitude of earnings management expect to experience with lower exchange rate exposure.

One needs first to define appropriate measures of earnings management to test this earnings management hypothesis. In the literature of earnings management, the modified Jones (1991) model is

widely applied to measure the magnitude of earnings management when earnings management is examined in relation to particular corporate events[8]. Since foreign currency activities are long-term ongoing events for a firm, the modified-Jones model is apparently inappropriate and difficult to implement. Alternatively, Leuz, Nanda, and Wysocki (2003) proposed four firm-level measures of earnings management, which capture different scopes of firm earnings management, including that managers can take actions to manipulate earnings and that managers can avoid reporting firms' actual activities. In this study we modify their measures to assess the magnitude of earnings management at firm level. The following describes the four earnings management measures used in our empirical analysis.

The first and second measures, EM1 and EM2, evaluate a firm's degree of earnings management based on the smoothing of its reported earnings. A third measure, EM3, assesses a firm's level of discretionary accruals. Leuz et al. use the ratio of absolute value of accruals deflated by cash flows from operations to estimate the relative level of manipulated accruals. This ratio however does fully reflect the actual magnitude of discretionary accruals. This paper thus calculates the discretionary accruals generated from the modify Jones model to replace the EM3 being used in the study of Leuz et al..

EM1 – Degree of income smoothing: the relative volatility of operating earnings and operating cash flow

When exchange rate fluctuations result in losses in firm operating income, managers may be motivated to increase reported earnings through accrual adjustments. It follows that firm exchange rate exposure may be reduced through earnings smoothing. To modify the EM1 from Leuz, Nanda, and Wysocki (2003), which used the measure to evaluate the country-wide earnings management, we calculate for each firm a ratio of the standard deviation of quarterly operating earnings over the standard deviation of quarterly operating cash flow. These two standard deviations are estimated from a three-year window

[8] The modified Jones model has been widely applied for testing those events including IPO, SEO, LBO, Reverse LBO among others. Those studies usually assume that prior to an event a firm has a normal magnitude of accruals. Based on the modified Jones model, the degree of earnings management is proxied by a firm's discretionary accruals, which is defined as the difference between a firm's actual accruals and its expected accruals. In the application, the expected accruals of a firm are estimated by the accruals of a set of matched firms.

during which a firm's exchange rate exposure is estimated. To control for the effect of firm size, both operating earnings and cash flows from operations are scaled by lagged total assets. A lower EM1 ratio indicates a greater accounting discretion exercised by managers and thus a higher degree of earnings management. EM1 is calculated as follows:

$$EM1 = \frac{\sigma\left(IB_{it} / TA_{i,t-1} \right)}{\sigma\left(OANCF_{it} / TA_{i,t-1} \right)} \quad , \tag{2}$$

where IB is the quarterly earnings before extraordinary items and discontinued operations, OANCF is the quarterly operating cash flow, and TA is quarterly total assets.

EM2 – Degree of income smoothing: the correlation between changes in accruals and changes in operating cash flows

Managers may use accruals to diminish economic shocks to the firm's cash flows from operations. Since cash flow shocks may be adjusted by accounting accruals, there is a negative correlation between changes in accruals and cash flows from operations. Our second measure (EM2) is the contemporaneous correlation between changes in accruals and changes in cash flows from operations. A larger EM2 value indicates a higher correlation in absolute value, which suggests that managers have exercised greater accounting discretion to smooth earnings.

The expected relation between EM2 and exchange rate exposure is not as clear as EM1 since there has been no consensus on the information contents about earnings quality conveyed by the correlation between accruals and cash flows. Dechow and Dichev (2002) suggest that the negative correlation between accruals and cash flows is associated with earnings quality. However, there is no conclusion as to whether EM2 is positively or negatively related to earnings quality [see, e.g. Dechow and Dichev (2002), Leuz, Nanda, and Wysocki (2003) and Wysocki (2005)]. If EM2 is positively associated with earnings quality, we would expect its corresponding estimated exchange rate exposure should be high and thus result in a negative

relation between exchange rate exposure and EM2. In contrast, if the absolute value of EM2 can be interpreted as an indicator of earnings management, it would be expected that a firm with more the absolute value of EM2 will take lower exchange rate exposure. That is, it results in a positive relation between the absolute value of EM2 and exchange rate exposure. In light of this, our empirical evidence thus has implications for the information contents about earnings quality shed from the correlation between accruals changes and cash flow changes. Quarterly data of total accruals and operating cash flows are used to calculate EM2 of individual firm for the 3-year window during which a firm's exchange rate exposure is estimated. Both changes in accruals and changes in cash flows are scaled by lagged total assets.

EM3 - Average magnitude of discretionary accruals

In addition to earnings smoothing, managers may use discretional accruals to manipulate the firm performance. Managerial discretion in the accruals system provides managers with opportunities to manipulate earnings. Through accrual adjustments, managers may increase current reported earnings while have the discrepancies recovered from future reported earnings. For the purpose of analysis, total accruals (*TAC*) can be decomposed into nondiscretionary accruals (*NDAC*) that are correlated with firm performance, and discretionary accruals that may cause earnings to be systematically managed. Our third measure of earnings management (EM3) is to measure the degree of earnings management based on the magnitude of discretionary accruals (DAC). Here, discretionary accruals are defined as the difference between total accruals and nondiscretionary accruals[9]. We use the modified cross-sectional Jones (1991) model to estimate those nondiscretionary accruals that are dictated by firm conditions and independent of managerial manipulation.[10] An ordinary least squares regression of current accruals for a given year is regressed on the change in sales and the level of property, plant and equipment (PP&E) for that year using all matching

[9] Nondiscretionary accruals present the normal level of total accruals that is associated with sales and investments of fixed assets.

