The Use of Currency Derivatives and Other Risk Management Strategies by Corporations: Success or Failure?

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Should Firms Hedge?

Theory	Prediction
Modigliani and Miller (1958)	Hedging does not matter
Agency Theories, Jensen & Meckling (1976)	Hedging is bad

Should Firms Hedge?

- Which theory of optimal hedging is *consistent* with what we observe in the data?

- We only observe the use of derivatives (gross notional amount), not whether they hedge or not.

Theory	Rationale	Empirical Evidence	Sample
Stulz (1984)	Managerial risk aversion	Tufano (1996)	Gold firms
Smith and Stulz (1985)	Taxes Fin. Distress Costs	NSS (1993) Visvanathan (1997) Haushalter (1999)	Fortune-S&P500 S&P500 Oil and Gas firms
FSS (1993)	Underinvestment	Geczy et al. (1997)	Fortune 500
Leland (1998)	Tax benefits	Graham and Rogers (2000)	Fortune 500
	High Fixed Costs of Hedging	Mian (1996)	All Compustat firms

Hedging and Risk

- Does the use of derivatives reduce risk?

  −Allayannis and Ofek (2001)
  "Exchange-rate exposure, Hedging, and the Use of Foreign Currency Derivatives"
  Journal of International Money and Finance 20 (2001) 273-296

- In a sample of S&P 500 nonfinancial firms during 1993-1995, we find that the use of currency derivatives significantly reduces currency risk on average.

Table 2
FX exposure and the use of derivatives

Sample		All Firms		All Firms		$\beta_2 > 0$
Dependent Variable	Predict	β_2	Predict	$abs(\beta_2)$	Predict	β_2
Observations		358		358		169
R^2		0.034		0.016		0.069
Intercept		-0.220^a		0.753^a		0.671^a
		(3.16)		(16.64)		(10.52)
Foreign sales/total sales	+	0.964^a	None	0.351^c	+	0.695^a
		(3.49)		(1.95)		(3.12)
FX Derivatives value /total assets	None	-1.531	-	-1.584^b	-	-2.735^a
		(1.42)		(2.26)		(3.04)

^{a,b,c} denotes significance at the 1%, 5%, and 10% levels, respectively.

The table provides parameter estimates for the model specified by the following equation,

$$\hat{\beta_{2i}} = \alpha_{1i} + \alpha_{2i}(FS/TS)_i + \alpha_{3i}(FCD/TA)_i + \eta_i,\ i = 1, ...N$$

where the dependent variable is estimated by the following equation,

$$R_{it} = \beta_{0i} + \beta_{1i}R_{mt} + \beta_{2i}FXI_t + \epsilon_{it},\ t = 1, ...T$$

where R_{it} is firm's i common stock return, R_{mt} is the return on the CRSP value-weighted market index and FXI_t is the rate of return on an exchange-rate index (J.P Morgan's dollar index). We use the sample of S&P 500 nonfinancial firms in 1993 and return data for 1992-94. We present the estimates (top) and the corresponding t-statistics (bottom) for the intercept α_{1i}, the coefficient of the ratio of foreign sales to total sales α_{2i}, and the coefficient of the ratio of foreign currency derivatives to total assets α_{3i}, for all firms (Regression 1), using the absolute values of the exposures (Regression 2) and using the sample of the positive exposures (Regression 3).

Table 3b
FX exposure and the use of derivatives

Sample	All Firms		Positive Foreign Currency Exposure $\beta_2 > 0$				
Dependent Variable	**1995** $abs(\beta_2)$	**1995** sample	Assets >500 mil.	Assets <500 mil.	European index	Canadian dollar	Japan Yen
Observations	629	319	168	151	269	277	379
R^2	0.016	0.025	0.061	0.008	0.018	0.018	0.012
Intercept	1.215[a]	1.098[a]	0.715[a]	1.348[a]	0.982[a]	1.225[a]	0.741[a]
	(14.57)	(10.52)	(7.03)	(8.56)	(10.08)	(11.47)	(7.94)
For. sales/total sales	-0.004	0.339	0.810[a]	0.228	-0.033	-0.137	-0.154
	(0.02)	(1.10)	(2.21)	(0.47)	(0.11)	(0.41)	(0.64)
FX Der./total assets	-3.292[a]	-3.348[a]	-2.347[a]	-3.962[a]	-2.434[a]	-2.164[a]	-1.864[a]
	(5.03)	(4.95)	(3.01)	(2.50)	(3.31)	(2.60)	(3.19)

[a,b,c] denotes significance at the 1%, 5%, and 10% levels, respectively.

