Uncertainty and Investment in an East Asian Economy:
A Firm Level Study of Thailand

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Abstract

This paper uses firm-level data to estimate a model of investment behaviour under uncertainty in Thailand. We find robust evidence of a negative relation between uncertainty and private domestic investment. We also find that the impact of uncertainty is related to measures of investment irreversibility, thereby lending support to the idea that firms' behaviour conforms to the real options model of investment under uncertainty.

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1. Introduction

Uncertainty may affect economic growth through several channels. The overall effect may, in principle, be positive or negative but there is growing evidence that on balance it tends to be negative. For a panel of 138 developing and developed economies between 1970 and 1995 Lensink, Bo and Sterken (1999) found a robust and negative effect of uncertainty on economic growth. Ramey and Ramey (1995) and Asteriou and Price (2005) found a significant negative relation between growth and volatility (which is widely used to proxy uncertainty) using panel data for industrialised and developing countries. The existence of such a relationship would have particular significance for our understanding of economic development and policy, but to be useful we require an analysis of the behaviour relations linking uncertainty and growth in developing economies.

One channel that has attracted much attention is the effect of uncertainty on private investment. In theory, optimising behaviour may cause uncertainty to have a positive or negative effect on a firm's investment and ambiguous effects on aggregate investment. Empirical studies suggest a negative relation exists, but since they are largely confined to developed economies we do not yet have a strong foundation for knowledge of the uncertainty-investment relation in developing economies.

The effect of uncertainty on investment might be more significant in developing countries than in developed market economies: macroeconomic volatility may be higher because production and trade are less diversified[1], and less developed financial markets limit individual agents' opportunity for insuring against idiosyncratic risk. Moreover, since incomplete markets in developing countries may make investment less easily reversible, the effect of uncertainty on investment may be more marked than in developed countries. In a macroeconomic database of 94 developing countries for 1970 to 1995, Serven (1998) finds a systematic and robust negative effect of uncertainty on private investment, but the findings of others using developing country macroeconomic data have been mixed (Serven and Solimano, 1993; Bleaney, 1996).

A limitation of existing studies of the effect of uncertainty on investment in developing countries is that almost all rely on macroeconomic, cross-country data. Compared to developed countries aggregate data for developing countries introduce greater measurement errors, and models estimated with aggregate data are unable to test theories of firm behaviour in cases where macroeconomic equilibrium properties are not directly derivable (Pindyck and Solimano, 1993). A notable exception to macro studies is Pattillo (1998) who uses panel data from 200 Ghanaian manufacturing firms for 1994-5 to estimate equations derived from the Dixit-Pindyck model. She finds strong evidence of a negative relationship between uncertainty and firms' investment, in line with the real-options model.

The present paper reports estimates of uncertainty's effect on private domestic investment using firm-level data for Thailand. The middle-income developing country experienced high growth for a decade following 1986, interrupted by a downturn and recovery following the East Asian crises of 1997. Private investment had an important role in those fluctuations. Estimating a macroeconomic model for Thailand and carrying out simulations on it, Vines and Warr (2003) found 'the investment boom and its changing composition [increase in private domestic investment] generated record growth but also increased macroeconomic vulnerability'. Similarly, on the basis of survey data, Dollar and Hallward-Driemeier (2000) found that the high rate of private investment, its financing, and its sectoral allocation contributed to Thailand's 1997 crisis and the economy's subsequent path. Because high rates of private investment occurred under a policy regime that offered implicit guarantees of macroeconomic stability (especially nominal exchange rate stability, and a credible commitment to fiscal discipline) the experience could be interpreted speculatively as suggesting that investment is a negative function of uncertainty, but econometric knowledge of Thai investment functions is limited[2].

We use firm-level data to estimate a model of investment behaviour under uncertainty in Thailand. Using data for an unbalanced panel of 283 firms over nine years 1994-2002 we find robust evidence of a negative relation between uncertainty and private domestic investment. We also find that the impact of uncertainty is related to measures of investment irreversibility, thereby lending support to the idea that firms' behaviour conforms to the real options model of investment under uncertainty. In addition to contributing new knowledge of the Thai economy, the paper's originality lies in contributing a firm-level study to the literature on investment under uncertainty in developing countries. Section 2 discusses the theory underlying our econometric model; Section 3 describes our data and method; Section 4 reports our principal results and explores the robustness of our results; and Section 5 concludes.