[10] This cross-sectional model has been widely applied to estimate expected accruals, including Teoh et al. (1998a, 1998b), Dechow, Sloan, and Sweeney (1995), and Richardson (2000).

firms in the same two-digit SIC code (?). This intra-industry cross-sectional regression is estimated for each year over the sample period from 1992 to 2002. All variables, including the intercept term, in the cross-sectional regression are deflated by the total assets of prior year to reduce the heteroskedasticities. The regression is as follows:

$$\frac{TAC_{jt}}{TA_{j,t-1}} = \alpha_0\left(\frac{1}{TA_{j,t-1}}\right) + \alpha_1\left(\frac{\Delta REV_{jt}}{TA_{j,t-1}}\right) + \alpha_2\left(\frac{PP\,\&\,E_{jt}}{TA_{j,t-1}}\right) + \varepsilon_{jt} \qquad (3)$$

where $TA_{j,t-1}$ is the total assets in year $t-1$, $\Delta REV_{j,t}$ is the change in sales in year t for firm j, $TAC_{j,t}$ is total accruals of firm j and is the difference between net income and cash flows from operation, and $PP\&E_{j,t}$ is the gross property, plant, and equipment of firm j in year t.

The nondiscretionary total accruals scaled by assets (*NDAC*) and the discretionary total accruals scaled by assets (*DAC*) are computed as:

$$NDAC_{it} = \hat{\alpha}_0\left(\frac{1}{TA_{i,t-1}}\right) + \hat{\alpha}_1\left(\frac{\Delta REV_{it} - \Delta AR_{it}}{TA_{i,t-1}}\right) + \hat{\alpha}_2\left(\frac{PP\,\&\,E_{it}}{TA_{i,t-1}}\right) \qquad (4)$$

$$DAC_{it} = \left(\frac{TAC_{it}}{TA_{it}}\right) - NDAC_{it} \qquad (4)$$

where ΔAR_{it} is the change in account receivables for sample firm i, $\hat{\alpha}_0, \hat{\alpha}_1, and\ \hat{\alpha}_2$ of equation (4) denote estimates of $\alpha_0, \alpha_1, and\ \alpha_2$ from equation (3). The *DAC* is our third choice of earnings management measure - EM3. EM3 is expected to be positively related to a firm's estimated exchange rate exposure if managers frequently manipulate their firm's reported earnings through adjusted accruals.

EM4 – Degree of small loss aversion

Hayn (1995) demonstrates that the volume of firms reporting small profits largely dominate those

firms reporting small losses. Degeoreg et al (1999) and Burgstahler and Dichev (1997) suggest that the overwhelmingly majority of small-profits reporting can be attributed to earnings management. Burgstahler and Dichev (1997) and Leuz, Nanda, and Wysocki (2003) use the ratio of firms reporting small profits to firms with small reported losses to measure the degree of earnings management on the country level. However, Dechow, Richardson and Tuna (2003) make a caution of this as they cannot find evidence that firms utilize discretionary accruals to prevent small-loss reporting (check). In order to adapt this measure to our firm level assessment of earnings management, this study uses the ratio of the numbers of quarters with small loss reporting to the total number of quarters with non-missing profits and losses data as a measure of a firm's tendency to avoid reporting small losses. To calculate EM4, we require the sample firm to have at least ten quarters with non-missing profits or losses data within the sample window corresponding to the estimation of exchange rate exposure. This measure is designed based on the following two assumptions: first, firms are unwilling to recognize losses in their accounting report. Second, a small loss is much easier to be altered than a large loss. Based on the two assumptions, those firms that do not avoid recognizing small losses in their accounting report are expected to engage less in earnings management. A higher score of EM4 thus implies a lower level of earnings management and expects to be associated with a higher exchange rate exposure. Small losses are defined to be in the range [−0.01, 0.00) and small profits are defined to be in the range [0.00, 0.01]. In order to compute a reliable ratio, we require at least ten quarterly observations of losses and profits for a firm.

2.3 Sample selection and descriptive statistics

Our sample covers those non-financial firms in *COMPUSTAT*. To be included in the sample, firms must have average total assets greater than 500 million dollars over the sample period and have positive foreign sales. The total sample period extends from 1992 to 2002. It is divided into nine overlapped sub-periods each covering three years. Only those firms with non-missing data of price series, total assets,

total sales, and market value over the total sample period are included in the final sample.

Previous studies have documented significant evidence of earnings management at the time of IPOs [see Teoh, Welch and Wong (1998a) and Teoh,Wang, and Rao (1998)]. Our sample excludes those firms that went public after January 1, 1991 and only those with non-missing data on price series are included in the final sample. This criterion mitigates the potential bias due to the earnings management activities before IPOs. Each sample firm's exchange rate exposure is estimated by equation (1) using monthly return data, which are collected from the *CRSP* database. We use the *CRSP* value-weighted index return of the NYSE, AMEX, and NASDAQ composite indexes to proxy for the market return. The US dollar trade-weighted exchange rate by Bank of England is retrieved from the *Datastream* database.

Following earlier studies, our sample includes those firms with non-zero foreign sales, a preliminary indicator for a firm's foreign involvement. Using a sample with a profile similar to previous studies allows us to compare the empirical results and test our hypothesis.

Descriptive statistics

Table 1 reports the descriptive statistics of the exchange-rate exposures estimated from equation (1) and the firm factors considered for determining firm exchange rate exposures. The absolute value of the sum of β_i^{fx} and $\beta_i^{lagged-fx}$ represents a firm's exchange rate exposure. Panel A shows that the mean and median absolute value of combined exposure, $|\beta_i^{fx} + \beta_i^{lagged-fx}|$, for all firms is equal to 1.070 and 0.786. As shown in Panel B and Panel C, the mean combined exposure for firms with positive combined exposure (net importers) and for firms with negative exposure (net exporters) is 1.008 and 1.119, respectively. Note that the foreign sales ratio, export sales ratio and firm size are roughly the same between positive and negative exposure firms. Table 1 also reports the summary statistics for our four earnings management measures. The two income smoothing measures (EM1 and EM2) of positive exposure firms are slightly greater than those of negative exposure firms. Since higher scores of EM1 and EM2 imply lower degree of

earnings management, this result indicates that net importers on average engage less in earnings smoothing than net exporters. The other two earnings management measures (EM3 and EM4) do not materially differ between positive exposure firms and negative exposure firms.

