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CONTENTS

LIQUIDITY, MANAGEMENT EFFORT AND PERFORMANCE

Mu-Shun Wang, KaiNan University
Shaio Yan Huang, National Chung Cheng University
An An Chiu, National Chung Cheng University

ABSTRACT

This research examines reform in China. We argue the reform will lead the socialist-market-economy into capitalism. Reform offers opportunities to alter ownership of equity and frees management from control of the communist party. This research discusses the relation between market liquidity, investment decision and financial performance. The results from an analysis of 1002 firms show that reforms have significant impacts on the investment decisions. We discover there is a nonlinear relationship between market liquidity and financial performance. We argue this explains a high ratio of tradable-shareholders shareholdings. We divide tradable shareholders into five groups by different ranges ownership percentage. The results were significant but the directions of influence in each group were different. We suggest that the province-policy may be an important variable in the future research.

JEL: Classification: G12, G34, P2

KEYWORDS: Liquidity, division of equity tradability, consideration, investment decision, nontradable share.

INTRODUCTION

Liquidity is drawing attention increasingly from traders, regulators, exchange officials and academics. Recent empirical evidence supports the theory that liquidity can increase investing activities of firms. This occurs reducing agency problems, holding larger-than-expected cash balances (Opler, Pinkowitz, Stulz and Willamson, 1999), and that public pools of liquidity allows firms to diversify their portfolios because of information asymmetry between firms and public market (Myers and Majluf, 1984).

When Insiders sell their stocks, reducing their share holds, they allow more shares to circulate in secondary markets, increasing market liquidity. The increase of market liquidity has the effect that speculators engage in the stock market introducing additional volatility in stock prices. They buy and sell stocks to gain benefits depending on market information. The marginal benefit they make must be equal to the marginal cost of external corporate governance. Holmstrom and Tirole (1993) pointed out this effect has the benefit of producing external corporate governance.

Due to the unique history of China, listed companies in A-share market can divide their stocks into tradable and nontradable shares. At the end of year 2004, nontradable shares account for 64% of all shares. Obviously, the different market system and structure between tradable and nontradable shares seriously complicate securities market development. Managers focus more on the nontradable shareholders' supervision and their evaluation of stock performance. Nontradable shareholders only rely on net value as an indicator of management performance. As a result, management only allows some tradable stocks to be listed. The premium from selling newly listed stocks can be converted into owners' equity and improve the company's net value. In other words, managers do not pay attention to market performance which relates to interests of tradable shareholders, but they do pay attention to the intrinsic value of any tradable stocks. The extent to which tradable stocks can be converted into nontradable stocks is called the intrinsic coefficient. When the intrinsic coefficient is higher, the contribution of tradability acknowledged by nontradable stocks is larger producing greater tradability value. The result is that management can

willfully deprive the interest of minority shareholders. The effect causes minority shareholders to be unwilling to hold stocks for a long time. Reform significantly improves liquidity in Chinese capital market. According to the market liquidity theory, speed, spread, volume and flexibility, affect liquidity. From the perspective of nontradability theory, the removal of liquidity limits on nontradable shares can increase the liquidity of nontradable shares causing the price of nontradable shares to rise. On the other hand, transaction costs and liquidity influence tradability. We can explain the influence in transaction cost theory. If we need to buy tradable shares during the reform to remove the nontradability liquidity limit, the stock price, the stock price decreases.

Roll, Schwartz and Subrahmanyam (2007) explored the joint structure of the future-cash basis and stock market liquidity. Officer (2007) described the level and determinants of multiples paid to get unlisted targets. We screen the larger-than-liquidity change after the reform of the division of equity tradability in China. Clearly, when external investors hold many shares, they will watch company management. That brings a positive effect on investment decisions of the company. We try to discern whether market liquidity affects investing activities and the firm performance. The reform in Chinese capital market results from the lack of liquidity. It is obvious that the lack of liquidity creates incomplete corporate governance, straying from customary practice.

Many papers discuss the relation between liquidity and managers' performance. Holmstrom and Tirole (1993) explored the relation between releasing shares from insiders and market value of the company and find a negative relationship. If a company's market value is too low, it can be increased raise increasing the stockholding of insiders. If a company's market value is too high, it can be reduced by decreasing the stockholding of insiders. Hadlock (1998) discussed the degree of relation between investment-cash flow sensitivity and stockholding of managers. Kaplan and Zingales (1997) discussed the relationship between investment-cash flow sensitivity and the time option. Boyle and Gupthrie (2003) explored the reaction of investment-cash flow sensitivity on liquidity and the effect of uncertainty on investment. Baum, Caglayan, Ozkan, and Talavera (2006) argued the influences of liquidity and uncertainty on managers' performance. Some papers study the relation between liquidity and corporate governance. Maug (1998) explored the motive for supervision of major shareholders from the liquidity perspective. Admati, Pfledierer, Zechner (1994) believed that minor shareholders lack inside news so they diversify their investment in holding shares. They also prefer to diversify their asset allocation. Moyen (2002) pointed out the investment in a high liquidity company is sensitive to the change of cash flow. Brockman and Chung (2001) proposed that liquidity is important because low liquidity leads to high capital cost and low firm value. Amihud and Mendelson (1986) proved the expected rate of return and transaction costs are related.

This paper discusses relationships between liquidity, managers' performance and firm financial performance under the equity tradability Chinese capital markets. The rest of this paper is structured as follows: Section 2 contains our literature review. We describe our data and methodology in Section 3； Section 4 reports the results of the various statistical analyses and Section 5 presents the conclusion, limitations and suggestions.

LITERATURE REVIEW

Market efficiency hypothesis point out that firm specific risk causes stock volatility under the condition of information asymmetry. However, a potential conflict of interest among managers and shareholders exists in the concentration of ownership. When the ownership is dispersed, managers are motivated to hold more control to entrench outsiders. To sum up, market liquidity is caused by dispersion of ownership. It is necessary to explore the relation between corporate governance and market liquidity in the Chinese capital market. Some argue there the lack of governance relates to the lack of liquidity of the institution of nontradable stocks in China. We examine this relationship by using a two-stage regression. The results support our hypotheses that market liquidity can reduce agency problems, consistent with Jensen and

Meckling (1976).

Zwiebel (1995) explained that liquidity can increase the willingness of major shareholders to watch management and to cooperate with controlling shareholders to realize the benefit. Hoshi, Kashyap and Scharfstein (1991) found liquidity and investing activities are directly related. Companies closer to banks have better access to financing and can keep a high liquidity, thereby supporting investing activities. Why banks prefer to finance companies with closer relation is because banks have more opportunities to know the real financial situation of the company and reduce information asymmetry. The study divided samples into two sets of firms, independent firms and group firms, and predicted that liquidity is a more important determinant of investment for independent firms than for group firms with close banking ties. The proxy variables are cash flow and short-term investment. To be different from liquidity, we use the compensation rate as the proxy variable for liquidity because our research focuses more on the liquidity created by relisted companies after reform.

Baum, Caglayan, Ozkan, and Talavera (2006) developed a static cash management model, which includes the signal deletion mechanism. They argued cash possession, bond interests and uncertainty are positively related. Specifically, they found companies increase cash on hand because of uncertainty. Boyle and Gupthrie (2003) pointed out small firms are more aggressive in entering new markets or launching new products than big ones, which are less financially constrained firms. Myers and Majluf (1984) proved that when firm insiders have information that outsiders do not have, the latter ones will interpret any attempts of the firm to raise external funds as an indication the firm is overvalued. Therefore, they lower their estimation of firm value, raise the firm's cost of external financing and lower project NPV's. When the firm has limited access to external funds, great cash flow not only relaxes the constraint on current investment, but also decreases the likelihood that future investment will be constrained and increases the value of the timing option. Therefore, the opportunity cost of current investment will decrease.

If the interest of managers is consistent with shareholders, the need to replace managers is low (Jensen and Murphy, 1990). Morck, Shleifer, and Vishny (1988) thought that management ownership relates to the power of top management. Outside control from the market influences inside supervision procedures. When management ownership is higher, the probability of outsiders' control is lower. Denis, Denis, Sarin (1997) found that ownership structure has an important influence on inside control. They found that CEO turnover negatively relates to management ownership and chairperson ownership under the control of market performance, turnover rate and other potential determinants. Denis, Denis, Sarin (1997) argued that management ownership might limit the effect of internal control. Management ownership relates to the takeover when managers turnover.

Broussard, Buchenroth, and Pilotte (2004) hypothesized that, when the sensitivity of management reward to performance is higher, the agency cost of major shareholders is lower. It means that issuing the stock option closer to the market price can decrease the agency problem. In other words, the reform of division of equity tradability increases the number of tradable shares. The proxy variable is the ratio of nontradable shares. If the ratio of nontradable shares is higher before the reform, market liquidity will improve after the reform. At the same time, higher management ownership has positive impact on market return (Shleifer and Vishny 1986). Huang (2002) found that investment-cash flow sensitivity was better when firms with higher financing constraint and others conversely. Li (2007) pointed the liquidity of a relisted company positively relates to the market performance. Lin (2007) discussed the influence of company size, capital structure, the ratio of market price to net asset value and the ownership of the largest shareholders on performance.

Hypothesis 1: Market liquidity positively relates to investment decisions in the reform of the division of equity tradability in Chinese capital market.

Hypothesis 2: Under the condition of manager turnover, liquidity positively relates to investment decisions. Under the condition without manager turnover, liquidity negatively relates to investment decisions.

Hypothesis 3: The degree of diversification negatively relates to investment decisions.

Some papers often used liquidity as a proxy variable for investment activities. High liquidity is a signal of good performance. Fazzari, Hubbard and Petersen (1988) mentioned that a low-dividend policy would increase retained earnings and reduce constraints on liquidity. Therefore, we deduce the relationship between investment and liquidity is significant. That means the over-investment hypothesis and underinvestment hypothesis provided by Myers and Majluf (1984) explain management entrenchment. We believed the board of directors inclines to execute the low-dividend policy to examine management performance and understand managers' investing decision when liquidity is high.

Holmstrom and Tirole (1993) found that managers had more opportunities to get stock bonuses after the company is listed. Stock bonuses not only increased liquidity but also provide a good way for external investors to watch the company. Under equilibrium among external investors, major stockholders and managers, the ideal quantity of stock holdings and equilibrium prices will be reached. If managers performed better, external investors would like to hold more shares, and we guess the relation between the two is positive.

McConnell and Servaes (1990) argued that, when low shareholding insiders increase their holdings, the interest of minor shareholders can improve but, when the shareholding of insiders is high, interests between insiders and minor shareholders will be inconsistent. Given that insiders can affect investment-cash flow sensitivity in a nonlinear method, managers invest excessively in internal cash. Hadlock et al. (1998) thought the investment-cash flow sensitivity would drop as the stock insiders hold decreases. That will produce more snatch effect when managers hold certain proportion of stocks in the company. The board of directors wants to replace the mangers, which is not easy to do. External shareholders also think acquisition and merger are not easy. Entrenchment effects cause the incentive perusal of managers to be weak when they face external shareholders. Therefore, the incentive effect aims at managers who are lacking in ownership.

Slovin and Sushka (1993) discussed the impact of the transfer of controlling rights on corporate performance under the hypothesis that the controlling shareholder dies. They found the relation between stock price and the death of controlling shareholders is positive, especially when the shareholding of major shareholder is above 10%. Brennan, Chordia, and Subrahmanyam (1998) revealed the deregulation for nontradable shares increased outstanding shares, leading to a decline in the price of tradable shares. This can be confirmed if government selling state shares through IPO or issuing more new stocks, leads to lower market price of shares.

Reform of the division of equity tradability is intended to solve the problem of the lack of liquidity caused by limits on nontradable stocks. To reduce the impact on the stock market, it needs nontradable shareholders to offer reasonable compensation to tradable shareholders. Xie and Yang (2007) found the consideration rate positively relates to market performance. Condensing stocks and paying cash have the most significant influence on market performance. Using the method of "the lowest stock price and nearly buy at the mentioned date" has no significant influence on market remuneration.

We use the consideration as the proxy variable of liquidity. The influence is mainly on manager performance and second on the market performance. We use two stages regression to test the relation among market liquidity, management performance and financial performance. Li (2007) studied the influence of relisted companies on market performance and the relation between the consideration and

market performance. The paper pointed out that investors are sensitive to the proportion of consideration in the early stage of reform. He (2006) pointed out the major shareholders would issue equity financing for their interests before the reform because interests of major shareholders are from dividends and cash capital increases not from market returns. This will have an entrenchment effect on minor shareholders. After the reform, managers will avoid equity financing and prefer debt financing. The interest of major shareholders will be consistent with minority shareholder because of the increasing number of minority shareholders. Our research infers that the increase of outside shareholders will raise the debt ratio. They are incline to debt financing that extrapolates the incremental debt ratio. This method of financing would increase consistent interests between external investors and large shareholders. The increase of management ownership will improve the efficiency of investment spending and improve market performance.

Pang (2007) developed a model to show increasing liquidity improves the ownership structure after the reform. Outside shareholders can decide whether the reform can improve the governance. This implies that external investors help to strengthen corporate governance, which increases management performance. Our hypothesis is as follows:

Hypothesis 4: Financial performance has an impact on liquidity and management performance.

DATA AND METHODOLOGY

To verify hypothesis one, we use the compensation rate and the current asset to stockholder equity rate to measure liquidity. The proxy variable of investment decision is capital expenses. The following regression equation was estimated to identify the determinants of ROA and net value per share. The related variables and the definitions are depicted in Table 1

We use the two stages least regression method to test the relation between market liquidity and performance. The regression model is as follows:

$$Y=\beta X+\varepsilon \qquad [1]$$

$$Y= LC\_K\beta 1+ CA\_K\beta 2+\beta 3\ldots iX+\varepsilon\ldots \qquad [2]$$

The explanation and operating definition of the dependent variables and control variables are depicted in Table 1. The management ownership rate is used to be the weight by the formula [1]. We use the WLS regression approach to understand the significance of measurement.

Descriptive Statistics

There are total 1,348 firms selected from Shanghai Stock Exchange and Shenzhen Stock Exchange from year 2005 to 2007. Of the 1,348 firms, ST and ST*S shares were removed from the sample. The final sample consists of 1002 firms. ST and ST*S shares whose operating losses have lasted for three years might go private. It is too complex to include ST and ST*S shares in samples to our main thesis in the market liquidity. In all samples, the maximum ratio of current asset to the market value of equity is 0.782, the minimum ratio is -0.0645, and the average value is 0.644. In addition, the ratio of capital investment to replacement cost can reach 99 times. There are many firms inclined to invest more than historical costs

Table 1: Operating Definition

Dependent Variable		
X variables	**Means**	**Operating Definition**
LC_K	Rate of current asset to Capitalization	Current asset is divided by market value of outstanding number of stock
CA_K	Investment expenses to replace cost	Investment expenses is divided by fixed asset deducted the depreciate
Cmpen%	Compensation rate	Compensation volume to divided by equity
H_5 index	Degree of diversification	To use Herfindahl index instead of degree of diversification
FL1	First large shareholders of tradability	Reveal first large tradability originally The annual report record holding rate after Relisted
Debt%	Debt ratio	Total debt is divided by total asset
D/E	Debt to equity ratio	Total debt is divided by equity
L_CTRL	Dummy variable for last controller type	1 means nonstated owner, 0 means stated-owner
Mo%	Holding share rate of managers	The holding share ratio from top management
Transfer	Transferred from ownership agreement	1 means the situation of referred ownership agreement，0 otherwise
Turnover	Dummy for CEO was dismissed	1 replace CEO after relisted; 0 otherwise
SEO	Dummy for seasoned	1 within season one year after relisted;0 otherwise
Control Variable		
Firm Scale	Firm scale	Nature logarithm of total asset
FB%	Holding rate of first large shareholder	Holding rate of shareholders after relist
CRL	Control power to other company	1 means have the control to others, 0 otherwise。
BOARD	Board size	The number seat of board

Table 2: Descriptive Statistics

Variable Symbol	Minimum	Average	Middle	Maximum	Standard Deviation
CA_K	0.001	0.947	0.28	99.01	8.77
LC_K	-0.0645	0.644	0.104	0.782	25.268
Cmpen%	0	1.87	1.5	29	1.41
H_5 index	0.01	0.191	0.159	0.288	0.151
FL1	0	0.02	0.01	0.579	0.043
Debt%	0.011	0.414	0.456	0.98	0.22
L_CTRL	0	0.322	0	1	0.555
FB%	0.052	0.319	0.257	0.826	0.173
Mo%	0	0.9563%	0.0022%	62.2597%	0.054
Transfer	0	1.148	0.827	1	2.154
Turnover	0	0.423	0	1	0.494
Firm Scale	16.884	21.14	21.11	26.69	0.86
CRL	0	0.22	0	1	0.415
BOARD	4	9.5	9	21	2.115

*There are 1,348 samples in Shanghai and ShaJing Zhen stock exchange markets. We filter the unsuitable data and keep 1,002 samples. The degree of freedom is 1001. We delete ST and ST*S shares whose operating losses have lasted for three years might go private. Of the total 1001 samples, there are 696 state-owned companies. Table 2 shows the statistics analysis of regression model: $Y=X\beta+\varepsilon$.*

The average is close to the median, both numbers are below one. The minimum rate of compensation to capital stock is 0%, and the maximum rate is 29%. Therefore, we must delete outliers in the regression. The Herfindahl index is between 0.01 and 0.288, the average is 0.191, and the median is 0.159. All samples are close to the average. Although the maximum ownership of the largest shareholders of tradable shares exceeds 57.9%, there are no largest shareholders of tradable shares in some companies. Companies without largest shareholders of tradable shares are because of the national loan funds. We remove the smallest and the biggest samples in robustness tests.

Managerial ownership ratio will influence managers' investing decisions. In Table 4, the maximum management ownership is 62.259%, but both the average and the median are under 1%. The standard deviation is 0.054, which represents samples have great deviation. The ratio of managerial ownership is low after the deviated values are excluded. We use the management ownership ratio by weighted-least square regression to test the heterogeneity of error terms and analyze the influence on investment decisions.

The maximum members on the board of directors are twenty-one. Since this number is far greater than the median and the average, we still need to do the robustness test. Company size was converted to natural log amount, and it lies between 16 and 26. We separate all samples into big companies and small companies. The paper discovered that management ownership ratio highly relates to the ownership type of final controlling shareholders, major shareholder and diversifications and equity transfer agreement. When choosing a parameter, we rely on the ratio of managerial ownership to calculate least square regression. Because some measurement variables are highly correlated, we merged two or more variables into one. We check their representatives, which have powerful meanings without using this method. In differences between hypotheses, we still care about their relevance and use different models to examine it by the two-stage least square regression.

RESULTS

At first, we used WLS (Weight Least Squares) to estimate the model by weighting management ownership in table 3. WLS needs residual values and has heterogeneity and the rate of stockholding of managers is lower than that of others. We use the characteristic of manager shareholder rate to weight others' independent variables.

The compensation rate always positively relates to investment decision. This is an important clue to explain the relation. We support the hypothesis 1. The control variables such as firm-scale also positively affect investment decisions. We can further explore the condition of division of tradable equity.

The board size has different results as shown in Table 3. We judge their difference by the influence of transfer agreement. That is proof of the concept that the merger and acquisitions have a power over external governance. Results supporting the management entrancement hypothesis or information

asymmetry hypothesis are different from our hypothesis. We guess that managers prefer to use internal funds to support their investment rather than external financing activities. Therefore, their investing actions tend to conservation. Transfer equity agreement has a positive influence on investing decisions not considering major shareholders because major shareholders, who watch managers, will decrease their stocks and influence on the company. Under the circumstances, the influence is not significant between transfer equity agreements and investment decisions. Basing on the above, we conclude the outcomes support the corporate governance and hypothesis 1.

If market liquidity can signal that external investors can campaign to be directors through buy-and-hold strategy, much more pressure will be put on managers' performance. We have a positive value on the reform of the division of equity tradability in Chinese capital market.

Table 3: The Test on Liquidity to Investment (WLS Regression by Manager Stock Holdings)

Model	1	2	3	4	5
Intercept	10.035***	1.753	3.785	3.42*	-0.143
	4.773	1.366	2.05	1.85	-0.075
Cmpen%	0.098***	0.107***	0.243***	0.11***	0.045
	2.397	3.239	3.06	3.29	0.18
H_5 Indx				-0.085***	-0.08***
				-2.628	-2.56
FL1		0.585***	0.611***	0.6***	0.583***
		18.04	17.84	17.53	17.3
Transf.			0.754***	0.088***	0.08***
			2.95	2.815	2.59
Debt%			0.089**	0.069*	0.016
			2.352	1.78	0.42
Firm Scale	0.156**	0.184***	-0.09**	-0.082**	-0.02
	3.773	2.851	-2.51	-2.255	-0.514
Board	-0.196***	-0.06*	0.17***	0.086***	0.064**
	-4.896	-1.732	2.602	2.54	1.94
TURNOVER					0.192***
					5.44
R-square	0.07	0.393	0.41	0.413	0.44
Adj. R square	0.067	0.389	0.4	0.406	0.433
F-test	15.71	99.34	69.625	61.242	59.787

*The dependent variable is CA_K. CA is the investment expenses for the year company relisted. K is the replacement cost, the book value of fixed asset reducing the depreciation and the reservation. The formula is Y=Xβ+ε and X is the independent variable. We filter the unsuitable data and keep 1,002 samples. The degree of freedom is 1001. We delete ST and ST*S shares whose operating losses have lasted for three years might go private. Of the total 1001 samples, there are 696 state-owned companies. The result of White F-test is over 59.133 and it is very significant. The multiregression model uses the ratio of management ownership to solve with WLS. We explore the influence of dummy variables of management turnover on Model 1 from 2005 to 2007. ***, confidence level 1%；**, confidence level 2.5%；*, confidence level 5%.*

We also conclude the relation between diversification and investment decision is negative. The corporation diversifies investments in different industries and businesses instead of the allocation, which has the waste of dispensing at the decision. We find a negative relation exists because of the information asymmetry after diversification.

However, we do not have a strong evidence to explain the relation between market liquidity and investment decisions under the manager turnover. This outcome surprises us. It is inconsistent with the Denis, Denis, Saran (1997), whose statement shows the different context in the Asian corporation. We argue managers are recruited not only by their profession but also by having more "Guan-XI" from the personnel-channel (network). The conclusion does not support our hypothesis 2.

Second, we use the two-stage regression to estimate the relation between investing activities and performance. The results in Table 4 and 5 are different. ROA and net value per share serve as dependent variables in Table 4 and 5 separately to discuss the effect of proxy variable of cash flow and liquidity and proxy variable of manager effort and control variable on firm performance. In Table 4 and 5, we divide the 1,002 samples into five groups according to the percentage of the largest tradable shareholder ownership. The range of percentage of the largest tradable shareholder ownership in first group is 0-0.21%; the second group 0.21%-0.72%; the third group 0.72%-1.29%; the fourth group 1.29%-2.39%; and the fifth group 2.4%-57.88%. In the fifth group, the number of samples of the largest tradable shareholder ownership over 5% is 55. In other words, the ownership of the other four groups is average and centralized.

In Table 4, we found the rate of current assets to equity has a significant influence on the rate of returns of assets in the fourth group. We find significant influences in groups one and five after considering cross-multiple items but the result in the fifth group, which show a negative relation, is different from the first group. It means that cash flow per share negatively relates to ROA when there are major shareholders

Table 4: The Result as a Predicted Variable by ROA

DV:ROA	1		2		3		4		5	
LC_K	.012	.264***	-.03	.024	.168	4.52	.21***	-.02	-.08	-.47***
	.2	2.543	-.57	.33	0.67	1.15	4.37	-.19	.99	-2.81
CA_K	-.09	-.077	.003	.02	-.18	-.98***	-.074	.06	1.95***	5.2***
	-1.33	-1.49	.057	.31	-.69	-3.09	-.55	.55	8.863	4.21
Cmpen%	-.688**	-.64***	-.37***	-1.46**	-.77***	-3.6***	-.14	.88***	.32***	.65***
	-3.88	-5.42	-7.1	-2.27	-3.63	-8.25	-1.35	3.91	2.97	2.5
Turnover	.466***	1.15***	0.16***	-.48***	.062	-1.0***	.3***	-.11	-.68***	-.18
	4.776	13.34	2.53	-3.45	.29	-4.28	3.85	-1.08	-4.64	-.96
H_5 index	-.257**	-.196**	-.05	.10	.16	-.38*	.42***	.44***	-.26***	-.24***
	-2.34	-2.6	-.5	.92	.8	-1.9	5.895	7.81	-3.53	-3.02
Debt%	-.16	-.025	.19*	.196*	-.26*	.011	.23***	-.022	-.011	.03
	-1.36	-.32	1.69	1.9	-1.67	.08	3.9	-.41	-.09	.26
L_CTRL	-.04	-.01	-.09***	-.09***	.03	.01	.33***	.2***	-.045	-.104*
	-.87	-.266	-2.66	-2.87	.38	.17	3.44	2.51	-.881	-1.89
Transfer	-.01	.013	-.09**	-.07	-.02	-.03	-.09	-.25***	.016	-.07
	-.183	.414	-1.91	-1.59	-.3	-.57	-.7	-2.5	.225	-.98
SEO	-.55***	-.137	-.77***	-.5***	-.18	-.2	.26***	-.065	-.23***	-.26***
	-2.99	-1.02	-14.77	-6.86	-1.22	-1.4	3.42	-.997	-3.02	-3.68
FB%	-1.2***	-.56***	0.14	-.24	-.36**	-2.7***	-.79***	.222	1.06***	1.07***
	-5.44	-3.57	1.21	-1.4	-1.98	-7.28	-19.3	.996	8.463	2.94
Firm Scale	.77***	.453***	-.25	-.233	.48***	.38***	-.59***	-.23***	0.2	1.8*
	3.7	3.21	-1.49	-1.52	2.96	2.64	-6.53	-2.82	1.127	0.08
Cmpen%xFB.		.63***		.89		2.9***		-1.7***		-.58
		3.42		1.39		6.93		-5.28		-1.44
CA_KxTurn.		-1.1***		.87***		.74***		-0.15*		-3.9***
		-11.6		4.53		4.2		-1.75		-2.77
LAxH_5 in.		-.06		-.1		-3.62		0.26**		.28**
		-.6		-1.2		-.89		2.46		2.2

*Dependent variable is ROA. The formula is a 2-stage regression model. X is the independent variable. We filter the unsuitable data and keep 1,002 observations. We delete ST and ST*S shares whose operating losses have lasted for three years might go private. Of the total 1001 samples, there are 696 state-owned companies. ***, confidence level 1%；**, confidence level 2.5%；*, confidence level 5%. The period is from 2005 to 2007. The 2-stage regression have interact term to test the regression. The design is compensation to multiple the first block holders, the Investment expenses to replace cost to multiple the turnover dummy variable, the large control holders to multiple the Herfindahl index.*

in capital market. When the percentage of the largest tradable shareholders ownership is under 2.4%, cash flow per share significantly and positively relates to ROA. When the percentage is between 0.21% and 1.29%, it does not significantly relate to ROA. This means cash flow is limited because major shareholders watch it. Market liquidity positively relates to performance when watching works and conversely. The argument is consistent with Bolton and Thadden (1998) that the major shareholders care more about investees' investment decisions and internal funds because major shareholders have more invested. We also found that major shareholders prefer to have liquidity negatively related to ROA. It means that corporations have poor performance when managers are under market pressure.

The rate of investment expenditure to replacement cost positively relates to ROA in group 5. We found the result perplexing about cash flow per share and we cannot understand the reason so we suggest further research is necessary. The rate of compensation of the reform has significant effect under different

conditions. The influence is negative in the first three groups, and it is positive in the latter two groups. It is evident that the percentage of the largest tradable shareholder ownership has different effects on the relation between liquidity and ROA. It is a non-linear relation. This finding is an important contribution of this paper

In Table 5, the compensation rate of the reform significantly relates to the financial performance based on liquidity. Investment decision has a positive impact on group 3 and group 5 but the others cannot be discriminated. The result shows the influence is only on the investment decision and asset value. However, the higher the degree of diversification, the higher the net value per share is. It means that only the good performance of a company matters. Issuing new shares can raise the liquidity but the influence of issuing new shares is different in each group. The relations are negative from groups one to four, while the relation is positive for group five. We point out the important latent variables are market investors and managers performance. The conclusion is consistent with Table 7. Turnover ratio significantly and negatively relates to ROA. With greater diversification, most of parts negatively relates to ROA except group 4. The reason ought to be that, when shareholding rate of market investors is low, the performance

Table 5: Result as a Proxy by per Share Net Asset Value

DV:PNV	**1**		**2**		**3**		**4**		**5**	
LC_K	-.09	.28***	.02	.26***	-.76***	16.5***	.22***	.52***	.065	.33**
	.93	2.67	.288	2.54	-3.47	7.13	4.3	5.87	.77	2.16
CA_K	-.04	-.07	-.11	-.077	.83***	-.04	.21	-.07	-.164	5.77***
	-.71	-1.31	-1.53	-1.49	3.63	-.23	1.403	-.58	-.711	5.21
Cmpen%	.05	-.36***	.085	-.64***	1.04	-.6**	-.231**	.038	.25***	.85***
	1.33	-3.05	1.59	-5.42	.3	-2.38	-2.03	.17	2.63	3.47
Turnover	.38***	.7***	.43***	1.15***	.89***	-.16	.48***	.15	.032	.53***
	4.99	8.18	4.05	13.34	4.73	-1.12	6.38	1.45	.197	3.03
H_5 index	-.27***	-.19***	-.29***	-.2***	1.24***	1.66***	-.86***	-.88***	-.19**	.007
	-3.11	-2.54	-2.44	-2.6	7.28	14.3	-10.49	-14.2	-2.35	.098
Debt%	-.33***	-.27***	-.22*	-.025	-.06	.43***	-.28***	-.42***	.08	.173
	-3.623	-3.35	-1.72	-.32	-.46	5.32	-4.453	-7.33	.61	1.6
L_CTRL	-.05	-.03	-.05	-.009	-.016	-.03	.05	-.12	.17***	.045
	-1.27	-1.07	-.888	-.266	-.25	-.76	.482	-1.46	2.97	.895
Transfer	-.025	-.02	-.02	.013	-.013	-.025	-.32**	-.03	.18**	.14**
	-.72	-.68	-.41	.414	-.21	-.731	-2.28	-.27	2.33	2.176
SEO	-.27*	-.12	-.61***	-.137	-.63***	-1.2***	.07	-.07	.34***	.265***
	-1.86	-.896	-3.06	-1.02	-4.84	-14.14	.859	-.93	4.27	4.05
FB%	-.14*	-.38**	-.31***	-.56***	.96***	.523**	.51***	.76***	.64***	.98***
	-1.72	-2.45	-2.81	-3.57	6.1	2.41	10.8	3.68	4.45	3.09
Firm Scale	.65***	-.088*	.95***	.45***	.78***	1.1***	.88	.21***	-.53***	-.44***
	4.08	-1.79	4.33	3.21	5.55	13.03	.38	2.66	-3.05	-2.93
Cmpen%xFB.		.41**		.63***		.74***		-.18		-1.2***
		2.24		3.42		3.001		-.56		-3.14
CA_KxTurn.		-.46***		-1.1***		1.09***		.18*		-6.6***
		-4.81		-11.6		10.42		1.88		-5.28
LAxH_5 in.		-.21**		-.06		-16.5**		-.44***		-.37***
		-2.08		-.603		-6.86		-5.56		-3.22

*Dependent variable is Net value per share. The formula is 2-stage regression model. X is independent variable. We filter the unsuitable data and keep 1,002 samples. The degree of freedom is 1001. We delete ST and ST*S shares whose operating losses have lasted for three years might go private. Of the total 1001 samples, there are 696 state-owned companies. ***, confidence level 1%；**, confidence level 2.5%；*, confidence level 5%. The period is from 2005 to 2007. The 2-stage regression have interact term to test the regression. The design is compensation to multiple the first block holders, the Investment expenses to replace cost to multiple the turnover dummy variable, the large control holders to multiple the Herfindahl index。*

will be poorer with greater diversification. However, when shareholding of major shareholders reaches a certain critical point, performance will also be poorer with greater diversification. When the percentage of major shareholder ownership is between 1.29% and 2.39, the performance is better. Sometimes, the result also happens to extraneous variables. For example, debt ratio, the final shareholders and transfer equity agreement, have significant impact on group 4. The shareholding rate of largest shareholders negatively relates to financial performance among group 1, 3, and 4. There is no impact on group 2, and the relation is positive in group 5. Firm size only influences group 1, 3 and 4, and the impact is negative on group 4, and positive on group 1 and 3. We get the answer from multigroups. The primary conclusion is that under the diversification of holding shares of market investor, liquidity has a significant impact on manager performance as well as financial performance.

From Table 5, it is sufficient to understand that reform increases market liquidity has a significant effect on manager's performance and financial performance. However, the different shareholdings of outside major shareholders have different influence other than merely nonlinear relation. The reason might be that China's listed companies in different provinces have specialties, management characteristics, and many other differences from each other. Our research examine whether it is the utility as a dummy variable and the result is insignificant. In other words, whether samples are utilities does not change our conclusion. Then, the final shareholders have effect on ROA in the group 2, 3 to 4, but no effect on net value per share. The conclusion supports reform of the division of equity tradability whose goal is to make management focus not only on net value per share but also on ROA. We are looking forward to the achievement.

CONCLUSION

We have some solid conclusions about the market liquidity and performance after the reform but the capital market is not completely free and we are concerned about the control from Chinese bureau systems. However, we discovered the relation supports our hypothesis 1, 3, 4, and rejects hypothesis 2. We notice that missing data from Chinese financial and economic database has an influence on our results.

The paper focuses on the influence of market liquidity on investment decisions, manager performance and financial performance after the reform. We further study the influence market uncertainty has on market return reasons and the change of the attitude of control shareholders toward the corporate governance and management performance before and after the reform. We also examine the topic of liquidity. From the results, we can tell that whether the managers own shares or not and whether the managers have replacement pressure influence how liquidity influences investment decisions. External major shareholders have significant influence on investment decisions and financial performance when managers hold shares. This means corporate governance works.

Although the empirical result shows that the two proxy variables of liquidity, cash flow and compensation rate, have a significant influence on investment decisions and financial performance, the compensation rate does not affect investment decisions and financial performance in some conditions. Obviously, the nontradable shareholders offer the exact amount to tradable shareholders in the consideration project. The primary consideration affecting the management decision is free cash flow. Our research will help identify the truth about the issues of control interests and cash flow and the issues of control interests and corporate governance.

This study originally assumes liquidity has impact on investment decisions and the impact will influence the financial performance through investment decisions. We find there is no relation after using two stage regression. Then we divide samples into five groups according to the percentage of the largest tradable shareholder ownership. Most samples are under 2.4%. We find that every group has significant but not all positive influence. Originally, we assume the relation has a lot to do with the firm attributes. Therefore,

we add a dummy variable indicating whether the firm is a utility and find the relation is insignificant. We continue to use other dummy variables to examine dependent variables. We discover that these dummy variables such as equity transfer agreement and types of final shareholders don't have much to do with dependent variables. We are also show how market uncertainty and financing costs affect the performance of the company.

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Appendix: The Correlation Table of Pearson

	b	c	d	e	f	g	h	i	j	k	l	m	n	o
A	0.81	0.02	-0.2	-0.01	-0.02	-0.01	-0.04	-0.02	-0.01	-0.01	-0.01	-0.03	0.06	0.02
B		-0.03	-0.02	-0.01	0	-0.01	0.02	0.01	0.02	-0.01	-0.05	0.04	0.06	0.02
C			-0.1	-0.04	-0.01	-0.04	0.04	-0.03	0.02	0.03	0.011	0.01	0.05	0
D				0.01	-0.1**	-0.04	-0.13**	0.43**	0.09**	-0.13**	0.03	0.12**	-0.05	0.044
E					0.03	-0.01	-0.04	0.02	-0.04	0.01	0.04	0.09**	0.01	0.04
F						0.48**	0.04	-0.07**	-0.02	0.02	0.07**	0.2**	0.02	-0.01
G							0.05	-0.04	-0.01	-0.02	0.011	-0.04	0.02	-0.01
H								-0.2**	-0.1**	0.13**	0.03	-0.2**	0	-0.2
I									-0.1**	-0.09**	0.02	0.2**	0	-0.02
J										-0.07*	0.01	-0.08*	-0.08*	-0.04
K											0.03	-0.1**	0.12**	-0.04
L												0.06	-0.4	0.05
M													0.02	0.2**
N														-0.01

a:LC_K、b:CA_K、c:Cmpen%、d:H_5 index、e:FL1、f:Debt%、g:D/E、h:L_CTRL、i:FB%、j:Mo%、k:Transfer、l:Turnover、m:Firm Scale、n:CRL. LC_K : Rate of current asset to capitalization, CA_K : Investment expenditure to replace cost, Cmpen% : Compensation rate, H_5 index : Degree of diversification, FL1 : First large shareholders of tradability, Debt% : Debt ratio, D/E : Debt to equity ratio, L_CTRL : Dummy variable for last controller type, FB% : Holding share rate of first large shareholder，Mo%: Holding share rate of managers, Transfer: Transferred from ownership agreement, Turnover: Dummy for CEO was dismissed, Firm Scale: Firm scale, CRL: Control power to other company.

BIOGRAPHY

Mu-Shun Wang is an Assistant Professor of Accounting at KaiNan University,Taiwan. He received his PhD in Business Administration from National Chengchi University, Taiwan. His current research interests include Corporate Finance and Corporate Governance. He has published papers in *International Journal of Business and Strategy, Business Review* and other journals. He can be reached at: No.168 University Road, Min-Hsiung, Chia-Yi, Taiwan(R.O.C.) 62102

Shaio Yan Huang is an Associate Professor of Department of Accounting and Information Technology at National Chung Cheng University, Taiwan. He received his Doctoral Degree in Accounting from Nova Southeastern University in Florida. His current research interests include Financial Accounting, Auditing and Accounting Information System. His recent researches have been published in various journals including: *Expert Systems with Application, International Journal of Manufacturing Technology and Management*, *Total Quality Management and Business Excellence.* He can be reached at: Department of Accounting & Information Technology, National Chung Cheng University, 886-5-2720411#34501, Email: actsyh@yahoo.com.tw, Address: No.168 University Road, Min-Hsiung, Chia-Yi, Taiwan(R.O.C.) 62102

An An Chiu is a Ph.D student at department of Accounting and Information Technology at National Chung Cheng University. Her research interests include Financial Accounting, Accounting Information System and Auditing. Her recent research has been published in *Journal of Valuation.* She can be reached at No.168 University Road, Min-Hsiung, Chia-Yi, Taiwan(R.O.C.) 62102, Email: ananchiu2009@gmail.com

TWIN-RATE UNCERTAINTY, DEBT AND INVESTMENT DECISIONS– EVIDENCE FROM DOW JONES PANEL DATA

Chien-Jen Wang, Takming University of Science and Technology
Po-Chin Wu, Chung Yuan Christian University
Yu-Ming Lu, Lunghwa University of Science and Technology

ABSTRACT

This article modifies the intertemporal optimization model proposed by Bo and Sterken (2002) by considering firm debt composition to derive a more suitable physical investment function and evaluates how twin-rate(i.e., interest rate and exchange rate) uncertainty, derived from the issuance of domestic and foreign debts, influences firms' investment decisions. The new model focuses on the effects of financial leverage—the use of debt and its role in the financial structure of a company—on firm decisions under uncertainty. Empirical results reveal that from the viewpoint of market standing, companies in Dow Jones Indexes decrease their investment as uncertainty increases. Moreover, when the foreign interest rates are lower along with lower exchange rate volatility, companies in the Dow Jones Indexes are inclined to increase the issuance of overseas firm debt in order to finance their planned investments.

JEL: G10; G32

KEYWORDS: Twin-rate uncertainty, debt, investment decisions

INTRODUCTION

The relationship between firm investment and uncertainty continues to fascinate economic researchers, because the effects of these uncertainties on firm investment present an impression of chaos and ambiguity. Huizinga (1993) documented that sources of uncertainty are found to be significant factors that influence the sign of the investment-uncertainty relationship. It is apparent that to analyze the investment-uncertainty relationship, we must think more carefully about the source of uncertainty.

A firm's investment decisions can be divided into two types: financial investment and physical investment. For physical investment, many studies have focused on adopting the cash flow model to derive investment functions. Nickell (1978) utilized the intertemporal optimization model to derive a firm's investment function under uncertain cash flows. The benefits of Nickell's dynamic objective function include the fact that it considers the dynamics of cash flow as well as the uncertainty factors inherited in this function. Bo and Sterken (2002) extended the dynamic objective function (i.e., the discounted cash flow function) used by Nickell (1978) to formalize a new investment function to analyze the relationship between interest rate uncertainty and firm investment. However, in deriving the investment function, Bo and Sterken assumed the firm maximizes discounted cash flow, which is affected only by firm debt and interest rate uncertainty. Meanwhile, debt in the model is generally called firm debt and cannot be further divided into sub-debts, which would be useful in judging the investment-uncertainty relationship. Due to the continuing process of internationalization and the prospering development of financial markets, many firms in developed countries utilize foreign capital to finance physical investment at lower costs. For example, by floating overseas debt in Europe (i.e., European Convertible Bonds, ECB), many U.S. firms obtain much less costly capital to finance their investment. In other words, considering only the effects of

a firm's domestic debt and interest rate uncertainty on investment is incomplete, especially for firms in developed countries.

The objective of this paper is to modify the structural model of Bo and Sterken and derive a more complete firm investment equation and evaluate the effect of uncertainty and debt on firms' investment decisions. For this, we divide firm debt into non-overseas debt and overseas debt. Since issuing debt overseas involves foreign interest rate uncertainty and exchange rate uncertainty (i.e., twin-rate uncertainty), we must add these two uncertainties and overseas firm debt to the cash flow function to derive the new investment function.

In this study, firms considered in the panel data include U.S. Dow Jones Component Stock (DJCS) companies for the period Q1 1995 to Q2 2007. After the global financial crisis started in Q3 2007, systematic risks and uncertainties in markets became fiercely volatile. Therefore, in order to maintain the stability of sampled data, we have chosen Q1 1995 to Q2 2007 as the sample period for estimation. The empirical results demonstrate that the cross-effects of exchange rate volatility, foreign interest rate, and overseas firm debts on firm investment are positive. Therefore, when the foreign interest rate and the volatility of the exchange rate is low, companies listed in the Dow Jones Indexes are inclined to increase the issuance of overseas firm debt in order to finance their planned investments.

The remainder of this paper is structured as follows. Section II reviews the related literature. Section III sets up a new intertemporal optimization model by considering the issue of overseas firm debt and derives a firm investment function, which depends on firm debt, twin-rate uncertainty and their cross terms. Sections IV and V provide data description and empirical results. Section VI presents the conclusions.

LITERATURE REVIEW

Earlier literature on the investment-uncertainty relationship mainly focused on the presence of symmetric convex costs of adjustment. Hartman (1972) and Abel (1983, 1984 and 1985) found that the mean-preserving spread (MPS) increases in price uncertainty and thereby raises investments of a competitive firm. This indicates a positive investment-uncertainty relationship. However, some studies have considered irreversibility and found that increased uncertainty lowers investment (Pindyck, 1988; Bertola, 1988), thus implying a negative relationship.

Caballero (1991) suggested that the different results are due to the asymmetric nature of adjustment costs. For this reason, Caballero developed a simple model with a cost-of-adjustment mechanism to take into account both symmetric convexity and irreversibility. He found that a combination of different degrees of imperfect competition and asymmetric adjustment costs probably reverses the positive correlation between uncertainty and investment to a negative correlation. Abel et al. (1996) developed a more general options model of irreversibility, including "call" and "put" options. Their empirical results revealed that the symmetric treatment of these two options still leads to ambiguous predictions for the effects of uncertainty on investment.

Recently, Lee and Shin (2000) argued that the "option value" of waiting for new information should be considered as an additional cost of investment. After this consideration, the investment is irreversible and can be postponed by the investors. Since the option value increases in uncertainty, this reveals a negative effect of uncertainty on investment. Lee, Makhija and Paik (2008) also supported the notion that real-options investments provide value under abnormal uncertainty because the effects of uncertainty on firm investment present an impression of ambiguity.

Twin-rate uncertainty indicates an uncertain environment comprising interest rate uncertainty and exchange rate uncertainty. Bo and Sterken (2002) analyzed the joint impact of interest rate volatility and

debt on investment. They found the cross-effects of these two variables on investment are positive; this result is more important for highly indebted firms than for less indebted ones.