The table provides parameter estimates for the model specified by the following equation

$$\hat{\beta_{2i}} = \alpha_{1i} + \alpha_{2i}(FS/TS)_i + \alpha_{3i}(FCD/TA)_i + \eta_i,\ i = 1, ...N$$

where the dependent variable is estimated by the following equation

$$R_{it} = \beta_{0i} + \beta_{1i}R_{mt} + \beta_{2i}FXI_t + \epsilon_{it},\ t = 1, ...T$$

where R_{it} is firm's i common stock return, R_{mt} is the return on the CRSP value-weighted market index and FXI_t is the rate of return on an exchange-rate index (J.P Morgan's dollar index) or a simple exchange-rate (i.e., US dollar/Yen). The sample includes all U.S. manufacturing firms listed in COMPUSTAT with assets above 100 million in 1994 and 1995. Results in this table are for the *1995* sample. For this sample, we estimate exposure using returns between 1994-1996. We present the estimates (top) and the corresponding t-statistics (bottom) for the intercept α_{1i}, the coefficient of the ratio of foreign sales to total sales α_{2i}, and the coefficient of the ratio of foreign currency derivatives to total assets α_{3i}, for the cases in which we estimate exposure. We use the JP Morgan index and estimate exposure using the absolute values of the exposures (Regression 1), all positive exposures (Regression 2), the subsample of large firms (above 500 million in assets) (Regression 3) and small firms (below 500 million in assets) (Regression 4), and using betas estimated with respect to a European index (Regression 5), the US/Canadian dollar exchange rate (Regression 6) and the US dollar/Japanese Yen exchange rate (Regression 7).

Hedging and Firm Value

- Does the use of derivatives increase firm value?

  – Allayannis and Weston (2001)
  "The Use of Foreign Currency Derivatives and Firm Market Value"
  The Review of Financial Studies Spring 2001, Vol. 14, No.1, pp. 243-276.

- In a sample of 720 large US nonfinancial firms between 1990-1995, we find that the use of currency derivatives is positively related to firm value for firms with currency exposure. On average, currency derivatives improve value by 4.9%.

Table 3

Comparison of Q: Hedgers vs. Non-hedgers

Panel A: Differences in means

		Foreign Sales > 0		*Foreign Sales = 0*					
		Hedgers	Non-Hedgers	Hedgers	Non-Hedgers	Difference		Difference	
Year		(1)	(2)	(3)	(4)	(5)=(1-2)	T-stat	(7)=(3-4)	T-stat
All Years	Mean	1.27	1.10	1.41	1.13	0.17	5.53	0.28	4.12
	std. dev.	0.84	0.56	1.21	0.82				
	N	1243	826	339	1896				
Dollar appreciation (93 & 94)	Mean	1.26	1.11	1.38	1.11	0.15	3.12	0.27	3.00
	std. dev.	0.74	0.54	0.91	0.73				
	N	436	258	122	617				
Dollar depreciation (90-92 & 95)	Mean	1.28	1.10	1.42	1.13	0.18	4.55	0.29	3.08
	std. dev.	0.89	0.57	1.35	0.86				
	N	807	568	217	1279				

Panel B: Differences in medians

	Foreign Sales > 0		*Foreign Sales = 0*					
	Hedgers	Non-Hedgers	Hedgers	Non-Hedgers	Difference		Difference	
Year	(1)	(2)	(3)	(4)	(5)=(1-2)	p-value	(7)=(3-4)	p-value
All Years	1.02	0.98	0.97	0.92	0.04	0.001	0.06	0.001
Dollar appreciation (93 &94)	1.05	1.00	1.05	0.91	0.05	0.027	0.14	0.001
Dollar depreciation (90-92 &95)	0.98	0.97	0.94	0.93	0.01	0.024	0.01	0.084

This table presents a univariate comparison of Tobin's Q between firms which used foreign currency derivatives and those which did not for the sample of firms with foreign sales and the sample of firms with no foreign sales. The sample includes all non-financial COMPUSTAT firms with assets greater than $500 million for 1990-1995. A firm is a user of foreign currency derivatives for a given year if the firm reports the use of foreign currency forwards, futures, options, or swaps during that year. P-values for testing the difference in medians are constructed using a rank-sum test.