2. Uncertainty and Investment

Theory does not yield unambiguous conclusions regarding the effect of uncertainty on investment; an increase in uncertainty might either increase or decrease investment. Real options theory has demonstrated that a key determinant of whether the relationship exists is the degree to which investment is reversible, but even in the presence of irreversibility the observable outcome is indeterminate.

In the absence of credit rationing and other imperfections the maximization programme of a firm can be implemented by following a standard expected net present value rule. The firm's investment flow resulting from that programme can be modelled as a change in the capital stock subject to adjustment costs and is equivalent to the *q* model of investment with adjustment costs (Abel *et al.*, 1996).

Early models of a positive uncertainty-investment relation rely on the assumption that investment is reversible. If investment decisions are reversible as new information becomes available, the existence of uncertainty that affects marginal productivity of capital would increase the optimal capital stock and, hence, investment. Here, uncertainty would be measured by the second moment of a probability distribution of a variable such as output price. Specifically, if the marginal revenue productivity of capital is a convex function of the stochastic variable, a mean-preserving increase in the spread of the stochastic variable increases optimal investment by increasing the positive difference between the expected net present value of a project and the expected value of the stochastic variable of which it is a function (Hartman 1972, Abel 1983, 1984, 1985)[3].

When irreversibility is present, the value of the firm is enhanced by the value of a call option representing the unexploited investment opportunity the firm has (the value of the 'option to wait') (Dixit and Pindyck, 1994)[4]. This 'real option' may cause the uncertainty-investment relation to be negative for the following reasons. The option is extinguished by carrying out the investment: therefore, for a project to be implemented its expected net present value must be sufficiently high to compensate for the loss of value represented by extinguishing the 'option to wait'. The value of the option is, thus, an element of the opportunity cost of an investment that must be reflected in the capital budgeting decision but which would not be present in the absence of uncertainty and irreversibility.

Since the value of an option is an increasing function of the variance of the underlying asset, an increase in uncertainty increases the cost of extinguishing the option by investing and thereby decreases the probability of a project's ENPV exceeding the opportunity cost. One way to express this idea is that, due to the existence of the 'option to wait', the firm's decision rule requires the ENPV of a project to be equal to or greater than a trigger value which is greater than zero and an increasing function of uncertainty; in an alternative formulation the marginal revenue product of capital must be greater than a 'hurdle rate of return' which is an increasing function of uncertainty (Pattillo, 1998; Driver and Temple, 2002).

The existence of irreversibility, however, is not a sufficient condition for high uncertainty to cause a low investment rate. The effect of increased variance is to raise the trigger value required of an irreversible project's ENPV. However, since a higher volatility not only increases the trigger value but always results in wider variations of the NPV itself, it increases the probability that any given trigger value will be reached within a given period. The combined effect might be to increase the volume of investment in a period. Sarkar (2000) shows that at low levels of volatility an increase in instantaneous variance can increase the probability of investing so that a positive uncertainty-investment relation would be observed. In a similar framework Cappucci and Moretto (2001) show that the sign of the relation between irreversible investment and uncertainty depends on the adjustments that occur to ensure asset market equilibrium.

The equations we estimate with firm level data are based on priors derived from the theoretical literature. We estimate logit regressions to investigate the effects of uncertainty and irreversibility upon the probability of a firm choosing to implement positive investment decisions. In the real options approach positive investment implies that projects have been implemented because their returns have exceeded a trigger value that reflects the cost of extinguishing the firm's call option. We also include control variables to capture the effect of variables other than uncertainty and irreversibility.

3. Data and econometric method

We use firm level data to estimate equations relating investment to firm size, sales growth, uncertainty, and irreversibility. Our unbalanced panel is constructed from company accounts data of firms listed on the Stock Exchange of Thailand and extracted from DataStream which provides accounting data from 1992. We exclude firms in the banking, financial and insurance sector and firms with fewer than three consecutive observations. After taking differences and lags, the data suitable for regression are reduced to a series of 9 periods (1994-2002) and include 283 firms. During this particular period of boom and bust in Thailand, entry and exit (listing and delisting) are skewed, leading us to have an unbalanced panel. Available data for suspended firms are used in order to minimize the loss of valuable information.

Table 1 describes the structure of the sample. The estimation sample includes 283 firms, with a total of 1980 observations for 9 years (1994-2002). We group firms into 8 categories for industrial classification, with the last group including all firms that have suspended or are currently under rehabilitation process. Column (1) shows the total number of firms included in the sample for the whole period 1994-2002. Columns (2)-(10) show the number of firms belonging to each category of industrial classifications for each year from 1994 to 2002. The last column gives the total number of observations available for each category of industrial classifications.