With respect to the relationship between investment and exchange rate volatility, most studies have focused on the devaluation argument. (Paganetto, 1995; Buffie and Won, 2001; Benavente, Johnson and Morande, 2003; Pratap and Urrutia, 2004). In earlier studies, many discussions were conducted by using data at the industry level. For instance, Campa and Goldberg (1995) used U.S. industry data (two-digit SIC manufacturing sectors) to investigate the linkage between exchange rates and investment, emphasizing the external exposure through both export sales and imported inputs. They found depreciation of the U.S. Dollar is associated with investment contraction rather than expansion. This is probably because industries with low markups (price over cost) cannot absorb a large proportion of the movements in exchange rates. This investment is significantly influenced by the appreciation and depreciation of the U.S. Dollar.

Later studies on investment behavior evolved to emphasize a shift from industry-level considerations to individual firm aspects. Nucci and Pozzolo (2001) used panel data on Italian firms to develop a more precise assessment of how an individual firm's investment responds to specific shocks of currency devaluation. Atella et al. (2003) also argued that exchange rate volatility depresses investment, with sensitivity decreasing among Italian firms with greater market power. Henceforth, in this study we try to use panel data to process blue chip companies in DJCS to prevent probable aggregate biases in industry data and estimate how the individual company's investment responds to the volatility of twin rates.

THEORETICAL FRAMEWORK

Modeling Interest Rate Uncertainty in an Investment Equation

We extend the empirical research on the effects of uncertainty on firm investment. That is, we link the uncertainty factors — interest rate volatility and exchange rate volatility — with firm investment in a structural way. In this section, we first discuss interest rate uncertainty based on Nickell's (1978) dynamic objective function for firms under uncertainty, which takes the form of Eq.(1).

$$\max V_j(0) = \int_0^{\infty} e^{-rt}[E_0(CF_{jt}) - \theta Var(CF_{jt})]d_t \qquad (1)$$

where $V(0)$ is the discounted present value of the firm at time $t = 0$, E_0 is the expectation value based on the information available at time $t = 0$, r is the constant discount rate faced by the firm and is measured in real terms, CF_{jt} is the cash flow generated by firm j at time t, $Var(CF_{jt})$ is the variance of cash flow, which is the measure of the amount of the risk associated with the future income stream, θ is the market price of risk. We assume that θ is positive, which is equivalent to assuming a risk-averse attitude of the owners of the firm. Eq.(1) states that the value of the firm is equal to the expected present value of the future cash flow generated by the firm less the total cost of the risk associated with that particular cash flow.

In order to derive the investment equation, the firm is assumed to maximize Eq.(1), subject to the capital accumulation process Eq.(2), and the cash flow identity Eq.(3). Most studies define cash flow as operating profits minus interest payments, plus the depreciation of capital stock, as shown in Eq.(3).

$$\text{s.t. } K_t = I_t - \delta K_{t-1} \qquad (2)$$

$$CF_t \equiv P_t F(K_t, L_t) - \omega_t L_t - P_t A(K_t, I_t) - P_t I_t - i_t B_t(I_t, IW_t) + \delta K_{t-1} \qquad (3)$$

where $F(K_t, L_t)$ is the production function; K_t, L_t, and I_t are the capital stock, the labor input, and the gross investment of the firm at time t, respectively; δ is the constant rate of depreciation of capital; and ω_t and P_t are the nominal wage rate and the output price respectively. For the sake of convenient analysis, we assume that the price of capital goods is equal to that of output. $A(K_t, I_t)$ represents the adjusted capital stock. $B_t(I_t, IW_t)$ is the net borrowing of the firm and is a function of the current investment I_t and a vector IW_t, which represents the internal source of investment financing available at time t. Finally, i_t is the interest rate at time t.

Assuming that the firm is operating in competitive markets, then the only source of uncertainty is the interest rate. By using the conventional quadratic adjustment cost function and a linear borrowing function, we can obtain the following investment equation (4).

$$\frac{I_t}{K_t} = \beta_0 + \beta_1 i_t + \beta_2 Var(i_t) \times B_t + \varepsilon_t \tag{4}$$

where ε_t is the error term, the βj $(j = 0,1,2)$ are parameters, and $Var(i_t)$ is the variance of the interest rate at time t.

Eq.(4) provides a theoretical relationship between investment and interest rate volatility. Since we are interested in how the interaction between interest rate uncertainty and debt affects firm investment, the individual effect of interest rate volatility and the individual effect of debt should be isolated from the cross-effect of the two. Therefore, the empirical specification of the investment equation is as shown in Eq.(5).

$$\frac{I_t}{K_t} = f_j + \beta_1 i_t + \beta_2 Var(i_t) \times B_t + \beta_3 Var(i_t) + \beta_4 B_t + \varepsilon_t \tag{5}$$

where f_j are firm effects (or fixed effects, which describe the characteristics of an individual firm); β_3 and β_4 represent the marginal effects of the interest rate volatility and debt on the investment-to-capital ratio; β_2 gives the sensitivity of the investment-to-capital ratio to the joint effect of interest rate volatility and debt. In estimation, B_t is scaled by the capital stock in order to eliminate the size effects.

Modeling Twin-Rate Uncertainty in an Investment Equation

Since the U.S. capital market is more mature and most DJCS companies are financed mainly through direct financing rather than indirect financing, the financing tool may issue overseas firm debts in other countries (such as the U.K.) in order to reduce enterprise costs. Thus, excluding twin-rate uncertainty and the issuance of overseas firm debt seems incomplete. For this reason, on the basis of the dynamic function adopted by Nickell (1978) and revised by Bo and Sterken (2002), we modify the cash flow equation Eq.(3) to Eq.(7) and derive an investment equation as Eq.(9). For the proof and derivation of the modified investment function for modeling twin-rate uncertainty in an investment equation, can be referred to Appendix A of this paper.

According to the derivation processes of the investment model mentioned in Eq.(2) to Eq.(5), we derive

an extended investment model to describe the correlation between the volatility of the twin rate and firm investment in Eq.(7).

$$\text{s.t. } K_t = I_t - \delta K_{t-1} \tag{6}$$

$$\begin{aligned} CF_t \equiv\ & P_t F(K_t, L_t) - \omega_t L_t - P_t A(K_t, I_t) - P_t I_t - i_t B_t(I_t, IW_t) \\ & - \overset{*}{i}_t e \overset{*}{B}_t(I_t, IW_t) + \delta K_{t-1} \end{aligned} \tag{7}$$

where $\overset{*}{i}_t$ is the foreign interest rate represented by the U.K. bank rate, e indicates the exchange rate of the Pound Sterling in terms of U.S. Dollars, and $\overset{*}{B}_t$ indicates the issuance of overseas firm debts. Therefore, the investment equation Eq.(4) can be rewritten as Eq.(8).

$$\frac{I_t}{K_t} = \beta_0 + \beta_1 i_t + \beta_2 Var(i_t) \times B_t + \beta_3 e_t + \beta_4 \overset{*}{i}_t Var(e_t) \times \overset{*}{B}_t + \mu_t \tag{8}$$

where μ_t is the error term; βj $(j = 0,1,2,3,4)$ are parameters; e_t is the exchange rate at time t; $\overset{*}{i}_t Var(e_t) \times \overset{*}{B}_t$ represents the cross-effects of foreign interest rate, exchange rate volatility and overseas firm debts. Since we are also interested in the interaction between exchange rate uncertainty in affecting firm investment, the own effect of exchange rate volatility should be isolated from the cross-effect and Eq.(8) can be rewritten as follows.

$$\begin{aligned} \frac{I_t}{K_t} =\ & f_j + \beta_1 i_t + \beta_2 Var(i_t) \times B_t + \beta_3 Var(i_t) + \beta_4 B_t + \beta_5 e_t \\ & + \beta_6 \overset{*}{i}_t Var(e_t) \times \overset{*}{B}_t + \beta_7 Var(e_t) + \mu_t \end{aligned} \tag{9}$$

DATA AND ESTIMATION

We chose the sample firms for empirical study based on the DJCS, which consists of 30 blue chip stocks in the U.S. capital market. After deletion of incomplete data, 21 companies remained in the sample group. The data were sourced from the COMPUSTAT and AREMOS databases. Table 1 presents the data description and measurement. We determined Q1 1995 to Q2 2007 as the sample period to achieve data stability because the global financial crisis started in Q3 2007. For the estimation, we adopt the Fixed Effects Model to investigate time-series and cross-sectional data. There are 1,050 observations in the DJCS profile. All series are quarterly data, processed in the standardized form.

Measurements of Interest Rate Volatility and Exchange Rate Volatility

We discuss two kinds of interest rates: firm interest rate (to represent the standing of the firm) and market interest rate (to represent the standing of the government). In order to measure their volatilities, we utilize two methods: the 12-month moving-average standard deviation (12MASD), to measure predicted historical data, and the ARMA deviation, to measure the unpredicted variance of the stochastic process. Considering the time dependence of the variance, the GARCH (generalized autoregressive conditional heteroskedasticity) type of volatility is applied (Huizinga, 1993). For the ARMA deviation, the firm interest rate is assumed to follow a first-order autoregressive process (AR(1)). We separately estimate the

AR(1) interest rate for each firm and save the estimated residuals. Then the variance of the residuals is computed as the measure of uncertainty. Table 1 presents data description and measurements for the sample firms. Because the sample firms' data are DJCS specific, we report the empirical results of the Fixed-Effects Model in this paper.

Table 1: Data Description and Measurement

Notation	Measurement	Data Source
$\frac{I}{K}$	Capital Expenditure Divided by Total Fixed Assets	COMPUSTAT
i	(1) The Levels of Firm Interest Rate = Firm Interest Expense Divided by Total Debt	COMPUSTAT
	(2)The Levels of Market Interest Rate = Federal Fund Rate	
B	Total Debt Divided by Total Fixed Assets	COMPUSTAT
	(Total Debt = Total Long-Term Debt Plus Total Current Liabilities)	
$Var(i)$	The Variance of Firm Interest Rate or Market Interest Rate	COMPUSTAT
$Var(i) \times B$	The Cross-Effect of Interest Rate Volatility and Firm Debt	COMPUSTAT
e	The Levels of Exchange Rate (i.e. Pound Sterling per US Dollar)	COMPUSTAT
$Var(e)$	The Variance of Exchange Rate	COMPUSTAT
i^*	Foreign Interest Rate = UK Bank Rate	AREMOS
B^*	Overseas Firm Debt = Assuming a Percentage of the Quantity of Total Firm Debt	COMPUSTAT
$i^*Var(e) \times B^*$	The Cross-Effect of Foreign Interest Rate, Exchange Rate Volatility	COMPUSTAT
	and Overseas Firm Debt	& AREMOS

This table shows the data description and measurements of U.S. DJCS companies. The data are sourced from COMPUSTAT and AREMOS.

EMPIRICAL RESULTS

This paper extends the original model proposed by Nickell (1978) to cover three additional variables—foreign interest rates, exchange rate volatility, and overseas firm debts—and their cross-effect terms to understand the correlations. Empirical results are shown in Tables 2 and 3, and explained as follows:

Both firm interest rate and market interest rate exert significant positive influences on firm investment. In contrast to Bo and Sterken (2002), this paper contends that an increase in the interest rate (either firm rate or market rate) raises firm investment in DJCS. The likely reason is that the financing methods of DJCS companies (U.S. blue chip companies) are based not only on bank loans (indirect financing) but also on the company's internal capital, overseas firm debt, and equity (direct financing). During the empirical period, Q1 1995 to Q2 2007, the U.S. economy was booming, so a large proportion of listed companies increased their capital by issuing overseas firm debts, especially in Europe, in order to decrease financing costs. When domestic interest rates are high, companies will raise finance by issuing overseas debts to reduce costs. This will increase firm investment. Therefore, interest rates are positively correlated with firm investment for DJCS companies.

Table 2: The Correlation between Twin-Rate Uncertainty and Firm Investment

	Firm interest rate		***Market interest rate***	
	Measure 1 (12MASD)	***Measure 2 (ARMA)***	***Measure3 (12MASD)***	***Measure 4 (ARMA)***
$Const.$	0.1369	0.1293	0.1575	0.1756
	(8.2988)***	(7.8724)***	(10.2577)	(10.5511)***
i	0.5360	0.8916	0.0038	0.0055
	(3.2836)***	(5.4789)***	(5.4636)***	(8.5405)***
$Var(i)$	1.4615	2.9477	-0.0076	-0.0201
	(0.6364)**	(1.7349)**	(-0.8936)**	(-1.3905)
$Var(i) \times B$	-1.1508	-4.7326	-0.0124	-0.0174
	(-0.3782)***	(-2.0835)**	(-1.0923)*	(-0.9463)
B	0.0215	0.0560	0.0517	0.0672
	(1.7882)***	(4.9669)	(3.9194)***	(5.8002)
e	-0.0267	-0.0539	-0.0514	-0.0841
	(-3.4928)***	(-7.7305)***	(-6.4196)***	(-11.1723)***
$Var(e)$	-1.5869	-0.7825	-1.0388	-0.3666
	(-13.7790)	(-8.9997)***	(-6.9839)	(-3.6168)***
$i^* Var(e) \times B^*$	0.2994	0.1986	0.1791	0.1069
	(12.5971)***	(11.3742)***	(5.7186)***	(5.2205)***
$R-squared$	0.7323	0.7480	0.7561	0.7497
$R-squared$				
$F-statistic$	115.0164***	106.3190***	121.4534***	17.3960***
SE	0.0288	0.0297	0.0283	0.0286
DW	0.2151	0.2373	0.2141	0.2342
$Nobs$	1,050	1,050	1,050	1,050

Data Source: COMPUSTAT and AREMOS
This table shows the Fixed-Effects estimation results of the equation:

$$\frac{I_t}{K_t} = f_j + \beta_1 i_t + \beta_2 Var(i_t) \times B_t + \beta_3 Var(i_t) + \beta_4 B_t + \beta_5 e_t + \beta_6 \overset{*}{i_t} Var(e_t) \times \overset{*}{B_t} + \beta_7 Var(e_t) + \mu_t$$

The number of firms in the sample is 21; the sample period is Q1 1995 – Q2 2007.
White heteroskedasticity-consistent t-statistics are shown in parentheses.
12MASD measure: The variance of the predictable part of the interest rate and exchange rate. ARMA measure: The variance of the unpredictable part of the interest rate and exchange rate based on the ARCH (1) model estimation.
**Significant at the 10% level.*
*** Significant at the 5% level.*
**** Significant at the 1% level.*

Debt exhibits a significant positive influence on firm investment. Since most DJCS companies are low-debt firms, the debt-financing cost is lower. Furthermore, the return on investment derived from debt-financing in DJCS companies is higher as compared to other companies. It is, therefore, not necessary for DJCS companies to be concerned about the interest rate burden or the debt-revaluation effect. Based upon the reversible point of view, DJCS companies will increase their investment expenditures in spite of an increase in debt,

Table 3: Fixed Effects for Dow Jones Component Stock Companies with Correlation between Twin-Rate Uncertainty and Firm Investment

Fixed Effects				
Company	**Firm Interest Rate** **Measure 1 (12MASD)**	**Measure 2 (ARMA)**	**Market Interest Rate** **Measure 3 (12MASD)**	**Measure 4 (ARMA)**
Wal-Mart	0.0270	0.0244	0.0288	0.02828
3M	0.0299	0.0334	0.0244	0.0245
Alcoa	-0.0062	-0.0062	-0.0031	-0.0026
AT&T	0.0216	0.0187	0.0280	0.02824
Boeing	-0.0780	-0.0787	-0.0787	-0.0791
Caterpillar	-0.0673	-0.0746	-0.0589	-0.0595
Coca-Cola	-0.0322	-0.0322	-0.0317	-0.0319
Du Pont	-0.0176	-0.0202	-0.0097	-0.0095
Eastman K.	-0.0077	-0.0060	-0.0084	-0.0085
Exxon	0.0286	0.0320	0.0275	0.0283
Home Depot	0.1211	0.1279	0.1141	0.1147
Honeywell	-0.0441	-0.0454	-0.0403	-0.0400
Intel	0.1695	0.1796	0.1580	0.1584
IBM	-0.0153	-0.0141	-0.0214	-0.0221
Intl Paper	-0.0543	-0.0607	-0.0431	-0.0429
Johnson & J	0.0124	0.0153	0.0094	0.0095
McDonald	0.0065	0.0035	0.0142	0.0147
Merck	-0.0079	-0.0042	-0.0095	-0.0090
Procter & G	-0.0199	-0.0222	-0.0181	-0.0183
Hewlett-Packard	-0.0137	-0.0149	-0.0259	-0.0267
United Tech	0.0556	-0.0581	-0.0552	-0.0561

This table shows the empirical results of the Fixed-Effects model for DJCS.

From the empirical results, we can also see that an increase in interest rate volatility raises firm investment. This also suggests that since the U.S. economy was booming during the sample period, from Q1 1995 to Q2 2007, it might be possible that firms with dissimilar debt patterns responded to the cross-effect differently because the debt-revaluation effect differs between high- and low-debt firms. When low-debt firms such as DJCS companies, face higher interest rate volatility, they will probably respond by investing more in the market.

Since the sample consists of low-debt firms, the cross-effect of debt and interest rate volatility on investment shows a significant negative reaction. The notably negative cross-effect for DJCS suggests that the positive debt effect on firm investment is offset by the negative effect of higher borrowing costs due to highly volatile interest rates for low-debt firms. This leads DJCS (low-debt) firms to cut investment. As regards exchange rate, two measurements show a significant negative influence on firm investment. This result supports the devaluation argument advanced by Atella et al. (2003) that the more the US Dollar depreciates (in other words, foreign currency appreciates), the more investment DJCS firms will undertake.

The volatility of the exchange rate exerts a significant negative influence when the ARMA deviation is used to estimate the investment equation. We can see that at this time the unpredicted part (ARMA measure) is much more significant than the predicted part (12MASD). The likely explanation is that unlike the interest rate variable, which is a domestic financial indicator, the exchange rate variable cannot be decided individually. Usually, volatile exchange rates of the past cannot fully help predict a volatile situation in the future. Meanwhile, the decision-making process concerning exchange rates is more complicated than the mechanism for interest rates. In this paper, we use Pound Sterling corresponding to the U.S. Dollar as the exchange rate to measure volatility because the U.K. is the main European country where U.S. companies issue debt instruments. Also, we can see that not only the U.S. but also the U.K. has a say in determining the exchange rate. Therefore, for the exchange rate, its unpredicted part (ARMA deviation) is much more significant than its predicted part (12MASD).

In addition, the empirical results suggest that exchange rate volatility reduces investment, as noted by Atella et al. (2003) as well. A stable exchange rate is an incentive for firms to increase investment. In other words, to some extent, any economic system may prefer and benefit from a stable exchange rate in terms of firm investment as well as profits.

The cross-effects of the three variables, foreign interest rates (measured by quarterly data of the U.K. bank rate), exchange rate volatility and overseas firm debts, exhibit a significant positive influence on firm investment. In this section, for simplicity, we assume the quantity of overseas firm debt is some proportion of the quantity of total firm debts for each DJCS company. The results show that according to the theory of uncovered interest rate parity, on the assumption that domestic bonds and foreign bonds are imperfect substitutes, when foreign interest rates as well as exchange rate volatility are lower, DJCS companies are more inclined to issue overseas debts in Europe (comparatively lower costs) rather than borrowing capital from U.S. domestic banks or issuing equity (comparatively higher costs). This phenomenon will create an opportunity to issue a greater amount of overseas debts to increase the firm's capital. Therefore, the cross-effects of the three variables—foreign interest rate, exchange rate volatility, and the quantity of overseas debts—will exert a significantly positive effect on firm investment.

CONCLUSION

The contributions of this paper are summarized as follows. First, this paper derives an investment function originally proposed by Nickell (1978) and revised by Bo and Sterken (2002) and extends it to cover three additional variables—foreign interest rate, exchange rate volatility, and overseas firm debts—and their cross-effect term to study the correlations between twin-rate uncertainty and firm investment. Second, in contrast to traditional methodologies, we use Dow Jones Panel Data—a mixed time-series and cross-sectional estimation approach—under a micro-structural framework to explore the investment-uncertainty relationship. Third, in order to estimate the volatility of financial indicators, we use two kinds of methods: 12MASD and ARMA deviation. The evidence shows that most economic agents are inclined to be rationally expectant. Fourth, most results of past studies reviewed, including aggregate and disaggregate studies of the investment-uncertainty relationship (see Carruth et al., 2000), are inclined toward a negative effect. Consistent with the traditional specification, our empirical results on DJCS also exhibit a negative investment-uncertainty relationship from the viewpoint of marketing standing. This shows that in most circumstances, economic agents will be inclined to decrease their investment expenditures with higher uncertainty. Finally, in this paper, we obtain further proof that when foreign interest rates are lower along with lower exchange rate volatility, DJCS firms are inclined to issue overseas firm debts to decrease their financing costs.

This research highlights the effect of financial structure uncertainty on a firm's physical investment. If the firm's debt composition is segmented into domestic and foreign debts, this will introduce volatilities of exchange and interest rates. Empirical evidence indicates that these financial uncertainties have a

significant impact on physical investment, which implies more channels in financial markets that influence a firm's physical investment than are proposed in the existing literature.

In sum, the volatilities of financial variables, especially the twin rate, play a major role in a firm's investment decision. Each volatility type exerts a unique influence, including scale, direction and policy implications. No investor or decision maker can neglect the volatility derived from financial markets. As mentioned by Lensink, Bo and Sterken (2000), researchers should rely on more empirical investigations to test the relationship between uncertainty and investment. For more effective results, topics such as the source of uncertainty, the technique used to quantify uncertainty and cross-sectional differences, could be engaged in future studies.

APPENDIX

Appendix A: Proof and Derivation of the Investment Equation for Modeling Twin-Rate Uncertainty

According to the dynamic objective function for the firm under uncertainty of Nickell (1978) which takes form as Eq.(A1).

$$MaxV_j(0) = \int_0^{\infty} e^{-rt} [E_0(CF_{jt}) - \theta \mathrm{Var}(CF_{jt})]\, d_t \tag{A1}$$

$$\text{s.t. } \dot{K}_t = I_t - \delta K_{t-1} \tag{A2}$$

$$CF_t \equiv p_t F(K_t, L_t) - \omega_t L_t - p_t A(K_t, I_t) - p_t I_t - i_t B_t(I_t, IW_t) - i_t^* e_t B_t^*(I_t, IW_t) + \delta K_{t-1} \tag{A3}$$

Inserting (A3) into (A1), that is, inserting the expected value and the variance of cash flow in Eq.(A1) and utilizing Eq.(A2), then we set up the Hamiltonian function for the problem:

$$\begin{aligned} H = \{ & [p_t F(K_t, L_t) - w_t L_t - p_t A(K_t, I_t) - p_t I_t - E(i_t) B_t(I_t, IW_t) + \delta K_{t-1} \\ & - \theta Var(i_t) B_t^2(I_t, IW_t)] + \mu(I_t - \delta K_{t-1}) - E(i_t^*)(e_t) B_t^*(I_t, IW_t) \\ & - \theta Var(i_t^*)^2 (e_t)(B_t^*)^2 (I_t, IW_t) + \mu(I_t - \delta K_{t-1}) \} e^{-rt} \end{aligned} \tag{A4}$$

where $Var(i_t)$ is the variance of the interest rate. We assume that the adjustment cost function takes the conventional quadratic form given by:

$$A(K_t, I_t) = \alpha_1 I_t + \alpha_2 \frac{I_t^2}{K_t} \tag{A5}$$

where α_1, α_2 are constants and $\alpha_2 > 0$.

We further assume that the net borrowing of the firm is linear in the current period investment. Consequently, the specification of the borrowing function, we have:

$$\frac{\partial B_t(I_t, IW_t)}{\partial I_t} = \lambda \tag{A6}$$

Also let $\frac{\partial i_t^*}{\partial I_t} = \gamma$,where $-1 < \gamma < 0$, B_t^* is some percentage of B_t.

Inserting Eq.(A5) into Eq.(A4). Using Eq.(A6) and utilizing the realizations of the interest rate as a proxy for its expected value $E(i_t) = i_t$, also utilizing the realizations of the exchange rate as a proxy for its expected value $E(e_t) = e_t$, we obtain the first-order condition of the problem:

$$\frac{I_t}{K_t} = \frac{-(1+\alpha_1)+\frac{\mu}{p_t}}{2\alpha_2} - \frac{\lambda}{2\alpha_2 p_t} i_t - \frac{\theta\lambda}{\alpha_2 p_t} Var(i_t) \times B_t - \frac{\lambda\gamma}{2\alpha_2 p_t} e_t - \frac{2\theta(\lambda)\gamma}{\alpha_2 p_t}(i_t^*)Var(e_t) \times B_t^* \quad \text{(A7)}$$

Normalizing the price of goods and redefining the parameters, Eq.(A7) becomes:

$$\frac{I_t}{K_t} = \beta_0 + \beta_1 i_t + \beta_2 Var(i_t) \times B_t + \beta_3 e_t + \beta_4 (i_t^*) Var(e_t) \times B_t^* + \varepsilon_t \quad \text{(A8)}$$

where ε_t is error term. β_0 contains both the Q-effect and an intercept. The sign of β_0 is unknown. $\beta_1 < 0$ since $\alpha_2 > 0$ and $\lambda < 0$. $\beta_2 < 0$ since $\alpha_2 > 0$, $\lambda > 0$ and $\theta > 0$. $\beta_3 > 0$ since $\alpha_2 > 0$, $\lambda > 0$ and $\gamma < 0$. $\beta_4 < 0$ since $\alpha_2 > 0$, $\theta > 0$, $\lambda > 0$ and $\gamma < 0$.

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BIOGRAPHY

Dr. Chien-Jen Wang is an Assistant Professor of International Trade at Takming University of Science and Technology, Taipei City, Taiwan, R.O.C. Email: chienjen@takming.edu.tw

Dr. Po-Chin Wu is a Professor of International Trade at Chung Yuan Christian University, He can be contacted at Department of International Trade, Chung Yuan Christian University, 200, Chung-Pei Rd., Chung Li, Taiwan, R.O.C. Email: pochin@cycu.edu.tw

Yu-Ming Lu teaches in Department of Information Management, Lunghwa University of Science and Technology, 300, Sec.1, Wanshou Rd., Guishan, Taoyuan County, Taiwan, R.O.C. Email: kevin@mail.lhu.edu.tw

FORECASTING FOREX VOLATILITY IN TURBULENT TIMES

Rajesh Mohnot, Middlesex University Dubai

ABSTRACT

The present study is an attempt to evaluate the predictability of the foreign exchange volatility in thirteen countries. The data covers the period of 2005-2009. To effectively forecast the volatility in the exchange rates, a GARCH model is used. The study compares the results between crisis period and a set of normal periods. The empirical results reveal that almost all countries except Thailand witnessed non-existence of volatility shocks at least once in a three year pre-crisis period but all the sample countries had volatility shocks in the crisis period of 2008-09. This apparently indicates that forecasting can be made at least for the next day given the high degree of volatility in the crisis period. T*he paper also reveals that exchange rates tend to have persistent conditional heteroskedasticity, and hence, could be predicted with one lag term.*

JEL: C53; F31; G17

KEYWORDS: Forecasting, GARCH, Foreign exchange rates, Volatility, Financial Crisis

INTRODUCTION

Since the introduction and implementation of the floating exchange rate system in 1971, volatility has become a buzz word in the financial markets. Many countries' currencies are floating freely against each other implying the economic principles of demand and supply prevail in the foreign exchange market. The FOREX markets and their activities have evolved tremendously during past few decades. Gone are the days when foreign exchange transactions were used as part of commercial, investment and central banks. Globalization and economic integration have impacted the involvement of foreign exchange transactions by multinational corporations, hedge funds, private investors, individual investors, speculators and arbitrageurs. This has changed the shape of foreign exchange market from a traditional limited-hour operational system to 24-hour electronic-based and market-oriented mechanism. Today, this market is believed to be the largest financial market in the world with an estimated daily turnover of US$ 3.2 trillion. According to BIS Survey 2007, turnover in traditional foreign exchange instruments such as spot, forwards, swaps etc increased by 71% and reporting dealers' turnover with both other financial institutions and non-financial customers almost doubled.

The above-mentioned dynamics have instilled a distinct feature in the foreign exchange market i.e. 'volatility'. Foreign exchange market volatility peaked in 2008, soon after Lehman Brothers collapsed. A worldwide recession followed. Though moderate volatility has always been welcomed in FOREX market circles, the recent pattern of volatility has become an issue of concern for the monetary policy makers and economists. The recent summit of G-7 nations in October in Istanbul expressed a deep concern over the unusual and abnormal behavior in exchange rates. It was noted that 'excess volatility and disorderly movements in exchange rates have adverse implications for economic and financial stability'. This is not the first time excess volatility has triggered a debate. Financial crisis and economic turbulence have been witnessed in the past from time to time, and the same issue were debated. This sparks a further discussion of why volatility clusters cannot be captured in the times of turbulence. We know volatility refers to fluctuations in a time series data due to the flow of time dependent information. It may be of concern to find out whether the past returns are able to predict the future returns in the exchange rates. While capturing volatility, one may observe that there are some calm periods with relatively small returns and some wide swings with large positive and negative returns. This is characterized as volatility clustering. If

the variance of an exchange rate series depends on the past then the series is likely to have conditional heteroskedasticity. Researchers are constantly experimenting with new ways to measure volatility in order to provide more reliable and consistent predictability in the foreign exchange markets.

Though there has been some extensive research work on the measurement and forecasting of volatility of exchange rates, most of the research attempts are related to normal economic times. Volatility patterns have been estimated during normal economic scenarios but times of turbulence have remained quite research-isolated. A renewed interest of research in this area seems inevitable as researchers would like to ascertain volatility patterns during the times of turbulence. The main objective of this paper is to examine volatility patterns in the exchange rates of developed, developing and emerging market economies especially in the current crisis period. The study uses the GARCH model to estimate volatility clustering in time series data of thirteen countries' exchange rates. The second section of the paper deals with the review of existing research literature in the area of foreign exchange volatility. Section-3 discusses the methodology and data used in this paper. Section-4 outlines the analytical part of empirical results based on methodology as discussed in section-3. The last section presents the concluding remarks.

LITERATURE REVIEW

There has been a good amount of research in the area of volatility measuring and forecasting. Some are related to developed countries while others cover some normal-state economy periods. In developed markets, the volatility structure has changed quite significantly especially in the last two decades. Long run volatility has been recorded at comparatively lower level but volatility in emerging countries like Brazil, China, India, South Africa, Russia etc currencies have fairly moderated in the recent years. Dunis, Laws, and Chauvin (2003) examine the medium-term volatility forecasting of some developed countries currencies using alternative models of forecasting. Maheu and McCurdy(2002) use nonparametric measures to analyze the time series behavior of foreign exchange volatility. According to them, the non-linear impacts in volatility should be measured taking in-sample statistics and out-of-sample forecasts. Goretti (2005) highlighted that non-linear models in financial time series analysis work better than linear models due to the fact that the latter sometimes ignore unobservable factors such as herding behavior, investors' beliefs, financial panic, and political uncertainty. Sager and Taylor(2006) clarify that the quality of short-term exchange rate models still continues to be an occupational hazard of the international financial economist as fundamental variables are poorly correlated with high frequency exchange rate movements. Sometimes models fail to record some of the variables which may cause validity of the outcomes. Takezawa (1995) evaluates information role of quote arrival in impacting intraday volatility by applying GARCH model and found that information process is time consuming. Aries, Giromini and Meissner (2006) have empirically examined the volatility of Brazilian Real, the Russian Ruble, the Chinese Yuan and the Australian Dollar concluding that these currencies are undervalued against the US$.

Hansen and Lunde (2001) have done an extensive comparison of various volatility models drawing out an inference that GARCH (1,1) model best forecast the volatility. On the contrary, Johnston and Scott (2000) have observed that GARCH models with normality assumptions do not provide a good description of exchange rate dynamics, thereby raises a question on the contribution of GARCH type models in the determination of the stochastic process. Even sometimes it was felt that there might be some differences in the outcomes of GARCH and Stochastic volatility models. Pederzoli (2006) results reveal that VaR based analysis does not support stochastic volatility model but emphasized that GARCH model could help in defining an interval forecast. Some researchers (Chowdhury and Sarno, 2004; McMillan and Speight, 2006) have used different forms of GARCH model to define intra-day volatility in the foreign exchange markets. Chowdhury and Sarno (2004) used multivariate stochastic volatility models to investigate the degree of persistence of exchange rate volatility at different frequencies while McMillan

and Speight (2006) used FIGARCH model to capture long memory dynamics in intra-day volatility. Similar work is produced by Bordignan, Caporin and Lisi (2009) in which it was mentioned that periodic patterns with long-memory behavior in conditional variance can be predicted. They tried PLM-GARCH model to examine intra-day volatility. Leon, Rubio and Serna (2005) tested the GARCH model to test time-varying volatility incorporating skewness and kurtosis and they revealed a significant presence of skewness and kurtosis. Fang (2000) work is also a remarkable contribution in time-varying volatility. He observed that there are significant day-of-week and hour-of-day seasonal effects which can best be characterized by alternative model of ARIMA-GARCH. But a recent study conducted by Vincent, Jonathan and Xuan (2009) reveals that the optimal modeling frequency volatility can be estimated based on realized volatility of 30-minute interval returns.

It may not be surprising to note that volatility is also caused by the central bank's intervention. In fact, central banks of several countries have been observed to intervene in the foreign exchange markets at times when their currencies were having unusual swings. Frenkel, Peirdzioch and Stadtmann (2005) examined the impact of monetary authorities' intervention in the exchange rate comparing Japanese intervention policy with US intervention policy, and as expected, Japanese authorities were actively respondent to the fluctuation of Yen / Dollar. Edisan, Cashin and Liang (2006) examined GARCH model to find out whether the intervention activities by the central bank influence the level of exchange rate. Their findings, though rejected that intervention consistently influence the level of exchange rate, showed that the conditional variance of the exchange rate is positively related to the magnitude of the official intervention. In the same way, Domac and Mendoza (2002) also used EGARCH model showing that both the amount and frequency of foreign exchange intervention decreased the volatility of the exchange rates. But all the time the reasons for monetary policy affecting the exchange rates are not obvious. Woglom (2003) found that the role of exchange rate in current monetary policy making is not very clear which leaves some doubts. In addition to the above mentioned factors affecting volatility, some researchers (Gau and Hua, 2007) have found that volatility is also affected by public news arrivals and unexpected volume shocks.

Some researchers have attempted to determine an appropriate volatility model in line with hedge risk objectives. The firms would like to apply a model which best defines the risk level. Mansur, Cochran and Shaffer (2007) highlighted that a firm can decide its futures position given a hedge ratio. For this purpose, ICSS-GARCH model reveals better results than standard GARCH model. In another scenario, some researchers realized that the changing pattern of volatility needs to be analyzed as it may have its impact on trade and business of multinational companies. Egert and Zumaquero (2008) carried out an extensive work measuring impact of foreign exchange volatility on export performance of some transitional east and central European countries. According to their findings, some dominating sectors like chemical and manufacturing were observed to suffer from increased foreign exchange rate volatility.

METHODOLOGY AND DATA DESCRIPTION

The main objective of this study is to evaluate the predictability of thirteen exchange rates especially in the times of turbulence. In this regard, it is important to highlight the very first contribution made by Engle (1982) who introduced autoregressive conditional heteroskedasticity (ARCH). According to the ARCH model, the variance of the dependent variable works as a function of past values of the dependent variable and independent variables. In the later stage, ARCH model was generalized by Bollerslev (1986) propounding GARCH model. The original ARCH model used the following equation:

$$r_t = \gamma_0 + \gamma_1 \sigma_t^2 + e_t + \theta_1 e_{t-1} \quad (1)$$

$$\sigma_t^2 = \omega + \alpha\ e_{t-1}^2 + \beta\ \sigma_{t-1}^2 \quad (2)$$

where α_1, αq, μ and w are the parameters to be calculated. The above mean equation (1) is written as a function of exogenous variables with an error term. Since σ_t^2 is the one-period ahead forecast variance based on past information, it is called the conditional variance. According to this equation σ_t^2 is supposed to have mean zero and variance one, and is often assumed to be normally distributed. This is a very common assumption that $\alpha 1$ and w are all positive in order to obtain positive values for the estimate of the condition variance. The (1,1) in GARCH(1,1) refers to the presence of a first-order GARCH term (the first term in parentheses) and a first-order ARCH term (the second term in parentheses). An ordinary ARCH model is a special case of a GARCH specification in which there are no lagged forecast variances in the conditional variance equation. The benefit of modeling volatility forecasting lies in the fact that variance of the errors provide more accurate time-varying intervals. This may help analyst to assess the risk of holding an asset or the value of an option. This model simply describes the characteristics of the AR(1) that the volatility in the current period is related to its past value with a white noise error term i.e. μ_t. As mentioned earlier, it is the variance which should be used as a measure of volatility and it is derived from the mean-adjusted relative log change value of the exchange rates.

With regard to data selection, since the study aims at forecasting forex volatility in times of turbulence, the most recent crisis period is chosen. The global financial crisis broke in June 2008, therefore, one year period is counted from July 1, 2008 to June 30, 2009. Indisputably, this period is the most affected period and demands a proper investigation with regard to volatility forecasting. To make this study logical, a past three-year period is also chosen in order to compare the results and draw robust conclusions. Thus the study covers a total of four-year period starting from July 1, 2005 and ending June 30, 2009. The empirical analysis considers daily changes in exchange rates. Following the IMF report which lists total twenty six countries, the present study has chosen twelve countries broadly covering developed and emerging economies, and the Euro Zone to represent the European countries. The thirteen countries include Brazil, Czech Republic, India, Korea, Mexico, Russia, South Africa, Thailand, UK, Canada, Singapore, Japan, and the Euro Zone. While choosing the countries, it is particularly taken care that the country is having either floating exchange rate system or managed float system. So the countries having other form of exchange rate systems are excluded from the study because the volatility is either restricted within a stipulated range or it is non-existent. The study uses the sample country's exchange rate against the US dollar keeping in mind the fact that these countries have significant proportion of their international business in dollar denominated currency. The exchange rates have been collected from different sources including the official website of Pacific Exchange Rate Service.

EMPIRICAL RESULTS

The daily changes in the exchange rates of twelve countries and European region currency have been compiled. The daily changes were calculated as the change in the logarithm of closing prices of the preceding day. The daily changes are calculated using the following formula:-

$$\Delta Ex_t = \ln (Ex_t) - \ln (Ex_{t-1}) \quad (3)$$

The changes in the logs of the exchange rates of the sample countries are shown through figures presented below. These figures clearly demonstrate the swings which further indicate the existence of volatility clustering.