Table 4
Foreign Currency Derivatives Use and Firm Value: Cross-Section Results

	All Firms with Foreign Sales > 0	
	Pooled regression	Fixed-effects
Dependent variable: *ln(Tobin's Q)*	(1)	(2)
Observations	2069	2069
R^2	0.73	0.22
FCD Dummy (% of Q in parenthesis)	0.053 (5.26%) 2.989 ***	0.045 (4.53%) 2.273 **
Foreign Sales / Total Sales	0.163 4.229 ***	0.573 5.918 ***
Size (log of total assets)	-0.071 -7.790 ***	-0.117 -4.833 ***
ROA	0.030 11.335 ***	0.015 11.195 ***
Debt to equity	0.000 5.004 ***	0.000 0.237
Growth (Capital Exp/Sales)	0.131 1.367	0.024 0.315
Diversification Dummy	-0.102 -4.830 ***	-0.111 -3.426 ***
Dividend Dummy	-0.090 -3.803 ***	-0.033 -1.704 *
Advertising/Assets	1.173 3.879 ***	0.417 1.622 *
R&D/Assets	-0.840 -2.330 **	-0.418 -0.648

This table presents the results for pooled and fixed-effects regressions of the use of derivatives on firm value. The sample includes all non-financial COMPUSTAT firms with assets>$500 million and positive foreign sales for 1990-1995. Tobin's Q is the market value of debt and equity divided by the replacement cost of assets constructed using method described in the text. FCD dummy variable is equal to 1 if the company reports the use of foreign currency forwards, futures, options or swaps. Return on assets is the annually compounded net income divided by total assets. Growth opportunities are proxied by the ratio of expenditures on new capital to sales. Debt to equity is the ratio of total debt to shareholder equity. The dividend dummy is set equal to 1 if the company paid dividends that year, zero

Table 6
Foreign Currency Derivatives Use and Firm Value: Cross-Section Results

	All Firms with Foreign Sales = 0	
	Pooled regression	Fixed-effects
Dependent variable: *Industry-adjusted Q*	(1)	(2)
Observations	2231	2231
R^2	0.25	0.07
FCD Dummy	0.025	0.074
	0.895	1.484
Foreign Sales / Total Sales	.	.
Size (log of total assets)	-0.052	-0.214
	-5.270 ***	-6.534 ***
ROA	0.028	0.012
	5.487 ***	8.481 ***
Debt to equity	0.000	0.000
	2.887 ***	1.242
Growth (Capital Exp/Sales)	0.092	0.114
	1.240	0.973
Diversification Dummy	-0.147	-0.164
	-7.989 ***	-4.601 ***
Dividend Dummy	0.160	-0.021
	3.201 ***	-0.674
Advertising/Assets	-0.905	-1.846
	-2.504 ***	-3.090 ***
R&D/Assets	-0.723	-1.467
	-1.160	-0.759

This table presents the results for pooled and fixed-effects regressions of the use of derivatives on firm value. The sample includes all non-financial COMPUSTAT firms with assets>$500 million and no foreign sales for 1990-1995. Industry-adjusted Qs are constructed by computing the log difference between the weight-adjusted industry Q ("pure play" firm Q) and each multisegment firm's Q following Lang and Stulz (1994). FCD dummy variable is equal to 1 if the company reports the use of foreign currency forwards, futures, options or swaps. Return on assets is the annually compounded net income divided by total assets. Growth opportunities are proxied by the ratio of expenditures on new capital to sales. Debt to equity is the ratio of total debt to shareholder equity. The dividend dummy is set equal to 1 if the company paid dividends that year, zero otherwise. The diversification dummy is set equal to zero unless the firm is active in more than one business segment. The regressions also include year dummies and credit quality controls. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively. T-statistics are based on White (1980) standard errors.

Hedging and Investment

- Does the use of derivatives mitigate underinvestment?