[Insert Table 1 Here]

Earnings management and exchange rate exposure: a preliminary analysis

Prior researches did not find a prevailing evidence of a significant relationship between exchange rate fluctuations and contemporaneous stock returns even when the samples were limited to firms with certain level of foreign involvement. This study tests the hypothesis that the observed weak linkage between exchange rate changes and stock returns is at least partly attributable to the earnings management.

[Insert Table 2 Here]

Table 2 presents the preliminary analysis, without controlling for other factors, of the relationship between earnings management and exchange rate exposure. We partition the sample firms into quartiles (Q1, Q2, Q3 and Q4) based on the scores of each earnings management measure. Note that for the two income smoothing measures (EM1 and EM2), higher scores imply less earnings management. On the contrary, for the magnitude of discretionary accruals measure (EM3), higher scores imply a more aggressive earnings management. We put those firms with the highest level of earnings management in Q4 and those with the lowest level of earnings management in Q1. For the small-loss aversion measure (EM4), the sample firms are partitioned into two groups, namely Zero and Non-Zero. The Zero group contains those firms never reporting small quarterly losses during the 3-year window and the Non-zero group consists of those firms reporting small losses in more than one quarter during the same period. Firms in the Zero group are regarded as conducting an aggressive earnings management and those in the Non-Zero group are regarded as practicing a conservative earnings management. Based on our hypothesis that earnings management reduces firm exchange rate exposure, we expect those firms in Q1 and Non-zero

group to have greater exchange rate exposure while those firms in Q4 and Zero group to have lower exchange rate exposure.

Panel A of Table 2 reports the distribution of exchange rate exposure across earnings management quartiles for the entire sample firms. All earnings management measures, with the exception of EM3, exhibit a relationship with exchange rate exposure consistent with our hypothesis. Taking the example of our first income smoothing measure, EM1, the mean exchange rate exposure is equal to 1.380, 1.050, 0.947 and 0.851 for those firms in the group of Q1 (most conservative), Q2, Q3, and Q4 (most aggressive), respectively. Similar patterns exist when $|\beta_i^{fx}|$ and $|\beta_i^{lagged-fx}|$ are considered separately. The evidence from income smoothing measures is consistent with our hypothesis that a more aggressive earnings management will decrease a firm's observed exchange rate exposure. The results of the small-losses aversion measure (EM4) also support our earnings management hypothesis. The mean exchange rate exposure, $|\beta_i^{fx} + \beta_i^{lagged-fx}|$, is equal to 1.190 and 0.963 for Non-zero (conservative) group and Zero (aggressive) group. Unlike other measures, the statistics of EM3, the most commonly used indicator of earnings management, exhibits different pattern and are contrary to our hypothesis. The mean exchange rate exposure, $|\beta_i^{fx} + \beta_i^{lagged-fx}|$, for Q1 (most conservative), Q2, Q3, and Q4 (most aggressive) is equal to 0.828, 0.984, 1.1049 and 1.341. This indicates that firms with higher magnitude of discretionary accruals tend to have higher observed exchange rate exposure. Same tendency is found when $|\beta_i^{fx}|$ and $|\beta_i^{lagged-fx}|$ are considered separately. The paradoxical results thus call for the testing the effect of earnings management on firm exchange rate exposure when other related variables are accounted for.

3. Exchange-rate exposure and earnings management: a regression model

The preliminary analysis in previous section reveals that there exists linkage between earnings management and estimated exchange rate exposure, although various earnings management measures proxy

for different earnings management behaviors exhibit inconsistent patterns. In this section, we examine the impact of earnings management on a firm's estimated exchange rate exposure while controlling for other variables related to firm exchange rate exposure. We hypothesize that earnings management reduces a firm's estimated exchange rate exposure if earnings management masks a firm's real performance.

3.1 **Existing Hypotheses/Theories on Firm Factors Determining Exchange Rate Exposure**

Due to the failure in uncovering a significant relation between exchange rate changes and stock returns, many studies had focused on the determinants of exchange-rate exposure [e.g. Jorion (1991), Amihud (1994), Bartov and Bodnar (1994), He and Ng (1998), Allayannis and Ofek (2001), Marston (2001) and Doidge et al. (2002)]. Building on existing studies, two groups of factors are suggested and found as important determinants affecting a firm's exchange-rate exposure: the level of foreign involvement and hedging activities.

The level of foreign involvement

It is a consensus that the level of a firm's foreign involvement or international activities is an important determinant of firm exchange rate exposure. Many studies have documented that firms with greater foreign involvement are exposed to higher exchange rate risk [e.g. Jorion (1991), He and Ng (1998), Allayannis and Ofek (2001) and Doidge et al. (2002)]. Considering the data availability, this study uses firm size (*SIZE*), the export ratio (*EXPORT*), and the foreign sales ratio (*FSALE*) as control variables representing a firm's foreign involvement.

Theory of optimal hedging

Dumas (1978) is one of the earliest researchers suggesting that the actual impact of exchange rate risk on firm value is not only determined by a firm's international activities but also by its engagement of

hedging, both financial and operating hedging activities. Indeed, a company may utilize financial instruments as well as operating diversification to mitigate the cash flow fluctuations due to exchange rate changes. In an imperfectly competitive market, stock prices should reflect a firm's expected hedging activities. A negative relation expects to be observed between the exchange rate exposure and the hedging activities. Existing studies have substantiated the hypothesis and find that U.S. corporations use financial instruments to mitigate their exposure to exchange rate fluctuations. [see Rawls and Smithson (1989), Dolde (1993), Allayannis and Ofek (2001), and Allayannis and Weston (2001)].