Figure 1: Fluctuation in Brazilian Real

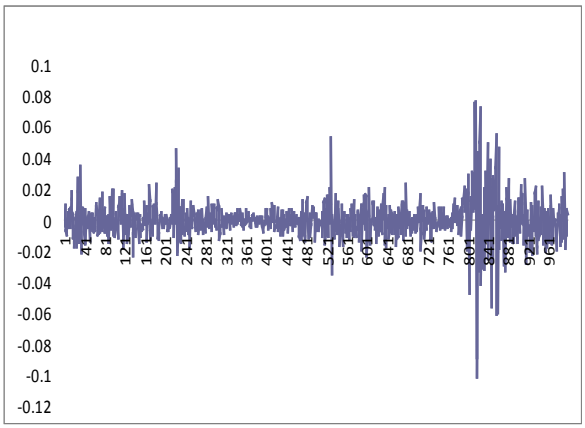


Figure 2: Fluctuation in Mexican Peso

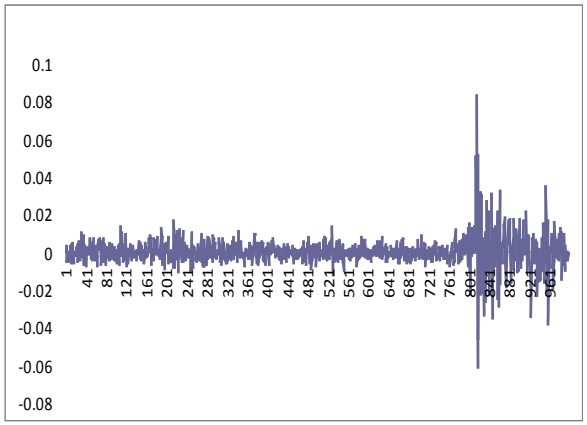


Figure 3: Fluctuation in Canadian $

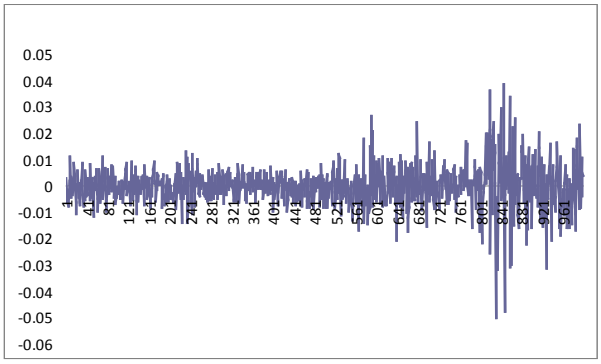


Figure 4: Fluctuation in South African Rand

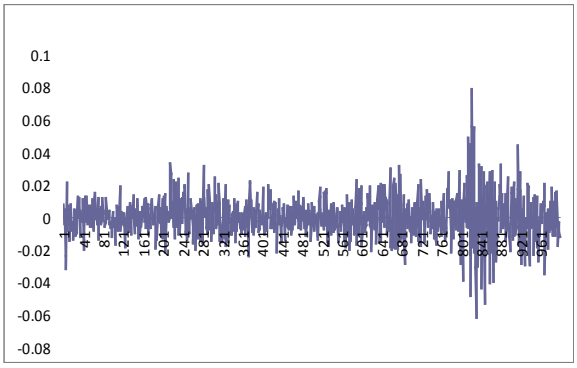


Figure 5: Fluctuation in Czech Koruna

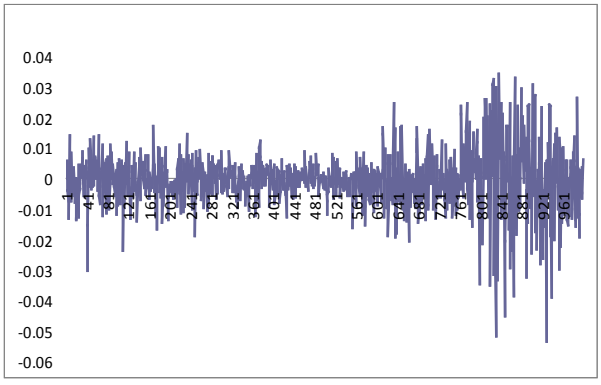


Figure 6: Fluctuation in UK Sterling

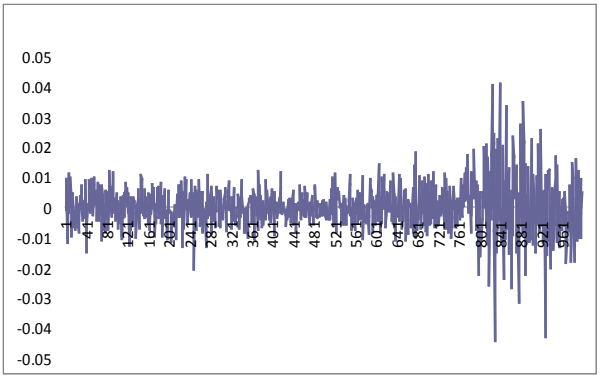


Figure 7: Fluctuation in Euro

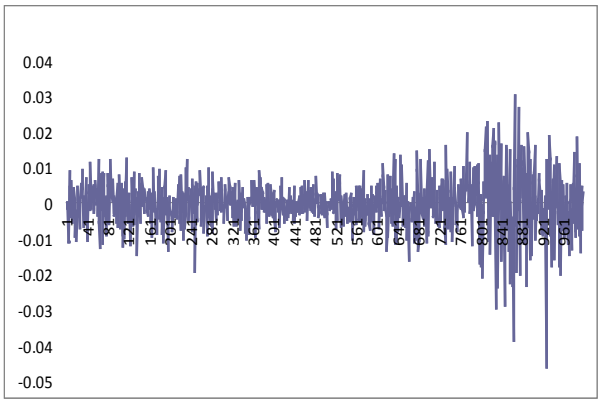


Figure 8: Fluctuation in Russian Ruble

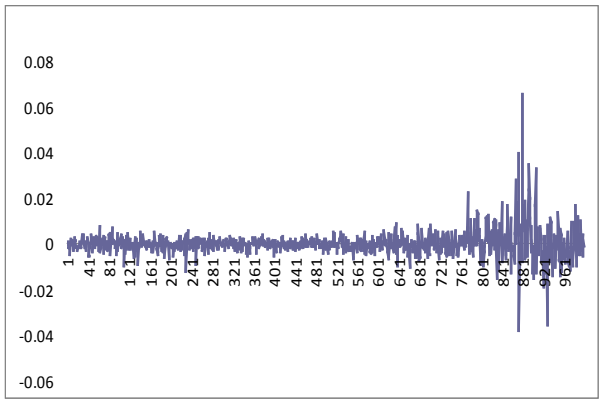


Figure 9: Fluctuation in Indian Rupee

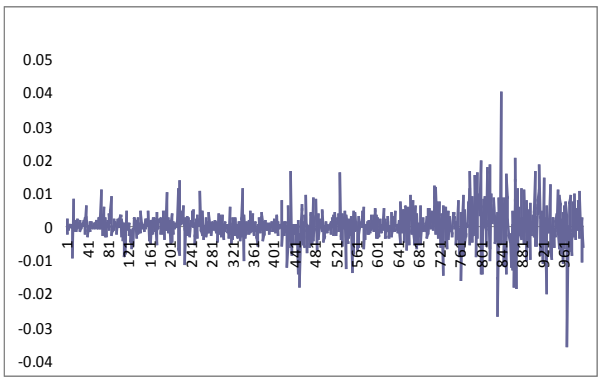


Figure 10: Fluctuation in Korean Won

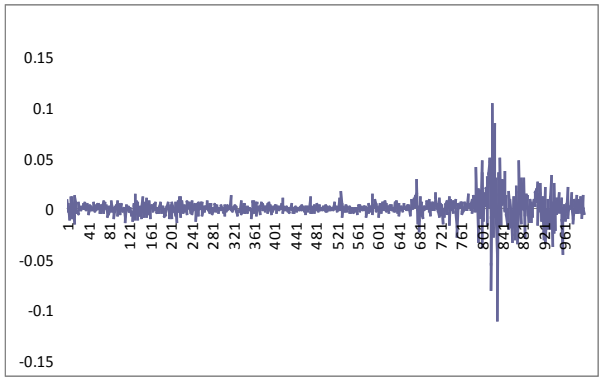


Figure 11: Fluctuation in Thai Baht

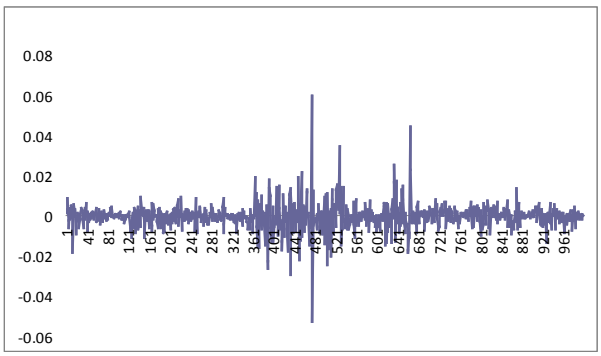


Figure 12: Fluctuation in Singapore $

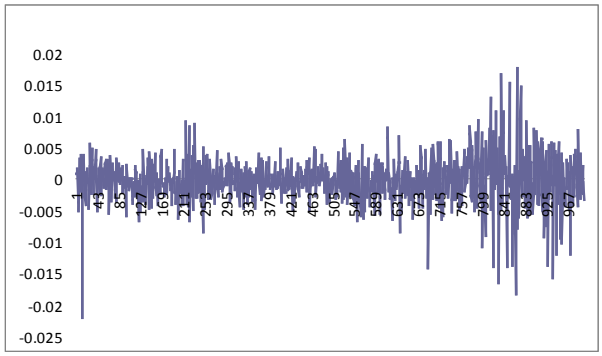
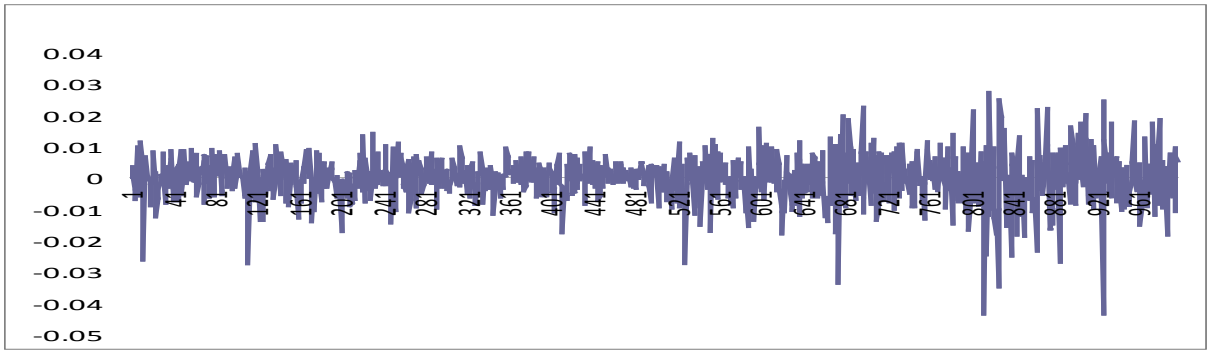


Figure 13: Fluctuation in Japanese Yen



All countries' exchange rates except Thai Baht could be observed to be highly fluctuating in the crisis year of 2008-09. As many as seven countries' exchange rates fluctuation turned from negative to positive into the crisis period compared to previous year indicating a very high degree of volatility. Similarly South African Rand was also seen with a very high volatility in the crisis period falling into negative zone. Since the volatility has been exorbitant in the recent past, it has posed some serious issues for the financial experts, analysts and policy makers as to how effectively it should be managed in order to contain it within limits. The Mexican peso appreciated from peso 11.364 to 10.628 to US$ registering 6.5% growth in 2005. By large, the variability of peso is quite comparable with any developed nations currencies such as Euro or Canadian Dollar during a period of 2003 to 2006. The Korean government is also taking care of exchange rate since its adoption as managed float. It has devised certain rules; important among them is 'sterilized intervention'. Dooley, Dornbusch, and Park (2002) have outlined, "changes in the composition of the central bank's assets (denominated in foreign currencies) will be relied on to moderate volatility in daily nominal exchange rates in excess of three percentage points against a basket of the dollar, euro and yen. This rule could be extended to resist cumulative movements of more than 6% in one week."

Table 1: Mean Changes in Exchange Rates (%)

	2005-06	**2006-07**	**2007-08**	**2008-09**
India	0.0210%	-0.0497%	0.0242%	0.0412%
Canada	-0.0425%	-0.0158%	-0.0158%	0.0551%
UK	-0.0198%	-0.0334%	0.0052%	0.0767%
Japan	0.0104%	0.0299%	-0.0568%	-0.0375%
Brazil	-0.0367%	-0.0463%	-0.0729%	0.0821%
Czech	-0.0484%	-0.0183%	-0.1319%	0.0838%
Singapore	-0.0269%	-0.0125%	-0.0450%	0.0259%
Thailand	-0.0331%	-0.0676%	0.0203%	0.0079%
Russia	-0.0278%	-0.0170%	-0.0363%	0.1153%
Korea	-0.0381%	-0.0086%	0.0525%	0.0831%
Mexico	0.0197%	-0.0105%	-0.0177%	0.0956%
S.Africa	0.0195%	0.0006%	0.0455%	-0.0055%
Euro Zone	-0.0282%	-0.0220%	-0.0582%	0.0496%

The Table 1 shows the mean changes of all the thirteen exchange rates. The outcome of this table is based on the daily log changes of the sample countries' currencies related to four-year period from 2005 to 2009. The first three years represent normal period while the last year represents crisis period. It is evident from the table that the mean changes between 2007-08 and 2008-09 are quite drastic in all countries' exchange rates except Japanese yen. Indian currency volatility shot up to 0.0412% in the year 2008-09 from previous year's level of 0.0242%. British pound also could not remain away from such high volatility which was recorded at 0.0767% in the crisis year compared to 0.00522% in 2007-08. Fluctuations can be observed to be more than double in case of India, Brazil, South Africa and Europe.

Figure 1: Average Daily Fluctuation (%)

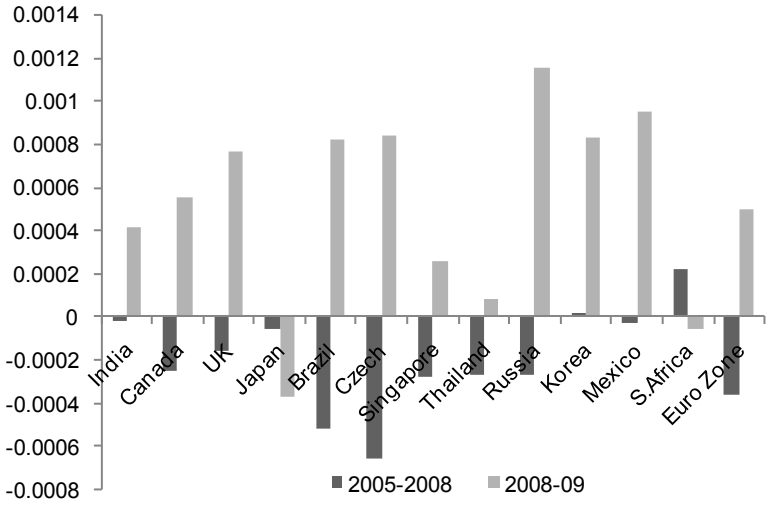


Figure 2: Exchange Rate Volatility (%)

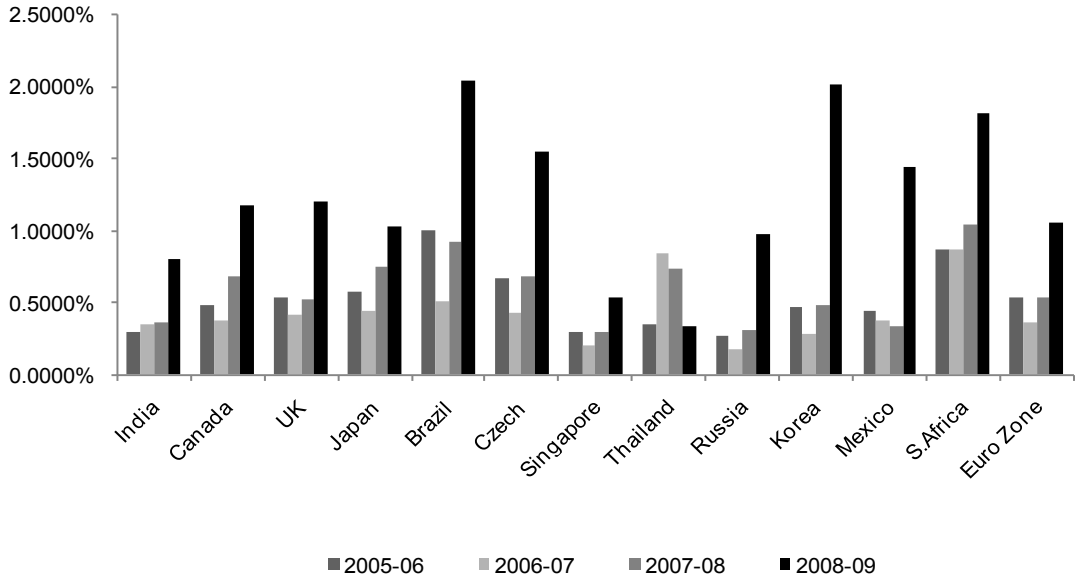


Figure 1 is a clear indication of pre-crisis and crisis period mean variability in thirteen exchange rates. One interesting fact can be noted from the above Figure that almost all the exchange rates' (except Korea

and South Africa) average fluctuation in the period 2005-2008 is found to be negative and most of them turned positive in the crisis period of 2008-09. More importantly, the average daily fluctuations can be seen at very high rate in the crisis period. In most cases, it remained in the range of 0.06% to 0.11%.

Figure 2 demonstrates volatility in the exchange rates. As mentioned earlier, this volatility is construed to be variance of all the thirteen countries time series. The analysis of statistical results indicates that standard deviations have been quite high in the crisis period in case of Brazil and Korea which were a little more than 2%-level. Canada, UK, Japan, Czech, Mexico, South Africa, and Euro Zone have shown standard deviations of >1%. However, countries like Singapore, Thailand, and Russia registered a moderate standard deviation of <1% mark. Indian currency seems to have the least degree of risk volatility as it recorded 0.08% standard deviation. On yet another note, eight exchange rates are observed to have negative skewness while India, UK, Russia, Mexico, and South Africa had positive skewness in the crisis period. The Jerque-Bera function is used to indicate whether the changes in the exchange rates are normal or not. An equally mix result can be observed looking at the data.

Table 2: GARCH Results

		2005-06	2006-07	2007-08	2008-09
India	ARCH(1)	0.1875	0.1002	0.0685	0.0044
	GARCH(1)	0.4073	0.8673	0.8871	0.9513
Canada	ARCH(1)	0.1364	-0.0566	0.1333	0.0659
	GARCH(1)	-0.1427	0.8622	0.4846	0.9197
UK	ARCH(1)	-0.0382	-0.0298	-0.0511	0.0460
	GARCH(1)	1.0160	0.6852	1.0214	0.9423
Japan	ARCH(1)	-0.0251	0.0292	0.0592	0.0223
	GARCH(1)	0.7422	0.9083	0.8678	0.9433
Brazil	ARCH(1)	0.1779	0.1128	0.2230	0.1990
	GARCH(1)	0.6997	0.8582	0.7263	0.8239
Czech	ARCH(1)	-0.0092	0.0215	0.0316	0.0445
	GARCH(1)	0.7538	0.9434	0.9579	0.9329
Singapore	ARCH(1)	0.0203	-0.0563	-0.0551	0.0388
	GARCH(1)	0.6692	0.9117	1.0120	0.9401
Thailand	ARCH(1)	0.1087	0.0996	0.3371	0.1244
	GARCH(1)	0.8740	0.9278	0.6861	0.8216
Russia	ARCH(1)	-0.0366	-0.0825	-0.0314	0.0649
	GARCH(1)	1.0122	0.7693	1.0234	0.9160
Korea	ARCH(1)	0.1243	0.0293	0.2186	0.2564
	GARCH(1)	0.7711	0.1754	0.7100	0.7444
Mexico	ARCH(1)	0.1198	0.0496	0.2382	0.2307
	GARCH(1)	0.7493	0.9080	-0.2997	0.8059
S.Africa	ARCH(1)	0.0377	0.0099	0.0535	0.1076
	GARCH(1)	0.9309	0.5604	0.8993	0.8649
Euro Zone	ARCH(1)	-0.1767	-0.0146	-0.0262	0.0305
	GARCH(1)	0.0156	1.0083	1.0202	0.9540

Table 2 presents the outcome of GARCH model. The results are based on the variance which is basically considered as a measure of volatility and is derived from the mean-adjusted relative log change value of the exchange rates. As mentioned in the preceding sections, GARCH model is used to test whether there appears to be volatility in the given set of series; and if found so; then the forecasting will hold. In this study, GARCH (1,1) is used to show that when the sum of ARCH and GARCH coefficients ($\alpha + \beta$) equals to one, there will be persistence of volatility shocks and hence, volatility can be forecast for the next day.

If the pre-crisis period is analyzed, it becomes evident that volatility shocks could not be captured in certain cases. For example, Canada witnessed non-existence of volatility shocks in 2005-06 and 2007-08 while almost all other countries except Thailand witnessed non-existence of volatility shocks at least once in a three year pre-crisis period. But this study emerged with an interesting observation that all the sample countries had volatility shocks in the crisis period of 2008-09. This apparently indicates that due to high degree of volatility in the crisis period, forecasting can be made at least for the next day.

CONCLUDING REMARKS

The current study has objectively focused on the volatility patterns in the exchange rate of thirteen countries with specific reference to the current crisis period. It describes the persistence of volatility clustering in the time series data of thirteen countries applying the GARCH model. The volatility is perceived to be a critical issue especially for those countries which have shifted from fixed exchange rate regime to floating exchange rate regime.

All the countries' exchange rates except Thai Baht are highly volatile in the crisis year of 2008-09. As many as seven countries' exchange rates volatility turned from negative to positive in the crisis period compared to the previous year indicating a very high degree of volatility. But South African Rand is seen with a very high volatility in the crisis period but falling into negative zone from the positive volatility in the preceding year. Indian currency volatility shot up to 0.0412% in the year 2008-09 from previous year level of 0.0242%. British pound also could not avoid high volatility which was recorded at 0.0767% in the crisis year compared to 0.00522% in 2007-08. Almost all the exchange rates' (except Korea and South Africa) average volatility in the period 2005-2008 are negative and most turned positive in the crisis period of 2008-09. Since the volatility has been exorbitant in the recent past, it poses some serious issues for the financial experts, analysts and policy makers as to how effectively it should be contained.

The results of the GARCH model are quite encouraging especially when the pre-crisis period is analyzed. Surprisingly, the volatility shocks could not be captured in certain cases. For example, Canada witnessed non-existence of volatility shocks in 2005-06 and 2007-08 while almost all other countries except Thailand witnessed non-existence of volatility shocks at least once in a three year pre-crisis period. But this study emerged with an interesting observation that all the sample countries had volatility shocks in the crisis period of 2008-09. This apparently indicates that due to high degree of volatility in the crisis period, forecasting can be made at least for the next day. In conclusion, this paper reveals that exchange rates have persistent conditional heteroskedasticity, and hence, could be predicted with one lag term.

The study objectively evaluates the predictability of volatility patterns in exchange rates in times of turbulence. However, it has certain limitations. Further investigations might consider more lag terms to determine the predictability in the exchange rate volatility. Further studies, might also cover more crisis periods, to gain additional insights.

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BIOGRAPHY

Dr. Rajesh Mohnot is a Senior Lecturer of Accounting and Finance at Middlesex University Dubai, he can be contacted at: MDX Business School, Block #16, Knowledge Village, Dubai, UAE. Email: rajesh_mohnot@yahoo.com; R.Mohnot@mdx.ac

THE EFFECT OF WORKING CAPITAL PRACTICES ON RISK MANAGEMENT: EVIDENCE FROM JORDAN

Faris Nasif ALShubiri, Amman Arab University for Graduate Studies

ABSTRACT

Working capital does not receive a great deal of attention in financial decision making. Perhaps this is because it involves investment and financing for the short term. Nevertheless, it is an important component of firm financial management. This study investigates the relationship between aggressive/conservative working capital practices and profitability as well as risk. The sample includes 59 industrial firms and 14 banks listed on the Amman Stock Exchange for the period of 2004-2008. The results indicate a negative relationship between profitability measures and working capital aggressiveness, investment and financing policy. Firms have negative returns if they follow an aggressive working capital policy. In general, there is no statistically significant relationship between the level of current assets and current liabilities on operating and financial risk in industrial firms. There is some statistically significant evidence to indicate a relationship between standard deviation of return on investments and working capital practices in banks.

JEL: E44, G11, G30, G31, G32

KEYWORDS: Banks, Degree of aggressiveness/conservativeness, Working Capital Practices, Profitability, Market Rate of Return, Tobin's q, Operating risk and Financial risk.

INTRODUCTION

Corporate finance basically deals with three decisions: capital structure decisions, capital budgeting decisions, and working capital management decisions. Among these, working capital management is a very important component of corporate finance since it affects the profitability and liquidity of a company. It deals with current assets and current liabilities. Working capital management is recognized as an important concern of the financial manager for many reasons. For one thing, a typical manufacturing firm's current assets account for over half of its total assets. For a distribution company, they account for even more. The maintenance of excessive levels of current assets can easily result in a substandard return on a firm's investment. However, firms with inadequate levels of current assets may incur shortages and have difficulties in smoothly maintaining day-to-day operations. Efficient working capital management involves planning and controlling current assets and current liabilities in a manner that eliminates the risk of inability to meet short term obligations on one hand and avoids excessive investment in these assets on the other hand (Eljelly, 2004).

The corporate finance literature has traditionally focused on the study of long-term financial decisions, particularly investments, capital structure, dividends and company valuation decisions. However, short-term assets and liabilities are important components of total assets and need to be carefully analyzed. Management of these short-term assets and liabilities warrants careful investigation since working capital management plays an important role for the firm's profitability, risk and value. The optimal level of working capital is determined to a large extent by the methods adopted for the management of current assets and liabilities. It requires continuous monitoring to maintain proper level in various components of working capital.

Working capital is current assets (cash, receivables, inventory, etc.) minus current liabilities (debt obligations due within one year). Working capital may also be viewed as the amount of a business's

current assets provided (financed) by long-term debt and/or equity .Net operating working capital relates to free cash flow and in turn market value of equity. A positive working capital requirement, or conservative working capital policy, indicates a need for additional capital which firms can finance internally, reducing free cash flow, or externally, generally via commercial paper or lines of credit. Thus, conservative working capital policy implies costs of either lost opportunities or explicit financing costs. A negative working capital gap means that the firm's net operating working capital provides financing for long-term assets, implying an aggressive strategy.

The crucial part in managing working capital is maintaining liquidity in day-to-day operation to ensure its smooth running and meets its obligation (Eljelly, 2004). Yet, this is not a simple task since managers must make sure that the business operation is running in an efficient and profitable manner. There is a possibility of a mismatch between current assets and current liabilities during this process. If this happens and firm's manager cannot manage it properly then it will affect firm's growth and profitability. This will further lead to financial distress and finally firms go bankrupt. Dilemma in working capital management is to achieve desired trade off between liquidity and profitability (Smith, 1980; Raheman and Nasr, 2007). Referring to theory of risk and return, investment with more risk will result to more return. Thus, firms with high liquidity of working capital may have low risk then low profitability. Conversely, a firm that has low liquidity of working capital, facing high risk results to high profitability. The issue here is in managing working capital, firm must take into consideration all the items in both accounts and try to balance the risk and return

Shin and Soenen (1998) and Deloof (2003) show profitability and risk-adjusted returns are inversely related to the cash conversion cycle suggesting that aggressive working capital policy significantly improve firm performance. A firm may adopt an aggressive working capital management policy with a low level of current assets as percentage of total assets or it may also used for the financing decisions of the firm in the form of high level of current liabilities as percentage of total liabilities. Excessive levels of current assets may have a negative effect on the firm's profitability whereas a low level of current assets may lead to lower level of liquidity and stock outs resulting in difficulties in maintaining smooth operations (Van Horne and Wachowicz, 2004).

This paper investigates the potential relationship of aggressive/conservative policies with the accounting and market measures of profitability as well as the risk factor of 59 industrial companies and for 14 banks listed at Amman Stock Exchange for the period of 2004-2008 .The main objective of working capital management is to maintain an optimal balance between each of the working capital components. Business success heavily depends on the ability of financial executives to effectively manage receivables, inventory, and payables (Filbeck and Krueger, 2005). The purpose of this study is hopefully to contribute towards a crucial element in financial management which working capital management. It is almost untouched in Jordanian or very little research has been done in this area. Working capital management practices and its effects on risk management is focused in this study. Specific objectives are to examine the effect of working capital practices on risk management over a 5 years period, to establish a relationship between the two policies (investment and financing policy) of the industrial firms and banks. Firms can reduce their financing costs and/or increase the funds available for expansion projects by minimizing the amount of investment tied up in current assets. Most of the financial managers' time and effort are allocated in bringing non-optimal levels of current assets and liabilities back toward optimal levels (Lamberson, 1995). An optimal level of working capital would be the one in which a balance is achieved between risk and efficiency.

The remainder of this paper is organized as follows. Section 2 briefly discusses the relevant literature .Data selection, research methodology, and empirical models are described in Section 3 .Section 4 provides analysis and interpretations of the empirical findings and section 5 concludes the paper.

LITERATURE REVIEW

There are basically two theories of working capital, which includes the conservative approach, the aggressive approach and the moderate approach (Nwankwo, 2005). These theories are examined below with their implications.

The Conservative Approach**:** In this approach permanent capital is being used to finance all permanent assets requirements and also to meet some or all of the seasonal demands. In view of conservative approach to working capital management, a company will keep a large quantity of current assets in relations to the total assets of the company. The implication of this approach is that it yields a lower expected profitability resulting in a lower risk. This type of policy will also increase the company's net working capital situation but the firm will be short of funds to be used in other productive sectors. This option means that the company's finance is going to be relatively high cost (that is sacrificing low cost finance) but low risk; this will make the company's profit to be low but does not run the risk of being faced with liquidity problem as a result of withdrawal of its source of finance. The conservative method is where a company predominantly finance all its permanent current assets and most of its fluctuation current assets using long-term source of finance and it is only a small proportion of its fluctuating current assets that is financed using short-term source of finance

The Aggressive Approach**:** In this approach, the company finances all of its fixed assets with long term capital but part of its permanent current assets with short-term credit (Van Horne, 1980). Under this policy, the company holds relatively small portion of its total assets in form of current assets. The implication of the aggressive approach is that it yields higher profitability resulting in a higher risk and lower working capital. A company that uses more short-term source of finance and less long-term source of finance will incur less cost but with a corresponding high risk. This has the effect of increasing its profitability but with a potential risk of facing liquidity problem should such short-term source of finance be withdrawn or renewed on unfavorable terms

The need for maintaining an adequate working capital can hardly be questioned. Just as circulation of blood is very necessary in the human body to maintain life, the flow of funds is very necessary to maintain business. If it becomes weak, the business can hardly prosper and survive. Working capital starvation is generally credited as a major cause if not the major cause of small business failure in many developed and developing countries (Rafuse, 1996). The success of a firm depends ultimately, on its ability to generate cash receipts in excess of disbursements. The cash flow problems of many small businesses are exacerbated by poor financial management and in particular the lack of planning cash requirements (Jarvis et al, 1996).

While the performance levels of small businesses have traditionally been attributed to general managerial factors such as manufacturing, marketing and operations, working capital management may have a consequent impact on small business survival and growth (Kargar and Blumenthal, 1994). The management of working capital is important to the financial health of businesses of all sizes.

A firm can be very profitable, but if this is not translated into cash from operations within the same operating cycle, the firm would need to borrow to support its continued working capital needs. Thus, the two objectives of profitability and liquidity must be synchronized and one should not impinge on the other for long. Investments in current assets are inevitable to ensure delivery of goods or services to the ultimate customers and a proper management of same should give the desired impact on either profitability or liquidity. The separation was made in order to cover all the possible operational risks and to concentrate on the most significant causes of the severity of loss met day by day. Thus the operational risk can be interpreted as a vulnerability of the financial institution that can be reduced or eliminated through an increased control. The important increase of the operational risk is due to organizational,

infrastructure, business environment or improvement changes. These changes were materialized in: the development of the technology.

Molina and Preve (2008) show that, compared to firms in competitive industries, firms in concentrated industries tighten credit policy to a greater extent when facing financial distress. Distressed firms have limited financial slack and cash generating ability, and the strain of financial distress may cause firms to reduce investment in operating working capital by collecting on receivables, tightening credit terms, liquidating existing inventory, and by stretching credit terms granted by suppliers. Molina and Preve (2008), show that financially distressed firms have significantly reduced levels of trade credit relative to their non-distressed counterparts. We expect the working capital requirement to correlate inversely with financial distress.

Afza and Nazir (2007) the study found significant differences among their working capital investment and financing policies across different industries. Moreover, rank order correlation confirmed that these significant differences were remarkably stable over the period of six years of study. Finally, ordinary least regression analysis found a negative relationship between the profitability measures of firms and degree of aggressiveness of working capital investment and financing policies. In the Pakistani context, Rehman (2006) He concluded that there is a strong negative relationship between above working capital ratios and profitability of firms. Furthermore, managers can create a positive value for the shareholders by reducing the cash conversion cycle up to an optimal level.

Filbeck and Krueger (2005) highlighted the importance of efficient working capital management by analyzing the working capital management policies of 32 non-financial industries in USA. According to their findings significant differences exist between industries in working capital practices over time. Moreover, these working capital practices, themselves, change significantly within industries over time. Teruel and Solano (2005) suggested that managers can create value by reducing their firm's number of day's accounts receivable and inventories. Similarly, shortening the cash conversion cycle also improves the firm's profitability. The recent work of Howorth and Westhead (2003), suggest that small companies tend to focus on some areas of working capital management where they can expect to improve marginal returns. Later on, Deloof (2003) analyzed a sample of large Belgian firms during the period 1992-1996 and the results confirmed that Belgian firms can improve their profitability by reducing the number of days accounts receivable are outstanding and reducing inventories.. Sathyamoorthi (2002) he observed that more emphasis is given to investment in fixed assets both in management area and research. However, effective management working capital has been receiving little attention and yielding more significant results.

Weinraub and Visscher (1998).The authors have concluded that the industries had distinctive and significantly different working capital management policies. Moreover, the relative nature of the working capital management policies exhibited remarkable stability over the ten-year study period. The study also showed a high and significant negative correlation between industry asset and liability policies and found that when relatively aggressive working capital asset policies are followed they are balanced by relatively conservative working capital financial policies Shin and Soenen (1998) concluded that reducing the level of current assets to a reasonable extent increases firms' profitability Pandey and Parera (1997) they found that most companies in Sri Lanka have informal working capital policy and company size has an influence on the overall working capital policy (formal or informal) and approach (conservative, moderate or aggressive). Moreover, company profitability has an influence on the methods of working capital planning and control. Jose , (1996) examined the relationship between aggressive working capital management and profitability of US firms using Cash Conversion Cycle (CCC) as a measure of working capital management where a shorter CCC represents the aggressiveness of working capital management. The results indicated a significant negative relationship between the cash conversion cycle and

profitability indicating that more aggressive working capital management is associated with higher profitability.

However, Lamberson (1995) who studied how small firms respond to changes in economic activities by changing their working capital positions and level of current assets and liabilities. Current ratio, current assets to total assets ratio and inventory to total assets ratio were used as measure of working capital while index of annual average coincident economic indicator was used as a measure of economic activity. Contrary to the expectations, the study found that there is very small relationship between charges in economic conditions and changes in working capital. Soenen (1993) investigated the relationship between the net trade cycle as a measure of working capital and return on investment in U.S firms. The results of chi-square test indicated a negative relationship between the length of net trade cycle and return on assets. Furthermore, this inverse relationship between net trade cycle and return on assets was found different across industries depending on the type of industry. A significance relationship for about half of industries studied indicated that results might vary from industry to industry .Carpenter & Johnson (1983) provided empirical evidence that there is no linear relationship between the level of current assets and revenue systematic risk of US firms; however, some indications of a possible non-linear relationship were found which were not highly statistically significant.

DATA AND METHODOLOGY

This study will show the impact of working capital practices on industrial firms' and banks on risk management. Since the study is based on financial data, the main source of data was financial statements, such as income statements, balance sheets, of listed 59 firms and 14 banks listed in Amman Stock Exchange for the period from 2004 to 2008. The reason for restricting the number of sample was that the latest data for the study was available for these years.

The study was used aggressive investment policy and aggressive investment policy as measuring variables of working capital management. Aggressive Investment Policy (AIP) results in minimal level of investment in current assets versus fixed assets. In contrast, a conservative investment policy places a greater proportion of capital in liquid assets with the opportunity cost of lesser profitability. In order to measure the degree of aggressiveness, following ratio will be used

AIP = Total Current Assets (TCA)/ Total Assets (TA)

Where: a lower ratio means a relatively aggressive policy

Aggressive Financing Policy (AFP) utilizes higher levels of current liabilities and less long-term debt. In contrast, a conservative financing policy uses more long-term debt and capital. The degree of aggressiveness of a financing policy adopted by a firm will be measured by:

AFP = Total Current Liabilities (TCL)/ Total Assets (TA)

Where: a higher ratio means a relatively aggressive policy.

The impact of working capital policies on the profitability will be analyzed through frequently used profitability measures i.e. Return on Assets (ROA) and Return on Equity (ROE) as well as market measure and Tobin's q by running cross-sectional regressions. The regression models and hypotheses to be estimated are:

$$ROA_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon_{it} \quad (1)$$

H0-1: There is no statistical significant effect between working capital policies and return on assets of Jordanian industrial companies and commercial banks.

$$ROE_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon_{it} \quad (2)$$

H0-2: There is no statistical significant effect between working capital policies and return on equity of Jordanian industrial companies and commercial banks.

$$Tobin's\ q_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon_{it} \quad (3)$$

H0-3: There is no statistical significant effect between working capital policies and Tobin's (Q) of Jordanian industrial companies and commercial banks

$$ROI_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon_{it} \quad (4)$$

H0-4: There is no statistical significant effect between working capital policies and return on investment of Jordanian industrial companies and commercial banks

$$ROC_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon_{it} \quad (5)$$

H0-5: There is no statistical significant effect between working capital policies and return on capital of Jordanian industrial companies and commercial banks.
Where:

ROA_{it} = Return on Assets of Firm / bank i for time period t
ROE_{it} = Return on Equity of Firm / bank i for time period t
ROC_{it} = Return on Assets of Firm / bank i for time period t
ROI_{it} = Return on Assets of Firm / bank i for time period t
$Tobin's\ q_i$ = Value of q of Firm / bank i for time period t
TCA/TA_{it} = Total current assets to total assets ratio of firm / bank i for time period t
TCL/TA_{it} = Total current liabilities to total assets ratio of firm / bank i for time period t
α = Intercept
ε = Error term of the model

The impact of the working capital assets management and financing polices on the relative risk will be measured by applying regression models for the risk of the company and its working capital management policies over the period of 2004-2008. The regression equations and hypothesis are:

H0: There is no statistical significant effect between working capital practices and risk management of Jordanian industrial companies and commercial banks

$$SD_{Sales} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon \quad (6)$$
$$SD_{ROA} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon \quad (7)$$
$$SD_{ROE} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon \quad (8)$$
$$SD_{ROC} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon \quad (9)$$

$$SD_{ROI} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon \quad (10)$$

$$SD_q = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon \quad (11)$$

Where: SD_i = Standard Deviation representing risk of Firm i

EMPIRICAL RESULTS

First I provide information about the regression analysis of working capital policies (aggressive and conservative policy) and ROA, ROE, Tobin's Q, ROI, ROC as dependent variables of industrial companies listed in Amman Stock Exchange. Metrics are reported over five periods from 2004 to 2008 (see Table 1). This table indicates β - Coefficient, (R^2), t-test values, F-values and significance of each policy. This table shows the regression estimates of the all previous equations discussions form 1-5.

The results of regression model 1: $ROA_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon$ have been reported in table 1, where the dependent variable return on assets having the same independent variable of working capital investment policy and working capital financing policy. TCA/TA and TCL/TA ratios have been regressed against ROA values and the six regression models indicating the impact of working capital policies on the profitability of industrial firms in Jordan. The model t-test, F-values and the SPSS statistics indicates overall best fit of the model. The t-statistics of both TCA/TA and TCL/TA are statistically significant 3.227***, 2.433**, 1.860* and 1.700* indicate on investment policy and -2.093** and -1.129* on financing policy and F-values are 14.155***,5.553*** on significance at the 1, 5, and 10 percent levels respectively except for the year 2006 and 2007.

The positive coefficient of TCA/TA shows a negative relationship between the degree of investment policy aggressiveness and return on assets. As the TCA/TA increases, degree of aggressiveness decreases, and return on assets goes up. Therefore, there is negative relationship between the relative degree of aggressiveness of working capital investment policies and return on assets. The negative value of β coefficient for TCL/TA also points out the same negative relationship between the aggressiveness of working capital financing policy and return on assets. Higher the TCL/TA ratio, more aggressive the financing policy, that yields negative return on assets.

The results of regression model 2: $ROE_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon$ have been reported in Table 1, where the dependant variable is return on equity having the same independent variable of working capital investment policy and working capital financing policy. As the degree of aggressiveness of working capital policy tends to increase, the returns are likely to decrease. Though, the results are statistically highly impressive which is apparent from the high level of significance of b coefficients and t-values , however, they predict a negative relationship between the degree of aggressiveness of working capital policy and accounting measures of returns. The second part of table 1 in each cell is the t- statistic of both TCA/TA and TCL/TA are statistically significant 3.262***, 2.199**, 2.078**, 2.590** and 2.109** indicate on investment policy and -2.656** on financing policy and F-values are 16.155***, 5.463*** and 4.371** on significance at the 1, 5, and 10 percent levels respectively except for the year 2008.

To further validate the above-mentioned results, the impact of working capital investment and working capital financing policy has also been examined on the market returns. Tobin's q has been used as a measure of market returns and, for each year from 2004 to 2008. A q value of greater than 1 indicated the greater perceived value given by investor to the firm.

The results of equation 3: Tobin's $q_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon$ have been presented in cell three of Table 1, which the highlighting that the market returns on Tobin's q are decreasing as the firms are following the aggressive investment policy by keeping low level of current assets in the firm. This similarity in market and accounting returns confirms the notion that investors do not believe in the aggressive approach of working capital management, hence, they don't give any additional value to the firms in Amman Stock Exchange .However, there are some dissimilarities are found in the relationship of financing policy and Tobin's q. In the year 2005, 2006 and 2007 the relationship between working capital financing policy and Tobin's q is positive, indicating that the higher the degree of aggressiveness of working capital financing policy, the greater the investor's value given to the firm. The cell three of table 1 in each cell is the t- statistic 2.520* and 1.761 indicate on investment policy and F-values are 3.040**, on significance at the 5, and 10 percent levels respectively except for the years 2005.2006 and 2007.

The results of regression model 4 : $ROI_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon$ have been reported in Table 1, where the dependant variable is return on investment having the same independent variable of working capital investment policy and working capital financing policy. As the degree of aggressiveness of working capital policy tends to increase, the returns are likely to decrease. Though, the results are statistically highly impressive which is apparent from the high level of significance of b coefficients and t-values , however, they predict a negative relationship between the degree of aggressiveness of working capital policy and accounting measures of returns. The cell fourth of table 1 in fourth cell is the t- statistic 2.426**, 1.705*and 2.169*, indicate on investment policy and -3.602**,-3.334**,-1.204* and -2.150* on financing policy and F-values are -3.484***, -2.7658*,-2.419**and -2.541* on significance at the 1, 5, and 10 percent levels respectively.

Finally , The results of regression model 5: $ROC_{it} = \alpha + \beta_1 (TCA/TA_{it}) + \beta_2 (TCL/TA_{it}) + \varepsilon$ have been reported in Table 1, where the dependant variable is return on capital having the same independent variable of working capital investment policy and working capital financing policy. As the degree of aggressiveness of working capital policy tends to increase, the returns are likely to decrease. The cell fifth of table 1 in each cell is the t- statistic -3.421**, 2.672**, -1.837 and -2.258*, indicate on investment policy and -3.189**,--2.142* and -2.241* on financing policy and F-values are -2.224***, -3.693***and -4.051** on significance at the 1, 5, and 10 percent levels respectively except the year 2004 and 2006.

Second, Table 2 provide information about the regression analysis of working capital policies (aggressive and conservative policy) and ROA, ROE, Tobin's Q, ROI, ROC as dependent variables of commercial banks listed in Amman Stock Exchange . Metrics are reported over five periods from 2004 to 2008 .This table indicates β - Coefficient, (R^2), t-test values and F-values and significance of each policy. This table shows the regression estimates of the all previous equations discussions form 1-5.

The results of regression model 1. TCA/TA and TCL/TA ratios have been regressed against ROA values and the six regression models indicating the impact of working capital policies on the profitability of commercial banks in Jordan. The model t-test and F-values and the SPSS statistics indicates overall best fit of the model. The t-statistics of both TCA/TA and TCL/TA are statistically significant -3.007**, indicate on investment policy and -9.301***,-3.437*** and -5.089*** on financing policy and F-values are 11.888***,-40.921***and 5.863** on significance at the 1, 5, percent levels respectively except the year 2004.

Table 1: Regression Analysis of Working Capital Policies and (ROA, ROE, Tobin's Q, ROI, ROC of Industrial Companies Listed in ASE)

	Year	Investment Policy		Financing Policy		Investment Policy+ Financing Policy	
		B- Coefficient (R^2)	t- value(sig)	B- Coefficient (R^2)	t- value(sig)	B- Coefficient (R^2)	t- value(sig)
ROA	2004	.307(.094)	2.433**	-.267(.171)	-2.093**	..597 -.571 (.336)	14.15***
	2005	.239(.234)	1.860*	-.052(.005)	-.392	.262 -.114 (.067)	2.019
	2006	.198(.004)	1.525	.116(.320)	.885	.187 .094 (.048)	1.406
	2007	.195(.011)	1.498	.039(.007)	.295	.212 -.045 (.040)	1.154
	2008	.220 (.048)	1.700*	.060 (.004)	.454	230 -.027 (.049)	1.439
	04-08	.185 (.043)	3.227***	-.008 (.124)	-1.129*	.196 -.049 (.037)	5.553***
ROE	2004	.269(.072)	2.109**	-.332(.110)	-2.656**	.591 -.632 (.369)	16.357***
	2005	.324(.324)	2.590**	-.090(.001)	-.681	.367 -.178 (.135)	4.371**
	2006	.265(.112)	2.078**	.062(.012)	.472	.262 .030 (.071)	2,151
	2007	.280(.320)	2.199**	.077(.001)	.580	.296 -.040 (.080)	2.420
	2008	.187 (.085)	1.434	.099 (.010)	.750	.174 .033 (.036)	1.038
	04-08	.187(.035)	3.262***	.009 (.000)	.146	.194 -.033 (.036)	5.463***
T-Q	2004	.069(.112)	2. 520*	-.024(.001)	-.184	.109 -.080 (.009)	0.268.
	2005	.095(.001)	.723	.166(.003)	1.271	.059 .152 (.031)	.891
	2006	-.074(.009)	-.564	.164(.023)	1.152	-.096 .175 (.036)	3.040**
	2007	-.114(.001)	-.866	-.052(.001)	-.393	-.111 -.008 (.013	.370
	2008	.227 (.052)	1.761*	.006(.000)	.046	.262 -.093 (.059	1.756
	04-08	.006 (.000)	.110	.-.017 (.000)	-.297	.011 -.020 (.000)	.060
ROI	2004	.056 (.313)	2.426*	-.080 (.146)	-3.602**	.131 .146 (.019)	-2.541*
	2005	.044 (.002)	.329	.157 (.125)	-1.204*	.086 -.176 (.232)	-2.919**
	2006	.044 (.002)	.330	.004(.000)	.034	-.044 -.001(.002)	.053
	2007	.083(.007)	.633	-.033 (.001)	-.248	.114 -.078 (.012)	.343
	2008	.220 (.049)	1.705*	.044(.222)	-3.334**	.238 -.046 (.550)	-3.484***
	04-08	.068 (.115)	2.169*	-.009 (.000)	-2.150*	.073 -.024 (.115)	-2.765**
ROC	2004	.017 (.000)	-.129	-.056 (.003)	-.427	.016 -.064 (.003)	.095
	2005	.034 (.211)	-2.258*	-.016 (.112)	-2.124*	-.040 .026 (.232)	-4.051**
	2006	-.168 (.028)	-1.283	.108 (.012)	1.823	-.184 .131 (.045)	-1.318
	2007	-.185 (.134)	-3.421**	-.095 (.009)	-.721	-.264 .199 (.068)	2.033
	2008	.089 (.238)	2.672**	-.025 (.231)	-3.189**	.092 -.010 (.118)	-2.224***
	04-08	-.107 (.011)	-1.837*	-.014 (.114)	-2.241*	-.109 .009 (.311)	-3.693

****, ** and * indicate Significant at the 1, 5, 10 percent level respectively*

The result of regression model 2 .The second cell of table 2 is the t- statistic 1.791*, indicate on financing policy on significance at the 10 percent level the year 2004, and no significant in other years of two policies. Tobin's q has been used as a measure of market returns and, for each year from 2004 to 2008. A q value of greater than 1 indicated the greater perceived value given by investor to the firm. The results of model 3 have been presented in cell three of Table 2, which the highlighting that the market returns on Tobin's q are decreasing as the firms are following the aggressive investment policy by keeping low level of current assets in the firm. This similarity in market and accounting returns confirms the notion that investors do not believe in the aggressive approach of working capital management, hence, they don't give any additional value to the firms in Amman Stock Exchange However, the cell three of table 1 in each cell is the t- statistic significant -3.445***, indicate on investment policy and -5.022*** on financing policy and F-values are 16.561***and 5.488** on significance at the 5, 10 percent levels respectively except the year 2005, 2007 and 2008.