  – Allayannis and Mozumdar (1999)
  "Cash Flow, Investment, and Hedging"

- In a sample of S&P 500 nonfinancial firms with significant FX exposure between 1993-1995, we find that the use of currency derivatives significantly reduces their dependence on internal cash flow for making investments, thereby mitigating underinvestment (direct evidence in support of FSS).

Table 2
Investment-Cash Flow Sensitivity and Hedging

This table provides coefficient estimates, with standard errors in parentheses, for the investment-cash flow sensitivity model specified below. The two groups (hedgers and non-hedgers) are distinguished by the dummy variable $FCDDUM$, with $FCDDUM = 1$ for hedgers and $FCDDUM = 0$ for non-hedgers. The coefficient γ^* for the interaction term $(CF_t/K_{t-1}) * FCDDUM$ estimates the difference in investment-cash flow sensitivity for hedgers and non-hedgers. The four columns report results for four different measures of cash flow: (I) NOPLAT+DA-ΔWC (Net operating profit less adjusted taxes plus depreciation and amortization less changes in working capital), (II) NOP+DA-ΔWC-tax expense (Net operating profit plus depreciation and amortization less changes in working capital less tax expense), (III) NOP+DA-ΔWC (Net operating profit plus depreciation and amortization less changes in working capital), and (IV) Net income plus depreciation and amortization less changes in working capital.

$$\frac{I_t}{K_{t-1}} = \alpha + \beta Q_t + \gamma \frac{CF_t}{K_{t-1}} + \alpha^* FCDDUM + \gamma^* \frac{CF_t}{K_{t-1}} FCDDUM + YEARDUM + FIRMDUM + \epsilon_t \quad \text{(i)}$$

	(I)	(II)	(III)	(IV)
	NOPLAT +DA-ΔWC	NOP+DA-ΔWC -Tax Expense	NOP+DA -ΔWC	Net Income +DA-ΔWC
Constant	0.103(0.082)	0.121(0.080)	0.070(0.076)	0.173*(0.074)
Q_t	0.018(0.016)	0.018(0.016)	0.015(0.016)	-0.036*(0.011)
CF_t/K_{t-1}	0.110*(0.037)	0.102*(0.037)	0.129*(0.032)	0.124*(0.044)
$FCDDUM$	0.070(0.041)	0.075(0.041)	0.077(0.040)	-0.048(0.062)
$(CF_t/K_{t-1})*$ $FCDDUM$	-0.117*(0.051)	-0.124*(0.052)	-0.121*(0.043)	-0.060(0.051)
$\overline{R}^2$	0.77	0.77	0.78	0.80
No. of Obs.	257	257	257	270

Table 4
Investment-Cash Flow Sensitivity and Hedging:
Regressions with First-Differenced Data

This table provides coefficient estimates, with standard errors in parentheses, for changes in investment in response to changes in cash flow, as specified by the investment-cash flow sensitivity model below. The two groups (hedgers and non-hedgers) are distinguished by the dummy variable $FCDDUM$, with $FCDDUM = 1$ for hedgers and $FCDDUM = 0$ for non-hedgers. The coefficient γ^* for the interaction term $FCDDUM * \Delta(CF_t/K_{t-1})$ estimates the difference in investment-cash flow sensitivity for hedgers and non-hedgers.

$$\Delta(\frac{I_t}{K_{t-1}}) = \alpha + \beta\Delta Q_t + \gamma\Delta(\frac{CF_t}{K_{t-1}}) + \alpha^* FCDDUM + \gamma^*\Delta(\frac{CF_t}{K_{t-1}})FCDDUM + YEARDUM + \epsilon_t \quad \text{(iii)}$$

Column 2 reports results for the full sample, Column 3 for positive changes in cash flow, and Column 4 for negative changes in cash flow.

