行政院國家科學委員會專題研究計畫 期末報告

多國籍企業之衍生性金融商品使用與公司資訊不對稱之探討

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計 畫 主 持 人：黃心怡

計畫參與人員：大專生-兼任助理人員：蔡宜伶

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公 開 資 訊 ：本計畫涉及專利或其他智慧財產權，2 年後可公開查詢

中 華 民 國 102 年 10 月 31 日

中 文 摘 要 ： 相較國內企業，多國籍企業因為面臨匯率風險及投資資金回溯性較低，對於資金避險有較大需求。但值得注意的是，近年來有許多研究顯示衍生性的使用與經理人職業考量及風險偏好有很高相關性。本篇研究即在探討公司衍生性金融商品的使用與多國企業內部資訊不對稱是否有相關性。本篇利用財報附註資料蒐集金融工具使用及交易相關資訊，並運用多種衡量資訊不對稱方法，冀望提出一個公司使用衍生性金融商品之解釋。實證顯示，多國籍企業個別風險並沒有比國內企業來的高，此實證資料提出一個多國籍企業衍生性使用來自於避險需求增加，而此效果減低公司個別風險。

中文關鍵詞： 衍生性金融商品；資訊不對稱；多國籍企業

英 文 摘 要 ： Multinational firms have higher hedging needs than domestic firms due to currency risk and irreversibility of investment funds. Notably, recent empirical studies argue that derivatives usage relates to careers concerns and risk preferences of managers. This paper aims to investigate the relationship between derivatives usage and information asymmetry of multinational firms. We explore the trading activities of financial instruments usage. In addition, we include several alternative measures of information asymmetry. Base on an empirical study, the research try to propose an alternative explanation for the motives of derivatives usage.

英文關鍵詞： derivative usage； information asymmetry； multinational firms

Derivatives usage and information asymmetry of multinational firms

Abstract

Multinational firms have higher hedging needs than domestic firms due to currency risk and irreversibility of investment funds. Notably, recent empirical studies argue that derivatives usage relates to careers concerns and risk preferences of managers. This paper aims to investigate the relationship between derivatives usage and information asymmetry of multinational firms. We explore the trading activities of financial instruments usage. In addition, we include several alternative measures of information asymmetry. Based on an empirical study, the research aims to propose an alternative explanation for the motives of derivatives usage.

中文摘要

相較國內企業，多國籍企業因為面臨匯率風險及投資資金回溯性較低，對於資金避險有較大需求。但值得注意的是，近年來有許多研究顯示衍生性的使用與經理人職業考量及風險偏好有很高相關性。本篇研究即在探討公司衍生性金融商品的使用與多國企業內部資訊不對稱是否有相關性。本篇利用財報附註資料蒐集金融工具使用及交易相關資訊，並使用多種衡量資訊不對稱方法，冀望提出一個公司使用衍生性金融商品之解釋。實證顯示，多國籍企業個別風險並沒有比國內企業來的高，此實證資料提出一個多國籍企業衍生性使用來自於避險需求增加，而此效果減低公司個別風險。

Keywords: derivative usage; information asymmetry; multinational firms
JEL G3,G32, G34, F3

1. Background of derivatives usage of multinational companies

The natural hedge hypothesizes that if investment opportunities of firms perfectly correlate with market prices of underlying assets, firms have lower operating cash flows sensitivities of cash and lower hedge needs, that is if market price decreases, the firm's investment would decreases accordingly, therefore, hedge remain low level (see Almeida, et al. (2004), Acharya, et al. (2007), Denis and Sibilkov (2010)). With this view, firms would align their demand of fund with internal fund, that is if firms' investment demand is positively correlated with internal cash flow (from the inflow of higher market prices of sales) they have lower hedging needs than those firms with fixed investment expenditure.

In addition, firm hedge because they tend to decrease convex taxes or the transaction costs of financial distress (see Smith and Stulz (1985)), and to smooth cash flows or to increase debt financing ability for investment needs (see Myers (1977) and Froot, et al. (1993)).

Multinational companies usually have higher risk on foreign currency trading, and they often trade foreign currency derivatives as a harbor of refuge for hedging cash flows to maintain their investment in each country (see Froot, et al. (1993)). The wildly usage of derivatives of multination firms attributes to cost reduction related (e.g. tax, financial distress) and risk management of liquidity.

On the other hand, Chang and Dasgupta (2007) investigate the transmission effect of sale shock among multi-segment firms. They find that emerged sales declines in one firm's segment would reduce investment on another non-shock segment within the firm due to declining value of collateral assets. Firms with higher volatility of foreign sales have higher propensity to use nonlinear derivatives rather than linear financial instruments to reduce business risk (see Froot, et al. (1993), Gay, et al. (2002) and Huang, et al. (2007)).

