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TESTING PARTIAL ADJUSTMENT DIVIDEND BEHAVIORAL MODELS IN EMERGING MARKETS: EVIDENCE FROM PRE AND POST MARKET REFORMS IN BANGLADESH

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ABSTRACT

A number of studies examine dividend policy and security price behavior in emerging markets but none on the stock market of Bangladesh. Partial adjustments are made to dividend behavior models that are then tested on the Dhaka Stock Exchange using data over the period of 1988-2003 in order to identify the dividend policy and security price behavior of the emerging Stock Market of Bangladesh. The empirical results suggest that dividend decisions are primarily governed by current profitability and lagged dividends. The empirical results identified cash flow as the better measure of the company's ability to pay dividends.

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INTRODUCTION

Dividend behavior among emerging financial markets is assumed to be quite different from developed markets. Several studies have been published on dividend policy and security price behavior regarding developed markets but very few of these studies have examined this issue in emerging markets. However, because of the financial reform in Asia in 1997/98 and a great deal of speculation, the Dhaka stock market crashed in 1998 with many other markets in Asia. No study focused on the situation of the post market reform either in Asian or Latin American emerging markets. Despite the evidence in the emerging markets on dividend behavior, no recognized study was conducted on the partial adjusted dividend behavioral models.

The primary purpose of this study is to identify the dividend policy and security price behavior of the emerging Bangladesh market. Partial adjustment models are tested on the Dhaka Stock Exchange data over the period of 1988-2003 to identify the dividend policy and stock price behavior of this emerging market. This study also distinguishes the behavioral difference in the pre (1988-1997) and post (1999-2003) market reform. The sample for this study is unique in the sense that key market characteristics are taken into consideration of an emerging market such as sect oral representation, size, product diversity, activity, consistency of payment, and payout ratio, etc.

The empirical results suggest that Brittain's (1966) dividend behavior model offers an adequate explanation of dividend behavior of the listed companies on the Dhaka Stock Exchange. Further, the findings also suggest that dividend decisions are primarily governed by the magnitude of current profitability. This appears to be the major variable for determining the capacity of the companies to pay dividends as well as dividends paid in the previous years, (i.e., lagged dividends). Nevertheless, the empirical results also identified cash flow as the better measure of the company's ability to pay dividends. The remainder of this paper is divided into four sections. A brief review of the theoretical background of partial adjustment models in section two. Section three contains the description of data and sample of the empirical analysis. The empirical results are reported in section four. The summary and concluding remarks are incorporated in section five.

THEORETICAL BACKGROUND

This section contains the brief review of the partial adjustment dividend behavioral models. Also included in this section is the identification of the key variables that identify the unique dividend policy and behavior of an emerging financial market. Finally, this section identifies the best-fitted partial adjustment dividend behavioral model of an emerging market.

Lintner's (1956) partial adjustment model: In the pioneering study of 1956, Professor John Lintner investigated dividend behavior over an extended period. He viewed dividend payout as a function of net current earnings post tax as well as the dividend payout in the previous years (lagged dividends). Changes in the dividend payout ratio $\{\Delta DPR = (Dividend / Sales)_t - (Dividend / Sales)_{t-1}\}$ are considered as the dependent variable of the model. Current profitability (Net Profit Post Tax / Sales), and the lag of the dividend payout ratio are considered as the independent variables of the model. It is worth mentioning that the considered variables are scaled (deflated) by common size (sales) to remove heteroskedasticity and outlier problems.

Darling's (1957) Partial Adjustment Model: In this model, Paul Darling modified Lintner's formulation to include expectations and liquidity in the determination of dividend policy. Darling, in essence, proposed a more complete explanation of dividend behavior without Lintner's principal emphasis. Darling hypothesized that dividends are a function of current investment, current use of external funds, as well as past dividends and current earnings. However, he concludes that lagged profits would offer a better explanation than the current level of dividends. In addition, he added depreciation and amortization recoveries as a source of funds and changes in sales as a working capital requirement. Changes in the dividend payout ratio $\{\Delta DPR = (Dividend / Sales)_t - (Dividend / Sales)_{t-1}\}$ is considered as the dependent variable of the model. Current profitability (Net Profit Post Tax / Sales), lag of profitability, amortization (Depreciation and Amortization / Sales), and growth (changes in sales) are considered as the explanatory variables of the model.

Brittain's (1966) Partial Adjustment Model: The effort by John Brittain from the Brookings Institution, could arguably be the most far reaching of the macro time-series studies on dividend behavior. Brittain's model suggests that cash flow is the better measure of the company's ability to pay dividends. Changes in the dividend payout ratio $\{\Delta DPR = (Dividend / Sales)_t - (Dividend / Sales)_{t-1}\}$ is considered as the dependent variable. Cash flow (Net Profit Post Tax + Depreciation/ Sales), and the lag of the dividend payout ratio are considered as the explanatory variables in Brittain's model.

Fama and Babiak's (1968) Partial Adjustment Model: Fama and Babiak (1968) offered their work on the partial adjusted model of Lintner (1956 and 1963) and the extended work by Brittain (1964 and 1966). They examined the dividend policy of 392 industrial firms over a period of 19 years (1946-64). Fama and Babiak tested behavioral models on individual firm data, ran simulations, and predicted the best-fit behavioral model. The empirical results provided consistent evidence on dividend models for individual firms. They found that the two variable Lintner model including a constant term, current earnings 'E_t', and lagged dividend 'D_{t-1}', perform well relative to other models. They also observed that net income seems to provide a better measure of profits than either cash flow or net income or depreciation when included as separate variables in the model. The dependent and the explanatory variables are considered the same as Lintner's model. However, as Fama and Babiak tested their models on individual firm data, similar results to the Lintner study were found.

In conclusion, Lintner (1956) was the first who introduced a partial adjustment dividend behavioral model and his empirical work is the best and the most recognized empirical investigation on dividend behavior to date. Moreover, Darling (1957) extended and Brittain (1966) modified Lintner's basic behavioral

model by altering and adding different parameters. In addition, Fama and Babiak (1968) tested Lintner and Brittain's developed partial adjusted dividend behavior models on individual firm's data rather than aggregate data and identified Lintner's model as the best partial adjustment model.

Garg *et al.* 1996, Mishra and Narender, 1996, applied Lintner's (1956) partial adjustment model on Indian data, identified that as the best-fit model, and concluded that dividend policy is primarily determined by the current profit post tax and dividends paid in the previous years, i.e., lagged dividends. However, Goergen et al. 2004 applied Lintner's (1956) partial adjustment model using German data and concluded that German firms do not base their dividend decisions on published earnings, but on cash flows.

The empirical part of this study tested the partial adjustment dividend behavioral models on the Dhaka Stock Exchange data in order to investigate the dividend policy and behavior in an emerging market. This study also tries to identify the best-fit dividend behavioral model in an emerging market of Bangladesh context through empirical investigation.

DATA AND METHODOLOGY

Data

All of the listed non-financial companies on the Dhaka Stock Exchange are considered as the population of this study for the period of 1988-2003. Financial sector companies are excluded from the study because the reporting system of financial sector companies is quite different from non-financial sector companies. However, because of the financial reform in Asia in 1997/98 and a great deal of speculation, the Dhaka stock market crashed in 1998. Following the market crash, an automated trading system replaced the traditional out cry trading system on the Dhaka Stock Exchange. In addition, the government reformed Security Exchange Commission (SEC) regulations to protect general investors and to ensure transparency in the securities market of Bangladesh. Therefore, this study focused on the pre (1988-1997) and post (1999-2003) market reforms in the stock market of Bangladesh. Companies selected for this study are considered based on their non-negative profits (net profit post tax), and their regularity of paying dividends. It is worth mentioning that researchers always take different company and market characteristics into consideration in selecting sample for testing behavioral models. First, 83 non-financial companies are taken into account post screening out irregular dividend distributions and companies with negative profits. Companies are then screened by considering the regularity of dividend payments for at least eight years among the sample period (1988-2003).

In addition, other characteristics such as: the selected sample should represent all sectors (incorporation of companies from all non-financial sectors), different sizes (large, medium, and small), product diversity (single product and multiple products), activity (active and inactive), consistency of dividend payments (companies paying dividends consistently versus companies paying dividends inconsistently), and the pay-out ratio (high, medium and low) are considered for selecting the final sample. The final sample is then reduced to 51 companies based on the above characteristics. The selected sample of 51 Dhaka Stock Exchange listed companies represents all sectors (12 companies are from Engineering, 7 are from Food and Allied Products, 8 are from Jute and Textile, 10 are from Pharmaceuticals, and 14 are from the Miscellaneous Sector). The sample also consists of 8 high dividend payout companies (payment of dividends of 50% and more), 9 low dividend pay-out companies (payment of dividends of 5% or less) and 34 medium dividend pay-out companies (payment of dividends between 5% and 50%). In addition, the sample represents 14 large companies (market capitalization of 1000 million Taka and more), 7 small companies (market capitalization of 5 million Taka or less), and 30 medium companies (market capitalization is between 110-150 million Taka). Moreover, the sample consists of 41 actively traded companies and 10 inactively traded companies on the Dhaka Stock Exchange. The sample also comprises

40 companies having single product and 11 companies having diversified product. In addition, the sample also represents 15 companies, which have paid regular dividends for all 10 years in the pre-reform sample and 5 years in the post-reform sample plus 36 companies that paid dividends over 5-9 years in the pre-reform sample and 3-5 years in the post-reform sample.

The required data for empirical investigation were collected from the published annual reports of the selected companies. In order to compare and justify the results of the selected sample we also analyzed all non-financial company (153) data for the same objective. In addition, for testing Fama-Babiak's behavioral model, the study was carried out only on the regular dividend paying companies (15) individually. The empirical analysis section gives particular attention to the selected sample of 51 companies and all non-financial sector companies (153) and both pre and post reform period of the same sample.

Models

Based on the Lintner's (1956) Partial Adjustment Model, the Null Hypothesis is defined as:

H_0: *Changes in dividend payout ratio (ΔDPR) is not a function of net current earnings post tax (PROFIT) and dividend paid in previous years (lagged dividends) (LDPR).*

The Model considered is as follows:

$$\Delta DPR_t = \alpha + \beta_1 PROFIT_t + \beta_2 DPR_{t-1}(LDPR) + \varepsilon_t \quad (1)$$

Where, ΔDPR_t and DPR_{t-1} = changes in the dividend pay-out ratio and lagged dividend pay-out ratio respectively, $PROFIT_t$ = the ratio of net profit post tax to sales in period 't', α = constant term, $\beta_1 = c_i r_i$ (where c_i is the 'speed-of-adjustment coefficient' and r_i is the firm's 'target ratio' of dividends to profits), $\beta_2 = - c_i$ (where c_i is the 'speed-of-adjustment coefficient for the lagged dividend), and ε_t = error term.

Based on the Darling's (1957) Partial Adjustment Model, The Null Hypothesis is defined as:

H_0: *Changes in dividend pay-out ratio (ΔDPR) is not a function of net current earnings post tax (PROFIT), lag profits (LPROFIT), amortization (AMORTISE), and sales growth (GROWTH).*

The Model is designed as follows:

$$\Delta DPR_t = \alpha + \beta_1 PROFIT_t + \beta_2 PROFIT_{t-1}(LPROFIT) + \beta_3 AMORTISE_t + \beta_4 GROWTH_t + \varepsilon_t \quad (2)$$

Where, ΔDPR_t = changes in the dividend pay-out ratio, $PROFIT_t$ and $PROFIT_{t-1}$ = the current profitability and lagged profitability respectively, $AMORTISE_t$ = the ratio of depreciation and amortization to sales, $GROWTH_t$ = the sales growth $((Sales_t - Sales_{t-1}) / Sales_{t-1})$, α = constant term, $\beta_1 = c_i r_i$ (where c_i is the 'speed-of-adjustment coefficient' and r_i is the firm's 'target ratio' of dividends to profits), $\beta_2 = - c_i$ (where c_i is the 'speed-of-adjustment coefficient' for lagged profits), β_3, and β_4 = the coefficients of amortization and sales growth respectively, and ε_t = error term.

Based on Brittain's (1966) Partial Adjustment Model, the Null Hypothesis is defined as:

H_0: Changes in dividend payout ratio (ΔDPR) is not a function of cash flow (CFLOW) and dividend paid in previous years (lagged dividends) (LDPR).

The Model is designed as follows:

$$\Delta DPR_t = \alpha + \beta_1 CFLOW_t + \beta_2 DPR_{t-1}(LDPR) + \varepsilon_t \quad (3)$$

Where, ΔDPR_t and DPR_{t-1} = the changes in dividend pay-out ratio and lagged dividend pay-out ratio respectively, $CFLOW_t$ = the ratio of cash flow (net profit post tax + depreciation) to sales in period 't', α = constant term, $\beta_1 = c_i r_i$ (where c_i is the 'speed-of-adjustment coefficient' and r_i is the firm's 'target ratio' of dividends to cash flow), $\beta_2 = - c_i$ (where c_i is the 'speed-of-adjustment coefficient' for lagged dividend), and ε_t = error term.

Fama and Babiak's (1968) Partial Adjustment Model: It is important to note that Fama and Babiak's (1968) model is tested on individual company data rather than aggregate data but the hypothesis, the model, and the variables are as same as Lintner's (1956) model. Thus, The Null Hypothesis is defined as:

H_0: Changes in dividend payout ratio (ΔDPR) is not a function of net current earnings post tax (PROFIT) and dividend paid in previous years (lagged dividends) (LDPR).

The Model is designed as follows:

$$\Delta DPR_t = \alpha + \beta_1 PROFIT_t + \beta_2 DPR_{t-1}(LDPR) + \varepsilon_t \quad (4)$$

Where, ΔDPR_t and DPR_{t-1} = changes in dividend pay-out ratio and lagged dividend pay-out ratio respectively, $PROFIT_t$ = the ratio of net profit post tax to sales in period 't', α = constant term, $\beta_1 = c_i r_i$ (where c_i is the 'speed-of-adjustment coefficient' and r_i is the firm's 'target ratio' of dividends to profits), $\beta_2 = - c_i$ (where c_i is the 'speed-of-adjustment coefficient' for lagged dividend), and ε_t = error term.

EMPIRICAL RESULTS

Descriptive Statistics

The changes in the dividend pay-out ratio over the pre-reform period (1988-97) is .051% and .32% for the post-reform period (1999-03) for the selected sample and .064% and .67% for all companies pre and post market reform in Bangladesh. The profitability is 7.0% in the pre-reform selected sample but that figure significantly increased in the post-reform period (36.88%) whereas the figures in the pre and post reform period for all companies are 8.66% and 18.20%. However, the growth rate of sales, depreciation and amortization recoveries are 11.56% and 4% while the average cash flow is 9.1% in the pre-reform selected sample but a significant change of those figures occur in the post-reform sample (6.66%, 19.69%, and 30.83%) and a noticeable difference in the pre-reform sample (16.57%, 8.11%, and 13.97%) and post-reform sample (-4.79%, 16.50%, and 18%) occur when we consider all companies.

These results indicate a higher level of change in the dividend payout ratio and a higher level of working capital requirements for the listed companies on the Dhaka Stock Exchange. However, the working capital requirements are greater than the available sources of funds, i.e., depreciation and amortization recoveries. Nevertheless, even though the level of profitability and cash flow vary largely, the figures indicate that cash flow is 2.1% more than the current earnings of the regular dividend paying companies in the stock market of Bangladesh (Table 1).

Table 1: Descriptive Statistics

Selected Sample: 51 Companies								
Variables	**Pre-reform Sample: 1988-1997**				**Post-reform Sample: 1999-2003**			
	Mean	**Standard Deviation**	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**
ΔDPR	0.0005	0.0260	.15	.15	0.0032	0.1280	-0.6950	0.6759
PROFIT	0.0700	0.0684	.00	.52	0.3687	1.1042	0.00	9.8725
LDPR	0.0310	0.0332	.00	.23	0.1644	0.4737	0.00	4.8045
LPROFIT	0.0700	0.0684	.00	.52	0.3279	1.1166	0.00	9.8725
AMORTIZE	0.0400	0.0376	-.03	.23	0.1968	0.6789	0.00	6.8446
GROWTH	0.1156	0.4089	-.99	3.03	0.0665	1.0818	-1.00	9.5460
CFLOW	0.0910	0.0922	-.26	.53	0.3083	0.6816	-0.003	6.3077
All Companies (153 Companies)								
Variables	**Pre-reform Sample: 1988-1997**				**Post-reform Sample: 1999-2003**			
	Mean	**Standard Deviation**	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**
ΔDPR	0.0006	0.0231	-0.2640	0.2398	0.0067	0.2688	-2.9548	3.9711
PROFIT	0.0866	0.1229	0.00	2.2512	0.1802	0.5346	-0.0043	5.9355
LDPR	0.0250	0.0326	0.00	0.4662	0.1195	0.6243	-0.0767	13.9752
LPROFIT	0.0866	0.1229	0.00	2.2512	0.1801	0.5346	-0.0053	5.9355
AMORTIZE	0.0811	0.2034	-0.0346	5.8902	0.1649	0.5689	0	6.8446
GROWTH	0.1657	0.5171	-1.00	6.2716	-0.0479	0.6422	-1.00	5.6780
CFLOW	0.1397	0.1619	-0.0031	2.4865	0.1799	0.5904	-6.2964	6.3077

Pearson's Correlation Matrix

Despite a few exceptions, the Pearson correlation matrix shows the expected relationship of all the independent variables with the dependent variable in the pre and post reform period for the selected sample. However, the situation improved slightly in post-reform for the all companies sample (see table 2). Nonetheless, the correlation matrix shows that the correlation between the explanatory variables is of either low or moderate degree, which suggests the absence of multicolinearity between independent variables. As suggested by Bryman and Cramer (1997), Pearson's *r* between each pair of independent variables should not exceed 0.80; otherwise, independent variables with a coefficient in excess of 0.80 may be suspected of exhibiting *multicolinearity.*

Multicolinearity is usually regarded as a problem because it means those regression coefficients may be unstable (Bryman and Cramer, 1997). Several scholars including Mendenhall and Sincich (1989), Hair *et al.* (1995), and Freund and Wilson (1998), state that multicolinearity can be quite difficult to detect where there are more than two independent variables. Moreover, the colinearity diagnostics provided by SPSS including colinearity statistics (Tolerance and VIF), condition index, and variance proportion, support the Pearson's correlation coefficients and document no proof of the multicolinearity problem in the regression models.

Table 2: Correlation Matrix: Pearson Indices

Selected Sample: 51 Companies										
	Pre-reform Sample: 1988-97					**Post-reform Sample: 1999-03**				
	Lintner's Model					**Lintner's Model**				
Variables	ΔDPR	PROFIT	LDPR			ΔDPR	PROFIT	LDPR		
ΔDPR	1.000					1.000				
PROFIT	.089	1.000				-.131**	1.000			
LDPR	-.399***	.384***	1.000			-.178***	.499***	1.000		
	Darling's Model					**Darling's Model**				
Variables	ΔDPR	PROFIT	LPROFIT	AMORTIZE	GROWTH	ΔDPR	PROFIT	LPROFIT	AMORTIZE	GROWTH
ΔDPR	1.000					1.000				
PROFIT	.089	1.000				-.131***	1.000			
LPROFIT	.018	.786***	1.000			-.169***	.259***	1.000		
AMORTIZE	-.107**	.157***	.183***	1.000		-.163***	.753***	.521***	1.000	
GROWTH	-.010	-.070	-.071	-.069	1.000	-.158***	-.055	-.073	-.056	1.000
	Brittain's Model					**Brittain's Model**				
Variables	ΔDPR	CFLOW	LDPR			ΔDPR	CFLOW	LDPR		
ΔDPR	1.000					1.000				
CFLOW	.115**	1.000				-.035	1.000			
LDPR	-.399***	.431***	1.000			-.178***	.312***	1.000		
All Companies: 153 Companies										
	Pre-reform Sample: 1988-97					**Post-reform Sample: 1999-03**				
	Lintner's Model					**Lintner's Model**				
Variables	ΔDPR	PROFIT	LDPR			ΔDPR	PROFIT	LDPR		
ΔDPR	1.000					1.000				
PROFIT	0.038	1.000				.573***	1.000			
LDPR	-0.358***	.102**	1.000			-.628***	.220***	1.000		
	Darling's Model					**Darling's Model**				
Variables	ΔDPR	PROFIT	LPROFIT	AMORTIZE	GROWTH	ΔDPR	PROFIT	LPROFIT	AMORTIZE	GROWTH
ΔDPR	1.000					1.000				
PROFIT	0.038	1.000				.573***	1.000			
LPROFIT	-0.043	.547***	1.000			-.553***	.302***	1.000		
AMORTIZE	-0.001	.163***	.134***	1.000		.139***	.316***	.015	1.000	
GROWTH	0.124***	-.013	.042	-.054**	1.000	-.126***	-.007	.282***	-.004	1.000
	Brittain's Model					**Brittain's Model**				
Variables	ΔDPR	CFLOW	LDPR			ΔDPR	CFLOW	LDPR		
ΔDPR	1.000					1.000				
CFLOW	0.038	1.000				.395***	1.000			
LDPR	-0.358***	.108***	1.000			-.628***	.117***	1.000		

****Significant at 1% level **Significant at 5% level *Significant at 10% level*

Regression Results

The cross-section and pooled Ordinary Least Square (OLS) regression models were run over the pre and post reform period for the selected samples as well as the all companies sample to identify the dividend policy and behavior in an emerging market. For the pooled regression models, nine (10-1) and four (5-1) year dummies are considered for pre (1988-97) and post (1999-03) reform period. However, no significance is found in the coefficients of the dummy variables, which indicates no impact of time on the

models. As time does not have any impact on the model, incorporation of year dummies has resulted in less overall significance of the regression models. Ramsey's RESET tests (Ramsey, 1969) and White's test (White, 1980) is employed for checking the heteroskedasticity problem of the partial adjustment dividend behavioral models. Both the tests are unable to reject the hypothesis of homoskedasticity for each and every model. Therefore, the residuals of all the behavioral models are homoskedastic. The Durbin-Watson is close to 2 in all the regression models, which also indicates no sign of an autocorrelation problem in the regression models.

Lintner's (1956) Partial Adjustment Model: The overall Fscore = 57.267 and 10.649 for cross-sectional and pooled regression models respectively and these scores are significant at 1% level (p<.000) in the pre-reform period. However, the Fscore is dramatically reduced (4.445 and 2.177) in the post-reform period of the selected sample of 51 companies. The adjusted R^2 = 0.220 and 0.210 for cross-sectional and pooled regression models in the pre-reform period of the selected sample of 51 companies but the situation significantly deteriorates in the post-reform period (adjusted R^2 = 0.026 and 0.027 for cross-sectional and pooled models). Nonetheless, while considering all companies as the sample, the Fscore in the pre-reform period are 11.022 and 21.714 and in the post-reform period but those Fscores significantly increased to 5418.718 and 14.5599 in the post reform for the all companies sample and the values are significant at the 1% level (p<.000). Despite some discrepancies in the post-reform selected sample, the standardised beta coefficients of the profitability and lagged dividend (LDPR) variables are in the predicted direction and are highly significant (p<.000). The empirical results suggest that profitability and lagged dividend have a significant influence on dividend changes in the listed companies of the Dhaka Stock Exchange. This is likely due to the fact that the listed non-financial sector (regular dividend paying) companies basically follow a stable dividend policy based on dividend per share (DPS). As the companies pay stable dividends, e.g., 15% (DPS) on the face value, the managers are reluctant to cut the dividend even though they may incur a loss in a certain year. However, managers may change the pay-out policy every few years depending on profitability. If the companies incur increased profits, then they certainly change the dividend payment rate, e.g., 15% to 20% and keep that level for a certain extended time period. In contrast, the basic assumption of the partial adjustment dividend behavior model is the relation of the target ratio of dividends to profits. The empirical findings of this study are quite acceptable as because dividend changes of the Dhaka Stock Exchange listed companies basically depend on the lagged profits. However, increased or decreased profitability encourage the firms to change dividends, i.e., speed of adjustment works in case of increasing or decreasing profitability. Therefore, the empirical results suggest that Lintner's dividend behavioral model is adequate for the Dhaka Stock Exchange (Tables 3).

Table 3: Lintner's Model Summary[a, b]

Panel A: Selected Sample: 51 Companies

Refined Constructs	**Pre-reform Sample: 1988-97**				**Post-reform Sample: 1999-03**			
	Cross-sectional Model		**Pooled Model**		**Cross-sectional Model**		**Pooled Model**	
	Coefficient	**T-Value**	**Coefficient**	**T-Value**	**Coefficient**	**T-Value**	**Coefficient**	**T-Value**
Constant	0.0070	3.830***	0.0087	2.209**	0.012	1.445	-0.018	-0.996
PROFIT	0.110	5.897***	0.108	5.684***	-0.007	-0.785	-0.008	-0.941
LDPR	-0.393	-10.509***	-0.393	-10.381***	-0.041	-2.101**	-0.035	-1.778*
F – ratio Value		57.267***		10.649***		4.445**		
R^2		.223		.231		0.034		0.050
Adjusted R^2		.220		.210		0.026		0.027
N		51		510		51		255

Panel: All 153 Companies

Refined Constructs	Pre-reform Sample: 1988-97				Post-reform Sample: 1999-03			
	Cross-sectional Model		Pooled Model		Cross-sectional Model		Pooled Model	
	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value
Constant	0.006	7.606***	0.017	1.092	-0.095	-2.601***	-0.008	-0.402
PROFIT	0.014	3.152***	0.014	3.162***	0.846	78.859***	0.134	7.575***
LDPR	-0.259	-15.280***	-0.262	-15.354***	-0.993	-83.630***	-0.096	-6.328***
F – ratio Value		11.022***		21.714***		5418.718***		14.5599***
R^2		.134		.147		.925		.102
Adjusted R^2		.133		.140		.925		.096
N		153		1530		153		765

*a. Dependent Variable: Changes in Dividend Payout Ratio (ΔDPR) b. All Requested Variables Entered ***Significant at 1% level **Significant at 5% level *Significant at 10% level*

Darling's (1957) Partial Adjustment Model: A poor overall F_{score} (1.569 and 0.832 for pre reform and 4.559 and 2.872 for post reform) was found for both the pre and post reform period of the selected sample. Also, the performance of the all companies sample (F_{score} = 9.375 and 3.924 for pre reform and 3078.238 and 23.028 for post reform) is better while testing Darling's behavioral model. Nevertheless, the adjusted R^2 in the post-reform period of the all companies sample performs excellent (0.933 and 0.187). The standardized beta coefficients of the profitability and lagged profitability (LPROFIT), amortization, and growth variables are in the predicted direction except depreciation and amortization recoveries, which are not highly significant with few exceptions.

While lagged profitability coefficients are not significant, both the profitability and lagged profitability coefficients are quite consistent with Lintner's model. The main reason for this is that the companies follow stable dividend policy based on dividend per share rather than target payout ratios (as mentioned earlier). However, as depreciation and amortization recovery is insufficient to fulfill the investment demand, the amortization variable does not influence the dividend policy significantly. In addition, as we have already mentioned, the companies are mostly determined not to change the dividend policy very often, and as a result, investment opportunities are not affecting a large change in dividend policy. Therefore, the empirical results suggest that Darling's model does not work very well on the Dhaka Stock Exchange (Tables 4).

Table 4: Darling's Model Summary[a, b]

Panel A: Selected Sample: 51 Companies

Refined Constructs	Pre-reform Sample: 1988-97				Post-reform Sample: 1999-03			
	Cross-sectional Model		Pooled Model		Cross-sectional Model		Pooled Model	
	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value
Constant	0.0011	0.440	0.0012	0.245	0.015	1.719*	0.021	1.154
PROFIT	0.0710	2.122**	0.0650	1.899*	-0.008	-0.690	-0.007	-0.603
LPROFIT	-0.0400	-1.201	-0.0330	-0.988	-0.016	-1.865*-	-0.013	-1.526
AMORTIZE	-0.0480	-1.166	-0.0470	-1.123	-0.010	-0.480	-0.013	-0.653
GROWTH	-0.0019	-0.523	-0.0031	-0.834	-0.021	-2.852***	-0.021	-2.874***
F – ratio Value	1.569		.832		4.559***		2.872	
R^2	.017		.030		0.068		0.085	
Adjusted R^2	.006		-.006		.053		0.056	
N	51		510		51		255	

Panel B: All Companies: 153 Companies

Refined Constructs	Pre-reform Sample: 1988-97				Post-reform Sample: 1999-03			
	Cross-sectional Model		Pooled Model		Cross-sectional Model		Pooled Model	
	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value
Constant	0.000	-0.327	0.009	0.581	-0.004	-0.102	-0.013	-0.661
PROFIT	0.018	3.085***	0.018	3.182***	0.983	89.302***	0.118	5.928***
LPROFIT	-0.019	-3.301***	-0.019	-3.375***	-0.959	-88.118***	-0.183	-10.064***
AMORTIZE	0.000	0.164	0.000	-0.096	-0.101	-13.234***	0.118	6.453***
GROWTH	0.006	5.119***	0.005	4.810***	0.007	13.009***	-0.024	-1.748***
F – ratio Value		9.375***		3.924***		3078.238***		23.028***
R^2		.024		.035		.933		.196
Adjusted R^2		.021		.026		.933		.187
N		153		1530		153		765

a. Dependent Variable: Changes in Dividend Payout Ratio (ΔDPR) b. All Requested Variables Entered ***Significant at 1% level **Significant at 5% level *Significant at 10% level

Brittain's (1966) Partial Adjustment Model: The overall *F* score in the pre and post reform period of the selected samples (77.424 and 14.282 for pre reform and 4.190 and 2.023 for post reform) and the Fscore for the all companies sample (Fscore = 118.350 and 21.817 for pre reform period and 464.631 and 10.490 for post reform period) are extremely significant at the 1% level (p<.000). Nevertheless, the adjusted R^2 of the models are not very high but the standardized beta coefficients of the cash flow and lagged dividend (LDPR) variables are in the predicted direction and highly significant at the 1% level (p<.000).

However, as cash flow incorporates depreciation as the source of funds with regular profits, cash flow also encourages companies to change their dividend policy at a point in time even though they are not highly motivated to change the payout policy often. Therefore, cash flow provides a better explanation of the ability of the companies to pay dividends. Finally, the empirical results suggest Brittain's partial adjustment dividend behavioral model as the best-fit model on the Dhaka Stock Exchange (Tables 5).

Fama and Babiak's (1968) Partial Adjustment Model: The standardised beta coefficients of the profitability and lagged dividend (LDPR) variables show the predicted sign and are significant at a higher level in the regular dividend paying companies. The adjusted R^2 of the models for the individual companies in the pre and post reform sample are very high indeed, suggesting that dividend decisions are primarily governed by the magnitude of current profitability as well as dividends paid in the previous years, (i.e., lagged dividends). (Table 6).

Table 5: Brittain's Model Summary [a, b]

Panel A: Selected Sample: 51 Companies

Refined Constructs	Pre-reform Sample: 1988-97				Post-reform Sample: 1999-03			
	Cross-sectional Model		Pooled Model		Cross-sectional Model		Pooled Model	
	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value	Coefficient	T-Value
Constant	0.0051	3.077***	0.006	1.667*	0.010	1.144	0.029	1.563
CFLOW	.0103	7.756***	0.102	7.566***	0.004	0.347	0.001	0.060
LDPR	-0.440	-12.125***	-0.438	-11.924***	-0.050	-2.838***	-0.044	-2.474**
F – ratio Value		7.424***		14.282***		4.190***		2.023**
R^2		.260		.267		0.032		0.047
Adjusted R^2		.257		.247		0.024		0.024
N		51		510		51		255

Panel B: All 153 Companies

Refined Constructs	*Pre-reform Sample: 1988-97*				*Post-reform Sample: 1999-03*			
	Cross-sectional Model		**Pooled Model**		**Cross-sectional Model**		**Pooled Model**	
	Coefficient	**T-Value**	**Coefficient**	**T-Value**	**Coefficient**	**T-Value**	**Coefficient**	**T-Value**
Constant	0.006	6.845***	0.016	1.080	0.048	0.381	-0.002	-0.107
CFLOW	0.011	3.241***	0.011	3.327***	0.280	18.330***	0.094	5.816***
LDPR	-0.260	-15.302***	-0.263	-15.389***	-0.860	-26.339***	-0.087	-5.689***
F – ratio Value		118.350***		21.817***		464.631***		10.490***
R^2		.134		.147		.619		.077
Adjusted R^2		.133		.141		.618		.069
N		153		1530		153		765

*a. Dependent Variable: Changes in Dividend Payout Ratio (ΔDPR) b. All Requested Variables Entered ***Significant at 1% level **Significant at 5% level *Significant at 10% level*

The empirical results of the Fama and Babiak's partial adjustment model are quite consistent among the companies. However, the coefficient of lagged profitability is more significant than profitability. As mentioned earlier, the main reason is that the Dhaka Stock Exchange listed non-financial sector firms paying regular dividends tend to follow stable dividend policies based on dividend per share (DPS) rather than a target payout ratio. However, current earnings encourage companies to change the payout policy every few years and they usually are consistent with current policy for the next few years. Therefore, the empirical findings explain the practice of the companies under consideration, i.e., dividend change depends on the lagged dividends, but profitability encourages the firms to change dividend policy, i.e., the speed of adjustment works to help make increasing or decreasing decisions given a stable dividend policy.