	Full Sample	Positive Cash Flow Changes	Negative Cash Flow Changes
Constant	0.029*(0.009)	0.030*(0.015)	0.037*(0.014)
ΔQ_t	-0.012*(0.006)	-0.033*(0.013)	0.008(0.008)
$\Delta CF_t/K_{t-1}$	0.140*(0.031)	0.105*(0.062)	0.206*(0.050)
$FCDDUM$	0.001(0.010)	-0.017(0.013)	-0.025(0.016)
$FCDDUM*$ $\Delta CF_t/K_{t-1}$	-0.076*(0.038)	0.000(0.072)	-0.254*(0.066)
$\overline{R}^2$	0.140	0.225	0.161
No. of Obs.	263	130	133

Alternative Means of Hedging

- Does the use of operational hedging (such as the existence of operations across many countries/regions of the world) by itself reduce risk and improve value?

  – Allayannis, Ihrig, and Weston (2000)
  "Exchange-Rate Hedging: Financial vs. Operational Strategies"
  forthcoming, *AER Papers and Proceedings*

- Operational hedging strategies as proxied by the location of subsidiaries across multiple countries or regions do not reduce exchange rate risk. However, firms that engage in operational hedges are more likely to use financial hedges. Operational hedges on their own do not improve value; but in conjunction with financial hedges they improve firm value.

TABLE 1 – GEOGRAPHICAL DISPERSION
AND EXCHANGE RATE EXPOSURE

Dependent Variable: Exchange Rate Exposure > 0				
Financial Hedge Dummy	-0.295**	-0.332**	-0.277**	-0.283**
	(0.133)	(0.131)	(0.132)	(0.131)
Foreign/Total Sales	-0.045	-0.077	-0.053	-0.055
	(0.174)	(0.177)	(0.180)	(0.179)
Dispersion Index (All Countries)	0.142	–	–	–
	(0.159)	–	–	–
Dispersion Index (All Regions)	–	0.309*	–	–
	–	(0.181)	–	–
ln(# of countries)	–	–	0.035	–
	–	–	(0.058)	–
ln(# of regions)	–	–	–	0.070
	–	–	–	(0.097)
R^2	0.017	0.023	0.017	0.017
obs	508	508	508	508

Note: Standard errors are reported below coefficient estimates. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

Table 2 – GEOGRAPHICAL DISPERSION
AND FOREIGN CURRENCY DERIVATIVES

Dependent Variable: Financial Hedge Dummy				
Foreign/Total Sales	1.492***	1.486***	1.369***	1.386***
	(0.463)	(0.455)	(0.470)	(0.464)
Dispersion Index	1.799***	–	–	–
(All Countries)	(0.335)	–	–	–
Dispersion Index	–	1.451***	–	–
(All Regions)	–	(0.408)	–	–
ln(# of countries)	–	–	0.725***	–
	–	–	(0.140)	–
ln(# of regions)	–	–	–	1.062***
	–	–	–	(0.232)
R^2	0.293	0.274	0.290	0.283
obs	756	756	756	756

Note: Standard errors are reported below coefficient estimates. ***, **,* denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 3 – GEOGRAPHICAL DISPERSION,
HEDGING, AND FIRM VALUE

Dependent Variable: ln(Market-to-book)				
Foreign/Total Sales	-0.247***	-0.251***	-0.257***	-0.251***
	(0.083)	(0.083)	(0.083)	(0.083)
Dispersion Index	-0.051	–	–	–
(All Countries)	(0.091)	–	–	–
Dispersion Index $*I_{FCD>0}$	0.167**	–	–	–
	(0.082)	–	–	–
Dispersion Index	–	-0.098	–	–
(All Regions)	–	(0.107)	–	–
Dispersion Index $*I_{FCD>0}$	–	0.218**	–	–
	–	(0.105)	–	–
ln(# of countries)	–	–	-0.027	–
	–	–	(0.037)	–
ln(# of countries)$*I_{FCD>0}$	–	–	0.066**	–
	–	–	(0.031)	–
ln(# of regions)	–	–	–	-0.032
	–	–	–	(0.053)
ln(# of regions)$*I_{FCD>0}$	–	–	–	0.085**
	–	–	–	(0.039)
R^2	0.617	0.616	0.618	0.617
obs	665	665	665	665

Note: Standard errors are reported below coefficient estimates. ***, **,* denote significance at the 1%, 5% and 10% levels, respectively.