The results of regression model 4 have been reported in Table 2, as the degree of aggressiveness of working capital policy tends to increase, the returns are likely to decrease. Though, the results are statistically highly impressive which is apparent from the high level of significance of β coefficients and t-values , however, they predict a negative relationship between the degree of aggressiveness of working capital policy and accounting measures of returns. The cell fourth of table 2 is the t- statistic significant -7.359***, -11.423*** and -5.302*** indicate on investment policy and -6.672***, 12.314***and -2.215 on financing policy and F-values are 27.186***, 18.036***, 82.300*** and 13.987*** on significance at

the 1, 5 percent levels respectively except the year 2005. Finally, the results of regression model 5. The cell fifth of table 2 is the t- statistic only at 1.804* at 10 percent level for year 2004

Table 2: Regression Analysis of Working Capital Policies (ROA, ROE, ROI, ROC of Commercial Banks Listed in ASE)

	Year	Investment Policy		Financing Policy		Investment Policy+ Financing Policy	
		B- Coefficient (R^2)	t- value(sig)	B- Coefficient (R^2)	t- value(sig)	B- Coefficient (R^2)	t- value(sig)
ROA	2004	.403(.162)	1.525	.215(.046)	.761	.379 .059 (.165)	1.809
	2005	-.117(.014)	-.408	-.827(.683)	-5.089***	.019 -.830 (684)	11.8882***
	2006	.063(.004)	.219	-.240(.058)	-.857	.361 .045 (.125)	.786
	2007	-.090(.008)	-.313	-.937(.878)	-9.301***	-.058 -.935 (.882)	40.921***
	2008	-.656(.430)	-3.007**	.704(.496)	-3.437***	-.989 .284 (.516)	5.863**
	04-08	-.016(.000)	-.133	-.061(.004)	-.507	.000 -.061 (.004)	.127
ROE	2004	.397(158)	1.499	.459(.211)	1.791*	.251 .356 (.263)	1.965
	2005	.026(.001)	.089	-.089(.008)	-.310	.136 -.096 (010)	.053
	2006	.110(.012)	.385	.263(.069)	-.946	.007 -.238 (.058)	.337
	2007	-.131(.017)	-.456	-.249(.062)	-.891	-.122 -.145 (.077)	.458
	2008	.265(.070)	.953	.321(.103)	1.175	-.688 .986 (.134)	.853
	04-08	.114(.013)	.947	-.037(.001)	-.309	.133 -.072 (.018)	.607
T-Q	2004	-.092(.008)	-.319	-.823(.678)	-5.022***	.296 -.945 (.751)	16.561***
	2005	.390(.152)	1.468	.413(.170)	1.569	.332 .358 (.277)	2.110
	2006	-.705(.497)	-3.445***	.120(.014)	.418	-.716 -.048 (.499)	5.488**
	2007	.417(.174)	1.590	.285(.081)	1.030	.408 .271 (.247)	1.806
	2008	.151(.023)	.528	.047(.002)	.164	1.598 -1.498 (.170)	1.128
	04-08	.002(.000)	.020	.006(.000)	.050	.001 .006 (.000)	.001
ROI	2004	-.172(.029)	-.604	-.539(.290)	-2.215**	.060 -.563 (.293)	2.281
	2005	.022(.000)	.074	-.551(.303)	-2.286	.115 -.570 (.316)	2.544
	2006	-.905(.819)	-7.359***	.101(.010)	.351	-.932 -.118 (.832)	27.186***
	2007	-.040(.002)	-.137	-.875(.766)	-6.672***	-.010 -.875 (.766)	18.038***
	2008	-.957(.916)	-11.423***	-.963(.927)	-12.314***	-.403 -.573 (.937)	82.300***
	04-08	-.541(.292)	-5.302***	-.095(.009)	-.790	-.553 .047 (.295)	13.987***
ROC	2004	.144(.021)	.503	.462(.213)	1.804*	-.055 .485 (.216)	1.514
	2005	.391(.153)	1.471	.315(.099)	1.150	.115 -.570 (.316)	2.544
	2006	.365(.133)	1.356	-.014(.000)	-.049	.382 .076 (.138)	.883
	2007	.202(.041)	.714	-.072(.005)	-.250	.205 -.079 (047)	.271
	2008	.189(.036)	.666	.168(.028)	.589	.407 -.226 (.039)	.223
	04-08	.087(.007)	.716	.126(.016)	1.050	.058 .111 (.019)	.651

****, ** and * indicate Significant at the 1, 5, 10 percent level respectively*

Third , table 3 provide information about the regression analysis of working capital policies and risk (SD_{Sales}, SD_{ROA}, SD_{ROE}, SD_{q}, SD_{ROI}, SD_{ROC},) of industrial companies listed in Amman Stock Exchange . Metrics are reported over five periods from 2004 to 2008 .This table indicates β - Coefficient, (R^2), t-test values and F-values and significance of each policy. This table shows the regression estimates of the all previous equations discussions form 6-11.

The theory of Van-Horne and Wachowicz (2004), impact of working capital policies on risk of the firms have been investigated by the ordinary least square regressions for equations 6-11. The risk is measured by the standard deviation of sales and different return measures as operating and financial risk respectively. The standard deviation has been estimated over the five years from 2004 to 2008 and then six regressions have been run for working capital investment and working capital financing policy and result are reported in Table 3. The positive β coefficients of SD_{Sales}, SD_{ROA}, SD_{ROE}, SD_{ROI}, SD_{ROC} and $SD_{Tobin's\ q}$ indicate negative relationship between the risk measurements and the working capital investment policy. On the other hand, similar relationship has been found for the working capital financing policy. The increased variation in sales and profitability is attributed to increasing the level of current assets and decreasing the level of current liabilities in the firm.

The results of regression model 6 : $SD_{Sales'} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported in Table 3, where the dependant variable is standard deviation of sales having the same independent variable of working capital investment policy and working capital financing policy and the results indicate no significant effect.

The results of regression model 7 : $SD_{ROA} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported in cell two at table 3, where the dependant variable is standard deviation of return on assets having the same independent variable of working capital investment policy and working capital financing policy and the results indicate t- statistic significant -2.679 indicate on investment policy and 4.462*** on financing policy and F-values are 4.623**, and 3.129* on significance at the 1, 5,10 percent levels respectively except the year 2005 and 2007.

The results of regression model 8: $SD_{ROE} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported in third cell at table 3, and the results indicate t- statistic significant -3.067*** indicate on investment policy and 3.625*** and 2.150** on financing policy and F-values are 16.881**, and 5.186*** on significance at the 1, 5 percent levels respectively except the year 2006 and 2007 and 2008.

The results of regression model 9 : $SD_q = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported in fourth cell at table 3, and the results indicate t- statistic significant -2.199** indicate on financing policy and F-values are 2.948*, on significance at the 5,10 percent levels respectively only on total years .The results of regression model (10) : $SD_{ROI} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported in fifth cell at table 3, and the results indicate t- statistic significant -3.446*** indicate on investment policy and F-values are 5.906***, on significance at the 1 percent levels only on the year 2008. The results of regression model (11): $SD_{ROC} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ has been reported in sixth cell at table 3, and the results indicate no significant effect. In general, there is no statistically significant relationship between the level of current assets and current liabilities and operating and financial risk of Amman industrial firms.

Fourth, table 4 provide information about the regression analysis of working capital policies and risk (SD_{Sales}, SD_{ROA}, SD_{ROE}, SD_q, SD_{ROI}, SD_{ROC},) of commercial banks listed in Amman Stock Exchange . Metrics are reported over five periods from 2004 to 2008 .This table indicates β - Coefficient, (R^2), t-test values and F-values and significance of each policy. This table shows the regression estimates of the all previous equations discussions form 6-11. The standard deviation has been estimated over the five years from 2004 to 2008 and then six regressions have been run for working capital investment and working capital financing policy and result are reported in Table 4.

The positive β coefficients of SD_{Sales}, SD_{ROA}, SD_{ROE}, SD_{ROI}, SD_{ROC} and $SD_{Tobin's\ q}$ indicate negative relationship between the risk measurements and the working capital investment policy. On the other hand, similar relationship has been found for the working capital financing policy. The increased variation in sales and profitability is attributed to increasing the level of current assets and decreasing the level of current liabilities in the firm. The results of regression model (6): $SD_{Sales'} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ has been reported in Table 4, and the results indicate no significant effect. The results of regression model 7 : $SD_{ROA} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported in cell two at table 4, where the dependant variable is standard deviation of return on assets having the same independent variable of working capital investment policy and working capital financing policy and the

results indicate t- statistic significant -3.539*** indicate on investment policy and -4.291*** on financing policy and F-values are 8.439***, on significance at the 1 percent level only on year 2008.

Table 3: Regression Analysis of Working Capital Policies and Risk (SD_{Sales}, SD_{ROA}, SD_{ROE}, SD_{q}, SD_{ROI}, SD_{ROC},) of Industrial Companies Listed in ASE

	Year	Investment Policy		Financing Policy		Investment Policy+ Financing Policy	
		B-Coefficient ((R^2)	t- value(sig)	B-Coefficient (R^2)	t- value(sig)	B-Coefficient (R^2)	t- value(sig)
SD Sales	2004	-.043(.003)	-.325	-.081(.011)	-.614	-.002 -.080 (.007)	.185
	2005	.017(.004)	.125	-.120(.023)	-.910	.048 -.131 (.016)	.628
	2006	-.019(.000)	-.140	.025(.004)	.187	-.022 .027 (.001)	.031
	2007	-.007(.000)	-.051	-.138(.002)	-1.050	.056 -.160 (.022)	.620
	2008	.040 (.002)	.299	-.081(.007)	-.615	.082 -.112 (.012)	.350
	04-08	-.062(.004)	-1.069	-.084(.007)	-1.435	-.047 -.074 (.009)	1.335
SD ROA	2004	-.117(.002)	-.890	.509(.234)	4.462**	-.288 .337 (.098)	3.031
	2005	-.147(.011)	-1.120	-.029(.098)	-.219	-.148 .006 (.022)	3.129(*
	2006	-.120(.012)	-.913	.006(.006)	.048	-.123 .021 (.015)	.422
	2007	-.047(.036)	-.354	.045(.012)	.341	-.077 .075 (.007)	.197
	2008	-.089 (.008)	-.671	-.119 (.014)	-.903	-.051 -.100 (.016)	.465
	04-08	-.155(.024)	-2.679***	-.113(.013)	-1.954	-.137 -.084 (.031)	.4.623**
SD ROE	2004	-.154(.011)	-1.176	.433(.336)	3.625***	-.505 .690 (.376)	16.881***
	2005	-.090(.003)	-.679	.274(.243)	2.150**	-.165 .313 (.101)	.618
	2006	-.165(.005)	-1.266	.160(.111)	1.222	-.188 .183 (.060)	1.795
	2007	-.150(.003)	-1.146	.058(.223)	.439	-.205 .139 (.039)	1.132
	2008	-.160 (.026)	-1.227	-.152 (.023)	-1.159	.174 .033 (.036)	1.083
	04-08	-.176(.031)	-3.067***	.-.093(.009)	-1.595	-.164 -.058 (.034)	5.186***
SD q	2004	-.058(.012)	-.436	-.007(.001)	-.054	-.073 .030 (.004)	.112
	2005	-.044(.003)	-.330	.055(.005)	.416	-.060 .069 (.006)	.182
	2006	.119(.078)	.905	-.215(.056)	-1.166	.148 -.234 (.068)	2.039
	2007	.072(.009)	.547	.034(.002)	.258	.070 .007 (.005)	.148
	2008	.214(.046)	1.653	.003 (.000)	.024	.248 -.091 (.053)	1.560
	04-08	-.085(.007)	-1.469	-.127(.016)	-.2.199**	-.061 -.114 (.020)	2.948*
SD ROI	2004	.005(.000)	.041	-.080 (.006)	-.602	.066 -.120 (.011)	.301
	2005	-.071(.005)	.539	.-140(.020)	-1.067	-.040 -.130 (.021)	.603
	2006	-.203 (.041)	-1.564	.096(.009)	.727	-.218 .123 (.056)	1.660
	2007	.092(.008)	.698	-.091(.008)	-.691	.152 -.151 (.028)	.800
	2008	-.415 (.172)	-3.446***	-.118 (.014)	-.895	-.433 .046 (.174)	5.906***
	04-08	-.093(.009)	-1.602	-.005(.000)	-.084	-.097 .016 (.009)	1.313
SD ROC	2004	.053(.003)	.402	.039(.002)	.297	.045 .017 (.003)	.085
	2005	.061(.004)	.458	.078 (.006)	.590	.045 .067 (.008)	.224
	2006	-.210(.044)	-1.618	.057(.003)	.428	-.220 .084 (.051)	1.499
	2007	.076 (.006)	.576	.128 (.016)	.972	.030 .116 (..017)	.486
	2008	.040 (.002)	.304	-.061(.004)	-.459	.074 -.089 (.008)	.235
	04-08	-.003(.000)	-.056	-.048(.002)	-.831	.007 -.050 (.002)	.352

****, ** and * indicate Significant at the 1, 5, 10 percent level respectively*

The results of regression model 8: $SD_{ROE} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ has been reported in third cell at table 4, and the results indicate t- statistic significant 1.890* indicate on financing policy and F-values are 6.634**, on significance at the 5, 10 percent levels respectively only on years 2004 and 2008.The results of regression model 9 : $SD_q = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported. in fourth cell at table 4, and the results indicate t- statistic significant -5.259*** indicate on financing policy and F-values are 14.266***and 5.768***, on significance at the 1 percent level only on years 2004 and 2006 The results of regression model 10 : $SD_{ROI} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ have been reported in fifth cell at table 4.

Table 4: Regression Analysis of Working Capital Policies and Risk (Standard Deviation of Sales (SD_{Sales}, SD_{ROA}, SD_{ROE}, SD_{q}, SDROI, SD_{ROC},) of Commercial Banks Listed in ASE

	Year	Investment Policy		Financing Policy		Investment Policy+ Financing Policy			
		B- Coefficient (R^2)	t- value(sig)	B- Coefficient (R^2)	t- value(sig)	B- Coefficient (R^2)			t- value(sig)
SD Sales	2004	..313(.098)	1.142	.255(.065)	.913	.251	.152	(.117)	.731
	2005	.221(.049)	.785	.244(.059)	.870	.186	.213	(.093)	.565
	2006	.197(.039)	.695	.119(.014)	.414	.238	.174	(.067)	.398
	2007	.223(.050)	.792	.089(.008)	.309	.220	.081	(.056)	.327
	2008	.148(.022)	.520	.138(.019)	.483	.225	-.079	(.022)	.126
	04-08	.129(.017)	1.075	.141(.020)	1.173	.100	.115	(.029)	1.004
SD ROA	2004	.265(.070)	.951	.156(.024)	.549	.241	.057	(.073)	.432
	2005	-.122(.015)	-.426	-.778(.605)	-4.291***	.006	-.779	(.605)	8.439***
	2006	.017(.000)	.059	-.245(.060)	-.875	-.043	-.255	(.062)	.362
	2007	-.064(.004)	-.224	-.875(.765)	39.162	-.034	-.874	(.767)	18.067***
	2008	-.715(.511)	-3.539***	-.672(.452)	-3.144	-.989	.284	(.516)	5.683**
	04-08	-.030(.001)	-.245	-.079(.006)	-.656	-.010	-.077	(.006)	.215
SD ROE	2004	.171(.029)	.603	.479(.229)	1.890*	.251	.356	(.263)	1.965
	2005	-.016(.955)	-.057	.017(.000)	.060	.041	-.096	(.010)	.053
	2006	.0139(.000)	.044	-.352(.124)	-1.304	-.074	-.370	(.129)	.816
	2007	-.104(.011)	-.361	-.224(.050)	-.797	-.096	-.221	(.059)	.348
	2008	.254(.065)	.911	.424(.180)	1.621	-2.363	2.708	(.547)	6.634**
	04-08	.090(.008)	.741	-.026(.001)	-.212	.133	-.072	(.018)	.607
SD q	2004	-.201(.040)	.710	-.835(.697)	-5.259***	.171	-.905	(.722)	14.266***
	2005	.304(.092)	1.106	.466(.217)	1.824	.234	.428	(.270)	2.038
	2006	-.709(.503)	-3.487	.076(.006)	.266	-.732	-.095	(.512)	5.768**
	2007	.444(.198)	1.719	.340(.116)	1.254	.433	.325	(.303)	2.395
	2008	.062(.004)	.217	.049(.002)	.171	.226	-.169	(.006)	.032
	04-08	-.031(.001)	-.256	.014(.000)	.113	-.037	.023	(.001)	.049
SD ROI	2004	-.236(.056)	-.842	-.561(.315)	-2.348**	.060	-.563	(.293)	2.281
	2005	.014(.000)	.048	-.523(.274)	-2.127*	.115	-.570	(.316)	2.544
	2006	-.903(.816)	-7.289***	.103(.011)	.359	-.930	-.115	(.828)	26.523***
	2007	-.017(.000)	-.060	-.832(.693)	-5.205***	.011	-.833	(.693)	12.422***
	2008	-.966(.933)	-12.937***	-.948(.899)	-10.319***	-.755	-.218	(.936)	80.734***
	04-08	-.542(.293)	-5.313***	-.097(.009)	-.802	-.553	.046	(.295)	10.039***
SD ROC	2004	.057(.003)	.197	.429(.184)	1.647	-.055	.485	(.216)	1.514
	2005	.372(.138)	1.388	.355(.112)	1.233	.326	.282	(.216)	1.513
	2006	.351(.123)	1.298	-0.40(.002)	-.139	.361	.045	(.125)	.786
	2007	.240(.057)	.855	-.046(.002)	-.159	.242	-.054	(.060)	.354
	2008	.170(.029)	.597	.187(.035)	.659	-.167	.349	(.037)	.210
	04-08	.081(.007)	.672	.131(.017)	1.092	.051	.118	(.020)	.671

****, ** and * indicate Significant at the 1, 5, 10 percent level respectively*

The results indicate t- statistic significant -7.289***, -12.937*** and -5.313*** indicate on investment policy and -5.205***and -10.319*** on financing policy. F-values are 26.523***, 12.422***, 80734*** and 10.039*** on significance at the 1 percent levels only on the year 2008. The results of regression model 11: $SD_{ROC} = \alpha + \beta_1 (TCA/TA_i) + \beta_2 (TCL/TA_i) + \varepsilon$ has been reported in sixth cell at table 4, and the results indicate no significant effect. In general, there is some statistically significant relationship between the level of current assets and current liabilities and operating and financial risk of Jordanian commercial banks especially between standard deviation of return on investment as dependent variable and working capital policies

CONCLUSION

Working capital management is the management of the net of current assets and current liabilities with the objective of reaching the right balance between profitability and liquidity. To discuss the different approaches to financing working capital, it is important to identify that ordinarily, company may use

short-term sources of finance to finance its short-term activities, such as working capital activities and long-term source of finance for its capital investments in non-current assets The choice of which source of finance a company uses to finance its working capital and other activities depend on several factors such as: availability of fund, the length of time such funds may be required for, the purpose for which the funds is required, the size of the company, the rate of interest but for the discussion of the financing of the working capital, the two main factors that needs to be considered are the risk of the finance used and the cost of finance; either by financing working capital using short or long-term source of finance. The risk and cost factors are inversely related, in that if a company goes for a low risk source of finance, it is related to a high cost source of finance and vice versa. Based on risk, short-term source of finance is assumed to be more risky than a long-term source of finance.

In general, current assets are considered as one of the important component of total assets of a firm. A firm may be able to reduce the investment in fixed assets by renting or leasing plant and machinery, whereas, the same policy cannot be followed for the components of working capital. The high level of current assets may reduce the risk of liquidity associated with the opportunity cost of funds that may have been invested in long-term assets. Efficient working capital is really a prerequisite to growth and existence of corporate enterprises because it dictates the level of production, inventory and sales

This study investigated the relative relationship between the aggressive/conservative working capital policies for 59 industrial companies and 14 banks listed at Amman Stock Exchange for a period of 2004-2008. The impact of aggressive/conservative working capital investment and financing policies has been examined through cross-sectional regression models between working capital policies and profitability as well as risk of the firms and banks.

The result indicates a negative relationship between the profitability measures of firms and banks and degree of aggressiveness of working capital investment and financing policies. The firms yield negative returns if they follow an aggressive working capital policy. The results moreover, also confirmed the findings of Carpenter and Johnson (1983) that there is no significant relationship between the aggressiveness\conservativeness of working capital policies of firms and their operating and financial risk, but there are some statistically significant relationship between the level of current assets and current liabilities and operating and financial risk of Jordanian commercial banks especially between standard deviation of return on investment as dependent variable and working capital policies. Moreover, theoretical discussion on risk and working capital management has also been tested on empirical basis in an emerging market of Jordan. Although the results of current study are in contradiction to some earlier studies on the issue, yet, this phenomenon may be attributed to the inconsistent and volatile economic conditions of Jordan.

When any company manages its working capital well, it has every leverage opportunity to continue in business indefinitely both in profitability and in liquidity. Based on this research work, the researcher has proffered the following recommendations: The financial manager should have knowledge of the sources of working capital funds as well as investment opportunities where idle funds may be temporarily invested. The current assets at all times should be sufficiently in excess of current liabilities to constitute buffer for maturing obligations within the ordinary operating cycle of a business. The management decisions concerning working capital should not be left to the financial manager alone. Other departmental heads should partake for optimality to be attained easily. The decision on how to optimize and finance current assets should be highly considered with care. Finally, the owners and investors should to be careful to analysis of accounting data of financial statements to gain access to the financial status of firms to try to make a proper assessment and improve the overall performance as well as risk of the firms

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BIOGRAPHY

Dr. Faris Nasif AL-Shubiri is an Assistant Professor of Finance at Amman Arab University for Graduate Studies, He can be contacted at: College of Business, Department of Finance and Banking , Amman-Jordan , P.O. box : 230094 Code : 11123, Email: fa_shub@yahoo.com , Tel NO: 00962-777726523.

LOCAL MONOPOLY, NETWORK EFFECTS AND TECHNICAL EFFICIENCY – EVIDENCE FROM TAIWAN'S NATURAL GAS INDUSTRY

Ting-Kun Liu, Chaoyang University of Technology

ABSTRACT

This paper examines the optimal number of natural gas firms in each region of Taiwan. In order to separate large local monopoly companies from the small ones, this paper constructs a firm-level panel data analysis for the industry covering the period 1995-1999. The optimal number of firms in each region is estimated by using the minimum efficient scale theory. In addition, a non-neutral stochastic frontier production function is used to detect the impact of the local monopoly, the network effects and cost structure on the natural gas firms' technical efficiency.

JEL: D42, L95, O30

KEYWORDS: Local monopoly, network effect, non-neutral stochastic frontier production function, technical efficiency, natural gas industry

INTRODUCTION

According to the energy statistics of the Bureau of Energy of the Ministry of Economic Affairs (2005), a total of 9,373 million cubic meters (Nm^3) of liquefied natural gas (LNG) was imported into Taiwan in 2005. When compared with the 856 million Nm^3 imported in 1990, this represents an average annual growth rate of 17.30%. The level of LNG consumption, this rose from 606 million Nm^3 in 1990 to 8,674 million Nm^3 in 2005. Of this quantity consumed, some 87.50% was for electricity usage, 9.88% for industry, 1.71% for residents, 0.83% for businesses and 0.08% for others.

The production of natural gas amounted to 1,327 million Nm^3 in 1985 declining to 547 million Nm^3 in 2005. The amount consumed was 1,391 million Nm^3 in 2005 compared with 1,130 million Nm^3 in 1985. The average annual growth rate was 1.05%. This study reveals that the consumption of natural gas has exhibited an increasing trend and implies that the usage of natural gas has gradually been adopted by the country. In view of the limitations regarding the supply of domestic natural gas energy, Taiwan depends increasingly on imports of natural gas.

Compared to coal and petroleum, natural gas is a source of energy with low carbon and it is clean. It produces no SO_X when burning. It produces only 20-40% of NO_X and 60% of CO_2 with less air pollution than coal. Faced with the requirement to reduce CO_2 emissions in accordance with the "Kyoto Protocol", the Taiwan government has introduced low-polluting energy policies and has extended the usage proportions of low-polluting energy sources such as natural gas. For example, the authority plans to abolish the imposition of a tariff and commodity tax on natural gas, encourage the utilization of natural gas by taxing coal, and replace coal with natural gas to generate electric power. Since the ratio of natural gas to the total amount of domestic energy is only 8%, there is still room to push for an increase in the use of natural gas.

In 2005, there were 25 local natural gas firms in Taiwan. Each was established at a different time and are spread out across different operating locations. Although the total number of firms differs from region to region, the natural gas industry in Taiwan is a chartered industry that causes the operation of each firm to be similar to that of a local monopoly. However, to our knowledge few studies consider this characteristic. Burton (1994), Bernard and Weiner (1996), Raphael (1998), Gort and Sung (1999) and Filippini and Wild (2001) discuss the insecticide, petroleum, telecommunications, telephone and electricity industries, respectively, without referring to the natural gas industry. The industry requires huge capital investments

and firms must endure both large and long-term losses in their initial stages of operation. According to Chen *et al.* (2005) natural gas firms in Taiwan make a profit but do not operate at an optimal level. It is thus necessary to further examine and evaluate the productivity and technical efficiency of these firms to improve their productivity and operating efficiency.

Due to higher population concentrations and urbanization, it is cheaper to set up the necessary piping in the north than in the south of Taiwan. The regions that use natural gas are all located along the western corridor of Taiwan, and for geographical and environmental reasons, there are no such firms in eastern Taiwan. The differences in calorific values are also a reason for the divergence in terms of the firms' cost structures (i.e., the price of self-produced gas is lower than imported gas and has a lower calorific value). Caves (1984) explored the network-related industries and indicated that cost was not only affected by inputs, but was also affected by network variables. Network effects may be divided into the network configuration and network utilization. The network configuration represents the spread of subscribers and air feed, and network utilization refers to the facilities' utilization rate. Due to difficulties in obtaining network utilization data, this variable has rarely been adopted in previous studies. With regard to network configuration, related studies focus on the length of railroad for transportation or service stations for the air transportation industry. Salvanes and Tjotta (1994) and Jang *et al.* (1997) study the electricity industry and both adopt the number of subscribers as a proxy for the network variable. For this reason, this paper applies the number of natural gas subscribers as a proxy for the network variable in order to measure the network effects.

The remainder of the paper is organized as follows. The literature is reviewed in Section 2. Section 3 describes empirical data and methodology of this study. Section 4 presents the empirical results, and the final Section contains concluding remarks.

LITERATURE REVIEW

Papers that discuss productivity and technical efficiency have not been seen in Taiwan and only a few are found abroad, including Sing (1986), Aivazian *et al.* (1987) and Chermak and Patrick (1995). Aivazian *et al.* (1987) found that, in addition to technical change, the other contributing factor to productivity of the U.S. natural gas industry is its economies of scale. Aivazian *et al.* (1987) confirmed the impact of economies of scale on the productivity of the natural gas industry. Differing from Aivazian *et al.* (1987), this paper refers to Chen *et al.* (2005) by applying the minimum efficient scale (MES) theory to estimate the optimal number of natural gas firms in each location.

A major difference between this study and previous studies on the cost-side in the energy or network industry is that this paper applies a production function. For example, Nemoto *et al.* (1993), Bhattacharyya *et al.* (1995) and Jang *et al.* (1997) used a cost function in their empirical analysis in studies of the air transportation, hydropower, electric power and telecommunications industries. With regard to the definition of a network industry, see White (1996). In the literature on natural gas (Sing, 1986; Chermak and Patrick, 1995), use a cost function to construct an empirical model. This paper applies the non-neutral stochastic frontier production function model defined by Wang and Schmidt (2004) and developed by Huang and Liu (1994) to investigate the impact of the non-neutral effects of natural gas firms' characteristic variables on production function frontiers and efficiency. For empirical studies on the Taiwanese electronics and banking industries that apply the non-neutral stochastic frontier production function, please refer to Chen (2001) and Huang (2005). Furthermore, this paper distinguishes between large and small local monopolies, and takes network effects and cost structure into consideration to identify differences in technical efficiency between large and small local monopolies.

DATA AND METHODOLOGY

Survey data were obtained from a plan drawn up by the Bureau of Energy of the Ministry of Economic Affairs (MOEA) and implemented during 1995-1999. From these data, we are able to construct a

balanced panel dataset of 21 Taiwanese natural gas firms for the 1995-1999 survey periods. The sample statistics for our key variables are provided in Table 1.

Table 1: Statistics for Variables (after Deflation by the 2005 Price Index)

Variable	Name	Unit NT$	Mean	Standard Error
Variable Cost	*VC*	thousands	474,304.52	560,046.04
Output of gas	Q_1	thousands	426,918.16	490,286.36
Output of device	Q_2	thousands	189,963.82	164,175.22
Price of gas	P_1	Nm^3/NT$	12.30	1.01
Price of device	P_2	thousands	19,139.14	14,727.57
Price of labor	P_3	thousands	867.67	300.86
Physical capital	*K*	thousands	929293.07	967441.90
Number of subscribers	*N*	household	78432.72	81372.35
Total sales	*Y*	thousands	631,189.63	614,003.02
Physical capital	*Cap*	thousands	929293.07	967441.90
Price of labor	*Lab*	thousands	867.67	300.86
Expenditure on material	*Mat*	thousands	38,340,829.38	44,661,880.37
Dummy variable	*Loc*	Larger local monopoly=1, otherwise=0		
Number of subscribers	*Net*	household	78432.72	81372.35
Operating cost	*Cost*	thousands	473,856.59	557,365.91

Notes: The survey data were obtained from a plan drawn up by the Bureau of Energy of the Ministry of Economic Affairs (MOEA) and *implemented during 1995-1999.* This table shows sample statistics for our key variables.

ESTIMATION OF THE MINIMUM EFFICIENT SCALE (MES)

This paper estimates the average MES production by using a short-term translog cost function under the output mode of selling both gas and devices. In addition, since geographical features easily affect the optimal number of firms, this paper divides the Taiwan market into the northern, central and southern regions and evaluates the optimal number of firms using MES. The firms that merge in each region are the larger local monopoly firms. When calculating the MES, we assume that the quantities of devices sold are given and use the sample average as the proxy variable. The estimated equation may then be expressed as follows:

$$E^C = \frac{\partial \ln VC}{\partial \ln Q_1} \tag{1}$$

where E^C is the short-term cost elasticity when $E^C = \partial \ln VC / \partial \ln Q_1 = 1$ is the condition for attaining the MES (Fuss and Gupta, 1981; Elhendy and Alzoom, 2001). Q_1 is the output of gas, and *VC* represents the variable cost, which is specified as:

$$\begin{aligned}\ln VC = {} & \beta_0 + \sum_{i=1}^{3}\beta_{P_i}\ln P_i + \sum_{i=1}^{2}\beta_{Q_i}\ln Q_i + \beta_K \ln K + \beta_N \ln N + \beta_T T \\ & + \frac{1}{2}\sum_{i=1}^{3}\sum_{j=1}^{3}\beta_{P_iP_j}\left(\ln P_i \ln P_j\right) + \frac{1}{2}\sum_{i=1}^{2}\sum_{j=1}^{2}\beta_{Q_iQ_j}\left(\ln Q_i \ln Q_j\right) \\ & + \frac{1}{2}\beta_{KK}\left(\ln K\right)^2 + \frac{1}{2}\beta_{NN}\left(\ln N\right)^2 + \frac{1}{2}\beta_{TT}\left(T\right)^2 \\ & + \sum_{i=1}^{3}\sum_{j=1}^{2}\beta_{P_iQ_j}\ln P_i \ln Q_j + \sum_{i=1}^{3}\beta_{P_iK}\ln P_i \ln K \\ & + \sum_{i=1}^{3}\beta_{P_iN}\ln P_i \ln N + \sum_{i=1}^{3}\beta_{P_iT}\ln P_i T + \sum_{i=1}^{2}\beta_{Q_iK}\ln Q_m \ln K \\ & + \sum_{i=1}^{2}\beta_{Q_iN}\ln Q_i \ln N + \sum_{i=1}^{2}\beta_{Q_iT}\ln Q_i T + \beta_{KN}\ln K \ln N \\ & + \beta_{KT} T \ln K + \beta_{NT} T \ln N + \varepsilon \end{aligned} \quad (2)$$

where P_1, P_2 and P_3 are the prices of gas, devices and labor, respectively. K represents a fixed input of capital, N is the number of subscribers serving as the proxy for the network effects, i and T are the firm and time trend, respectively, and Q_2 is the output of the devices.

THE NON-NEUTRAL STOCHASTIC FRONTIER PRODUCTION FUNCTION

A stochastic frontier production function in translog form with three input variables is formulated as follows:

$$\ln(\eta) = \beta_0 + \sum\beta_i \ln(X_i) + \sum\beta_i (X_i) + \frac{1}{2}\sum\sum\beta_{ij}\ln(X_j) + \nu \quad (3)$$

where η is the stochastic frontier output, and the X's are the total wage bill (*Lab*), the value of fixed capital assets (*Cap*) and total expenditure on materials (*Mat*), respectively. The firm's characteristics, i.e., the scale of the local monopoly (*Loc*), network effects (*Net*), and the cost structure (*Cost*), are identified as sources of efficiency in production. The interaction between a firm's characteristics and input usage results in non-neutrality in terms of productivity and efficiency. The non-neutral efficiency function with interaction is of the form:

$$\ln(Y) - \ln(\eta) = \sum\alpha_i Z_i + \sum\sum\alpha_{ij} Z_i \ln(X_j) + w \quad (4)$$

where α_{ij}= 0 in equation (4) represents the neutral efficiency function in which the interaction terms do not exist, otherwise the interaction between a firm's characteristics and input usage results in the non-neutrality of productivity. Y is the firm's total sales. With the truncated normal distribution for w, it is easily shown that an individual firm's mean technical efficiency $E(Y/\eta)$ in equation (5) is equal to:

$$E\left(\frac{Y}{\eta}\right) = \exp\left[\sigma_w + \left(\rho + \frac{1}{2}\sigma_w\right)\right]\frac{1-\Phi(\sigma_w + \rho)}{1-\Phi(\rho)} \quad (5)$$

where

$$\rho = \frac{\sum\alpha_i Z_i + \sum\sum\alpha_{ij} Z_i \ln(X_j)}{\sigma_w} \quad (6)$$

The industry-wide mean technical efficiency is then the average of the individual firm's mean technical

efficiency. The specification of the efficiency function in equation (4) allows for the non-neutral shift in observed output from the frontier. The marginal effect of Z_i on the expected production efficiency is a function of input X_j

$$\frac{\partial E\left(\frac{Y}{\eta}\right)}{\partial Z_k} = \psi\left[\alpha_k + \sum \alpha_{kj} \ln(X_j)\right] E\left(\frac{Y}{\eta}\right) \tag{7}$$

where

$$\psi = \left[\sigma_w + \frac{\phi(\xi)}{1-\Phi(\xi)} - \frac{\phi(\sigma_w + \xi)}{1-\Phi(\sigma_w + \xi)}\right]\frac{1}{\sigma_w} \tag{8}$$

Finally, the returns to scale in production can be calculated as:

$$\sum \frac{\partial \ln E(Y)}{\partial \ln(X_k)} = \sum \left[\beta_k + \sum \beta_{kj} \ln(X_j)\right] + \psi \sum \sum \alpha_{jk} Z_j \tag{9}$$

The first part of the right-hand side of the equation is the returns to scale corresponding to a neutral specification of the production function, i.e., $\alpha_{jk} = 0$ for all j and k.

EMPIRICAL RESULTS

The cost function model consisting of equation (2), with restrictions in terms of homogeneity in input prices, symmetry, and its adding up property, was estimated using panel data for the period 1995-1999. As noted above, in the model estimation, the cost-share equation for capital was deleted. The parameter estimates and the associated asymptotic t-values are presented in Table 2. This paper then estimates the average MES production by using a short-term translog cost function under the output mode of selling both gas and related devices, and obtains an optimum average MES of 176,952,000 Nm^3.

By using the average amount of natural gas sales as the market demand for the 5 survey years, this paper can measure the optimal number of firms in each region. In the northern region, the optimal number of firms is 3.39 according to the average quality of sales of 600 million Nm^3. The optimal number of firms is 1.27 in the central region according to the average quality of sales of 225 million Nm^3. In the southern region, the average quality of sales is 131 million Nm^3 and the optimal number of firms is 0.74. We thus conclude that under the optimal production scale in Taiwan's natural gas industry, the optimal number of firms should be 3, 1 and 1 in the northern, central and southern regions, respectively. These empirical results also provide us with the number of large local monopoly firms for further analysis.

The maximum-likelihood method is used to estimate the translog frontier (3) and the efficiency (4) functions. The estimates of the translog frontier function and of the efficiency function are presented in Table 3. All estimates are statistically significant at the 10% level, with the exception of the coefficients $\beta_{MatMat,}$ and $\alpha_{CostMgt}$.

Table 2: Estimation of Translog Cost Function (1995-1999)

Variable	Coefficient	Variable	Coefficient
Constant	8.042 (3.436)***	$ln\ P_1\ ln\ N$	-0.065 (-3.421)***
$ln\ P_1$	0.192 (0.580)	$ln\ P_1\ ln\ T$	0.004 (0.295)
$ln\ P_2$	0.398 (3.670)***	$ln\ P_3\ ln\ P_2$	-0.001 (-0.077)
$ln\ P_3$	0.410 (1.265)	$ln\ P_3\ ln\ Q_1$	-0.102 (-5.257)***
$ln\ Q_1$	-1.325 (-3.436)***	$ln\ P_3\ ln\ Q_2$	0.066 (4.030)***
$ln\ Q_2$	-0.274 (-1.238)	$ln\ P_3\ ln\ K$	0.060 (4.464)***
$ln\ K$	-0.421 (-1.888)*	$ln\ P_3\ ln\ N$	-0.039 (-2.557)***
$ln\ N$	2.837 (9.008)***	$ln\ P_3\ ln\ T$	0.004 (1.264)
$ln\ T$	-0.339 (-5.443)***	$ln\ P_2\ ln\ Q_1$	-0.053 (-3.480)***
$(ln\ P_1)^2$	0.007 (0.205)	$ln\ P_2\ ln\ Q_2$	0.007 (0.768)
$(ln\ P_2)^2$	-0.005 (-0.186)	$ln\ P_2\ ln\ K$	0.005 (0.654)
$(ln\ P_3)^2$	0.013 (1.347)	$ln\ P_2\ ln\ N$	0.035 (2.324)**
$(ln\ Q_1)^2$	0.446 (10.901)***	$ln\ P_2\ ln\ T$	-0.004 (-1.542)
$(ln\ Q_2)^2$	0.046 (2.835)***	$ln\ Q_1\ ln\ Q_2$	-0.040 (-1.965)**
$(ln\ K)^2$	0.019 (2.065)**	$ln\ Q_1\ ln\ K$	-0.025 (-2.405)***
$(ln\ N)^2$	0.284 (6.720)***	$ln\ Q_1\ ln\ N$	-0.312 (-7.838)***
$(ln\ T)^2$	-0.001 (-0.255)	$ln\ Q_1\ ln\ T$	0.039 (6.946)***
$ln\ P_1\ ln\ P_3$	0.006 (0.194)	$ln\ Q_2\ ln\ K$	-0.017 (-1.940)*
$ln\ P_1\ ln\ P_2$	-0.012 (-1.077)	$ln\ Q_2\ ln\ N$	0.007 (0.374)
$ln\ P_1\ ln\ Q_1$	0.155 (5.954)***	$ln\ Q_2\ ln\ T$	-0.004 (-1.498)
$ln\ P_1\ ln\ Q_2$	-0.073 (-4.326)***	$T\ ln\ N$	-0.029 (-4.376)***
$ln\ P_1\ ln\ K$	-0.054 (-4.321)***		

This table presents the parameter estimates and the associated asymptotic t-values of the translog cost function model. The translog cost function model consisting of equation (2). *The numbers in parentheses are T values. The terms* ***, **, *and* * *represent the 1%, 5%, and 10% significance levels, respectively.* R^2 of Cost function 0.994, R^2 of Gas share 0.848, R^2 of Labor share 0.839

Table 3: Estimation of MLE (1995-1999)

Stochastic frontier production function		**Non-neutral efficiency function**	
Variable	**Coefficient**	**Variable**	**Coefficient**
B_0	0.300 (10.125)***	α_{Loc}	0.210 (6.725)***
B_{Lab}	-0.084 (-6.186)***	α_{Net}	0.034 (5.109)***
B_{Cap}	0.022 (5.045)***	α_{Cost}	0.122 (4.000)***
B_{Mat}	0.023 (1.741)*	α_{LocLab}	0.223 (1.741)*
B_{LabLab}	-0.217 (-8.188)***	$\alpha_{LoctCap}$	-0.017 (-6.702)***
β_{LabCap}	-0.474 (-4.282)***	$\alpha_{LoctMat}$	0.266 (3.882)***
B_{LabMat}	1.491 (3.924)***	α_{NetLab}	0.795 (4.743)***
β_{CapCap}	-0.204 (-4.235)***	$\alpha_{NettCap}$	0.204 (3.442)***
β_{CapMat}	0.112 (2.219)**	α_{NetMat}	-0.335 (-2.002)**
B_{MatMat}	0.053 (1.001)*	$\alpha_{CostLab}$	0.198 (1.800)*
		$\alpha_{CostCap}$	0.383 (1.926)*
		$\alpha_{CostMat}$	0.403 (1.501)*
σ^2_y	-0.082 (-6.064)***	σ^2_w	0.136 (3.064)***

This table provides the estimations of maximum-likelihood method to estimate the translog frontier (equation (3)) and the efficiency function (equation (4)). Numbers in parentheses are T values. The terms ***, **, and * represent the 1%, 5%, and 10% significance levels, respectively.

Panel A of Table 4 presents the results for the small and large local monopoly firms' mean technical efficiency. The results show that the large local monopoly firms' mean technical efficiency is higher than that of the small local monopoly firms. This coincides with Chen *et al.* (2001) who find that large firms have a higher mean technical efficiency than small firms in the electronics industry. By observing the impact of firms' characteristics on the marginal effect of technical efficiency, we see that the marginal

effects of the firms' scale and network effects are higher in large local monopoly firms than in small local monopoly firms as shown in Panel B of Table 4. In other words, when large local monopoly firms extend their scale then the economies of scale they obtain are significantly better than in the case of small local monopoly firms. This implies that firms in the natural gas industry can enhance their technical efficiency by enlarging their scale. Furthermore, the small local monopoly firms' marginal effect of scale is negative which could be the reason why some firms' exploitation of capacity is restricted by scale, which raises the operating costs and is unfavorable to the improvement of technical efficiency. In general, Panel B of Table 4 reveals that large local monopoly firms have higher technical efficiency due to the large firms having greater scale and network effects. Panel C of Table 4 shows estimates of the returns to scale.

The small local monopoly firms in the Taiwanese natural gas industry are close to exhibiting constant returns to scale. This implies that Taiwan's natural gas industry is presently characterized by constant returns to scale. If Taiwan can adopt the mode of a large local monopoly, then increasing returns to scale could be obtained in the natural gas industry.

Table 4: Estimations of Mean Technical Efficiency, Marginal Effects and Average Returns to Scale

Panel A			
Firms	**Technical Efficiency**	**Standard Error**	**Sample**
Large local monopoly	0.7139	0.060	21
Small local monopoly	0.7162	0.045	5
Panel B			
Firms	**Scale**	**Network Effects**	**Cost**
Large local monopoly	-0.0445	0.0009	0.6562
Small local monopoly	0.0362	0.0726	0.5873
Panel C			
Firms	**Return to Scale**	**Standard Error**	**Sample**
Large local monopoly	0.9761	0.1352	21
Small local monopoly	1.4429	0.2342	5

Notes: Panel A presents the results of Mean Technical Efficiency of Large and Small Local Monopoly Firms, Panel B are Marginal Effects of Firms' Characteristics, and Panel C shows the Average Returns to Scale of Large and Small Local Monopoly Firms.