The average company size of this sample is 391 million Taka (Bangladesh Currency) whereas the average company size of the non-financial sector companies is almost 70 million Taka. Moreover, the institutional shareholdings for this sample are 12.44%, which is a bit higher than the average market institutional ownership. In addition, the insider ownership for this sample is 23.31%, which is lower than the average insider ownership of the non-financial sector companies. However, insiders are still the major shareholders of the regular dividend paying companies in Dhaka Stock Exchange. Presumably, solely insider controlled firms have lower levels of outsider protection in the stock market of Bangladesh. However, as we have mentioned earlier, the regular dividend paying companies follow a stable dividend policy based on the dividend per share, hence, pay-out policy does not adjust properly with the level of profitability. Therefore, as regular dividend paying companies do not properly adjust payment policy with the level of earnings, insiders have greater opportunity to expropriate funds from their controlled larger firms.

Table 6: Regression Results of Fama and Babiak's Partial Adjustment Model: Testing on Regular Dividend Paying Companies Individually

Company	*Pre-reform Sample: 1988-97*					*Post-reform Sample: 1999-03*				
	N	**α_0 Coefficient (T-Value)**	**β_1 Coefficient (T-Value)**	**β_2 Coefficient (T-Value)**	**Adj. R^2**	**N**	**α_0 Coefficient (T-Value)**	**β_1 Coefficient (T-Value)**	**β_2 Coefficient (T-Value)**	**Adj. R^2**
1	1	0.0008	0.483	-0.805	0.887	5	0.000	-0.055	-0.713	1.000
	0	(0.183)	(7.794***)	(-7.096***)			(1.664)	(-33.625***)	(-242.027***)	
2	1	0.0009	0.250	-0.447	0.757	5	0.005	1.388	-1.236	0.993
	0	(0.335)	(3.557*)	(-4.133***)			(1.104)	(3.346*)	(-8.110*)	
3	1	-0.0015	0.638	-0.867	0.866	5	-0.003	1.174	-0.560	0.984
	0	(-1.073)	(6.754***)	(-5.318***)			(-2.880)	(11.167***)	(-5.074**)	
4	1	-0.0017	0.628	-0.785	0.738	5	0.305	0.389	-0.507	0.992
	0	(-0.622)	(4.505***)	(-4.389***)			(0.979)	(21.821***)	(-15.774***)	
5	1	0.029	0.846	-0.821	0.480	5	0.023	-0.153	-0.997	1.000
	0	(-1.100)	(2.674**)	(-2.374*)			(5.988**)	(-2.491)	(-1210.493***)	
6	1	0.0048	0.805	-0.859	0.878	5	-0.010	0.491	-0.971	0.996
	0	(0.998)	(6.831***)	(-6.829***)			(-0.922)	(15.665***)	(-14.810***)	
7	1	0.0039	0.328	-1.066	0.584	5	0.015	0.404	-0.916	0.988
	0	(0.324)	(2.669**)	(-3.740***)			(3.215*)	(2.603)	(-16.324***)	
8	1	-0.0013	0.516	-0.619	0.922	5	-0.100	0.299	-0.051	0.986
	0	(-0.274)	(4.969***)	(-5.531***)			(-1.191)	(16.164***)	(-0.823)	
9	1	-0.042	0.602	-0.466	0.994	5	0.006	0.219	-1.068	0.993
	0	(-4.641**)	(19.064***)	(-8.734**)			(0.631)	(16.576***)	(-17.852***)	
10	1	-0.0022	0.820	-1.626	0.994	5	0.003	0.625	-1.009	0.999
	0	(-1.087)	(19.884***)	(-25.247***)			(1.138)	(61.093***)	(-61.689***)	
11	1	0.010	1.171	-1.948	0.862	5	0.000	0.873	-1.003	1.000
	0	(1.083)	(3.856**)	(-5.749***)			(0.455)	(73.164***)	(-73.384***)	
12	1	-0.047	1.248	-0.863	0.977	5	0.000	0.045	0.086	0.994
	0	(-2.220*)	(8.014***)	(-17.099***)			(0.542)	(20.872***)	(19.995***)	
13	1	0.0054	0.700	-1.085	0.916	5	0.001	0.467	-1.023	1.000
	0	(0.549)	(5.741***)	(-6.352***)			(0.128)	(4.335**)	(-101.130***)	
14	1	0.0046	0.362	-1.092	0.583	5	-0.001	0.165	-0.986	1.000
	0	(1.059)	(2.783**)	(-3.424***)			(-1.845)	(2.691)	(-6333.947***)	
15	1	-0.0009	0.814	-1.351	0.632	5	0.141	-1.027	-1.293	0.983
	0	(-0.030)	(2.292*)	(-3.371**)			(10.412***)	(-5.083**)	(-14.295***)	

*Note: a. Dependent Variable: Changes in Dividend Payout Ratio (ΔDPR) b. All Requested Variables Entered c. ***Significant at 1% level **Significant at 5% level *Significant at 10% level d. α_0 is the Coefficient for constant, β_1 is the Coefficient Profitability, and β_2 is the Coefficient for Lag Dividend Pay-out Ratio.*

Finally, our empirical results support Lintner's (1956) view that dividend policy is primarily governed by current earnings and lagged dividends but find Brittain's (1966) dividend behavioral model as the best-fit partial adjustment dividend behavior model in this emerging market. Nevertheless, the empirical studies mentioned identify cash flow as the better measure of the company's ability to pay dividends because cash flow encourages the companies to change their dividend policy at a given point even though they are not highly motivated to change the payout policy often.

CONCLUSION

Dividend behavior of emerging markets is quite different from developed markets due to various characteristics. Partial adjustment models are tested on the Dhaka Stock Exchange for listed non-financial sector companies over the period of 1988-2003. The empirical results support Lintner's (1956) view of a partial adjustment model but find Brittain's (1966) model as the better-fit partial adjustment model in this emerging market. While the empirical results show a very high degree of relationship between dividend change, current earnings, and lagged dividends, in practice dividend policy is primarily governed by lagged dividends because the regular dividend paying companies follow stable dividend policy and the pay-out policy does not adjust perfectly with the level of current earnings. Moreover, as cash flow incorporates depreciation as a source of funds with regular profits, cash flow encourages the companies to change their dividend policy at a given point in time even though they are not highly motivated to change

the pay-out policy often. However, the empirical studies also identify cash flow as the better measure of the company's ability to pay dividends.

Finally, the empirical results indicate some connection with the firm size and the ownership structure, which are the major influential factors in an emerging market. Even though the empirical results indicate that the regular dividend paying firms are comparatively larger sized firms on the Dhaka Stock Exchange, insiders also solely control these firms. Therefore, insider controlled firms presumably has a much lower level of outsider protection. However, as mentioned earlier, the regular dividend paying companies follow a stable dividend policy based on the dividend per share. Hence, the dividend policy does not reflect the level of earnings properly. Because of the company's choice to pursue a stable dividend policy, insiders tend to enjoy many opportunities to expropriate funds on the Dhaka Stock Exchange. Despite the findings, that dividend policy is primarily governed by current earnings and lagged dividends in the emerging markets, this study failed to incorporate the key determinants of dividend policy like size, leverage, ownership structure, etc. Therefore, it is suggested that future studies examine these variables to build up dividend behavioral models in the emerging financial markets.

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REEXAMINATION OF THE RELATIONSHIP BETWEEN DISCLOSURE AND COST OF CAPITAL

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ABSTRACT

This study examines how information environment and industry concentration affect the relations between firms' financial disclosure quality and cost of capital. Information environment is proxied by firm size, and industry concentration is proxied by four-firm concentration ratio. The study finds a significant negative association between financial disclosure quality and cost of capital only for small firms and firms in more concentrated industries. The results of this study suggest that the contradictory findings in the extant accounting literature (Botosan, 1997; Botosan and Plumlee, 2002; Cheng et al., 2006) may be driven by variation in their sample in terms of firm size. The findings in this paper suggest that managers of small firms should recognize the significant role of disclosure in reducing cost of capital and increase their financial disclosure to enhance firm value.

JEL: M41, G14, D80.

INTRODUCTION

The role of accounting information in firm valuation and corporate finance has been an intriguing topic in voluntary disclosure literature. However, the findings are inconsistent in the extant literature on the relation between corporate disclosure and cost of capital. Using a self-constructed index to measure the amount of disclosure in firms' financial reports, Botosan (1997) documents a *significant negative* association between firms' disclosure level and cost of capital for a sample of manufacturing firms. On the other hand, Cheng et al. (2006) find a *significant positive* relation between Standard & Poor's Transparency & Disclosure rankings and cost of capital for S&P 500 firms.

This study examines the relation between corporate disclosure and cost of capital in the context of information environment (hereafter, IE) and industry competition in order to provide a potential explanation for the mixed findings. Prior studies have been treating disclosing firms as a homogeneous group. This paper is the first empirical study that directly tests whether the impacts of disclosure on cost of capital vary with firm size and industry competition.

A firm's information environments refer to the aggregate information available on the firm from all sources, including the firm's corporate disclosure, public media coverage and private information production by investors, etc. Therefore, the weight of a firm's disclosure in the information environment varies with the amount of information from other sources. Prior disclosure studies ignore the existence of other sources of information, implicitly assuming that corporate disclosure is the only source of information available to investors. However, public media and private information production activities by institutional investors and financial analysts contribute substantial information on the firms. Empirical evidence shows that there is systematic difference between large and small firms' IEs. Public media and private information production activities tend to focus on large firms (Atiase, 1980; Bhushan, 1989). Large firms generally make more disclosure than small firms do (Land and Lundholm, 1993). On the other hand, financial reporting regulations by the SEC on publicly traded corporations require all public firms to file a whole set of financial reports and forms, thus guaranteeing substantial flows of financial disclosure from all public firms. As a result, financial disclosure constitutes a bigger component of small

firms' IEs than of large firms' IEs. A given level of disclosure should have a bigger impact on small firms than on large firms.

Prior studies also fail to consider the costs associated with disclosure. Disclosure to investors may damage firms' competitive position by releasing relevant information to competitors (i.e. proprietary costs, Verrecchia, 1983). Harris (1998) finds that firms in highly concentrated industries make less disclosure on their segment operations than firms in more competitive industries, suggesting that proprietary costs associated with disclosure increase with industry concentration. These costs offset the benefits from disclosure. Therefore, disclosure's impacts on cost of capital vary with the degree of industry competition.

This paper finds a significant negative association between disclosure quality and cost of capital for small firms. No significant relation is found for large firms. After controlling for the effect of information environment, industry competition has a marginally significant incremental impact on the relation between disclosure and cost of capital. These results suggest that the impact of disclosure on cost of capital varies with firms' information environment and industry competition. Financial reporting disclosure is more effective at reducing small firms' cost of capital than large firms' cost of capital. Therefore, by pooling firms of all sizes in the sample, prior studies may get biased results about the effect of disclosure quality on cost of capital. The findings of this paper suggest that difference in firm sizes of their samples may account for the inconsistent findings in prior disclosure studies.
The above findings provide supporting evidence for Zhang (2001), who posits that the relation between disclosure and cost of capital depends on certain firm characteristics such as private information production costs and proprietary costs. This paper also extends Atiase (1985, 1987) and Bamber (1986, 1987). While they find that stock price and volume reactions to small firms' earnings releases are larger than to those of large firms, this study investigates how the impact of disclosure on cost of capital varies with firm size and industry concentration.

The paper proceeds as follows. Section II develops hypotheses. Section III contains data selection criteria and sample description. Section IV presents research design and test results. Section V concludes the paper with discussions on limitations and implications.

LITERATURE REVIEW

Extant research provides both theoretical modeling and empirical evidence on the relationship between disclosure and cost of capital. Theoretical research models the potential impacts of disclosure on cost of capital in two different dimensions (Botosan, 1997). On the one hand, prior research (Barry and Brown, 1985; Clarkson et al., 1996) suggest that disclosure reduces the information asymmetry between managers and investors and thus help investors better estimate stock returns through more accurate assessment of the business' true performance. On the other hand, disclosure may also increase stock liquidity, thereby reducing stock transaction costs and increasing demand for a firm's stock (Amihud and Mendelson, 1986; Diamond and Verrecchia, 1991).

There is mixed empirical evidence on the relationship between cost of capital and disclosure. Welker (1995) finds that higher levels of disclosure levels lead to lower bid-ask spreads. Botosan (1997) find a significant negative association between firms' disclosure level and cost of capital for a sample of manufacturing firms. Francis et al. (2005) provide international evidence that disclosure reduces cost of external financing. On the other hand, Botosan and Plumlee (2002) find no significant relation between AIMR (Association of Investment Management and Research) rankings of firms' overall corporate disclosure and cost of capital. Cheng et al. (2006) find a significant positive relation between Standard & Poor's Transparency & Disclosure rankings and cost of capital for S&P 500 firms.

Hypothesis Development

The Role of Information Environments as Proxied by Firm Size : A firm's information environment (IE) consists of the aggregate information about the firm from all sources, including firms' disclosure, public media coverage, and private information production activities by sophisticated investors and financial analysts. Empirical evidence shows that there are systematic differences between small and large firms' IEs.

Large firms generally have richer IEs than small firms. Public media tend to focus on large firms, thus providing more information on large firms than on small firms. Atiase (1980) provides evidence that the *Wall Street Journal* publishes fewer items concerning small firms than large firms. Grant (1980) finds that there are fewer WSJ articles about OTC firms than NYSE firms.

Private information production activities by investors and financial analysts increase with firm size. Arbel et al (1983) and Bhushan (1989) report that financial analysts, whose primary customers are institutional investors, concentrate their activities on large firms. Investors can potentially earn greater trading profits by engaging in private information acquisition activities on a large firm than on a small firm (Atiase 1980).

Large firms tend to make more disclosure than small firms because of higher public demand for information on large firms, lower information processing costs and higher litigation costs. Lev and Penman (1990) indicate that the financial press reports more earnings forecasts for large firms than for small firms. Skinner (1992) finds that the management tends to make preemptive disclosure to avoid legal liabilities. Chow and Wong-Boren (1987) find that the extent of voluntary financial disclosure of Mexican corporations is positively related to firm size.

The SEC also advocates that large firms have richer information than small firms. The SEC notes that those largest firms provide a steady stream of high quality information to the marketplace. Investors and analysts are constantly uncovering and digesting information regarding the large firms, and information about those firms is broadly disseminated on a timely basis by the financial press and other participants in the market. Thus, the SEC allows only the largest firms to make shelf registrations of new stock issuances.

The structure of the IEs of small and large firms is also different. The SEC requires all public firms to file a whole set of financial reports and forms, thus ensuring that firms provide at least certain levels of disclosure to investors. Due to the lack of attention from public media and financial analysts on small firms, disclosure constitutes a bigger component of small firms' IEs than large firms' IEs. Therefore, firm size serves as a valid proxy for the different IEs of small and large firms.

Empirical evidence shows that large firms' disclosure has less information content and less impact on stock prices than small firms' disclosure. Zeghal (1984) provides evidence that because of less information available on small firms, small firms' financial statements have more information content than those of large firms. Freeman (1987) finds that security prices start to anticipate large firms' earnings at an earlier time than small firms' earnings. A given level of unexpected earnings induces higher cumulative abnormal returns for small firms than for large firms. Bamber (1987) finds that trading volume reactions to small firms' quarterly earnings announcements are greater and last longer than the reactions to large firms' earnings announcements. Kross and Schroeder (1989) find that price reactions to a firm' earnings announcements are inversely related with the amount of pre-announcement coverage on the firm in the *Wall Street Journal*. Their findings suggest that the marginal effect of disclosure on

investors' estimation of stock returns decreases with the amount of predisclosure information from other sources.

Finance theories suggest that disclosure can lower firms' cost of capital by providing information to reduce information asymmetry (i.e. the asymmetric information possessed by the management and by the outside investors) and help investors to estimate firms' future prospects. Because of the lack of attention from public media and financial analysts on small firms, small firms' disclosure is expected to play a more significant role in helping investors to estimate firms' future performance and return distributions. The impact of large firms' disclosure is mitigated by large firms' rich IEs. Therefore, the inverse association between disclosure and cost of capital predicted by disclosure theories is expected to be significant only for small firms.

H_{o1}: The relationship between disclosure quality and cost of capital does not vary with firm size.

H_{a1}: Disclosure quality has a significant inverse association with cost of capital for small firms. Disclosure quality does not have a significant association with cost of capital for large firms**.**

Industry Competition

Fields et al (2001) suggest that research on the relation between disclosure and cost of capital should consider not only the benefits, but also the cost associated with disclosure. Without considering costs associated with disclosure, we cannot explain why not all firms select the highest possible disclosure level if higher disclosure results in lower cost of capital.

Zhang (2001) suggests that corporate disclosure could have either a positive or a negative impact on cost of capital depending on firm characteristics such as proprietary costs. Proprietary costs refer to that disclosure to investors may damage firms' competitive position by revealing relevant information to competitors (Verrecchia, 1983). Core (2001) suggests that firms optimize their disclosure policy by trading off the benefits in reducing information asymmetry component of cost of capital against the proprietary costs.

Prior research shows that proprietary costs are associated with industry competition. Darrough and Stoughton (1990) theoretically demonstrate that firms in highly concentrated industries have less incentive to make informative disclosure for fear of attracting competition and regulators' attention, while firms in more competitive industries tend to provide more informative disclosure to discourage new entry. Empirically, Harris (1998) finds that firms in more concentrated industries generally enjoy abnormal profits and large market shares. As a result, they are reluctant to reveal information about their operations for fear of attracting competitors and regulations. Harris' findings suggest that proprietary and political costs increase with industry concentration. Those costs offset the potential benefits of disclosure. Therefore, it would be more likely to find a significant negative relation between disclosure and cost of capital in less concentrated industries than in more concentrated ones.

H_{o2}: The relationship between disclosure quality and cost of capital does not vary with industry concentration.

H_{a2}: Disclosure quality has a significant inverse association with cost of capital for firms in less concentrated industries. Disclosure quality does not have a significant association with cost of capital for firms in more concentrated industries.

METHODOLOGY

Data Sources and Selection Criteria

Data on analysts' perceived quality of corporate disclosures are obtained from the 1995-1996 AIMR (Association of Investment Management and Research) corporate disclosure reports. The 1995-1996 AIMR report is the latest AIMR corporate disclosure reports available, because AIMR stopped issuing these corporate disclosure reports after 1996. The AIMR disclosure scores are a measure of analysts' perceived quality of corporate disclosure in annual and quarterly reports, other publications and investor relations. Examples of factors considered by AIMR committees in evaluating a firm' disclosure quality are the amount of details about products and geographic segments, the overall level of details in the financial statements and footnotes, the frequency and content of presentations to analysts, and the availability of press releases.

The sample consists of all firms that have the following four categories of data available: (1) The overall disclosure score in the 1996 AIMR corporate disclosure reports, (2) Total assets, book value of equity, earnings per share, dividends, and total shares outstanding from COMPUSTAT North American Industrial Annual Data file, (3) IBES analyst forecasts for one-year-ahead and two-year-ahead earnings per share and long term growth rate for earnings made in the end of year 1995, and (4) end of year price, earnings per share, and at least 30 months of CRSP monthly returns data in the five-year period by the end of 1995.

Variables and Sample Description

This study uses the Gode and Mohanram (2003) (GMM) model to measure firms' cost of capital. The GMM model is a commonly used approach to measure cost of capital at the firm level. Prior studies (Gode and Mohanram, 2003) have found significant positive associations between this measure of cost of capital and various risk proxies. The GMM model relates current period price to forecasted future earnings, a short-term earnings growth rate and a long-term growth rate and is specified in the following form:

$$P_0 = \frac{eps_1}{\gamma_{GMM}} + \frac{(eps_2 - eps_1 - \gamma_{GMM}(eps_1 - dps_1))}{\gamma_{GMM}(\gamma_{GMM} - \rho - 1)} \quad (1)$$

Where, eps_1 is analysts forecasted one period ahead earnings per share; eps_2 is analysts forecasted two period ahead earnings per share; dps_1 is analysts forecasted one period ahead dividend per share; P_0 is current price per share of common stock; ρ is the long-term growth rate; γ_{GMM} is cost of capital calculated using GMM model.

To calculate the implied cost of capital, one rearranges the above formula and gets the following equation:

$$\gamma_{GMM} = A + \sqrt{A^2 + \frac{eps_1}{p_0}\left(\frac{eps_2 - eps_1}{eps_1}\right) - (\rho - 1)} \quad (2)$$

$$\text{Where } A = \frac{1}{2}\left[(\rho - 1) + \frac{dps_1}{p_0}\right] \quad (3)$$

The model assumes that all firms' short-term earnings growth rates (i.e. $(eps_2-eps_1)/eps_1$) decay asymptotically to the same long-term growth rate. The long-term growth rate γ-1 is usually set as γ_f-3%,

where γ_f is the current yield on 10-year treasury notes. Following Harris (1998), industry concentration is proxied by four-firm concentration ratio, which is defined as the ratio of the sum of the top four firms' sales over the total sales in an industry. The concentration ratio captures the degree of competition for market share among all firms in an industry. Industry is identified using the four-digit SIC code.

As shown in Table 1, Panel A, there are 262 firms in the 1996 AIMR reports. All 6 Canadian banking firms are deleted from the sample, because this study concentrates on US firms. 5 firms are deleted for lack of IBES earnings and long-term growth rate forecasts, and 9 firms for lack of at least 30 months of CRSP monthly stock returns data. 28 firms are deleted because the GMM model either yields a negative cost of capital or no solution. One firm with an extremely high estimated cost of capital of 46% is deleted. All other firms have cost of capital lower than 30%. One firm is deleted as an outlier. The final sample consists of 212 firms. The 212 firms are distributed across 16 industries. Food Beverage and Tobacco, Insurance and Retail Trade industries have over 24 firms, twice as many as the other industries have.

Table 1: Sample Selection Procedures

Sample Selection Procedures		
Number of firms with 1996 AIMR disclosure scores		**262**
Less:	Firms in Canadian Banking industry	6
	Firms missing IBES EPS forecast data	5
	Firms with fewer than 30 months of stock returns available in CRSP	9
	Firms with negative GMM model cost of capital	28
	Firms with GMM model cost of capital higher than 40%	1
	Firms with too much influence on the regression results (outliers)	1
Number of firms available for analysis		**212**

This table shows the sample selection procedures.

Table 2 provides descriptive statistics for the main variables used in the study. The GMM measure of cost of capital r_{GMM} has a mean of 12.72%, similar to the estimated cost of capital in Gode and Mohanram 2003. Four-firm concentration ratio CONCEN has a mean of 0.85 and a range of 0.52 to 0.99. The disclosure score TSCORE has a mean of 72.12. It ranges from 30.0 to 96.30, indicating variation in firms' disclosure policies. The mean (median) market value of the sample firms is $10570 MM ($3945 MM). The minimum and maximum market values are $103 MM and $119989 MM, respectively. COMPUSTAT firms have an average market value of $1026 MM in 1995. Therefore, firms covered by AIMR reports are generally large ones in the industries. Theoretically, the difference in the information environments of large firms should not be as big as that between large and small firms. The absence of really small firms in the sample may decrease the power of the test to detect the variation of disclosure's impact on cost of capital with firm size.

Table 2: Descriptive Statistics for Variables in the Study

Variable	Mean	Standard Deviation	Minimum	Quartile 1	Median	Quartile 3	Maximum
r_{GMM}	12.72	3.66	6.72	10.50	11.79	13.85	29.63
BETA	1.01	0.49	-0.40	0.72	0.95	1.28	3.17
CONCEN	0.85	0.12	0.52	0.85	0.86	0.93	0.99
TSCORE	72.12	13.67	30.00	62.05	73.00	82.00	96.30
MKTVAL	10,570	17,804	103	1,525	3,945	10,396	119,989

This table shows that descriptive statistics of key variables. The variables are defined as follows: rGMM is implied cost of capital calculated following the GMM (Gode and Mohanram 2003) approach. The unit is in the number of percentage points. BETA: The coefficient of the market model regression of firm returns on value weighted NYSE/AMEX market index returns, using at least 30 monthly returns over the 60 months prior to the end of 1995. CONCEN: The four firm concentration ratio calculated as the ratio of the sales of the top four firms over total sales of the industry. TSCORE: The AIMR (Association of Investment Management and Research) score on firms' overall disclosure. MKTVAL: Firms' market values of common equity in million dollars at the end of 1995.

Correlations between the Variables

Table 3 presents the correlation coefficients among the variables with Pearson correlation coefficients in the upper right corner and Spearman correlation coefficients in the lower left corner. Consistent with the predictions of finance theories, the GMM measures of cost of capital, r_{GMM}, has significant positive correlations with BETA and negative correlation with MKTVAL. There is no significant correlations between cost of capital measures and disclosure score TSCORE, implying that the relation between disclosure and cost of capital may be affected by some confounding factors.

Table 3: Pearson (above diagonal)/ Spearman (below diagonal) Correlation Coefficients

	r_{GMM}	BETA	CONCEN	TSCORE	MKTVAL
r_{GMM}		0.23	-0.11	-0.03	-0.19
		0.00	0.12	0.66	0.00
BETA	0.29		-0.03	0.06	-0.01
	0.00		0.65	0.37	0.94
CONCEN	-0.15	-0.06		-0.08	0.32
	0.03	0.38		0.25	0.00
TSCORE	-0.02	0.07	-0.04		0.17
	0.76	0.31	0.53		0.02
MKTVAL	-0.30	0.07	0.47	0.20	
	0.00	0.32	0.00	0.00	

This table shows that descriptive statistics of key variables. The variables are defined as follows: r_{GMM} is implied cost of capital calculated following the GMM (Gode and Mohanram 2003) approach. The unit is in the number of percentage points. BETA: The coefficient of the market model regression of firm returns on value weighted NYSE/AMEX market index returns, using at least 30 monthly returns over the 60 months prior to the end of 1995. CONCEN: The four firm concentration ratio calculated as the ratio of the sales of the top four firms over total sales of the industry. TSCORE: The AIMR (Association of Investment Management and Research) score on firms' overall disclosure. MKTVAL: Firms' market values of common equity in million dollars at the end of 1995.

Tests on Hypothesis 1

The estimated coefficient $\widehat{\beta}_1$ in the following OLS linear regression model represents the association between cost of capital and disclosure:

$$CC_i = \beta_0 + \beta_1 \text{ DISCLOSURE}_i + \varepsilon_i \quad (4)$$

If both variables CC and DISCLOSURE were scaled to have a zero mean, the coefficient $\widehat{\beta}_1$ would be:

$$\widehat{\beta}_1 = \frac{\sum CC_i DISCLOSURE_i}{\sum DISCLOSURE_i^2} = \sum w_i \frac{CC_i}{DISCLOSURE_i} \quad (5)$$

Where, $w_i = DISCLOSURE_i^2 / \Sigma DISCLOSURE_i^2$ and $\Sigma w_i = 1$ can be interpreted as a weight. The above formula shows that the coefficient $\widehat{\beta}_1$ is a weighted average of firm specific cost of capital-to-disclosure ratios. The disclosure score DISCLOSURE drives up the weight w_i at an accelerating rate. Since large firms generally have higher disclosure scores, the coefficient $\widehat{\beta}_1$ estimated with a pooled sample of firms of all sizes would be mainly driven by large firms. Hypothesis 1 predicts that the association between cost of capital and disclosure should be different for small firms and for large firms. Therefore, in order to test hypothesis 1, the smallest and largest 25% firms in the sample in terms of market value are identified with dummy variables D_1 and D_2, respectively.

Large firms generally are less risky than small firms. As a result, large firms on a whole have a lower cost of capital than small firms (Fama and French, 1992). On the other hand, large firms tend to disclose more than small firms (Lang and Lundholm, 1993). If large firms and small firms were put together, disclosure would likely exhibit an inverse association with cost of capital, regardless of the true underlying relation between disclosure and cost of capital. Using dummy variables to separate large and small firms into different groups would help disentangle the variation of intrinsic risk from the effect of disclosure.

The AIMR appoints a subcommittee of analysts with industry expertise to evaluate selected firms in each industry. Although AIMR provides a general guideline to the subcommittees for the evaluation, the subcommittees often deviate from them and develop their own indices tailored to industry specific practices (Botosan and Plumlee 2002). Therefore, hypothesis 1 is tested using the industry adjusted disclosure score in order to control for potential measurement errors in the AIMR scores. The industry adjusted disclosure score is computed by first taking the difference between the original disclosure score with the industry/year mean disclosure score and then rescaling it to the 100 scale.

Hypothesis 1 is tested with equation 6, where the GMM measure of cost of capital is regressed on the dummy variables D1 and D2, the industry adjusted disclosure score ADJTSOCRE, and the interaction terms D1ADJTSCORE and D2ADJTSCORE, controlling for Beta. The model is consistent with the models in Botosan (1997) and Botosan and Plumlee (2002).

$$r_{GMM\,i}=\alpha_0+a_1D_1+a_2D_2+\alpha_3ADJTSCORE_i+\alpha_4D_1ADJTSCORE_i+\alpha_5D_2ADJTSCORE_i+\alpha_6BETA_i+\varepsilon_i \quad (6)$$

Where, r_{GMM} is GMM measure of cost of capital; ADJTSCORE is industry adjusted AIMR overall disclosure score; D_1 (D_2) is dummy variable representing the smallest (largest) 25% firms in the sample in term of market value of equity; D_1ADJTSCORE: (D_2ADJTSCORE) is interaction term between the dummy variable D_1 (D_2) with ADJTSCORE; BETA is the market beta calculated as the coefficient of the market model regression of firm returns on value weighted NYSE/AMEX market index returns, using a minimum of 30 monthly returns over the 60 months by the end of 1995. BETA is included in the models as a control for systematic risk; i is a specific firm; ε is the random error term in the model.

The sum of the coefficients a_3 and a_4 represents the coefficient for disclosure of the smallest firms in the sample, while the sum of the coefficients a_3 and a_5 represents the coefficient for disclosure of the largest firms. Hypothesis 1 predicts that there exists a significant negative association between disclosure and cost of capital only for small firms. Consequently, a_3+a_4 is expected to be significantly negative, while a_3+a_5 is expected to be insignificant.

Table 4 reports the test results for hypothesis 1. The sum of the coefficients a_3 and a_4, which represents the slope for disclosure of the smallest firms in the sample, is negative at the 0.01 significance level. As predicted, the sum of the coefficient a_3 and a_5, which represents the slope for disclosure of the largest firms, is insignificant. The test results support hypothesis 1.

Tests on Hypothesis 2

Hypothesis 2 is tested using equation 7 as shown below:

$$r_{GMMi}=\alpha_0+a_1D_1+a_2D_2+\alpha_3ADJTSCORE_i+\alpha_4D_1ADJTSCORE_i+\alpha_5D_2ADJTSCORE_i+\alpha_6BETA_i+\alpha_7DUM+\alpha_8DUMADJTSCORE_i+\varepsilon_i \quad (7)$$

Where, D_1 (D_2): dummy variable representing the 25% firms in industries with the lowest (highest) four-firm concentration ratios in the sample; D_1ADJTSCORE (D_1ADJTSCORE): interaction term between the dummy variable D_1 (D_2) with ADJTSCORE; DUM: dummy variable representing the smallest 25% firms in the sample; DUMADJTSCORE: interaction term between dummy variable DUM and ADJTSCORE; All other variables are the same as in Equation 1. DUM and DUMADJTSCORE are added to the model to control for the effect of firm size (i.e. information environments).

EMPIRICAL RESULTS

Table 4: Test Results on Hypothesis One

α_o	α_1	α_2	α_3	α_4	α_5	α_6	$\alpha_3+\alpha_4$	$\alpha_3+\alpha_5$	adj R^2	N
10.56	1.81	-1.45	0.02	-0.19	0.02	1.87	-0.17	0.04	0.212	212
18.45***	3.25***	-2.71***	0.54	-2.99***	0.39	4.14***	-10.63***	0.74		

This table reports the test results on hypothesis one.
*Model: $r_{GMM}=\alpha_o+a_1D_1+a_2D_2+\alpha_3ADJTSCORE+\alpha_4D_1ADJTSCORE+\alpha_5D_2ADJTSCORE+\alpha_6BETA+\varepsilon$ The variables are defined as follows: r_{GMM} is implied cost of capital calculated following the GMM (Gode and Mohanram 2003) approach. The unit is in the number of percentage points. ADJTSCORE: The industry adjusted AIMR (Association of Investment Management and Research) score on firms' overall disclosure. BETA: The coefficient of the market model regression of firm returns on value weighted NYSE/AMEX market index returns, using at least 30 monthly returns over the 60 months prior to the end of 1995. D_1: The smallest 25% firms in the sample in terms of market value. D_2: The largest 25% firms in the sample in terms of market value. D_1ADJTSCORE (D_2ADJTSCORE): Product of D_1 (D_2) with ADJTSCORE. Coefficients on top of test-statistics. The symbols ***, **, and * represent p-values significant at the 0.01, 0.05 and 0.1 levels respectively. N refers to the number of observations used in the test.*

The sum of the coefficients a_3 and a_4 represents the slope for disclosure of the group of firms in the least concentrated industries, while the sum of the coefficients a_3 and a_5 represents the slope for disclosure of the group of firms in the most concentrated industries. Hypothesis 2 predicts a significant negative association between disclosure and cost of capital only for firms in competitive industries. Therefore, the sum of a_3 and a_4 is expected to be significantly negative, while a_3 and a_5 is expected to be insignificant.