Hedging and Financial Crises (I)

- Does the use of currency derivatives protect firms during a crisis? Evidence from East Asian Firms

  – Allayannis, Brown, and Klapper(2000)
  "Exchange Rate Risk Management: Evidence from East Asia"

- The use of currency derivatives did not provide significant protection against the systemic currency crisis in South East Asia. Hedgers performed as poor as nonhedgers during the crisis; although, given their generally higher FX exposures, they could have performed even worse.
- Significant evidence that East Asian firms engage in selective hedging.

Table 5

Determinants of the Extent of Hedging

Results are from TOBIT regressions with the dependent variable equal to the percentage of foreign debt hedged in 1996. Coefficients (Coef.) and standard errors (SE) are reported. Only firms that had foreign debt outstanding are included in the estimation since the hedging data are for foreign debt. The dependent variable is censored at 0% and 100% (the number of firms in each group are reported in the last two rows). Reported p-values are from a Wald chi-squared test against a null of 0.0. Korean firms are excluded since these companies were forbidden by law from using derivatives to hedge foreign debt. Foreign Debt is the inverse Mills ratio from the LOGIT estimation in Column (1) of Table 3. Other independent variables are for 1996 and are defined in detail in the Appendix. Asterisks (***, **, *) denote significance in a two-tailed test at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Percent of Foreign Debt Hedged					
	(1)		**(2)**		**(3)**	
Variable	**Coef.**	**SE**	**Coef.**	**SE**	**Coef.**	**SE**
Foreign EBIT (%)	-0.559 *	0.327	-0.663 **	0.330	-0.771 **	0.323
Foreign Cash (%)	0.808 **	0.367	0.307	0.390	0.041	0.340
Sales (log, USD)	0.058	0.090	-0.121	0.100	-0.148 *	0.091
Nondomestic Exchange (Dummy)	0.114	0.254	0.147	0.248	0.143	0.224
Foreign Debt / Total Debt	0.396	0.397	0.326	0.362	0.413	0.356
Debt-to-Assets	-0.965	1.010	-0.186	0.969	0.161	0.923
Gross Margin	1.907 ***	0.570	1.673 ***	0.584	1.435 ***	0.535
Market-to-Book	-0.081	0.136	0.027	0.134	0.065	0.127
Committed Capital Expenditures	-0.082	0.145	-0.194	0.176	-0.265 *	0.160
Quick Ratio	-0.137 ***	0.048	-0.092 **	0.044	-0.081 *	0.043
Market-to-Book * Debt-to-Assets	0.223	0.340	0.129	0.329	0.074	0.313
Intercept	-1.126	1.343			0.805	1.263
Control Variables						
Foreign Debt (Inverse Mills Ratio)	0.135	0.503	0.843	0.724	1.297 ***	0.533
Interest Rate Differential					-13.941 ***	3.321
Country Dummies						
Hong Kong / China			0.562	1.341		
Singapore			0.776	1.316		
Taiwan			0.507	1.354		
Indonesia			0.022	1.264		
Malaysia			1.184	1.381		
Philippines			-0.946	1.289		
Thailand			0.552	1.271		
Industry Dummies						
Manufacturing			0.133	0.354	0.011	0.339
Transportation			-0.520	0.379	-0.485	0.373
Wholesale and Retail Trade			0.722 **	0.370	0.581 *	0.357
Services			-0.868	0.543	-0.977 *	0.550
Number of Observations	166		166		166	
Left Censored	97		97		97	
Right Censored	19		19		19	

Table 6

Comparison of Hedgers and Nonhedgers

This table reports median values for differences between firms that hedge and firms that do not hedge for three variables: excess equity returns (first block), domestic equity betas (second block), and exchange rate sensitivities (third block). Excess equity return is defined as the holding period return for each company in the sample minus the domestic market index holding return. Exchange rate sensitivities and domestic equity betas for each firm and sub-period are coefficients from a linear regression with weekly firm market returns as the dependent variable and weekly domestic equity index return and percent changes in the domestic currency against the US Dollar as independent variables (corrected by standard errors). Because these two variables are highly collinear, domestic equity index returns are residuals from a regression of weekly percent changes in the domestic currency against the US Dollar on the domestic equity index returns. This orthogonalization has little effect on the estimated equity betas and increases the explanatory power of exchange-rate changes. See the Appendix for details. The crisis period is from June 28, 1997 to June 26, 1998. The post-crisis period is from June 27, 1996 to June 25, 1997. Each subperiod contains 52 weeks. "Hedgers / Nonhedgers" reports the number of firms in each category. Asterisks (***, **, *) denote significance in a two-tailed Wilcoxon two-sample test at the 1%, 5%, and 10% level respectively.