CONCLUSION

The most significant difference between previous studies on the cost-side in the energy or network industry in this paper is that it applies a production function (for example, see Nemoto *et al.* (1993), Bhattacharyya *et al.* (1995) and Jang *et al.* (1997). In the literature on natural gas (Sing, 1986; Chermak and Patrick, 1995), a cost function is used as an empirical model. This paper applies the non-neutral stochastic frontier production function model to investigate the impact of the non-neutral effects of natural gas firms' characteristic variables on the production function frontier and efficiency. Furthermore, this paper distinguishes large from small local monopolies, and takes the network effects and cost structures into consideration in order to compare the differences in technical efficiency between large and small local monopolies.

The results show that the mean technical efficiency of large local monopoly firms is higher than that of small local monopoly firms. This finding coincides with that of Chen *et al.* (2001). By observing the impact of firms' characteristics on the marginal effect of technical efficiency, we find that the marginal effects of the firms' scale and network effects are higher in large local monopoly firms than in small local monopoly firms. In general, the large local monopoly firms have higher technical efficiency due to the large firms having greater scale and network effects. This implies that constant returns to scale currently exist in Taiwan's natural gas industry. If we can adopt the mode of large local monopolies, then increasing returns to scale can be achieved in the natural gas industry.Our empirical results should be good reference material for other developing countries. However, with the limitations of data resources

we are limited by sample size. In future studies, the comparison of different industries and periods could be completed to provide additional insights.

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BIOGRAPHY

Dr. Ting-Kun Liu is an Assistant Professor of Finance at Chaoyang University of Technology. His research interests include information technology, E-commerce management and applied econometrics. He can be contacted at: Department of Finance, Chaoyang University of Technology, 168 Gifong E. Rd., Wufong Township, Taichung County, 41349, Taiwan. Email: tkliu@cyut.edu.tw.

EVIDENCE ON HOUSEHOLD SAVINGS IN ITALY

Angela Coscarelli, University of Calabria
Domenica Federico, University of Calabria
Antonella Notte, University of Calabria

ABSTRACT

Recent financial crises have revealed the importance for the industrial and financial development of countries. In Italy, in the first quarter of 2009, growing concerns about personal economic prospects and the evolution of the labor market have impaired consumers confidence providing motivation for increasing precautionary savings. Generally the savings propensity of Italian households is undergoing a series of changes that are related not only to the dissemination of innovative financial instruments but also to the changing demographic structure of the population. The aim of this research is to analyze the relationship between population structure and Italian household savings. Data is collected on Italian household saving published by the Bank of Italy, and data related to some demographic and economic indicators. The study finds that, in the current Italian population, saving choices are markedly different between generations, geographic areas and qualifications.

JEL: E21, G20, G21, J10, J11

KEYWORDS: Household saving, demographic transition, financial data

INTRODUCTION

Saving is an important element for country growth. The current climate is characterized by increasing levels of concern and uncertainty by Investors and households. Because of severe financial recently, the saving potential of households has decreased. Moreover, the recent vicissitudes in international financial systems have increased mistrust towards financial instruments. This mistrust has put a strain on the relationship between investors and financial operators. Historically, financial investment was oriented primarily towards instruments issued by banks such as intensified disposals of investment fund units. Following the financial crisis of 2007, the household saving rate rose from 0.4 percentage points to 11.9% in 2008. The increase interrupts a downward trend under way for over twenty years. In the mid-1980s the saving rate stood at around 28% (Bank of Italy, 2009).

The literature on saving includes several studies on the effects that the changing population structure plays on the formation and accumulation saving (Miles, 1999; Rossi and Visco, 1995). Particular interest is shown towards demographic transitions indicating a shift from a traditional regime characterized by high fertility and high mortality, to a modern regime with low birth rates and mortality rates. Italy is distinguished by the aging process expected in the coming decades. This aging process could lead to a reduction in savings, due to a low savings rate among young people. This could adversely affect the accumulation process (Borsch-Supan, 1996; Jappelli, 1999; Jappelli and Modigliani, 1998).

The aim of this research is to analyze the relationship between population structure and Italian households saving. The research uses a multi-disciplinary approach and is developed through the collection and re-elaboration of data published by the Bank of Italy. Specifically, data on a survey of Italian household income and wealth in 2006 are examined along with some demographic, economic and financial indicators. The remainder of the paper is organized as follows: Section 2 discusses household savings and demographic transition in the literature, Section 3 describes the data and methodology and Section 4 presents the results. Section 5 concludes the paper.

LITERATURE REVIEW

The literature review section is divided into two parts. The first part discusses the literature related to household savings. The second part discusses the literature related to demographic transitions.

The Household Savings

Recent financial crises have led to serious repercussions in the global economy because of deep economic and moral losses of investors (Gorton, 2009). These events revealed the relevance of saving and especially its allocation in the nation economy (Bernhiem and Shoven, 1991). Indeed, saving is very important in the development of industrial and financial systems (Attanasio, 1998; Bosworth, Burtless and Sabelhaus, 1991; Deaton and Paxson, 2000). For example, due to the absence of credit and insurance markets, household saving is a welfare factor in developing countries. On the one hand, without savings, households have few other mechanisms to smooth out unexpected variations in their incomes, and so, shocks may create some problems of human capital accumulation at early ages. On the other hand, the capacity to save becomes one of the main tools of social mobility and of future income-earning possibilities.

Although there is controversy about the relationship between savings and economic growth, it is generally agreed that once savings start to rise, perhaps due to increases in income, the potential to finance investment improves, and leads to the creation of more opportunities in the economy (Paxson, 1996). In fact domestic savings finance the bulk of any country's investment.

Theoretical literature on the determinant factors of saving is rooted in consumption theory and, consequently, largely concerns factors affecting households. Loayza, Schmidt-Hebbel and Servén (2000) provide an overview of empirical studies in this area in developed and developing countries. They found, through a cross-country study, that private sector and national savings are affected by many factors. The factors include demographic changes, an increase in young and old dependency rates, the level of development, per capita income, influences the countries development, fiscal policy, pension reform, and financial liberalization, and credit supply.

It is necessary to consider the meaning of savings. First, savings is characterized by a general restriction of expenditures, reduced to an extent strictly necessary to achieve a certain purpose (Dell'Amore, 1972). In general, the aim of savings is to provide resources to face unexpected expenses, precautionary savings, to ensure future income in addition to the income offered by the pension system, to leave a legacy or to make an investment. Second, savings is the balance of the income distribution, i.e. the positive difference between income and expenditure (Lisle, 1971). In this context, saving is a variable flow, because it measures the size of a phenomenon over a given period of time, unlike the patrimony which is a variable stock.

In Italy, attention to the savings doctrine is not new in the literature. But it is necessary to note the positions taken by leading scholars and theorists are so different that it is necessary to distinguish between economic science evaluations and financial science. In fact, while the economic literature uses mathematical models and focuses on the difference between income and expenditure, the financial literature emphasizes quantitative and qualitative analysis of savings by focusing on its evolution and on the techniques of allocation (Jappelli and Pagano, 1999).

Savings trend into investments, usually facilitated by the banking system. This is even more evident in the Italian context, in which banks have always been interested in the transfer of resources within the macro-economy, channeling the flow of funds from surplus areas to deficit ones, and ensuring allocation of resources. In recent years, the Italian legislature realized the need to enact a law to protect forms of

savings (Legislative Decree of 24 February 1998, n. 58 of the Testo Unico della Finanza (TUF)). This Law n. 262 of 28 December 2005, known as the "law for the protection of savings and discipline of financial markets", which replaced some articles of the TUF and established: greater transparency of banking contracts, restrictions on ownership, regulation on corporate governance and greater information disclosure to public.

Recently, the literature has shown increasing attention to household savings, particularly on the allocation of the financial components of wealth and the influences of demographic household changes on savings (Guiso, Haliassos and Jappelli, 2002; Cannari, 1994).

The Demographic Transition

It is evident that population changes are usually the effect of some particular demographic phenomena: fertility, mortality, migrations. In demography, but also in other sciences, it is possible to define demographic transition (Lesthaeghe and Surkyn, 1988). It deals with a theory which explains the trend or transition of a population from high birth rates and high death rates to low birth rates and low death rates as part of the economic development of a country from a pre-industrial to an industrialized economy. It is based on an interpretation begun in 1929 by the American demographer Thompson (1929) which involves observed changes, or transitions, in birth and death rates in industrialized societies over the past two hundred years.

Specifically, this model is described by four transition phases. The first transition, i.e. in a pre-industrial society, is characterized by very high levels of fertility and mortality that fluctuate rapidly according to natural events, such as drought and disease, to produce a relatively constant and young population.

The second stage, in a developing country, leads to a fall in death rates with a life rate increase, a disease reduction and an increase in population. These changes were due to improvements in food, farming techniques, access to technology, basic healthcare, and education. Without a corresponding fall in birth rates this produces an imbalance and countries can experience a large increase in population in this stage (Lesthaeghe and Surkyn, 2004).

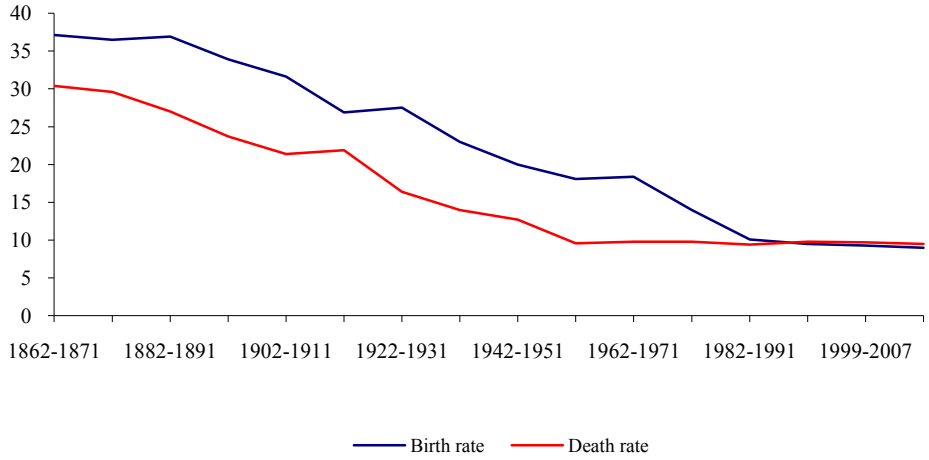
The third phase moves the population towards stability through a decline in the birth rate. There are several factors contributing to this eventual decline including the availability of contraceptives, urbanization changing traditional values on fertility, the cost of dependent children to a family, reduction of the number of children working, a reduction of agriculture, an increase in status and women education, and an increase in wages. The resulting changes in the age structure of the population includes a reduction in the young age dependency ratio and eventually population aging. The population structure becomes less triangular and more like an elongated balloon. During the period between the decline in young age dependency and rise in old age dependency, there is a demographic opportunity that can potentially produce economic growth through an increase in the ratio of working age to dependent population; the demographic dividend.

The last transition phase occurs where birth and death rates are both low. Therefore the total population is high and stable. Some theorists consider there are only 4 stages and that the population of a country will remain at this level. The demographic transition model is only a suggestion about the future population levels of a country; it is not a prediction (Beaver, 1975). We can observe the Italian demographic transition from the Italian unity (1862) up to current day in Figure 1.

During the last two decades, European countries have been characterized by several changes in their demographic patterns: the drop in their fertility and mortality rates and the notable increase in their life

expectancy. These demographic changes, which have been identified as the key elements of the "Second Transition", especially affect the social science. These aspects have contributed to the emergence of new and particular needs in welfare. Western European countries have adopted, with different intensity since the 1960's and 1970's, some demographic patterns that pose new challenges for these societies. The principal demographic feature of the second demographic transition is the decline in fertility below the replacement level, which is set at 2.1 births per woman. If fertility declines below this level, population sustainability will not be guaranteed (Van de Kaa, 1987). The other feature of the second demographic transition is the increase of life expectancy from which population aging derives. The decline of fertility, the increase of life expectancy and aging population can determine the changes in public society. Aging population is studied both for its implications on the progress and sustainability of accounts, and for the consequences on the formation of savings and accumulation.

Figure 1: Italian Demographic Transition



This figure shows the evolution of the demographic transition (birth and death rates) of the Italian population during the period going from 1862 to 2010, besides it shows the different transition phases: from 1862 to 1901 the first phase; from 1902 to1991 the second phase; from 1992 to 2010 the third phase.

A demographic phenomenon further studied and discussed by economists is the increase of the dependency ratio, defined as the ratio between the number of people over 65 years old and that of individuals between 15 and 64 years old. If the fertility rate remains at the same levels as the previous decade and average life expectancy continues to lengthen, this ratio is expected to rise continuously until 2040, with radical consequences for major financial institutions of social protection. However, the demographic transition determines other changes in relationships between the abundance of related generations. A significant aspect, but perhaps less examined for its macroeconomic implications, is analysis of passage of the baby-boom along the middle-age and end of life stages. Over the next two decades these generations, more numerous than the others currently, live in a period where the level of disposable income and savings are higher. What effect might this phenomenon on macroeconomic variables and their relative prices have? What are the effects on the formation of private savings? (Baldini and Mazzaferro, 2003).

DATA AND METHODOLOGY

Data regarding a survey on Italian household income and wealth in 2006 published by the Bank of Italy, are related to some demographic, economic and financial indicators (Bank of Italy, 2008). The survey covered 7,768 households, 19,551 individuals, from which 13,009 are income earners.

From the structural point of view, the sample is composed of 48.7% male and 51.3% female, 39.7% are head of household, 29.9% are head of household partners, 17.8% are children, and 9.3% are head of household parents, and 3.3% are other members of the family (Table 1). Collected data show that the household is mainly composed of four components (27.2%), while 9.9% live alone and 24.2% live in couple relationships. The percentage of couples without children continues to increase, while the head of household percentage with more than one child decreases. The average family member is higher in the South, especially in Campania. In terms of geographical distribution, 44.6% of households reside in the North, 20.1% in the Centre and 35.3% in the South and Islands. 29.97% of the Italian families live in towns with fewer than 20,000 inhabitants, 19.69% in municipalities with a population between 20,000 and 40,000 inhabitants, and the remaining 50.34% in the bigger cities. The sample is principally composed of Italian citizens (97.4%). Only 2.6% do not have Italian citizenship and entered Italy after 2001. With regard to the educational qualification of the sample, the major part of the sample has a middle school level (29%), while only 7.5% has a university degree. This distribution is more interesting if age is considered. In fact, there is a large presence of over 65 years old people and individuals of 30 years old and under (29.6%).

Table 1: Household Structure (Values In Unit and %)

	Frequency	*Percentage*
	Gender	
Male	9,514	48.7
Female	10,037	51.3
Total	19,551	100
	Age	
30 to under	5,782	29.6
31-40	2,474	12.7
41-50	2,973	15.2
51-65	4,191	21.4
over 65	4,131	21.1
Total	19,551	100
	Educational qualification	
None	2,293	11.7
Primary school	4,240	21.7
Middle school	5,671	29.0
Secondary school	5,884	30.1
University degree	1,463	7.5
Total	19,551	100
	Members in the family	
Head of household	7,768	39.7
Partner	5,841	29.9
Child	3,475	17.8
Others	2,467	12.6
Total	19,551	100
	Numbers of members in the family	
1	1,927	9.9
2	4,732	24.2
3	4,959	25.4
4	5,316	27.2
5+	2,617	13.4
Total	19,551	100
	Citizenship	
Italian	19,045	97.4
Not Italian	506	2.6
Total	19,551	100
	Work status	
Employee	5,746	29.4
Self employed	1,408	7.2
Not employed	12,397	63.4
Total	19,551	100

This table shows some social characteristics of all the households of the analyzed sample, indicated in absolute and percentage values.

With regard the work status, the households are composed in large part of people who do not have a job (63.4%), while 29.4% are employees and 7.2% are self employed. More specifically, 16.4% are occupied in the industrial sector, 14.9% in the Public Administration, 8.8% in commerce and 5.2% in agriculture.

For our analysis, it is important to note some characteristics of the head of household who represent the main person responsible for family finances. The head of household is a man in 63% of the cases and a woman in 37% of the cases. With regards the male, he is less than 30 years old for 2.9% of the cases and more than 65 years in 30.2% of the cases. The most common educational qualification is secondary school and only 3.2% has no educational qualification. He attended a technical institute while he has a university degree in 9.4% of the cases prevalently in liberal arts. With regards the female, she is under 30 for 3.2% and over 65 in 41.7% of the cases. Only 8% of women have a university degree (Table 2).

Table 2: Age and Educational Qualification of the Head of Household (Values in Unit and %)

		Gender				Total	
		Male		Female			
		Frequency	*Percentage*	*Frequency*	*Percentage*	*Frequency*	*Percentage*
Age	30 to under	144	2.9	93	3.2	237	3.1
	31-40	667	13.6	341	11.9	1,008	13.0
	41-50	973	19.9	532	18.5	1,505	19.4
	51-65	1,634	33.4	708	24.7	2,342	30.1
	over 65	1,478	30.2	1,198	41.7	2,676	34.4
	Total	4,896	100	2,872	100	7,768	100
Educational qualification	None	159	3.2	270	9.4	429	5.52
	Primary school	1,100	22.5	960	33.4	2,060	26.52
	Middle school	1,520	31.0	671	23.4	2,191	28.21
	Secondary school	1,656	33.8	742	25.8	2,398	30.87
	University degree	461	9.4	229	8.0	690	8.88
	Total	4,896	100	2,872	100	7,768	100

This table shows the distribution of the head of household by gender in age classes, and the different educational qualification of the head of household distinct per gender, too.

The head of household has a non-professional status in 54.9% of the cases, and is more frequently a dependent employee (34.8% against 10.2% of the independent employee). In 2006 the average annual head of household income, net of income taxes and social security contributions, is 31,792 euros, equal to 2,649 euros per month, and it is higher for males (34,785 euros) than for females (25,081euros). Moreover, average head of household income is higher for households with head of household graduates, working independently or as a manager, between 41 and 65 years old.

From the methodological point of view, the research uses a multi-disciplinary approach and is developed through the determination of economic and financial indicators that describe head of household saving in Italy. Specifically, the bivariate analysis identifies the relationship between two variables showing the correlation (Corbetta, 1992; Piccolo, 2000).

RESULTS

Based on the head of household structure, the research analyzes some indicators of saving in Italy. The indicators are: bank or post office current accounts, saving forms as bonds, mutual funds and equity, and payment instruments.

With regard to the first indicator, 89.9% of the households owned a bank or postal current account in 2006, and the distribution for gender shows a situation in equilibrium (Table 3). Among the deposit bank or post office forms, the current account is very spread out. Most households have an account at a bank and use it for more than 10 years. This choice is linked to proximity from housing. Typically, through the

account it is possible to pay bills and to receive the salary. The financial instruments used increase according to the income and educational qualifications. Moreover, financial instruments are generally more common in the North and the Centre of Italy, with the exception of post office deposits that are more common in the South. Specifically, 75% of the families residing in the South have at least a deposit, against 93% in the Centre and 97% in the North. The gap between North and South is relatively more pronounced in the case of shares, bonds and government securities that is six times higher in the North than the South.

Table 3: Bank or Post Office Accounts (Values in %)

	Bank/post office current accounts	**Bank/post office savings accounts**	**Bank/post office deposit accounts**
Male	89.9	18.3	91.3
Female	82.7	18.5	84.5

This table shows the percentage of hold of household distinct per gender that owns a bank or post office current account, a saving account and a deposit account.

As regards the saving forms, in 2006, 10.4% of the households owned Italian shares and other equities, among these 49.3% are male head of household while 50.7% are female head of household; beside, 10.7% of the households owned bonds and 12.3% owned mutual funds. Interesting observations can be extrapolated from the bivariate analysis between mutual funds and bonds owned by the households (Table 4).

Table 4: Bonds and Mutual Funds (Values in %)

			Bonds		
			Yes	No	*Total*
Mutual Funds	Yes	*Male*	22.6	27.4	50
		Female	21.7	28.3	50
		Total	44.3	55.7	100
	No	*Male*	2.9	45.5	48.3
		Female	3.1	48.6	51.7
		Total	6	94	100

This table shows the relation between bonds and mutual funds owned by the head of household distinct per gender. For example, 22.6% of the male owns both bonds and mutual funds, while 2.9% owns only bonds.

Other forms of investment are less common such as the postal saving certificates (5.9%), certificates of deposit or repos (2.1%), form of loans in cooperatives (1.6%), and individual investment portfolios (1.4%). Only 0.7% invested in foreign securities. Also, a wider distribution of government bonds is observed for households with head of household as a manager (13.6%), retired (10.6%), contractors and freelancers (15.2%) and is particularly low when the breadwinner is a worker (3.6 %). For other forms of savings accounts, workers are more oriented towards bonds and mutual funds, while a high percentage of managers also invest in the stock market.

The survey shows that there is a gradual replacement of traditional payment instruments such as cash and checks, with most advanced and flexible payment method, like a credit and debit card. The use of new technologies to make payments and manage relationships with intermediaries is extending, but still remains limited to a small portion of the population. 63% of the head of household have a payment card; specifically, 60% are in possession of a debit card, 31% of a credit card and 2.2% are in possession of a prepaid card. The average monthly expenditure made in cash by households amounted to 943 euros, 48% of the total monthly expenditure. Regarding the different payment instruments, Table 5 shows that credit and debit cards are distributed in a similar percentage between male and female.

Table 5: Payment Instruments (Values in %)

Banking relationship	Debit card		Credit card		
			Yes		Total
One bank	Yes	*Male*	44.2	55.8	100
		Female	44.0	56.0	100
		Total	44.1	55.9	100
	No	*Male*	7.2	92.8	100
		Female	9.4	90.6	100
		Total	8.4	91.6	100
Several banks	Yes	*Male*	70.1	29.9	100
		Female	69.1	30.9	100
		Total	69.9	30.4	100
	No	*Male*	29.2	70.8	100
		Female	33.9	66.1	100
		Total	31.3	68.8	100

This table shows the percentage of hold of household distinct per gender that owns credit card and debit card, relating to the relationship with one bank or several banks. For example, 44.2% of the males own credit and debit cards and have a relationship with only a bank.

The share of expenditure is higher in the South and Islands, for families with head of household with low educational qualifications or with less disposable income. The most common way families receive their income is the direct payment on current account (74.5%). The number of payments made over the internet by households is still low; in fact the majority of households do not use computers at home even though they own it. But 8.5% of the households use an evolved form of communication with financial intermediaries such as remote banking. The use of new technology is particularly diffused among households living in the North or in the cities, or with head of households between 30 and 50 years old, highly educated, manager or entrepreneurs.

The analysis of the Italian household structure and the saving provides evidence of how saving choices are markedly different depending on the household structures. The value of expenditure rises with the educational qualification of the head of household and is correlated with the household size. Levels are higher in the North and the Centre (25,770 euro and 26,942 euro respectively) than in the South and Islands (18,654 euro). The saving average is equal to 8,244.8 euro and 25% of the sample save up to 850 euro. Besides, there are cases where saving is negative because of the household deficit status, or equal to zero (Table 6).

Table 6: Income, Expenditure and Saving (Values in Euro)

		Income	Expenditure	Saving
Average		31,892.8	23,648.0	8,244.8
Median		26,216.5	20,400.0	4,711.4
Mode		13,000.0	16,800.0	0.0
Standard deviation		27,275.6	14,322.6	20,344.7
Min value		-8,643.0	40.0	-93,919.4
Max value		811,087.8	246,100.0	776,087.8
Percentile	25	14,500.0	850.0	850
	50	20,400.0	4,711.4	4,720
	75	28,800.0	12,210.2	12,260

This table shows some statistical indicators determined on the income, expenditure and saving.

CONCLUSIONS

The devastating effects produced by the latest market crises have clearly shown the need to analyze the relationship between the saving household formation and the population structure. In fact, the research analyzed the structure of the Italian head of household in 2006 and, through some economic and financial indicators, provides evidence on the saving status in Italy. The sample includes 7,768 households that are

analyzed through some indicators: number in the household, geographic location, citizenship, employment type, educational qualification and income.

Data confirm that the spread of financial assets is linked to household characteristics, and primarily to its economic characteristics. In fact, the use of financial instruments increases with income and educational qualifications. Furthermore, the ability of individuals to make appropriate decisions regarding the management of their finances varies in relation to their degree of financial literacy. The growth of levels of financial knowledge is a topic of great interest to economic institutions and is an essential condition to conscious choices of savings. Households of the South have less financial knowledge than the rest of Italy, but there is no significant difference between the educational qualification of the Northern head of household and that of the Centre of the Italy. With regard to occupational status, households where the head of household is an entrepreneur or self-employed, are financially educated. The university degree of financial literacy is higher for households with head between 41 and 50 years old, the elderly are less financially educated than younger people.

This description makes difficult to define the saving status of the Italian households. It would be interesting to consider the situation of past saving trends, and to analyze a prevision on Italian saving. Future research will examine the relationship between household savings and demographic transitions in Italy through historical data series selected for cohorts related to surveys of the Bank of Italy in the period going from 1995 to 2008. It is interesting to identify the savings profile per age and cohort of the Italian household that can be used to provide an estimation of the impact on Italian households saving in the period 2010-2040.

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Dr. Angela Coscarelli is a Ph.D. in Economic History, Demography, Institutions and Society in the Mediterranean Countries at University of Calabria, She can be contacted at: Department of Economics and Statistics, Faculty of Economics, University of Calabria, via P. Bucci, Arcavacata di Rende, Italy. Email: a.coscarelli@unical.it

Dr. Domenica Federico is a Ph.D. in Banking and Finance at University of Calabria, She can be contacted at Department of Business, Faculty of Economics, University of Calabria, via P. Bucci, Arcavacata di Rende, Italy. Email: dfederico@unical.it

Dr. Antonella Notte is a Ph.D. in Banking and Finance at University of Calabria, She can be contacted at Department of Business, Faculty of Economics, University of Calabria, via P. Bucci, Arcavacata di Rende, Italy. Email: anotte@unical.it

GOING GREEN: INCENTIVES FOR THE ELECTRIC POWER INDUSTRY

Michael Godfrey, University of Wisconsin Oshkosh
Andrew Manikas, University of Wisconsin Oshkosh

ABSTRACT

The electric power industry finds itself at a critical juncture—increased regulation of its emissions combined with a shift in U.S. energy policy to emphasize renewable energy. Industry executives must determine the timing and the extent of their investments in clean technology to preserve the use of coal as a viable option. It is time for those executives to question whether they should make investments merely to comply with new regulations or to go beyond meeting regulations to enhance the industry's environmental (green) performance and reputation. We argue that an industry with a poor reputation in some areas (e.g., emissions) should want to improve its reputation. This could lead to enhanced profits for the industry, reduced pressure from regulatory bodies, and enhanced goodwill in the community. We investigate the company and industry-wide profit incentives for firms in the electric power industry to use clean versus dirty coal technology. Our model provides equations to show the total industry profit as a function of the participation percentage of players in the industry. We conclude with managerial implications and suggestions for future research.

JEL: C02, C61, M10, O21

KEYWORDS: Green, *n*-person prisoner's dilemma, clean coal, tragedy of the commons

INTRODUCTION

As the climate change legislation debate continues, industry faces great uncertainty regarding impending changes in regulations and the investments required to meet those regulations. For example, recently we witnessed attempts at worldwide regulation of greenhouse gases at the Copenhagen Climate Conference at which delegates failed to reach a binding agreement due to disagreements on emissions, payments into a global fund by richer countries, and deforestation reductions (Hawser, 2010). Within the United States, the U.S. Senate considered, but failed to pass, three climate change bills during 2009: the Bingaman-Specter bill, the Lieberman-Warner bill, and the Manager's Amendment to the Lieberman-Warner bill (Richards & Richards, 2009).

The electric power industry, in particular the sector using coal as fuel, appears to be operating under extreme uncertainty regarding greenhouse gas regulation. For example, in October 2007, Kansas denied a permit for a proposed coal-fired plant based on the plant's anticipated carbon dioxide (CO_2) emissions (Sioshansi, 2007). Since 2007, at least 84 projects and $64 billion of investment in coal-fired plants were canceled and/or put on hold in the U.S. due to the uncertainty regarding legislation of greenhouse gases and the lack of a breakthrough in carbon capture and sequestration (Sioshansi, 2010). Victor and Rai (2009) lamented that the financial crisis in the U.S. has killed plans for investment in clean coal technology. However, during this same period of reduced investment in clean coal technology, the U.S. Department of Energy earmarked $16.8 billion toward *renewable* energy (Holden, 2009).

The electric power industry finds itself at a critical juncture—increased regulation of its emissions combined with a shift in U.S. energy policy to emphasize renewable energy. However, coal is still the dominant fuel source, accounting for about 59% of electric power generation (Energy Information Administration, 2007b). Industry executives must determine the timing and the extent of their

investments in clean technology to enable continued use of coal in the electric power industry. It is time for those executives to question whether they should make investments merely to comply with new regulations or to go beyond meeting regulations to enhance the industry's environmental (green) performance and reputation. We argue that an industry with a poor reputation in some areas (e.g., emissions) may want to improve its reputation. This could lead to enhanced profits for the industry, reduced pressure from regulatory bodies, and enhanced goodwill in the community. We investigate the company and industry-wide profit incentives for firms in the electric power industry to invest in clean coal technology. Our model provides equations to show the total industry profit as a function of the participation percentage of players in the industry. The remainder of our paper is organized as follows: a literature review of environmental regulations, technology, and obstacles to industry-wide adoption of clean technology; a model illustrating the payoffs to the electric power industry from using cleaner technology; and managerial implications and suggestions for future research.

LITERATURE REVIEW

In the first section, we provide an overview of environmental regulations affecting the use of coal by the electric power industry. Second, we discuss environmental technology for reducing coal-fired emissions. Third, we elaborate on the benefits of using environmental technology to achieve clean production. Fourth, we present the *n*-person prisoner's dilemma as a model for explaining why electric power firms are not proactive in implementing environmental technology.

Environmental Regulation: The U.S. Department of Energy enacted the 1990 Clean Air Act Amendments to address problems with acid rain caused by sulfur dioxide (SO_2) and nitrous oxides (NO_x) emissions from electric power plants using fossil fuels (Energy Information Administration, 2007a). The 1990 Clean Air Act Amendments established the U.S. Acid Rain Program (ARP) and created the world's first large cap-and-trade program for air pollution (Napolitano et al., 2007). The ARP set a limit (cap) on total SO_2 emissions from electric power generators. Every year, the Environmental Protection Agency (EPA) issues allowances for emissions equal to the cap by using pre-defined formulas. The EPA also auctions a small percent (2.8%) of the allowances each year. Each allowance allows a firm to emit one ton of SO_2. The ARP also required a two million ton annual NO_x emission reduction from projected emissions in 2000, however, electricity power generating companies were provided some flexibility in meeting the caps, e.g., by averaging emission rates at two or more units owned by the same company (Napolitano et al., 2007). Napolitano et al. (2007) attributed the greater than 99% compliance with these caps to rules that are clear and easy to enforce.

More recently, in the United States, we witnessed the consideration and failure of three climate change bills during 2009: the Bingaman-Specter bill, the Lieberman-Warner bill, and the Manager's Amendment to the Lieberman-Warner bill (Richards & Richards, 2009). Each of those bills would have forced caps on and overall reduction in carbon dioxide emissions. For example, the Lieberman-Warner bill would have mandated a 17% decrease in CO_2 by 2025 (relative to 2000 levels). One of the greatest concerns regarding carbon dioxide caps is the lack of viable environmental technology to meet the caps and desired reductions in CO_2. Environmental technology is discussed in the next section.

Environmental Technology: Given the worldwide push to reduce greenhouse gases, investment in environmental management technologies has become an increasingly important topic. Environmental technology falls into two categories: (1) end-of-pipe technology and (2) cleaner production (Frondel, Horbach, & Rennings, 2007). End-of-pipe technology is an add-on to existing technology to reduce pollution, and cleaner production decreases pollution at the source.

Examples of end-of-pipe (abatement) technology are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR) used to reduce NO_x emissions and flue gas desulfurization equipment

(scrubbers) used to reduce SO_2 emissions (Energy Information Administration, 2007a). End-of-pipe technology for CO_2 is referred to as carbon capture and storage (CCS). The primary challenge with CCS is reducing the costs of capturing and storing the CO_2 in geological formations, coal seams, oil and gas bearing seams, and storage options on dry land (Tucker, 2007).

Cleaner production (pollution prevention) technology includes the use of fuel switching and/or blending or using more efficient steam generators. Coal has been ranked into four categories by the Energy Information Administration (Energy Information Administration, 2007a) - lignite, subbituminous, bituminous, and anthracite. Increasing in rank from lignite to anthracite increases carbon content and recoverable heat energy. Furthermore, the EIA notes that using scrubbers to remove SO_2 is estimated to cost $322 per ton. Modifying a high sulfur bituminous coal-fired plant to burn lower sulfur subbituminous coal is estimated to cost $113 per ton of SO_2 removal, which is the least expensive method for SO_2 removal. The EIA (2007a) lists fuel switching and/or blending with a lower sulfur, subbituminous coal, e.g., from the Powder River Basin (PRB) in the western U.S., as the dominant compliance method for achieving SO_2 reductions. However, the use of PRB coal by utilities in the central and eastern U.S. has drawbacks, e.g., higher water content (about 28% water content compared to 8% water content for bituminous coal), lower heating value, and longer transportation routes than local bituminous coal (Labbe, 2009). The transportation of PRB coal and its higher water content lead to higher CO_2 production. The Energy Information Administration (2010) lists the CO_2 of subbituminous coal as 213 pounds of CO_2 per million BTU, compared to 205 pounds of CO_2 per million BTU for bituminous coal. Labbe (2009) recommended a strategy of blending PRB coal with bituminous coal, which results in lowering CO_2 emission and continued compliance with SO_2 and NOx emissions. Other forms of cleaner technology center on the steam generators. For example, Labbe (2009) recommended furnace performance optimization to control for the inferior combustion characteristics of PRB coal. As another example, Giglio and Wehrenberg (2009) described a new steam generator technology called circulating fluidized bed that uses fluidization to mix and circulate fuel particles with limestone as the particles burn at low temperature—the limestone captures the sulfur emissions and the lower temperature reduces the nitrous oxide emissions.

Benefits of Industry-Wide Clean Technology: As discussed by Navarro and Brunetto (2007), quantifying the benefits of green technology is a classic problem when dealing with non-marketed goods such as clean air. One method suggested to deal with this problem is contingent valuation, which estimates the willingness of customers to pay for some benefit, by surveying those customers. Farzin (2003) hypothesized that contrary to claims by industrialists that stricter emissions standards make firms unprofitable, pollution reduction could lead to more firms in an industry and greater industry output because increased environmental quality increases the demand for the good. Deva (2006) referred to the benefits of sustainable good governance policies as "goodwill-nomics" through which a corporation could gain and maintain an edge over its competitors if it acts as a good corporate citizen. In some cases, participants in an industry collaborate in voluntary environmental programs to reduce the burden of regulation upon themselves (Delmas & Keller, 2005).

However, whether or not benefits can be quantified, perception is reality. Therefore, an industry may decide that as a strategic move, it will seek to participate voluntary in the use of cleaner coal. Despite the potential benefits derived from firms cooperating on environmental issues, firms still may fail to act collectively due to individual incentives for increased profit at each firm. This situation is modeled as an *n*-person prisoner's dilemma, as described in the next section.

n-Person Prisoner's Dilemma: The adoption of clean coal technology by all electric power industry players can be modeled as an *n*-person prisoner's dilemma. Suzuki and Muto (2005) described the prisoner's dilemma as follows: each player has two choices—cooperate or defect—and each gains a higher payoff by defecting regardless of the strategy chosen by other players. However, if all players

defect, then they all are worse off than if they had cooperated. Hardin (1968) referred to this problem as the "tragedy of the commons," in which multiple individuals, acting independently and rationally, deplete a shared resource even when it is clear that it is not in anyone's long-term interest. In the context of voluntary environmental programs, the commons would include the industry's reputation (Prakash & Potoski, 2007).

Even if players agree initially to coordinate their actions, e.g., by all using clean coal, the free-rider problem might be difficult to avoid. Some firms may choose to free ride, i.e., to benefit from the actions of other players without sharing the cost of cooperation (Delmas & Keller, 2005). Prakash and Potoski (2007) described another type of free riding, shirking, as firms joining a voluntary club claiming to produce positive externalities, but not living up to their promises.

In the next section, we present a model illustrating the profit curves for each member firm in the industry for using clean versus dirty coal.

MODEL

The model involves two profit curves and *n* players. The lower profit curve is the profit per player at percentage *p* of participation in clean coal technology. The higher profit curve is the profit for a firm at point *p* that moves from participation using less clean, but more cost efficient, coal. The participation curve is increasing due to the electric power generation perception that as more firms use clean coal, the overall industry image and mitigation of future regulation have a positive benefit to the industry.

Variables

n the total number of players in the industry

p the percent of companies in the industry participating in the clean coal program

f(p) the profitability of the *p* percent of companies participating in using clean coal

g(p) the profitability of the *(1-p)* percent of companies still using dirtier coal

subject to the following assumptions:

g(i)>f(i) firm *i* always makes a higher profit by using dirty coal versus clean coal, for a given *p*.

g(0)<f(1) 100% participation *(p=1)* has a greater benefit to the industry than when there is no participation *(p=0)*.

f(p),g(p)>0 expected profits are positive, non-zero.

Each additional firm that participates has a positive impact, but with diminishing returns, to total industry payoff.

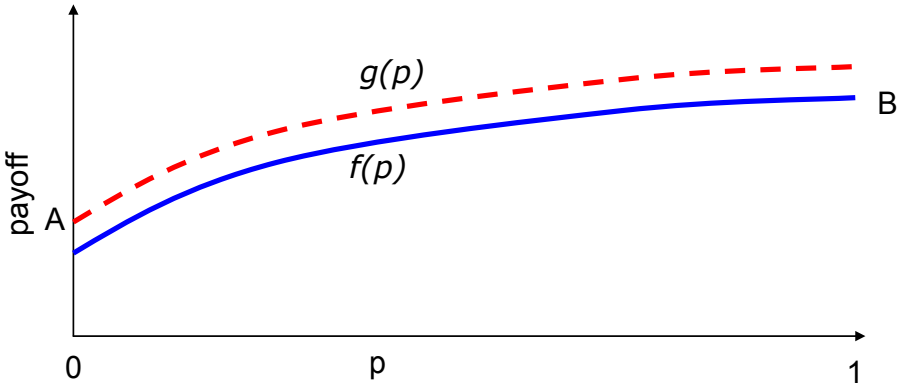
f(p) and *g(p)* are monotonically increasing.

f'(p) and *g'(p)* are positive, but decreasing in probability *p*, $0 \le p \le 1$.

f"(p) and *g"(p)* are negative, indicating that *f(p)* and *g(p)* are strictly concave.

Total industry profit is $f(p)p + g(p)(1-p)$ (1)

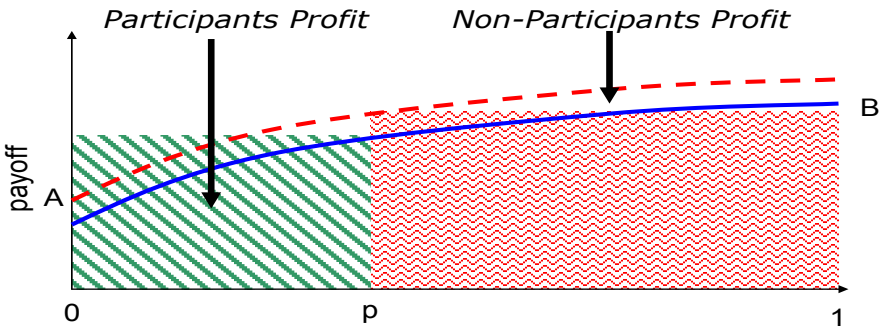
Figure 1: Industry Profit Curves For Participation *f(p)* And Free-Riding *g(p)*



Industry profit curves for participation f(p) and free-riding g(p) for each percent p of the population of companies that participate in the clean coal program.

Each player participating (indicated by the lower profit line) at the percent *p* has an incentive to shirk (i.e., to move to the dashed, higher line), thus making *p* slightly smaller. Then, the payoff for the industry decreases slightly. Each player has this incentive at all percentages *p;* thus, the trend is for *p* to decrease down to 0% participation over time. Hardin (1968) referred to this as the "tragedy of the commons." This indicates that the Adam Smith invisible hand model (Smith & Cannan, 2003), i.e., every firm acting in its own best interest is what is best for all, does not model markets for not-marketed goods such as clean air or brand reputation well. The industry's profits and reputation suffer from individual firms acting in their own self-interest.

Figure 2: Total Profit for the Industry



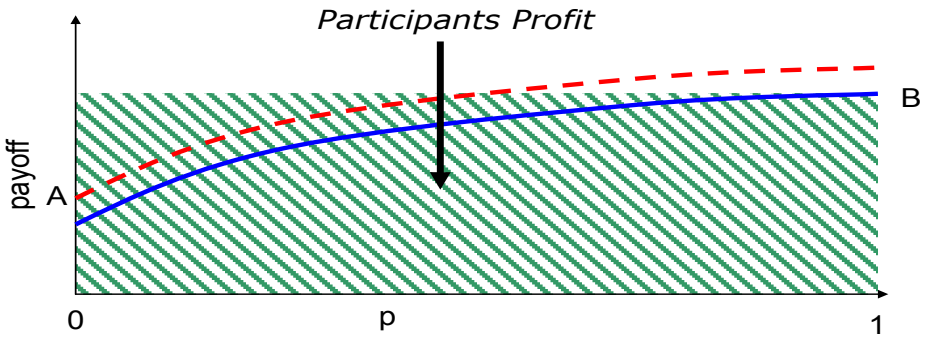
Total profit for the industry is the sum of the two shaded regions above: Participant profit and non-participant profit.

Given our assumptions, point B is the optimal point, maximizing the value of equation (1) for a profit of *f(1)*100% = B*.

When player *i* jumps from *f* to *g*, that player immediately increases its own profit given that *g>f*, and decreases the percent *p* of participating companies. When *p* decreases, the payoffs for all *n* players lower slightly.

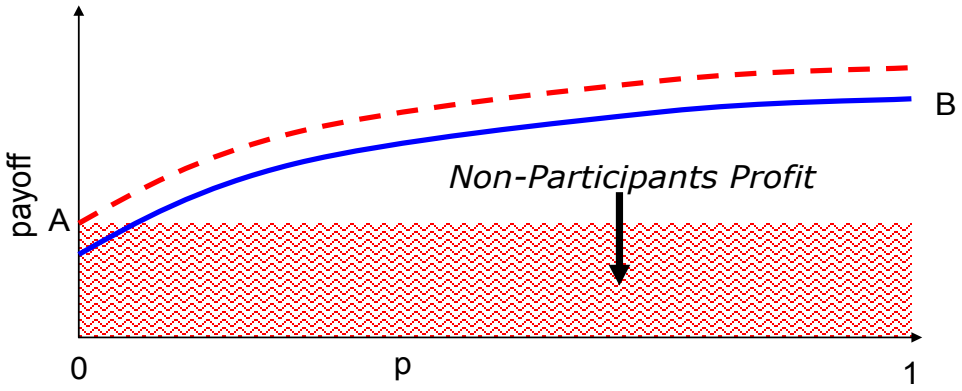
Each player will lose a little profit, and will follow suit and shirk by moving from participation *f*, to non-participation *g*. If all players do not participate, the profit will be at point A, for a total profit of *g(0)*100% = A*.

Figure 3: Participants Profit



In Figure 3, total profit is maximized with p=1, full participation by 100% of the industry players. Profit = B.

Figure 4: Non-Participants Profit



In figure 4, total profit is minimized when all players use dirty coal. Profit = A. This is the result of individual firms acting independently to maximize their own profit, thus moving one at a time from the clean coal f profit to the locally more profitable dirty coal on the g curve.

Because individual firms will seek to maximize their own profit, the solution is an industry-wide regulation imposed within the industry itself or from government. Counterintuitively, a regulation that forces all companies within the industry to comply with the use of clean coal technology would increase the profit of all players, and of course be beneficial to the community, with better air quality.

MANAGERIAL IMPLICATIONS AND CONCLUSIONS

Although participation in the use of clean coal by all members of an industry maximizes the total profit of the industry, the incentive to shirk (i.e., to use dirty coal) is high. An individual firm always improves its individual profit by moving from clean coal to dirty coal. Therefore, without any external incentives, each individual firm, acting as a rational profit maximizer, would use dirty coal.