Contrary to the insurance hypothesis mentioned upon, some empirical evidence shows that hedging strategy is more related with information and transaction incentives than

reduction of costs of financial distress (see Mian (1996)) and taxes (Howton and Perfect (1998) and Graham (2000), Graham and Rogers (2002)). Sula and Willett (2009) find that foreign direct investment is highly illiquid and less reversible than those capital flows from portfolios investment or than private loans during crises, in that the volatility of capital flows is less informative during the periods of unexpected crises. Their results explain the phenomenon that foreign direct investment is the most stable type of private capital flows due to investment irreversibility (see Hutchison and Noy (2006) and Sula and Willett (2009)). Due to foreign investment are less likely to draw back, firms tend to hedge more when managers possess greater foreign assets, and which are associated with marketable risks.

Andersen (2012) argues that multinational firms have higher operational flexibility with the advantages of accessing to overseas resources and investment opportunities, or they have diverse cash flow resources to support their financing needs of investment, the associated information flow releases to market would increase the firm value. With this view, the purpose of derivative usage of multinational firms is more coincide with the hypothesis of profit seeking (or speculation) rather than hedging. Consistent with this argument, Dolde and Mishra (2007) find that complex (diversified) firms tend to use derivatives for speculative rather than hedging purpose. Investigating firms in Nordic countries, Brunzell, et al. (2011) also find that firm-level diversification is positively related to the usage of derivatives for additional income but negatively related to hedging. Géczy, et al. (2007) argue that multination firms have comparative information advantage relative to the market and, thus, tend to speculate on foreign tangible assets (i.e. foreign currency) for further positive value.

Managerial incentives could also influence the decision of derivatives usage. Tufano (1996) investigate gold mining industries and find that risk-averse managers with option-based compensation would hedge more. Petersen and Thlagarajan (2000) argue that whether or not a firm uses derivatives to hedge risk depends on managerial incentive. In addition, if managers' wealth relates to firm value then they would have higher probabilities

to use derivatives on behalf of their firms to insure their wealth (see Petersen and Thlagarajan (2000), Mozumdar (2001)). Spanò (2007) looks at the relationship between managerial ownership and corporate hedging policy and finds that managers with risk aversion would deviate firm away from the optimal hedging portfolios, on the contrary, firms with a higher percentage of managerial stock ownership would link hedging strategy to firm value. Nam, et al. (2008) posit that managerial career concern influences the motivation of derivatives usage and managers with less reputation or poor performance are prone to engage in speculative or hedging activities.

In addition, prior evidence shows the positive relationship between a firm's growth potential and hedging activities, e.g. Allayannis and Weston (2001) find that U.S. firms use foreign currency derivatives have higher firm value (Q value). Firm with high market-to-book ratios and firms in non-regulated industries have higher information asymmetry, and these firms are likely to use derivatives to insure their wealth. However, the associated equity cost arises from the information asymmetry between managers and shareholders. Froot, et al. (1994) suggest that even hedging does not influence investment profit but it influences investment opportunities. Mian (1996) finds that there is economies scale in hedging activities, which suggests larger firms hedge more than smaller firms. Thus, firms have primarily concern with firm's financial flexibility than agency theory problem occurred on cash holding issues, firms would have precaution motive of holding cash due to riskier cash flows and poor access ability to external capital (see Opler, et al. (1999) and Graham and Harvey (2001)). Firms hedge on the purpose of stable cash flows for their growth opportunities.

While prior literatures argue that firms ignore shareholders' abilities to diversify risk from multinational operating and to monitor the hedge activities of managers, they have greater information asymmetry between shareholders and managers (see DeMarzo and Duffie (1991); DeMarzo and Duffie (1995)). The influence of derivative usage on information asymmetry requires a further examination.

Regarding the type of risk reduced by derivatives trading, Adam and Fernando (2006) find that derivatives usage significantly generates positive cash flows (or shareholder value) but it self does not relate to system risk. In addition, Leland (1998) finds that hedging increase firms' value when they have lower agency costs. Fauver and Naranjo (2010) find that firms with higher agency and monitoring costs would have negative impact of derivatives usage on firm value. The lack of consensus regarding the relation between derivative usage and firm value could be attributed to agency costs arise from information asymmetry.

Literature on the investigation on the information flow of derivatives usage is limited. Fauver and Naranjo (2010) use dummy variable to indicate derivative usage or not, Géczy, et al. (2007) test several information asymmetry proxies but using only few years periods. To provide more contents and information of derivatives usage, this paper include sample periods which firm's financial complied with SFAS regulations, which requires firms have to release derivatives information on their financial reports

In related papers, Froot, et al. (1993) posit that nonlinear derivatives would coordinate investment and financing plans more precisely than linear instrument due to nonlinear hedging with lower costs have greater leverage effect. Huang, et al. (2007) provide the evidence that investment opportunities, option characteristics in debt and incentive compensation positively influence the use of nonlinear derivatives. Thus, we argue that firms are likely to use nonlinear derivatives when there are lower cash holdings in firms or there is higher managerial discretion, in which they have greater associated information asymmetry. In our empirical test, the motives of derivatives usage are investigated by using derivatives contents.