Tables 5 reports the test results for hypothesis 2. The coefficient for disclosure of the firms in the least concentrated industries, a_3+a_4, is marginally significant. The coefficient for disclosure of the firms in the most concentrated industries, a_3+a_5, is also insignificant. The results provide weak evidence in support of hypothesis 2.

Table 5: Test Results of Hypothesis Two

α_o	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	$\alpha_3+\alpha_4$	$\alpha_3+\alpha_5$	$\alpha_4-\alpha_5$	adjR^2	N
9.79	0.02	-0.04	0.03	-0.15	-0.02	1.84	1.94	-0.02	-0.12	0.01	-0.13	0.14	212
14.77***	0.03	-0.08	0.63	-2.03**	-0.40	3.87***	3.77***	-0.35	-2.00*	0.04	-2.21**		

*This table reports the test results of hypothesis two. The equation estimated is given by the following formula: $r_{GMM}=\alpha_o+a_1D_1+a_2D_2+\alpha_3ADJTSCORE+\alpha_4D_1ADJTSCORE+\alpha_5D_2ADJTSCORE+\alpha_6BETA+\alpha_7DUM+\alpha_8DUMADJTSCORE+\varepsilon$ Coefficients on top of test-statistics. The symbols ***, **, and * represent p-values significant at the 0.01, 0.05 and 0.1 levels respectively. r_{GMM}: Implied cost of capital calculated following the GMM (Gode and Mohanram 2003) approach. The unit is in the number of percentage points. ADJTSCORE: The industry adjusted AIMR (Association of Investment Management and Research) score on firms' overall disclosure. D_1: The bottom 25% firms in the sample in terms of industry concentration ratio. D_2: The top 25% firms in the sample in terms of industry concentration ratio. D_1ADJTSCORE (D_2ADJTSCORE): Product of D_1 (D_2) with ADJTSCORE. BETA: The coefficient of the market model regression of firm returns on value weighted NYSE/AMEX market index returns, using at least 30 monthly returns over the 60 months prior to the end of 1995. LOGMKTVAL: Natural log of firms' market values of common equity in million dollars at the end of 1995. DUM: A dummy variable representing the smallest 25% firms in the sample. DUMADJTSCORE: Product of DUM with ADJTSCORE. N refers to the number of observations used in the test.*

Sensitivity Test

Because the risk free rate in 1995 as measured by the 10-year Treasury Bill yield is 5.2%, observations with estimated cost of capital lower than 5% are deleted from the sample to repeat the tests, because firms are unlikely to have cost of capital lower than risk-free rate. Deleting low cost of capital observations does not qualitatively change the test results. Moreover, varying the percentages of firms represented by the dummy variables to 30%, 35%, or 40% does not qualitatively affect the results, either.

CONCLUSIONS

This paper examines whether information environment and industry competition affect the relation between disclosure and cost of capital. The test results suggest that the impact of disclosure on cost of capital varies with firm size and industry concentration. The evidence implies that disclosure is more effective in reducing the cost of capital of small firms and firms in more concentrated industries.

There are a few limitations with this study. First, this study uses only one year (1995-1996)'s data in the sample, because AIMR stopped issuing corporate disclosure reports after 1996. Although there is no prior evidence that suggests that the relation between disclosure and cost of capital varies over time, the findings of the paper should be generalized to the current period with caution. Second, the AIMR analyst committees tend to focus on 15 to 20 large firms in an industry. This selection criterion limits the cross sectional variation in disclosure quality and firm size of the sample. The power of the study to detect the differential effects of the variation in disclosure quality on firms' cost of capital is decreased by the reduced heterogeneity of the sample.

The study has some implications on future research and business managers. The study improves our understanding of the relation between cost of capital and disclosure quality. Whereas previous studies treat disclosing firms as a homogenous group, this paper shows that the relation between disclosure and cost of capital varies with some firm characteristics such as firm size and industry affiliation. The findings in this paper suggest that managers of small firms should recognize the significant role of disclosure in reducing cost of capital and increase their financial disclosure to enhance firm value.

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THE PRICING OF EXCHANGE RATE RISK IN UP AND DOWN WORLD STOCK MARKET PERIODS

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ABSTRACT

This paper examines the pricing of exchange rate risk in up and down world stock market periods using multifactor arbitrage pricing models during the period of January 1973 through June 2007. The risk premium of exchange rate exposure in up market periods appears to be small and insignificant. However, it appears to be priced and significant under down market periods. The results in this study help understand why investors decide to hedge exchange rate exposure. The above asymmetry in pricing exchange rate risk seems to justify the use of hedging strategies when investors face low international stock market returns due to depressed world stock market conditions.

JEL: G12, G15

INTRODUCTION

Accepted methods for testing whether the exchange rate risk is priced in the world stock market do not address the possibility that such risk should be differently priced under up and down world stock market periods. We discuss this oversight in the literature review section of the paper. Currency exposure could lead to different risk premia depending on previous up and down market conditions. This scenario may arise from various sources. Investor optimism or pessimism, for instance, may result in asymmetric responses under such market conditions. This could generate differences in an investor's return expectations about the potential international impact of changes in foreign stock markets (Erb et al., 1994). For instance, a small negative movement in the U.S. stock market could lead to larger declines in other stock markets due to widespread earnings disappointment among investors rather than as a result of the particular magnitude of U.S. stock market decline. Conversely, a small positive movement in the U.S. stock market could have no larger effects in other stock markets (Skinner and Sloan, 1999).

Thus, when investors price currency exposure in down rather than in up world stock market periods, investors' pessimism or their widespread earnings disappointment in such market conditions may lead them to use financial hedging strategies with the objective of protecting their returns against exchange rate risk and, thus, prevent financial portfolio difficulties or going bust.

Although different exchange rate risk premia for up and down world stock market periods could be due to various sources, our main objectives in this paper are 1) to examine whether currency risk is a priced factor under up and down world stock market periods and 2) to estimate the compensation that investors expect to receive in order to bear the exchange rate risk if it is finally priced under such world stock market conditions. Thus, we aim at contributing to the literature by closely examining the relationship between exchange rate risk and stock market returns under conditions of both up and down world stock market periods. The paper is organized into five sections. Section 2 discusses the main contributions in the relevant literature, more specifically the multifactor arbitrage pricing model. Section 3 presents the methodology of empirical research including data and main measures. Section 4 summarizes the empirical results. The last section offers a summary of the research and the conclusions.

LITERATURE REVIEW

Two key assumptions are considered when addressing the relationship between stock market pricing and exchange rate risk pricing. First, if the effects of exchange rate risk do not disappear in a well-diversified portfolio, then investors should price such pervasive risk. Second, if Purchasing Power Parity (PPP) theory holds among countries and if stock markets behave perfectly, then the single-market factor Capital Asset Pricing Model (CAPM) should hold internationally. As a consequence of the latter, the exchange rate risk should not be a pervasive risk factor priced by investors.

Diverse studies have considered the effects of exchange rate risk on asset returns when examining international asset pricing models, which include both the exchange rate risk factor and the market risk factor (Solnik, 1974; Sercu, 1980; Stulz; 1981; Adler and Dumas, 1983; Solnik, 1997). However, the empirical evidence shows mixed results. On one hand, results from testing unconditional asset pricing models are not conclusive. Seminal studies (e.g., Hamao, 1988; Jorion, 1991) do not find evidence in favor of pricing exchange risk on the Japanese or the U.S. stock markets. More recent studies (e.g., Carrieri and Majerbi, 2006), however, show significant unconditional exchange risk premium when emerging stock markets are analyzed. On the other hand, results from testing time varying conditional asset pricing models generally conclude that foreign exchange risk is priced in the stock markets of major developed countries (Dumas and Solnik, 1995; De Santis and Gerard, 1998; Choi, et al., 1998; Doukas, et al., 1999; Carrieri, 2001). Moreover, Vassalou (2000) shows that exchange rate risk, along with foreign inflation risk, can explain an important portion of the cross-sectional variation in stock market returns of 10 developed countries.

Previous studies, however, do not evaluate the issue that exchange risk premia may differ under up and down stock market periods. Traditional approaches based on either conditional or unconditional models do not consider previous possibility, even after controlling for the effects of stock market and/or foreign inflation risk factors. A pioneering study (Pettengill, et al., 1995) recognized that a conditional relationship between market beta risk and return may take place in up and down stock market periods and that a systematic relationship must exist between market beta risk and return for the former to be a useful measure of risk. Theoretically, the CAPM shows a systematic and positive tradeoff between market beta and expected return. Yet, in line with rational expectations and Pettengill, et al. (1995), there should be a positive relationship between realized returns and market beta during positive market-excess return periods and a negative relationship during negative market-excess return periods.

However, the above prediction applies only to the case of one systematic risk factor, the market beta risk factor. The question is what would happen if more risk factors that are also systematic affect the stock market's return generating process. To answer this question, we extend Pettengill, et al's model in order to incorporate the effect of orthogonal innovations that arise from macroeconomic risk factors under a conditional framework. The extension is based on Ross' Arbitrage Pricing Theory (APT) model (Ross, 1976). We conduct an analysis using a three-factor model conditional to up and down world stock market periods in an international context where both inflation and exchange rate innovations are pervasive systematic risk factors in addition to the world stock market factor.

Vassalou (2000), for instance, supports a three-factor solution. It is well known that countries with relatively high unexpected inflation rates transfer this uncertainty to their stock markets by making their stocks less attractive. Investors would require higher compensation risk and thus higher rates of returns if they would invest in such stocks. A similar situation is observed when net importing/exporting countries deal with unexpected depreciation/appreciation in their currencies. However, it is not known whether risk premia that are associated to previous macroeconomic risk factors are positive or negative in up or down world stock market periods, respectively, and whether such relationships are symmetric or asymmetric. Our empirical research addresses those questions next.

METHODOLOGY

Data

The data consist of monthly returns for 18 country stock market indexes as well as the Morgan Stanley Composite World Index (MSCI World Index[SM]) as proxy for the world stock market. The indexes are available in www.mscibarra.com. MSCI Barra is a leading provider of investment decision tools to investment institutions worldwide and its products include indices and portfolio risk and performance analytics for use in managing equity, fixed income and multi-asset class portfolios. On the one hand, to construct a particular country market index, every listed security in the market is identified for inclusion. Eligible securities are free float adjusted, classified in accordance with the Global Industry Classification Standard (GICS®), and screened by size, liquidity and minimum free float. On the other hand, the MSCI World Index is constructed as a free float-adjusted market capitalization index designed to measure global developed market equity performance. The stock market indexes included are Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, The Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

The sample period extends from January 1973 through June 2007. This period is initially characterized by the Bretton Woods (1973) and the Jamaica Agreements (1976), which established a set of rules for the international monetary system, where flexible exchange rates were declared acceptable to the IMF members, and central banks were allowed to intervene in the exchange markets in order to control unwarranted volatilities. Despite the regulations, however, $\widetilde{R}_{st}$, the proxy for foreign exchange rate variations used in this study, showed significant volatility over the sample period, with an annualized standard deviation of 7.85% versus 0.86% for the U.S. Treasury Bill rate. It is important to note that $\widetilde{R}_{st}$ is estimated as the rate of change for a world stock market capitalization-weighted exchange rate index, measured as the dollar price of foreign currency. Given that the MSCI World Index is a linear combination of various stock market indexes with their respective market capitalization weights, we perform the restricted multiple regression approach suggested by Sharpe (1992) in order to obtain explicit weights for such exchange rate index. The regression sets the MSCI World Index returns as dependent variables and the stock market indexes returns as independent variables. Consequently, the estimated coefficients are restricted to be non-negative and their sum equal to one. Thus, in the construction of $\widetilde{R}_{st}$, these coefficients can be interpreted as those "naive" weights used in an internationally diversified portfolio of foreign currencies, which are essentially the same weights used in the MSCI World Index construction once extracted the U.S. market capitalization weight due to the fact that this stock market uses the USD as numeraire currency.

Analytical Procedures

Our analysis starts by applying factor analysis to the database of excess return on stock market indexes in the sample. We have 18 time series containing such excess returns with 414 months associated to each time series, totaling 7,452 data entries. With the application of factor analysis, we pursue identification of the underlying factor structure with its respective number of factors through data summarization. Thus, we at least may identify the number of factors behind the dataset, which is an important step for later APT pricing model specification. Then, we continue by splitting the total sample period into up and down world stock market periods. Following a modified Jorion's approach, which is based on Ross's APT, and the results from the factor analysis, a three-factor arbitrage-pricing model is analyzed in up and down world stock market periods. The tests of model rest on the assumption that the included factors are well specified. The model includes the world stock market returns as the first factor, and the orthogonal component (of the world stock market factor) of innovations in a world stock market capitalization-

weighted inflation rate factor as a second factor. The weights used to build this factor are the same as those used as market capitalization weights in the MSCI World Index.

The third and last factor is the orthogonal component (of the two previous orthogonal factors) of innovations in a world stock market capitalization-weighted exchange rate factor. The proposed three-factor model is well founded. On the one hand, the world stock market returns are used by several empirical studies as a reliable source of important systematic risk factors that help explain stock market returns [See for example; Gupta and Finnerty (1992); Dumas and Solnick (1995)]. On the other hand, inflation rate and foreign exchange rate are pervasive macroeconomic factors that involve risk and affect security returns. A three-factor model allows a direct test of the CAPM where inflation and exchange rate innovations are assumed pervasive orthogonal factors.

The orthogonalization process is useful in order to avoid spurious pricing correlation among inflation rates, foreign exchange rates and world stock market returns. The parameters of the model are estimated using generalized least squares seemingly unrelated regressions (SUR), which are said to be a more powerful technique than the traditional Fama-MacBeth (1973) approach. Yet, differing from Jorion's approach, we jointly estimate the parameters of the unrestricted and restricted three factor model in up and down world stock market periods, respectively. This process allows us to test for statistically significant differences in the price for exchange rate exposure under such conditions in the world stock market, which is a major contribution of the study.

Three-Factor Model

The dollar rate of return in excess of the risk-free rate, $\widetilde{R}_{jtUS\$}$, that an investor can make from an investment in the *jth* stock market is given by

$$\widetilde{R}_{jt} = \widetilde{R}^{*}_{jt} - \widetilde{R}_{ft} \tag{1}$$

where $\widetilde{R}^{*}_{jt}$ is the j_{th} stock market return, $\widetilde{R}_{ft}$ is the U.S. risk-free rate, both are measured in U.S. dollars, and the symbol "~" indicates a random variable. A Ross's (1976) APT three-factor linear model can be written as

$$E(\widetilde{R}_j) = \delta_0 + \delta_m \beta^m_j + \delta_i \beta^i_j + \delta_s \beta^s_j \tag{2}$$

where $E(\widetilde{R}_j)$ is the j_{th} stock market expected return, β^m_j is the sensitivity to the world stock market returns, β^i_j and β^s_j are the sensitivities to inflation and exchange rate variations, respectively. The sensitivities are restricted to be orthogonal to the world stock market returns, which is consistent with Ross's (1976) APT assumptions. This framework is correct if loadings on non-included risk factors are near zero. Given that the world stock market itself must have neither inflation nor exchange rate systematic risks (β^i_m and $\beta^s_m = 0$) and must follow equation (2) at the same time, this equation can also be expressed as:

$$E(\widetilde{R}_j) = \delta_0 + [E(\widetilde{R}_m) - \delta_0]\beta^m_j + \delta_i \beta^i_j + \delta_s \beta^s_j \tag{3}$$

The empirical test of equation (3) is developed next. Assuming stationarity, the time series of j_{th} stock market returns can be written as:

$$\widetilde{R}_{jt} = E(\widetilde{R}_{jt}) + \beta_j^m[\widetilde{R}_{mt} - E(\widetilde{R}_{mt})] + \beta_j^i \widetilde{F}_{it} + \beta_j^s \widetilde{F}_{st} + \widetilde{\varepsilon}_{jt} \quad (4)$$

where

$$\widetilde{F}_{st} = \widetilde{R}_{st} - (\hat{\gamma}_0 + \hat{\gamma}_1 R_{mt}^* + \hat{\gamma}_2 \widetilde{F}_{it}) \quad (5)$$

is the residual after running an OLS regression with exchange rate variations $\widetilde{R}_{st}$ as dependent variable and world stock market returns $\widetilde{R}_{mt}^*$ and inflation rate innovations $\widetilde{F}_{it}$ (orthogonal to world stock market returns) as independent variables. Thus, $\widetilde{F}_{st}$ has, by construction, zero mean and zero correlation (orthogonal) to world stock market returns and inflation rate innovations. The orthogonalization avoids spurious pricing correlation between exchange rate and world stock market returns. Under rational expectations, equation (3) can be substituted in equation (4) to get the testable three factor model:

$$\widetilde{R}_{jt} = [\delta_0(1-\beta_j^m) + \delta_i\beta_j^i + \delta_s\beta_j^s] + \beta_j^m \widetilde{R}_{mt} + \beta_j^i \widetilde{F}_{it} + \beta_j^s \widetilde{F}_{st} + \widetilde{\varepsilon}_{jt} \quad (6)$$

Now, we introduce a dummy variable into equation (6) in order to split the sample into up and down world stock market periods so that we can test whether there are statistically significant differences in pricing exchange rate exposure in such market conditions.

The econometric specification that captures the above conditions can be written as:

$$\begin{aligned}\widetilde{R}_{jt} = {} & \{[\delta_0^u D + \delta_0^d(1-D)][1-(\beta_j^{um} D + \beta_j^{dm}(1-D))] + \delta_i^u \beta_j^{ui} D + \delta_i^d \beta_j^{di}(1-D) + \\ & \delta_s^u \beta_j^{us} D + \delta_s^d \beta_j^{ds}(1-D)\} + \beta_j^{um} \widetilde{R}_{mt} D + \beta_j^{dm} \widetilde{R}_{mt}(1-D) + \\ & \beta_j^{ui} \widetilde{F}_{it} D + \beta_j^{di} \widetilde{F}_{it}(1-D) + \beta_j^{us} \widetilde{F}_{st} D + \beta_j^{ds} \widetilde{F}_{st}(1-D) + \widetilde{\varepsilon}_{jt}\end{aligned} \quad (7)$$

where

D = Dummy variable with $D = 1$ *if* $(\widetilde{R}_{mt*} - \widetilde{R}_{ft}) >= 0$ (up world stock market periods) and zero otherwise (down world stock market periods)

β_j^{um} = World stock market systematic risk of jth stock market in up world stock market periods

β_j^{dm} = World stock market systematic risk of jth stock market in down world stock market periods

β_j^{ui} = Inflation rate systematic risk of jth stock market in up world stock market periods

β_j^{di} = Inflation rate systematic risk of jth stock market in down world stock market periods

β_j^{us} = Exchange rate systematic risk of jth stock market in up world stock market periods

β_j^{ds} = Exchange rate systematic risk of jth stock market in down world stock market periods

δ_i^u = Risk premium of inflation rate exposure in up world stock market periods

δ_i^d = Risk premium of inflation rate exposure in down world stock market periods

δ_s^u = Risk premium of exchange rate exposure in up world stock market periods

δ_s^d = Risk premium of exchange rate exposure in down world stock market periods

Measurement

$\widetilde{R}_{st}$, the exchange rate variation in equation (5), corresponds to the rate of change in a world stock market capitalization-weighted exchange rate index. In previous data section of this paper, we discuss and explain its construction and estimation. Both the market excess return and exchange rate variations series are tested for stationary. Using the Augmented Dickey-Fuller test, we reject the unit root hypothesis for both series at the 1% level of significance. Therefore, a positive value in $\widetilde{R}_{st}$ shows a depreciation of the U.S. dollar. The use of this proxy is adequate when foreign exchange rate variations are unanticipated. An alternative proxy would be to use the forward premium on the exchange rate. However, several empirical studies show that the forward rate is a biased estimator of future spot exchange rate and does not even outperform the current spot exchange rate (e.g., Levich, 1982).

Next, we focus on building the innovations in a world stock market capitalization-weighted inflation rate factor. To do this, we start by considering the 18 inflation rate time series associated with the countries under study. Countries' inflation rates were obtained from International Financial Statistic (IFS) available as an electronic database in the International Monetary Fund's web site. Then these series are weighted using the same weights that arise from the MSCI world index. Thus, we obtain a composite factor that represents a world stock market capitalization-weighted inflation rate factor. However, in our framework, investors should price only orthogonal innovations associated with this factor. We generate such innovations by first taking the residuals that arise after running an autoregressive world inflationary model (AR Model). The AR model has the following specification: the composite world index inflation rate is used as a dependent variable. The independent variables are lags 1, 3, 5, 11, 12, 13, and 24, of the dependent variable and are all significantly different from zero at the 5% level. The model has a R-Squared of 0.67 and was the best fitted model compared to alternative AR specifications according to Schwarz' criterion. Using the Augmented Dickey-Fuller test, we reject the unit root hypothesis at the 1% level of significance for the innovations (residuals) that arise from previous AR model. Then, in order to get orthogonality, we run a new OLS regression where previous residuals enter as dependent variables and the world stock market returns as independent variables. Thus, the new residuals generated from previous regression represent the orthogonal series of inflation rate innovations, which is used further as $\widetilde{F}_{it}$ in this research.

Variations in the value of $\widetilde{R}^{*}_{jt}$ are estimated by the MSCI rate of return of *j*th stock market index included in the sample. Excess Returns, $\widetilde{R}_{jt}$, are computed by subtracting the series of monthly return on a 3-month U.S. Treasury Bill available in the Federal Reserve electronic database. It should be noted that the world stock market return was higher than the contemporaneous U.S. risk-free return (up market periods) in 230 instances during the sample period of January 1973 through June 2007. It was lower in 184 instances (down market periods). This yields a statistic of approximately 56% and 44% for up and down world stock market periods, respectively. This observation is useful for further pricing analysis of foreign exchange rate exposure in such world stock market conditions.

Empirical Results

We start by reporting factor analysis results. The overall significance of the excess stock market returns' correlation matrix is jointly analyzed through the Barlett and MSA tests. The first test shows that the correlations, when taken overall, are significant at the 1% level. The Barlet test of sphericity yields a value of 4,286 with a p-value of 0.00 for 153 relevant correlations among the 18 stock markets under study. However, this test is able to test the presence of nonzero correlations but not the pattern of these correlations. The second test, which is able to manage this issue, is the measure of sampling adequacy

(MSA test), which in this case falls in the acceptable range (over 0.50) with a value of 0.944. Therefore, the set of variables meet the requirements for factor analysis. The next step is to select the number of factors to be extracted. We use the principal component as method of extracting factors. Table 1 shows information regarding the 18 possible factors and their relative explanatory power as expressed by their eigenvalues. In addition to assessing the relative importance of each factor, the eigenvalues can be used to select the number of factors. Thus, according to the latent root criterion, three factors can be retained.

The rationale for the latent root criterion is that any individual factor should account for the variance of at least a single variable if it is to be retained for analysis. Each variable contributes a value of 1 to the total eigenvalue. Thus, only factors having latent roots or eigenvalues greater than 1 are considered significant. These three factors account for 62% of the variance of the 18 excess market returns' database. Therefore, the results after applying factor analysis suggest the presence of three significant risk factors. This is an important finding that is incorporated in the specification of the three factor model whose results are further reported in this section.

Table 1: Total Variance Explained

Factor	Eigenvalues		
	Total	% of Variance	Cumulative %
1	8.724	48.090	48.090
2	1.470	8.103	56.193
3	1.050	5.788	61.981
4	0.873	4.812	66.793
5	0.700	3.859	70.652
6	0.636	3.506	74.158
7	0.603	3.324	77.482
8	0.557	3.070	80.552
9	0.515	2.839	83.391
10	0.477	2.629	86.021
11	0.465	2.563	88.584
12	0.422	2.326	90.910
13	0.374	2.062	92.972
14	0.335	1.847	94.818
15	0.281	1.549	96.367
16	0.266	1.466	97.834
17	0.217	1.196	99.030
18	0.176	0.970	100.000

First column in Table 1 shows the factors extracted after applying factor analysis. Second column shows eigenvalues associated to each factor. Third column shows the % of total data variance explained by each correspondent factor and the last column shows the cumulative % of variance when additional factor are added.

Table 2 shows the world stock market systematic risk and exchange rate exposure of the 18 stock markets for the unrestricted linear three-factor model. The exchange rate exposure coefficients are presented after accounting for the effects of both the world stock market factor and the orthogonal world stock market capitalization-weighted inflation rate factor. Thus, Table 2 reports results that are estimated under unrestricted conditions using the SUR method of estimation. Conversely, Table 3 reports results obtained under restricted parameters for the model, in line with the SUR estimation in equation (7). The results are reported separately for up and down world stock market periods.

Across models and stock markets, the results show that the exchange rate exposure coefficients appear to be very different for either up or down world stock market periods. A negative sign for a single stock market's exposure coefficient indicates that this stock market tends to decrease investors' benefits when U.S. dollar depreciates. That is the case of the U.S. stock market. Given that on average the U.S. stock market index is characterized by import net-oriented industries, their stock prices tend to decrease when the dollar falls. Conversely, a positive sign shows that a stock market tends to increase investors' benefits when the U.S. dollar depreciates. Austria, Belgium, Denmark, France, Germany, Japan, and Switzerland, where export-oriented industries compete in worldwide-diversified operations, illustrate this condition.

Japan, for instance, has experienced a strong yen in recent years making Japanese exports more expensive.

The stock markets of previously cited countries show significant positive exposure coefficients either in up or down world stock market periods. To empirically test whether the exchange rate exposure coefficients are equal across stock markets, Wald-test statistics are presented at the bottom of Table 2. These statistics significantly reject the null hypothesis of equal exchange rate exposure coefficients. Therefore, we find significant cross-sectional variations in exchange rate exposure coefficients across stock markets in up and down world stock market periods, respectively.

Table 2: Exchange Rate Exposure of Stock Markets (Monthly Data, January 1973-June 2007).
Unrestricted Three-Factor Model

$$\tilde{R}_{jt} = \alpha_j^u D + \alpha_j^d (1-D) + \beta_j^{um} \tilde{R}_{mt} D + \beta_j^{dm} \tilde{R}_{mt} (1-D) + \beta_j^{ui} \tilde{F}_{it} D + \beta_j^{di} \tilde{F}_{it} (1-D) + \beta_j^{us} \tilde{F}_{st} D + \beta_j^{ds} \tilde{F}_{st} (1-D) + \tilde{\varepsilon}_{jt}$$

	Stock Market	Up World Stock Market Periods: Exchange Rate Beta (after accounting for the effects of world stock market and inflationary factor)	Up World Stock Market Periods: Exchange Rate Beta Standard Error	Down World Stock Market Periods: Exchange Rate Beta (after accounting for the effects of world stock market and inflationary factor)	Down World Stock Market Periods: Exchange Rate Beta Standard Error
		β_j^{us}	$S(\beta_j^{us})$	β_j^{ds}	$S(\beta_j^{ds})$
1	Australia	0.026648	0.167087	-0.010085	0.169244
2	Austria	0.823911*	0.165091	0.731473*	0.167221
3	Belgium	0.628596*	0.126170	0.619198*	0.127798
4	Canada	-0.315294*	0.113885	-0.211302	0.115354
5	Denmark	0.361516*	0.128547	0.741544*	0.130206
6	France	0.479450*	0.141136	0.373308*	0.142957
7	Germany	0.318767*	0.140290	0.501158*	0.142100
8	Hong Kong	0.956450*	0.279157	-0.407100	0.282760
9	Italy	0.271876	0.197414	0.399659*	0.199961
10	Japan	0.897598*	0.134311	0.772014*	0.136044
11	Netherlands	0.186044	0.099776	0.329696*	0.101063
1	Norway	0.155107	0.188605	0.140738	0.191039
13	Singapore	-0.218628	0.205343	-0.052545	0.207973
14	Spain	0.458764*	0.161563	0.217807	0.163648
15	Sweden	0.074771	0.161507	0.039323	0.163591
16	Switzerland	0.590408*	0.111115	0.561191*	0.112549
17	U.Kingdom	0.353373*	0.140096	0.160892	0.141903
18	U.S.A	-0.530197*	0.060361	-0.524964*	0.061140
Test of Equal Exchange Rate Betas					
Wald Test		169.2167*		151.5465*	
[p-value]		[0.0000]		[0.0000]	

The header of Table 2 shows the specification of the unrestricted three-factor model where Rmt is the MSCI value-weighted world stock market return. F_{it} is the orthogonal component of innovations in a composite inflationary factor. D is a dummy variable which takes D =1 if $R^*_{mt} >= R_{ft}$ (up world stock market periods) and D = 0 otherwise (down world stock market periods). Fst is the orthogonal component of the exchange rate variation. Second column in Table 2 shows the stock markets under study. Third and fourth columns show the exchange rate betas and their correspondent standard error in up world stock market periods, respectively. Fourth and fifth columns show the exchange rate betas and their correspondent standard error in down world stock market periods, respectively. Significant at the 5-percent level.*

Next, the Wald test and p-value columns reported in Table 3 show the value of the test and its statistical significance under the null hypothesis of equal exchange rate exposure coefficients in up and down world stock market periods for each stock market under study. The null hypothesis is rejected only for Denmark and Hong Kong stock markets, which indicates statistically different exchange rate exposure coefficients at the 5% level. Therefore, investors in these stock markets seem to react differently to the exchange rate risk factor in up and down world stock market periods, respectively. However, for the remaining 16 stock markets, investors seem to react similarly under previous world stock market conditions. Given the presence of asymmetries in the exchange rate exposure for some stock markets and significant differences

in this exposure across all stock markets for up and down world stock market periods, these findings allow us to continue with the pricing analysis of exchange rate risk.

Table 3: Exchange Rate Exposure of Stock Markets (Monthly Data, January 1973-June 2007). Restricted Three-Factor Model

$$\widetilde{R}_{jt} = \{[\delta_0^u D + \delta_0^d (1-D)][1-(\beta_j^{um} D + \beta_j^{dm}(1-D))] + \delta_i^u \beta_j^{ui} D + \delta_i^d \beta_j^{di}(1-D) + \delta_s^u \beta_j^{us} D + \delta_s^d \beta_j^{ds}(1-D)\} + \beta_j^{um} \widetilde{R}_{mt} D + \beta_j^{dm} \widetilde{R}_{mt}(1-D) + \beta_j^{ui} \widetilde{F}_{it} D + \beta_j^{di} \widetilde{F}_{it}(1-D) + \beta_j^{us} \widetilde{F}_{st} D + \beta_j^{ds} \widetilde{F}_{st}(1-D) + \widetilde{\varepsilon}_{jt}$$

	Stock Market	Up World Stock Market Periods Exchange Rate Beta (after accounting for the effects of world stock market & inflationary factor) β_j^{us}	Down World Stock Market Periods Exchange Rate Beta (after accounting for the effects of world stock market & inflationary factor) β_j^{ds}	Wald Test	
1	Australia	0.043053	0.003450	0.027709	0.8678
2	Austria	0.831356*	0.726547*	0.197118	0.6571
3	Belgium	0.630252*	0.627745*	0.000195	0.9888
4	Canada	-0.307060*	-0.208793	0.368009	0.5441
5	Denmark	0.358965*	0.746307*	4.491892*	0.0341
6	France	0.483747*	0.379040*	0.271078	0.6026
7	Germany	0.305996*	0.518897*	1.136482	0.2864
8	Hong Kong	0.939063*	-0.371498	10.90457*	0.0010
9	Italy	0.267074	0.402000*	0.231389	0.6305
10	Japan	0.891550*	0.757924*	0.480542	0.4882
11	Netherlands	0.176053	0.137960*	1.407557	0.2365
12	Norway	0.166111	-0.006655	0.011016	0.9164
13	Singapore	-0.209620	-0.006655	0.483655	0.4868
14	Spain	0.464311*	0.212214	1.203602	0.2726
15	Sweden	0.051105	0.052201	0.000022	0.9962
16	Switzerland	0.585710*	0.575107*	0.004508	0.9465
17	U.Kingdom	0.365556*	0.171175	0.946967	0.3305
18	U.S.A	-0.527334*	-0.519507*	0.007630	0.9304

Notes: The header of Table 3 shows the specification of the restricted three-factor model where R_{mt} is the MSCI value-weighted world stock market return. F_{it} is the orthogonal component of innovations in a composite inflationary factor. D is a dummy variable which takes D =1 if $R^*_{mt} >= R_{ft}$ (up world stock market periods) and D = 0 otherwise (down world stock market periods). F_{st} is the orthogonal component of the exchange rate variations. Second column in Table 3 shows the stock markets under study. Third and fourth columns show the exchange rate betas in up and down world stock market periods, respectively. Fourth column shows the Wald test while fifth column its correspondent p-value. Wald test tests whether there is significant difference between up and down exchange rate betas. Significant at the 5-percent level.*

It is important to note that parameters reported in Tables 2, 3 and 4 are estimated using generalized least squares seemingly unrelated regressions (SUR), which has been documented to be a more powerful technique than the traditional Fama-MacBeth (1973) approach. The SUR technique offers two advantages. First, the constraints imposed by the models to the parameters can be tested by a likelihood ratio test. This test is defined as $L(k) = T \ln \frac{|\Sigma R|}{|\Sigma U|}$ and is distributed as a χ^2 with k degrees of freedom equal to the difference between the number of parameters estimated under unrestricted and restricted three factor model, respectively. The values of $|\Sigma R|$ and $|\Sigma U|$ represent the determinants of the residual covariance matrices of the restricted and unrestricted model, respectively. T is the number of observations. This test also allows us to evaluate the extent to which the models fit the data. Second, following the SUR technique no data is lost. In the Fama-McBeth approach, the initial data period (typically 5 years) is lost when the β parameters are estimated by OLS regression.