As a proxy for **uncertainty** we use a measure of recent volatility in the firm's stock returns, following Caballero and Pindyck (1996), Leahy and Whited (1996), and Bloom *et al.* (2001). The standard deviation of stock returns reflects volatility in expectations about the full range of factors that influence the firm's future profits.[5] We choose the volatility of stock returns, reflecting all relevant sources of uncertainty, in contrast to measures of volatility in individual determinants of profitability. Using Italian data, for instance, Calcagnini and Saltari (2000) find that the effect of volatility in one variable (demand) is not matched by the effect of volatility in another (interest rate). In this study the uncertainty proxy for each period is calculated as a rolling three year average, using either monthly or weekly stock returns, for the current year and two previous years and covers the period 1991-2002. The choice of three years is reasonably long but not too long so that any structural shifts in stock return volatility would not result in biased estimates of the true variances.

Two uncertainty proxies are constructed from, respectively, weekly and monthly data on stock returns to allow for the possibility that uncertainty is better measured by higher or lower frequency data. The first is a rolling three year average of weekly stock returns (calculated over the current year and two previous years). The second is calculated as a three year rolling average of monthly stock returns[6].

A common problem in studies of uncertainty and investment is that data on new and used asset prices which could give a direct measure of the cost of reversing an investment and, hence, of **irreversibility**, are unavailable. Their absence for Thailand leads us to define two alternative proxies for reversibility. The first uses the firm's balance sheet measures of financing; a high level of the balance sheet item 'debt and leasing' is judged to indicate a high level of reversibility. We assume that leasing, debt, or equity may be used to finance potentially reversible investments but that leasing is the most efficient and debt the second most efficient form in the sense of minimising the cost of subsequently reversing the investment[7]. Assuming total debt and leasing capital can measure the reversibility of investments, we create a reversibility dummy, REV_{it}, which receives the value of 1 if the ratio of total debt and leasing capital to total fixed capital is larger than the median of the whole sample, indicating more reversibility; and 0 otherwise, indicating more irreversibility.

The second proxy for irreversibility uses the standard industrial classification. Assuming firms in Communication and Transport Industries; Heavy Industries; Chemical and Materials Industries; and Property Development have relatively irreversible investment we construct a dummy DIC_{it} which takes the value 0 for those industries and the value 1 for all others. REV_{it} and DIC_{it} enter the model alternately as a slope dummy, enabling us to estimate whether investment's sensitivity to uncertainty is enhanced by the presence of irreversibility.

To control for the **fundamental determinants** of investment we include firm size measured by lagged market value, and the rate of growth of sales. The first is a proxy for factors such as capital market imperfections influencing the cost of capital; the second is a proxy for expected returns and, hence, the marginal revenue productivity of capital.

We estimate logit regressions to evaluate, first, the effect of uncertainty on investment and, second, the combined effect of uncertainty and irreversibility[8]. Our dependent variable is a bivariate dummy which takes the value 1 if investment in the period is positive and the value zero otherwise. Thus, our estimation model is concerned with the determinants of a firm's decision to invest (rather than the amount of investment) reflecting the real option approach's focus on the binary decision: either wait (and not invest), or invest and lose the value of the option. Our explanatory variables are uncertainty, U_{it}, and the interaction of uncertainty and reversibility ($REV_{it} * U_{it}$). We also estimate the effect of an uncertainty dummy designed to capture non-linearity in the effects of uncertainty (Sarkar, 2000). DU_{it} takes the value 1 if the uncertainty variable is greater than the median and 0 otherwise. As control variables for the fundamental determinants of investment we include the firm's market value lagged one period, $ln(MV_{it-1})$, and the normalized rate of growth of sales, $\Delta lnS_{it}/K_{it-1}$.

4. Empirical findings

Using our panel of data for listed Thai firms we apply the Generalized Estimating Equations (GEE) population-averaged model (Liang and Zeger, 1986) to estimate the logit models.

First we estimate the effect of uncertainty on the probability of a firm having positive investment while controlling for firm size and sales growth (Table 2). The estimated coefficients on uncertainty are statistically significant and negative, implying that investment is inversely related to uncertainty. Our estimates yield no evidence of non-linearity in the relationship, for when the uncertainty variable is included with the slope dummy, no statistically significant relationship between investment and uncertainty is found. The coefficients on the control variables conform to expectations. The results are similar for weekly and monthly measures of the uncertainty variable.