Hypothesis: Multi-national firms use more non-linear derivatives than linear instruments.

Multination firms have greater foreign currencies than domestic firms. Based on the

theory of risk hedging, multinational firms have lower information asymmetry. While based on the theory of risk seeking, multinational firms have greater information asymmetry. Information flow positively correlates with volatilities, Ross (1989) argues idiosyncratic volatility is treated as an adequate measure of information flow, which reflects private information of firms rather than public information. We also use alternative measures of information flow, including private information, and accounting forecast, as robust tests (see Ferreira and Laux (2007)). In addition, idiosyncratic volatility positively correlates with informed trading (see Roll (1988)), efficient capital allocation (see Durnev, et al. (2003)), information of future earning, corporate governance (see Ferreira and Laux (2007)) To test whether or not private information embeds in the activities of derivatives trading, we test the differences of idiosyncratic volatilities between firms with and without derivatives usage.

Hypothesis 1: Multi-national firms with hedging purposes have lower information asymmetry than domestic firms.

Hypothesis 2: Multi-national firms with speculative purposes have greater information asymmetry than domestic firms.

2. Measures of idiosyncratic volatility and information flow

We review relevant literature about the determinants of derivatives usage, characteristics of multi-national firms, and risk preferences of managers. Using the finance data of U.S. listed sample firms, we examine the relationship between derivatives usage and information flow for multinational firms.

Refer to Ferreira and Laux (2007), the measure of daily idiosyncratic volatility is based on a regression of daily stock returns on the returns of the market index (a market model) as follows,

$$r_{id} = \alpha_i + \beta_i r_{md} + e_{id}, \tag{1}$$

where r_{id} is the excess return for stock i on day d, and r_{md} is the value-weighted excess market index return on day d. The idiosyncratic variance is defined as

$$\sigma_{ie}^2 \equiv \sigma_i^2 - \sigma_{im}^2 / \sigma_m^2, \tag{2}$$

where $\sigma_i^2 \equiv Var(r_{id})$, $\sigma_{im} \equiv Cov(r_{id}, r_{md})$, and $\sigma_m^2 \equiv Var(r_{md})$. We obtain monthly return variances and covariances by the sums of squares of daily returns and sums of cross-product in each moth t, respectively.

Further, we compute relative idiosyncratic volatility, as the ratio of idiosyncratic volatility to total volatilities, $\sigma_{ie,t}^2 / \sigma_{i,t}^2$, and logistic transformed relative idiosyncratic volatility, $\ln\left(\frac{\sigma_{ie,t}^2}{\sigma_{it}^2 - \sigma_{ie,t}^2}\right)$, for each month t.

Alternative measures of information flow include: (1)share turnover (TURN), which is monthly share volume divided by shares outstanding; (2)the privation information trading (PRIVATE) measure of Llorente, et al. (2002), in which the annual amount of private information trading given for each firm-year by the b_{i2}^a estimate of the time-series regression: $r_{id} = b_{i0}^a + b_{i1}^a r_{i,d-1} + b_{i2}^a r_{i,d-1} V_{i,d-1} + \varepsilon_{id}^a$, where r_{id} is daily stock return and V_{id} is log daily turnover detrended by subtracting a 200 trading day moving average; and (3)the future earnings response coefficient (FERC) and future earnings incremental explanatory power (FINC) measures of Durnev, et al. (2003). Future earnings response coefficient (FERC) is the sum of the coefficients on future changes in earnings $\sum_{\tau=1}^{3} b_{2,\tau}^b$ of the annual regression on each two-digit SIC industry with at least 10 firms: $r_{it} = b_0^b + b_1^b \Delta E_{it} + \sum_{\tau=1}^{3} b_{2,\tau}^b \Delta E_{i,t+\tau} + \sum_{\tau=1}^{3} b_{3,\tau}^b r_{i,t+\tau} + \varepsilon_{it}^b$, where r_{it} is annual stock return

calculated from fiscal year-end share price plus dividends adjusted by stock splits and distributions, and ΔE_{it} is annual change in earnings before interest. Taxes, depreciation, and amortization scaled by previous fiscal year-end market capitalization. Future earnings incremental explanatory power (FINC) is an increase in the coefficient of determination (R^2) of the annual regression on each two-digit SIC industry with at least 10 firms: $r_{it} = b_0^b + b_1^b \Delta E_{it} + \sum_{\tau=1}^{3} b_{2,\tau}^b \Delta E_{i,t+\tau} + \sum_{\tau=1}^{3} b_{3,\tau}^b r_{i,t+\tau} + \varepsilon_{it}^b$ relative to the base regression: $r_{it} = b_0^c + b_1^c \Delta E_{it} + \varepsilon_{ic}^c$.