Table 4 shows the exchange rate risk premia (δ coefficients) and their respective standard errors for up and down world stock market periods after running the restricted three-factor model. We also perform

tests for foreign exchange rate exposure without including up and down world stock market periods (equation (6)). The tests for such model (not reported here) confirm that the exchange rate exposure coefficient is not significantly different from cero. Thus, the foreign exchange rate exposure is not priced under such conditions. This result is in line with Jorion's method where such risk is not price in the U.S. stock market.

The last column shows the chi-squares statistics for the cross-sectional restrictions imposed on the model. With no variations for up world stock market periods, the pricing of exchange rate exposure results are small and insignificant in any time periods. Conversely, for down world stock market periods the price of exchange rate risk is positive and significant with one exception in the period from July 1984 through December 1995. Yet, for the entire period of January 1973 to December 2007, it is positive and significant. Previous results indicate that investors who invest in those stock markets with positive exposure (e.g., 0.233 an average estimate number for exchange rate coefficients in the restricted three-factor model, see Table 3) require 4.1% more USD annual return than those who invest in the stock markets with no exposure.

Table 4: Pricing of Exchange Rate Risk (Monthly Data January 1973-June 2007). Restricted Three-Factor Model

$$\widetilde{R}_{jt} = \{[\delta_0^u D + \delta_0^d (1-D)][1 - (\beta_j^{um} D + \beta_j^{dm}(1-D))] + \delta_i^u \beta_j^{ui} D + \delta_i^d \beta_j^{di}(1-D) + \delta_s^u \beta_j^{us} D + \delta_s^d \beta_j^{ds}(1-D)\} +$$
$$\beta_j^{um} \widetilde{R}_{mt} D + \beta_j^{dm} \widetilde{R}_{mt}(1-D) + \beta_j^{ui} \widetilde{F}_{it} D + \beta_j^{di} \widetilde{F}_{it}(1-D) + \beta_j^{us} \widetilde{F}_{st} D + \beta_j^{ds} \widetilde{F}_{st}(1-D) + \widetilde{\varepsilon}_{jt}$$

Period	Up World Stock Market Periods Exchange Rate Risk Premium δ_s^u (Coefficient Standard Error)	Down World Stock Market periods Exchange Rate Risk Premium δ_s^d (Coefficient Standard Error)	Test of Fit (p-values) χ^2_{30}
1973:01-2007:06	-0.002274	**0.014712***	41.61
	(0.002622)	(0.005969)	(0.077)
1973:01-1984:06	-0.031168	**0.010940***	37.83
	(0.055372)	(0.002478)	(0.154)
1984:07-1995:12	0.012026	-0.100937	27.95
	(0.009456)	(0.340192)	(0.573)
1996:01-2007:06	-0.089370	**0.014207***	34.48
	(0.111720)	(0.007080)	(0.262)

The header of Table 4 shows the specification of the restricted three-factor model where R_{mt} is the MSCI value-weighted world stock market return. Fit is the orthogonal component of innovations in a composite inflationary factor. D is a dummy variable which takes D =1 if $R^*_{mt} >= R_{ft}$ (up world stock market periods) and D = 0 otherwise (down world stock market periods). F_{st} is the orthogonal component of the exchange rate variations.Second column in Table 4 shows the exchange rate risk premium and its correspondent standard error through four up world stock market subperiods. Third column shows the exchange rate risk premium and its correspondent standard error through four down world stock market subperiods. The last column shows The chi-square statistic χ^2_{30}, which tests the cross-sectional restrictions required by the three-factor model, with a 5% critical value of 43.77.
**Significant at the 5% level*

SUMMARY AND CONCLUSIONS

An increasing number of empirical studies based on Ross's Arbitrage Pricing Theory (APT) have studied the effect of exchange rate risk on stock market returns and adopted either unconditional time-unvarying ways to test the models or alternative conditional time-varying approaches. Nonetheless, following the conditional approach to up and down stock market periods developed by Pettengill et al. (1995), there is no empirical evidence on whether foreign exchange exposure commands different and significant conditional risk premia in such market conditions.

We replicate Pettengill et al.'s empirical observation by inspecting the world stock market return and the risk-free rate series. The results indicate that, for the entire sample period of January 1973 through June 2007, 56% of the time the world stock market return was higher than the contemporaneous U.S. risk-free rate (up market periods) and was lower 44% of the time (down market periods). From this observation, we conclude that the examination of the pricing of foreign exchange exposure is a relevant issue under

such world stock market conditions. Consequently, the purpose of this paper is to examine the pricing of exchange rate risk when the world stock market returns are split into up and down world stock market periods within a framework of three-factor APT model. Our findings, after applying factor analysis, suggest the presence of three significant risk factors.

The results also suggest that exchange rate risk appears to be a diversifiable risk in up world stock market periods. For down market periods (pessimistic stock market periods), the risk appears to be not diversifiable. In fact, under down world stock market periods, the empirical results show that investors who invest in those stock markets with positive exposure (i.e., 0.233, an average estimate number for restricted three-factor model, see Table 4) demand 4.1% more USD annual return than those who invest in those stock markets with no exposure.

Therefore, financial hedging strategies seem to be justified when investors face low international stock market returns due to depressed world stock market conditions. In such conditions, the investors try to protect their returns against exchange rate exposure and, thus, hedge their returns. It is important to note that the results on this study are conditional to the currency used as numeraire. We use the USD as numeraire. Future research can also analyze different currencies depending on what kind of currency the investors are interested on hedging. Thus, we may have euros, British pounds, yens as potential currencies for future study.

Finally, the results provide guidance to government policy-makers and financial managers worldwide. Since there is a high probability that up and down world stock market periods will be observed in the future, policymakers should offer an international regulatory financial framework that ensures adequate conditions for the development of competitive financial derivatives markets. Similarly, financial managers should be prepared to use economically the instruments designed for managing foreign exchange rate exposure, especially when they have to face depressed conditions in the world stock market.

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MEASUREMENT OF INEFFICIENCIES IN BANGLADESH BANKING INDUSTRY USING STOCHASTIC FRONTIER PRODUCTION FUNCTION

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ABSTRACT

This paper examines inefficiencies of Bangladesh banking industry using the stochastic frontier production function model and the time invariant cross-sectional data. The measure of ith bank technical efficiency indicates that the efficiency of Bangladesh commercial banks lies between 12.7 and 94.7 percent; the industry average is 69.5 percent. The model suggests that about 30 percent of the commercial banks in Bangladesh are below the industry average.

JEL: C12, C13, C24

INTRODUCTION

The study of efficiency in manufacturing industry in the developing countries has been an important topic in developmental literature (Pitt and Lee, 1981). In the past, the study of efficiency—technical and allocative—has also been a topic of considerable interest in agriculture. Several authors have conducted numerous studies for estimating technical inefficiencies including Battese and Coelli, 1988 and 1992. Huang and Liu (1994), Reifschneider and Stevenson (1991), and Kumbhakar, Ghose and McGuckin (1991) have also introduced models for technical inefficiency effects in the stochastic function. The interest in efficiency studies is no longer limited to agriculture and industry as it has been in the past. The interest has now entered into the banking industry.

Although there are a number of studies relating to bank efficiencies, the survey of literature done for this paper demonstrates that all of the studies applied non-parametric approaches in measuring the efficiency. All of the studies relating to bank efficiency followed Data Envelope Analysis (DEA). The DEA analysis does not provide enough credibility to the statistical significance of efficiency measure. Because "DEA assumes all deviations from the frontier are due to inefficiency" (Collie, Rao and Battese, 1998, p.219). In this respect the stochastic frontier production model, independently developed by (ALS) Aigner, Lovell, and Schmidt (1977) and (M&B) Meesuen and van den Broeck (1977), and then later modified and applied by Battese and Corra (1977) and Battese and Coelli (1995, is the most appropriate tool for measuring firm level inefficiency. The reason to use the stochastic model is because if there is any noise, like measurement errors, strikes, this "may influence the placement of the DEA frontier more than would be the case with the stochastic frontier approach" Collie, Rao and Battese,1998, p.219). There are other relative advantages for using the stochastic frontier approach. Tests of the hypothesis for the existence of inefficiency and the structure of production technology can also be performed in a stochastic frontier analysis.

This paper applies the stochastic frontier production function approach to the banking industry in Bangladesh. A stochastic frontier production function is defined for panel data, in which the non-negative technical inefficiencies of firms are assumed to be dependent on firm specific variables and time (Battese and Coelli, 1995). The stochastic production frontier model measures firm's technical efficiency which is the ratio of its mean output (subject to the level of its inputs and firm effects) to the corresponding mean production obtained by utilizing its factor inputs most efficiently.

The function also postulates the inefficiency effects in producing a firm output that are independently distributed as truncations of normal distributions with a constant variance. The parameters of the stochastic frontier and the efficiency model are estimated simultaneously with a given distributional assumption associated with cross-sectional data on the sample firm.

This paper is organized as: A brief survey of literature is outlined in Section 2. Section 3 provides a description of technical inefficiency and the frontier model with panel data. The estimate of the model and conclusion are provided in Section 4

LITERATURE REVIEW

There are numerous studies for measuring inefficiencies (efficiencies) at firm and industry level. In measuring inefficiencies, there are two prominent approaches. The one is the data envelopment analysis (DEA) known as nonparametric approach. The other is the stochastic frontier production function known as parametric approach.

DEA method was developed by Farrell (1957) and extended by Fare, Grasskopf, and Lovell (1994). This methodology is used in the banking studies of the United States by a number of authors as Farrier and Lovell (1990), Miller and Noulas (1996), Fixler and Zieschange (1993). Drake and Howcroft (1994) and Athanassopoulos (1995) used the DEA methodology for the banking industry in U.K. Lovell and Pastor applied this methodology in measuring efficiencies for the Spanish banking industry. Hassan, Al-shakas, and Samad (2004) used this method in investigating the relative efficiency of the banking industry in Bahrain.

The stochastic frontier production function, proposed and independently by Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977), then later developed and applied in numerous studies. Battese and Corra (1977), Kaliranjan (1982) used the stochastic frontier production function. Pitt and Lee (1981) measured the technical inefficiency in the Indonesian weaving industry with a time series cross-sectional data. Battese, Coelli and Colby (1989) applied this model for measuring efficiencies of Indian rice farms using panel data. Battese and Coelli (1992) used the frontier production function in estimating technical efficiencies of the paddy farmers of India. A generalized production frontier approach was used by Kubhakar, Ghose and McGuckin (1991) in estimating determinants of inefficiency of the United State dairy farm.

Technical Inefficiency (Efficiency)

Technically, a production function is efficient if a firm produces a maximum quantity of the output attainable with given inputs. Thus, production frontier is the locus of the technically efficient input-output combination. Inefficiency arises when a firm produces a quantity of output which is below the production frontier. That is, the output is below the maximum quantity of the attainable output. The real problem comes from estimating the production frontier. In this regards, early attempts were made by Farrell (1957) and subsequently by Aigner and Chau (1968) and Richmond (1974) to determine the frontier. These studies used linear and quadratic programming methods for estimating the production frontier. Several shortcomings became apparent. The most important, among the disadvantages, is that the production frontier does not incorporate the effect of random shocks which are outside the firms' control. As a result, "a few extreme measured observations determine the frontier and exaggerate the maximum possible output given inputs" (Pitt and Lee, (1981, p.44).

This problem is overcome by the application of the stochastic frontier production model which was developed independently by ALS (1977) and M&B (1977) by explicitly incorporating the inefficiency component, the error term, in the estimated production function. In the frontier production functions

involving cross-sectional data on sample firms, the technical efficiency of a given firm was defined as the ratio of its mean observed production, given its realized firm effect, to the corresponding mean production, if the firm effect was zero (Battese and Coelli (1988). The technical efficiency of ith firm is:

$$\text{TEi} = \frac{E(Yit^* \mid Uit, xit, t = 1,2,..)}{E(Yit^* \mid Uit = 0, xit = 1,2,..)} \quad (1)$$

Where Y*it is the value of i^{th} firm production at t^{th} time and $0 \leq TE \leq 1$. If TE=1, technical inefficiency = 0, on the other hand, if TE=0, technical inefficiency of ith firm is 100 percent.

Frontier Model for Panel Data

The important subject concerning the frontier production function is the component of the firm specific technical efficiency. The following is the frontier production function used for estimating inefficiencies of Bangladesh commercial banks:

$$Y_{it} = \exp (X_{it}\beta + V_{it} - U_{it}) \quad (2)$$

Where Y_{it} = quantity of output for i-th firm (i=1, 2,….N) at t-th time (t=1,2,…T)

X_{it} is a (1x k) vector of inputs and other explanatory variables used for the quantity of output of ith firm and t-th observation.

β is a (k x 1) vector of unknown parameters to be estimated.

V_{its} are random error variables and assumed to be independent and identically distributed as $N(0,\sigma_v 2)$ random variables, independent of U_{it} . $\sigma_v 2$ is independent of $U_{it.}$

Uits are non-negative random variables associated with ith firm technical inefficiency of production and assumed to be independently and identically distributed truncations (at zero) of the $N(\mu, \sigma 2)$.

The ratio of the observed output of the ith firm to potential output determined by the frontier function, given the input vector xi provides the definition of ith firm technical efficiency (TEi):

$$\text{TEi} = \frac{yi}{ecp(xiB} = \frac{\exp(xiB - ui}{\exp(xiB)} = \exp(-u_i). \quad (3)$$

(3) is the measure of technical efficiency for the ith firm. The mean technical efficiency of firms in the industry which corresponds to (3),according to Battese and Coelli, can be expressed and estimated as:

$$TE = \{\frac{1 - \Phi[\sigma - \mu / \sigma]}{1 - \Phi(-\mu / \sigma}\} \exp(-\mu + 1/2\, \sigma^2) \quad (4)$$

Thus, when μ = 0, the mean technical efficiency provided in (4) equals to what derived by Lee and Tylor (1978) which is:

$$TE = 2[1-\Phi(\sigma)]\exp(1/2\, \sigma^2) \quad (5)$$

The method of maximum likelihood estimated proposed by Battese and Coelli (1993) is used for simultaneous estimation of the parameters of the stochastic frontier and the model of technical inefficiency effects. The likelihood function expressed in terms of variance parameters is:

$$\sigma^2_s = \sigma^2_v + \sigma^2 \text{ and } \gamma = \sigma^2 / \sigma^2_s \quad (6)$$

DATA AND METHODOLOGY

Data concerning Bangladesh commercial banks are considered for an empirical application of the model defined above. The data used in this paper is taken from Banks and Financial Activities, publication of the Ministry of Finance, Finance Division, Peoples' Republic of Bangladesh. Data is cross-sectional for the 44 commercial banks in Bangladesh for the year 2000.

In many industries, physical measures of output and input are readily available. There are no differences of opinion about it. For examples, in agriculture, the output is paddy, wheat or corn and is measured in tons or kg. Inputs are land, labor, and capital. In electricity, the output is kilowatt-hours of electricity. Inputs are the number of workers, tons of fuels used, and the value of electric generators.

There is no agreement in the physical measures of output in the banking sector. Moreover, there is no consensus with regard to the definition of input and output for a banking firm. Banks are multi-product firms and produce a variety of products and services as loans to customers, safekeeping, intermediation and accounting services for deposits (Benston and Smith, 1976). Some have argued that a bank's primary product is loans. From an asset point of view, the production of deposit services is essentially viewed as inputs which are used to make loans (Sealey and Lindley, 1977). This study looks at bank loans as an output of the bank. Lack of employee expenditure data, this paper uses the number of employees and deposits as inputs to generate outputs such as loans. The stochastic frontier production function is estimated as:

$$\ln(Y_{it}) = \beta_0 + \beta_1 \ln(Dep_{it}) + \beta_2 \ln(Emp_{it}) + V_{it} - U_{it} \quad (7)$$

where

Y is the total loans, Dep is total deposits, and Emp is the total number of employees working for the bank $_{it}$. ln is natural log. The stochastic frontier production function in (7) is viewed as a linear version of the logarithm of the Cobb-Douglas production function. Maximum-likelihood estimates of the parameters of the model (7) are obtained by purpose specific computer software (Frontier 4.1, Coelli, 1996).

RESULTS

The estimated parameters of the frontier model are provided in (7) and are reported in Table 1.

Table: 1 Para meter Estimates for Frontier Production Function for Bangladesh Commercial Banks

Method of Estimate	**Intercept**	**Variables**		**Variance Parameters**			**Log-likelihood**	**Mean Technical Efficiency**
	β_0	$\beta_1$ln Dep	$\beta_2$lnEmp	σ_s^2	γ	μ		
M.L. (μ=0)	0.14	0.60	0.32		0.83	0.0	-33.2	
M.L. (final)	0.48	0.89	0.68	1.7	0.97*	-0.25	-25.3	0.69
($\mu \neq 0$)	(0.53)	(0.11)	(0.095)	(0.7)	(0.013)	(0.11)		

** Significance level is 0.001 percent. Table 2 provides estimated parameters of the stochastic frontier model where γ represents inefficiency. Log-likelihood ratio test provides whether γ, the measure of randomness is present and significant*

The estimated value of the parameter, μ, which defines the distribution of the bank effects for the different banks is –0.25, with an estimated standard error of 0.11. The distribution of the bank effects is found to be significantly different from the half-normal distribution in which μ =0.

A test on the significance of the random variable U_i , in the frontier model (7) is obtained from the likelihood ratio, LR. To determine if the random variable is absent from the model (i.e. μ= γ=0) a test can be performed for the significance of LR.

The LR value is obtained as = -2(URLLF – RLLF).

Where

URLLF = unrestricted log likelihood function
URLLF = restricted log likelihood function

Substituting the value from Table 1, LR= -2(-33.2 – (-25.3) = 15.8. The LR value has approximately chi-square distribution with parameter equal to two. According to Battese & Coelli, "the negative of twice the logarithm of the generalized log likelihood ratio has approximately chi-square distribution with parameter two" (1988, p.396).To determine if the estimated LR statistics = 15.8 is statistically significant can be tested by calculating the p-value with the number of restriction = 2.

Since the calculated p-value corresponding to LR = 15.8 with df =2 is 0.00038, LR is statistically significant at .001 percent level of significance. This means that the inefficiency effect as measured by γ is significantly different from zero. Thus, $H_0 : \gamma = 0$, is rejected. The result ($\gamma = 0.97$) indicates that the vast majority of residual variation, about 93 percent, is due to inefficiency effects, U_i , the bank specific factors. The random error, V_i , which accounts for the present measurement error in outputs, explains only 3 percent of the inefficiency.

The estimator β_1, is the coefficient for the deposit and is statistically significant. The test statistics for $\beta_1 =$ 8.09 (=0.89/0.11) is higher than $t_{.0005,42} = 3.50$. Thus, H_0: $\beta_1 = 0$ is rejected at a significance level = 0.001. The estimator β_2, as the coefficient for employees is not statistically significant. The predicted efficiencies for the individual commercial bank of Bangladesh are presented in Table 2.

Tables 2 show that the average (mean= μ) technical efficiency of the banking industry in Bangladesh is 0.696 i.e.69.6 percent. It appears from Table 3 that 29.53 percent of the Bangladesh commercial banks are operating below the industry (banking) average. This means that about 70 percent of the commercial banks have technical efficiency higher than the industry average of 0.695. The frequency of predicted efficiencies in different ranges is presented in Table 3.

Table 3 shows that 11.35 percent of Bangladesh commercial banks have technical efficiency less than 0.5 (50%) in issuing loans. 68.11 percent of the commercial banks have technical efficiencies in the range between 0.70 and 0.9 in issuing loans with labor and deposits. 29.53 percent of the banks in Bangladesh had a technical efficiency less than 0.70 in 2000. Only one bank in this study had a technical efficiency higher than 0.9 i.e. 90 percent.

Table 2: Predicted Efficiencies for Sample Banks of Bangladesh

Bank	Estimated efficiencies	Bank	Estimated efficiencies
1	0.78	23	0.56
2	0.80	24	0.38
3	0.82	25	0.76
4	0.81	26	0.62
5	0.81	27	0.74
6	0.77	28	0.41
7	0.85	29	0.39
8	0.12	30	0.62
9	0.77	31	0.76
10	0.78	32	0.81
11	0.80	33	0.27
12	0.88	34	0.89
13	0.85	35	0.83
14	0.83	36	0.79
15	0.75	37	0.75
16	0.80	38	0.57
17	0.77	39	0.50
18	0.83	40	0.59
19	0.61	41	0.81
20	0.57	42	0.94
21	0.77	43	0.70
22	0.80	44	0.83
Mean efficiency for 44 banks			=0.695

Numbers, in Table 2, below the bank variable i.e. in column 1 and 3 are individual commercial bank and their respective estimated efficiencies are provide in column in 2 and 4.

Table 3 Frequency Distribution of Predicted Efficiencies for the Bangladesh Commercial Banks

Range of efficiencies	*Frequency of occurrences*	*Relative frequency (%)*	Cumulative relative frequency (%)
Less than 0.3	2	4.55	4.54
0.30 – 0.50	3	6.81	11.35
0.50 – 0.70	8	18.18	29.53
0.70 – 0.90	30	68.11	97.64
0.9 and above	1	2.27	100.0
Total	44	100.0	

CONCLUSION

The application of the stochastic frontier production function to the banking industry in Bangladesh indicates that the average technical efficiency for the industry is 0.695. About 30 percent of the commercial banks in Bangladesh have less than the industry average for technical efficiency and 70 percent of the banks have technical efficiency higher than the industry average.

The application of the model indicates that 0.97 of the residual variation of outputs (loans) are explained by the bank specific inefficiency factors, U_i . A proper bank management policy at the bank and national level may be perused to address these residual variations of outputs.

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PERFORMANCE EVALUATION FOR THE BANKING INDUSTRY IN TAIWAN BASED ON TOTAL QUALITY MANAGEMENT

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ABSTRACT

This study explores critical factors for quality improvement in the Taiwanese banking industry. The study examines eight measurement dimensions. In addition, a hierarchical framework for the Taiwanese banking industry is constructed based on the eight dimensions and various sub-factors. Fuzzy Analytic Network Process (FANP) is utilized to analyze the opinions collected from a sample of experts in Taiwanese banks. The results of this study are that the top five crucial quality factors for the banking industry in Taiwan are Operation and Improvement of Strategy, Customer Relationship Management, Evaluation of Innovation Results, Cross-Organization Management, and Social Responsibility. The article closes with a discussion of key research findings and practical implications for the Taiwanese banking industry.

JEL: C51; C52; M10; G21

INTRODUCTION

Various kinds of organizations have implemented total quality management (TQM) to generate competitive advantage (Nilsson et al., 2001; Chan & Quazi, 2002). In Taiwan companies in different industries face significant competition from both domestic and international companies. Related studies focusing on Taiwanese industries are increasing; however, studies that examine the banking industry is still rare. In addition, mergers have now become an emergent issue for Taiwanese banks. Due to the rising importance of total quality management, some banks' top managers are trying to adopt this philosophy to improve their competitive advantage. Nevertheless, there are still some banks being merged or closing down. The aim of this study is to explore the most critical and effective factors for banks to efficiently conduct quality improvement.

We utilize literature-summarizing methods to identify related measurement factors proposed by recent research. Next, we use in-depth interviews to establish priority measurement factors. A fuzzy analytic network process (FANP) was used to overcome problems of dependence and feedback among dimensions or factors. FANP is a general form of the Fuzzy Analytic Hierarchy Process (FAHP) that releases hierarchical structural restrictions (Liou et al., 2007). In this study, literature-summarizing methods based on National Quality Award (NQA) are utilized in combination with FANP to extract the most critical quality improvement factors for the Taiwanese banking industry. The remainder of the paper is organized as follows. In the next section we discuss the relevant literature. Next, we discuss the Fuzzy Analytic Network process. A discussion of the Data and Methodology, along with a presentation of the results follow. The paper closes with some concluding comments and a discussion of the implications of this research.

LITERATURE REVIEW

Recent studies have observed that quality has a variety of meanings (Sitalakshmi, 2007) causing confusion since each individual's perception of quality differs (Shield, 1999). Since increased quality has been shown to contribute to greater market share, better returns on investments (Philips et al., 1983;

Cole, 1992), lower manufacturing costs, improved productivity (Garvin, 1983) and improved strategic performance (Zhang, 2000), a growing number of firms are placing emphasis on improving quality.

When discussing quality improvement, total quality management is the criteria most often used for enhancing organization quality (Nilsson et al., 2001; Chan & Quazi, 2002). There is a stream of literature suggesting that practicing total quality management within a firm has many advantages including increasing performance (Knod, Jr. & Schonberger, 2001; Wadsworth et al., 2002; Chase et al., 2006; Han et al., 2007). These benefits also include reducing rework and reducing costs related to poor quality such as scrap, rework, late deliveries, warranty, and replacement (Antony et al., 2002). Total quality management also generates more unique competitive advantages (Reed et al., 2000). Hence, understanding the best way to conduct total quality management has been an important issue for all kinds of industries in Taiwan.

Methods of total quality management (TQM) measurement vary from one author to another (Ozden & Birsen, 2006). Saraph et al. conducted early research defining what elements constitute TQM practice (Joo & Yong, 2006). Since then, researchers have proposed many different factors based on different kinds of industries, as shown in Table 1.

In accordance with Table 1, TQM factors can be assigned to four dimensions: leader, employee, customer, IT, and operating process. In addition, the National Quality Award (NQA) is used most frequently in some industries in Taiwan to measure the overall quality of a firm. Because the dimensions of NQA are similar to the afore-mentioned dimensions, the research structure in this study is based on NQA and supplemented through in-depth interviews and literature as shown in Table 1.

Table 1: TQM Measurement Factors

Authors	TQM Factors
Besterfield (2003)	Quality culture, the quality chain, quality assurance, commitment to continuous improvement, and the support of top management
Prajogo & Sohal (2003b)	Product innovation
Jacqueline, Coyle, & Paula (2003)	Statistical process control, commitment of top management, empowerment, and appropriate culture
Wagner & Schaltegger (2004)	Leadership
Kenneth & Cynthia (2004); Escrig-Tena (2004)	Financial performance
Ozden & Birsen (2006)	Customer focus, continuous improvement, and teamwork
Nusrah et al. (2006)	employee empowerment, information and communication, customer focus, and continuous improvement
Ismail (2006)	Leadership, strategic planning, customer focus, information and analysis, human resource management, process management, supplier management, human resource results, customer results, and organizational effectiveness.
Dinh & Triros (2006)	Strategic planning
Keng et al. (2007)	Teamwork, reward and recognition, customer focus, organizational trust, extensive training, high level of communication, management commitment at all levels, employee involvement, empowerment and organizational culture
Han et al. (2007)	Supplier relationship, customer involvement, training, top management commitment, and product design

This table shows the measurement factors of TQM proposed by recent researchers.

FUZZY ANALYTIC NETWORK PROCESS

Analytic Hierarchy Process and Fuzzy Set Theory

Thomas L. Saaty developed the Analytic Hierarchy Process (AHP) in 1971. The AHP method is known

as an eigenvector method, which means that the eigenvector corresponding to the largest eigenvalue of the pairwise comparisons matrix gives the relative priorities of the factors and preserves ordinal preferences among the alternatives. This implies that if one alternative is preferred to another, its eigenvector component is larger than that of the other. A vector of weights obtained from the pairwise comparisons matrix reflects the relative performance of the various factors.

However, a growing literature now argues that AHP has its drawbacks. Studies have concluded that AHP can be applied to specific, but not fuzzy decision-making. AHP evaluates questions using different criteria for different parts of the test set. Moreover, AHP cannot include uncertainty factors of people toward objects and that the priority of AHP is unspecific. In addition, AHP is based on an assumption of independence within each factor; however, this does not apply in the real world. Thus, this study used a modified form of AHP called fuzzy ANP (FANP) to obtain more precise results.

Fuzzy set theory was initially developed in 1965 by Professor L.A. Zadeh. He attempted to solve fuzzy phenomenon problems that exist in the real world (e.g., uncertain, incomplete, nonspecific, and fuzzy situations). Fuzzy set theory has an advantage over traditional set theory in describing set concepts in human language. It demonstrates specific and fuzzy characteristics in language on the evaluation and uses a membership function concept. The fuzzy set permits a situation such as "incompletely belongs to" and "incompletely does not belong to."

Fuzzy Number

We order the Universe of Discourse such that U is a whole target, and each target in the Universe of Discourse is called an element. Fuzzy $\tilde{A}$ states for U that random $\mathrm{X} \to U$, appointing a real number $\mu_i(\mathrm{x}) \to [0,1]$. We call anything above that level of x *under A*.

The set of real numbers R is a triangular fuzzy number (TFN): $\tilde{A}$, which means that
$\mathrm{x} \in R$, appointing $\mu_A(\mathrm{x}) \in [0,1]$, and

$$\mathrm{M} = \begin{Bmatrix} \mathrm{x} - L/_{M-L}, L \le \mathrm{x} \le M \\ U - \mathrm{x}/_{U-M}, M \le \mathrm{x} \le U \\ 0 \qquad\qquad , otherwise \end{Bmatrix}$$

The triangular fuzzy number above can be written as $\tilde{A} = (L, M, U)$, where L and U represent the fuzzy probability between the lower and upper boundaries of evaluation information, as shown in Figure 1. Assume two fuzzy numbers $\widetilde{A_1} = (L_1, M_1, U_1)$ and $\widetilde{A_2} = (L_2, M_2, U_2)$:

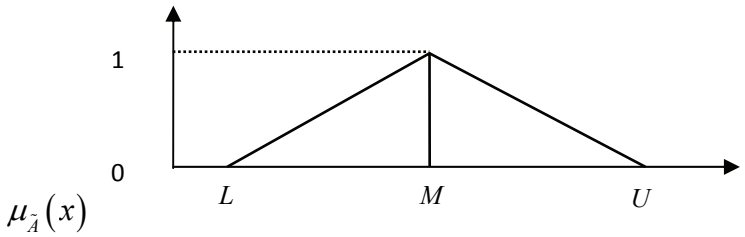
1: $\widetilde{A_1} \oplus \widetilde{A_2} = (L_1, M_1, U_1) \oplus (L_2, M_2, U_2) = (L_1 + L_2, M_1 + M_2, U_1 + U_2)$
2: $\widetilde{A_1} \otimes \widetilde{A_2} = (L_1, M_1, U_1) \otimes (L_2, M_2, U_2) = (L_1 L_2, M_1 M_2, U_1 U_2), L_i > 0, M_i > 0, U_i > 0$
3: $\widetilde{A_1} \ominus \widetilde{A_2} = (L_1, M_1, U_1) \ominus (L_2, M_2, U_2) = (L_1 - L_2, M_1 - M_2, U_1 - U_2)$
4: $\widetilde{A_1} \oslash \widetilde{A_2} = (L_1, M_1, U_1) \oslash (L_2, M_2, U_2) = (L_1/L_2, M_1/M_2, U_1/U_2), L_i > 0, M_i > 0, U_i > 0$

$$\widetilde{\mathrm{A}_1^{-1}} = (L_1, M_1, U_1)^{-1} = (1/U_1, 1/M_1, 1/L_1), L_i > 0, M_i > 0, U_i > 0$$

Fuzzy Linguistic Variable

The Fuzzy linguistic variable is a variable that reflects the different levels of the human language. Its value represents the range from natural to artificial language. When precisely reflecting the value or meaning of a linguistic variable, there must be an appropriate way for the variable to change. Variables representing a human word or sentence can be divided into numerous linguistic criteria, such as equally

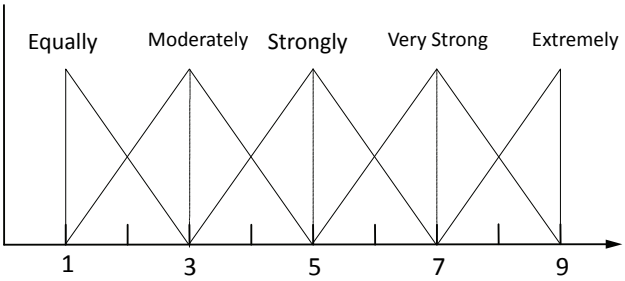
Figure 1: A Triangular Fuzzy Number



This figure shows the presence of opinion decided by each expert. In the form of AHP, each score (number) provided by an expert is marked as M. To obtain results that are more precise, a triangular fuzzy number that involved close numbers, L and U, is utilized.

important, moderately important, strongly important, very strongly important, and extremely important, as shown in Figure 2. The definitions and descriptions of these terms are given in Table 2. For the purposes of the present study, the five labels above are used.

Figure 2: Fuzzy Memberships Function for Linguistic Values of Attributes



This figure shows the meanings of each number (linguistic variable). If there is no difference of importance between two target factors, experts will mark 1, equally. However, if there is a great difference of importance between two target factors, experts will mark 9, extremely.