		Difference in Median Excess Equity Return (Hedgers - Nonhedgers)				**Difference in Median Domestic Equity Beta** (Hedgers - Nonhedgers)				**Difference in Median Exchange-Rate Sensitivity** (Hedgers - Nonhedgers)			
	Hedgers /	Crisis		Post-Crisis		Crisis		Post-Crisis		Crisis		Post-Crisis	
	NonHedgers	Difference (%)	p-val	Difference (%)	p-val	Difference	p-val	Difference	p-val	Difference	p-val	Difference	p-val
All Firms	70 / 97	2.2%	0.569	13.9% **	0.040	-0.043	0.435	-0.024	0.857	-0.030	0.717	0.214 *	0.086
High Income	29 / 38	1.2%	0.481	3.5%	0.179	-0.257	0.382	0.081	0.828	-0.169	0.869	0.426	0.196
Hong Kong / China	17 / 19	33.2%	0.204	21.2%	0.125	-0.322	0.797	0.006	0.573	-0.746	0.824	-0.568	0.443
Singapore	7 / 8	-4.5%	0.776	-25.5%	0.776	-0.098	0.909	-0.121	0.400	-0.077	0.909	-0.556	0.400
Taiwan	5 / 11	0.7%	0.738	37.4%	0.161	-0.124	0.275	0.160	0.656	-0.122	0.507	1.624 **	0.016
Middle Income	41/59	-9.7%	0.317	20.8% *	0.074	0.028	0.941	-0.144	0.862	0.322	0.522	0.281 *	0.096
Indonesia	17 / 21	2.6%	0.751	18.3%	0.576	-0.315	0.225	0.013	0.391	0.397	0.497	0.474	0.273
Malaysia	5 / 7	1.4%	0.980	20.0%	0.636	0.202	0.873	-0.215	0.909	1.120	0.874	0.526	0.187
Philippines	4 / 20	-24.5%	0.242	30.1% *	0.082	0.329	0.188	0.088	0.789	2.643 **	0.017	2.400 **	0.014
Thailand	15 / 11	-7.8%	0.309	-7.8%	0.359	0.172	0.386	-0.161	0.837	0.824	0.158	-0.176	0.474

Table 7
Hedging and Market Returns

This table reports results from OLS regressions with firms' excess equity returns as the dependent variables. Excess equity return is defined as the holding period return for each company in the sample minus the domestic market index holding return. The first set of coefficients reports results from a regression using equity returns for the crisis period (June, 28 1997 to June 26, 1998). The second set of coefficients reports results from a regression using equity returns for the post-crisis period (June, 27 1998 to June 25, 1999). Explanatory variables are defined in detail in the Appendix. All results exclude South Korean firms because they were prevented by law from hedging foreign debt. Asterisks (***, **, *) denote significance in a two-tailed test at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Excess Equity Returns			
	(1) Crisis		**(2) Post-Crisis**	
Variable	**Coef.**	**SE**	**Coef.**	**SE**
Hedge (notional value as % of total assets)	-0.527 *	0.296	1.421 *	0.766
Foreign EBIT (% total assets)	1.125 ***	0.443	0.489	1.149
Foreign Cash (% total assets)	-0.070	0.070	-0.047	0.182
Debt-to-Assets	-0.084 ***	0.028	0.035	0.074
Foreign Debt / Total Debt	-0.128 **	0.066	-0.141	0.172
Exchange Rate Sensitivity	-0.072 ***	0.013	0.064 *	0.034
Equity Beta	-0.302 ***	0.042	-0.031	0.109
Change in Sales (log-difference)	0.136 *	0.074	0.010	0.192
Change in Gross Margin	0.217 ***	0.061	-0.152	0.157
Quick Ratio	0.014	0.013	-0.065 *	0.034
Sales (log, US)	0.049 **	0.020	0.041	0.052
Nondomestic Exchange (Dummy)	-0.118 **	0.056	0.169	0.146
Control Variables				
Country Dummies				
Hong Kong	-0.192	0.329	-1.159	0.852
Singapore	-0.685	0.433	-0.612	1.121
Taiwan	-0.091	0.315	-1.089	0.817
Indonesia	-0.248	0.343	-1.154	0.889
Malaysia	-0.217	0.294	-0.885	0.763
Philippines	-0.385	0.355	-1.092	0.921
Thailand	-0.339	0.343	-0.863	0.888
Industry Dummies				
Manufacturing	0.079	0.076	0.156	0.197
Transportation	0.154 *	0.082	0.153	0.212
Wholesale and Retail Trade	0.081	0.082	0.210	0.212
Services	0.048	0.097	0.227	0.251
Number of Observations	253		246	
Adjusted R^2	52.1%		7.9%	