2. **Data**

Sample firms, filter by the Compustat Segment File, are required having the information of geographic segments for identified as multi-national firms, respectively. Segment data is obtained from Compustat segment file, which includes information of standard industry classification code (SIC) for business segment, geographic segment type (domestic or non-domestic), and the associated segment sales. The sources date of segments observations is required the same and duplicate reporting observations are omitted. For each year, we identify industrial segments by SIC first-two codes and geographic segments by geographic segment type (i.e., domestic or non-domestic) and summarize industrial and geographic segments sales for each company. In which, the firm-year observations without both business and geographic information for that year are deleted. Follows Denis, et al. (2002), firm-years observations in which industrial segment sales are less than $20 million or the total of either industrial or global segment sales is not within one percent of total Compustat annual reported firm sales for that year are also eliminated. The dependent variables (Y) include the types of derivatives usage and idiosyncratic risks and the independent variables include geographic and industrial segments.

For the derivative usage, we begin our sample formation by selecting all firms exist in

the 2000 to 2012 annual COMPUSTAT files with total assets grater than $20 million. We delete utility (with SIC codes 4900-4999 or NAICS codes 22XX) and financial firms (with SIC codes 6000-6999 or NAICS codes 52XX). Sample firms are limited to firms that have their 10-Ks available electronically at the SEC EDGAR database. (see Fauver and Naranjo, 2010). We hand-collect the information of derivative usage described in the footnotes in 10-K statements, which is obtained from the Securities and Exchange Commission (SEC) filed in LEXIS/NEXIS database. We search sample firms' financial report footnotes with the sections of "Derivative Financial Instrument" and "Quantitative and Qualitative Disclosures about Market Risk ". In which, we look at the keywords of financial derivatives regarding as "swap", "caps", "collars", "futures", "caps", "collars", and "options", which were used for risk management of interest rate, commodity, or foreign currency. Our sample firms are classified as derivatives users if there is any reference to these keywords and as nonusers, otherwise. In specific, the contents related to these keywords are also investigated.

Many descriptions in financial report footnotes indicate the derivatives uses as non-speculation or non-trading purposes. Due to financial reports lack of information for the speculating trading. To identify the active users of financial derivatives, we follow Géczy, et al. (2007) to identified active and less active users by the types, trading frequency, and notional amounts of financial derivatives. To separate derivatives hedgers and speculators, we follow Mian (1996) to separate "hedging" or "speculative" activities, in which a firm has hedger realized gain or loss on their hedging instrument at the time of transactions are finished.

Any declaration of neither the firm engages in speculative or leveraged transactions, nor does the company hold or issue financial instruments for trading purposes in the financial footnotes are classifies as hedgers. On the other hand, both of gain or loss of speculative activities have to be recognized currently. The value of unrealized (AOCIDERG) and realized derivatives gain/loss (CIDERGLQ) in financial report are obtained from Compustat quarterly

report.

Endogenous problem arises due to the negative effect of agency problem on firm value, which may mislead our results to the effect of firm characteristics rather than the motive of derivatives usage. Therefore, we control several firm characteristics.

Speculation may not meet the requirements for reporting under generally accepted accounting principles (GAAP). Géczy, et al. (2007) identify speculative or active derivatives traders based on a market view from the survey data. They argue that speculative trading captures rather the cost advantages of derivatives instruments transaction than they have information on market view. However, the survey data embeds surviving problem.

This paper use 10K yearly financial reports for the periods of 2000 to 2012 due to SFAS (Statement of Financial Accounting Standards) No. 133 "Accounting for Derivative Instruments and Hedging Activities" is effective for fiscal years beginning after June 15, 2000. SFAS No. 133 establishes accounting and reporting standards for derivative instruments and for certain hedging activities. It requires that an entity recognize all derivatives as either assets or liabilities in the statement of financial position and measure those instruments at fair value in the balance sheet. "Accounting for Derivative Instruments and Hedging Activities--Deferral of the Effective Date of SFAS No. 133", the Company will adopt this standard in the first quarter of fiscal 2001. We define speculative for those firms with reports mention speculative or frequent derivatives usage and active for those firms use two more kinds of derivatives; continuing trading; derivatives size

Géczy, et al. (2007) argue that firms with greater revenue and cost denominated in foreign currency would have the advantage to speculate on foreign currency due to they would have greater information than single firms (foreign business operation and operations). They have no evidence that Interest rate (IR) speculation relates with FX speculation. (Their evidence has no overlap between FX speculation and IR speculation.)

3. **Empirical Results**

Table 1 presents descriptive statistics for our sample from year 2000 to 2012. All sample statistics are winsorized at the percentage levels of 1% and 99%. The result shows that sample firms have one to two geographic segments, while that the foreign sales ratios range from 0 to 95%. Here, we define multi-national firms as sample firms have foreign sales ratios greater than zero. Sample firms have idiosyncratic volatility of 0.26 and the relative idiosyncratic volatility (RVAR_e) ranges from 0.32 to 1.