Table 2: Definition and Membership Function of Fuzzy Numbers

Fuzzy Number	Linguistic Variable	Triangular fuzzy number
$\tilde{9}$	Extremely important/preferred	(7,9,9)
$\tilde{7}$	Very strongly important/preferred	(5,7,9)
$\tilde{5}$	Strongly important/preferred	(3,5,7)
$\tilde{3}$	Moderately important/preferred	(1,3,5)
$\tilde{1}$	Equally important/preferred	(1,1,3)

This table shows the detailed definitions of each number. At the right hand side of column shows triangular fuzzy number and those numbers are the final utilizing in our study.

Analytic Network Process (ANP)

The purpose of the ANP approach is to solve the problem of interdependence and feedback between criteria or alternatives. The ANP is the general form of the analytic hierarchy process (AHP), which has been used in multicriteria decision-making (MCDM) to release the restrictions of hierarchical structure and has been applied to project selection, product planning, strategic decision making, optimal scheduling, etc. (Ong et al., 2004).

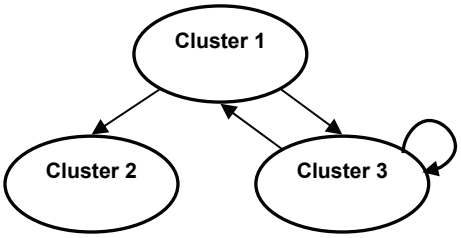
The first phase of the ANP is comparison of the measurement criteria of the overall system to form the super matrix. This step can be accomplished through pairwise comparisons. The relative importance value of pairwise comparisons can be assigned on a scale of 1 to 9, representing equal importance to extreme importance (Saaty, 1980). The following shows the general form of the super matrix:

$$\mathrm{W} = \begin{matrix} \mathrm{C}_1 \\ \dots \\ \mathrm{C}_\mathrm{m} \end{matrix} \begin{bmatrix} W_{11} & \cdots & W_{1\mathrm{m}} \\ \vdots & \ddots & \vdots \\ W_{\mathrm{m}1} & \cdots & W_{\mathrm{mm}} \end{bmatrix}$$

where C_m denotes the *m*th cluster, C_{mn} denotes the *m*th element in the *m*th cluster, and W_{ij} is the principal eigenvector influencing the elements compared in the *j*th cluster to the *n*th cluster. In addition, if the *j*th cluster has no influence on the *n*th cluster, then W_{ij}=0.

Based on the above, the form of the super matrix relies on the variety of the structure. Several structures were proposed by Saaty, including hierarchy, holarchy, suparchy, intarchy, etc. (Ong et al., 2004). In order to demonstrate the ways in which the structure is affected by the super matrix, Ong et al. (2004) offer two simple cases, both of which have three clusters, to show how to form the super matrix in accordance with the structures (Figure 3).

Figure 3: Case 1 Structure



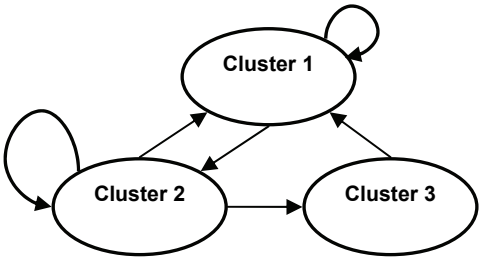
This figure shows the first case which contains three measuring clusters proposed by Ong et al. (2004) to explain how to form the super matrix.

Based on Figure 3, we can form the super matrix as follows:

$$\mathrm{W} = \begin{bmatrix} 0 & 0 & W_{13} \\ W_{21} & 0 & 0 \\ W_{31} & 0 & W_{33} \end{bmatrix}$$

As it is shown in Figure 4, the second case is more complex than the first.

Figure 4: Case 2 Structure



This figure depicts the second case which contains three measuring clusters as proposed by Ong et al. (2004).

From Figure 4, we can form the super matrix as follows:

$$W = \begin{matrix} W_{11} & W_{12} & W_{13} \\ W_{21} & W_{22} & 0 \\ 0 & W_{32} & 0 \end{matrix}$$

When the super matrix has been formed, the weighted super matrix can then be derived by transforming all columns so that they sum exactly to unity (Ong et al., 2004). This step is similar to the Markov chain concept for ensuring that the sum of the probabilities of all states equals one. We then limit the power of the weighted super matrix by using Eq. (1) to obtain the global weights:

$$\lim_{k\to\infty} W^k \tag{1}$$

In this step, if the super matrix is cyclic, then more than one limiting super matrix exists. More precisely, there are two or more limiting super matrices in this case, and the Cesaro sum would be calculated to determine which matrix has priority. The Cesaro sum is formulated as Eq. (2) and is used to calculate the average effect of the limiting super matrix. The super matrix could also be raised to large powers to get the priority weights.

$$\lim_{k\to\infty} \left(\frac{1}{n}\right) \sum_{k=1}^{N} W^k \tag{2}$$

Based on the above description of the ANP approach, the critical advantages of this analysis are that first, it is appropriate for both quantitative and qualitative data types; and second, it can solve the problem of interdependence and feedback between whole factors. Thus, the ANP approach is adopted in this study.

Summarizing the above literature, the steps for fuzzy ANP calculation are provided as follows:

1. Confirm both the dimensions and the factors of the model.
2. Hierarchically build up an ANP model containing goals, dimensions, and factors.
3. Determine the local weights of both dimensions and factors by utilizing pairwise comparison matrices (assume that there is no dependence among factors). The relative importance value of pairwise comparisons is provided in Table 2. The dependence of the local weights of the dimensions of the inner matrix has already been done. This step is to calculate the interdependent weights of the dimensions.
4. Determine the inner dependence matrix of each dimension with respect to the other dimensions.
5. Calculate the global weights for the factors. These can be acquired by multiplying the local weight of the factor with the interdependent dimension weights above each.

DATA AND METHODOLOGY

To gather data for the study, we sent 67 questionnaires to the senior managers and related experts of different Taiwanese banks by personal mail. Fifty-one of these were returned. After discarding three due to statistical issues our final sample includes 48 responses. Demographic information on respondents are provided in Table 4. The study first summarized critical quality measuring factors, provided in Table 1, and built up the research structure as provided in Table 3.

Table 3: Research Structure of This Study

Goal	Evaluation Dimensions	Evaluation Factors
Performance Evaluation for Banking Industry	Leadership and Operation Ideals (D1)	Operational Ideals and Values (F1)
		Organizational Mission and Vision (F2)
		Leadership Ability of Top Managers (F3)
		TQM Culture Formation (F4)
		Social Responsibility (F5)
	Strategy Management (D2)	Overall Strategy Planning (F6)
		Operation Model (F7)
		Operation and Improvement of Strategy (F8)
	R&D and Innovation (D3)	Strategy and Process of Innovation (F9)
		Input of Innovation (F10)
		Evaluation of Innovation Results (F11)
	The Development of Customers and Market (D4)	Strategy of the Product or Service and Market (F12)
		Customer and Business Management (F13)
		Customer Relationship Management (F14)
	Human Resource and Knowledge Management (D5)	Human Resource Planning (F15)
		Human Resource Development (F16)
		Use of Human Resources (C17)
		Employee Relationship Management (F18)
		Knowledge Management (F19)
	The Application and Management of Information Strategy (D6)	Information Strategy Planning (F20)
		Internet Applications (F21)
		Information Applications (F22)
	Process Management (D7)	Product Process Management (F23)
		Supportive Activity Management (F24)
		Cross-Organization Management (F25)
	Operation Performance (D8)	Customer Satisfaction (F26)
		Market Development Performance (F27)
		Financial Performance (F28)
		Human Resource Development Performance (F29)
		Information Management Performance (F30)
		Process Management Performance (F31)
		Innovation and Core Competitive Ability Performance (F32)
		Social Evaluation (F33)

Using NQA and utilizing literature summarization, this table shows the final measurement structure. The main measuring dimensions are Leadership and Operation Ideals, Strategy Management, R&D and Innovation, The Development of Customers and Market, Human Resource and Knowledge Management, The Application and Management of Information Strategy, Process Management, and Operation Performance.

Table 4: Demographic Information

Variable	Item	Distribution	Percentage	Variable	Item	Distribution	Percentage
1. Gender	(1) Male	33	69	3. Years with Company	(1) Under 5	2	4
	(2) Female	15	31		(2) 6 ~ 10	31	65
2. Age	(1) Under 30	19	40		(3) 11 ~ 20	10	21
	(2) 31 ~ 40	24	50		(4) Over 21	3	6
	(3) 41 ~ 50	4	8	4.Educational Degree	(1) Bachelor's	4	8
	(4) Above 51	1	2		(2) Master's	41	85
					(3) Doctoral	3	6
				5. Background	(1) Academia	2	4
					(2) Industrial	46	96
					(3) Gov Unit	0	0

This table shows information on our sample of experts. The background factors we utilized are Gender, Age, Years with Company, Educational Degree, and Background. All experts are currently or had previously worked in Taiwanese banks.48 valid responses were received.

Sixty-nine percent of the respondents were male and 31% were female; half (50%) of the respondents were between 31~40, and 40% were under 30 years old; 65% of the respondents had served their company for between six and ten years, and about 30% had served for between 11 and 20 years. More than half (85%) of the respondents had reached the master's degree; and about 96% of respondents were from industrial background.

RESULTS

In this section, results of the response analysis are reported. The survey responses were evaluated using FANP. The findings are presented in Table 5. The first column indicates the Evaluation Dimension, followed by its Global Weight and Ranking. Next, the individual evaluation factors are reported, along with their local weight, global weight and ranking.

The top five critical factors to improve quality performance are found to be Operation and Improvement of Strategy (0.0814), Customer Relationship Management (0.0800), Evaluation of Innovation Results (0.0756), Cross-Organization Management (0.0565), and Social Responsibility (0.0558). Human Resource Planning (0.0083), Human Resource Development (0.0093), and Information Management Performance (0.0087) were the least critical factors.

CONCLUSIONS AND IMPLICATIONS

Taiwanese companies experience both domestic and international competition. To increase the competitive advantage of Taiwanese industries, research focused on Taiwanese industries has been increasing; however, studies that emphasize the banking industry are rare. Thus, due to limited resources and the rising importance of total quality management, some banks' top managers are trying to utilize total quality management to rebuild their competitive advantage. Unfortunately, some banks are still merging or closing down.

The aim of this study was to explore the most critical and effective factors for efficiently conducting quality improvement. First, the study identified quality measurement factors proposed by recent research; these measures were then adapted via in-depth interviews and fuzzy analytic network processes to develop a TQM measuring model that considers interdependence between a range of dimensions and factors and their weightings.

Based on a survey of 48 bank executives, we identify critical TQM measuring factors for the Taiwanese banking industry. Although several factors in the research structure fit the characteristics of the Taiwanese banking industry, due to limited resources, the study suggests that banks in Taiwan may focus their resources on the five most critical factors, Operation and Improvement of Strategy, Customer Relationship Management, Evaluation of Innovation Results, Cross-Organization Management, and Social Responsibility.

With regard to the first factor, banks are required to handle significant amounts of money each day; hence, they face numerous financial risks. Thus, timely improvement of the operation strategy by the top manager is needed to prevent related financial problems. In addition, banks are also a service industry; therefore, to compete with both domestic and international competitors, attracting and retaining more customers has become a crucial issue. This study suggests that each bank should provide unique services, relying upon its limited resources and own organizational culture.

One branch of literature has indicated that if an organization cannot keep innovating, it will fail (Daft, 2004; Krause, 2004). For Taiwanese banks today, innovative service operation as well as inner management has become crucial for maintaining a substantial competitive advantage. Thus, the study suggests that top managers should speak to customer service personnel often about the needs of customers or use brainstorming to keep the organization creative.

Cross-Organization Management has also been a key factor in the success of an organization. Banks are spread throughout Taiwan. Thus, keeping their service consistent enough to maintain and improve corporate reputation has been an important issue for top managers. This study suggests that top

Table 5: The Result of the Study-Banking Industry Performance Evaluation

Evaluation Dimensions	Global Weight	Ranking	Evaluation Factors	Local Weight	Global Weight	Ranking
Leadership &Operation Ideals (D1)	0.1480	1	Operational Ideals & Values (F1)	0.0979	0.0145	26
			Organizational Mission & Vision (F2)	0.1238	0.0183	22
			Leadership Ability of Top Managers (F3)	0.1629	0.0241	17
			TQM Culture Formation (F4)	0.2379	0.0352	11
Strategy Management (D2)	0.1388	3	Social Responsibility (F5)	0.3774	0.0558	5
			Overall Strategy Planning (F6)	0.1786	0.0248	16
			Operation Model (F7)	0.2345	0.0325	12
R&D and Innovation (D3)	0.1444	2	Operation & Improvement of Strategy (F8)	0.5869	0.0814	1
			Strategy and Process of Innovation (F9)	0.1497	0.0216	19
			Input of Innovation (F10)	.03264	0.0471	6
Development of Customer & Market (D4)	0.1352	4	Evaluation of Innovation Results (F11)	0.5238	0.0756	3
			Strategy of Product or Service & Market (F12)	0.1727	0.0233	18
			Customer and Business Management (F13)	0.2358	0.0319	13
Human Resource &Knowledge (D5)	0.0889	8	Customer Relationship Management (F14)	0.5915	0.0800	2
			Human Resource Planning (F15)	0.0938	0.0083	32
			Human Resource Development (F16)	0.1048	0.0093	30
			Use of Human Resources (C17)	0.1697	0.0151	25
			Employee Relationship Management (F18)	0.3971	0.0353	10
Application &Mgmt. of Info. Strategy (D16)	0.0952	7	Knowledge Management (F19)	0.2347	0.0209	20
			Information Strategy Planning (F20)	0.1717	0.0163	24
			Internet Applications (F21)	0.4229	0.0403	7
Process Management (D7)	0.1186	6	Information Applications (F22)	0.4055	0.0386	8
			Product Process Management (F23)	0.3044	0.0361	9
			Supportive Activity Management (F24)	0.2195	0.0260	15
Operation Performance (D8)	0.1311	5	Cross-Organization Management (F25)	0.4762	0.0565	4
			Customer Satisfaction (F26)	0.2133	0.0279	14
			Market Development Performance (F27)	0.1414	0.0185	21
			Financial Performance (F28)	0.0906	0.0119	28
			Human Resource Develop. Performance (F29)	0.1070	0.014	27
			Information Management Performance (F30)	0.0661	0.0087	31
			Process Management Performance (F31)	0.0892	0.0117	29
			Innovation and Core Competitive Ability Performance (F32)	0.1337	0.0175	23
			Social Evaluation (F33)	0.1586	0.0208	21

This table shows the overall ranking of TQM measuring dimensions and factors. The top five critical factors to improve quality performance are Operation and Improvement of Strategy, Customer Relationship Management, Evaluation of Innovation Results Cross-Organization Management, and Social Responsibility.

managers of different branches should report operation performance and carefully coordinate with the head office to categorize problems and develop consistency.

Finally, due to the rising importance of business ethics, organizations in Taiwan are attempting to demonstrate social responsibility in order to acquire more customers. Recent results on related activities provided by Taiwanese banks confirm the results of this study. Thus, the study suggests that banks develop more positive social activities for their own benefit and the benefit of society.

The main limitation of this study is that critical quality performance measuring factors are developed and identified in the Taiwanese banking industry. The extent to which these findings can be generalized to other markets is unknown. We close by noting that future research might adopting our quality performance measurement structure to other countries and compare those findings with the findings presented here.

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THE GLOBALIZATION OF ACCOUNTING STANDARDS : IFRS VERSUS US GAAP

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ABSTRACT

The movement of business toward a global economy has accelerated the need to move toward global accounting standards. Two recent decisions by the United States Securities and Exchange Commission, SEC, have had a major impact on the issue of converging US GAAP and international accounting standards. This paper examines the implications of the SEC decision to allow foreign companies to use IFRS in financial reporting without reconciliation to US GAAP on investors, multinational corporations, and global financial reporting. The decision of the SEC to unite world regulators on the convergence of global accounting standards is also reviewed. The European Commission, the Japan Financial Services Agency, and the International Organization of Securities Commission, IOSC are to be included in the International Accounting Standards Committee Foundation IASCF in an IASCF Monitoring Group (SEC ,2008). Differences between IFRS and US GAAP are examined. The authors' conclusion is that it is both timely and necessary to converge and harmonize IFRS and US GAAP into a single set of Global Accounting Standards. This will lead to a more stabilized and prosperous world economy and it will help to resolve many of the world's financial reporting problems.

JEL: M4, M40, M41

INTRODUCTION

The movement of world economies and the expansion of corporate America overseas with dramatic financial results brought forward the need for a single set of global accounting standards that could be used for domestic and cross border financial reporting of foreign and US multinational companies. Advances in technology, the Internet, lower trade barriers, NAFTA, communication, and transportation systems have expanded the marketplace in which companies operate. Multinational companies have their home in the US, but operate in other countries. The trend toward US companies earning more profits abroad is not new, but it has accelerated in recent years and spread to many types of companies. Many of these multinational companies are earning more than 50% of revenue from foreign sales reflecting the growing globalization of US business. Examples of American companies that have obtained 50% or more in revenues from foreign sales include Honeywell International, Coca Cola, Pepsi Cola, and IBM (Holstein, 2007). Nearly 500 foreign companies are listed on the New York Stock Exchange while the London Exchange lists over 400 foreign companies (Spiceland, 2007).

On November 15, 2007 the Securities and Exchange Commission, SEC exempted foreign firms from including a reconciliation from International Financial Reporting Standards, IFRS to US Generally Accepted Accounting Principles, US GAAP when filing on US stock exchanges. Foreign public firms are now permitted to file using the International Financial Reporting Standards (IFRS) without reconciliation to US GAAP as previously required. This move has created a mandate to converge IFRS and US GAAP and financial statement requirements (SEC, 2007).

On June 18, 2008 the SEC issued a press release stating that the world's securities regulators are uniting to increase their oversight of international accounting standards. The European Commission, the Japan

Financial Services Agency, and the International Organization of Securities Commission, IOSC, are to be included in the International Accounting Standards Committee Foundation IASCF in an IASCF Monitoring Group (SEC, 2008). The threat of increased global power by the SEC has become one of the largest sticking points in the convergence of US and international accounting standards. This movement to include world regulators will aid in resolving world concerns about global control by the SEC and the US in overseeing the globalization of accounting standards

This paper examines the implications of the SEC decision to allow foreign companies to use IFRS in financial reporting without reconciliation to US GAAP on investors, multinational corporations, and global financial reporting. The decision of the SEC to unite world regulators on the convergence of global accounting standards is also reviewed. The European Commission, the Japan Financial Services Agency, the International Organization of Securities Commission, IOSC is to be included in the International Accounting Standards Committee Foundation IASCF in an IASCF Monitoring Group. (SEC, 2008) The differences between IFRS and US GAAP are compared. A detailed list of countries that have adopted IFRS is provided.

LITERATURE REVIEW

The United States Government and business community have played a major role in shaping the accounting profession from the standpoint of accounting standards. The review of the literature cites events that lay the foundation for justification for having global accounting standards.

Besides government and business, technology has also played a role in shaping the future of the accounting profession. With the creation of technology and computer communication, information could be recorded and transmitted quickly with remarkable accuracy. Thus, the "World Wide Web" in the 1990's created the source of obtaining reliable international financial information. The standard protocol of the Internet technologies allowed for a growth in global business. The increase in global business led to an increased focus on the growth of global transactions. In 1999 the Bank on International Settlements, BIS revealed that the annual value of cross-border debt and equity transactions exceeded the value of the national gross domestic products in many western economies including the US, Canada, as well as Germany and France. The growing interest in foreign financing activity created a demand for accounting standards that met the needs of investors and companies operating in global equity markets (Bank on International Settlement, 1999). In 2000 Gunther Gebhardt of the Brookings Institution wrote that market demand and market forces will achieve globally accepted accounting standards (Gebhardt, 2000).

In 2002 following the US accounting scandals of Enron, World Com and other US companies the US Congress legislated The Public Accounting Reform and Investor Protection Act of 2002 (The Sarbanes Oxley Act). This Congressional Act requirement referenced a previous act passed by Congress entitled The National Capital Markets Efficiency Act of 1996. In this act, the US Congress directed the SEC to respond to the growing internationalization of the securities market by heavily supporting the development of high quality international accounting standards as soon as possible (Congress, 1996, 2002).

With the legislative response to the accounting scandals in the US, the US Congress in the Sarbanes Oxley Act of 2002, has given direction to the SEC to move toward IFRS. In the act, the US Congress requested that the SEC undertake a study on the adoption by the US reporting system of a principle based accounting system. This reference can be interpreted as an IFRS accounting system. In addition, the SEC was required to complete its study within one year and submit its report to the US Senate and House of Representatives (Congress,1996, 2002).

Following the SEC request, the Financial Accounting Standards Board, FASB, and the International Accounting Standards Board, IASB, responded to the Congressional mandate by attempting to reach convergence between IFRS and US GAAP financial accounting standards. The boards met in September 2002 and pledged commitment to the convergence project called the Norwalk agreement (Day, 2002). In 2002 FASB and IASB signed the Norwalk Agreement formalizing a joint agreement to the convergence of US GAAP and IFRS. The FASB and IASB agreed to resolve existing differences between their standards.

At a meeting in 2005 FASB and IFRS reaffirmed their commitment to the convergence of these standards. A common set of high quality global standards remains a priority. At the time it was thought that the convergence would take many years of discussion and compromise before agreement could be reached. However, rapid changes are occurring. The increasing participation of jurisdictions and countries in the European Union has expanded the international interest in formalizing one set of global accounting standards. The November 15, 2007 move by the SEC to allow IFRS in financial reporting by foreign companies on US stock exchanges without the requirement of reconciliation to US GAAP has created ultimately a mandate to converge IFRS and US GAAP financial statement requirements.

Robert Herz is Chairman of the FASB. He has chaired FASB since 2002 and was reappointed to a second five year term in July 2007. Mr. Herz has predicted a minimum of five years for the convergence of IFRS and US GAAP standards to occur. (Journal of Accountancy, 2008). Law Schools have recognized the need for global accounting standards. To understand the Securities and Exchange Commission's (SEC's) mandate and the extent of the requirements, it is necessary to focus on an overview of Global Accounting Standards and the complexities involved in reaching harmonization. On January 30, 2003 Harvard Law School hosted a symposium exploring the need for global accounting standards (Harvard Law School, 2003).

HISTORY OF ACCOUNTING STANDARDS IN THE UNITED STATES

The 1933 Securities Act and the 1934 Securities Exchange Act were created to restore investor confidence after the stock market crash of 1929 and the subsequent economic depression in the US. The 1934 Act also created the US Securities and Exchange Commission (SEC). Congress gave the SEC the power and responsibility for setting accounting and reporting standards for companies whose securities are publicly traded on either organized stock exchanges or over the counter markets. It is important to recognize that the SEC has delegated the responsibility to the FASB but not the authority to set standards. The power thus lies with the SEC to disagree or change standards issued by the private sector which it has done.

Early standard setting was done by a private sector body called the Committee on Accounting Procedure (CAP). The CAP was a committee of the American Institute of Accountants (AIA). The AIA was changed to the American Institute of Certified Public Accountants in 1957. From 1938 to 1959 CAP issued 51 Accounting Research Bulletins (ARB's) dealing with specific accounting reporting problems However, criticism of the lack of development of a conceptual framework of accounting led to the creation of the Accounting Principles Board (APB) in 1959 replacing the CAP. Members of the APB were also members of the AICPA. APB operated from 1959-1973 and issued 31 Accounting Principles Board Opinions (APBO's). The APB's main effort was to create and establish a conceptual framework for financial accounting and reporting identifying the basic concepts of accounting. The APB was represented by members of the accounting profession and supported by their organization. Members of the APB served on a voluntary basis. APB was criticized by industry and government for their lack of independence. The criticism led to the creation of the Financial Accounting Standards Board (FASB) in 1973. FASB is represented by seven full time members compared to 18-21 part time voluntary members of the APB. FASB is represented by members of various organizations concerned with accounting

standards. FASB is supported financially by the Financial Accounting Foundation (FAF). The FAF is responsible for selecting FASB members who must leave their present employment and work only for FASB.

FASB has created an important document in the formulation of a conceptual framework providing a current and future structure for accounting and reporting standards. FASB has issued seven statements of financial accounting concepts (SFAC's) to describe its conceptual framework. The Board has issued over 163 specific accounting standards to date.

VOLUNTARY INTERNATIONAL ACCOUNTING STANDARDS

The first step towards international accounting standards was the formation of The International Accounting Standards Committee (IASC) in 1973. In 2001 the IASC reorganized and created the International Accounting Standards Board (IASB). The IASC now acts as an umbrella organization similar to the Financial Accounting Foundation (FAF) in the United States. IASC issued 41 International Standards (IAS's). The IASB has endorsed these standards, when it was formed in 2001. Since then IASB has issued 6 standards of its own called International Financial Reporting Standards (IFRS). Compliance with these standards is voluntary since IASB has no authority to enforce them. The International Organization of Securities Commission (IOSCO) has approved allowing members to use these standards for cross border offerings and listings on international stock exchanges. As of 2005 all listed companies in the European Union (EU) must prepare consolidated financial statements using IFRS. About 7,000 companies are affected.

In 1994 the move toward convergence of accounting standards began with the Financial Accounting Standards Board (FASB) and International Accounting Standards Commission (IASC) jointly working on the issuance of new standards for the computation of earnings per share (EPS). Harmonization has yet to be achieved.

ADOPTION OF IFRS AROUND THE WORLD

In response to the need to move toward global accounting standards the adoption of International Financial Reporting Standards IFRS has grown. Figure 1 shows the percentage of the world market capitalization that is using US GAAP, using IFRS, plan to use IFRS or have a partial adoption of the IFRS standards, or have other standards. According to the International Accounting Standards Board (IASB) a world level marketing cap of accounting standards shows that IFRS now covers thirty three percent 33% of global capitalization, US GAAP represents 35%, while 22 % of other territories including China and India plan to have partial adoption of IFRS. Other countries not participating are estimated at ten percent 10% (Financial Times, 2007). In a more recent webcast by Deloitte & Touche revealed that large countries like Brazil, Canada and India have announced mandated adoption of IFRS. All European Union (EU) countries as of 2005 are required to use IFRS reporting. Today IFRS is used in over 100 countries (Deloitte & Touche, 2008).

Table 1 provides a summary of the countries and regions presently using IFRS as the primary accounting standard in the preparation of external financial reporting. The table lists 85 jurisdictions which use IFRS as a basis of preparation.. The auditor's report will reference conformity with IFRS. The table notes the use of IFRS for external financial reporting. Some exceptions include Hong Kong has adopted national standards that are identical to IFRS standards. China has listed 150 companies on the Hong Kong Exchange. Australia and New Zealand have adopted national standards described as IFRS equivalents. Switzerland permits the use of IFRS or US GAAP in financial reporting. Ecuador will adopt IFRS in 2008. Chile moves to IFRS in 2009. Brazil plans on adopting IFRS in 2010. Canada, India, Japan and Korea are scheduled for IFRS in 2011. Other jurisdictions include 24 regions where IFRS is permitted

and 4 jurisdictions where IFRS is required in some cases. A total of 113 jurisdictions exist that permit or require IFRS (Deloitte, 2008).

Figure 1: World Market Capitalization by Accounting Standard

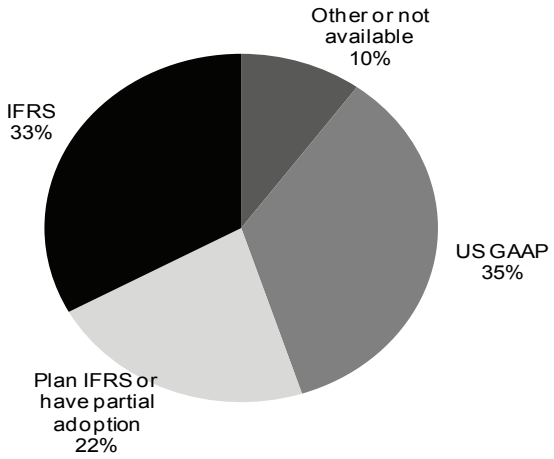

Figure 1 shows the percentage of the world market capitalization that is using US GAAP, using IFRS, plan to use IFRS or have a partial adoption of the IFRS standards, or have other standards. The source of the data is the Financial Times Research.

Table 1: Countries and Regions Using IFRS

Country	Country	Country	Country
1. Abu Dhabi- United Emirates	23.Dubai-United Emirates	45. Japan 2011	67.Norway
2. Anguilla	24.Ecuador 2008	46Jordan	68.Oman
3. Antigua and Barbuda	25.Egypt	47.Kazakhstan	69.Panama
4. Armenia	26.Fiji	48 Kenya.	70.Papua New Guinea
5. Austria	27.Finland	49 Korea South 2011	71.Peru
6 Australia	28.France	50.Kuwait	72.Poland
7. Bahamas	29.Germany	51 Kyrgyzstan	73.Portugal
8. Bahrain	30.Georgia	52.Latvia	74.Qatar
9. Barbados	31.Ghana	53.Lebanon	75.Romania
10.Belgium	32.Grenada	54.Liechtenstein	76.Serbia (Republic of)
11.Bosnia and Herzegovina	33.Greece	55.Lithuania	77.Slovenia
12.Botswana	34.Guatemala	56.Luxembourg	78.Slovak Republic
13.Brazil 2010	35.Guyana	57.Macedonia	79.South Africa
14.Bulgaria	36.Haiti	58.Malawi	80.Sweden
15.Chile 2009	37.Honduras	59.Malta	81.Tajikistan
16.Canada 2011	38.Hong Kong	60.Mauritius	82.Tanzania
17. Chile 2009	39.Hungary	61.Montenegro	83.Trinidad and Tobago
18. Costa Rica	40.Iceland	62.Namibia	84.United Kingdom
19.Cyprus	41 Iraq	63.Netherlands	85.Venezuela
20.Czech Republic	42.Ireland	64.Nepal	
21.Denmark	43.Italy	65 New Zealand	
22.Dominican Republic	44.Jamaica	66.Nicaragua	

The table below is a summary of the countries and regions presently using IFRS as the primary accounting standard in the preparation of external financial reporting as of August 2008.

In developing convergence of standards the standard setters have three options. They may opt for a FASB standard, use an IFRS standard, or if both are inadequate, they may develop a completely new rule. (Herman, 2006) In one instance they decided to converge an IFRS standard to a US GAAP (Discontinued Operations) standard. After reviewing FASB #144 Accounting for Impairment or Disposal of Long Lived Assets and IAS #35 Discontinuing Operations the standard setters decided that FASB #144 was the preferable standard. As a result, IASB issued IAS #5 Noncurrent Assets Held For Sale and Discontinued Operations which generally converged with FASB #144. In another instance, a US GAAP standard converged to an IFRS standard. The standard setters decided that IFRS #8 Accounting Policies and

Changes in Accounting Estimates and Errors was superior to past US GAAP APB #20 Accounting Changes. In June 2005 FASB issued Statement #154 Accounting Changes and Error Corrections to converge with the provisions of IAS #8. In the third instance, the standard setters are developing a new approach or compromise and are jointly working to develop a new standard. For example, FASB and IFRS standard setters have been unable to converge on the handling of extraordinary items, a part of the calculation of Earnings per Share EPS standard (Herman, 2006). With the movement toward IFRS the resolution of standards to be converged are more likely to adopt a simpler or principled based solution.

Many areas of accounting standards remain to be comprised and converged. Some of these areas are outlined in Table 2. Other differences also exit. Measurement of interpretations includes IFRS standards which are for the most part are more broad and principle based as compared to US GAAP. US standards contain underlying principles as well as strong regulatory and legal requirements. As a result the existing environment in the United States has required a more prescriptive approach to financial reporting. (Ernst & Young, 2007). Differences in implementation and enforcement in various countries will make financial statements appear more uniform than they actually are.

Table 2: Areas of Accounting that Have Not Been Comprised and Converged

Conceptual Framework	Comprehensive Income
Earnings Per Share	Inventories
Statement of Cash Flows	Valuation of Property, Plant and Equipment
Lower of Cost or Market	Interest Capitalization
Valuation of Intangible Assets	Impairment of Value
Research and Development Expenditures	Fair Value of Options-Investments
Impairment of Goodwill	Comprehensive Income
Equity Method	Contingencies
Classification of Liabilities to be refinanced	Convertible Bonds
Distinction between debt and equity for preferred stock	Post Retirement Benefit Plans
Leases	Use of the Term Reserves
Recognition of Pension Asset	Classification of Cash Flow
Error Correction	Standards for Presentation of Information in Financial Statements and Segment Reporting
Non Cash Activities	

IMPACT OF ALLOWING FOREIGN COMPANIES TO USE IFRS WITHOUT RECONCILIATION TO US GAAP

In this section we discuss the implications of the SEC decision to allow foreign firms to use IFRS without reconciliation to US GAAP. We begin by discussing the impact on investors. Next, we discuss the impact on multinational firms.

Impact on Investors

The requirement of a reconciliation between IFRS and US GAAP standards for foreign companies filing on US exchanges continued for many years. Choi wrote about the global consequence of international diversity. He discussed Daimler-Benz AG the first German company to list on the New York Stock Exchange. Daimler was required by Form 20F to reconcile its financial statements to US GAAP accounting standards. In 1993 a US $1.3 billion discrepancy existed between German accounting rules and US GAAP Under German accounting, Daimler reported a profit of US $733 million. US GAAP reported a loss of $589 million.. Thus major differences were evident between foreign accounting rules and US GAAP standards (Choi, 1998).