Prior literature associated with theories of optimal hedging has suggested several hypotheses to explain why a firm engages in hedging. First, hedging can reduce the transaction costs of financial distress and then mitigate the probability of bankruptcy. Firms with greater probability of or higher transaction cost from financial distress are thus more motivated to undertake hedging activities. [see Smith and Warner (1979), Smith and Stulz (1985), Nance et al. (1993), and Geczy et al. (1997)]. This study includes financial leverage, ROA and dividend yield to control a firm's hedging incentives for mitigating its costs or probability of financial distress. Firms with higher financial leverage, lower ROA[11] and higher dividend yield are classified as being suffered higher financial distress cost or probability and are expected to undertake more hedging activities to reduce exchange rate exposure.

Second, Froot et al (1993) extends Myers' (1977) agency cost hypothesis and suggests that the underinvestment problem can be mitigated by hedging as hedging activities reduce the cash flow volatility and thus make external financing less costly. This study employs the following variables to control for a firm's incentives to reduce its underinvestment problems: the market-to-book ratio (MB), R&D expenditure as a ratio of sales (*R&D*) [12] and dividend yield (div). Firms with higher market-to-book ratio, higher R&D expenditure ratio and lower dividend yield are expected to engage in more hedging activities and thus are associated with lower exchange rate exposure.

[11] See Nance et al. (1993) and He and Ng (1998).
[12] The R&D expenditure is mostly missing for our sample firms. We also use capital expense ratio to proxy for firm growth opportunity, and the results generally remain unchanged.

Finally, the hedging costs also affect a firm's decision to use hedging instruments. Due to the large start-up costs, a firm's hedging incentives are subject to economies of scale. Size, already included as a proxy for a firm's foreign involvement, is also considered as a control variable for a firm's relative hedging costs. Under this consideration, firms with larger size are associated with lower hedging costs and are more motivated to engage in hedging.

Business hedging

This study also recognizes that the hypotheses of hedging incentives and activities derived from optimal hedging theories also apply to operating hedging. A firm may typically mitigate its exchange rate exposure by geographic or business diversification. *COMPUSTAT* provides two kinds of diversification data, the number of geographic segments and business segments in which a firm is engaged. We focus on business segments since the number of geographic segments tends to be significantly correlated with foreign sales ratio and firms with more geographic segments tend to have higher exchange rate exposure. We would expect that firms engaging in greater number of business segment can diversify their currency risk and thus have lower exchange rate exposure. When a firm is engaged in multiple business segments, the dummy variable, *Dseg*, is set to 1 and 0 otherwise.[13] This variable proxies for the diversification of a firm's cash flow sources, and thus the degree of business hedging. It is expected that *Dseg* will be negatively correlated with firm currency risk exposure.

3.2. The Panel Regression

A two-stage framework similar to He and Hg (1998) and Allayannis and Ofek (2001) is employed to further document the impact of earnings management on a firm's exchange rate exposure while controlling other factors related to exchange rate exposure. Differing from He and Hg (1998) and Allayannis and Ofek

[13] Lang and Stulz (1994), Berger and Ofek (1995), and Allayannis and Weston (2001) have applied a similar measure to serve as a proxy for a firm's industrial diversification, and examine its relationship with firm value. Allayannis and Weston (2001) find that industrial diversification increases firm value, which is consistent with our hypothesis.

(2001), we apply the approach repeatedly over a longer sample span, instead of a single fixed period. That is, for each year *t* when the control variables proxy for a firm's foreign involvement and hedging activities are recorded, we estimate each firm's exchange rate exposure and the four earnings management measures from the three years window (year *t-1* to year *t+1*) surrounding year *t*. In the first stage, Eq. (2) is used to estimate individual firm's exchange rate exposure for each three-year window. Earnings management measures are also calculated for the corresponding window over which exchange rate exposure is estimated. Since our sample period covers 11 years, we construct a total of 9 partial overlapping three-year windows, 1992-94, 1993-95, 1994-96, 1995-97, 1996-98, 1997-99, 1998-2000, 1999-2001 and 2000-2002 respectively. In the second stage, we regress a firm's exchange rate exposure estimated from first stage on the earnings management measures and the control variables with a panel regression model as follows:

$$\left|\hat{\beta}_{i,j}^{fx} + \hat{\beta}_{i,j}^{lagged-fx}\right| = \sum_{j=1}^{J} D_j \gamma_{0,j} + \gamma_{1,j} SIZE_{i,j} + \gamma_{2j} Dseg_{i,j} + \gamma_{3,j} DAT_{i,j} + \gamma_{4,j} ROA_{i,j} + \gamma_{5,j} DIV_{i,j} + \gamma_{6,j} MB_{i,j} + \gamma_{7,j} RD_{i,j} + \gamma_{8,j} EXPORT_{i,j} + \gamma_{9j} Fsale_{i,j} + \gamma_{10j} EM_{i,j} + \varepsilon_{i,j} \quad , \qquad (5)$$

where $\left|\hat{\beta}_{i,j}^{fx} + \hat{\beta}_{i,j}^{lagged-fx}\right|$ is the measure of combined exchange rate exposure as estimated from equation (1) for firm *i* during window *j*. This method takes advantage of time-varying estimates of exchange rate exposure and earnings management measures generated from our moving window calculations, and yields greater testing power due to the expanded observations. A Feasible GLS is implemented to account for possible autocorrelations in the residuals.

3.3. Empirical results

Table 3 presents the regression results of equation (3), which tests the relation between earnings management and estimated exchange rate exposure while controlling for variables related to a firm's

foreign involvement and hedging incentives. In the first column of Table 3, the independent variables are ordered as factors associated with a firm's foreign involvement, hedging incentives, and earnings management. We hypothesize that the market or investors cannot accurately evaluate a firm's exchange rate exposure if the firm engages in earnings management to mask its true performance subject to exchange rate changes. The estimated exchange rate exposure is thus expected to be negatively related to earnings management level. Our analyses focus on the sign and significance of the four earnings management measures. The second column in Table 3 lists the expected sign of the four earnings management measures). Panel A of Table 3 lists the results for all firms. Consistent with our expectation, the two income smoothing measures, EM1 and EM2, are significantly and positively related to estimated combined exchange rate exposure no matter other earnings management measure(s) is/are included or not. Since lower scores of EM1 and EM2 imply higher degree of earnings management and are hypothesized to be associated with lower exchange rate exposure. The positive relation between income smoothing measures and exchange rate exposure thus indicate that the earnings management activities for income smoothing purposes do reduce exchange rate exposure being estimated by stock market. The results of small-loss avoidance measure, EM4, also significantly support our hypothesis. We find that EM4 is also positively related to exchange rate exposure in all regression combinations. On the other hand, the significance of the magnitude of discretionary accruals measure, EM3, is much lower than other earnings management measures. This is consistent with our expectation. However, the sign of EM3 are positive in all regression combinations, this is still a confusing results indicating that the higher magnitude of discretionary accrual is associated with the higher estimated exchange rate exposure.