Table 1 Simple Statistics

Variable	Name	Mean	Median	SD	Min	Max
VAR_e	Idiosyncratic volatility	0.26	0.15	0.31	0.02	1.78
RVAR_e	Relative idiosyncratic volatility	0.79	0.82	0.18	0.32	1.00
LnRVAR_e	Logistic relative idiosyncratic volatility	2.03	1.51	1.91	-0.74	9.01
PRIV	Amount of private information trading	0.01	0.01	0.12	-0.35	0.31
TURNann	Stock turnover rate (yearly)	2.3	1.76	2.01	0.07	10.1
AOCIDERGL	Derivatives Unrealized Gains/Losses	-1.57	0.00	11.1	-77	34.00
CIDERGL	Derivative Gains/Losses	-0.21	0.00	12.45	-74	60.05
GEO_NUM	Geographic segment number	1.64	2.0	0.48	1.00	2.00
HERF	Herfindal Index	0.93	1.00	0.15	0.39	1.00
SALEr_foreign	Ratio of foreign sales to total sales	0.25	0.16	0.27	0.00	0.95
Q	Tobin's Q	1.6	1.2	1.31	0.17	7.61
AT	Total assets (mil $)	3,052	500	7818	22	51,779
LEVG	Leverage ratio	0.51	0.49	0.27	0.04	1.57
LogSIZE	log of market value	6.36	6.28	2.01	1.66	11.07
LogAGE	log of (1+age)	1.68	1.79	0.73	0.00	2.56
SALE_AT	Sales-to-assets	1.18	0.95	0.9	0.01	4.89
RD_S	R&D-to-sales	0.14	0.01	0.58	0.00	4.72
FCF_AT	Free cash flow/Total assets	0.05	0.08	0.14	-0.65	0.31

Table 2 shows the difference statistics between multinational firms and domestic firms. The left hand sized column reports the mean test and right hand sized reports median test. T-tests are used to test for differences in each respective mean value, while a Wilcoxon rank-sum test is used to test for differences in the median values.

The results show that multination firms have lower idiosyncratic risk than domestic firms. The results are consistent with alternative information flow, in which multination firms have lower amount of private information trading and greater turnover rates. In addition, compare with domestic firms, multinational firm have triple amount assets as domestic firms and they have greater Tobin's Q value.

Table 2. Sample statistics by domestic and multi-national firms

Variable	Domestic Mean	Multi-national Mean	Diff	p-value	Domestic Median	Multi-national Median	p-value
VAR_e	0.29	0.23	0.06	0.00	0.17	0.13	0.00
RVAR_e	0.85	0.74	0.10	0.00	0.89	0.76	0.00
LnRVAR_e	2.60	1.55	1.05	0.00	2.07	1.14	0.00
PRIV	0.01	0.01	0.01	0.24	0.02	0.01	0.18
TURNann	2.05	2.48	-0.43	0.00	1.47	1.93	0.00
AOCIDERGL	-0.87	-2.02	1.15	0.00	0.00	0.00	0.79
CIDERGL	-0.26	-0.21	-0.05	0.92	0.00	0.00	0.61
GEO_NUM	1.07	2.00	-0.93	0.00	1.00	2.00	0.00
HERF	0.96	0.92	0.04	0.00	1.00	1.00	0.00
SALEr_foreign	0.00	0.40	-0.40	0.00	0.00	0.39	0.00
Q	1.47	1.63	-0.17	0.00	1.10	1.26	0.00
AT	1,373	4,624	-3,252	0.00	308	905	0.00
LEVG	0.52	0.49	0.04	0.00	0.49	0.48	0.00
LogSIZE	12.69	13.94	-1.25	0.00	12.60	13.82	0.00
LogAGE	1.65	1.76	-0.11	0.00	1.79	1.95	0.00
SALE_AT	1.43	1.05	0.38	0.00	1.24	0.88	0.00
RD_S	0.09	0.08	0.01	0.57	0.00	0.03	0.00
FCF_AT	0.06	0.07	-0.01	0.05	0.08	0.08	0.32

Table 3 shows the difference statistics between firms with derivatives use and nonusers. The left hand sized column reports the mean test and right hand sized reports median test. T-tests are used to test for differences in each respective mean value, while a Wilcoxon rank-sum test is used to test for differences in the median values.

The results show that derivative users have lower idiosyncratic risk than non-users. The results are consistent with alternative information flow, in which multination firms have lower amount of private information trading and greater turnover rates. In addition, compare with domestic firms, multinational firm have triple amount assets as domestic firms. The results of subsample comparison for derivatives users are similar with classification for multination firms.