With the enormity of the large number of jurisdictions and countries now using IFRS reporting, the US despite its large role of in worldwide business activity cannot remain isolated in following US GAAP accounting standards, nor can they expect the world to reconcile to US GAAP.

Comparing company financial statements prepared using IFRS and US GAAP reporting present difficulties for investors. Despite the problems, companies with many overseas locations may benefit from using IFRS standards in financial reporting because they may be able to be more flexible in meeting statutory filing requirements in the various locals.

From the investors standpoint IFRS offers a sophisticated and a simplified program for a fresh start in financial reporting. The volume of US GAAP standards have increased in complexity. The rules are hard to figure out. Investors should be advised to check with the company they are considering investing in if the company is using IFRS for financial reporting. It may be able to explain the differences existing between IFRS and US GAAP reporting. For example Glaxo Smith Kline is already making this information available for interested investors. Furthermore any company could use a format similar to the formerly required reconciliation of IFRS to US GAAP to explain differences to interested investors. Or Investors should consult with financial analysts or credit rating agencies.

Impact on Multinational Corporations

Despite the many problems in converging accounting standards, the movement of US Multinational companies to overseas operations is indicated in the following graphs. Data from the Commerce Department reveals that in 2006 the change in corporate profits fell dramatically for domestic operations in the United States and foreign sales revenue received by US Multinational companies exceeded the domestic revenues as indicated in Figure 2, Change in Corporate Profit Receipts From Overseas and Domestic Operations from 2005-2007 (Appel, 2007).

Figure 2: Change in Corporate Profits Receipts from Overseas and Domestic Operations from 2005-2007

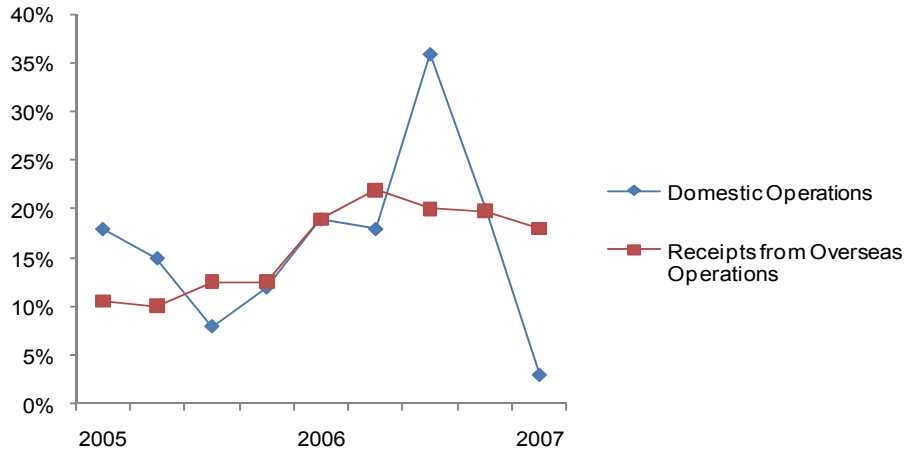

Figure 2 shows the change from 2005-2007. This data from the Commerce Department reveals that in 2006 the change in corporate profits fell dramatically for domestic operations in the United States and foreign sales revenue received by US Multinational companies exceeded the domestic revenues.

For the first time in its history, General Electric's overseas revenue surpassed its domestic sales in 2007 (Deutsch 2008). Despite the increased overseas revenue, the first quarter profit for 2008 has fallen six percent. As a result of the earnings report the stock price fell from $36.75 to $32.05, the largest drop since 1987. The cause of the problem was that their financial services declined sharply in late March after the near-collapse of Bear Stearns. It is important to note that overseas sales are growing even though the slowing of the American economy is damping sales in the United States (Deutsch, 2008). Other companies crossing the 50% threshold in international sales are Pepsi Cola, Coca Cola, Honeywell International, and IBM (Holstein, 2007).

In other areas of business operations, most chemical companies have been building plants and operating offices abroad for decades where operating costs were lower. The low cost operations have become major markets. By the third quarter of 2007 international sales of Du Pont worldwide sales have jumped to sixty four percent 64% and Dow Chemical's international revenue was about sixty five percent 65% of total revenue (Campoy, 2008). Despite these happenings it appears that growth around the world is slowing.

Under IFRS revenue is usually recognized when a sale occurs. This is called the principle based approach. Whereas in US GAAP revenue recognition is generally deferred until the earnings process has occurred and expenses are recorded and are matched against the earned revenue. Commonly called the matching process, this method is identified as the prescriptive approach. With SEC approval, foreign companies may now use IFRS standards for financial reporting without reconciliation to US GAAP. These companies will be reporting higher revenues than a comparable US Multinational corporation following US GAAP.

Since companies are compared by analysts with a focus on revenue dollars, investors tend to regard revenue as a measure of net worth. The corporations with higher revenues will benefit. Thus companies using IFRS standards for financial reporting will have a distinct advantage over US Multinationals using US GAAP. Although many differences between IFRS and US GAAP have yet to be resolved, interest in the differences in revenue recognition and the concern of US multinational companies becomes a contributing factor in the resolution of differences in financial reporting.

THE WORLD'S FEAR OF THE UNITED STATES IN REGULATING ACCOUNTING STANDARDS

European countries have been concerned that the International Accounting Standards Board has been mandating laws to them. In European countries where the IASB standards are laws they have started to propose local or industry-specific exceptions to IFRS, known as "carve-outs" (Reason, 2008). These "carve outs" create a lack of uniformity of the IFRS standards.

European CEO's received extensive questioning from the SEC after filing statements under IFRS. They question the United States motivation in allowing them to use IFRS. In response to their opinion, former SEC commissioner Roel Campos, states "the SEC is simply trying to respond to registrants that have a global presence and may find using IFRS more practical" (Reason, 2008). He believes that the SEC decision to allow foreign companies to report using IFRS is to be responsive to their need and make financial reporting more practical.

On June 18, 2008 the SEC issued a press release stating that the world's securities regulators are uniting to increase their oversight of international accounting standards. The European Commission, the Japan Financial Services Agency, the International Organization of Securities Commission, IOSC is to be included in the International Accounting Standards Committee Foundation IASCF in an IASCF monitoring group. The IASCF is the parent organization that sets international financial reporting standards (SEC,2008).

By definition the SEC regulates the world's largest capital market the New York Stock Exchange and Euronext. Thus, with internationalizing accounting standards and the creation of global accounting standards the SEC will have an increase in global power. The world regulators have had great concern of this happening. The threat of expanded global power has become one of the largest points of contention in the convergence of US and international accounting standards.

The SEC has stated that the IASCF monitoring group will provide an organized interaction between national authorities responsible for the adoption or recognition of accounting standards for listed companies. Global convergence of the standards was expected to require many years of debate and compromise. Instead it may make a relatively quick transition to IFRS brought about by the SEC.

FASB FUTURE AND PROS AND CONS OF IFRS

The basic principles of accounting are very much the same between IFRS and US GAAP but interpretations may vary. FASB board and US GAAP standards will become part of IASB.
While it seems unlikely that FASB will disappear, its future role will be greatly diminished. Three board members have left as of June 30, 2008. FASB will replace only one member. With a five member board going forward the focus of the board is likely to be restricted. FASB's future could very well become a branch of IASB (Wyatt, 2008).

By adopting IFRS as a global reporting standard multinational companies will be able to save labor cost and time associated with preparing financial statements for various locals. Having one set of statements will simplify investor's decisions as they will be able to compare companies using a uniform financial statements. According to Bnet Business Network companies in Europe and Asia have found that converting to IFRS have found that it reduces the cost of capital, improves access to capital, reduces cost of raising capital, increases shareholder confidence, and allows for transparency and comparison among companies (Bnet, 2004). By adopting IFRS, the accounting profession will be required to become educated about the new standards. Colleges and universities will need to revise their curriculums to be consistent will the new standards. The training of current and new accountants about IFRS will involve substantial time and costs. However, the new IFRS standards are not as difficult to learn as the US GAAP standards. Over time the authors believe that benefits of having a uniform reporting system will outweigh the time and cost associated with learning the new standards. However, in the end the enforcement of these standards will rest with local authorities and inevitably there will still be differences.

There is also the issue raised about the United States becoming a global regulating power. With the SEC mandating and the IASCF monitoring it, the SEC is essentially acknowledging this problem. The IASCF should facilitate the organization and communication among the national authorities responsible for adoption of accounting standards for companies in their nation.

CONCLUSION

Although the world is in unchartered territory with the globalization of business, successful foreign operations will help rebuild the American image abroad as well establish many profitable foreign companies. The world of accounting is changing rapidly. Many US Multinational companies have reached a level where foreign sales revenues exceed domestic revenues earned in the US.

Many comment letters sent to the SEC have indicated that it is too premature to implement global accounting standards because many differences between IFRS and US GAAP still need to be resolved. However, a driving force toward accelerating the process of resolution and adoption of global accounting is the revenue recognition factor as well as many other factors.

The revenue recognition factor is a major concern because under IFRS revenue is usually recognized when a sale occurs whereas in US GAAP revenue recognition is generally deferred until the earnings process has occurred and expenses are recorded and are matched against the earned revenue. As mentioned earlier, companies using IFRS standards for financial reporting without reconciliation to US GAAP will be reporting higher revenues than a comparable US Multinational corporation following US

GAAP. This places the foreign companies at an advantage since analysts focus on revenue dollars which investors regard as a measure of worth.

Since companies are compared by analysts with a focus on revenue dollars, investors tend to regard revenue as a measure of net worth. The corporations with higher revenues will benefit. Thus companies using IFRS standards for financial reporting will have a distinct advantage over US Multinationals using US GAAP. Although many differences between IFRS and US GAAP have yet to be resolved, interest in the differences in revenue recognition and the concern of US multinational companies becomes a contributing factor in the resolution of differences in financial reporting.

The movement of the SEC to include the world's securities regulators in the oversight of international accounting standards is a positive step in resolving problems in the convergence of US and IFRS accounting standards. The authors' conclusion is that it is both timely and necessary to converge and harmonize IFRS and US GAAP into a single set of Global Accounting Standards. This will lead to a more stabilized and prosperous world economy and it will help to resolve many of the world's financial reporting problems.

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OUTSOURCING OF RESEARCH AND DEVELOPMENT ACTIVITIES: EVIDENCE FROM U.S. BIOPHARMACEUTICAL FIRMS

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ABSTRACT

This paper examines changes in outsourcing in biopharmaceutical firms over the past ten years using a survey of 86 firms. The data suggest that in spite of the rising expenses in research and development (R&D) and the trend toward external sourcing, a large segment of the firms still prefer to conduct discovery and research in-house. Despite a growing literature on the importance of R&D outsourcing in the biopharmaceutical industry, the data suggest that most firms have recently been reducing their dependence on external R&D partners. The results indicate that the biopharmaceutical firms are using a combination of domestic and foreign firms to outsource their R&D activities and there is no correlation between outsourcing and R&D intensity. The paper concludes with a brief discussion of the implications of the survey findings and the role outsourcing play for R&D activities in the biopharmaceutical industry.

JEL: M16

INTRODUCTION

The biopharmaceutical industry is experiencing an extremely challenging period primarily with respect to constant changes in traditional drug development strategies. While sufficient evidence and empirical analyses of innovation and research and development (R&D) activities exist among large biopharmaceutical firms, it is surprising to note that very little academic research has focused on the small and medium-sized (SMEs) firms. The underlying importance of this paper is to examine R&D strategies and whether outsourcing of R&D as part of a firm's strategy is a growing practice and is likely to continue as more companies become dependent on the external biotechnology know-how that they have corporated internally. According to Achilladelis and Antonakis (2001), the biopharmaceutical industry as compared to other high technology industries is highly competitive and innovative research and development (R&D) is the key to success in the market. This industry has been dominated by a few multinational companies, which are involved in research and development, manufacturing, and marketing of drugs both domestically and globally (Lane and Probert, 2007, Tapon and Thong, 1999). Although, such a focus is logical in light of sheer dominance of large firms in this industry, small and medium-sized enterprises (SMEs) ought not to be overlooked. Just like their larger counterparts, however, SMEs in the biopharmaceutical industry regularly outsource and exploit external sources of knowledge and expertise.

My interest in the SME segment of the biopharmaceutical industry is based on two key factors. First, the extent of utilizing external sources is much greater with SMEs as compared to its larger counterparts (Seget, 2002). Second, R&D productivity has been steadily declining in the biopharmaceutical sector during the past three decades (Buxton and Easton, 2003).

Much of the recent literature has shown that small firms tend to augment their internal competencies by engaging networks of external innovation support (Hall and Bagchi-Sen 2001; Howells, 2006). Extensive literature exists on R&D collaboration and the effect of alliances and joint ventures on large and small firms. However, there is a paucity of research that examines the value and extent of outsourcing within biopharmaceutical firms. While studies have been conducted that identify the advantages and disadvantages of outsourcing and critical success factors in other industries, this paper explores the extent and impact of outsourcing of R&D and other services within the biopharmaceutical industry.

Set against this backdrop I address three primary questions on outsourcing in the empirical section. More specifically the objectives of this section of my research were to determine:

- What is the role of outsourcing as it relates to the product development process?
- What are the key factors in outsourcing R&D and other services for effective implementation?
- What is the impact of outsourcing and the impact on biopharmaceutical R&D?

A major factor for outsourcing has been made on the basis of comparative cost. However, it has also been determined that outsourcing has other strategic benefits such as flexibility and product quality. The R&D process of the biopharmaceutical industry is comprised of two primary phases: drug discovery which focuses at discovering a new compound, and the development phase which evaluates the efficiency of the new compound. One major form of accessing external sources during the clinical and preclinical phase of R&D is through outsourcing. The basic idea behind core competencies and strategic outsourcing is to leverage a firm's core internal skills and available resources while outsourcing non-core activities for which the firm does not have in-house expertise. According to Tesse et.al (1997), a competence is created when firm-specific assets are assembled into integrated clusters between different individuals and groups thereby allowing distinctive activities to be performed.

This paper is organized as follows. The next section provides a research context for the study and gives an overview of current theoretical perspectives with regard to outsourcing. Next I describe the survey methodology and the main characteristics of the sample. I then examine the outsourcing of research and development activities of the survey firms. The paper concludes with a brief discussion of the implications of the survey results for R&D strategies of innovation function.

LITERATURE REVIEW

The pharmaceutical industry has experienced major changes in the research and development activities with the increase of research-based biotechnology and biopharmaceutical firms that have been established during the past three decades (Howells,Gagliardi,and Malik,2008). The biopharmaceutical industry is unlike other high-tech industries. From its establishment, the biopharmaceutical industry has become one of the most research-intensive and innovative sectors of manufacturing (Achilladelis and Antonakis, 2001).

Academic literature that links external knowledge sourcing with successful innovation at the firm level spans several decades, (for early examples, see Carter and Williams, 1957). For small firms operating in technology-intensive fields, the decision to engage networks of external partners is rarely a simple make-or-buy decision (MacPherson, 1997). Instead, the decision is typically powered by sheer necessity because in-house resources are fully stretched. Moreover, technology-based SMEs often need to combine multiple strands of expertise for any given product development initiative (Freel, 2006) – rendering the need for external resources quite critical. A common denominator across recent studies is that SMEs *must* develop external partnerships or collaborative arrangements in order to bring new products to the marketplace.

The fortune of a biopharmaceutical firm is its ability to produce a "blockbuster" drug. A blockbuster drug is typically a drug to treat a common disease, which provides a substantial perceived health benefit and is marketed in several countries with sales exceeding $1 billion. The discovery and development of a new drug is a lengthy and complex process. In order to develop a drug, the biopharmaceutical companies are involved in extensive R&D that extends an average of 10-15 years of research, and the results of this research are then submitted to the FDA with an application for approval. For every 5,000-10,000 compounds tested, only one will receive FDA approval.

The development process is long and complex and it represents the heart of the development process in the biopharmaceutical industry. With the rapid increase in R&D expenditures, clinical trials have become more complex and expensive. With a lack of new drugs in their development pipeline, the large biopharmaceutical companies are reorganizing their in-house R&D by outsourcing all but their core competencies. They have sought external partners for innovation and entered into strategic alliances with small and medium-sized biotech companies, which control more than two-thirds of the industry's total product pipeline. Lim et al., 2006 mention in their study that even though R&D activity showed a high level of outsourcing activity because of shortening the time period for drug introduction, but more particularly for the lack of in-house skills in process technology. Process technology is less proprietorial and thus seen as a less risky option as compared to outsourcing of R&D activities which has a much higher level of risk and uncertainty because of disclosure of information and knowledge which is a core competency of the firm.

Outsourcing has evolved into a strategic alternative for biopharmaceutical firms for a variety of reasons, such as cost and time savings, and lack of in-house resources required for new product development (Stephen, 2006). R&D plays and important role in the entire product development process within the biopharmaceutical industry and in order to focus on the core activities outsourcing is a critical element to the activities of the R&D process. Although cost savings is a major factor for outsourcing R&D activities, many of the biopharmaceutical firms have been outsourcing in order to improve their profitability, increase market share, and the ability to improve the speed of the product to market (Lacey, 2005).

The reason for such strategic alliances between biotech and biopharmaceutical companies is because each contributes a different set of competencies that is necessary for successful new drug development. While the small and medium-sized biotech companies provide the technology for drug innovation, the large drug companies contribute the capital required to take the product through FDA approval, marketing, and distribution. Many outsourcing SMEs have evolved that specialize in preclinical and clinical trials and excel in new drug development. Although there are a number of generic issues and strategies that firms need to be aware of in relation to outsourcing R&D activities, there are certain peculiarities with outsourcing associated with R&D and innovative activity of a firm. There is a high level of risk and ambiguity in relation to the result of the research that is being outsourced, risk of transforming information to the outsourced firm, quality of the work performed by the outsourced firm, and the significance of the research and technology which is a core competency of the firm and by having the R&D outsourced and receiving poor quality work will have a major impact on the credibility and profitability of the firm (Howells, Gagliard, & Malik, 2008).

The constant pressure to develop drugs faster and at lower cost is the reason for outsourcing, collaboration and strategic alliances between biotech firms and the large drug companies. This, at least, is what the mainstream literature suggests (e.g., Lane and Probert, 2007).The strategic response of biopharmaceutical firms has been to develop multiple competencies and to collaborate with multinational enterprises (MNEs) and small and medium-sized enterprises (SMEs) located in the emerging countries such as India and China (Rao, 2008).

SURVEY METHODOLOGY

In a preliminary effort to explore the business characteristics of firms in this industry, self-administered questionnaires were mailed to the Chief Executive Officers (CEOs) or R&D Directors of 390 companies. The sampling frame for the project was developed from the database of the North American Biotechnology Directory (May 2006). The database included dedicated biotechnology companies, biopharmaceutical biotech divisions, and other biotech companies. SMEs were defined as firms with less than 500 employees (small firms were defined as having 1-100 employees, whereas medium-sized firms were allocated to the 101-500 employee class).

From a total sampling base of 862 U.S. based companies, a random sub-sample of 390 companies (45 percent) was selected for the study and questionnaires were then mailed. A cover letter and 4-page survey instrument was then distributed to the 390 R&D Directors or CEOs. A return postage-paid envelope was included in the survey package. Follow-up telephone calls and faxes were made to the companies and 60 usable responses were received (yielding an initial response rate of 15.4 percent). Second requests were mailed to the companies who had not responded. Follow-up telephone calls and faxes were made and 26 additional completed surveys were received giving a final response rate of 22.0 percent.

RESULTS-OUTSOURCING

Because of the increased complexities of the R&D process, drug discovery has become a process that involves cooperation and collaboration with many sectors, both public and private. Major biopharmaceutical companies are now evolving into the primary source for R&D funding both for in-house research and for research licensed from other sectors. Small to medium-sized companies are now driving this innovative process from drug discovery, preclinical and clinical trials (Audretsch and Feldman, 2003). All stages of the innovation process (from drug discovery to marketing/distribution) are being performed through various forms of networking arrangements. Firms have entered into these networking arrangements because of access to new markets, speed of entering a new market, complementary assets, and shared risk (Audretsch and Feldman, 2003).

A current crisis exists in the biopharmaceutical industry as in-house R&D fails to generate a significant number of high-value products to drive company growth and replace revenue generated by products approaching the end of their life cycle that are facing patent expiry and generic competition. The industry shift is now to utilize licensing and other outsourced R&D strategies that will replace this lackluster in-house performance.

From the outset, however, it should be emphasized that outsourcing is not the same as external collaboration. Outsourcing is a form of vertical disintegration, where specific production or service activities are subcontracted to external suppliers. The goal is usually to reduce unit costs by engaging outside vendors that enjoy higher levels of efficiency than in-house alternatives. From this perspective, outsourcing reflects the transactions cost explanation for external linkage development. In contrast to these cost-containment goals, external collaboration is more typically spurred by the need to access specialized expertise that is not internally available. This strategy corresponds with the resource-based explanation for external linkage formation, where the goal is to innovate with the help of outside partners. Both strategies have become common in the U.S. biopharmaceutical industry. In some cases, however, there is a degree of overlap between the two strategies.

Tapon et al. (1999) suggests that an effective outsourcing strategy can enable a biopharmaceutical company to develop new drugs in a more cost effective way, obtain new knowledge and capabilities from its outsourcing partners, improve its core competencies by encouraging in-house research departments to become more competitive than the external research institution, achieve greater speed in the drug development process, and cut risk in the drug development process.

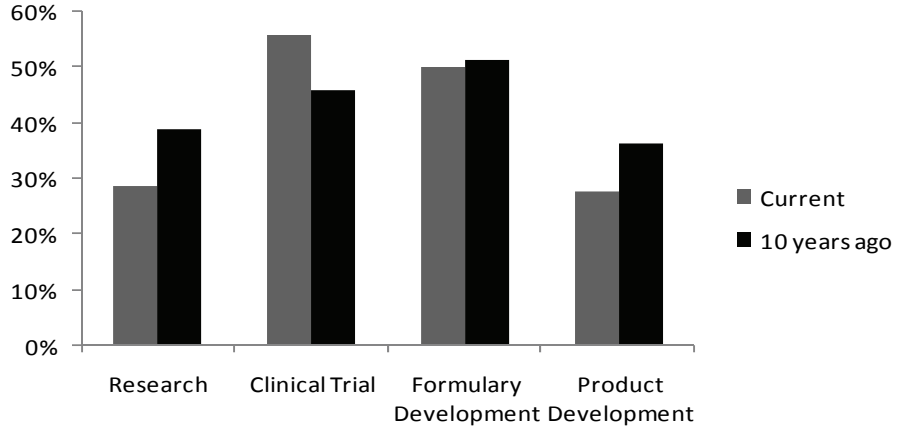
However, research conducted by Piachaud (2002) identifies certain disadvantages with outsourcing primarily related to effective management of the outsourcing partner in terms of lack of control, underestimating the cost and time for new drug development, and creating a competitor. Thus, a firm should clearly understand the nature of its R&D activities and realize outsourcing should be considered a complement to the firm's research activities and non-core competencies rather than a substitute strategy. Strategic outsourcing is not a panacea for whatever ails the company. Rather, it is a sophisticated approach to the strategic use of non-core business functions. This outsourcing encompasses several challenges to high tech firms, and biopharmaceutical firms must understand the entire process before

implementing this strategy for drug development. Outsourcing represents an extension of a biopharmaceutical firms research and development capabilities and has become a critical part of the drug manufacturing process.

Keeping the literature in mind, I looked at the current outsourcing activities and compared it to ten years ago. Within the biopharmaceutical firms the data indicate that in spite of the rising R&D expenses and the trend toward external sourcing, almost half (56.9 percent) of the firms still prefer to conduct discovery and research in-house. From Table 1 and figure 1, I can see that the percentage of the total budget used for outsourcing of research has decreased to 28.4 percent as compared to 38.7 percent ten years ago. Despite a growing literature on the importance of R&D outsourcing in the biopharmaceutical industry, the results shown in Table 1 suggest that most firms have recently been cutting their dependence on external R&D partners. This is evident for all three size-classes of firms, though the most dramatic drop has been for small firms (i.e., from 48.1 percent 10 years ago to 35.4 percent today).

The discovery phase of R&D identifies lead compounds and eliminates any problem compounds before progressing into the pre-clinical and clinical trials. The study data show a decline in the outsourcing of the research phase because discovery, the first phase of the drug development process, is considered as a core competency and firms are reluctant to outsource this phase (see Table 1). Such competencies lead a company to new products and/or new markets. Also, attractive and reliable discovery partners are not always available. Outsourcing of discovery is a strategic commitment involving difficult and risky management decisions, as revealed later when I discuss the results of personal interviews with 20 respondents. The data as revealed in Table 1 also indicate a variation by firm size in outsourcing the research component of the drug development process. The medium-sized firms reported using only 9 percent of their total budget in outsourcing research as compared to 35 percent by small firms and 25 percent by the large firms. Interestingly, medium-sized firms exhibit the lowest levels of outsourcing across all the categories listed in Table 1. For example, the sample as a whole currently outsources around 56 percent of clinical trial work -- but the proportion for medium-sized firms is only 31 percent.

Figure 1: Percentage of Total Budget Used for Outsourcing - Current and 10 Years Ago



This figure shows the percentage of total budget used for outsourcing

Table 1: Percentage of Total Budget Used for Outsourcing and Firm Size (Number of Employees)

		Firm Size			
	Sample Mean %	**Small %**	**Medium %**	**Large %**	***ANOVA***
Research: Current	28.4	35.4	9.3	25.4	.112
10 years ago	38.7	48.1	13.4	31.7	.147
Clinical Trial: Current	55.9	63.0	31.3	56.0	.128
10 years ago	45.8	50.5	29.3	56.0	.458
Formulary Development: Current	49.9	61.8	17.6	55.0	.132
10 years ago	51.4	75.6	6.5	44.0	.033
Product Development: Current	27.5	30.6	14.6	33.8	.345
10 years ago	36.2	47.6	8.8	37.0	.100

This table shows current outsourcing activities and compares it to ten years ago. The data suggest that most firms have recently been reducing their dependence on external partners. This is evident for all three size-classes of firms, though the most dramatic drop has been for small firms. The large and small firms tend to outsource more in all the categories as compared to the medium-sized firms. Total budget used for outsourcing of research has decreased ten percentage points from ten years ago. Medium-sized firms exhibit the lowest levels of outsourcing across all the categories. The ANOVA statistics show that most of the outsourcing categories are inter-correlated at p = 0.05 or less.

A step that is critical in bringing new drugs into the market is clinical trials. Table 1 shows an increase in outsourcing of clinical trials from 45.8 percent ten years ago to 55.9 percent in 2006. The success of a company relies on strategic decisions between utilizing in-house capabilities and taking advantage of external sources. The spiraling cost of drug development and the high failure rate makes the drug development process highly risk-intensive. The value of a firm's compounds increases with the completion of each phase of the clinical trials (phases I to III). Furthermore, the clinical trial process is the most expensive phase of the entire drug development process representing about 40 percent of R&D expenditure (UBS Warburg, 2001). Because of the pressure to get the drugs through the clinical trial process and the amount of expense involved during this phase, biopharmaceutical and biotech companies consider the outsourcing of clinical trials to be a viable option. Outsourcing of all three phases of the clinical trial process is predicted to increase given the pressure to produce new drugs and the overall time and cost involved bringing a new drug to market. However, the results indicate that the small firms outsource almost two-thirds of their clinical trials and the large firms outsource over half of their clinical trial while the medium-sized firm outsource about a third of their clinical trials budget (see Table 1).

The other two specific areas of the R&D process that showed an overall decline in outsourcing were formulary development and product development. This relates to the previous discussion of utilizing in-house discovery to build and maintain competitive advantage in this rapidly changing environment. Overall, about half of the total budget in formulary development is used for outsourcing primarily by the small and medium-sized firms. Medium-sized firms spend only 18 percent of the budget for formulary development in outsourcing as compared to 62 percent by the small firms and 55 percent by the large firms. The trend is also similar with product development where again medium-sized firms are spending less for outsourcing. Medium-sized firms utilized 14.6 percent of the product development budget for outsourcing as compared to 30.6 percent by small firms and 33.8 percent by large firms. I also computed a one-way ANOVA comparing the variance of the different R&D categories of outsourcing by firm size and the results show that most of the outsourcing categories are inter-correlated at $p = 0.05$ or less (see Table 1). Results from further analysis shows for example, R&D outsourcing correlates positively with the outsourcing of formulary development ($r=0.527$; $p=0.020$).

When looking at outsourcing by firm size (small, medium, and large), the small and large firms tend to outsource more in all the categories as compared to the medium-sized firms (see Table 1). Of the total cost necessary to develop a drug, 68 percent of the cost occurs during the clinical development stage (phases I, II, and III). This is one reason why most outsourcing occurs at the clinical stages of the drug-development process. The small companies that are generally cash poor tend to outsource this phase of drug development in order to preserve their cash reserves. The large firms outsource to access the technology and expertise in conducting clinical trials. Their primary objective is to expand their product

portfolios by controlling and developing new drugs outside their own organization. The medium-sized firms have the financial resources and the expertise in-house and conduct their own clinical trials rather than outsourcing. In some instances, it is less cost effective to outsource because in-house R&D offers more control and better quality during this critical stage of the drug development process. Small and large firms outsource more of the product development than do their medium-size firm counterparts. The medium-sized firms outsource about 15 percent of the product development, which is half of the small and large firms (see Table 1).

The primary reasons for outsourcing R&D activities by all sizes of firms are because of the expertise of the external source, and lack of in-house skills and knowledge (see Table 2). The small and large firms also outsource their R&D activities because they lack in-house resources. If a firm lacks the resources, outsourcing can help whether it is a small firm with limited resources or a large firm that must utilize its existing resources more effectively. Through outsourcing, a firm can get the required expertise that it can't expect a small group of people to have in-house. The opportunity to save expenses is also a big reason for small firms to outsource their R&D activities. Through outsourcing, the small firms can rely on some other firm's infrastructure and resources rather than providing the capital itself. Small firms have limited financial resources and have to utilize such resources more cost effectively. The medium-sized firms outsource their R&D activities if they lack the external expertise required. However, the data suggest that they outsource the least as compared to their small and large firm counterparts.

But, despite the benefits achieved through outsourcing, the firms are concerned about the risks involved in outsourcing R&D. Biotech and biopharmaceutical firms are concerned that the lack of control and relying on external partners could cause them to risk losing their competitive edge. The cost savings may fail to develop any profitable products. The survey participants identified a number of risks when considering outsourcing (see Table 3). These include lack of control, quality of work, project delay, product failure, cost, and confidentiality problems. Looking by size of firms, the major risk factor encountered by the small firms is lack of control. Slightly over a third (36 percent) of the small firms indicated that 'lack of control' is the major risk factor in outsourcing R&D activities. The major concern expressed by 36 percent of the medium-size firms is 'project delay', which could result in big losses. The large firms are more concerned about the 'quality of work' as stated by 42 percent of the respondents (see Table 3).

When developing a new drug, poor quality, mistakes, and delay in the development of the drug can result in big losses and delays in the FDA approval process. A SVP of business and commercial development at one of the biopharmaceutical firms surveyed says: "The cost savings do not justify the risks." This is why many of these firms are keeping the research in-house to avoid costly mistakes and liabilities. The drug industry must also comply with rigorous regulations and project delays, and mistakes can result in problems with compliance issues and more costly process. Finally, confidentiality and protection of intellectual property of patent information is subject to great risks at some of the offshore countries.

Table 2: Top 3 Reasons for Outsourcing R&D Activities by Firm Size

		Firm Size		
	Total Sample %	**Small %**	**Medium %**	**Large %**
Do not have the skill/external expertise	61.9	65.8	61.5	50.0
Lack of in-house resources	25.4	26.3	7.7	41.7
Cost effectiveness	23.8	23.7	7.7	8.3

This table shows the primary reasons for outsourcing R&D activities by all sizes of firms. The three key reasons are the expertise of the external source, lack of in-house skills and knowledge, and the opportunity to save expenses. The small and large firms also outsource their R&D activities because they lack in-house resources. The opportunity to save expenses is also a big reason for small firms to outsource their R&D activities. The medium-sized firms outsource their R&D activities if they lack the external expertise required.

Table 3: Top 6 Risk Factors for Outsourcing R&D Activities by Firm Size

		Firm Size		
	Total Sample %	**Small %**	**Medium %**	**Large %**
Lack of control	32.2	36.1	18.2	33.3
Quality of work	30.5	30.5	18.2	41.7
Project delay	28.8	27.8	36.4	25.0
Product failure	11.9	11.1	9.1	16.7
Cost	10.2	11.1	9.1	8.3
Confidentiality	6.8	8.3	-	8.3

This table shows the risks involved in outsourcing R&D. A number of risk factors were identified when considering outsourcing. These include lack of control, quality of work, project delay, product failure, cost and confidentiality problems. The major risk factor encountered by the small firms is lack of control while the major concern for medium-sized firms is project delay. The large firms are more concerned about the quality of work.

Research Limitations

Caution should be taken in generalizing the results of this study because this study is subject to several limitations. The two major limitations are: 1) sample size and 2) low response rate.