[Insert Table 3 Here]

Panel B of Table 3 shows the results for positive exposure firms (net importers). Consistent with the hypothesis, firms with higher EM1, EM2 and EM4 are positively related estimated exchange rate exposure. On the contrary, the results of EM3 still do not support our hypothesis. Panel C of Table 3 shows the results

for negative exposure firms (net exporters). The results are similar to all firms and positive exposure firms. Other variables also exhibit significantly explanatory abilities, e.g., Size, dividend yield, R&D and financial leverage.

We also find some evidence in Table 3 while comparing positive and negative exposure firms. Among the foreign involvement factors, both export ratio and foreign sales ratio are positively and significantly related to exchange rate exposure for net exporters (firms with negative exposure). This is consistent with our expectation that higher foreign involvement will increase firm exchange rate exposure. On the contrary, the two foreign involvement variables are insignificantly related to exchange rate exposure for net importers (firms with positive exposure). Since the foreign revenues in excess of foreign costs will offset the benefits (losses) form the U.S. dollar appreciation (depreciation) and thus mitigate a net importer's exchange rate exposure, foreign sales is expected to be negatively or at least insignificantly related to a net importer's exchange rate exposure. The evidence thus confirms our methodology to partition sample firms into net importers or net exporters. This is important since some conjectures below depend on the correct partition of net importers and net exporters.

4. Summary

It has long been puzzled that studies do not offer a prevailing evidence of significant relationship between exchange rate risk and stock returns of U.S. corporations. This paper proposes that earnings management may be an important determinant of firm exchange rate exposure in that the market participants cannot correctly evaluate the impact of exchange rate changes on firm value when a firm is engaged in earnings manipulation. We thus hypothesize that firms employing greater levels of earnings management will reduce more of their exchange rate exposure assessed by the stock market.

This study estimates a firm's exchange rate exposure using the Fama-French three-factor model. The sum of current and lagged exposure coefficients is used to measure a firm's exchange rate exposure. We

calculate four earnings management measures at firm level by following the study of Leuz, Nanda, and Wysocki (2003).

Consistent with our hypothesis, firms engaged with more aggressive earnings management activities, especially those aiming at income smoothing, tend to have significantly lower exchange rate exposure. A further analysis finds that the effect of earnings management on firm exchange rate exposure becomes strengthened when the currency movements are adverse to firm earnings. This evidence supports the opportunistic earnings management hypothesis that managers only smooth their reported earnings during adverse periods while enjoy the profits during favorable periods.

Our results also have implications for the information contents about earnings quality shed from the correlation between accruals changes and cash flow changes. Our second income smoothing proxy, measured as the correlation between accruals changes and cash flow changes, is found significantly positively associated with exchange rate exposure. This indicates that to a certain extent, greater correlation between changes of accruals and changes of cash flow implies earnings management.

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Table 1
Summary Statistics of Exchange Rate Exposures and Firm Characteristics

The table reports the summary statistics for our sample of the non-financial *COMPUSTAT* firms with average total assets greater than 500 million dollars over the sample period and with foreign sales in excess zero. The total sample period extends from 1992 to 2002. Panel A presents the descriptive statistics for the total sample. Panel B and Panel C present the descriptive statistics for firms with positive combined exposure (net importers) and firms with negative combined exposure (net exporters). The exposure coefficients are estimated by Eq. (2) using monthly return data. *SIZE* is the logarithm of a firm's market value at fiscal year end. *Export sales ratio* is a firm's annual exports over total sales. *Foreign sales ratio* is a firm's annual foreign sales over its total sales. EM1 is calculated as the a firm's standard deviation of quarterly operating earnings over the standard deviation of quarterly operating cash flow for a three-year window during which exchange rate exposure is estimated (both operating earnings and cash flow from operations are divided by lagged total assets). EM2 is the correlation between accruals changes and cash flow changes (both accruals changes and cash flow changes are divided by lagged total assets). EM3 is the average absolute value of yearly discretionary accruals scaled by lagged total assets. The discretionary accruals are estimated using Modified Jones model. EM4 is the ratio of the numbers of quarters with small-loss reporting to the total number of quarters with non-missing profits and losses data for the three-year window. N* is the number of significant coefficients estimated from Eq. (2). N*(%) is the percentage of firms with significant exposure coefficient at the 10% level.

Panel A: Firms with Foreign Sales > 0

	No. obs.	Mean	Std. Dev.	Q1(25%)	Median	Q3(75%)	N*	N*(%)
$\lvert \beta_i^{fx} + \beta_i^{lagged-fx} \rvert$	3946	1.070	1.005	0.350	0.786	1.460		
$\lvert \beta_i^{fx} \rvert$	3946	0.855	0.828	0.285	0.623	1.160	853	21.62%
$\lvert \beta_i^{lagged-fx} \rvert$	3946	0.818	0.846	0.257	0.576	1.093	705	17.87%
SIZE	3938	8.398	1.451	7.315	8.237	9.363		
Total sales	3946	7788	16641	1127	2469	7422		
Export sales ratio	3946	3.766	8.834	0	0	2.721		
Foreign sales ratio	3946	36.874	24.345	17.182	33.195	51.180		
EM1	3157	0.334	0.383	0.122	0.214	0.387		
EM2	3125	-0.936	0.137	-0.996	-0.987	-0.946		
EM3	2917	0.056	0.073	0.025	0.039	0.065		
EM4	3371	0.062	0.103	0	0	0.0833		