The estimates reported in Table 2 deal with uncertainty without controlling for irreversibility. To test whether the estimated uncertainty-investment relationship is consistent with decision making based on real options, we estimate the same logit equations with the additional inclusion of a dummy variable acting as a proxy for reversibility (alternately REV_{it} and DIC_{it})[9]. As reported in Table 3, the inclusion of REV_{it} as a slope dummy in ($REV_{it} *U_{it}$) yields estimated coefficients on all variables which are significant at the 5% level or better and have the expected sign. Those coefficients indicate that for firms with high reversibility the negative uncertainty-investment relation is smaller in absolute value than for firms with low reversibility, as hypothesised on the basis of the real-options approach[10].

Due to the binary definition of the dependent variable in the logit model, the coefficient estimates use less of the available information than a Tobit model. Therefore a Tobit regression of $\frac{I_{it}}{K_{it-1}}$ using the same panel data gives us an additional limited dependent variable test of the relationships. The results shown in Tables 4 and 5 corroborate the conclusions drawn from the logit regressions. Using REV_{it} as the measure of irreversibility the Tobit regressions suggest more strongly than the previous results that the effect of uncertainty is due to optimizing behaviour in terms of the real options model. While no significant relation between the uncertainty variable and the investment ratio is found in an equation without irreversibility (Table 4), the inclusion of irreversibility (the variable $REV_{it}*U_{it}$) yields estimates of coefficients on uncertainty, and all other variables, which are significant at the 1% level (Table 5)[11].

These estimates give strong support to the existence of a negative relation between investment and uncertainty in Thailand listed companies. They also support an explanation of that relation based upon the real options approach to the extent that the proxy we use does measure irreversibility. Since the effect of the proxy REV_{it} may be due to other factors we also estimate the model using an alternative indicator for irreversibility. Estimating the Tobit equation with a slope coefficient using the industrial classification dummy, DIC_{it}, as the proxy for reversibility corroborates the results obtained with REV_{it}. As shown in Table 5, the coefficient on the industrial classification proxy for irreversibility is positive and statistically significant at the 1% level, and therefore is consistent with the hypothesis that the existence of real options in investment causes a negative relation between uncertainty and investment.

5. Conclusion

The evidence from listed companies in Thailand suggests that a significant negative relationship exists between uncertainty and investment. The robustness of the finding that the relationship depends upon a measure of investment irreversibility gives support to the notion that firms' investment decisions are influenced by the value of the option to wait. In addition to yielding new estimates of the determinants of investment in Thailand, the results add to the few existing firm-level investment studies for developing countries.

This research does suggest several lines of further research, including exploration of alternative measures for both uncertainty and irreversibility.

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[1] Kim, Kose and Plummer (2003) find that, for APEC countries including Thailand, business cycles measured between 1960 and 1996 have a greater amplitude than in G7 countries although less than in other developing countries.

[2] Vines and Warr (2003) include a simple capital stock adjustment equation in their model.

[3] The result follows from Jensen's inequality (Jensen J.L. *Acta Mathematica* 1906, Stockholm). If X is a real-valued stochastic variable with $E(|X|)$ finite and the function $g(\ )$ is convex, then $E[g(X)] \geq g(E[X])$.

[4] Uncertainty and firm expandability may also create a put option for the firm (Abel *et al*., 1996).

[5] The ability of our measure to represent accurately the variance of expected future profits depends on the informational efficiency of the market. Goh, Wong and Kok (2005) provide evidence on time series properties of the Stock Exchange of Thailand and other ASEAN capital markets.

[6] The choice of a three year rolling average is based on the following consideration. Assuming that managers adjust their estimates of uncertainty on the basis of observed trends in volatility, smoothing over a long period is desirable. However, if there are significant shifts in risk class over time, stock returns may exhibit recent memory but not long memory and extreme (large or small) values for deviations in the past may bias the standard deviation upwards or downwards and give too much importance to past relative to recent and current experience. A three-year period is considered to be a reasonable time span for the models examined in this paper.

[7] The high cost of reversing equity-financed investment can be attributed to a signalling effect or its effect on managerial reputation.

[8] We also estimate probit regressions and obtain similar results. The choice between the two models is purely on grounds of computational ease, which is not an issue here.