Prakash and Potoski (2007) recommend that voluntary clubs could reduce shirking by creating monitoring and sanctioning mechanisms. Therefore, the solution is for the industry to adopt binding regulations, or

have regulations imposed upon it by the government or a regulatory agency. Although forced compliance sounds limiting, it actually maximizes the total industry profit while giving external benefits (e.g., cleaner air) to society. It is a true win-win scenario.

The goal of our paper was to present a theoretical model of the benefits to the electric power industry from using clean coal. Our model showed potential payoffs to individual companies and to the electric power industry for varying percentages of participation in using clean coal technology by companies within the industry. By definition, clean coal is more costly to use than dirty coal, so the participation and free riding lines are directionally correct. Regardless of the exact shape of the lines, there will be an incentive for any individual firm to defect. We have found that given the incentive to defect, firms would all choose to defect eventually, leading to a siutation of no participation by the industry. To counteract this, we have proposed industry or government regulation to ensure compliance to the mutual benefit of all industry players.

A limitation of this paper is that we have not collected empirical data from industry members. A good next step would be to meet with industry members to determine how receptive they would be to self-regulation and to discuss which metrics would be most useful to ensure participation (i.e., the use of clean coal technology) by companies in the industry.

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BIOGRAPHY

Dr. Godfrey earned his B.S. in Operations Management and M.S. in Management Information Systems from Northern Illinois University, and his Ph.D. in Production & Operations Management from the University of Nebraska - Lincoln. He is department chair of the Supply Chain & Operations Management department at UW Oshkosh. He is a CFPIM, CIRM, and CSCP through APICS and a CPSM through ISM. Email: godfrey@uwosh.edu

Dr. Manikas earned his B.S. in Computer Science and M.B.A. in Materials and Logistics Management from Michigan State University and his Ph.D. from The Georgia Institute of Technology. Prior to that, he was an instructor for supply chain optimization courses for i2 Technologies. Prior to that, he worked as a management consultant for KPMG Peat Marwick, CSC, and Deloitte Consulting. Email: manikasa@uwosh.edu

DO FEMALE CONSUMERS HAVE HIGHER ETHICAL PERCEPTIONS OF MARKETING?

Robert D. Green, Lynn University
Ghensy Antoine, Lynn University

ABSTRACT

Studies have found either females being more ethical than males or no significant differences. Ethical evaluations and judgments lead to intentions, and behavior. Furthermore, marketing activities create positive, e.g., ethical, or negative, e.g., unethical, perceptions of firms' market offerings. The purpose is to make an initial study of consumers' ethical perceptions of firms' marketing strategy and to clarify prior findings of these somewhat inconsistent results of gender differences toward marketing ethics. Two propositions are presented with each under different cues and intensiveness levels. The conclusion is that under certain conditions – "it depends" – there are differences between male and female consumers' ethical perception of firms' marketing strategy.

JEL: D11; M31

KEYWORDS: Consumer behavior, ethical perceptions of marketing, gender differences of ethics

INTRODUCTION

Marketing, more than any other area in a business, is undoubtedly the most visible to the public. It is the "face" of the organization either in person, e.g., sales representatives, or in actions, e.g., advertising. While marketing provides firms a competitive advantage, it can also create great harm if not meeting the ethical expectations of consumers, e.g., aggressive high pressure selling, deceptive advertising. In a 1961 survey of 1,700 executives, 80% responded that in their industry there were "practices which are generally accepted and are unethical" (Baumhart, 1961, p. 160). More recently, it was found in a 1997 survey of public perception that ethics were "at 5.7 on a 10-point scale, the lowest recorded in the 13 surveys conducted since 1959" (Heubusch, 1997, p. 29). Marketing strategies are critical in creating a positive image and trust, by establishing acceptable practices and relationships, to meeting or exceeding consumers' ethical expectations, and for retaining and attracting new customers.

Consumer studies have generally focused on ethical behavior in such areas as (1) culture (Swaidan, Vitell, Rose and Gilbert, 2006), (2) international markets (Erffmeyer, Keillor and LeClair, 1999), (3) race (Swaidan, Vitell and Rawwas, 2003), (4) age (Vitell, Lumpkin and Rawwas, 1991) and (5) gender (Glover, Bumpus, Sharp and Munchus, 2002). Within this latter affluence of consumer research, gender has attracted much attention and continues to warrant further investigation. Approximately one-half of the studies have found females being more ethical than males with the remaining one-half of the studies finding no significant differences between genders (Ford and Richardson, 1994). Another study reported that of the 21 empirical studies nine found no differences between the genders and 12 where females were more ethical than males under certain situations (Low, Ferrell and Mansfield, 2000). O'Fallon and Butterfield concluded that "there are often no differences found between males and females, but when differences are found, females are more ethical than males" (2005, p. 379). While these studies have been consumer-focused, they have been generally in regard to consumer behavior characteristics, e.g., shoplifting (Moschis and Powell, 1986), ideology (Rawwas, 1996). Only one study was found to be related to marketing strategies, and that was an ethics study of moral norms associated with environmental-friendly packaging (product) as perceived by Danish consumers (Thøgersen, 1999).

Therefore, the primary purpose of this research is to advance the understanding of marketing ethics by examining the literature and determining consumer perception of marketing strategy. A secondary purpose is to analyze this area of consumer marketing ethics from the perspective of male and female shoppers. Hence, are there differences between men and women consumers' ethical perception of firms' marketing strategy? This study presents a review of the literature, the theoretical framework with an analysis of the empirical literature to support this framework, and then a discussion and conclusion of the findings.

REVIEW OF THE LITERATURE

Marketing strategies identify and achieve an unserved or underserved position in the marketplace by segmenting and targeting. Positioning or repositioning may occur with products (goods and services) or retail stores (Kerin, Hartley, Berkowitz and Rudelius, 2006). Segmentation has been a marketing tool for decades in which the segment must be large enough to be profitable (Smith, 1956). Markets may be segmented on the bases of geographic, demographic, psychographic, and behavioral methods (Kotler and Armstrong, 2008) to target a specific homogenous consumer group.

Targeting is merely the selection of specific segment in a demographic segment, e.g., gender (males or females). Consumer product manufacturers, services providers, and retailers "must decide on a value proposition – on how it will create differentiated value for targeted segments and what position it wants to occupy in those segments" (Kotler and Armstrong, 2008, p. 203). Jack Trout reminds marketers of Walter Landor's statement that "products are created in the factory, but brands are created in the mind" (2005, p. 28) or perceptions. Retail stores, products or particular brands, therefore, are created by having the appropriate marketing mix – product, price, place, promotions (McCarthy, 1960) – to support (connected with) the positioning strategy in the minds of the target market in comparison to competitors (Kotler and Armstrong, 2008). Furthermore, these views, or these "perceptions can vary widely among individuals exposed to the same reality" (Kotler and Keller, 2006, p. 186), e.g., male or female ethical perceptions of marketing strategies or specific marketing activities (Schneider, 1983/1984). Therefore, strategies are based on segmenting, targeting, and positioning that may influence the perception of marketing ethics.

In order to successfully implement a marketing strategy (marketing mix) and a favorable position, firms must know consumers' needs, wants and behavior with the offerings as to what is acceptable or not, including ethical considerations. From the positioning strategy for a target market, those consumers make a judgment which is "typically represented as good-bad, favourable-unfavourable" (Bagozzi, Gürhan-Canli and Priester, 2002, p. 5) using evaluative criteria of "standards and specifications to compare different products and brands" (Blackwell, Miniard and Engel, 2006, p. 80). A postive, e.g., good or favorable, judgment leads to the intention that "should always predict behavior, provided that the measure of intention corresponds to the behavioral criteria" (Ajzen and Fishbein, 1980, p. 50), e.g., the consumers' perception of the marketing strategy and the associated ethical considerations (Smith, 1995).

Marketing ethics research has evolved through three primary eras. First, until 1985 there were empirical studies with the focus on marketers and their ethical responsibilities and decision-making (Levy and Dubinsky, 1983; Sturdivant and Cocanougher, 1973) that were based on ethical theories from philosophy (Hunt and Vitell, 1986). Second, between 1985 and 1990 major marketing theories were developed (Ferrell and Gresham, 1985; Ferrell, Gresham and Fraedrich, 1989; Hunt and Vitell, 1986) that enable "a theory of marketing ethics to guide empirical research and analysis" (Hunt and Vitell, 1986, p. 15). Finally, since 1990 consumer marketing ethics of the buyer-seller dyad became much more prevalent (Fullerton, Kerch and Dodge, 1996; Vitell and Muncy, 1992; Vitell, Singhapakdi and Thomas, 2001).

Certain ethics theories, e.g., Bartels (1967) in marketing and Trevino (1986) in management, were advanced and have influenced the current marketing ethics theories. For example, Ferrell and Gresham "assume that exigencies of the firm being the marketer into contact with situations that must be judged as ethical or unethical (right or wrong)" (1985, p. 88), or situations based more on the organization rather than the consumer. They proposed a "contingency framework" that begins with the influence from the social and cultural environment which may present an ethical issue or dilemma, e.g., advertising deception, falsifying research data, price collusion, bribes, bid rigging. This issue or dilemma impacts the individual decision making that results in his/her evaluation and behavior as being ethical or unethical.

In addition to the ethical issue or dilemma, individual factors, significant others, and opportunities impact individual decision making. Individual factors include knowledge, values, attitudes and intentions; significant others are differential associations and role-set configuration; and opportunity includes professional codes, corporate policy and rewards/punishment. Individual factors, significant others, and opportunity are influenced by the evaluation of behavior but individual factors are also influenced by the individual decision making (two- or each-way influence). Therefore, the core relationships to individual decision making are from ethical issue or dilemma, individual factors, significant others and opportunity. Ferrell and Gresham state that the theory is "process oriented, with events in a sequence causally associated or interrelated ….. (with) a start toward developing a comprehensive framework of ethical decision making" (1985, p. 95).

A second marketing ethics theory was advanced in the late 1980s. Hunt and Vitell (1986) developed a positive "General Theory of Marketing Ethics" that was supported by prior empirical research. In this theory, the environment (cultural, industry, organizational) and personal experiences influence the (1) perceived ethical problem, alternatives and consequences, (2) deontological norms, (3) probabilities and desirability of consequences, and (4) importance of stakeholders. Deontological norms and perceived alternatives impact deontological evaluation, while probability and desirability of consequences influence teleological evaluation. Ethical judgments are determined from deontological and teleological evaluations which lead to intentions. In addition, teleological evaluation may not only lead to ethical judgments but directly to intentions.

Furthermore, intentions results in behavior but behavior is also influenced by situational constraints. Behavior, then, leads to the actual consequences that impacts personal experiences. Hunt and Vitell argue, and important to this study is the contention that "with general theories in consumer behavior …..., ethical judgments impact on behavior through the intervening variable of intentions" (1986, p. 9). Therefore, the core relationships with these components towards intentions are the deontological norms influencing the deontological evaluations, and the consequences and importance of stakeholders influencing the teleological evaluations, which in turn impact ethical judgments.

Ferrell, Gresham and Fraedrich (1989) attempted to synthesize the Ferrell and Gresham (1985) and Hunt and Vitell (1986) theories. However, while they are compatible and greater effort for micro aspects, the synthesis remained more of macro orientation of marketing ethics. Therefore, the General Theory of Marketing Ethics is "the only (marketing ethics theory) that can be applied to individual contexts such as consumer behavior" (Vitell, Singhapakdi and Thomas, 2001, p. 155).

With the Hunt-Vitell model (1986, 1993) as the key theory for this study, other theories are necessary to explain the differences between male and female perceptions of marketing activities that have not been before proposed as well as a gap in the literature. Two primary research areas – business and moral development – pertain to this study. First, the business literature supports the role of intensity in management ethics decision making (Jones, 1991) and in marketing (consumer behavior) (Meyers-Levy, 1989). Second, additional aspects, however, of gender's evaluation, judgments and intentions of ethical perceptions is needed. There are different determinants of moral development, one for males (Kohlberg,

1971) and another for females (Gilligan, 1982/1993). The following sections synthesize the theoretical and empirical literature in these areas to explain and better understand the differences between males and females perceptions of marketing.

THEORETICAL FOUNDATION

The intent of this conceptual research is to determine relationship differences between male and female ethical perceptions resulting from marketing strategies. Marketing strategy, as the marketing mix, is well established, researched and practiced for over five decades (Kotler and Keller, 2006; Smith, 1956). Additional discussion is warranted as to the remaining two theories. First, the General Theory of Marketing Ethics (Hunt and Vitell, 1986) is further analyzed. Moreover, an integration of this theory with an ethical decision-making model that includes moral intensity is presented (Jones, 1991). Second, a theory of moral development that establishes a hierarchy of values with six moral stages is discussed (Kohlberg, 1971). However, during the 1980s as with marketing ethics, an extremely different view of these values and a new understanding of moral development was advanced, e.g., females' motives, moral commitments and psychological growth as to what is important in their lives (Gilligan, 1982/1993).

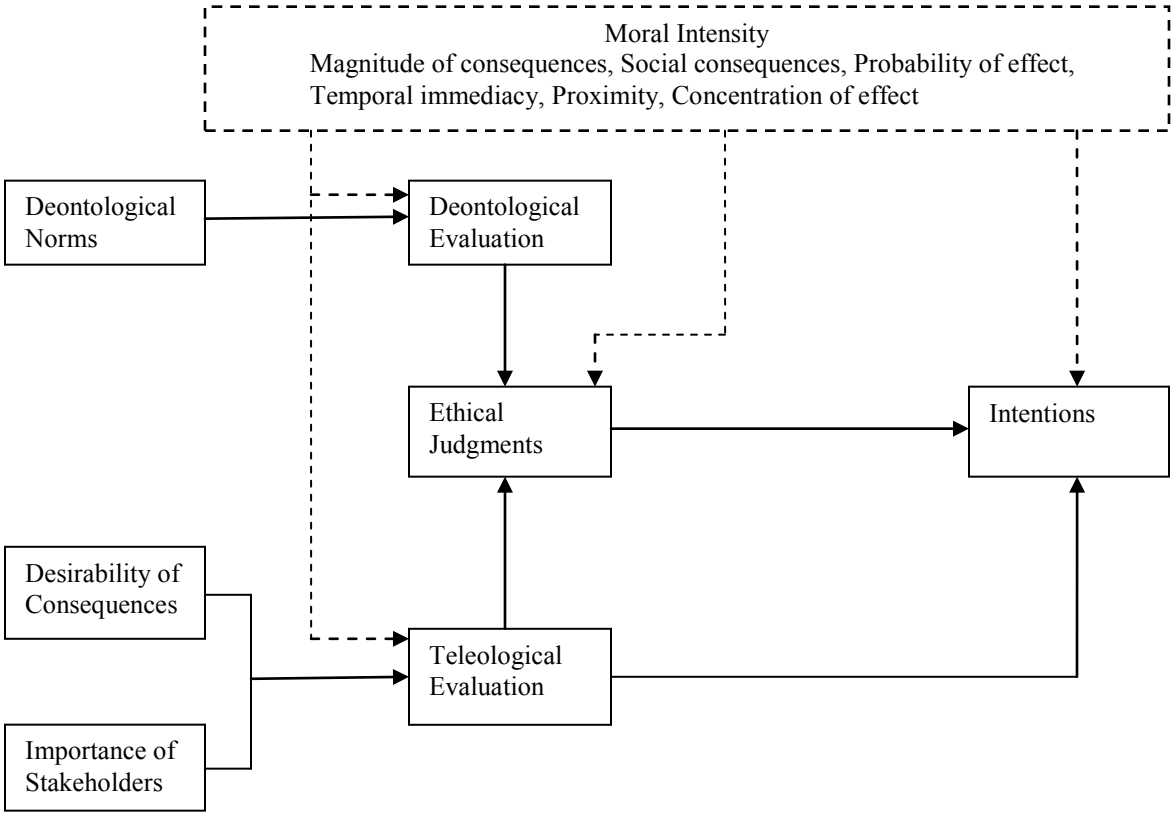
General Theory of Marketing Ethics and Moral Intensity

The core relationships of the Hunt-Vitell model are the basis for this study. Therefore, the focus is on the (1) deontological norms and deontological evaluations on ethical judgments relationship and (2) desirability of consequences, importance of stakeholders, teleological evaluations relationships on ethical judgments or on intentions relationship (Hunt and Vitell, 1986). See Figure 1 with the solid lines. Judgments (Bagozzi, Gürhan-Canli and Priester, 2002; Blackwell, Miniard and Engel, 2006) and intentions (Ajzen and Fishbein, 1980) were discussed above, except in this theory these constructs are in an ethical context.

Once the consumer is exposed to and identifies an ethical issue, two ethical evaluations occur – deontological and/or teleological evaluations. Hunt and Vitell (1986) state that a consumer may use one or both evaluations. The primary differences between the two are deontological evaluations are based on rule norms and teleological evaluation on the situation, e.g., the consequences, stakeholder considerations. Specifically, deontological relies on the particular actions and the "good" *over* "evil" to make evaluations. For them, the rules to live by may be the "golden rule" or a matter of a principle of justice. Deontological ethics is idealism, or the acceptance of universal moral principles. On the other hand, teleological is highly concerned about self, e.g., consequences, and the affect on others, e.g., importance of stakeholders, that results in having *greater* "good" than "bad" to make evaluations. Teleological ethics is relativism, or the rejection of universal moral principles, and associated with utilitarian, "the greatest good for the greatest number". Therefore, these differences in the two evaluations, e.g., rule versus situation based, would likely result in different ethical judgments. Furthermore, the Hunt and Vitell theory has been empirically tested using the core relationships (Mayo and Marks, 1990) and for investigating consumer behavior, marketing ethics, and gender (Rawwas, 1996).

Moreover, the Issue-Contingent Model states that particular moral intensity factors (variables) influence ethical behavior (Jones, 1991). Jones uses, as a basis, Rest's (1986) four stage model – recognize moral issue, make moral judgment, establish moral intent, and engage in moral behavior. This moral reasoning process is similar to those developed by Hunt and Vitell (1986), e.g., see Jones (1991), Figure 1, page 370. Jones argues that "moral intensity focuses on the moral issue" and "is likely to vary substantially from issue to issue, with a few issues achieving high levels and many issues achieving low levels" (Jones, 1991, p. 373) in which this intensity influences each of the four stages.

Figure 1: Core Relationships from the General Theory of Marketing Ethics and Moral Intensity from the Issue-Contingent Model



Sources: Adapted from Shelby Hunt and Scott Vitell (1986) A General Theory of Marketing Ethics, Journal of Macromarketing, 8(Spring), p. 8 and Thomas M. Jones (1991) Ethical Decision Making by Individuals in Organizations: An Issue-Contingent Model, The Academy of Management Review, 16(2), p. 370. This Figure depicts the core relationships of the General Theory of Marketing Ethics with factors influencing moral evaluation, judgments and intentions (solid lines). The moral intensity components from the Issue-Contingent Model have been integrated with the General Theory of Marketing Ethics to show the influence on the evaluation, judgments and intentions (dash lines).

Moral intensity includes the magnitude of consequences, social consequences, probability of effect, temporal immediacy, proximity and concentration of effect. See Figure 1 with the dash lines. These components are characteristics of a moral issue and have an interactive effect. Furthermore, this effect is expected to increase "if there is an increase in any one (or more) of its components, and it is expected to decrease if there is a decrease in any one (or more) of its components, assuming the remaining components remain constant" (Jones, 1991, p. 378).

Jones (1991) points out that people use external cues when moral issues are low and rely on self-perception processes when such issues are higher. With such stimuli, "high-intensity moral issues are salient and vivid (and) they will be more likely to catch the attention of the moral decision maker and will be recognized as having consequences for others, a vivid component of recognizing moral issues" (Jones, 1991, p. 381). Jones concludes, "The relative importance of personal factors and situational factors might vary considerably, from issue to issue. Similarly, issue characteristics could alter the balance of teleological and deontological considerations in the moral evaluation stage of Hunt and Vitell's (1986) general theory model of marketing ethics" (1991, p. 391). The Issue-Contingent Model has been empirically tested (Loo, 2003; Singhapakdi, Marta, Rallapalli and Rao, 2000; Weber, 1996).

Moral Development

During the 1960s and 1970s, a cognitive development approach was evolving to further understand moral judgment (Kohlberg, 1971, 1981a, 1981b). This approach as applied to cognitive structure is the "rules for processing information or for connecting experienced events" (Kohlberg, 1971, p. 349) and assumes "that basic mental structure is the product of the patterning of the interaction between the organism and the environment rather than directly reflecting either innate patterns in the organism or patterns of events (stimulus contingencies) in the environment" (p. 350). Kohlberg finds that "the rules of the game" influences moral decision making of the situation or task at hand ("the interaction between the organism and the environment"). These "rules of the game" are based on the theory of justice. Kohlberg states that his "philosophic conception of moral judgment has been based on principles of justice and has depended upon the theories of Kant and Rawls (1971) to justify the principles of the highest stages (of moral judgment)" (1981a, p. 7). As applicable to the General Theory of Marketing Ethics (Hunt and Vitell, 1986) Kohlberg theory is deontological (idealism, universal moral principles) which is based on rules and justice.

Kohlberg (1981a, 1981b) has used longitudinal studies primarily in schools and prisons to observe and analyze findings in developing the six stages of moral judgment. See Table 1 for the three levels with two stages in each level as well as a brief description for each stage. Kohlberg (1981b) has found that most people in the United States reason at the conventional level (Stages 3 and 4). For example, Stage 3 includes people who trust others, care about other group members and abide by shared expectations. At Stage 4, individuals share responsibilities, make their opinions known and have a concern for the welfare of and harmony with others (Kohlberg, 1981a). Kohlberg states, "As far as we can ascertain all Stage 6 persons must have been killed in the 60s like Martin Luther King" (1981a, p. 34).

However, while Kohlberg's specific theory of moral development is widely used in research and education, it nevertheless has been questioned and challenged (Gilligan, 1982/1993). Gilligan observes that a female's "phrase 'it depends' has been repeated by many women who also resist formulatic solutions to complex human problems" (1982/1993, p. xxi). She has found that development theories, e.g., by Kohlberg (1971, 1981a, 1981b), have been viewed and built on the observations of men's lives, and lacked the aspects of women's development. She establishes "two voices" – one autonomous (men) and the other connected (women). For example, Gilligan (1982/1993) finds that (1) masculinity is defined through separation while femininity is defined through attachment (p. 9); (2) women do not conform to the standards of psychological expectations (p. 15) with their sensitivity to the needs of others and the assumption of responsibility for taking care (p. 16); and (3) women's criterion for judgment is when the morality of action is assessed …. in terms of the realities of its intention and consequence (p. 83).

On the other hand, men use the approach that "the absolutes of truth and fairness (are) defined by the concepts of equality" (Gilligan, 1982/1993, p. 166). Gilligan concludes,

> In view of the evidence that women perceive and construe social reality differently from men and that these differences center around experiences of attachment and separation, life transitions that invariably engage these experiences can be expected to involve women in a distinctive way. And because women's sense of integrity appears to be entwined with the ethic of care, so that to see themselves as women is to see themselves in a relationship of connection, the major transitions in women's lives would seem to involve changes in the understanding and activities of care. (1982/1993, p. 171)

Table 1 : Six Stages of Moral Judgment

Level	Stage	Content
Preconventional	Stage 1 Punishment and Obedience	Right is literal obedience to rules and authority, avoiding punishment, and not doing physical harm.
	Stage 2 Individual Instrumental Purpose and Exchange	Right is serving one's own or other's needs and making fair deals in terms of concrete exchange.
Conventional	Stage 3 Mutual Interpersonal Expectations, Relationships, and Conformity	The right is playing good (nice) role, being concerned about the other people and their feelings, keeping loyalty and trust with partners, and being motivated to follow rules and expectations.
	Stage 4 Social System and Conscience Maintenance	The right is doing one's duty in society, upholding the social order, and maintaining the welfare of society or the group.
Postconventional	Stage 5 Prior Rights and Social Contract or Utility	The right is upholding the basic rights, values, and legal contracts of a society, even when they conflict with the concrete rules and laws of the group.
	Stage 6 Universal Ethical Principles	This stage assumes guidance by universal ethical principles that all humanity should follow.

Source: Lawrence Kohlberg (1981b), The Philosophy of Moral Development, San Francisco: Harper & Row, p. 409-412. This table shows the three levels, six stages and brief description of each stage of Kohlberg's moral development theory.

Therefore, moral development theories show further relationship to and use for the General Theory of Marketing Ethics (Hunt and Vitell, 1986). Based on Gilligan's finding women "with the ethic of care", "a relationship of connection" and "the realities of (the action's) intention and consequence" would support having teleological ethics (relativism), or "it depends". Men with views of "separation" (independent) and "the absolutes of truths and fairness" would support having deontological ethics (idealism). These theories have been empirically tested in marketing with the Selectivity Model (Meyers-Levy, 1989).

Empirical Evidence

Gilligan's "ethic of care" is applicable to business ethics (White, 1992). White states that "despite the growing number of discussions of differences between men and women in business, Gilligan's ideas have been largely ignored in this context" (1992, p. 51). He points out that Kohlberg's findings were based on rules, laws and principles while Gilligan's on helping others, goodness, and obligations and responsibilities to others. White further analyzes the findings from two business studies, one in marketing, in which women were found more ethical than men. White concludes that in business "many women do approach and resolve ethical dilemmas as Gilligan claims that they do" (1992, p. 57). Marketing studies have results associated with the differences between Kohlberg and Gilligan views of moral reasoning, yet these studies have not focused on, nor have been analyzed and explained in such method.

According to the Selectivity Model, males and females process information differently (Meyers-Levy, 1989), e.g., marketing mix examples of product safety, advertising messages, price disclosures and restrictive distribution. Males use selective, or discrete information processing that is heuristic, schematic. On the other hand, females use more comprehensive, or continuous processing that is effortful, detailed elaboration. Furthermore, Meyers-Levy and Maheswaran (1991) confirmed that females use greater detailed elaboration of information than males, but this difference disappeared when recognition versus recall tasks (condition, situation factors) and/or cue incongruity (information factors) stimulated both genders.

Meyers-Levy and Maheswaran (1991) study offers a greater understanding of differences in gender moral reasoning that results in distinctive male-female buying decisions, e.g., differences appear at a moderate level of intensity and dissipates at a high level. Women as compared with men have a lower threshold for elaborating message cues (Darley and Smith, 1995; Meyers-Levy and Maheswaran, 1991). Therefore, females make greater use of cues, e.g., perceptions of ethical evaluations leading to judgments, whereas men use heuristic, rule-based judgments in decision making. Furthermore, similar cue situations occur in the level of involvement as well as intensity in judging (evaluation) and making purchase decisions, e.g., magnitude, consequences, effect (Jones, 1991). For example, consumer behavior studies find that for lower priced products, e.g., toothpaste, there is a low level of involvement, an indication of intensity level, while for higher priced products, e.g., an automobile, there is high involvement (Blackwell, Miniard and Engel, 2006; Petty, Cacioppo and Schumann, 1983). As a result, with high involvement, high intensity of an automobile purchase there would be expected that women would be more critical, discriminating (sensitive) of the sales representative or advertising message ethical cues than men.

Weber (1996) studied the nature of harm, magnitude of consequences (moral intensity) and moral reasoning. The nature of harm was physical with the Heinz dilemma (possibility of a spouse death) and economic by the Roger dilemma (possibility of unethical cover-up of an illegal transaction). The harm was manipulated in a low and high level of consequences. Moral reasoning was evaluated by a scale determining the stages of Kohlberg's moral judgment. As expected, the study found that physical harm evoked higher stage of moral reasoning than economic harm with increased magnitude of consequences. While gender results were not reported, the study provides an understanding of the differences in and relationship between the nature of harm, and the level of moral intensity and reasoning.

In a perception of ethics study, Singer (1996) compared managers and the general public judgments. Using three ethical decision making scenarios, the participants evaluated situations of being financially harmed and benefited. The judgments were assessed based on overall ethicality, magnitude of consequence, social consensus, likelihood of action, likelihood of consequence and perceived fairness. Overall, both groups (managers and the public) made similar judgments about ethicality, moral intensity of the issues and fairness. However, for the magnitude of consequences ("How would you estimate the seriousness of the consequences of the decision?") was the major determent for the general public's ethical judgment while for managers it was social consensus ("How likely is it that there is a general consensus among people that the decision is unethical?"). Clearly the results show that differences in perceptions with the public's greater concern about the magnitude of the consequences of an ethical judgment and by managers' being more interested by being "guided by their peers and to stay in line with prevailing business practices" (Singer, 1996, p. 474). The study did not report if the general public (males or females) had greater concern about the consequences.

In a study that includes all six components of moral intensity, Tsalikis, Seaton and Shepherd (2008) used two scenarios with 350 non-student respondents. The mechanic and dentist ethical situations were developed to include the six components and to be germane to the participants. Each respondent completed evaluations and made judgments using a 9-point scale (unethical-ethical). The results indicated clearly that the three most important components influencing ethical perceptions were probability of effect, magnitude of consequences and temporal immediacy. Social consensus was a very distant fourth in importance. While again this study does not indicate differences between genders, it nevertheless is the only one to test all components and to indicate consumers' moral intensity of ethical situation perceptions.

Consumer ethics research has focused on the behavior of the customers (e.g., Rawwas, 1996; Vitell, Lumpkin and Rawwas, 1991; Vitell, Singhapakdi and Thomas, 2001), not the ethical perceptions of marketing activities. For example, Rawwas used an Austrian consumer sample to determine such ethical situations as "changing price-tags on merchandise in a store," "lying about a child's age to get a lower

price," "not telling the truth when negotiating the price of a new automobile" (1996, p. 1017). In a study of elderly consumers, Vitell, Lumkin and Rawwas asked such ethical dilemmas as "drinking a can of soda in a supermarket without paying for it," "getting too much change and not saying anything," "returning merchandise after trying it and not liking it" (1991, p. 369). However, using the Hunt and Vitell theory (1986) Vitell, Singhapakdi and Thomas (2001) did test ethics position (idealism and relativism) and certain marketing situations. These included coupon proneness (e.g., "redeeming coupons makes me feel good"), consumer alienation from the marketplace (e.g., "there is little that people like myself can do to improve the quality of the products they sell"), value consciousness (e.g., "I am very concern about low price, but am equally concerned about product quality") (Vitell, Singhapakdi and Thomas, 2001, p. 175-176). However, the focus of the study was, "Is consumer behavior in ethically questionable situations guided by principles or by consequences?" (Vitell, Singhapakdi and Thomas, 2001, p. 155), not the ethical perception of marketing activities.

While these, and many other similar consumer ethics studies are important to businesses in general and to marketers in particular, they do not identify the firms' marketing activities that consumers perceive as being ethical (acceptable) and those as unethical (unacceptable). Studies (e.g., Singer, 1996) have shown that there are intensity differences as to what is ethical or not between managers and consumers. For consumers drive the success of businesses in terms of revenue and profits, it is their perceptions of fairness and value that are vital. Furthermore, there are significant differences between male and female perceptions, e.g., loyalty, brand equity (Chen and Green, 2009; Green and Chen, 2010), and as to what is ethical, e.g., the "two voices" (Gilligan, 1982/1993). Therefore, we posit based on the General Theory of Marketing Ethics (Hunt and Vitell, 1986) that differences between men and women consumers (Chen and Green, 2009; Green and Chen, 2010) will vary as to the moral intensity (Jones, 1991) and their ethical perception (Gilligan, 1982/1993) of marketing activities.

Meyers-Levy and Sternthal found that women "have a lower threshold for elaborating message cues and thus made greater use of such cues in judging products" (1991, p. 84). Moreover, females change information processing strategies (evaluations) at different levels of cue intensity that creates differences in perceptions (judgments) (Darley and Smith, 1995). According to the Selectivity Model (Meyers-Levy, 1989), this would result with females as "comprehensive information processors who consider both subjective and objective product attributes, and respond to subtle cues" (Darley and Smith, 1995, p. 41). This is expected to result in that females will identify an ethical problem situation at lower intensity level (threshold) than males. Therefore, we propose,

P_1 Male and female consumers have significantly different ethical views of marketing strategies associated with moderate levels of cue intensity.

However, at low and at high salient levels of cue intensity and involvement, there are no differences between male and female evaluations and judgments. Meyers-Levy and Sternthal determined "when manipulations prompted attention to the message cues that was either above or below both genders' threshold for elaboration, no differences in judgments were found. …. In general, gender differences seem most likely to emerge when the average of the task demands is moderate" (1991, p. 93). Therefore, "as risk increased, females shifted from responding equally to objective and subjective claims to favoring objective claims" (Darley and Smith, 1995, p. 53). As a result, we propose,

P_2 Male and female consumers do not have significantly different ethical views of marketing strategies associated with low and high level of cue intensity.

DISCUSSION

Hunt and Vitell (1986) recognized that to test the model an individual must perceive a situation as having ethical content. They state, "This perception of an ethical problem situation triggers the whole process depicted by the model. If the individual does not perceive some ethical content in a problem situation, subsequent elements of the model may not come into play" (Hunt and Vitell, 1986, p. 7). Moreover, the authors encourage the use of scenario techniques, as being widely used in ethics research. While their examples are for marketers' ethics, the same approach can be adapted for the consumers' perceptions (Vitell, Singhapakdi and Thomas, 2001) of specific marketing activities, e.g., three scenarios related to the buyer-seller dyad (sales representative and the customer).

In a study of "marketing strategies for the ethical era," Smith (1995) asks, what constitutes ethical marketing practices? He established a marketing ethics continuum that ranged from caveat emptor (let the buyer be aware) that included such measures as profit maximization and subject to legal constraints and anchored on the other end with caveat venditor (let the seller be aware) which was customer satisfaction. From the literature, Smith identified several ethical issues and classified them according to the appropriate marketing mix elements of product, promotions (marketing communications), price, and place (channels of distribution). Select examples are shown in Table 2. Using the buyer-seller dyad mentioned by Hunt and Vitell (1986) and the personal selling example of high pressure selling by Smith, at least three scenarios may be developed.

To further develop the scenarios and operationalize the study that tests the propositions, the focus should be on the level of cues and the moral intensity. First, females have lower thresholds of cues that may not be recognized by males (Meyers-Levy and Sternthal, 1991). Therefore, the ethical situations should range from extremely low to high to identify perceptions and any changes in the perceptions of ethical content, e.g., low, moderate, high levels of cue intensity. Second, while the moral intensity components of probability of effect, magnitude of consequences and temporal immediacy have been found as the most important, all six should be included (Tsalikis, Seaton and Shepherd, 2008) since this study would be for a different purpose and with a different sample. As Hunt and Vitell suggest, "Ultimately, respondents would be asked to identify the degree to which they believe each alternative is ethical (Ethical Judgment) and the likelihood in a probability sense that they would actually adopt each alternative (Intentions)" (1986, p. 11).

From the theoretical literature, males with deontological ethics and females with teleological ethics have different perceptions (Gilligan, 1982/1993) of the marketing strategy (marketing mix) which influences their ethical judgments and intentions (Hunt and Vitell, 1986). Teleological evaluations are influenced by consequences and the importance of stakeholders (care considerations for others), while deontological evaluations are influenced with deontological norms, e.g., rules, justice (the Golden Rule). However, individuals do "use both deontological and teleological evaluations in resolving their ethical problems" (Hunt and Vitell, 1986, p. 16).

We argue, based on the literature, that as the intensity increases to a moderate level, females use more elaboration in their evaluations (Meyers-Levy and Maheswaran, 1991) and they rely more strongly on the consequences of the ethical situation, or teleological evaluations. That is, an imbalance occurs strongly favoring teleological evaluations, or favoring teleological than deontological as the intensity increases to moderate level. Hence, this much greater difference results from female consumers having a more interest for others and the situation and male shoppers having a more interest in rules and justice that takes on teleological and deontological evaluation characteristics, respectively. This appears to be consistent, at least in part, with Hunt and Vitell's (1986) position that people use both deontological and teleological evaluations.

Table 2 : Select Ethical Issues in Consumer Marketing

Marketing Mix Elements	Ethical Dilemma
Product Policy	Product safety
	Service product delivery (e.g., rotelike service, employee respect for customers)
Marketing Communications	
Personal Selling	Questionable/psychological sales techniques (e.g., high-pressure selling)
	Overselling (e.g., overestimating customer's problem, overpromising product performance, over specifying product requirement)
Advertising	Deceptive/misleading advertising (including puffery that amounts to "soft core deception")
	Advertising to children
Sales Promotion	Deceptive/misleading sales promotions
	Bait-and-switch
Direct Marketing	Misrepresentation of products (i.e., misleading advertising via direct mail, etc.)
	Violations of consumer privacy (e.g., unauthorized use of mailing lists)
Pricing Policy	Deceptive/misleading pricing (e.g., non-unit pricing, absence of item marking in retail stores, price advertising that fails to disclosure full price through disclaimers, retailer "high-low" pricing)
	Unfair practices (i.e., price too high, can occur when price is signal of quality, price discrimination, nonprice competition, price gouging, limited consumer ability to pay [e.g., life-saving drugs}, consumer does not receive value expected {e.g., "downsizing}, price fixing)
Channels of Distribution	Discrimination (e.g., e.g., "redlining," selective direct marketing)
	Restricted availability (e.g., supply shortages)

Source: N. Craig Smith (1995). Marketing Strategies for the Ethics Era. Sloan Management Review, 36(4), p. 94
This table shows the four marketing mix elements with two ethical dilemmas examples for each. Marketing communication is further measured with the four promotional elements and two ethical situations for each of them.

Furthermore, when differences do occur between genders' perceptions of marketing ethics, the female teleological beliefs (consequences and/or care about others) are from greater elaboration and are stronger than the male deontological beliefs (rules and/or justice) at moderate level of cue intensity. This indicates that women are more ethical than men. However, as cues decrease (or increase) from moderate intensity, females use less (or more) elaboration information processing strategies and males use less (or more) objective, heuristic methods. Goolsby and Hunt conclude that "cognitive moral development suggests a key individual characteristic influencing the ability of people to process the multiple norms and consequences effectively to reach an appropriate ethical judgment" (1992, p. 66). Therefore, there should be expected an "appropriate ethical judgment," or differences between men and women consumers' ethical perception (norms and consequences) of firms' marketing strategy under the condition of moderate levels of cue intensiveness.

Certain implications and considerations are important from this study and to the need for new direction for empirical consumer ethics studies. First, prior marketing ethics studies lack consumers' perceptions of firms' marketing strategies. Public opinion of business ethics is at the lowest level since the 1950s (Heubusch, 1997). At a time when the marketing concept of "creating, delivering, and communicating superior customer value" (Kotler and Keller, 2006) to a target market, ethics offer a competitive advantage. This study has advanced the importance of such perceptions of marketing ethics and strategies (Smith, 1995), and market opportunities (Ferrell, Hartline and Lucas, 2002). Second, marketing ethics influence the satisfaction and loyalty of consumers. Using a marketing ethics continuum of caveat emptor and caveat venditor, Smith (1995) identified customer satisfaction as the latter. Satisfaction is the positive perception and experience of a purchase (Sheth and Mittal, 2004), while loyalty is the intent or commitment to repurchase a product (good or service) (Oliver, 1999). Therefore, marketing ethics may act as a mediating factor between marketing strategies, customer satisfaction and loyalty.

CONCLUSION

This study has contributed to a better understanding of ethical perceptional differences between male and female consumers. The differences begin with identification of an ethical problem (Hunt and Vitell, 1986, 1993). Such ethical situations may result from the type and level of intensity (Jones, 1991). However, according to the Selectivity Model, males and females process information differently (Meyers-

Levy, 1989) that depends on the intensity or level of message cues (Meyers-Levy and Sternthal, 1991). One explanation of this difference in ethical perceptions is moral development (Gilligan 1982/1993; Kohlberg, 1971). However, a limitation of this study is the context in which it could be empirically tested. For example, while the propositions may be tested for retail stores or for specific products (brands) perceived marketing ethics, no consideration has been concluded as to similar or different results between the two contexts. Furthermore, no specific determination is considered as to different marketing mix elements, just suggestions such as high pressure personal selling (Hunt and Vitell, 1986; Smith, 1995). Moreover, this study, however, has provided opportunities as to research strategies to empirically test the propositions, e.g., scenario techniques (Hunt and Vitell, 1986; Vitell, Singhapakdi and Thomas, 2001), in various contexts.

Almost one-half of the studies have found females being more ethical than males with the remaining one-half of the studies finding no significant differences between genders (Ford and Richardson, 1994). O'Fallon and Butterfield concluded that "there are often no differences found between males and females, but when differences are found, females are more ethical than males" (2005, p. 379). Ethical evaluations and judgments lead to intentions, and behavior (Hunt and Vitell, 1986), e.g., purchase decisions. Marketing activities create positive, e.g., ethical, or negative, e.g., unethical, perceptions of firms' market offering. The purpose of this research is to advance the understandings of marketing ethics by examining the literature and determining the differences influencing male and female consumers' perception of marketing strategy.

A basis for gender-distinct moral reasoning is related to different socialization experiences. Men are socialized more as an individual agent, or viewed as an individualistic framework of rules and justice that is associated with deontological ethics. On the other hand, women are socialized more communally, or a communal framework of consequences, concern for others that is linked to teleological ethics (Callahan, 1990; Gilligan, 1982/1993; Goolsby and Hunt, 1992; Hunt and Vitell, 1986). We have determined that these frameworks are further influenced by different processing of information, heuristic predominately by males versus elaboration primarily by females (Meyers-Levy, 1989) and the varying cue intensity, low versus high (Jones, 1991; Meyers-Levy and Maheswaran, 1991). From these influences either contrasting or similar depending on the cue intensity, moral reasoning for ethical issues (deontological or teleological evaluations) results in ethical judgments, and leads to intentions and behavior (Hunt and Vitell, 1986).

A gap in the marketing ethics literature as to the consumers' perceptions of marketing strategies has been identified. We propose the question, are there differences between men and women consumers' ethical perception of the firms' marketing strategy? A conceptual framework was established in this study. Two propositions were established as to the level of intensity and by the ethical perceptions of male and female consumers. Various marketing strategies with related, associated ethical dilemmas (Smith, 1995) were presented in which there are important factors to consider in targeting segments, e.g., males and females (Goolsby and Hunt, 1992; Hunt and Vitell, 1993), to meet, or exceed consumers' ethical expectations. There is a need for more empirical research for a better understanding of marketing ethics perceptions of marketing strategy. Until marketers further know these gender differences of marketing ethics perceptions, the improvement of customer satisfaction, greater customer loyalty and increased market share will not likely achieve the level of expectations. In the meantime, we do know in marketing ethics and gender-specific purchase behavior that from the level of cue intensity – "it depends"!

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BIOGRAPHY

Robert D. Green, D.B.A., is Professor of Marketing in the College of Business and Management at Lynn University. He has held faculty positions in the U.S. and internationally. Dr. Green has had articles in *International Journal of Management and Marketing Research*, *Journal of Business & Entrepreneurship* and more than 50 other referred publications. He serves on the Editorial Board for the *International Journal of Management and Marketing Research* and *Business Education & Accreditation*. He can be contacted at: College of Business and Management, Lynn University, 3601 North Military Trail, Boca Raton, Florida 33431 USA. Email: rgreen@lynn.edu

Ghensy Antoine is a doctoral candidate (Ph.D.) in Global Leadership for Corporate and Organizational Management at Lynn University. He holds an A.A.S. in Civil Engineering Technology, a B.P.S. in Behavioral Science, a M.S. in Criminal Justice Administration, and a Graduate Certificate in Emergency Planning Administration. He formerly held various positions in the private sector implementing innovative remediation approaches for promoting ethical standards within the Corporate Social Responsibility arena, and assisting with business emergency response and continuity strategies. His research focuses on the significance of marketing strategy and consumers' perceptions towards marketing ethics within a cross-cultural perspective. He can be contacted at: Lynn University, College of Business and Management, Lynn University, 3601 North Military Trail, Boca Raton, Florida 33431 USA. Email: gantoine@email.lynn.edu

A NEW MEASURE OF EMPLOYEE SATISFACTION

Renata Myskova, University of Pardubice

ABSTRACT

Employee satisfaction involves not only efficient usage of human resources, but also preservation and securing vital company information. Satisfaction lowers fluctuation of employees, positively influences productivity indicators, and thus overall company output. Therefore it supports long-term stability and competitiveness. The problem with evaluating and interpreting gathered knowledge is that it can be greatly influenced by subjective evaluator criteria. It this article a methodology for evaluating employee satisfaction is developed. The goal is to quantify employee satisfaction by means of a factor that indicates employee satisfaction. The indicator was empirically tested in a selected company in 2003 and 2009. Results indicate that the employee satisfaction indicator developed here has predicative ability. However, it is necessary to update partial indicators and their weights over time to reflect the current economic situation.