Panel B: Firms with Foreign Sales > 0 and Positive Combined Exposures

	No. obs.	Mean	Std. Dev.	25%	Median	75%	N*	N*(%)
$\lvert \beta_i^{fx} + \beta_i^{lagged-fx} \rvert$	1752	1.008	0.947	0.326	0.742	1.413		
$\lvert \beta_i^{fx} \rvert$	1752	0.837	0.849	0.257	0.585	1.161	319	18.21%
$\lvert \beta_i^{lagged-fx} \rvert$	1752	0.819	0.772	0.281	0.611	1.104	312	17.81%
SIZE	1750	8.490	1.428	7.496	8.340	9.400		
Total sales	1752	7816	16938	1200	2573	7155		
Export sales ratio	1752	3.076	7.884	0	0	0		
Foreign sales ratio	1752	34.767	24.154	15.486	30.272	48.480		
EM1	1454	0.348	0.419	0.131	0.216	0.389		
EM2	1433	-0.933	0.148	-0.996	-0.986	-0.945		
EM3	1311	0.056	0.066	0.025	0.039	0.067		
EM4	1561	0.061	0.103	0	0	0.0833		

Panel C: Firms with Foreign Sales > 0 and Negative Combined Exposures								
	No. obs.	Mean	Std. Dev.	25%	Median	75%	N*	N*(%)
$\lvert \beta_i^{fx} + \beta_i^{lagged-fx} \rvert$	2194	1.119	1.047	0.382	0.835	1.493		
$\lvert \beta_i^{fx} \rvert$	2194	0.869	0.811	0.306	0.649	1.159	534	24.34%
$\lvert \beta_i^{lagged-fx} \rvert$	2194	0.817	0.902	0.242	0.548	1.082	393	17.91%
SIZE	2188	8.324	1.465	7.207	8.148	9.338		
Total sales	2194	7767	16403	1058	2368	7758		
Export sales ratio	2194	4.317	9.491	0	0	4.426		
Foreign sales ratio	2194	38.557	24.371	19.420	34.878	53.077		
EM1	1703	0.323	0.350	0.116	0.211	0.386		
EM2	1692	-0.938	0.128	-0.996	-0.987	-0.946		
EM3	1606	0.057	0.078	0.025	0.039	0.063		
EM4	1810	0.062	0.104	0	0	0.083		

Table 2

Preliminary Analysis of the Level of Earnings Management and Firm Exchange Rate Exposure

This table presents the mean absolute exchange rate exposure for earnings management quartiles. The calculations of EM1, EM2, EM3 and EM4 are as Table1.For each earnings management measures, sample firms are partitioned into quartiles based on the earnings management scores. Q1 contains those firms with the most aggressive earnings management level and Q4 contains firms with the most conservative earnings management level. For EM4, the sample firms are partitioned into two group, Zero and Non-zero. The Zero group includes those firms never reporting small quarterly losses during the 3-year window and the Non-zero group thus includes those firms reporting small losses in more than one quarters during the same period.

Panel A: All Firms

	EM1				EM2				EM3				EM4	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Non-zero	Zero
	Conservative		→	Aggressive	Conservative		→	Aggressive	Conservative		→	Aggressive	Conservative	→ Aggressive
$\lvert \beta_i^{fx} + \beta_i^{lagged-fx} \rvert$	1.380	1.050	0.947	0.851	1.378	1.070	0.975	0.795	0.828	0.984	1.049	1.341	1.190	0.963
	789	789	790	789	781	781	782	781	729	730	729	729	1303	2068
$\lvert \beta_i^{fx} \rvert$	1.125	0.834	0.762	0.648	1.099	0.856	0.758	0.650	0.610	0.743	0.859	1.116	0.982	0.748
	789	789	790	789	781	781	782	781	729	730	729	729	1303	2068
$\lvert \beta_i^{lagged-fx} \rvert$	1.070	0.823	0.744	0.628	1.050	0.839	0.753	0.631	0.596	0.752	0.796	1.018	0.969	0.712
	789	789	790	789	781	781	782	781	729	730	729	729	1303	2068

Panel B: Firms with Positive Combined Exposures

	EM1				EM2				EM3				EM4	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Non-zero	Zero
	Conservative		→	Aggressive	Conservative		→	Aggressive	Conservative		→	Aggressive	Conservative	→ Aggressive
$\lvert \beta_i^{fx} + \beta_i^{lagged-fx} \rvert$	1.292	1.059	0.903	0.794	1.269	1.033	0.945	0.769	0.829	0.936	0.926	1.314	1.171	0.906
	363	364	363	364	358	358	359	358	328	328	327	328	608	953
$\lvert \beta_i^{fx} \rvert$	1.146	0.858	0.718	0.624	1.118	0.869	0.686	0.653	0.572	0.737	0.789	1.185	1.005	0.725
	363	364	363	364	358	358	359	358	328	328	327	328	608	953
$\lvert \beta_i^{lagged-fx} \rvert$	0.936	0.872	0.781	0.673	0.914	0.825	0.806	0.698	0.640	0.757	0.778	1.000	0.940	0.727
	363	364	363	364	358	358	359	358	328	328	327	328	608	953

Panel C: Firms with Negative Combined Exposures

	EM1				EM2				EM3				EM4	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Non-zero	Zero
	Conservative		→	Aggressive	Conservative		→	Aggressive	Conservative		→	Aggressive	Conservative	→ Aggressive
$\lvert \beta_i^{fx} + \beta_i^{lagged-fx} \rvert$	1.454	1.048	0.984	0.895	1.468	1.083	1.005	0.833	0.827	1.023	1.129	1.381	1.207	1.013
	426	425	426	426	423	423	423	423	402	401	402	401	695	1115
$\lvert \beta_i^{fx} \rvert$	1.105	0.821	0.799	0.665	1.085	0.841	0.796	0.672	0.639	0.752	0.906	1.067	0.962	0.768
	426	425	426	426	423	423	423	423	402	401	402	401	695	1115
$\lvert \beta_i^{lagged-fx} \rvert$	1.179	0.782	0.676	0.630	1.163	0.837	0.707	0.591	0.563	0.745	0.802	1.041	0.995	0.700
	426	425	426	426	423	423	423	423	402	401	402	401	695	1115