[9] The equations exclude suspended and delisted firms (IC no. 8).

[10] The total sensitivity of investment to uncertainty is measured by the sum of the coefficients on the two variables U_{it} and $(REV_{\mathrm{it}} * U_{it})$. The estimated coefficient on U_{it} is negative while that on $(REV_{\mathrm{it}} * U_{it})$ is positive. For firms with reversible investment REV_{it} takes the value 1 and the positive coefficient partly offsets the negative coefficient; for firms with irreversible investment $REV_{\mathrm{it}} = 0$ and the total effect is given by the negative coefficient on U_{it} .

[11] As for Table 3, the equations in Table 5 exclude suspended and delisted firms.

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Tables

Table 1: Structure of the Sample Panel Data by Year

IC	Industry Classification	Total Number of firms 1994-2002	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total Number Of Observations
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	Commerce & Services	***40***	18	24	26	32	36	38	38	39	40	***291***
2	Communication & Transports	***30***	9	11	13	23	25	28	26	29	30	***194***
3	Heavy Industries (excl. Chem & Mats)	***26***	6	9	15	20	23	25	24	26	26	***174***
4	Chemicals and Materials	***26***	13	16	17	19	23	26	26	25	26	***191***
5	Food, Textile & Garment	***45***	30	36	38	41	44	45	45	45	45	***369***
6	Agribusiness & Other Light Industries	***60***	26	36	43	53	54	58	59	60	60	***449***
7	Property Development	***17***	2	4	7	10	14	14	14	16	16	***97***
8	Suspended and Rehabilitation	***39***	18	23	30	30	28	26	24	20	16	***215***
Total Number of Sample Firms		**283**	***122***	***159***	***189***	***228***	***247***	***260***	***256***	***260***	***259***	**1980**

Table 2: The Impact of Uncertainty on Net Investment

DI_{it}	(a) Uncertainty Proxy: Standard Deviation of 3 Year Weekly Stock Return		(b) Uncertainty Proxy: Standard Deviation of 3 Year Monthly Stock Return	
	(i)	(ii)	(i)	(ii)
U_{it}	-.6597*	-.4813	-.6001**	.4525
	(.2734)	(.5747)	(.2267)	(.5297)
$DU_{it}*U_{it}$		-.1242		-.7498*
		(.3308)		(.3420)
$Ln(MV_{it-1})$	.2434**	.2429**	.2512**	.2467**
	(.0382)	(.0382)	(.0376)	(.0378)
$\frac{\Delta Ln(S_{it})}{K_{it-1}}$	83449*	84073*	84095*	85073*
	(40266)	(40184)	(40153)	(38953)
Constant	-.9796**	-1.043*	-1.0714**	-1.3115**
	(.3778)	(.4225)	(.3535)	(.3948)
$z_1(k)$	63.17(4)**	63.62(5)**	72.39(5)**	72.87(5)**
$z_2(k)$	37.04(8)**	35.51(8)**	63.16(8)**	35.99(8)**

(**Significance at 1% level; *Significance at 5% level; # Significance at 10% level)

i) Time dummies are included in all regressions. Heteroskedasticity-robust standard errors in brackets. All regressions show estimated results of logit regressions adjusted for serial correlation assuming to follow an AR1 stochastic process.

ii) Equations estimated using STATA's Generalized Estimating Equations (GEE) population-averaged model. Heteroskedasticity-robust standard errors in brackets. Estimated results are adjusted for serial correlation assuming to follow an AR1 stochastic process.

iii) $z_1(k)$ is a Wald test of joint significance of the reported coefficients, $z_2(k)$ is a Wald test of joint significance of the time dummies, all asymptotically distributed as $\chi^2(k)$ under the null hypothesis of no relationship.

Table 3: The Impact of Uncertainty and Irreversibility on Net Investment

DI_{it}	(a) Uncertainty Proxy: Standard Deviation of 3 Year Weekly Stock Return		(b) Uncertainty Proxy: Standard Deviation of 3 Year Monthly Stock Return	
	(i)	(ii)	(i)	(ii)
U_{it}	-1.1740** (.2961)	-.7155** (.2781)	-1.0767** (.2521)	-.6220** (.2364)
$REV_{it}*U_{it}$	.6247** (.1618)		.6115** (.1624)	
$DIC_{it}*U_{it}$		.3951$^{\#}$ (.2062) t=1.92 p=0.055		.3611$^{\#}$ (.2026) t=1.78 p=0.075
$Ln(MV_{it-1})$	.2248** (.0393)	.2775** (.0443)	.2353** (.0389)	.2820** (.0434)
$\frac{\Delta Ln(S_{it})}{K_{it-1}}$	79942* (40514)	116284** (44619)	81477* (40654)	116025** (44802)
Constant	-.7425$^{\#}$ (.3860)	-1.231** (.4111)	-.8022* (.3547)	-1.297** (.3893)
$z_1(k)$ $z_2(k)$	80.32(5)** 33.86(8)**	65.21(5)** 35.35(8)**	87.37(5)** 35.45(8)**	65.34(5)** 36.91(8)**