Table 3. Sample statistics by derivatives users and non-users

Variable	Non-Users Mean	Users Mean	Diff	p-value	Non-Users Median	Users Median	p-value
VAR_e	0.31	0.22	0.09	0.00	0.17	0.13	0.00
RVAR_e	0.84	0.75	0.09	0.00	0.89	0.76	0.00
LnRVAR_e	2.51	1.60	0.91	0.00	2.07	1.14	0.00
PRIV	0.01	0.01	0.01	0.10	0.02	0.01	0.03
TURNann	2.15	2.43	-0.28	0.00	1.47	1.93	0.00
AOCIDERGL	-0.39	-2.63	2.24	0.00	0.00	0.00	0.00
CIDERGL	0.10	-0.48	0.58	0.22	0.00	0.00	0.40
GEO_NUM	1.52	1.74	-0.22	0.00	1.00	2.00	0.00
HERF	0.95	0.92	0.03	0.00	1.00	1.00	0.00
SALEr_foreign	0.19	0.30	-0.12	0.00	0.00	0.39	0.00
Q	1.74	1.45	0.29	0.00	1.10	1.26	0.00
AT	1,280	4,785	-3,504	0.00	308	905	0.00
LEVG	0.44	0.57	-0.13	0.00	0.49	0.48	0.00
LogSIZE	12.74	14.02	-1.28	0.00	12.60	13.82	0.00
LogAGE	1.62	1.74	-0.12	0.00	1.79	1.95	0.00
SALE_AT	1.30	1.07	0.22	0.00	1.24	0.88	0.00
RD_S	0.22	0.07	0.15	0.00	0.00	0.03	0.52
FCF_AT	0.03	0.07	-0.04	0.00	0.08	0.08	0.01

Table 4 reports correlation coefficients for our relevant variables. Idiosyncratic volatility variables (VAR_e, RVAR_e, and LnRVAR_e) and information flows (PRIV) negatively correlates with derivative users, multinational firms, Tobin's Q, assets, firms' size, ages, and free cash flows.

Table 4 Correlation Coefficients

Below triangle cells are Pearson coefficients, and above triangle cells are Spearman coefficients.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	VAR_e	1	0.4	0.4	-0.01	0.05	-0.21	-0.14	-0.15	0.17	-0.15	-0.16	-0.53	-0.11	-0.58	-0.31	-0.01	0.09	-0.26
2	RVAR_e	0.31	1	1	0.04	-0.46	-0.26	-0.29	-0.3	0.09	-0.31	-0.11	-0.6	-0.06	-0.61	-0.46	0.13	-0.1	-0.13
3	LnRVAR_e	0.32	0.83	1	0.04	-0.46	-0.26	-0.29	-0.3	0.09	-0.31	-0.11	-0.6	-0.06	-0.61	-0.46	0.13	-0.1	-0.13
4	PRIV	-0.03	0.07	0.05	1	-0.1	-0.04	-0.02	-0.02	0	-0.06	-0.02	-0.07	-0.02	-0.08	-0.03	0.04	-0.03	0.01
5	TURNann	0.11	-0.3	-0.36	-0.1	1	0.11	0.15	0.17	0.07	0.18	0.27	0.4	-0.05	0.48	0.23	-0.15	0.17	0.16
6	DV_hedge	-0.15	-0.26	-0.24	-0.03	0.07	1	0.25	0.23	-0.1	0.24	-0.08	0.43	0.28	0.31	0.09	-0.11	0.01	0.04
7	DVgeo	-0.1	-0.28	-0.27	-0.02	0.11	0.25	1	0.94	-0.14	0.87	0.1	0.28	-0.07	0.31	0.09	-0.18	0.44	0.02
8	GEO_NUM	-0.12	-0.29	-0.29	-0.01	0.11	0.23	0.94	1	-0.17	0.81	0.12	0.29	-0.05	0.34	0.07	-0.18	0.45	0.02
9	HERF	0.1	0.09	0.05	-0.01	0.09	-0.09	-0.13	-0.17	1	-0.07	0.15	-0.22	-0.15	-0.15	-0.01	0.05	0.09	0.04
10	SALEr_foreign	-0.08	-0.3	-0.26	-0.06	0.13	0.21	0.72	0.67	-0.02	1	0.11	0.32	-0.06	0.36	0.11	-0.24	0.51	0.02
11	Q	-0.04	-0.03	-0.13	-0.02	0.24	-0.11	0.07	0.12	0.15	0.06	1	0.03	-0.29	0.43	-0.03	-0.17	0.35	0.31
12	AT	-0.21	-0.29	-0.24	-0.07	0.06	0.22	0.2	0.19	-0.22	0.18	-0.05	1	0.31	0.87	0.19	-0.11	-0.06	0.2
13	LEVG	0.01	-0.04	0	-0.02	-0.03	0.25	-0.08	-0.06	-0.08	-0.07	-0.16	0.15	1	0.07	0.02	0.08	-0.28	-0.12
14	LogSIZE	-0.46	-0.54	-0.6	-0.07	0.35	0.31	0.31	0.33	-0.12	0.31	0.34	0.58	0	1	0.17	-0.14	0.13	0.32
15	LogAGE	-0.35	-0.43	-0.38	0.01	0.16	0.08	0.08	0.06	-0.01	0.1	-0.06	0.11	0.01	0.17	1	-0.03	0.01	0.05
16	SALE_AT	-0.03	0.12	0.12	0.04	-0.11	-0.12	-0.21	-0.22	0.07	-0.27	-0.12	-0.1	0.11	-0.13	-0.02	1	-0.44	0.29
17	RD_S	0.14	0.03	-0.02	-0.02	0.08	-0.13	-0.01	0.03	0.09	0.04	0.23	-0.06	0.03	-0.04	-0.02	-0.24	1	-0.17
18	FCF_AT	-0.35	-0.11	-0.1	0	0.01	0.08	0.02	0.01	0.01	0	-0.11	0.04	-0.15	0.16	0	0.1	-0.33	1