Table 3
The Impact of Earnings Management on Firm Exchange Rate Exposure – A Panel Analysis

This table presents the panel regression results of the earnings management measures on firm exchange rate exposure. The sample firms contain the non-financial COMPUTSTAT firms with assets greater than $500 million and non-zero foreign sales for 1991-2002. A firm's exchange rate exposure is measured by the absolute value of combined exposure, $|\beta_i^{fx} + \beta_i^{lagged-fx}|$, estimated from Eq. (2). *SIZE* is the logarithm of a firm's market value at fiscal year end. *EXPORT* is a firm's annual exports over total sales. *FSALE* is a firm's annual foreign sales over its total sales. *DAT* is the debt ratio measured by total debt as a percentage of total assets. *ROA* is the pre-tax return on total assets. *DIV* is the dividend yield. *MB* is the market to book ratio. *R&D* is the R&D expense as a percentage of annual sales. *Dseg* is the dummy indicating firms with more than two business segments. White heteroskedasticity-consistent standard errors and covariance are used. Numbers in the parentheses under the coefficients are the associated t-statistics. '***', '**' and '*' indicate statistical significance at 1%, 5% and 10%, respectively. EM1, EM2, EM3 and EM4 are measured as Table 1.

Panel A: All Firms									
Size	-0.1120	-0.1133	-0.1025	-0.1157	-0.1052	-0.1021	-0.1102	-0.1035	-0.0992
	(-8.77)***	(-9.01)***	(-7.66)***	(-9.47)***	(-7.17)***	(-7.13)***	(-7.82)***	(-7.06)***	(-6.93)***
DAT	0.2294	0.3137	0.3225	0.2203	0.1930	0.2632	0.2220	0.1244	0.1712
	(1.95)*	(2.78)***	(2.61)***	(1.96)*	(1.44)	(2.05)**	(1.72)*	(0.92)	(1.32)
ROA	-0.3028	0.0302	-0.0667	-0.1701	-0.1292	0.1961	0.0572	0.0352	0.2754
	(-1.35)	(0.20)	(-0.40)	(-1.16)	(-0.52)	(1.13)	(0.34)	(0.14)	(1.59)
Div	-0.0722	-0.0705	-0.0775	-0.0711	-0.0733	-0.0711	-0.0725	-0.0698	-0.0670
	(-6.68)***	(-6.55)***	(-7.22)***	(-7.05)***	(-6.27)***	(-6.14)***	(-6.53)***	(-5.96)***	(-5.78)***
MB	0.0104	0.0013	-0.0225	0.0100	-0.0103	-0.0202	-0.0126	-0.0101	-0.0170
	(0.68)	(0.09)	(-1.45)	(0.71)	(-0.61)	(-1.27)	(-0.79)	(-0.59)	(-1.07)
R&D	1.0737	1.3086	1.6163	1.5377	1.0132	1.2614	1.5619	1.0502	1.2718
	(3.26)***	(4.13)***	(4.72)***	(4.95)***	(2.78)***	(3.63)***	(4.53)***	(2.89)***	(3.67)***
Export	0.3660	0.2976	0.3807	0.3514	0.3284	0.2663	0.3040	0.3164	0.2559
	(2.11)**	(1.76)*	(2.21)**	(2.15)**	(1.82)*	(1.52)	(1.74)*	(1.76)*	(1.46)
Fsale	0.2885	0.2936	0.2779	0.2736	0.2939	0.2730	0.3056	0.2910	0.2678
	(3.90)***	(4.03)***	(3.62)***	(3.98)***	(3.38)***	(3.21)***	(3.75)***	(3.36)***	(3.15)***
Dseg	-0.0292	-0.0221	-0.0375	-0.0457	-0.0464	-0.0424	-0.0555	-0.0517	-0.0494
	(-0.83)	(-0.64)	(-1.02)	(-1.32)	(-1.21)	(-1.13)	(-1.47)	(-1.35)	(-1.32)
EM1	0.2819				0.3049			0.2808	
	(6.15)***				(5.79)***			(5.29)***	
EM2		0.7303				0.8502			0.7878
		(5.61)***				(5.71)***			(5.26)***
EM3			0.7119		0.3463	0.2805	0.6997	0.3652	0.2973
			(2.42)**		(1.07)	(0.92)	(2.35)**	(1.14)	(0.98)
EM4				0.6950			0.8340	0.6879	0.7445
				(4.40)***			(4.42)***	(3.44)***	(3.87)***
Adj. R-sq	0.0908	0.0893	0.0780	0.0850	0.0911	0.0891	0.0907	0.0950	0.0941
n obs.	3144	3112	2904	3357	2618	2598	2751	2618	2598