The first limitation concerns the small sample size used in this study. I collected data utilizing a sub-sample instead of the total population because of my limited budget. I could not afford to survey more than 45 percent of the population. A second weakness of this study is the low response rate of 22 percent. Usually a 20 percent or lower response rate in survey research with business establishments is quite common, but nevertheless my response rate of 22 percent is insufficient to provide conclusive findings, and thus the results should be treated as suggestive only.

SUMMARY AND CONCLUSIONS

Over the past decade, strategic outsourcing has become a critical decision within the biopharmaceutical industry. Increased pressure for new products in the pipeline, rising R&D expenses, the pressure to reduce costs, and the need to bring new products to the market have led to the outsourcing of not only the traditional non-core functions, which include clinical trials and drug manufacturing, but also the technically demanding areas of drug discovery and development. However, a decline in the outsourcing of these areas (core competencies) and an increase in the outsourcing of non-core functions have also been observed. In this study I have attempted to understand how biopharmaceutical companies have employed outsourcing in an effort to conduct declining product pipelines and patented product portfolios. From previous studies it has been established that networks of collaboration and outsourcing dedicated to the creation of innovation during the past decade seem to be the expected formula for new product development among biopharmaceutical firms. However, from this study I can conclude that there is some evidence that for the large firms, outsourcing and product development activity were strongly correlated 10 years ago.

Furthermore, R&D outsourcing has declined significantly over the past 10 years. Across all three size-classes of firms, R&D appears to be gaining ground as an internalized activity. Medium-sized firms currently conduct over 90 percent of their R&D in-house, compared to 75 percent among large firms and 65 percent among small firms. The trend toward declining levels of R&D outsourcing is not what we would expect in light of the recent literature (e.g., Chiesa et al., 2004). The budget used by these firms for outsourcing research has decreased from 10 years ago. Outsourcing of the discovery process is a strategic commitment and involves a lot of risks, as mentioned by 20 respondents during follow-up interviews. The respondents were asked to explain why their research budget for outsourcing had decreased from 10 years ago. The firms have developed more in-house research expertise and are conducting more research in-house. Some of the main reasons included the poor quality of research being conducted, delays in

meeting deadlines by the external firm, and the difficulty of maintaining control of the research activity due to distance and insufficient in-house manpower to control it. These factors led to more ineffective research and ultimately ended up being more costly. This study has offered an exploratory review of a topic that has attracted significant attention in the recent academic literature on innovation and outsourcing within the U.S. biopharmaceutical sector. The task remains to conduct specific case studies to more fully understand the relationships between innovation and outsourcing.

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AN ANALYSIS OF JOB SATISFACTION AT THE ACADEMIC LEVEL: A ROMANIAN CASE STUDY

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ABSTRACT

The present paper identifies and discusses factors, considerations and aspects from the jobs of university academic staff that contribute to their satisfaction and dissatisfaction at the working place. An institutional case study lies at the basis of the discussion, emphasizing the measurement of the job satisfaction of academic staff within a Romanian university. Among the debated aspects are: promotion opportunities, support and facilities, working conditions, climate at the work place, income level and others, some of them contributing to increased satisfaction, but others contributing to dissatisfaction at the work place. Based on the results of the research, institutional problems can be identified and suggestions for a new institutional profile and a modern management strategy can be formulated as a key in the new competitive context, where a functional redesigning is a necessity, as to set up a dynamic equilibrium at the crossroads between universities and economic, social and political environment.

JEL: I21

INTRODUCTION

Job satisfaction refers to one person's feelings regarding the nature of the work and can be influenced by a variety of factors, such as the quality of the relationship with the supervisor, the quality of the working environment, the motivation system and its efficiency. A good deal of empirical research have been conducted on the job satisfaction in various business settings. But very little empirical research, however, has investigated level of job satisfaction in universities.

One reason for this situation is based on the fact that academics are commonly regarded as self motivated, working within highly motivated environment which enables them to pursue their aims in teaching, research, service and consultancy (Moses, 1986). To be consistent with this opinion, the enhancement of university teaching is a genuine scholarly activity and should be regarded as a professional commitment by all academic staff involved in teaching, supervising and tutoring. The evaluation of teaching is an integral feature of the enhancement of teaching. Teaching is a complex human activity and its quality is of concern to a variety of stakeholders.

Academic management should take into consideration that an appropriate recognition and reward of the accomplishments of staff is essential to the motivation, attraction and retention of quality staff. The ability to attract and retain key academic staff is one of the important components of the university's ability to achieve the strategic goals it has set for the future. A transparent and consistently robust process of promotion which is based upon meritorious performance in areas of research, teaching and service and seeks to recognize and reward academic work according to its quality and impact, will be one measure of the university's educational management performance.

LITERATURE REVIEW

Job satisfaction is important because of its effects on employees' performance and behaviour, as well as general health (Oshagbemi, 1999). Prior studies have shown that there is a close connection between job satisfaction and organizational outcomes: job performance (Meyer et al., 1989), customer satisfaction (Bitner, 1990), turnover intention (Tett et al., 1993), organizational commitment (Locke&Latham, 1990) and personal outcomes: workplace turnover and life satisfaction (Judge et al. 2001; Dickter et al., 1996; Morrison, 1997). According to Oshagbemi (1999) and Robbins (2001), the construct of job satisfaction is conceptualized as an individual's general attitude toward an object, the job. This is consistent with Locke's (1976) definition of job satisfaction as a "pleasurable or positive emotional state, resulting from the appraisal of one's job experiences". Dawis and Lofquist (1984) argued that job satisfaction is the result of the individual's appraisal of the extent to which the work environment meets the individual's needs.

Robbins (2001) notes that factors affecting job satisfaction include "interaction with co-workers and bosses, observing organizational rules and policies, meeting performance standards and living with working conditions". He acknowledges job satisfaction factors as relating to the work itself, quality of supervision, relationship with co-workers, promotional opportunities and pay. In addition, the Minnesota Satisfaction Questionnaire identified various aspects of job satisfaction: working conditions, chances for advancement, freedom to use one's judgment, praise for going a good job and feelings of accomplishment (Weiss et al., 1967). This supports Locke's (1976) findings, which showed factors conducive to job satisfaction as including: mentally challenging work equitable rewards, supportive working conditions, and supportive colleagues.

Herzberg et al. (1959) expounded *the dual-factor theory of job satisfaction*, which states that there are two groups of factors, which determine job satisfaction or job dissatisfaction. Herzberg's (1966) two-factor theory suggests that only job content-related factors (achievement, responsibility, the work itself) lead to job satisfaction. On the other hand, job context-related factors (pay, security, working conditions) lead to job dissatisfaction.

The situational occurrences theory developed in 1992 by Quarstein et al. argues that job satisfaction is a function of situational occurrences and situational characteristics and that any given factor, e.g. pay or recognition, can result in either job satisfaction or dissatisfaction. There are important changes occurring in higher education today all over the world, changes that have arisen from pressures of demand, the cultural shift in the way in which higher education is viewed, financial pressures, structural and managerial diversity and diversity of university missions and such changes affect the job satisfaction and dissatisfaction of university teachers Oshagbemi (1997).

DATA AND METHODOLOGY

The present study was conducted with all members of the academic staff from a higher education institution (HEI) specialized in the economic field, from Bucharest, Romania. Among the objectives of the study were to identify the degree of satisfaction of the academic staff in relationship with a number of aspects of the institutional life as important factors of job satisfaction. A written questionnaire was distributed nominally to all 832 full time employed academics of the studied institution in the period November-December 2006. The response rate was of 32.5%, as 271 academics participated in the survey. Table 1 presents the structure of the sample.

Table 1: Structure of the Sample

No.	Academic **P**osition	Total **N**umber of **A**cademics	Number **R**espondents	Response **r**ate (%)
1.	Professor	253	70	27.6%
2.	Senior lecturer	125	42	33.6%
3.	Lecturer	169	61	36%
4.	Asisstant lecturer	201	75	37.3%
5.	Junior assistant lecturer	84	23	27.3%
	Total	**832**	**271**	**32.5%**

This table presents the structure of the sample of the research.. The questionnaire was distributed to all academic staff within the university (832 persons) and the overall response rate was 32,5%.

One can notice that there were slightly lower response rates (under the average) for the extreme academic positions (junior assistant lecturer and full professor), while more interested to express their opinions were lecturers and assistant lecturers.

RESULTS

As we have already seen, a number of factors influence job satisfaction. In this context, we were interested to investigate the perception of academic staff over aspects that can be potential influencers of job satisfaction: the level of income, working conditions, access to information, teaching aids, climate at the work place, certainty of the work place, promotion opportunities and the teaching load. Respondents were asked to express their level of satisfaction with a number of aspects, part of the institutions' life. Table 2 presents how their opinion differed according to academic position.

Table 2: Degree of Satisfaction of Academic Staff according to the Academic Positions

Aspects*	Junior **A**ssistant **L**ecturer	Assistant **L**ecturer	Lecturer	Senior **L**ecturer	Professor	Average
Level of income	2.70	2.15	2.13	2.36	3.69	2.64
Working conditions	2.70	2.74	2.95	3.15	3.51	3.05
Support services personnel	3.13	3.03	3.08	3.14	3.32	3.14
Access to information	3.00	2.89	3.12	3.34	3.55	3.15
Teaching aids	2.91	2.99	3.18	3.43	3.65	3.27

This table presents how the opinion of the respondents differed according to their academic position.
** Each aspect was ranked on a scale from 1 to 5, where 1 = very dissatisfied and 5 = very satisfied*

Academics in the studied Romanian HEI were most dissatisfied by the level of the income they earn from the institution, aspect that on average was appreciated as being under 3 (2.64), the acceptable level. However, there were differences according to academic positions, as presented in Table 2. The only category that had a higher degree of satisfaction as far as the income was concerned (3.69) was the full professor category (many of whom aged over 50), the position of full professor being so far the only academic position well paid in the Romanian higher education system. The least dissatisfied with the income they receive from the institution were lecturers (2.13) and assistant lecturers (2.15), generally corresponding to ages between 25 and 40 years old.

All other aspects scored on average around 3 and a little above, illustrating a level of average satisfaction, the highest score being received by the number and quality of the teaching aids (3.27), given the technological updating that took place in the last years in the institution. Again, there were differences on academic positions. Persons on lower academic positions (junior assistant lecturers, assistant lectures and lecturers) and younger (under the age of 30) were more dissatisfied with working conditions, access to information and teaching aids, than persons on more senior positions (senior lecturers and full professors). This is due on the one hand to the higher expectations of more IT and high tech literate younger junior positioned academic staff. On the other hand, senior people have better access to facilities (some have

their own offices in the buildings of the HEI, better access to IT equipment and consumables and better access to scientific information) and to support services (secretarial services, etc).

The t-test reveals that the level of income and the working conditions are significantly correlated with the academic position, while the other three elements are not (the critical value of the t-stat is 1.645), confirming that the degree of satisfaction of the academic staff is differentiated according to academic position for the level of income and the working conditions, while for the support service personnel, access to information and teaching aids elements, the degree of satisfaction is more homogeneous for academic staff on different academic positions (see Table 3).

Table 3: Mean, Variance and T-stat Values for the Degree of Satisfaction of the Academic Staff (according to the Academic Positions)

	Level of **I**ncome	Working **C**onditions	Support **S**ervices **P**ersonnel	Access to **I**nformation	Teaching **A**ids
Mean	2.6431	3.0544	3.1486	3.1533	3.2710
Variance	1.3265	1.1197	1.1445	1.5021	1.1982
Observations	271	271	271	271	271
t stat (Ac. Position)	-6.2360	-1.7007	-0.5744	-0.8343	0.5818
Significance	100%	91%	43.1%	59.3%	43.3%

This table shows the correlation between the level of income, working conditions, support service personnel, access to information and teaching aids on the one hand and the academic positions on the other hand using T-stat tests

Respondents were also asked to rank on a scale from 1 to 5 (1 – very bad, 5 – very good) the way they appreciate a number of aspects related to the activities of the HEI that constitute job satisfaction factors. Table 4 shows how results differed according to the academic positions.

Table 4: Ranking of Job Satisfaction Factors according to the Academic Position

Job satisfaction factors*	Junior **A**ssistant lecturer	Assistant **L**ecturer	Lecturer	Senior **L**ecturer	Professor	Average
Climate at the work place	3.43	3.34	3.41	3.21	3.30	3.31
Certainty of work place	3.96	3.61	3.43	3.29	3.64	3.55
Promotion opportunities	3.17	2.88	2.85	2.52	3.02	2.87
Teaching load	3.00	3.07	3.26	3.22	3.71	3.29

This table shows the perception of the respondents related to the importance of different factors for their job satisfaction, according to their academic position. Each aspect was ranked on a scale from 1 to 5, where 1 = very bad and 5 = very good*

The aspect that was most appreciated by academics on all positions was the certainty of the work place (3.55), while promotion opportunities was the least appreciated aspect (2.87). As far as promotion opportunities are concerned, slightly more satisfied were junior assistant lecturers (who are promoted as assistant lecturers in two years time) and the full professors (who are at the end of their promotional ladder). All others appreciated that promotion opportunities are under the average level. This is due to the new (2005) promotion criteria introduced in Romania that are more demanding than the ones in the previous period. The senior lecturers are the least satisfied (2.52) as they are willing to be promoted to full professor positions. Instead, they are now required to fulfill a number of tougher conditions than before. Nicolescu et al. (2008) present how the promotion criteria have changed in Romania with higher orientation towards research and international publications, criteria that were not required previously and that imply a certain experience and longer periods of time in order to be fulfilled.

Another aspect positively evaluated by most academics was the climate at the workplace, with a score of 3.3. Persons on junior academic positions were the most satisfied by the climate at the work place. Teaching load was appreciated positively by persons on senior positions (senior lecturers and full professors) and older of age (over 50), who actually have teaching norms formed from a lower number of teaching hours, (other activities being included in their norms), while persons on junior positions have

norms with higher number of teaching hours. Male and female academics appreciated equally the aspects influencing their degree of satisfaction at the work place

The correlation between certainty of work place and promotion opportunities on the one hand and academic position on the other hand is statistically significant (computed T-stat values are higher than the critical value 1.645), illustrating differences in the appreciation of job satisfaction factors by people on different academic positions. At the same time a higher degree of homogeneity between people with different academic positions is noticed for the other job satisfaction factors (climate at the work place, teaching load), for which t-tests are not significantly correlated. Table 5 presents the t-stat values for the above discussed job satisfaction factors.

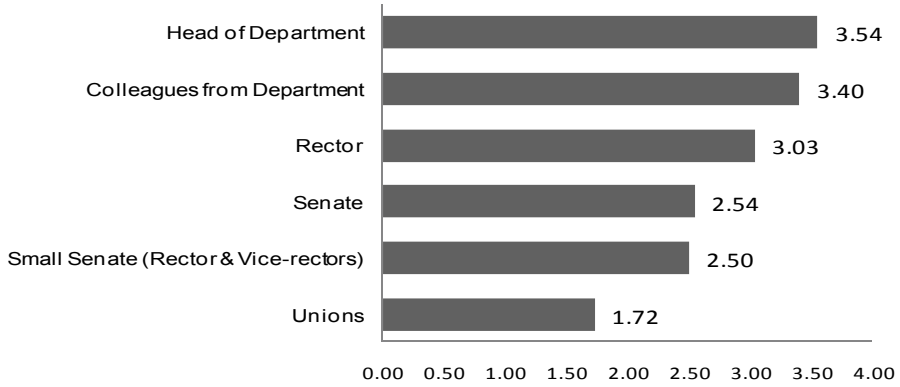
Table 5: Mean, Variance and T-stat Values for the Job Satisfaction Factors Ranking (according to the Academic Position)

	Climate at the **W**orkplace	Certainty of **W**orkplace	Promotion **O**pportunities	Teaching **L**oad
Mean	3.3188	3.5589	2.8707	3.2901
Variance	13088	1.2100	1.5055	1.5338
Observations	271	271	271	271
t-stat (Ac. Position)	1.4082	3.4055	-3.2876	0.3890
Significance	83.8%	99.9%	99.8%	29.6%

This table shows the correlation between climate at the work place, certainty of the work place, promotion opportunities and the teaching load on the one hand and academic position on the other hand using T-stat tests.

Other aspects researched having possible implications for the job satisfaction were the following: the perceived level of the students' quality and the degree of trust in different persons and institutions within the HEI. The higher degree of trust the academics feel towards their direct bosses (heads of departments) and their department colleagues influences positively the good climate at the work place (see Figure 1). At the same time, unions are not trusted at all (1.72); an acceptable degree of trust receives the Rector of the university (3.03), while collective representative bodies (such as the Senate) enjoy less trust.

Figure 1: Degree of Trust of Academics in Persons and Bodies within HEI



This figure shows the degree of trust of the respondents towards different bodies within the studied HEI.

Similarly, both the percentage of the total individual income earned from this institution and the direction in which the academic staff personal responsibility goes, can also explain the degree of job satisfaction at the work place.

Based on t-stat tests, we noticed that the correlations between the degree of trust of academics in persons and bodies within the HEI and academic position are statistically relevant for all analyzed categories, confirming the above presented results (see Table 6).

Table 6: Mean, Variance and T-stat Values for the Degree of Trust of Academics in Persons and Bodies within HEI

	Colleagues	Unions	Head of **D**epartment	Rector	Senate	Small **S**enate
Mean	3.4053	1.7295	3.5456	3.0330	2.5437	2.5095
Variance	1.5748	1.84383	2.3133	2.4869	2.3514	2.4811
Observations	271	271	271	271	271	271
t-stat (Ac. Position)	9.8612	-4.6887	10.9804	6.5431	3.0316	2.2399
Significance	100%	99.9%	100%	100%	99.7%	97.4%

This table shows the correlation between the degree of trust of academics in different persons and bodies within the HEI on the one hand and academic position on the other hand using T-stat tests.

Most academic staff feels responsible for their activity in front of their own consciousness (48.5%) and an almost equal group of academics feels responsible in front of the students (41.3%). This reflects on the one hand, the high degree of freedom that academics have that make them feel responsible towards themselves for doing a good job through a self-controlled system and on the other hand the actual tendency all over the world towards a client –oriented philosophy when dealing with students, towards whom, academics feel accountable for their activities.

The degree to which academics round their income by working supplementary outside the institution reflects on the one hand their degree of satisfaction at the work place, as well as their fidelity towards the institution. The majority of the academic staff from our sample (62.6%) earn more than 90% of their income from the HEI where they are employed fulltime and this reflects a certain degree of loyalty, given the fact that most of them (except probably full professors) are discontent with the level of income they earn from the institution. However, 22% of the respondents get 50% or more of their income outside the institution. Firstly, these are people hired on junior positions, who usually have lower salaries, higher expectations and more outside opportunities (some of them choose eventually to leave the institution for other jobs). Secondly, among the dissatisfied, there are people on senior positions who also have professional commitments outside the HEI.

CONCLUDING COMMENTS

Three types of institutional factors influence job satisfaction levels in the studied Romanian HEI. First, Dissatisfaction factors for a large part of the academic staff are the following: the level of income for all academic positions (except full professor) and promotional opportunities. Second, Satisfaction factors for most academic staff are the following: certainty of the work place, climate at the work place and the number of teaching hours. Third, The following factors are sources of both satisfaction and dissatisfaction: the access to information, the teaching aids and the working conditions. People consider the above factors as satisfactory or non-satisfactory depending on the differences in expectations (determined by personal factors such as age, academic position, working experience) on the one hand, and the access to different facilities, working conditions on the other hand. These factors relate to the organizational support offered to employees. Susskind et al. (2000) consider that employees' perceived organizational support influences their job satisfaction and the employees' job satisfaction influences work-related attitudes. The correlations with academic position of the majority of the variables are statistically significant, illustrating higher or lower differences in the job satisfaction's factors and influencers for people with different academic positions.

The results of the present study are consistent with findings of other similar studies. For instance, Kostelious (2001) has studied the relationship between personal characteristics and job satisfaction for

Greek teachers and showed that teachers were satisfied with the job itself and supervision but dissatisfied with pay and promotional opportunities. In addition, he found that various personal characteristics (e.g. gender, age, etc) were significant predictors of several aspects of job satisfaction, therefore moderating job satisfaction.

Oshagbemi (1997) considered the complexity of the decisions relating to both satisfaction and dissatisfaction and concluded that the two-factor theory is an over-simplification of reality in today's organizations. Thus, his study that has employed a content analytical methodology to investigate contributory factors to the job satisfaction and dissatisfaction of teachers in higher education, does not support the Herzberg's theory, which says that factors that lead to the job satisfaction are separate and distinct from those that lead to job dissatisfaction. Rather, the results of his investigation appear to support the situational occurrence theory, which argues that any given factor, e.g. the work itself or salary, can result in either job satisfaction or dissatisfaction.

This is also consistent with the results of the present study that illustrate how different factors influence positively or negatively the job satisfaction of the academic staff, depending on individuals. This means that the overall level of job satisfaction increases if employers concentrate their efforts at both situational occurrences and situational characteristics rather than by either factor alone. We do not claim that these results apply to the entire Romanian higher education sector, but they represent a good example of what can motivate or de-motivate academic staff in obtaining performance and can be a starting point both at institutional and at sector level for policy decision making.

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COMPARATIVE ANALYSIS OF TAX POLICIES APPLICABLE IN THE NEW AND ORIGINAL EU MEMBER-STATES

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ABSTRACT

The objective of this paper is to compare the tax policies of the twelve new countries of the European Union with those of the existing fifteen members. These countries have sometimes been criticized because of their tax-favoring policies especially lower rates and revenues and various tax exceptions, namely, for capital tax. Critical comments have even been made about the establishment of the "flat tax" in some of these countries. The indicators monitored in this comparison are the tax quota, the tax mix and the tax rates of corporations, as the taxes are potentially most affected by tax competition. Moreover, the focus is on the effective taxation of capital, labor and consumption, measured by "implicit tax rates". The heteroscedastic and pair t-tests are used as the analysis tools, so that the statistical significance of the differences between the average values of the two compared groups can be tested. The tests confirmed the hypothesis of the non-statistically significant differences in the size of some of the pairs of researched averages.

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JEL: H20

INTRODUCTION

The objective of this paper is to describe the tax policies of the twelve new countries of the European Union and compare them with the existing fifteen members. A different approach to taxation by the original, industrialized member countries of the European Union compared to that of the new, less developed and moreover transitive countries is often pointed out. These new member countries are not afraid to experiment with competitive taxes and to reduce tax rates below a value unprecedented in the EU for a long time ago.

Economically the twelve mentioned countries have a different position than the original fifteen, as it is an exception to find a new member-state distinguished by a higher GDP per capita than the worst positioned of the old ones. The new members also differ from the original EU15 geographically (they are located more to the east), as well as due to their historical heritage (mostly post-communist states). Is it however actually true that the tax policies of new member countries are different to such an extent that could be statistically proven?

The similarity of the tax policy that would distinguish these two groups of countries may result not only from the historical heritage and a similar economic level but also the tax competition existing among them. The tax competition would probably lead to an overall decline of taxes, the transfer of the burden from the more mobile tax bases (capital) to the less mobile factors (labor, consumption). We shall try to confirm or invalidate these hypotheses.

The paper is organized as follows. First, the bibliography involved in comparing the tax indicators between the new and old EU member countries is summarized followed by the Data and Methodology section. The results themselves first compare the tax quotas and their structures and then corporate income tax is compared. Finally, there is the comparison of implicit tax rates. The conclusions section summarizes the analysis results including the specification of the overall comparison table.

LITERATURE REVIEW

The bibliography dealing with the comparison of the tax systems of the new and original 15 EU members is rather dated particularly because of the accession of new, mainly transient countries to the EU in 2004 and 2006. Only around the accession of the new EU members are the required statistical indicators using uniform methodology for analysis regularly monitored.

Usually, (Taxation trends, 2007), Gandullia (2005), Bernardi - Chandler (2005), (Markiewicz, 2008), Jakubiak - Markiewicz (2007) lower tax quotas and various structures are emphasized in the form of a lower proportion of direct taxes and a higher proportion of indirect taxes and social security contributions in the new EU member countries. Lower rates of personal income tax as well as corporate income tax are also highlighted in addition to the more frequent reduction of the personal income tax rate in the new EU member countries. Late in the nineteen-nineties, corporate income tax was significantly reduced, first in the new and then in the old EU member countries. Analyses also mention the situation and development of implicit tax rates for work, consumption and capital and state that the implicit rate applicable to work is much higher than consumption and capital, that the work taxation drop is negligible and since 2001, there has been a slight increase in the implicit rates applicable to consumption and capital. The new countries report lower effective capital taxation whereas for effective work and consumption taxation there is almost no difference.

The most detailed comparisons focused completely on the differences between the new and old EU member countries were conducted by Gaudullia (2005) and Bernardi – Chandler (2005). The former emphasizes that there were huge differences between the new and old EU member countries in the nineteen-nineties and the tax mixes are varied more frequently than for old members. The latter are deeply involved in the level and development of the tax rates for both the countries groups.

However, e.g. Barysch (2004) writes that the statement regarding lower corporation income taxes in Eastern Europe is a myth only because the tax burden is influenced by the tax base, adjusted differently both in the EU's Eastern countries as well as in the original member countries. According to her, another myth is harmful tax competition because "...taxes are only one factor in determining companies' investment plans. In the case of Eastern Europe, fast growth rates, improving business environments, low-wages and highly-skilled workers are at least as important in attracting foreign businesses." (Barysch, 2004, p. 2).

All the comparison methods have one thing in common which is the descriptive statistics method. The authors compare the differences and evaluate the development of the indicators but without verification using a statistical hypothesis. Considering the high variability of tax indicators - also inside the groups monitored (12 new and 15 old EU member countries) - their conclusions are not generally valid.

DATA AND METHODOLOGY

The indicators monitored in this comparison are the tax quota and its structure expressed as the share of direct taxes and the share of corporation income tax in the overall tax revenue. Furthermore, these are implicit tax rates imposed on capital, labor and consumption and corporate tax rates, as the taxes most

potentially affected by the tax competition. The new and old European Union member countries are compared on the basis of the arithmetic averages of the respective variables.

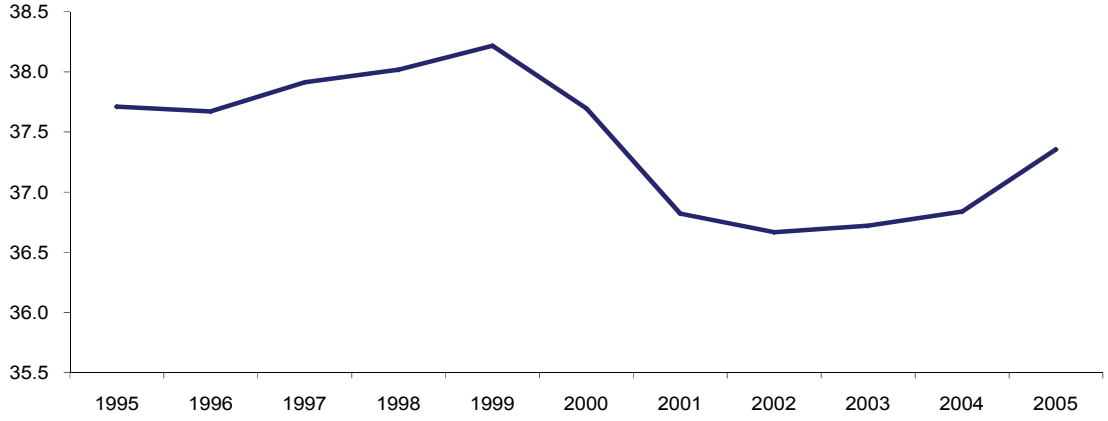
The basic statistics are the data from the statistics "Taxation Trends in the European Union", published by the European Commission together with Eurostat and the Directorate-General for Taxation and the Customs Union (Taxation Trends, 2007). The applied method is testing the statistical hypotheses on the average value by means of heteroscedastic (for comparing two files) and pair t-tests (for comparing the same file in different periods) on the 5%-significance level, using MS Office Excel 2003 software.

RESULTS

Tax Quota

In 2005, the average weighted tax quota in EU member countries was equal to 40 %, and the un-weighted average of tax quotas was equal to 37.4 %. Figure 1 illustrates the quota development from 1995 to 2005.

Figure 1: Development of the Average Tax Quota in the EU27 Member Countries 1995-2005, in %



This figure shows the arithmetic averages of the tax quotas of the European Union member countries. Un-weighted arithmetic average. Bulgaria has only been only included since 2000, Romania since 2001. Data source: Taxation Trends in the European Union (2007)

As mentioned by the Taxation Trends in the European Union (2007), traditionally the quotas in the new member countries are lower than those in the old member countries; however, there are also some exceptions. The total growth of the un-weighted average of the tax quota by a half a percent in 2005 is relatively high and it is the first growth since 1999, when the quota began to decline. Thus the average quota has practically returned to the level of 1995, so that the decline which took place in the late part of the last century has been eliminated.

The tax quotas were also naturally affected by cyclic development, which contributed to the moderation of the quota decline after 2002. The growth accelerated again in 2004, when the member countries tried to reduce their deficit which is why they probably postponed tax cuts. However, the quotas in 2005 grew in spite of a temporary decline in the pace of economic redevelopment (with a growth of 1.7% in 2005 compared to that of 2.4 % in 2004). In 2005 the tax quota only declined in seven EU member countries (including both the EU15 member countries and the new ones).

A typical feature of the tax quota development in separate countries from 1995 to 2005 is that where the quota has been relatively high, it changes, whether in the upward or downward direction, to the minimum extent. Larger variations may be observed in those countries in which the initial level of the tax quota is

low.This is apparently associated with the fact that lower taxation takes place only in the transitive countries, where the tax system is only "settling down" so that the quota is still "oscillating" so much then for the evaluation made by the European Commission. Let's focus our attention on the comparative analysis of EU27 tax policies proper, as expressed in the shape of the differences between the original and the new member countries.

Table 1 gives an overview of the conducted tests. According to the table there is indeed a statistically significant difference between the value of the average tax quota of the new and original member countries and this indicator is as expected, lower in the case of the new member countries. Rather surprisingly, however, no statistically significant growth or decline of the EU27 average tax quota has been substantiated but the difference between the two extremes, namely, 1999 and 2002, has been proven. This result indicates that there are movements in the average taxation in the EU27 countries over time but so far, we have been unable to prove any long-term trend, whether upward or downward.

Table 1: Testing the Statistical Significance of the Differences of the Average Tax Quotas in New and Original EU Member Countries and Changes To The EU27 Average Quota

Variables	Mean value 1	Mean value 2	*t* stat	Critical value - single tail t-test**	Critical value - double-tailed t-test**	Interpretation
Tax quota in 2005 new EU12, EU15	33.5639	40.38855	-11.3274	1.812461	2.228139	In 2005 new EU12 member countries quota is less than that of EU15
Tax quota in 1995 new EU12, EU15	34.10821	39.62363	-2.55175	1.710882	2.063899	In 1995 new EU12 member countries quota is less than that of EU15
EU27 tax quota 1995, 2005	37.17233	37.35537	-0.24588	1.705618	2.055529	Growth of EU27 average quota from 1995 to 2005 is statistically insignificant
EU27 tax quota 1999, 2002 (comparison of extreme values)	37.64117	36.66673	2.469006	1.705618	2.055529	In1999 EU27 the average quota is more than that of 2002 (extreme average values)

*This table shows the results of the tests for the statistical significance in the differences between the arithmetical averages of two files. The first column shows which data files are compared (e.g. the tax quota in 2005 in the new EU12 and the tax quota in 2005 in EU15); the 2nd and 3rd columns involve the arithmetic averages of respective files. The heteroscedastic t-test was applied to the different files in the same year, pair t-test for the same file in two different years.The data for the initial year is not available for Bulgaria, and/or Romania and therefore the nearest available data has always been applied for this year (for 2000, and/or 2001).The EU27 average tax quota is therefore in this calculation lower than the statistically stated average without Bulgaria and Romania.The change of the tax quota from 1995 to 2005 was not statistically confirmed even in the case of the new E12 member countries, and/or the original EU15. MS Office Excel 2003 software ** indicates the 5%-significance level Data source: Taxation Trends in the European Union (2007)*

Tax Mix – Share of Direct and Indirect Taxes

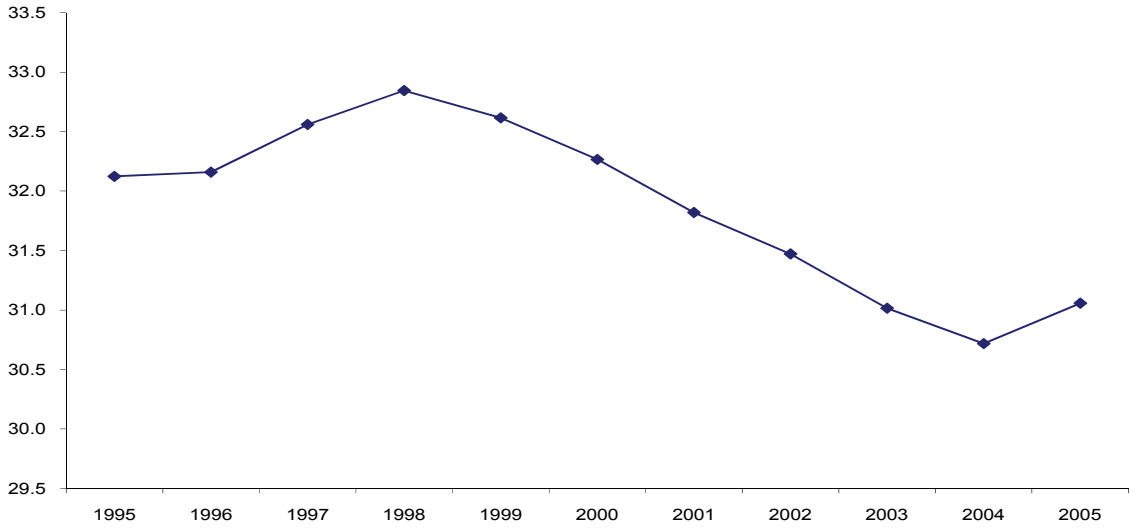
We are going to evaluate the tax mix by means of changes to the shares of direct taxes, provided that in most cases the mix changes by transferring the burden from direct to indirect taxes, and vice versa. Transfers to contributions paid to social security or from them to direct or indirect taxes do not vary so much, as they are linked to their expenditure requirements. The Government cannot change them without social security scheme reforms.