(**Significance at 1% level; *Significance at 5% level; # Significance at 10% level) Time dummies are included in all regressions. Heteroskedasticity-robust standard errors in brackets. All regressions show estimated results of logit regressions adjusted for serial correlation assuming to follow an AR1 stochastic process. See also Notes for *Table 3*.

Table 4: The Impact of Uncertainty on Net Investment

$\frac{I_{it}}{K_{it-1}}$	(a) Uncertainty Proxy: Standard Deviation of 3 Year Weekly Stock Return		(b) Uncertainty Proxy: Standard Deviation of 3 Year Monthly Stock Return	
	(i)	(ii)	(i)	(ii)
U_{it}	-.4322	-.5900	-.5138$^{\#}$	.5965
	(.3189)	(.6357)	(.2810)	(.6002)
$DU_{it}*U_{it}$		.1130		-.8010*
		(.3939)		(.3835)
$Ln(MV_{it-1})$	.2052**	.2063**	.2054**	.1997**
	(.0446)	(.0447)	(.0438)	(.0438)
$\frac{\Delta Ln(S_{it})}{K_{it-1}}$	85402**	85433**	85334**	84448**
	(15104)	(15102)	(15098)	(15091)
Constant	-1.5975**	-2.669**	-1.5092**	-1.8937**
	(.5631)	(.5544)	(.5648)	(.5682)
$z_1(k)$	58.20(3)**	58.28(4)**	59.64(3)**	63.95(4)**
$z_2(k)$	36.19(8)**	35.39(8)**	34.54(8)**	31.64(8)**
$z_3(k)$	4.35(7)	4.35(7)	4.59(7)	4.37(7)

(**Significance at 1% level; *Significance at 5% level; $^{\#}$ Significance at 10% level)

i) Time dummies and Industrial classification dummies (derived from Industrial Classification Number (IC) in *Table 1*) are included in all regressions.

ii) Equations estimated using STATA's Random-effects Tobit Estimation method.

iii) $z_1(k)$ is a Wald test of joint significance of the reported coefficients, $z_2(k)$ is a Wald test of joint significance of the time dummies, and $z_3(k)$ is a Wald test of joint significance of the industrial classification dummies, all asymptotically distributed as $\chi^2(k)$ under the null hypothesis of no relationship.

Table 5: The Impact of Uncertainty and Irreversibility on Net Investment

$\frac{I_{it}}{K_{it-1}}$	(a) Uncertainty Proxy: Standard Deviation of 3 Year Weekly Stock Return		(b) Uncertainty Proxy: Standard Deviation of 3 Year Monthly Stock Return	
	(i)	(ii)	(i)	(ii)
U_{it}	-.8986** (.3552)	-.7693* (.3865)	-.9406** (.3185)	-.7715* (.3414)
$REV_{it}*U_{it}$	.6464** (.2041)		.6078** (.2040)	
$DIC_{it}*U_{it}$		.6247** (.2187)		.5975** (.2187)
$Ln(MV_{it-1})$	.1872** (.0448)	.2126** (.0448)	.1899** (.0440)	.2173** (.0439)
$\frac{\Delta Ln(S_{it})}{K_{it-1}}$	85748** (15095)	217068** (25218)	85902** (15095)	217499** (25224)
Constant	-1.539** (.5858)	-1.682** (.4771)	-1.564** (.5425)	-1.7192** (.4530)
$z_1(k)$	67.31(4)**	108.26(4)**	67.63(4)**	108.03(4)**
$z_2(k)$	33.68(8)**	32.64(8)**	32.39(8)**	32.21(8)**
$z_3(k)$	4.95(7)		4.97(7)	

(**Significance at 1% level; *Significance at 5% level; # Significance at 10% level) Time dummies and Industrial classification dummies are included in all regressions. See also Notes for *Table 5*.