Panel B: Firms with Positive Combined Exposures									
Size	-0.0672	-0.0691	-0.0677	-0.0731	-0.0646	-0.0599	-0.0636	-0.0596	-0.0543
	(-3.85)***	(-4.08)***	(-3.44)***	(-4.35)***	(-3.10)***	(-2.99)***	(-3.15)***	(-2.86)***	(-2.71)***
DAT	-0.0221	0.0859	0.0339	-0.0341	-0.0110	0.0888	-0.0311	-0.1031	-0.0089
	(-0.14)	(0.57)	(0.19)	(-0.22)	(-0.06)	(0.50)	(-0.17)	(-0.54)	(-0.05)
ROA	-0.3449	-0.1369	-0.7899	-0.6666	-0.2785	-0.0975	-0.5638	-0.1118	0.0786
	(-1.17)	(-0.52)	(-2.50)**	(-2.54)**	(-0.83)	(-0.31)	(-1.71)*	(-0.33)	(0.24)
Div	-0.0492	-0.0453	-0.0488	-0.0465	-0.0419	-0.0383	-0.0428	-0.0376	-0.0335
	(-3.73)***	(-3.49)***	(-3.71)***	(-3.78)***	(-2.96)***	(-2.77)***	(-3.17)***	(-2.65)***	(-2.42)**
MB	0.0032	-0.0076	-0.0042	0.0130	-0.0091	-0.0236	-0.0083	-0.0111	-0.0249
	(0.16)	(-0.39)	(-0.19)	(0.67)	(-0.39)	(-1.05)	(-0.36)	(-0.47)	(-1.11)
R&D	1.4079	2.0269	1.7518	2.1102	0.9143	1.6358	1.6689	0.8678	1.5869
	(3.15)***	(4.85)***	(3.79)***	(5.00)***	(1.85)*	(3.56)***	(3.57)***	(1.77)*	(3.47)***
Export	-0.0312	-0.2133	0.1785	-0.0153	0.0601	-0.0946	0.0897	0.0236	-0.1302
	(-0.12)	(-0.86)	(0.67)	(-0.06)	(0.22)	(-0.36)	(0.33)	(0.09)	(-0.50)
Fsale	0.1164	0.0814	0.1201	0.0973	0.1523	0.0574	0.1788	0.1489	0.0528
	(1.12)	(0.81)	(1.08)	(0.99)	(1.20)	(0.48)	(1.50)	(1.17)	(0.44)
Dseg	-0.0349	-0.0291	-0.0227	-0.0511	-0.0457	-0.0400	-0.0467	-0.0653	-0.0619
	(-0.70)	(-0.61)	(-0.43)	(-1.05)	(-0.83)	(-0.78)	(-0.85)	(-1.18)	(-1.19)
EM1	0.3458				0.3766			0.3512	
	(6.12)***				(5.65)***			(5.22)***	
EM2		0.7661				0.8717			0.8185
		(4.89)***				(4.81)***			(4.51)***
EM3			1.0424		0.3079	0.4941	1.1522	0.3942	0.5346
			(2.34)**		(0.64)	(1.10)	(2.55)**	(0.83)	(1.19)
EM4				0.6104			0.8713	0.7062	0.7579
				(2.88)***			(3.39)***	(2.69)***	(3.03)***
Adj. R-sq	0.0838	0.0829	0.0691	0.0745	0.0804	0.0797	0.0799	0.0860	0.0863
n obs.	1450	1430	1308	1557	1184	1172	1251	1184	1172

Panel C: Firms with Negative Combined Exposures									
Size	-0.1481	-0.1497	-0.1202	-0.1489	-0.1310	-0.1295	-0.1334	-0.1323	-0.1289
	(-8.19)***	(-8.34)***	(-6.69)***	(-8.63)***	(-6.48)***	(-6.52)***	(-6.92)***	(-6.56)***	(-6.50)***
DAT	0.5289	0.5770	0.5258	0.4719	0.4057	0.4312	0.3985	0.3540	0.3486
	(3.14)***	(3.58)***	(3.09)***	(2.98)***	(2.16)**	(2.40)**	(2.25)**	(1.88)*	(1.92)*
ROA	-0.1207	0.1563	0.1868	0.0450	0.1272	0.3541	0.2523	0.3366	0.3945
	(-0.36)	(0.86)	(0.99)	(0.27)	(0.35)	(1.78)*	(1.32)	(0.91)	(2.00)**
Div	-0.0948	-0.0950	-0.1074	-0.0978	-0.1093	-0.1058	-0.1069	-0.1059	-0.1020
	(-5.60)***	(-5.58)***	(-6.36)***	(-6.16)***	(-5.86)***	(-5.67)***	(-6.01)***	(-5.68)***	(-5.46)***
MB	0.0176	0.0115	-0.0296	0.0192	-0.0144	-0.0188	-0.0094	-0.0129	-0.0132
	(0.81)	(0.56)	(-1.37)	(0.96)	(-0.59)	(-0.83)	(-0.42)	(-0.53)	(-0.58)
R&D	0.7025	0.6713	1.4004	0.9602	0.9927	0.9658	1.3147	1.1019	1.0162
	(1.50)	(1.45)	(2.86)***	(2.16)**	(1.92)*	(1.90)*	(2.67)***	(2.13)**	(2.01)**
Export	0.5088	0.5179	0.4149	0.4643	0.3983	0.4213	0.3502	0.3945	0.4174
	(2.20)**	(2.25)**	(1.83)*	(2.15)**	(1.67)*	(1.78)*	(1.51)	(1.65)*	(1.76)*
Fsale	0.3608	0.3868	0.3275	0.3438	0.3312	0.3448	0.3150	0.3301	0.3413
	(3.49)***	(3.75)***	(3.10)***	(3.60)***	(2.78)***	(2.91)***	(2.83)***	(2.78)***	(2.89)***
Dseg	-0.0238	-0.0240	-0.0434	-0.0322	-0.0442	-0.0485	-0.0530	-0.0393	-0.0447
	(-0.49)	(-0.49)	(-0.88)	(-0.68)	(-0.85)	(-0.94)	(-1.04)	(-0.76)	(-0.86)
EM1	0.2597				0.2531			0.2311	
	(3.58)***				(3.08)***			(2.80)***	
EM2		0.7718				0.8366			0.7704
		(3.73)***				(3.59)***			(3.29)***
EM3			0.6382		0.4270	0.2969	0.5524	0.3936	0.2910
			(1.66)*		(1.00)	(0.74)	(1.42)	(0.93)	(0.74)
EM4				0.7982			0.7623	0.7620	0.7542
				(3.52)***			(2.82)***	(2.60)***	(2.67)***
Adj. R-sq	0.1083	0.1102	0.0959	0.1065	0.1063	0.1076	0.1078	0.1100	0.1117
n obs.	1694	1682	1596	1800	1434	1426	1500	1434	1426