Hedging and Financial Crises (II)

- Did the Asian Crisis affect US multinationals? Did location of operations and the use of financial hedging matter?

  – Allayannis and Weston (2001b)
  "The Impact of the Asian Crisis on U.S. Multinationals"

- US multinationals were significantly affected by the crisis, only if they had operations (exposure) to East Asia. The use of currency derivatives did not mitigate the effect.

Table 2:

Abnormal Returns During the East Asian Crisis

This table presents average monthly abnormal excess returns during the Asian financial crisis for our sample. Abnormal returns are constucted using the time series regression:

$$R_{i,t} = \quad a_0 + \gamma I_{event} + \beta R_{m,t}$$

where $R_{i,t}$ is the return for firm i in month t and $R_{m,t}$ is the market return in month t. The event indicator variable is equal to 1 during June 1997 to May 1998; zero otherwise. Our measure of $\widehat{\gamma_i}$ is our estiamte of the abnormal return for firm i. Standard deviations and T-statitics for our measure of abnormal returns are based on the standard deviation of our estimates of γ_i.

	Sample of firms	Obs	Mean	Std.	median	T-stat
1.	All firms	521	0.00055	0.0396	0.00259	0.317
2.	Firms with foreign subsidiaries	225	-0.00924	0.0352	-0.00924	-3.942
3.	Firms with foreign subsidiaries but no subsidiaries in East Asia	103	-0.00320	0.0341	-0.00290	-0.952
4.	Firms with foreign subsidiaries in East Asia	122	-0.01435	0.0354	-0.01170	-4.475
5.	Firms with foreign subsidiaries in East Asia that do not use derivatives	13	-0.01354	0.0436	0.00177	-1.120
6.	Firms with foreign subsidiaries in East Asia that use derivative	109	-0.01444	0.0345	-0.01182	-4.365

Table 4:

Determinants of Abnormal Returns During the Asian-Crisis

This table presents the results of a cross-sectional regressions on abnormal returns during the Asian financial crisis. Standard errors are reported below coefficient estimates.

Dependent variable : Abnormal Returns		
Exposure	-0.309	-0.292
	(0.067)	(0.084)
Ratio of Foreign Sales / Total Sales	-2.201	-2.265
	(0.098)	(0.091)
East Asian Dummy	-0.923	-4.182
(=1 if the firm has subsidiaries in east asia)	(0.042)	(0.078)
Ratio of East Asian Subs.	–	0.092
		(0.887)
Derivatives Dummy	0.257	–
(=1 if the firm uses derivatives)	(0.688)	
Constant	0.114	0.123
	(0.855)	(0.843)
N	225	225
R2	0.071	0.075

Conclusions

- Financial (Currency) Hedging on the part of US firms has been effective on average in a) reducing risk; b) improving firm value; c) mitigating underinvestment.

- On average, firm value improves by 4.9% through the use of derivatives.

- Operational Hedging has been less effective; however, this type of hedging is usually combined with financial hedging.

- Financial Hedging seems to mitigate underperformance for East Asian firms during the East Asian Financial Crisis, although it failed to completely insulate them from the crisis. We found evidence that the use of derivatives by East Asian firms is motivated by "perceived" arbitrage opportunities, as they tend to use less derivatives when the interest rate

differential is high. US firms with operations (exposure) in East Asia were also affected by the East Asian crisis, regardless of their use of derivatives. US multinationals with no operations in East Asia were unaffected by the crisis.