JEL: J53, M12, O15

KEYWORDS: employee satisfaction valuation survey, employee satisfaction indicator, company information securing

INTRODUCTION

Human resources are strategically the most important company resource, even though it cannot be expressed in numbers from a financial point of view. The task is the motivation of employees to produce high-quality output. Motivation is closely linked to employee satisfaction (Kaplan, Norton, 1996), which is one of the main motive forces of future company output. Moreover, a content employee has no reason to change his/her occupation reducing workforce fluctuation. Consequently, the costs for training new employees are reduced and revenues are maximized by using trained employees (Belcourt, Wright, 1998).

The influence of satisfied employees manifests outside the company, in customer and supplier relations (Styblo, 2001). Another reason to ensure employee satisfaction is the safety of company information. We cannot delimitate the information only as strategic, because such information is probably not available to common workers, but in small businesses it could be information about suppliers, customers structure, and work processes etc. With narrowly specialized workers there is a danger, that they can be hired by a competitor.

All the findings stated imply that it would be appropriate to engage employee satisfaction issue in more detail and to find ways and methods of measuring it a methodology of satisfaction evaluation.
Usage of causal analysis can help us to delimitate more causal relationships. The following are considered important: a) in terms of work output: Insufficient work output → unwillingness of employees to maximize their work output (in quality and quantity areas) → insufficie nt motivation → no motivating influence is clarified → employees are not satisfied. b) in terms of internal information safety: Company information leakage → bad company climate → unsatisfied workers. Application of deductive causal analysis can identify insufficient work output and information leakage – employee dissatisfaction (Myskova, 2003).

The article is divided into several parts. First the existing literature related to employee satisfaction is examined. These results indicate that the problem is important for further company development. In next

part the design of methodology for evaluation of employee satisfaction is presented including goal setting, problem identification, and a new method of satisfaction measurement. This new indicator was tested empirically in a selected company in years 2003 and 2009. The results of these researches and discussion on gathered knowledge are stated in last part of the article. The paper closes with some concluding comments.

LITERATURE REWIEW

Employee satisfaction is connected to usage of human resources and influences the quality and amount of work done (Kaplan and Norton ,2001; Copeland, Koller and Murrin, 1991, Lamming and Bessant, 1995, Belcourt and Wright, 1998). Styblo (2001) describes the impact of employee satisfaction on customer satisfaction. Donelly, Gibson a Ivancevich (1997) examine a similar problem. The importance of employee satisfaction can be supported by a statement of a Nobel price winner – G. S. Becker (1997) – about the rational behavior of individuals, which states: "Individuals maximize utility in a consistent way and in decision-making process they consider impact of their own activities on utility – current and future."

Drucker (2000) recommend using comparative analyses for better usage of human resources and improvement of interpersonal relations. Delaney and Huselid (1997) surveyed more than 1400 American organizations. Their research indicated that employee satisfaction, motivation and keeping high output have certain significance in the evaluation of company performance. The relations between employee satisfaction and company performance are monitored within BSC methodology by Kaplan and Norton (2008), Harris and Moran (2000), Keaveny (2001) and others. Connection between satisfaction and employee motivation has been noted for many years (Bernard, 1948; Porter,1993; Becker, 1997; and Vebr, 2009). Nenadál (2001), Rosa (2000) and others emphasize the importance of employee satisfaction and warn that measurement of employee satisfaction is not easy.

EMPLOYEE SATISFACTION VALUATION– METHODOLOGY AND DATA

The aim of this methodology is to describe and delimitate possibilities of employee satisfaction evaluation according to the needs and requirements of the company. A second goal is construction of an employee satisfaction indicator and its application in reality of individual companies, with consideration of their specific conditions.

The aim was to create a methodology to measure employee's satisfaction. The reason why we want to determine satisfaction level within a company is the casual relation expressed in method BSC and also in systems of quality management. Respectively: employee satisfaction leads to productivity increase and thus increase in efficiency of the company as a whole. Even though factors which influence employee satisfaction have qualitative character, it is necessary to determine and measure them.

In the process of resolving this problem we have to ask a number of questions. First, what is the content? – Determination of employee satisfaction influencing factors. Who is the subject? – Company employees. Where is the problem resolved? – Best within company as a whole with workers classification according to their position. How often is the problem solved? – Employee satisfaction needs to be observed not only once, but in regular periods. In this way we can search for ways to increase it and consequently use the gathered data as a feedback for evaluation of already realized changes within company (related to employee satisfaction). Why is the problem solved? – Employee satisfaction is determinant of future output rate and increases human potential. Dissatisfaction of employees result in lower working effort and thus lower utilization of human resources.

What kind of values should we look for and how many factors should we delimitate? – The answer to this question depends on specific conditions of the company. (I recommend delimitating 15 factors.).The applied process of measuring satisfaction includes: 1. Analysis and formulation of the problem, 2. Determination and analysis of all parameters (factors) which characterize the problem and determination of possible values (level, implementation) of individual parameters, 3. Systematic delimitation of the problem solution alternatives through combinations of individual parameter values and 4. Choice and realization of selected alternative.

Ad 1. Analysis and formulation of the problem is already described in the text above.

Ad 2. In course of factors delimitation, we created questionnaires. Question comprehensibility should be examined with certain workers. Accuracy and integrity of element delimitation is further verified by means of questionnaires within company where workers themselves delimitate factors influencing their satisfaction and also significance of these factors for an individual. I recommend utilization of scales for numeric and metric data necessary to determination of satisfaction indicator. Also we can apply a semantic differential, scalable by a method that uses points for evaluation.

Ad 3. Quality of analysis of all the elements depends on delimitation and data collection. Statistical analysis can be complete or incomplete. If all observations are available (parent population is described by parameters; that mean unique constants), data are complete. If a population is incomplete, constricted, does not contain all statistic units (sample population), data are incomplete. We deduce characteristics of the whole from characteristics of a part; therefore, we have to consider the probability theory and selection of descriptive characteristics which have characteristics of random quantity.

For calculation, whether sample population fits into required accuracy and approximation reliability, delimitation is defined as follows: approximation accuracy 5 % or 10 %, approximation reliability 80 – 95 %, variation coefficient 0.3 – 1. Delimitation of number of factors which influence employee satisfaction level is required according to needs and opportunities of the company.

Selection of method for data analysis depends on decision; whether questionnaires would serve for the sole purpose of delimitation of the most important factors which influence employee satisfaction with aim to quickly remove acute deficiencies within this area in company or whether a synthetic indicator of employee satisfaction which covers all influencing factors is desired.

Ad 4. Point 4 is represented by own evaluation of filled-in questionnaires.

DETERMINING THE FACTOR WITH GREATEST INFLUENCE ON EMPLOYEE SATISFACTION

In order to evaluate the data, aggregate statistic characteristics are used to determine location, dispersion, inclusion of special characteristics and dispersion characteristics need for evaluation of sample population characteristics. Location (level) describes data on the number axis according to their order. Dispersion (variability) describes the level of representation of parent population and collective dispersion around mean value.

The following location characteristics are used arithmetic mean, modus, median and fracticle. For correct interpretation of statistic data it is vital to present characteristics according to points a) to c). For purpose of practice it is possible to determine the most significant factor of employee satisfaction with the median. Another possibility is to evaluate the factor with greatest influence on employee satisfaction, by means of maximum relative frequency, where relative frequencies can be calculated according to following formula:

p_i = *number of evaluations of i-th factor by maximum number of points / total number of workers* (1)

We can assume that even in parent populations there will be the same relative frequency of this factor An advantage of this approach is the possibility to simplify empirical research by identifying only factors that influence satisfaction level and not to differentiate their significance. Then the most significant factor would correspond to the highest relative frequency of answers.

CONSTRUCTION OF SYNTHETIC EMPLOYEE SATISFACTION INDICATOR

Construction of this indicator is executed by following process. 1) Classification of filled-in questionnaires to groups according to characteristic marks, 2) Evaluation of the scale by arithmetic mean, modus, median, standard deviation and variation coefficient for each of surveyed factors influencing employee satisfaction, 3) Selection of characteristics which optimally describes the sample for further calculation, 4) Application of the Saaty method or method of paired comparison with determination of weights of individual criteria (influencing factors). When applying more methods, weight determination is done by arithmetic mean of values obtained from individual methods.

1. I suggest employee satisfaction indicators as synthetic resulting from following relation

$$I_{sp} \approx \Sigma\, w_i .\, I_{si}, \quad (2)$$

Where w_i = weights of individual (partial) factor (mark) of satisfaction,
I_{si} = i-th partial satisfaction factor,
$i \in \langle 1,2,..k \rangle$ for k = number of satisfaction factors.

2. Substitution of recognized weights (w_i) and partial indicators (I_{si}) to synthetic employee satisfaction indicator equation ($I_{sp\ xx}$). I formulate employee satisfaction indicator within designed methodology like this:

$$I_{sp\ xx} = \Sigma\, (w_i * Fs_i) / 10, \quad (3)$$

where $I_{sp\ xx}$ = employee satisfaction indicator within group xx,
xx = delimitates group according to a characteristic symbol,
Fs_i = fulfillment of partial (i-th) factor of employee satisfaction in particular company conditions (expresses in %),
w_i = weights of partial satisfaction factor,
$i \in \langle 1,2,..n \rangle$, where n = number of factors, which influence employees satisfaction,
$I_{sp\ xx} \in \langle 0, 10 \rangle$.

The employee satisfaction indicator can take the value from interval ‹0 - 10›, where 0 represents complete dissatisfaction, 10 means complete contentment. Choice of this interval ensued from need to ensure comparability with range of scales used in data collection. Calculation of employees satisfaction is done by substituting assigned percent points Fs_i to individual factors according to their occurrence and fulfillment in the company. Verification of employees satisfaction is done by subsequent comparison of resulting indicator values with subjectively stated values of satisfaction in a selected sample of employees. When there is greater variance between calculated and subjective values we adjust the factor weights.

CONSTRUCTION AND VERIFICATION OF EMPLOYEE SATISFACTION INDICATOR ACCORDING TO DESIGNED METHODOLOGY – EMPIRICAL RESULTS

Employee satisfaction indicators can be constructed for selected satisfaction factors and delimitated work groups according to various perspectives resulting from different needs of the examiner. Satisfaction indicators of certain work groups can be obtained by substituting calculated weights w_i to equation (3). Calculation of satisfaction is, as mentioned above, realized by substituting Fs_i. This formula was used within an empirical survey for a specific company. The design indicator was verified by a sample of common workers selected as a random sample without repeating data filled in to questionnaires. Each worker valuated (in %) fulfillment of partial criteria within the company and then expressed his/her satisfaction on an interval from 1 to 10. Calculated indicator Common worker's satisfaction $I_{sp\ cw}$ was compared to subjectively stated satisfaction of employees in their current occupation. Weights of satisfaction indicators related to individual methods for groups of common workers are stated in Table 1.

Table 1: Weights of Partial Criteria for Group Common Workers – Calculation According to the 2003 Survey

	Common Employees		
Criterion	**Method 1**	**Method 2**	**Weights-average**
Type of work	0,0998	0,0976	**0.0987**
Wage	0,0998	0,0976	**0.0987**
Working hours	0,0608	0,0609	**0.0609**
Organization of work	0,0608	0,0609	**0.0609**
Team	0,0608	0,0609	**0.0609**
Environment	0,0608	0,0609	**0.0609**
Qualification	0,0608	0,0609	**0.0609**
Educational possibilities	0,0608	0,0609	**0.0609**
Superiors	0,0608	0,0609	**0.0608**
Independence	0,0608	0,0609	**0.0608**
Traffic	0,0397	0,0401	**0.0399**
Vacation	0,0397	0,0401	**0.0399**
Vacation term	0,0397	0,0401	**0.0399**
Working process	0,0397	0,0401	**0.0399**
Work safety	0,0397	0,0401	**0.0399**
Necessity of education	0,0231	0,0234	**0.0233**
Re-qualification	0,0231	0,0234	**0.0233**
Team leading	0,0231	0,0234	**0.0233**
Benefits	0,0231	0,0234	**0.0233**
Employment contract restrictions	0,0231	0,0234	**0.0233**
Sum of weights	**1**	**1**	**1**

Source: author. Table 1 shows weights of partial criteria for group Common workers. Method 1 corresponds to the Saaty method with utilization of columnar standardized matrix for weights calculation; method 2 applies geometric average values for weights determination. Weights-average represents weights determined by arithmetic average values from used applications. I assume that for practical usage it would be sufficient to round weights of individual criteria (factors, which influence employee satisfaction) to 3 decimal places. Pair comparison is not used, because in my opinion the result would be burdened by method error.

VERIFICATION OF SATISFACTION INDICATORS IN PRACTICE IN 2003

The designed indicator was further verified in the chosen company. The subject had 21 employees, 4 of which constituted Company management. The verification does not distinguish by gender. The calculated satisfaction indicator of common employees $I_{sp\ cw}$ is then compared to subjectively stated employee satisfaction in current occupation. Results of this verification are stated in Table 2.

The predicative ability of satisfaction indicator can be thought of as sufficient (max. deviation of subjectively stated satisfaction is 0.785), even though we cannot separate the error rate caused by subjective evaluation of employees from company specifics. The satisfaction indicator can express

satisfaction of individuals from delimitated groups (as shown in Table 2), but can also cover satisfaction of a group or all employees. In this case there are two ways of calculating the result:

Table 2: Satisfaction of Common Employees According to Subjective Evaluation and Satisfaction Indicator (One Company, Data from 2003)

Employee	Subjective Satisfaction (2003)	Satisfaction Indicator (2003)
1	7	**7.21052**
2	6	**5.5756**
3	8	**7.5253**
4	7	**6.74535**
5	8	**8.59351**
6	6	**6.78221**
7	6	**6.13689**
8	6	**6.75268**
9	8	**7.56912**
10	7	**6.59874**
11	7	**7.02158**
12	8	**7.27155**
13	6	**6.503**
14	5	**4.21552**
15	6	**6.2893**
16	7	**7.69842**
17	9	**8.57413**

Source: author. Table 2 sums up results of empirical research in the selected company in 2003. Employee satisfaction is determined by each and every employee subjectively and also by calculation of means of designed employee satisfaction indicators. Value 1 (from interval from 1 to 10) corresponds to total dissatisfaction whereas value 10 indicates total satisfaction. Variance of subjective satisfaction and satisfaction indicator is small

1. We will determine satisfaction of all individuals within group (company) and satisfaction of whole group (all company employees) based on the arithmetic mean of these values, 2. Eetermine fulfillment level of each (i-th) factor of employee satisfaction Fsi within the team (company) as an arithmetic mean of values stated by individuals; finally we include the computed value into the satisfaction indicator formula.

VERIFICATION OF SATISFACTION INDICATOR IN 2009

Considering economic changes and on-going crisis we presume that employee satisfaction will be influenced by individual factors with a different rate. For this reason we conducted the survey in the same company as in 2003 with the aim of recognizing changes and determining factors of satisfaction and their weights in current conditions. Table 3 contains results of satisfaction surveys from 14 employees. Answers were obtained from filled-in questionnaires created for research in 2003, so the weights of individual criteria correspond to the weights in Table 1.

The results show that satisfaction indicator has lower predicative ability than in 2003 (max deviation 1,951), which is caused by changes of individual satisfaction factors. Based on current evaluation of these criteria significance (from an empirical survey from 2009) I determined new satisfaction indicators weights for common employees in surveyed company.

Table 4 states the values and consequently indicates by + and – symbols changes in preferences compared to 2003. New employees indicated the most important factor was certainty of work combined to stability of their company.

Table 3: Subjective Satisfaction of Common Employees and Satisfaction Indicator Value - Year 2009

Employee	Subjective Satisfaction (2009)	Satisfaction Indicator (According to 2003)
1	6	**7.569**
2	8	**9.1254**
3	7	**8.021**
4	5	**4.568**
5	9	**9.544**
6	5	**3.965**
7	6	**7.658**
8	6	**7.951**
9	7	**7.689**
10	4	**4.213**
11	5	**4.368**
12	8	**8.924**
13	7	**7.988**
14	6	**7.052**

Table 2 summarizes results of empirical research in the selected company in 2009. Employee satisfaction is determined by each and every employee subjectively and also by calculation by means of designed employee satisfaction indicator designed in 2003. Value 1 (from interval from 1 to 10) corresponds to total dissatisfaction whereas value 10 indicates total satisfaction. Variance of subjective satisfaction and satisfaction indicator indicates that it is necessary to re-evaluate factors which influence employee satisfaction and to reset their weights.

Table 4: Weights of Individual Criteria for Group of Common Employees – Calculation Based on Survey From 2009

Criteria	Weights (Saatys Method, Usage of Columnar Standard Matrix)	Change from 2003	Weights 2003
Wage	0,1083	+	**0.0987**
Type of work	0,0824	-	**0.0987**
Organization of work	0,0678	+	**0.0609**
Qualification	0,0678	+	**0.0609**
Independence	0,0678	+	**0.0608**
Work safety	0,0678	+	**0.0399**
Traffic	0,0523	+	**0.0399**
Superiors	0,0523	-	**0.0608**
Certainty of work	0,0523	New factor, +	
Working hours	0,0421	-	**0.0609**
Vacation	0,0421	+	**0.0399**
Team	0,0421	-	**0.0609**
Environment	0,0421	-	**0.0609**
Educational possibilities	0,0421	-	**0.0609**
Necessity of education	0,0296	+	**0.0233**
Vacation term	0,025	-	**0.0399**
Re-qualification	0,025	+	**0.0233**
Working process	0,025	-	**0.0399**
Benefits	0,025		**0.0233**
Employment contract restrictions	0,025		**0.0233**
Team leading	0,0161	-	**0.0233**
Sum of weights	**1**		

Table 4 shows criteria that influence employee satisfaction within company surveyed in 2009.\weights of individual factors are recalculated (2nd column) and for comparison there are weights of satisfaction indicator stated in 4th column. Changes in factors and weights, compared to 2003 (column 3) are expressed by + (criterion weight increased; criterion for employee satisfaction is more important than it was in 2003), - (criterion is less important for an employee than it was in).

The indicator calculated with newly calculated weights of individual satisfaction factors was again verified by subjectively expressed satisfaction of individual employees. Results are stated in Table 5.

Table 5: Subjective satisfaction of common workers within surveyed company and satisfaction indicator value – calculation based on survey from 2009

Employee	Subjective Satisfaction (2009)	Satisfaction Indicator (according to 2009)
1	6	6.451
2	8	8.336
3	7	7.522
4	5	4.753
5	9	8.792
6	5	4.787
7	6	6.564
8	6	6.254
9	7	7.310
10	4	4.532
11	5	5.215
12	8	8.321
13	7	6.756
14	6	6.162

Table 5 summarizes results of empirical research in a selected company in 2009. Employee satisfaction is determined by each employee subjectively and also by calculation by means of designed employee satisfaction indicator designed in 2009. Value 1 (from interval from 1 to 10) corresponds to total dissatisfaction whereas value 10 indicates total satisfaction. Variance of subjective satisfaction and satisfaction indicator are not too big.

CONCLUSION

The goal of this article was to create a methodology suitable for evaluating employee satisfaction and to design an employee satisfaction indicator that could be applied in individual companies with consideration of their specific conditions. The methodic approach includes four phases – analysis and formulation of the problem, determination and analysis of all factors which characterize the problem, delimitation of a set of possible values for each parameter, delimitation of possible solutions and selection and implementation of the selected alternative. It is convenient to express employee satisfaction mathematically to quantify levels. For that purpose an employee satisfaction indicator was developed. In the process of construction, factors influencing employee satisfaction were determined, and then weights were assigned to them. Necessary data were gathered within empirical research performed in 2003 and 2009. The designed indicator was tested in a selected company. The results can be summed as follows: Indicator I_{sp} created according to this methodology for one company quite precisely expresses satisfaction rate of the subject employees.

The situation within the examined company is good in light of achieved outputs and long-term company stability. Most employees, save administrative, are rewarded based on output related to commissions. That is why the possibility of adjusting work and working hours is so important. Management provides their employees with various benefits: company car even for private use and for transportation to work, company cell phones, and high meal allowances. Company management is aware that loss of such narrowly specialized workers represents not only increase of costs caused by training of new employee. Loss of employees to competition constitutes the greatest risk in the form of transfer of confidential information and know-how. Employee satisfaction is therefore very important aspect of safeguarding confidential information.

Over time satisfaction of employees changes. Aggravated situation of 2009 as a result of financial crisis reflected in weights of individual satisfaction factors, priorities of employees have been changed. Predicative ability of the newly designed employee satisfaction indicator depends on factors selected as significant for the respective workgroup, on significance of these factors, which is expressed by their weights. The indicator describes the satisfaction rate only when the designed methodology is implemented to the situation within certain company. It is important to recognize changes, which are

implemented within or outside the company and in case of significant changes it is necessary to update the indicator. In further research variations on the technique developed here might be examined. These include observation of causal relations among employee satisfaction values and output of their work activities.

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BIOGRAPHY

Dr Renata Myskova is an Associate Professor of Management and Dean of the Faculty of Economics and Administration, University of Pardubice, Studentska 95, 532 10 Pardubice, Czech Republic, Email: renata.myskova@upce.cz

PERCEPTIONS OF MANAGEMENT ACCOUNTING SERVICES

Kenton B. Walker, University of Wyoming
Gary M. Fleischman, University of Wyoming
Eric N. Johnson, Indiana University

ABSTRACT

Internal service quality is important to management accounting (MA) service providers and users to promote good communications, ensure high standards of service, and to support good organizational decision making. However, there is little research concerning MA quality issues despite the prevalence of service quality research in other service areas. The purpose of this paper is to investigate differences, and their sources, between perceptions of management accounting services as reported by accounting service users and providers in a corporate organization. We collected qualitative interview data from managers and staff from different functional units about specific MA services by asking questions about user-provider perceptions of MA services in the areas of communication and satisfaction while applying the internal customer service perspective. We supplement our analysis with quantitative data based on the interviews. Our findings show evidence of user-provider perception gaps and provide a foundation for management actions to improve MA service quality.

JEL: M41

KEYWORDS: Management accounting services, user-provider perceptions, service satisfaction, service quality

INTRODUCTION

In this paper, we report on user versus provider perceptions of management accounting (MA) services in a corporate organization. The purpose of this study is to investigate sources of perceptual differences between MA service users and providers in the areas of communication, satisfaction, and quality using the internal customer service perspective (Hollowell et al., 1996; Lings and Brooks, 1998). This study details efforts by management of one organization to improve the services of MA to meet the needs of users. We collect and compare qualitative and quantitative evidence derived from interviews of MA (provider) and non-accounting (user) personnel. We report and analyze this information both by specific MA service and overall. A consistent perception of MA services by providers and users is essential because if perceptions differ, then the goals for services will also differ. Different goals lead to different courses of action and conflicting perspectives on MA service providers and their performance.

Service quality is an extensively-researched area, with hundreds of articles published across numerous organizational and service settings, including transportation (Bonsall et al. 2005), health care (Ward et al. 2005), public administration (Callahan and Gilbert 2005), and information systems (Watson et al. 1993; Bharati and Berg 2005). However, research concerning the quality of accounting services is nearly non-existent. Following this and subsequent studies, we may learn 1) if, generally, MA provides services that meet the needs of users, 2) about the nature and extent of communication difficulties between MA and users, 3) if and how organizations evaluate MA services, 4) how MA influences their roles within organizations, and 5) about management actions in response to perceptual differences in service quality.

The remainder of this manuscript is organized as follows. The next section provides the literature review. Section three discusses the data and methodology. In section four, we discuss our results. Conclusions appear in the final section.

LITERATURE REVIEW

The few studies in accounting concerned with accounting services address primarily user perceptions in contrast to the comprehensive user-provider comparisons made in this study. For example, Aldhizer et al. (2002) examined consulting service quality in an accounting and non-accounting provider environment from the client perspective. These authors recommend that future research consider a comparison of provider and user perceptions of service quality. Frezatti et al. (2006) analyzed the relationship between attributes of a MA system and user satisfaction and found that examining the satisfaction level of users facilitated provider understanding of user requirements and development of decision-useful services. The only studies that directly compared user and provider perceptions of MA services are Pierce and O'Dea (2003) and Byrne and Pierce (2007). These studies showed evidence of major preparer-user perception gaps concerning the usefulness of specific types of information and managers' views of roles for MAs. These studies provide indicators about how to narrow these gaps including a broad knowledge of the business, well-developed interpersonal and communications skills, flexibility, and sound technical knowledge. Four theoretical approaches used in past research are relevant to user perceptions of MA service quality; discrepancy theory, contingency theory, social perception theory, and role theory.

Discrepancy theory argues that an individual's satisfaction is partly determined by psychological comparisons of current experience against personal comparative standards (Locke, 1969). The gap between what an individual expects versus the service they perceive to actually receive influences their dissatisfaction. Smaller gaps imply relative satisfaction while larger gaps suggest dissatisfaction. Discrepancy theory is widely used in the IS literature e.g. Bhattacherjee (2001), Jiang and Klein (2002), Tesch et al. (2005), and Boyd et al. (2007).

The second theoretical lens is *contingency theory*. This theory recognizes MA services as passive tools designed to assist in user decision making (Chenhall, 2003). In sum, the organizational context drives the design and influence of MA systems (Chenhall, 2003; Sabherwal and Sabherwal, 2005), so monitoring user satisfaction and information quality is necessary to ensure effective user-provider information exchange linkages. Hopper (1980) and Byrne and Pierce (2007) employed contingency theory in studies that addressed accounting service quality issues.

The third theory commonly used to support service satisfaction studies is *social perception theory*. The theory suggests that service quality perceptions between users and providers may be driven by differing education, goals and experiences, or even overall worldview (Ross and Fletcher, 1985; Srull and Wyer, 1988). This theory was used in the IS literature to explain why users have different perceptions of service quality than providers of the service (Jiang et al., 2000). Given these differences, MAs have incentives to 1) identify user-provider service quality gaps, and 2) take actions to narrow or eliminate the effects of these gaps.

The final theory relevant for service satisfaction studies is *role theory*. The theory posits that focal roles, such as those of MAs, are influenced by other members in the organization, who are referred to as role senders (Kahn et al., 1964; Katz and Kahn, 1978). Accountants may shape how they perform their job functions, especially when others' expectations of accounting information are either unclear or in conflict. In the accounting literature, Hopper (1980), Sathe (1982), and Byrne and Pierce (2007) draw on role theory to examine the roles of MAs and controllers. Therefore this theory may prove useful to explain perceptions of MA services and suggest ways to better meet user expectations and quality needs.

DATA AND METHODOLOGY

We used a case study approach to compare provider and user perceptions of MA services. Use of the case study method of empirical research is supported by the internal customer service literature (e.g.,

Hallowell et al., 1996; Lings and Brooks, 1998; Marshall et al., 1998; Brooks et al., 1999; Gelb and Gelb, 1991) and is especially useful when the purpose of the research is to conduct an exploratory identification of initial "inadequacies and weaknesses" associated with the internal marketing framework (Brooks et al., 1999: 55). The internal customer service literature also supports empirical service assessment utilizing qualitative data analysis gathered through interviews with organizational employees (Brooks et al., 1999; Gelb and Gelb, 1991; Marshall et al., 1998; Lings and Brooks, 1998). Hopwood (1983) and Kaplan (1984) suggest researchers assess MAS service delivery in organizational contexts, and Ahrens and Dent (1998) encourage field research in MA. In addition, a case study is able to bring the context of the field site into the research, which is often missing in archival studies. Although the unstructured approach to problem solving in case studies limits causal inference and generalizability to broader populations (Chenhall, 2003: 160), the accumulation of knowledge about this topic from several such studies may prove interesting.

We conducted the research in three phases. The purpose of the first phase was to compile a list of services carried out by the MA section. Phase two consisted of interviews with a cross-section of MA service users and providers. In phase three, we followed up with management to see what actions they took to narrow perception gaps and address service quality issues.

The Subject Organization

The subject organization for this study was a large, multi-divisional, and geographically dispersed utility service organization that we refer to as Utility Company (UC) to preserve the company's anonymity. The company is located in Australasia and has been in existence for several decades. The company operates in a highly regulated environment. The company is subject to price controls, and must comply with numerous regulations and government reporting requirements. Sales of services in 2000 exceeded $2.5 billion. The company employs approximately 2,300 individuals organized into four divisions, ranging in size from about 400 employees to over 650 employees. The company was faced with impending deregulation that would introduce competition and require the company to spin off, in about a year, segments of its highly vertically integrated operations.

UC employs about 200 persons at the corporate headquarters responsible for coordinating corporate reporting activities, planning, and providing advice to the four divisions. Headquarters employees provide for corporate services in the areas of executive management, customer relations, human resources, technical support, operations, finance, treasury, and internal audit. Division managers (DM), responsible for all activities in each division, are also located at the corporate headquarters.

Staff at all locations are organized into four support functions; Accounting, Human Resources, Technical Support, and Operations. A corporate support manager (CSM) located at the corporate headquarters office heads each function and reports to the general manager. Support personnel have a direct reporting relationship to the division managers and dotted-line responsibility to the CSM.

Accounting employs 85 people in four divisions and at corporate headquarters. The management organization structure of the firm consisted of three levels (manager, supervisor, and staff) at three locations (corporate, division, and area).

Development of MA Service Categories

In order to address RQ1, we developed a preliminary list of MA services in consultation with accounting division managers. We then distributed the list to the remaining accounting personnel. After three iterations, and having achieved a consensus list, we then sent it to 42 non-accounting service users for comment. In some instances, we met with individuals or groups to discuss listed services. After about two

weeks, we completed the list used in connection with the interviews. We categorized all interviewee comments according to eleven specific accounting services identified jointly by company users and providers. The services consist of: Planning; Routine Accounting; Management Reporting; Training; Audit/Internal Control; AIS Support; Project Analysis; Land and Property Administration; Fixed Asset Accounting; Other Services; and Accounting Management. For each service, we attached a list of two to eight examples specific to the company in order to ensure common understanding of each service category.

Interview Procedures

We obtained the data for this study from interviews of providers and users of accounting services. We interviewed a representative cross section of 159 UC employees concerning their views on MA services. Of this group, 93 were users of MA services (including five corporate executives), and 66 were MA service providers. Some personnel were interviewed individually and others in small groups to optimize the rate of information gathering. In addition, group interviews did not mix persons from accounting and user departments and avoided situations where subordinates and their superiors were in the same group interview. We took these steps to encourage frank discussion of issues. Table 1 lists the number of interviewees by level.

Table 1: Number of Interviewees by Level

Panel A – Providers	
Corporate Accounting Officer (P1)	2
Corporate Accounting Manager (P2)	3
Corporate Accounting Staff (P3)	0
Division Accounting Manager (P4)	5
Division Accounting Supervisor (P5)	6
Division Accounting Staff (P6)	9
Area Accounting Manager (P7)	23
Area Accounting Supervisor (P8)	6
Area Accounting Staff (P9)	13
Panel B – Users	
Corporate General Manager (U1)	1
Corporate Manager (U2)	7
Corporate Staff (U3)	4
Division Manager (U4)	4
Division Supervisor (U5)	10
Division Staff (U6)	2
Area Manager (U7)	20
Area Supervisor (U8)	22
Area Staff (U9)	18
Total	93

Table 1 shows the total number of individuals interviewed by level of management among service providers and users. Interviewees are coded as P if they were a service provider and U if a user.

We took two sets of notes at each interview. During transcription, we read and compared the two sets of notes to ensure that both sets of recorded comments were in substantial agreement. The coding schemes for interviewee level and services enabled us to sort all comments according to MA service and interviewee functional orientation and level. We asked the following questions during our interviews. Does the list of MA functions cover everything that concerns you? Do MA services/reports focus on the most important issues? Do reports have the right amount of detail? Do you give/get good advice from MA staff? Are you generally satisfied or unsatisfied with MA services that you use?

For analysis purposes, we grouped all comments into one of three classifications. We classified comments that were unambiguously favorable with respect to the accounting service as *positive.* Likewise, we judged comments that were unambiguously unfavorable or that we could construe as suggestions for improvement as *negative*. The interviewers independently classified interviewee comments and a third individual who was not involved in the collection or analysis of the data reviewed them to control for bias. The majority opinion settled disagreements. We designed our quantitative analysis to augment our qualitative narratives below, not to obfuscate them. In essence, although our method is primarily qualitative in focus, we believe that readers can more easily digest our lengthy interview data through our quantitative summaries.

We used the positive and negative classifications for two forms of analysis. First, we qualitatively assessed comments to obtain a general sense of users' and providers' prevailing sentiments regarding accounting services, grouped by service type. Second, we quantitatively analyzed differences in the proportion of positive and negative comments in each classification between providers and users. We tabulated neutral comments in both the qualitative and quantitative analyses but did not use them in order to concentrate on the differences between positive and negative perceptions of accounting service provision and use. Most neutral comments were statements of fact which, in our judgment, added little of substance to determining provider or user perceptions of service quality. Finally, we asked interviewees to indicate whether they were generally satisfied or dissatisfied with each service they used.

Because of the exploratory nature and case study setting for this research, we do not advance formal research hypotheses. Instead, we posit four applied research questions derived from the literature and theories reviewed in the previous sections (indicated parenthetically).

RQ1: What discrete services do providers and users recognize? (communications)

RQ2: Do perceptions of MA service providers and users differ by service? Why? (social perception/role theory/discrepancy theory)

RQ3: Do perceptions of MA services differ by level of management? (social perception/role theory/discrepancy theory)

RQ4: What actions can management take to narrow perception gaps? (communications/business partner roles)

RESULTS

Tabulation of Comments by Providers and Users

A tabulation of *provider* and *user* comments by organizational level and accounting service appear in Table 2. Table 3 shows results of chi-square tests of the distribution of positive versus negative comments by service (Panel A) and overall (Panel B).

Table 2: Number of Comments by Service and Level of Management

Panel A – Providers

Level*/Service	P1	P2	P3	P4	P5	P6	P7	P8	P9	Total
Planning	0	2	0	5	9	1	6	5	0	28
Routine Accounting	0	0	0	1	0	0	2	3	2	8
Management Reporting	4	2	0	16	11	2	19	2	3	59
Training	0	2	0	0	6	3	7	1	3	22
Audit/Internal Controls	0	1	0	2	7	4	6	2	0	22
AIS Support	2	14	0	9	11	12	11	2	15	76
Project Analysis	0	0	0	2	1	0	1	0	0	4
Land & Property Admin.	0	0	0	1	1	3	1	0	0	6
Fixed Asset Accounting	0	0	0	0	1	0	3	0	0	4
Other Services	0	0	0	0	0	0	0	0	0	0
Accounting Management	0	0	0	10	12	14	8	3	6	53
Total	6	21	0	46	59	39	64	18	29	282

Panel B – Users

Level*/Service	U1	U2	U3	U4	U5	U6	U7	U8	U9	Total
Planning	3	5	5	6	15	0	11	13	4	62
Routine Accounting	4	1	1	2	2	0	6	1	0	17
Management Reporting	15	13	5	16	30	1	33	18	2	133
Training	0	5	3	3	8	1	6	4	2	32
Audit/Internal Controls	3	0	0	3	1	0	0	1	1	9
AIS Support	0	7	2	6	16	1	1	10	2	45
Project Analysis	0	2	1	0	3	0	1	1	0	8
Land & Property Admin.	0	2	0	1	1	0	3	0	0	7
Fixed Asset Accounting	0	0	4	1	1	0	2	0	1	9
Other Services	0	0	0	0	0	0	0	0	0	0
Accounting Management	7	5	6	11	9	1	9	3	0	51
Total	32	40	27	49	86	4	72	51	12	373

**1=Corporate Officer; 2=Corporate Manager; 3=Corporate Staff*
4=Division Manager; 5=Division Supervisor; 6=Division Staff
7=Area Manager; 8=Area Supervisor; 9=Area Staff

Table 2 shows a count of the comments made on each MA service by management level of service user and provider in the organization. Comments may be positive, negative, or neutral. Neutral comments were statements of fact and we did not use them for identifying service quality issues or differences between perception of service users and providers.

Table 3: Chi-Square Test of Comment Distribution between Users and Providers

Panel A – Distribution of Comments by Service

	Comment Classification (Pos./Neg.)		
Service	**Provider**	**User**	**Chi-Square *p*-value**
Planning	6/19	4/50	0.043
Routine Accounting	0/6	5/10	0.262*
Management Reporting	12/31	22/85	0.331
Training	2/14	2/28	0.602*
Audit/Internal Control	12/5	0/7	0.000*
AIS Support	14/45	3/33	0.058
Project Analysis	0/1	1/7	1.000*
Land and Property Admin.	0/6	0/4	1.000*
Fixed Asset Accounting	0/4	0/8	1.000*
Other Services	0/0	0/0	1.000*
Accounting Management	12/36	11/28	0.736
Total	58/167	48/120	0.004

Panel B – Overall Distribution of Comments

	Comment Classification		
Source	**Positive**	**Negative**	**Total**
Providers	58	167	225
Users	48	260	308
Total	106	427	533

*Fischer's Exact Test reported due to small number of observations

Chi-square (1 df) = 8.479 p = 0.004. Table 3 shows the results of Chi-square tests of differences in the number of positive versus negative comments made by providers and users about each management accounting service, and overall. The total number of comments differs from that in Table 2 by the number of neutral comments that we noted.

In the following sections, we report on development of the list of MA services and comparisons between comments of users and providers on Planning, Management Reporting, Training, Audit/Internal Control, Accounting Information Systems, and Accounting Management. Users and providers did not provide a significant number of comments on the remaining services.

Definition of MA Services and Interview Results

There was widespread praise among interviewees for the process of identifying MA services. Users were particularly gratified for the opportunity to discuss what services accounting performed. Many of these individuals commented that they achieved a higher level of understanding and appreciation of the accounting function. In many cases, users, particularly at lower levels, really didn't know what the accountants did aside from their limited service encounters. In addition, this exercise provided an opportunity to discuss accounting terminology that was a source of confusion. For providers, developing a list of services served to identify and clarify organizational roles. In a few instances, duplications of effort were uncovered leading to internal resource reallocations. In addition, most providers agreed that the list would help improve communications with users and for conducting future service assessments, particularly when seeking user input. Overall, it was evident that communications between users and providers was previously too limited and that both groups considered this exercise an opportunity to work together more extensively in the future.

Planning. Provider and user comments were generally similar for planning. For example, both users and providers were concerned with the amount of time the budgeting process took. Users were especially critical of arbitrary budget cuts from management that they believed were not well-communicated. The tenor of users' negative comments was much more severe than were providers' comments. As shown in Panel A of Table 4, the distribution of positive versus negative comments on Planning differed significantly between providers and users: the chi-square statistic with 1 degree of freedom was 4.114 (p = 0.043).

Management Reporting. Provider comments indicated that they were cognizant of the severe lack of communication with users, which demonstrates that they were at least aware of some of the serious internal service quality issues. Otherwise, providers were more internally focused on the pressures they felt from corporate and they were relatively happy with the reports they produced, so there is a rather large disconnect with user comments. Users, on the other hand, were generally very unhappy with the reporting function, and stated that the information in reports was too detailed and too old to be of any decision-making value.

Statistically, however, the distribution of positive versus negative comments between providers and users was not significantly different (there was consistent dissatisfaction with this service). As shown in Panel A of Table 4, the chi-square statistic for this comparison with 1 degree of freedom is 0.944 (p = 0.331).

Training. As mentioned above, providers seemed to be aware of the great need for user training. However, they did not seem aware of how critical this need was. User comments indicated a severe unmet need for accounting assistance, since they had trouble with accounting terms and definitions, as well as the technical complexities of the budget process.

Quantitatively, the distribution of positive and negative comments was not significantly different between providers and users (Fisher's exact test p = 0.602), as shown in Panel A of Table 4. The small number of positive comments (2) from both providers and users drive this result.

Audit/Internal Control. In general, Audit/Internal Control was a much more relevant service to providers than to users, because user groups did not normally interface with most control and/or audit related issues.

Both groups, however, mentioned that there were some rather serious systems control issues that management needed to address.

Statistically, the distribution of positive and negative comments between providers and users regarding Audit/Internal Control was significantly different (Fisher's Exact Test $p = 0.000$). This result reflects the fact that all user comments on this service were negative, while the majority of provider comments were positive as shown in Panel A of Table 4.

Accounting Information System (AIS) Services. The general focus of the negative provider comments was on the inadequacy of the system itself (resulting in slow processing) and the failure to update the system on a timely basis due to "botched" system upgrades. In contrast, negative comments by users' were much more focused on the inadequacy of system output. Users repeatedly commented on system inflexibility, data obsolescence, data fragmentation, and the general absence of user support (best captured by the comment that AIS "uses the user").

As shown in Panel A of Table 4, the difference in the distributions of positive and negative comments between providers and users was statistically significant. The chi-square statistic for this comparison is 3.607 ($p = 0.058$).

Accounting Management. Perhaps no other accounting service polarized providers and users as much as Accounting Management did. Providers were critical of perceptions of poor communication abilities by accounting management in general, as well as an "appalling" lack of staff relations. Users were more specific in their criticism of accounting management, noting a fixation on the details of the accounting process compared with an overall absence of internal service quality and support.

Despite the qualitative divergence in comments on accounting management between providers and users, the distributions of positive and negative comments on accounting management services between the two groups were not statistically different (Chi-square = 0.114; $p = 0.736$) as shown in Panel A of Table 4.

Overall Comparison of Comments and Additional Quantitative Analysis

We tabulated positive and negative comments for all accounting services for both providers and users, and the overall distribution was compared as shown in Panel B of Table 4. Users provided slightly fewer positive comments, and substantially more negative comments, across all accounting services relative to providers. The chi-square statistic of 8.479 with 1 degree of freedom is significant at $p = .004$. This result, substantiated by the qualitative comparisons of provider and user comments above, indicates significant differences between providers and users in their perceptions of accounting service usefulness and quality. The reasons for this situation may be explained by unique characteristics of the accounting processes and services in this organization, failure to market and communicate service capabilities, and characteristics of the individuals, consistent with social perception theory.

At the end of each interview, we asked individuals to list up to five services they were "very satisfied" or "very dissatisfied" with and indicate their perception of the efficiency of the MA function on a scale of 1 (very inefficient)-5 (very efficient). Chi-square results were reliably different for planning ($p = .081$) and management reporting ($p < .001$). Management reporting was the most frequently listed service. In this case, individuals from both groups placed this service in the very satisfied category more often than very unsatisfied, but far more so by providers. For planning, most users were very unsatisfied while more providers were very satisfied. Cell frequencies were too low to perform chi-square tests for training and accounting management. Fischer's Exact Test results were significant for training ($p = .073$), where very unsatisfied was listed most by both groups, but more so among users. The test for accounting

management was not significant. A *t*-test of the difference in means between user and provider perceptions of efficiency was significant ($p = .03$), with providers indicating greater efficiency.

Additional Qualitative Analysis: Application of the Internal Customer Service Model for MA Services

Although providing a customer-oriented or service attitude was not a formal, strategic goal of the MA function at UC, it was obvious from user comments that accounting providers generally needed to improve their internal service usefulness and quality. The following paragraphs highlight specific user comments about the existing customer (accounting service user) orientation of accounting providers.

Many U2 (corporate support manager) comments related to the customer orientation of MA providers, and these comments were mixed. One U2 was very positive regarding MA customer service; another, however, stated that accountants were too isolated from other functions. Another U2 noted that MAs needed more technical knowledge about the company's business. We interpreted this latter comment to imply that the MAs do not understand many of the technical issues that users with technical backgrounds must grapple with.

U3 (corporate support staff) employees were especially critical of the lack of customer orientation from accounting providers. For example, one U3 member emphasized that the accounting function is "self-serving." Another claimed that accounting provides "little feedback to users" while a third U3 member explicitly noted that accounting has a "lack of service-oriented attitude" and is "not part of [the] management team." One U4 (division manager) made positive comments about accounting customer orientation, but most other comments were quite critical of accounting service providers. For example, another U4 flatly stated that division mangers did not get the information that they need from accounting. Other related complaints included "users (were) not consulted" and "accountants should be more proactive."

A U5 (division supervisor) indicated that advice provided by the accounting function was generally not understandable. Another mentioned that the U5 group required proactive accounting advice and that accounting needed to work alongside the group as a "partner." A number of U7s (area managers) expressed criticism of the perceived absence of a customer orientation by accounting, as well as related AIS provision issues. For example, one U7 noted that accounting did not explain information "whys and hows" to users.