We identified derivatives types with interest rate, commodity, and foreign currency. Firms may use multiple kinds of derivatives to hedge their underlying assets related with their specific business purposes. Panel A in Table 5 shows the frequency of derivatives usage for domestic and multinational firms. Panel B shows generalized logistic model to test whether or not multinational firms use more derivatives than domestic firms based on derivatives classification in Panel A. The results show that relative to domestic firms, the probability of derivatives usage for multinational firms is two times greater than domestic firms.

Table 5 Derivative Usage Information

Panel A. Derivatives Trading Frequency	Domestic	Multinational	Total
Non-users	989	755	1,744
Users	611	1,281	1,892
Derivatives Types			
Interest Rate	363	297	660
Commodity	84	39	123
Foreign Currency	30	472	502
Interest Rate & Commodity	75	18	93
Interest Rate and Foreign Currency	40	376	416
Commodity and Foreign Currency	0	15	15
Interest rate, Commodity, and Foreign Currency	19	64	83
Trading Frequency			
Less Frequent	381	630	1,011
Modest Frequent	184	465	649
Most Frequent	46	186	232
Total	1,600	2,036	3,636

Panel B Derivatives Usage Probability	Compare with Domestic firms, Multinational Firms
Odd Ratio of Usages/Non-usages	2.75
(95% CI)	(2.40-3.14)
p-value	<.0001
AIC=5037, SC=5043, -2 Log L=5035	

Table 6 shows that multinational firms have lower relative idiosyncratic risk and logarithm idiosyncratic risk. Without considering fixed effects of industry and years, firms with derivatives usages have lower idiosyncratic risk. Whereas, the effect of derivate usage on volatility can be omitted when we include both fixed effects. The intersection term between geographic indicators and derivatives usage is not significant. Regarding the characteristics of firms, larger or aged firms have lower volatility, firms with larger market to book ratio have greater information flows. These results of control variables are consistent with prior literature.

Table 6 Information Asymmetry Regression

Dependent variable:	RVAR_e			LnRVAR_e		
Intercept	0.873***	1.221***		2.866***	6.813***	
	(167.3)	(103.2)		(51.12)	(54.92)	
DVgeo	-0.086***	-0.042***	-0.015***	-0.885***	-0.319***	-0.192***
	(-13.9)	(-8.02)	(-2.74)	(-13.3)	(-5.76)	(-2.89)
DV_hedge	-0.070***	-0.015***	-0.008	-0.695***	-0.157***	-0.076
	(-11.6)	(-2.75)	(-1.63)	(-10.7)	(-2.72)	(-1.27)
LogSIZE		-0.043***	-0.044***		-0.54***	-0.545***
		(-27.4)	(-30.4)		(-32.6)	(-31.1)
LogAGE		-0.085***	-0.095*		-0.789***	-0.016
		(-24.3)	(-1.84)		(-21.5)	(-0.026)
LEVG		0.023**	0.02*		0.476***	0.375***
		(2.055)	(1.956)		(4.139)	(3.119)
Q		0.011***	0.004		0.036 (1.395)	-0.016
		(4.532)	(1.628)			(-0.582)
SALE_AT		-0.001	0.006		-0.048	0.097**
		(-0.164)	(1.607)		(-1.47)	(2.336)
MB		0.003***	0.001*		0.024***	0.018**
		(2.974)	(1.749)		(2.688)	(1.984)
DIVPOS		-0.011**	-0.020***		0.067 (1.244)	-0.022
		(-2.05)	(-4.15)			(-0.387)
ROE		0.011**	0.002		0.103*	0.037
		(2.043)	(0.387)		(1.793)	(0.608)
CAPX_S		-0.051***	-0.041**		-0.371**	-0.387*
		(-3.59)	(-2.33)		(-2.48)	(-1.85)
RD_S		0.003	0.003		-0.095	-0.103
		(0.285)	(0.366)		(-0.848)	(-0.926)
FCF_AT		0.008	0.001		0.588**	0.37 (1.271)
		(0.301)	(0.054)		(2.059)	
Industry Fixed Effect			YES			YES
Year Fixed Effect			YES			YES
R square	0.118	0.440	0.707	0.106	0.459	0.633

4. Conclusion

In this paper, we examine the relationship between the contents of derivative usage and level of information asymmetry of multinational firms. We survey yearly financial reports footnotes to identify amounts, types and frequency of derivatives trading. The simple results showed in this report display that multinational firms use more derivatives than domestic firms. Moreover, they have lower information flows (lower idiosyncratic risk) than domestic firms and this result is consistent with hedging theory of derivatives rather than speculative theory. In addition, derivatives usage also negatively correlates relatively idiosyncratic volatility.

The alternative explanation of lower idiosyncratic risk may be attribute to different effects of types or activities of derivatives trading, and that would be included in on our further examination tests.

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附件四

國科會補助專題研究計畫項下出席國際學術會議心得報告

日期：102 年 7 月 8 日

計畫編號	NSC 102－2410－H－263－001－		
計畫名稱	多國籍企業之衍生性金融商品使用與公司資訊不對稱之探討		
出國人員姓名	黃心怡	服務機構及職稱	致理技術學院/財務金融系/助理教授
會議時間	102 年 7 月 4 日至 102 年 7 月 5 日	會議地點	澳洲雪梨
會議名稱	(中文)全球財務穩定之研討會第二年會:系統風險:流動性風險,公司治理與財務穩定 (英文)**Second Annual Conference on Global Financial Stability Systemic Risk: Liquidity Risk, Governance and Financial Stability**		
發表論文題目	(中文)資產銷售與投資現金流量敏感性 (英文)**Asset Sales and Investment Cash-Flow Sensitivities**		

一、參加會議經過

本研討會為國際型研討會,主辦學校為澳洲大學商管學院，每年有二次會議,本次參與之年會主要以全球系統性風險，公司治理層面為主，廣邀各國相關領域之參與者，包括政策制定者、交易市場參與者、與學術研究學者參與，以討論、分析、與意見交流方式進行。

研討會地點之澳洲雪梨市四季飯店。文章投稿截止日為每年 4/1，審查通知日為 4/17，會議舉辦日期為 7 月初。出席研討會共二天，第一天場次主要以系統風險、公司治理、財務穩定、公司財務場次為主，第二天以系統性風險、新興市場、流動

性風險及波動性傳染性探討為主。本次研討會文章也同時有機會進行JBF(journal of business finance,為國科會A級期刊)之特別議題（special issue）之篩選。

澳洲雪梨為南半球國家，正逢冬天，時差比台灣快兩個小時，華航直飛需九個小時以上，因此，必須於前二天出發才能趕的上研討會議程。

二、與會心得

研討會於四季飯店進行，同一議程包括四位學者之口頭報告、相互評析與建議。另外三位議題並非我熟悉議題，不過同議程文章裡都有共通點，即對於資訊不對稱及流動性風險之探討、實證應用及模型都具體之分析。這幾篇文章對於資訊不對稱及風險衡量之方法上都有給予我一些概念，對於我未來之研究或議題上的省思都有相當多幫助。

其中二篇文章主要探討市場風險及流動性風險，其概念來自於公司治理之資訊不對稱會進一步影響市場及流動性風險。也因此，市場模型中若加入流動性風險，則必須先對於資訊不對稱因子先進一步分析。另外一篇文章。主要探討董事會組成特性對經理人風險偏好行為之改變，其概念提到之董事會之獨立性、性別分散性...等因素，會使經理人風險偏好程度不同而造成公司總風險程度不同。然而，對於該篇文章,我在評析中也給予建議應以個別風險而並非總風險來衡量經理人風險偏好。

三、考察參觀活動(無是項活動者略)

無

四、建議

本研討會為國際研討會，但以特定內容及主題，即全球風險為主要議題規劃，因此，雖然研討會範疇及規模較其它之前參與之研討會相對較小，但能夠認識相同領域學者感到相當榮幸。

不過，本次在規劃上，議程及研討會位置更改幾次，事前規劃及接待人員不足，與其它國際研討會比較起來較為鬆散。

五、攜回資料名稱及內容

攜回本次會計核銷所需資料及議程表

六、其他

國科會補助計畫衍生研發成果推廣資料表

日期:2013/10/31

國科會補助計畫	計畫名稱: 多國籍企業之衍生性金融商品使用與公司資訊不對稱之探討
	計畫主持人: 黃心怡
	計畫編號: 102-2410-H-263-001- 學門領域: 財務

無研發成果推廣資料

102 年度專題研究計畫研究成果彙整表

計畫主持人：黃心怡	計畫編號：102-2410-H-263-001-
計畫名稱：多國籍企業之衍生性金融商品使用與公司資訊不對稱之探討	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	1	1	100%		
		研討會論文	1	1	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		

其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)	本研究報告尚在整理與修改當中，將詢求相關領域意見 未來將投稿國內及國際研討會與國外期刊發表

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估 ■達成目標 □未達成目標（請說明，以 100 字為限） □實驗失敗 □因故實驗中斷 □其他原因 說明：
2. 研究成果在學術期刊發表或申請專利等情形： 論文：□已發表 □未發表之文稿 ■撰寫中 □無 專利：□已獲得 □申請中 ■無 技轉：□已技轉 □洽談中 ■無 其他：(以 100 字為限)
3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）(以 500 字為限)