User Comments by Corporate Executives

The corporate executives interviewed included the chief executive officer (CEO), financial controller (FC), corporate finance manager (CFM), treasurer, and corporate audit manager (CAM). The executives' comments were heavily concentrated on accounting services related to planning, management reporting, and management of the accounting function. Comments on these specific accounting services by the corporate executives are summarized below, addressing RQ3.

Planning. The CEO believed the annual plan was comprehensive but "messy." He believed that performance against the plan was "excellent" and that the planning system might be improved with a "budget trading" system where a manager could sell, for example, $100 of budgetary authority to another manager for $110. When told that, based on other interviews, budget managers were making decisions on a monthly basis at the expense of the long term, he found that "fascinating."

Other Corporate interviewees also provided comments on Planning. For example, the CFM expressed satisfaction with the budgeting process and the resulting reports. However, the Treasurer commented that he knew little of the company's long-term plans and that "everyone [was] too busy to plan ahead."

Management Reporting. The CEO felt there was an "astonishing" number of budgetary and account codes, resulting in far too much detail and a need to "cull something out of the accounting systems." (The treasurer echoed this comment in making reference to the "massive" accounting reports.) The CEO also stated a belief that reports should come much faster and with no additional information. He questioned whether, with the existing level of detail, anyone had the time or need to use all of the information included in accounting reports. The CEO indicated a personal goal with respect to accounting reports would be the ability to answer "nine out of 10 questions" asked of him by the board of directors. He stated that this was not possible given the profusion of detail within the existing financial reporting system.

The CFM believed that managers were generally not accountable for their accounting reports. In addition, he perceived a lack of consistency across groups, in that some managers delegated responsibility and others abdicated responsibility for performance on accounting reports. The CFM went on to state that he thought routine monthly reports were "okay," but that corporate didn't look enough at variances.

Accounting Management. The view of the CEO was that the accounting organization structure had too many layers. He also wondered if there were too many people in the accounting function, and if the function could be centralized to a greater degree. The CEO felt accounting "didn't send the right signals" to managers in terms of encouraging behaviors consistent with the goals of the company. The treasurer stated that our interview represented the first time anyone asked him about accounting services. In the treasurer's opinion, accounting should be more centralized, with a stronger reporting responsibility to the corporate office instead of to station managers.

CONCLUSIONS

Our purpose in this paper was to report on an investigation of perceptual differences between users and providers of MA services. The premise of our study was that success for management accountants relies on good communications (a mutual understanding of the services management accountants provide) and high standards of performance. However, MA service providers may have different perspectives on what constitutes "successful" delivery of MA services. Therefore, management should attempt to identify areas of concern and work to align the views of providers and users.

In order to accomplish our objectives, we interviewed individuals at all levels of management to uncover their perceptions of MA services that they used or provided. We identified commonly understood MA services, as per RQ1. Our qualitative assessment suggested noteworthy perceptual differences in three services: Management Reporting, Training, and Accounting Management. Our quantitative statistical tests, relying on classifications of comments as either positive or negative, indicated that there are significant user-provider perceptual differences in three services at this organization: Planning, Management Reporting, and AIS Support. Further analysis indicated Training to be an area of additional concern. These analyses support RQ2.

There was no statistical difference between the number of positive versus negative comments given by supervisory (supervisors and managers) versus non-supervisory interviewees, failing to support RQ3. Both groups expressed general dissatisfaction with MA services. However, based on the comments from four corporate executives, the answer to RQ3 seems to be a qualified "yes." These executives "consume" only a few MA services and were not aware of the problems noted at lower levels. Generally, this group was satisfied with the services they received. This suggests poor communication between top-level operational managers and corporate-level executive. Utility Company's accounting department took several actions in response to the outcomes of this investigation to improve their communications and internal service marketing, addressing RQ4. Some of these appear in Table 5.

Table 5: List of Actions Taken to Improve Service Quality

1.	**Allocated of more resources to management (versus financial) accounting functions.**
2.	Implemented new training programs for budget managers, and accounting information systems training for accounting staff.
3.	Revised the budgeting process to shorten the budget preparation cycle, improve communication of business planning parameters and targets in advance of annual planning, and increase coordination with longer-term business plans.
4.	Developed a new portfolio of company performance indicators designed to have maximum relevance to each level of management.
5.	Revised the chart of accounts to eliminate codes that were no longer relevant and introduction of an annual process to provide accounting codes that correspond to objectives and performance measures contained in the current business plan.
6.	Reoriented reports to area managers to provide a group-wide view of performance.
7.	Implemented a mandatory training program for accounting function managers focused on developing personal management skills and planning for the accounting function.
8.	Introduced training programs to improve user understanding of accounting services.

Table 5 lists actions taken by management to improve communications between management accountants and service users to improve communications and the quality of services.

Finally, we note a few limitations of this study. First, we obtained the interview data from employees of a single organization and approximately two-thirds of our interviews were with employees in the bottom three functional levels of the organization. Second, external validity and comparisons with other firms and industries are problematic, as are any assertions of causality. Third, we based our qualitative classifications of interview comments as positive, negative, or neutral on personal judgments, which could have introduced bias into the analysis. Given that we know little about perceptions of MA services, much work remains in order to determine the state of service quality. Researchers should conduct future studies in other organizations and industries and undertake cross-sectional investigations. A body of research about MA service quality is required to determine if there are common areas of concern about MA services and ways organizations might improve services in order to better satisfy customers and improve decision making.

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BIOGRAPHY

Kenton Walker is professor of accounting at the University of Wyoming. His research interests include service quality, management uses of accounting information, and information systems. Email: kbwalk@uwyo.edu.

Gary Fleischman is professor of accounting at the University of Wyoming. His research interests focus on business ethics, service quality, and taxation. Email: gflash@uwyo.edu.

Eric Johnson is associate professor of accounting at Indiana University. His research is primarily concerned with auditing and gender issues in accounting. Email: erijohns@iu.edu.

MARK-TO-MARKET AND THE WIDENING GAP BETWEEN FINANCIAL AND TAX ACCOUNTING

Albert D. Spalding, Jr., Wayne State University

ABSTRACT

In the wake of the recent financial meltdown, financial reporting under both North American generally accepted accounting principles (GAAP) and international financial reporting standards (IFRS) has involved renewed attention to the structures and constraints of "mark-to-market" and similar expressions of fair value accounting. Despite some significant opposition by banks and other financial institutions (and their political champions), mark-to-market has enjoyed a relatively high level of support by securities regulators and by the accounting profession. Meanwhile, mark-to-market as a tax accounting concept has recently been subjected to a sustained attack by the Internal Revenue Service, courts, and legislators. This paper examines the recent Treasury regulations, revenue rulings, court cases, legislative proposals and other legal regulatory and administrative promulgations and pronouncements that comprise this renewed opposition to mark-to-market, in an effort to identify and articulate this widening gap between financial and tax accounting in the United States. Inductive research methods include legal research and analysis, and case studies.

JEL: M4, M40, M41

KEYWORDS: Tax accounting, fair value, mark-to-market, tax administration.

INTRODUCTION

In the case of *Thor Power Tool Co. vs. Commissioner* (439 U.S. 522, 1979), the United States Supreme Court acknowledged that tax accounting and financial accounting are two different and separate disciplines. In that case, the notion of "lower of cost or market," an accounting protocol that is widely used in financial accounting for inventories, was effectively abolished for tax accounting purposes. This despite the Internal Revenue Code's premise that businesses and other tax reporting entities use the same accounting principles on their tax returns as they do on their financial statements (26 USC § 446). In some ways, *Thor Power* represents the beginning of a bifurcation of the two accounting systems, and the gap between tax and financial accounting has become more obvious and more pervasive through the decades since that case was decided.

In more recent years, even as financial accounting within the United States and other countries around the world is converging into a globalized system of international financial reporting standards (IFRS), the gap between tax accounting and financial accounting in the United States is has widened even further. This paper examines the recent court cases, administrative pronouncements, and legislative initiatives that have combined to create this larger separation between these two approaches to accounting. After taking into account the history of, and scholarly literature relating to, the tension between tax and financial accounting in regard to fair value accounting, the current status of fair value accounting is considered. In particular, recent legislative, administrative and judicial developments that have combined to halt, and even reverse, the accommodation of fair value accounting within the tax arena. Finally, this paper addresses the significance and the impact of this phenomenon, and the increasing burden that it imposes on business operations as they are required to maintain sufficient books and records so that they can comply with both accounting methods.

LITERATURE REVIEW AND BACKGROUND

The US Supreme Court was correct. There is a difference between the objectives of tax accounting and those of financial accounting. That difference, and indeed the tension between these two approaches to accounting, has been the subject matter of an ongoing conversation among academics, standard setters, and various stakeholders, for several decades. It is a technical discussion, one that resides at the nexus between two larger debates. Within the financial accounting discipline in the United States and elsewhere, there is a deliberate and gradual shift away from balance sheet reporting of historical costs, to the reporting of current or fair values. Tax accounting within the United States, on the other hand, has retained a greater adherence to the historical cost principle, and has relied upon and "all-even as test" for any determination as to whether income transactions, expenditures, or other types of transactions have been completed to the point where the pertinent gains, expenses, or other accounting consequences have been realized. As academics, professionals, standard setters and others debate these movements and the dynamics, business organizations and other reporting entities are caught in the middle. They are required to comply with both accounting regimes, and so they must continually develop and maintain information systems that properly support both.

Zielinski (1997) summarized this discourse in a law review article that emphasized the need for tax accounting to be pragmatic from the perspective of the collection of revenue. He also highlighted the need for uniform, coherent tax accounting principles: he observed, for example, that a common objection to mark-to-market accounting, for tax purposes, is that if it applies only to a subset of positions, taxpayers will gravitate to substitutes that are taxed only if transactions are completed. He recommended that, for the sake of tax administration, the virtues of consistency, acceptability, enforceability, compliance and fairness would be enhanced if Congress required that only completed transactions would have taxable impact for all taxpayers. He also acknowledged, however, that among academics and tax policy experts, the doctrine of realization has largely fallen out of favor.

If Zielinski was a proponent of uniformity, Morse (1999) has been a proponent of flexibility. For him, heavy-handed adherence to rules, such as the all-events test of the realization principle, can result in inappropriate responses on the part of tax authorities in some circumstances. His preference would be that decision-makers would be authorized to take into account a robust set of variables that would allow them to craft appropriate responses to specific situations. As Carman and Gnazzo (2003) have pointed out, the courts have occasionally done exactly that. The authors observed that in the case of *Bank One Corp. v. Comm'r* (120 T.C. 174, 2003), the Tax Court rejected the taxpayer's method of accounting for securities, but also rejected the method proposed by the IRS. A third method, proposed by the court itself, is neither a pure mark-to-market, current value approach (as favored by the taxpayer), nor a transaction-based method (as favored by the IRS). Instead, the court crafted a series of adjustments that allowed the taxpayer to avoid the severity of the preferred IRS method, while exerting some discipline over a mark - to-market approach.

Other scholars have pointed to the importance of theoretical soundness. Even though the principle of realization has historically been central to the jurisprudence of the federal income tax, it has not enjoyed a reputation for theoretical elegance or coherence, at least among academics. Geier (1998) critiqued the realization doctrine and its essential elements (known as the all-events test), and concluded that it did a poor job of matching of expenses to revenue used within a given tax year. She points out that the all-events test as adopted by the Internal Revenue Service is not really equivalent to the matching principle as used in financial accounting, but instead operates as an independent and somewhat arbitrary tax rule. In Dodge's (2006) view, the realization principle, as employed through the use of the all-events test for tax purposes, is a rule that "almost gets it right."

In the midst of this ongoing conversation about tax accounting methods and principles, Root (2000) raised the alarm about the extent to which the Internal Revenue Service has been given the power to arbitrarily require that taxpayers use specific accounting methods. She expressed concern that the anti-abuse provisions of the Internal Revenue Code have been interpreted by the courts as a broad grant of discretion to the IRS, both to determine whether an accounting method used by a taxpayer clearly reflects income, and, if the Service determines that it does not reflect income, to specify and require the Service's preferred accounting method. Her analysis of this yielding of discretion by the courts and by Congress, led her to ask where the rule of law has gone and whether and how we can get it back.

Most of the analysis and scholarship in this area has focused on the propriety and the fairness of the tax accounting methods as prescribed in some cases by Congress, and in other cases by the IRS. Fair value accounting, in particular, has been compared to transaction-based accounting in light of the overall objectives of tax administration. With the exception of a few scholars, such as Zielinski, most academics have applauded the incremental gravitation toward fair value accounting by both tax and financial accounting standard setters. This paper suggests that the graduation toward fair value tax accounting has halted, if not reversed, even as the movement toward current value accounting has continued or accelerated for financial accounting purposes, and considers the implications of the resulting gap.

Historical Cost vs. Fair Value Accounting

The art of accounting emphasizes objectivity, relevance, and reliability of the financial information being communicated. To that end, much attention is paid to the way assets and liabilities are measured and reported. According to the Financial Accounting Standards Board (FASB) *Concepts Statement No. 5* (1984), five attributes can be taken into account for this purpose: historical cost, current cost, current market value, net realizable value, and present value of future cash flows. Generally, historical cost refers to the amount paid to acquire an asset, and is commonly adjusted after acquisition for amortization or other allocations. Current cost is the amount that would have to be paid if the same or an equivalent asset were acquired currently. Current cost is the amount that would have to be paid if the same or an equivalent asset were acquired currently. Current market value (often referred to as fair value, or market value) is the amount that could be obtained by selling an asset in orderly liquidation. Net realizable value is the amount, net of direct costs, into which an asset can be expected to be converted in the due course of business. Present value is the discounted value of net future cash inflows into which an asset can be expected to be converted in the due course of business.

The traditional measurement attribute used in financial reporting has been historical cost. The historical cost protocol results in the recording of transactions at their entry price. At the point of exchange, historical cost is equivalent to fair value because it represents the price at which a willing buyer and a willing seller would establish at the time of the transaction. Over time, portions of the historical cost of an asset are "matched" to annual revenues, through a process of depreciation or amortization. As this happens, the net book value (that is, the difference in cost and accrued depreciation or amortization) is reflected on the balance sheet of the organization even though the fair value of the asset may be different.
Generally accepted accounting principles (GAAP) have for many years been guided by the historical cost principle. Historical cost has been considered reliable because it exists as a historical event that can be verified by the documentation accompanying the purchase transaction. Market values, in contrast, are often difficult to obtain accurately for many assets, and are usually temporary. Under a fair market accounting, fluctuations in market values trigger unrealized gains and losses until the asset is sold.
And yet, in recognition of the shortcomings of historical cost, alternatives and exceptions to the historical cost principle have been developed for purposes of GAAP. For example, under the lower-of-cost-or-market concept, inventory can be reflected on the balance sheet at the lesser of the inventory's historical cost and market value. The reported value of certain marketable securities held by the reporting organization is also maintained at fair value. Similarly, impairments of investments and other assets are

recognized, even though this can result in a recorded value less than the original historical cost. In these specific situations, the FASB has concluded that the continued use of "true" historical cost accounting was inappropriate, because strict adherence to the historical cost principle would result in financial distortions rather than fair representations.

As described in its *Concepts Statement No. 2* (1980), the FASB has pointed to relevance and reliability as the primary qualitative accounting characteristics that distinguish more useful accounting information from less useful accounting information. In financial accounting, information is considered to be relevant when it makes a difference for investors, creditors, or other users of information as they assess future cash flows and attempt to make investment decisions, lending decisions, and other decisions in reliance upon the information. On the other hand, information is considered to be reliable when it captures how well the measure represents what it purports to represent and can be verified.

In the selection and establishment of useful accounting standards, trade-offs can occur between relevance and reliability. This tension is brought into sharp focus as the accounting profession, users of financial statements, and society in general, deliberate and debate the various advantages and disadvantages of fair value accounting as opposed to the historical cost principle. To the extent that it is determined that there is a need for greater relevance, fair value accounting is emphasized. On the other hand, to the extent that reliability and verifiability are paramount, the emphasis shifts to the historical cost principle.

FINANCIAL ACCOUNTING'S RECENT EMPHASIS ON RELEVANCE

Over the last decade, the FASB has moved toward a more comprehensive view of the appropriateness of fair value accounting, especially for financial instruments. This evolution began in 1991 with the issuance of *Statement No. 107, Disclosures about Fair Value of Financial Instruments* (now codified at FASB ASC 825-10-50-1), whereby companies were required to disclose fair market values for financial instruments. This was followed in 1993 by *Statement No. 115, Accounting for Certain Investments in Debt and Equity Securities* (FASB ASC 320-10-25-1), which required debt and equity securities that are available-for-sale or trading to be recorded at fair value rather than, as in the past, lower of cost or market.. In 1998, *Statement No. 133, Accounting for Derivative Instruments and Hedging Activities* (FASB ASC 825-10-35-1) was issued, requiring that derivatives be recorded at fair value. Prior to that pronouncement, these activities were not reported on the balance sheet at all.

FASB *Statement No. 115* provides specific guidance for the accounting for investments such as mortgages and mortgage-backed securities. Under that standard, companies holding these types of investments are required to categorize them into three separate groups. "Hold to maturity" investments are those which the owner holds in its portfolio with no intention or compulsion to sell. Because these investments are being held long-term, temporary fluctuations in the market value of these investments are not considered to be relevant and are not taken into account. For these investments, the accounting protocol approximates that of the historical cost principle. "Trading securities" are at the other end of the spectrum. This refers to securities which the owner intends to sell or turn over on a regular basis. These investments are "marked to market" at every balance sheet date, and any gains or losses are recognized currently on the owner's income statement. "Available for sale" securities fall within an intermediate category, and represent investments that the owner intends to sell at some point, based on operational and financial decision-making. These securities are marked to market in the same manner as trading securities, but the resulting gains and losses are not recognized through the income statement. Instead, unrealized gains and losses on these securities are recognized through a special category of shareholder equity, "Additional Other Comprehensive Income." The reader of the financial statement can see this AOCI gain or loss on the Statement of Shareholder's Equity.

The most dramatic fair value accounting pronouncement by the FASB, *Statement No. 157, Fair Value Measurements* (FASB ASC 820-10-35), issued in September 2006, did not actually require fair value accounting *per se.* What it did do, however, was set forth valuation protocols for those situations for which fair market value of accounting was already required via previous promulgations. A three-level hierarchy for measuring fair value is established, based on the availability of market information. For securities for which an exchange price is available, referred to as Level 1, the valuation is established at the fair value for which the security would sell at market. If there is no formal, ongoing, meeting place for exchange, *Statement No. 157* requires the use of market participant assumptions based on credible market data obtained from independent sources (Level 2). If no such credible market data can be found, the reporting entity may used its own assumptions based on the best information available in the circumstances (Level 1). These three "confidence levels," from which these protocols are derived, have been referred to by cynics as "mark to market; mark to model; or make it up."

As soon as *Statement No. 157* became effective, many banks and financial institutions were required to be value their holdings of financial instruments. This, in turn, caused an uproar, and led to a grand debate about whether the requirements of *Statement No. 157* actually "caused" the financial crisis of 2008 and 2009, or merely "precipitated" the crisis by shedding light on problems that should probably have been disclosed years earlier. In response to this brouhaha, the United States Congress enacted the Emergency Economic Stabilization Act of 2008, which directed the Securities and Exchange Commission to research and report on the impact of *Statement No. 157* on the market. The SEC's responsive report rejected the proposition that mark-to-market caused economic distress, but called for more clarification of the measurement rules. Despite recurrent calls for revocation of *Statement No. 157* from various corners, including some banks and a number of their supporting politicians, mark-to-market is not only here to stay; it is likely to be expanded in the years ahead.

Part of that likely expansion is related to the convergence between U.S. GAAP and the International Financial Reporting Standards (IFRS). As Fosbre, Kraft and Fosbre (2009) have observed, the movement toward global accounting standards has accelerated in recent years. IFRS also provides for a similar methodology for determining fair value, that is, for arriving at an amount equivalent to the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties, in an arm's length transaction. Under IAS 39, quoted prices in active markets must be used as fair value when available. In the absence of such prices, the reporting entity is required to use valuation techniques and all available relevant market information so that valuation techniques maximize the use of observable inputs (International Accounting Standards Board, 2004).

Proponents of fair value accounting have argued that fair values for assets and liabilities provide more timely and more relevant information, increase transparency, and encourage promptness in the correction of financial reporting information. Despite objections that fair value accounting is not as readily verifiable as historical cost accounting, and despite concerns that current value information could be distorted by market fluctuations and inefficiencies, by overreactions to liquidity problems, and by investors are rationality, fair value accounting is here to stay. Both in the United States and globally, accounting standard setters are committed to an evolutionary process that will result in continued graduation from historical cost to fair value accounting for financial reporting purposes.

TAX ACCOUNTING: NO "LOWER OF COST OR MARKET" INVENTORY

Section 446 of the Internal Revenue Code (26 USC § 446) provides that taxable income "shall be computed under the method of accounting on the basis of which the taxpayer regularly computes his income in keeping his books." This section includes the relevant portions of its predecessor § 41 of the 1939 Code relating to methods of accounting, and provides the general rule that the regular method of accounting used in keeping the books of the taxpayer is to be used in the computation of income for tax

purposes. This establishes the premise that taxpayers need not develop an entirely different system of accounting protocols and procedures in order to comply with the income tax laws. Instead, the starting point for tax compliance is the utilization of the books and records, including the accounting methods, used for financial reporting purposes.

In fact, the Internal Revenue Code that are specifically permits the Secretary of the Treasury (and, by delegation Commissioner of Internal Revenue) to require the use of accounting methods that clearly reflect taxable income, even if those methods are not the same it as used for financial reporting purposes. But section 446 of the code also provides that if no established method of accounting has been regularly used by the taxpayer, or, if the method used does not clearly reflect income, the computation of taxable income shall be reconstructed by the Internal Revenue Service in a manner that does properly reflect taxable income. Other parts of the Internal Revenue Code requires specific accounting methods in certain situations area other rules within the code emphasized the role of the IRS in requiring the calculation of taxable income in a manner that is satisfactory to the government. Section 471 of the Internal Revenue Code (26 USC § 471), for example, provides that whenever the use of inventories is necessary in order clearly to determine the income of any taxpayer, inventories shall be taken by such taxpayer on such basis as the government may prescribe as conforming as nearly as may be to the best accounting practice in the trade or business and as most clearly reflecting the income.

This statutory empowerment of the Commissioner of Internal Revenue as the tax accounting standard setter has been largely supported by the courts. This has been especially true since the United States Supreme Court weighed in on the matter in the in the case of *Thor Power,* mentioned above. In that case, the IRS took issue with tool manufacturer Thor Power's calculation of losses stemming from certain items of inventory -- namely, 44,000 pieces of excess merchandise, most of them spare parts and accessories. To value these items, Thor employed the "lower of cost or market" (LCM) method of inventory accounting. Under this method, the taxpayer values inventory at either cost or market value, whichever is lower. Thor put the market value of the items of excess merchandise at approximately their scrap value and thus recognized a loss on those items, which contributed to a net operating loss for the year. Meanwhile, however, Thor continued to offer the "excess" items for sale at their original prices. The Commissioner disallowed the offset on the ground that Thor's valuation of the inventory did not constitute a clear reflection of income as required by the Code. The Court agreed, concluding that the Commissioner acted within the discretion afforded by the statute in deciding that Thor's write-down of 'excess' inventory failed to reflect income clearly. In resolving the matter, the US Supreme Court held that the IRS is clearly vested with wide discretion in determining whether a particular method of inventory accounting should be disallowed as not clearly reflective of income.

In arriving at its decision, the court in the Thor Power case took note of the "vastly different objectives that financial and tax accounting have." It affirmed that notion that an accounting method that may be entirely satisfactory for book purposes may be unsatisfactory for reporting taxable income. The intent and design of § 446 was upheld by the Court: any accounting method used by a taxpayer to calculate income must render a clear reflection of income consistent with the goals of the Internal Revenue Service ... as determined by the Service.

MOVING AWAY FROM FAIR VALUE: THE CASE OF MMC CORPORATION

If there has been any one area where fair value accounting is clearly called for, it has been accounting for dealers in securities, and for holders of financial instruments (for the purpose of eventually selling or liquidating them). As noted above, both IFRS and US GAAP have identified accounting for securities held for sale as one of the most obvious situations for which fair value accounting is appropriate. Indeed, as part of the Omnibus Budget and Reconciliation Act of 1993, the U.S. Congress added § 475, to the Internal Revenue Code (26 USC § 475), specifically allowing mark-to-market accounting method for

dealers in securities. As enacted in 1993, § 475 defined the term "security" to include any "note, bond, debenture, or other evidence of indebtedness." Treasury regulations interpreting this statute provided that a debt instrument can be considered to be customer paper if (1) a person's principal activity is selling nonfinancial goods or providing nonfinancial services, (2) a debt instrument was issued by a purchaser of goods or services at the time of purchase to finance the purchase and (3) at all times since the debt instrument was issued, it has been held either by the person selling the goods or by a corporation that is a member of the same consolidated group as that person (26 CFR. § 1.475(c)-1(b)(2)).

Many taxpayers took the position that their accounts receivable that met this definition of customer paper were securities under the statute. Hence, they elected dealer treatment, and accounted for their customer paper using fair value accounting for tax purposes. Electing taxpayers determined the current value of their nonfinancial customer paper (i.e., trade accounts receivable) on hand at the end of each tax year, and recognized gain or loss equal to the resulting increase or decrease in value.

Five years later, however, Congress passed the Internal Revenue Service Restructuring and Reform Act of 1998, which modified the definition of security under § 475. Under the revised statute, "nonfinancial customer paper" was excluded from the definition of security, effectively prohibiting taxpayers from marking to market their trade accounts receivable. This was a major step backwards for those taxpayers who were using fair value accounting for both financial and tax reporting, and who were now required to essentially maintain two separate accounting systems in order to accommodate the new law.

The recent case of *MMC Corp. v. Comm'r*, 551 F.3d 1218 (10th Cir. 2009) helps to highlight the impact of this change in the tax law. MMC Corporation and its subsidiaries are in the construction services business. MMC elected in 1997 to change its method of accounting for customer paper (i.e., accounts receivable) from the face-value method to the mark-to-market method as permitted at the time by § 475 of the Internal Revenue Code. As a result of using fair value accounting for its accounts receivable, MMC reported a loss and a resulting tax deduction of $5,349,372 on its customer paper accounts. Had it not used fair value accounting, MMC would not have been entitled to deduct these accounts until they actually became worthless. The deduction offset MMC's taxable income for 1997, thereby reducing MMC's corporate income tax liability.

Unfortunately, one year after their change to the mark-to-market method, Congress amended the tax code to prohibit mark-to-market evaluation of customer paper accounts, and MMC had to revert to their original method because of the change in the tax law. The original method, which was a face-value approach rather than a market-value approach, did not involve write-downs. The IRS was concerned that once MMC changed back to the face-value approach, the taxpayer would expect to claim an additional loss (and resulting deduction) if and when the accounts actually became worthless. To prevent these omissions and duplications, the IRS required MMC to treat the change back to the face-value approach, as a change in accounting method. Thus, in determining its income for tax years 1998 through 2001, MMC was required to account for $ 1,337,344 in 1998, $ 1,337,341 in 1999, $ 1,337,339 in 2000, and $ 1,337,338 in 2001 through four positive adjustments. These sums would, to use MMC's terminology, "recapture" the $ 5,349,372 4 deduction taken in 1997 by adding it back into MMC's taxable income in increments over the four-year period.

In a sense, MMC fared well as a result of this process. The company was able to deduct over $5 million worth of decline in value on its commercial paper in one year, and recapture that same amount over a period of four years. On the other hand, the deductions reflected the conditions of the marketplace at the time (in 1997), while the recoupment of that same income was imposed on the taxpayer irrespective of the economic conditions of the following four years. In addition, the sheer size of the difference between these two methods of accounting for this taxpayer demonstrates the significance of the change in 1998 which prohibited the use of mark-to-market for companies like MMC. In addition, as noted above, the

1998 change in the law forces companies like MMC to account for its customer paper using fair value accounting (irrespective of whether MMC is using IFRS or US GAAP), and to separately account for its customer paper using the face-value method for tax purposes.

UNICAP AND THE CASE OF ROBINSON KNIFE MANUFACTURING COMPANY

The *Thor Power* decision by the U.S. Supreme Court permitted the IRS to preclude the use of lower of cost or market for inventories. From a computational perspective, this prohibition of fair value accounting had two effects on the books of *Thor Power*. First, write-downs of inventory, with a corresponding deduction against taxable income, were not allowed. Second, ending inventories are always kept at a higher level than would be the case if write-downs were allowed. When an ending inventory is increased, or kept at a higher level than would otherwise be the case, this reduces the cost of goods sold and serves to increase the gross profit of the taxpayer.

For a manufacturing business, "gross income" for tax purposes means the total sales, less cost of goods sold. The cost of goods sold is determined by subtracting the year-end inventory from the total inventory available during the year, so that the taxpayer excludes goods that have been sold from ending inventory. Reducing the year-end inventory thus increases the cost of goods sold and correspondingly reduces income. Cost of goods sold, or cost of sales, in turn, is the price of buying or making an item that is sold." Over a given period, it is calculated as the dollar value of beginning inventory, plus purchases, less the dollar value of ending inventory. In short, cost of goods sold is a measure of inventory sales.

The denial of the lower of cost or market method of accounting for ending inventories, with the corresponding increase in taxable gross profits, was the idea of the IRS, and the idea culminated in the US Supreme Court decision of *Thor Power*. But it was Congress who, in 1986, added § 263A to the Internal Revenue Code. That section imposes "uniform capitalization rules," often referred to as UNICAP, which require manufacturers to bury many of their indirect manufacturing costs into their calculations of ending inventories, or to otherwise write them off over time rather than in the year they are incurred. Under § 263A, costs capitalized under section 263A are recovered through cost of goods sold, depreciation, amortization, or by an adjustment to basis at the time the property is used, sold, placed in service, or otherwise disposed of by the taxpayer.

At the time (in 1986), Congress was acting to address what it perceived as two significant problems concerning the expense/capital expenditure boundary with respect to inventory: First, the legislature was concerned that the more flexible financial accounting rules were allowing costs that were in reality costs of producing, acquiring, or carrying property, to be deducted currently, rather than capitalized into the basis of the property and recovered when the property is sold or as it is used by the taxpayer. This produced, in the view of Congress, a deferral of taxes. Second, Congress was concerned that different capitalization rules were being applied in different circumstances, depending on the nature of the property and its intended use. Those differences could arguably create distortions in the allocation of economic resources and the manner in which certain economic activity is organized. To fix these possible problems, Congress enacted § 263A, which was an attempt to impose a single, comprehensive set of rules would govern the capitalization of costs of producing, acquiring, and holding property

The mandate to capitalize costs, such as by increasing ending inventories by absorbing a comprehensive list of overhead costs (rather than writing those costs off directly against taxable income), not only runs counter to the fair value accounting notion of lower of cost or market, but it moves tax accounting even further away from financial accounting than would otherwise be the case. These rules are designed to achieve a result that is as similar as possible to what would happen if it were administratively feasible to keep track of each individual inventory item, so that whenever an item were sold its cost basis would be known, and the taxpayer would pay income tax on the gain (or deduct the loss) from the sale of that

inventory item. Some capitalization of costs is consistent in principle with US GAAP and financial reporting generally, but not to the extent of the UNICAP rules of § 263A.

The recent case of *Robinson Knife Mfg. Co. v. Comm'r*, 2010 U.S. App. LEXIS 5693, 2010 WL 986532, 94 U.S.P.Q.2d 1045 (2d Cir. Mar. 19, 2010), serves as an example of the reach and application of § 263A. Robinson is a corporation whose business is the design, manufacture and marketing of kitchen tools such as spoons, soup ladles, spatulas, potato peelers, and cooking thermometers. In the process by which Robinson typically turns an idea into a saleable finished product, someone at Robinson comes up with an idea for a product. Robinson then decides which brand name would be best for that product, and if Robinson does not already have a licensing agreement that would permit it to use that trademark on the proposed product, it tries to negotiate one. Once Robinson has a licensing agreement in hand, it hires an industrial designer to design the product, and the trademark licensor is consulted to make sure that they agree that the designer's plans are appropriate for the brand that's involved. Robinson next contracts out the manufacturing, usually to firms in China or Taiwan, and the products are shipped to Robinson in the United States. With the products in hand, Robinson markets them under the previously selected brand name to customers, who are generally large retailers such as Wal-Mart or Target.

As part of their business, Robinson entered into trademark licensing agreements with Corning, Inc. (for the use of the Pyrex name) and Oneida Ltd. (for the use of the Oneida name). The agreements gave Robinson the exclusive right to manufacture, distribute, and sell certain types of kitchen tools using the licensed brand names. In return, Robinson agreed to pay each trademark owner a percentage of the net wholesale billing price of the kitchen tools sold under that owner's trademark. These royalty payments were calculated as a percentage of sales revenue from the licensed inventory, and were incurred only upon sale of such inventory. Robinson deducted these royalty payments to Corning and Oneida as ordinary and necessary sales-related business expenses under § 162 of the Internal Revenue Code.
The IRS had other ideas. Based on § 263A, the IRS determined that the royalty payments made by Robinson to Corning and Oneida should be added to Robinson's capital and deducted only over time, either as a separate asset, or, as part of ending inventories. As a result, the IRS denied to the deduction and issued a notice of deficiency to Robinson. Robinson petitioned the Tax Court for a redetermination of the deficiency, but the Tax Court rejected Robinson's arguments. It held that, within the meaning of § 263A, the royalties directly benefitted Robinson's production activities or were incurred by reason of those activities. It also held that the royalties were not marketing costs exempt from capitalization or absorption into ending inventories.

On appeal, the Second Circuit disagreed. It noted that royalties like Robinson's in this case do not directly benefit production activities, and are not incurred by reason of the performance of production activities. It observed that Robinson could have manufactured the products, and did, without paying the royalty costs. None of the product approval terms of the license agreements referenced by the Tax Court relates to Robinson's obligation to pay the royalty costs. Robinson could have manufactured exactly the same quantity and type of kitchen tools – that is, it could have performed its production activities in exactly the same way it did – and, so long as none of this inventory was ever sold bearing the licensed trademarks, Robinson would have owed no royalties whatever. Robinson's royalties, therefore, were not, in the view of the Second Circuit court, factory overhead that was some incurred by reason of production activities, and did not directly benefit such activities. It concluded that Robinson's royalty payments were, in economic substance, nothing other than true sales-based royalties that were properly deducted currently in the same manner as advertising and other sales-related expenses. This allowed Robinson to maintain consistent accounting treatment of the royalties for both tax accounting and financial reporting.

The case of *Robinson Knife Mfg. Co.* serves as an indication that there are limits to the extent to which the IRS may recharacterize the accounting treatment of items to suit its purposes. Despite *Thor Power*, and despite broad statutory language giving the IRS the authority to require accounting methods that do not,

in its view, distort income, this case stands for the proposition that the IRS must stay within the parameters of some level of reasonableness. Nevertheless, this case also serves as an indication of the cost that must be incurred by a taxpayer if the taxpayer wishes to challenge IRS attempts to require accounting methods that run contrary to those normally used in financial accounting. In this case, Robinson had to endure an IRS audit, the assessment of an IRS deficiency, an administrative appeal within the IRS, a petition to the Tax Court, a full Tax Court proceeding, and, finally, an appeal to the US Court of Appeals for the Second Circuit. And while future taxpayers may benefit from these efforts and expenses on the part of Robinson, there is no indication that the IRS will be dissuaded from continuing its aggressive stance toward tax administration by way of accounting recharacterization.

UNICAP FOR AUTO DEALERS

Battles over technical accounting protocols are not being waged solely within the courts. The IRS has maintained a number of administrative initiatives that comprise a comprehensive effort to avoid being drawn into the financial accounting discipline's movement toward fair value accounting. A prominent example of this effort has been the agency's stance toward auto dealers, and whether auto dealers "produce" final products in the same manner as auto manufacturers.

Typically, auto dealers sell new and used vehicles, and also sell vehicle parts. In addition, auto dealer service departments repair and install parts on vehicles owned by customers (as well as on and new and used vehicles owned by the auto dealers themselves). An auto dealership usually has both "regular" sales automobiles to retail customers, as well as "lease sales." If a retail customer prefers to lease a vehicle, the auto dealer usually leases the vehicle to the customer and simultaneously or immediately thereafter sells the vehicle, subject to the lease, to a credit financing company. To facilitate sales of new and used vehicles, an auto dealership will allow its customers to trade in their used vehicles in exchange for a reduction in the price of a new or used vehicle that the customer is purchasing from Taxpayer. If the dealership determines that a particular trade-in is not suitable for retail sale, it will sell the trade-in on a wholesale basis. The dealership will also sell, on a wholesale basis, some trade-in vehicles that it originally intended to sell on a retail basis and some vehicles that it has purchased at auction. If a customer wants to purchase a vehicle that the dealership does not have in stock (e.g., a specific model in a particular color), the dealership will arrange to acquire the vehicle from another dealership. Usually, dealers accommodate each other and sell such vehicles at the dealer's cost. Likewise, when a dealership sells new vehicles to other automobile dealers, it does so at its cost. Dealerships also sell multiple new vehicles in fleet sales.

An automobile dealership also typically has a "service" department that "repairs" automobiles, most of which involves installation of new or replacement automobile parts. Under tax accounting principles, the activities of an automobile dealership's service department would qualify as providing services to customers as well as sales of goods to customers and production of goods for sale to customers. Similarly, the law of tax accounting distinguishes between repairs and improvements and provides different treatment for each. Besides working on customer-owned vehicles, the service department also installs certain options such as air running boards, alarm systems, plow packages, towing packages, air conditioning, stereo equipment, and entertainment systems on new vehicles. Some of these options are installed prior to the sale of the new vehicle being consummated, and some are installed subsequent to the sale transaction being completed. Whether the option is installed before or after the sales transaction is completed often depends on the dollar value of the option being installed. For example, if the cost of any option is above, say, $200, an auto dealership often will not install the option until the customer completes the sales transaction.

An auto dealership's service department also normally installs parts on used vehicles to correct defects or to make them more suitable for sale. Auto dealerships often obtain most of their used vehicles from

auction or trade-ins, and sometimes install new or replacement parts, if needed, prior to reselling the vehicles. The extent of the work done on a vehicle depends on the retail merit of the vehicle in the auto dealership's judgment. "Retail merit" in the auto industry refers to the following characteristics of the vehicle: mileage, condition, year of vehicle and amount of work required to ready for resale. Auto dealerships also sell automobile parts to automobile repair shops that install the parts in retail customers' vehicles. Other part sales are made to end users. Auto dealerships generally account for new vehicle inventory under the last-in, first-out (LIFO) method, and for used vehicles and parts inventory under the first-in, first-out (FIFO) method. Auto dealerships whose average annual gross receipts are over $10,000,000 are subject to the uniform capitalization rules under § 263A of the Internal Revenue Code and the corresponding Treasury Regulations.

In September 2007, the IRS issued *Technical Advice Memorandum 200736026.* In that case, an auto dealership under IRS audit had been capitalizing § 263A costs to ending inventory using a self-developed method. Under this method, the dealership computed two absorption ratios, one applied to new vehicle inventory, and the other to parts inventory. The dealership capitalized additional § 263A costs to new vehicles by dividing additional § 263A costs attributable to new vehicles by current year purchases and then multiplying the result by the LIFO increment. The dealership capitalized additional § 263A costs to parts by dividing additional § 263A costs attributable to parts by current year purchases of parts and then multiplying the result by § 471 parts costs in ending inventory. The dealership included a limited amount of mixed service costs in the calculation. The dealership did not capitalize any additional § 263A costs to the used vehicle inventory.

When the dealership's service department repaired or improved dealership-owned vehicles, the costs of parts and labor are accumulated on documents called "internal repair orders." The dealership capitalized the total on the internal repair order to the inventoriable basis of the new and used vehicles. However, other than a limited amount of mixed service costs, the dealership did not capitalize any other indirect costs to new vehicles or to parts. In its TAM, the IRS concluded that when a taxpayer or a subcontractor installs parts to new and used vehicles owned by the dealership, the activities may constitute "production activities" under IRC § 263A(g)(1) and the corresponding regulations (26 CFR 1.263A-2(a)(1)(I)). The IRS also concluded that costs attributable to repair/installation activities with respect to customer-owned vehicles may constitute "handling costs" under a related regulation (26 CFR § 1.263A-3(c)(4)). Additionally, vehicles sold at wholesale, vehicles sold to another dealership at cost, leased vehicles, and some parts sales generally are not on-site sales to retail customers.

The IRS on September 15, 2009, directed its agents to suspend examination of section 263A issues for auto dealerships to encourage compliance and to allow taxpayers in the auto dealership industry an opportunity to voluntarily change their methods of accounting. The directive was issued by the heavy manufacturing and transportation industry director for the IRS Large and Mid-Size Business ("LMSB") Division. The directive is effective through December 31, 2010. The decision to suspend examination of section 263A issues was intended to allow auto dealers an opportunity to voluntarily change their methods of accounting to comply with the legal reasoning outlined in the 2007 TAM.

Taken together, these cases and administrative actions on the part of the IRS provide a clear and strong signal that the Service, and, for that matter, Congress, have no plans to join the financial accounting trend in the direction of fair value accounting. The one statutory exception, § 475 of the Code, has been trimmed to include only dealers in securities, irrespective of other types of taxpayers who rely of fair value accounting for financial accounting purposes. Manufacturers, retailers, wholesalers and many other types of taxpayers are effectively required to maintain two sets of books to account for their inventories. And whenever there is doubt about whether to rely on historical cost information, or more current fair value information, the default protocol for tax purposes is nearly always the historical cost principle.

CONCLUSION: THE WIDENING GAP BETWEEN TAX AND GAAP

The case studies here do not constitute an exhaustive aggregation or compilation of the various initiatives by the IRS, the Congress, or the courts, as they act to widen the gap between the historical cost emphasis of tax accounting and the increasing use of fair value accounting for financial reporting purposes. But it is safe to say that these cases are representative and instructive, especially in light of other indicators of this same trend. A recent analysis by Lee A. Sheppard, published in *Tax Notes Today* (2009), provides additional evidence (derived from the remarks of IRS officials at a Tax Executives Institute meeting) of the IRS' acknowledged hesitation to embrace mark to market accounting, especially in regard to investment accounts and hedge funds. A recent Treasury Department proposal to eliminate the last-in-first-out (LIFO) inventory method, which approximates current values more closely than other inventory methods, is also indicative.

There are macroeconomic implications and microeconomic implications of this widening gap between the fair value emphasis of financial accounting and the historical cost/realization principle of tax accounting. At the macroeconomic level, standard setters for tax accounting (that is, Congress, the IRS, and of course) are insistent upon the notion that tax accounting should result in a clear reflection of income. At the same time, financial accounting standard setters (such as the FASB and the IASB) are dedicated to the continual improvement of financial accounting so that it ensures a fair representation of the economic activities of reporting entities.

These objectives are very close, even if the methodologies advocated by the respective standard setters are not. They cannot both be right, if the accounting regimes developed by each result in significantly different measures of income. A limitation of this paper is that it does not attempt to measure, at the macroeconomic level, the differing results of these two approaches to accounting. If the macroeconomic differences are very large, the theoretical underpinnings relied upon by one set of standard setters or the other, may need to be revisited. But at the macroeconomic differences are small, questions about the costs of requiring separate accounting systems, especially for tax purposes, ought to be asked and addressed.
At the microeconomic level, this widening gap places an increasing burden on taxpayers, who are required to develop and maintain separate accounting information systems that will yield differing results and reports in regard to the same accounts on their books. Another limitation of this paper is that it points to, but does not attempt to measure, that burden. Although the cost of maintaining historical information, and then providing that information as needed for purposes of tax compliance, might not be severe, it has not been measured here (or, from a review of the literature, by any other researchers to date). The extraction and calculation of these costs are likely within the reach of empirical researchers, and appears to be a research opportunity for accounting scholars who would be willing to measure them.

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BIOGRAPHY

Albert D. Spalding, Jr., is a former tax law specialist at the Internal Revenue Service National Office in Washington, DC, and now serves as Associate Professor of Legal Studies at Wayne State University. He can be contacted at the Department of Accounting, School of Business Administration, Wayne State University, Detroit, Michigan 48202. Email: aspalding@wayne.edu

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