The share of direct taxes within the tax mix usually correlates to the level of the development of the country, as it emphasizes the transparency of the tax system and also reflects the high incomes of rich payers, which are subject to higher average rates (and which also apply to the so called "flat taxes", since even these are progressive). The maturity of the country is also reflected in its tax collection capability, so that the Government is not forced to resort to indirect taxes; the collection of which is less transparent, tax evasion is restricted and revenues are thus more certain. The transition from direct to indirect taxes can also mean that attempts are being made to maintain revenues or even to increase them in a less

conspicuous way than the growth of rates or the bases of direct taxes and, newly, this transfer has been observed in connection with the "flat tax" which reduces revenues from the rich. The Government then proceeds to the flat increase of the burden using VAT (see e.g. Kubátová, 2006).

Figure 2 of the development of the share of direct taxes reflects several of the present trends in taxation appearing at the turn of the century; even though it might appear that direct taxes are declining due to tax competition and the rate decline of corporate taxes, it is not so. Corporate taxes do not decline as to their share in the overall taxation and, on the contrary, the rate decline is compensated for by an extension of the bases due to the growth of corporate business, the flexible response of the bases in the years of growth and other factors. Even in years of economic recession, the share of this tax in the overall revenue need not always drop. Labor taxes did rather decline in the second half of the last century but this trend stopped in 2005.

Figure 2: Development of the Share of Direct Taxes within the Overall Tax Revenues in the EU27 Countries:1995-2005



This figure shows the arithmetic averages of the share of direct taxes (e.g. personal income, corporation income and property taxes) in the overall tax revenue (including social security contributions) of the 27 European Union member countries. Data source: Taxation Trends in the European Union (2007. Un-weighted arithmetic average

So how did the taxation policy manifest itself in respect to the share of direct taxes? Table 2 comprising the results of the t-tests shows the difference in the share of direct taxes in the tax quota. With regard to the new member countries, this share is lower. However, neither of the groups of member countries experienced any statistically significant change of this share in 2005 compared to 1995.

Share of Corporate Taxes and Rates

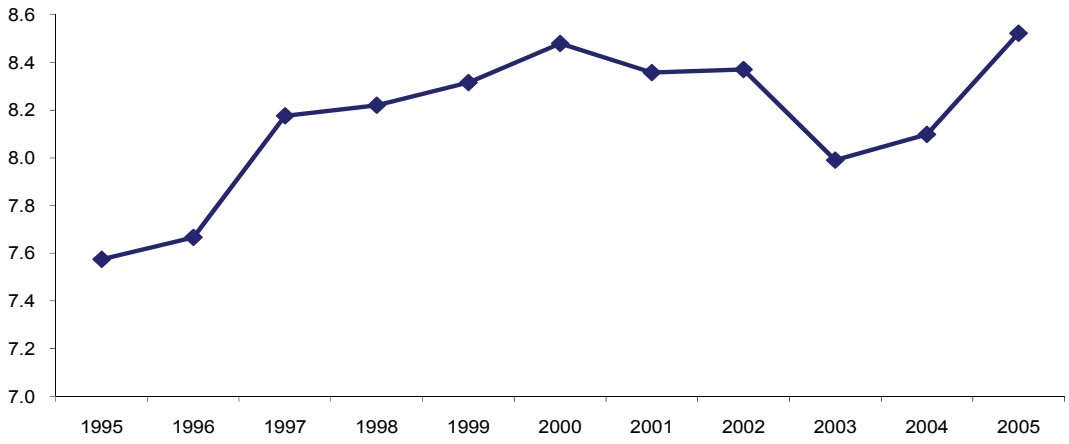
We are going to restrict the comparative analysis of the direct tax policy because of the limited scope of the paper in the following part to corporate taxes, considered to be the most affected by the competition among countries.

Table 2: Testing the Statistical Significance of Differences of the Share of Direct Taxes in the New and Original EU Member Countries and the Changes Taking Place from 1995 to 2005

Variables	*Mean value 1*	*Mean value 2*	*t stat*	*Critical value - single tail t-test***	*Critical value - double-tailed t-test***	*Interpretation*
Share of direct taxes of the EU27 - 1995, 2005	31.34635	30.83966	0.617758	1.705618	2.055529	The decline in the share of direct taxes in the EU27 from 1995 to 2005 is not statistically significant
Share of direct taxes 2005 - new EU12, EU15	24.58838	35.84068	-3.91988	1.717144	2.073873	The share of direct taxes in the new member countries in 2005 is less than that in the EU15
Share of direct taxes 1995 - new EU12, EU15	26.18785	35.47314	-2.98478	1.720743	2.079614	The share of direct taxes in the new member countries in 1995 is less than that in the EU15
Share of direct taxes in new EU12- 1995, 2005	26.18785	24.58838	1.034847	1.795885	2.200985	The decline in the share of direct taxes in the new EU12 from 1995 to 2005 is not statistically significant
Share of direct taxes in EU15- 1995, 2005	35.47314	35.84068	-0.46511	1.76131	2.144787	The decline of the share of direct taxes in the new EU15 from 1995 to 2005 is not statistically significant

This table shows the results of the tests of the statistical significance in the differences between the arithmetical averages of two files. The first column shows which data files are compared (e.g. the share of direct taxes of the EU27 in 1995 and the share of direct taxes of the EU27 in 2005); the 2nd and 3rd columns involve the arithmetic averages of respective files. The heteroscedastic t-test was applied for the different files in the same year, pair t-test for the same file in two different years. Data for the initial year is not available for Bulgaria, and/or Romania and therefore the nearest available data has always been applied for this year (for 2000, and/or 2001). The change of the tax quota from 1995 to 2005 was not statistically confirmed even in case of the new E12 member countries, and/or the original EU15. MS Office Excel 2003 software
*** indicate the 5%-significance level. Data source: Taxation Trends in the European Union (2007)*

Figure 3: Share of Revenues from Corporate Taxes in EU27 Countries from 1995 to 2005



This figure shows the arithmetic averages of the share of corporation income taxes in the overall tax revenue (including social security contributions) of the 27 European Union member countries. Data source: Taxation Trends in the European Union (2007). Un-weighted arithmetic average.

The share of the corporate taxes in the overall tax/internal revenues in the EU27 countries is growing on a long-term basis, as shown by Figure 3, in spite of the continuous decline of rates. It has already been mentioned that the causes consist of the growing role of corporate business and the growth of tax costs due to economic growth. This growth in the share of corporate taxes however is not statistically

significant, as shown by Table 3. Neither statistically significant as well, is the difference of the share of corporate taxes in the overall taxation of the new EU12, while the share of corporate taxes in the overall tax revenues of the original EU15 on average has grown. With regard to corporate taxes, these are distinguished by a very mobile base, affected by the tax competition. If so, the competition taking place in the original fifteen member countries is more successful than in the new E12. The question then is which competitive tools, in particular, are being applied by both these groups. These may include a larger than standard reduction of the rate, various other exemptions/relief associated with corporate taxation or non tax tools consisting of attracting and maintaining capital under one's own jurisdiction.

As far the rates of corporations are concerned, the results of the comparison differ and confirm the existing view of the tax policies of the new member countries, when compared to the original fifteen. The difference in the average rates in 2007 is statistically significant (see Table 3) and the new member countries have a rate which is lower on average by almost 10 percentage points according to the table. With regard to the development of the average rate of the EU27 countries, the rate during the period from 1995 to 2005 declined and this decline is once again statistically significant. Coincidentally, the average rate decline is once again almost 10 percentage points.

Table 3: Testing the Statistical Significance of the Differences between the New EU12 and the Original EU15 in Respect of Corporate Taxes from 1995 to 2005

Variables	*Mean value 1*	*Mean value 2*	*t stat*	*Critical value - single tail t-test***	*Critical value - double-tailed t-test***	*Interpretation*
Share of corporate taxes of the EU27- 1995, 2005	7.649937	8.52874	-1.81379	1.705618	2.055529	The growth of the share of corporate taxes in the EU27 is not statistically significant from 1995 to 2005
Share of corporate taxes 2005 - new EU12, EU15	8.742162	8.358003	0.328473	1.710882	2.063899	The difference in the growth of the share of corporate taxes between the new E12 and EU15 in the EU27 is not statistically significant in 2005
Share of corporate taxes of the new EU12- 1995, 2005	8.679867	8.742162	-0.07178	1.795885	2.200985	The statistically insignificant difference of the share of corporate taxes in the new EU12 from 1995 to 2005
Share of corporate taxes of original EU15- 1995, 2005	6.825993	8.358003	-3.1098	1.76131	2.144787	The growth of the share of corporate taxes in EU215 from 1995 to 2005
Rates of corporate taxes 2007 - new E12, original E15	19.13333	28.86667	-3.8388	1.713872	2.068658	The corporate rate tax in the new E12 in 2007 was lower than that in the EU15
Rates of corporate taxes 1995 - new E12, original E15	31.96667	38.02667	-1.97329	1.710882	2.063899	Difference in the rate of corporate taxes between the new E12 and the EU15 in 1995
Rates of corporate taxes of the EU27- 1995, 2007	35.33333	24.54074	6.435355	1.705618	2.055529	Decline in the average rate in the EU27 in 2007 compared to 1995

*This table shows the results of the tests of statistical significance in differences between the arithmetical averages of two files. The first column shows which data files are compared (e.g. share of corporate taxes of the EU27 in 1995 and in 2005), the 2nd and 3rd columns involve the arithmetic averages of the respective files. The heteroscedastic t-test was applied to the different files in the same year, pair t-test for the same file in two different years. Data for the initial year is not available for Bulgaria, and/or Romania and therefore the nearest available data has always been applied for this year (for 2000, and/or 2001). MS Office Excel 2003 software ** indicate the 5%-significance level. Data source: Taxation Trends in the European Union (2007)*

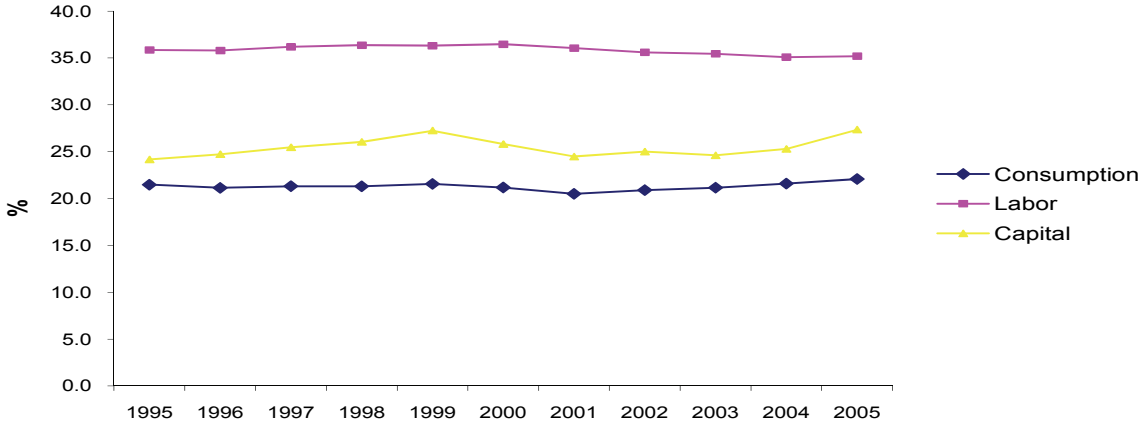
If we summarize what has been confirmed by the tests of the statistical hypotheses we reach the conclusion that the share of corporate taxes in the overall tax revenues does not differ between the new and old member countries and that it is maintained on the same level in the new member countries, while it had grown in the original E15. The rates differ significantly statistically and are also declining on a long-term basis. Is it possible to evaluate this development as so called "harmful tax competition" of the new EU member countries to the detriment of the original members? According to my opinion we must be very cautious in doing so, as the governments are not concerned with the rates but the revenues flowing into their budgets. Should the new member countries not reduce their rates, then the transfer of corporate profits to the original member countries could harm *ceteris paribus* the interests of their public finances.

Implicit Tax Rates

Implicit rates, sometimes also called effective rates, express the extent to which any given manufacturing factor or consumption is burdened. Compared to the average tax rate which is in its result the ratio of the tax revenue and stated base, implicit rates are defined as "...the ratio of the total tax revenues of the category (consumption, labor and capital) to a proxy of the potential tax base defined using the production and income accounts of the national accounts". (Taxation Trends, 2007, s. 415). Implicit tax rates are a better indicator of the tax burden than the nominal, as they are not deformed by various modifications of tax bases, such as exemptions, deductions and discounts. Their nature is purely economic and not technical. It is obvious that compared to the nominal rates which testify to the actual tax burden in a very limited manner and with their international comparison being of little purpose, the implicit rates are internationally comparable.

The calculation of implicit rates which is quite demanding in respect of the supporting data on taxes and national accounts has been monitored in the European Union only recently and the indicators from 1995 are available and the last statistics indicate the 2005 data (see Taxation Trends, 2007). In the case of certain countries, predominantly some of the new member countries from 2004 and 2006, certain data has been missing so far. Figure 4 gives a comparison of the development of the average values of three basic implicit rates for the EU27 countries in the monitored period (Eurostat now monitors other partial implicit rates, such as those for the capital in business, independently conducted trade and activities, etc. We shall not analyze these rates because of the limited scope of this paper.

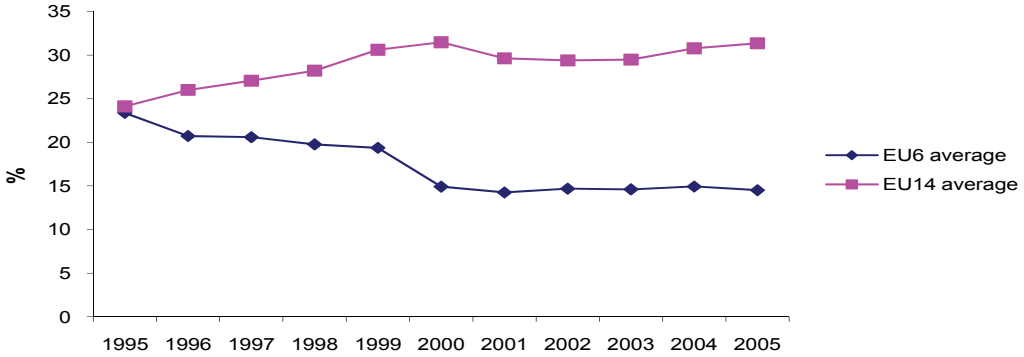
Figure 4: The Development of Implicit Tax Rates in EU Countries from 1995 to 2005



This figure shows the arithmetic averages of implicit tax rates in the 27 European Union member countries. Implicit rates, sometimes also called effective rates, express the extent to which any given manufacturing factor or consumption is burdened. They are defined as the ratio of total tax revenues of the category (consumption, labor and capital) to a proxy of the potential tax base defined using the production and income accounts of the national accounts. Un-weighted arithmetic average. Data source: Taxation Trends (2007)

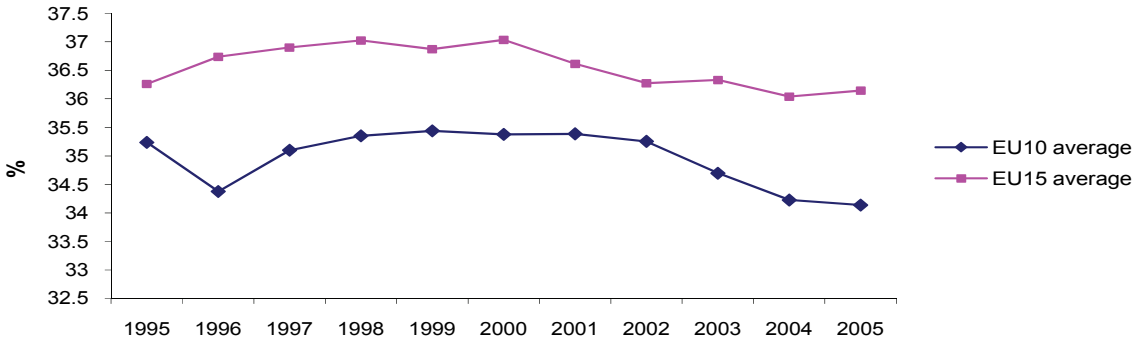
The highest implicit rates fall on labor and the lowest ones on consumption. The tax burden in the countries of the European Union did not change very much on average even within a longer period of eleven years. Figure 5, Figure 6 and Figure 7 then enable how these rates have respectively developed in the new and the old member countries to be compared. As regards consumption, we do not see any big differences in the development of implicit rates between these two groups of countries and even for labor. The development does not differ too much in both the groups, although in the latter case a lower burden may be seen in the new member countries, as well as it being a product of the development of the economic cycle (Figure 6). The apparent difference involves the implicit tax from capital, where the schisms between the new member countries (in this case based on the data available from six countries only) and the EU14 member countries (with the data for Luxembourg missing) are clearly opening out (Figure 5).

Figure 5: Implicit Tax Rates Relating to Capital in the New EU6 and the Original EU14 Member Countries from 1995 to 2005



This figure compares the arithmetic averages of implicit tax rates in the 6 new and 14 old European Union member countries. Implicit rates, sometimes also called effective rates, express the extent to which the capital factor is burdened. They are defined as the ratio of the total tax revenues of the capital to a proxy of the potential tax base defined using the production and income accounts of the national accounts. No data for Luxembourg is available. Data is only available for six new members (Czech Republic, Estonia, Lithuania, Latvia, Poland and Slovakia). The nearest available information instead of 2005 has been applied to Latvia, Greece, Portugal and Sweden and instead of 1995 for Lithuania. Note: un-weighted arithmetic average values. Source: Taxation Trends (2007)

Figure 6: Implicit Tax Rates Relating to Labor in the New EU10 and the Original EU15 Member Countries from 1995 to 2005*

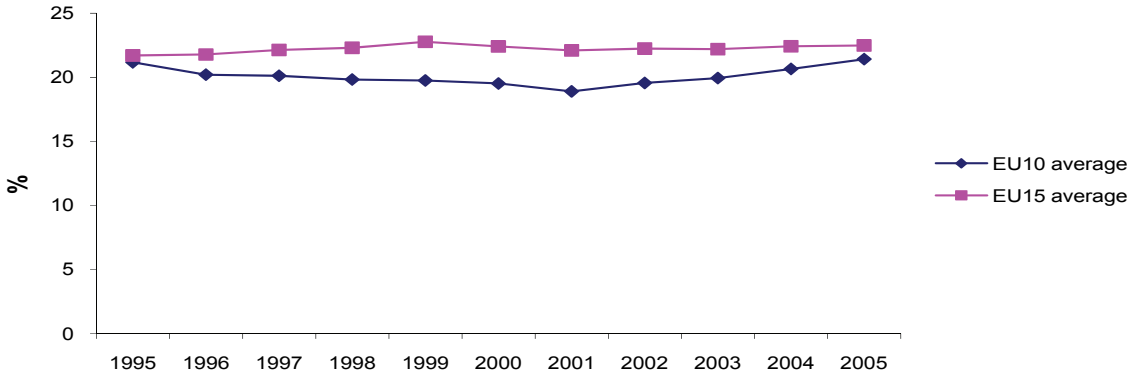


This figure compares the arithmetic averages of implicit tax rates on labor in the 10 new and the 15 old European Union member countries. Implicit rates, sometimes also called effective rates, express the extent to which the factor of labor is burdened. They are defined as the ratio of total tax revenues of labor to a proxy of the potential tax base defined using the production and income accounts of the national accounts.
The nearest available information instead of 2005 has been applied for Portugal and instead of 1995 for Bulgaria and Romania. Note: un-weighted arithmetic average values. Source: Taxation Trends (2007)

Table 4 shows the results of pair t-tests with average values (un-weighted arithmetic average values) of implicit tax rates relating to capital. We can see that while there was no significant statistical difference

between the implicit tax rates relating to capital in the new member countries when compared with the original EU member countries in 1995, the capital taxation in 2005 in these new member countries is much more moderate than in the original ones. In a period from 1995 to 2005, the capital taxation measured by the implicit rate had developed in these groups in the opposite way so that it grew in the original ones and declined in the new ones, and statistically significantly. The implicit tax rate declined from an average of 23% to 15% in the new member countries during the period in question, while it increased from an average of 24% to 31% in the new member countries.

Figure 7: Implicit Tax Rates Relating to Consumption in the New EU6 and the Original EU14 Member Countries from 1995 to 2005*



This figure compares the arithmetic averages of implicit tax rates on consumption in the 6 new and 14 old European Union member countries. Implicit rates, sometimes also called effective rates, express the extent up to which consumption is burdened. They are defined as the ratio of total tax revenues of the consumption to a proxy of the potential tax base defined using the production and income accounts of the national accounts. The nearest available information instead of 2005 has been applied for Portugal and instead of 1995 for Bulgaria and Romania. Note: un-weighted arithmetic average values. Source: Taxation Trends (2007)

Table 4: Testing the Statistical Significance of Differences between the New EU12 and the Original EU15 for Implicit Tax Rates ("ITR") Regarding Capital and Development From 1995 To 2007

Variables	***Mean value 1***	***Mean value 2***	***t stat***	***Critical value - single tail t-test*****	***Critical value - double-tailed t-test*****	***Interpretation***
EU ITR on capital - 1995, 2005	23.9012	26.31714	-1.03724	1.729133	2.093024	ITR on capital had not changed on average from 1995 to 2005
EU ITR on capital 2005 - new EU6, original EU14	14.51822	31.37382	-4.66353	1.782288	2.178813	ITR on capital in 2005 is statistically significantly lower in the new member countries
EU ITR on capital 1995 - new EU6, original EU14	23.37397	24.12715	-0.24717	1.833113	2.262157	ITR on capital 1995 in the six new member countries does not statistically significantly differ from EU14
EU ITR on capital in the new EU6 - 1995, 2005	23.37397	14.51822	2.704459	2.015048	2.570582	ITR on capital from 1995 to 2005 in the six new member countries had statistically significantly declined
EU ITR on capital in the EU14 - 1995, 2005	24.12715	31.37382	-3.83193	1.770933	2.160369	ITR on capital from 1995 to 2005 in the original twelve member countries had statistically significantly grown

*This table shows the results of the tests of statistical significance in differences between the arithmetical averages of two files. The first column shows which data files are compared (e.g. EU ITR on capital in 1995 and in 2005), the 2nd and 3rd columns include the arithmetic averages of the respective files. The heteroscedastic t-test was applied to the different files in the same year, pair t-test for the same file in two different years. Data source: Taxation Trends in the European Union (2007). No data for Luxembourg is available. Data is only available for six new members (Czech Republic, Estonia, Lithuania, Latvia, Poland and Slovakia). The nearest available information instead of 2005 has been applied to Latvia, Greece, Portugal and Sweden and instead of 1995 for Lithuania. MS Office Excel 2003 software ** indicate the 5%-significance level*

The tax burden imposed on labor in the new EU member countries is on average much higher than the burden imposed on capital and was equal to approx. 34% compared with 15% in 2005. This however does not apply to the original fifteen where the burden imposed on labor and capital is roughly the same, as the following difference, namely 36% of ITR on labor vs. 31% of the ITR on capital is rather not statistically significant (see Table 5).

While the capital-related burden shows significant differences, the labor-related burden in the new member countries does significantly differ from the EU15 neither at the beginning of the period, nor at its end in 2005. The labor-related burden in both the groups of countries had not at the same time changed on average during the researched eleven years, not even within the whole EU27 or any of the groups of countries. This supports an often stated hypothesis that the non mobile base – labor – is not subject to tax competition among the countries. However not all are convinced, that as a consequence of tax competition the elimination of revenues from corporate taxes and from capital must occur or that the impact of tax competition on the tax/internal revenues does not concern labor (for various views on tax competition, see e.g. Stults, 2004).

Table 5: Testing the Statistical Significance of Differences between the New EU12 and the Original EU15 for Implicit Tax Rates ("ITR") Regarding Labor and Development from 1995 to 2007

Variables	*Mean value 1*	*Mean value 2*	*t stat*	*Critical value - single tail t-test***	*Critical value - double- tailed t-test***	*Interpretation*
EU ITR on labor - 1995, 2005	35.79783	34.9758	1.444079	1.705618	2.055529	ITR on labor had not changed on average from 1995 to 2005
EU ITR on labor 2005 - new EU12, original EU15	33.51839	36.14174	-1.04286	1.708141	2.059539	ITR on labor in the new member countries does not statistically significantly differ from the EU15 in 2005
EU ITR on labor 1995 - new EU12, original EU15	35.21976	36.26028	-0.3788	1.713872	2.068658	ITR on labor in the new member countries does not statistically significantly differ from the EU15 in 1995
ITR 2005 in EU15 - labor, capital	36.14174	31.37382	1.622816	1.708141	2.059539	ITR on labor in the EU15 does not statistically significantly differ from ITR on capital in 2005

This table shows the results of the tests of statistical significance in the differences between the arithmetical averages of two files. The first column shows which data files are compared (e.g. EU ITR on labor in 1995 and EU ITR on labor in 2005), the 2nd and 3rd columns include the arithmetic averages of the respective files. The heteroscedastic t-test was applied for the different files in the same year, the pair t-test for the same file in two different years. The nearest available information instead of 2005 has been applied for Portugal and instead of 1995 for Bulgaria and Romania. Luxembourg, for which no data is available, is missing in the ITR on capital file. MS Office Excel 2003 software
*** indicate the 5%-significance level. Data source: Taxation Trends in the European Union (2007).*

The taxation of consumption is in both the original and the new member countries practically the same and does not even change during the researched period (namely, 1995 compared with 2005), see Table 6. Burdening consumption by taxes ranges on the average from 20% in the new EU12 in 1995 to 22% in the original EU15 in 2005 and as has already been mentioned earlier, the differences between the groups of countries or in time are not statistically significant.

Consumption is apparently one of the tax bases providing steady revenue (due to the wide-based VAT and consumption taxes on goods with an inflexible demand), with tax evasions restricted to the minimum, including the transfer of the base to a country with a more advantageous regime of taxes. As the increase of taxes affects the inflation measured by consumer prices and has a rather regressive affect, governments are reluctant for political reasons to tackle the increase in rates. Harmonization of consumption taxes may also affect the stabilization of revenues where the result is the stability of bases and rates, and/or implicit tax rates.

Table 6: Testing the Statistical Significance of Differences between the New EU12 and the Original EU15 for Implicit Tax Rates (ITR) Regarding Consumption and Development 1995-2007

Variables	*Mean Value 1*	*Mean Value 2*	*t stat*	*Critical Value - single tail t-test***	*Critical Value - double- tailed t-test***	*Interpretation*
ITR on consumption of the EU27- 1995, 2005	21.14829	22.00526	-1.6396	1.705618	2.055529	ITR on consumption had not statistically significantly changed from 1995 to 2005
ITR on consumption of – the new EU12, original EU15	21.43097	22.46469	-0.65731	1.713872	2.068658	ITR on consumption in the new member countries does not statistically significantly differ in 2005 from the EU15
ITR on consumption1995 - new EU12, original EU15	20.47089	21.69021	-0.63226	1.720743	2.079614	ITR on consumption in the new member countries does not statistically significantly differ in 1995 from the EU15.

*This table shows the results of the tests of statistical significance in the differences between the arithmetical averages of two files. The first column shows which data files are compared (e.g. EU ITR on consumption in 1995 and EU ITR on consumption in 2005), the 2nd and 3rd columns involve the arithmetic averages of the respective files. The heteroscedastic t-test was applied to the different files in the same year, pair t-test for the same file in two different years. The nearest available information instead of 2005 has been applied for Portugal and instead of 1995 for Bulgaria and Romania MS Office Excel 2003 software ** indicate the 5%-significance level. Data source: Taxation Trends in the European Union (2007)*

CONCLUSIONS

The article has attempted to contribute to the discussion on the difference in the tax policies of the twelve new member countries which acceded to the European Union in 2004 and 2007 and those of the original fifteen members. We have researched the tax quota and its structure, as regards direct and indirect taxes and the share of corporate taxes, which are mostly liable to tax competition among the countries. We have moreover researched the indicators of implicit tax rates in relation to capital and consumption and the statutory tax rates applicable to corporate taxes, which are most often talked about as the rates employed by the new member countries as a competitive tool. After completing t-tests of the statistic hypotheses about the equality of the average values of two groups and the equality of the average values with pairs of groups on the 5%-significant level we have found several interesting points. For the sake of clarity, we shall insert the basic points found from all the above tables in a single, systemizing. Table 7. The new countries have indeed a statistically significantly lower level of overall taxation measured by means of the tax quota in 1995 and also in 2005.

However, no statistically significant growth or decline in the average tax quota has been observed in the above period, either for the whole EU27, or the new twelve or the original fifteen members separately. Taxes measured by this indicator are thus considerably rigid so that the differences between both the groups tend to continue. Should it be true that the new member countries have effectively conducted so-called "harmful tax competition", the difference ought to increase, which we have not observed. Another indicator of tax policies is the share of direct and indirect taxes in the tax revenue. T-tests have substantiated that in the case of the new member countries the share of direct taxes is lower than that of the original fifteen members. No statistically significant change in this share in 2005 compared with 1995 has however taken place for either of the groups of member countries.

As far as the share of corporate taxes is concerned, this is not statistically significantly different for the new members than for the original member countries. In the case of the new member countries this share does not change on average in the long-term but it is growing in the case of the original fifteen member countries. The rate of this tax declined on average in 2007 compared to 1995 in both the groups of countries, while in the case of the new EU12 the rate is on average lower than in the original EU15. This means that for corporate tax, the new member countries tend to compete through their rates but in the

remaining areas (affecting the tax base) the competition is successful for the more advanced European fifteen (see e.g. Global Competitiveness, 2008).

Table 7: Summary of T-Tests for Tax Quota, Tax Mix, Implicit Tax Rates and Nominal Rates of Corporate Taxes In The EU- 1995-2005

Indicator	Average[2)] in 2005		Average[2)] in 1995		Evaluation of t-tests on man values
	New EU12	Original EU15	New EU12	Original EU15	
Tax quota	33.5639	40.38855	34.10821	39.62363	Both in 1995 and 2005 the tax quota in the new EU12 countries is lower on average than that of the original EU15. No statistically significant change of the tax quota took place in any of the group of countries from 1995 to 2005.
Share of direct taxes	24.58838	35.84068	26.18785	35.47314	Both in 1995 and 2005 the share of direct taxes in the new EU12 countries is lower on average than that of the original EU15. No statistically significant change of the share of direct taxes took place in any of the group of countries from 1995 to 2005.
Share of corporate taxes	8.742162	8.358003	8.679867	6.825993	In 2005 no statistically significant difference in the share of corporate taxes can be found between the new EU12 and the original EU15. No change in the share of corporate taxes in the new EU12 took place from 1995 to 2005 either. However, the share of corporate taxes in the original EU15 grew in this period *
Rate of corporate taxes	19.13333 (year 2007)	28.86667 (year 2007)	31.96667	38.02667	In 2007 the rate of corporate taxes in the new EU12 is lower than that of the original EU15 but this difference was not statistically significant in 1995.
ITR on capital [2)]	14.51822	31.37382	23.37397	24.12715	ITR on capital in 2005 is statistically significantly lower in the new member countries. The original difference in 1995 was not statistically significant but ITR growth in the new countries caused the origination of a big difference. Tax competition by the new member countries is obvious. In 2005 the average burden imposed on capital does not statistically significantly differ from the burden imposed on labor which is taxed equally, in both the groups of countries.
ITR on labor [3)]	33.51839	36.14174	35.21976	36.26028	ITR on labor does not differ in the new and original member countries and has not even changed in either of these groups of countries since 1995. As regards the taxes imposed on labor, no competition takes place, as the tax base is immobile.
ITR on consumption[3)]					ITR on consumption does not differ in the new and original member countries and has not even changed in either of these groups of countries since 1995. Taxes are harmonized; although the rates may differ, the bases specified by the regulations/directives cannot be changed. These taxes do not present a suitable competitive tool.

*This table summarizes the results of the tests of statistical significance in the differences between the arithmetical averages of tax quotas, tax mixes, implicit tax rates and the nominal rates of corporate taxes in the EU from 1995 to 2005. 1) Un-weighted arithmetic average. 2) No data for Luxembourg is available. Data is available for only six new members (Czech Republic, Estonia, Lithuania, Latvia, Poland and Slovakia). The nearest available information instead of 2005 has been applied to Latvia, Greece, Portugal and Sweden and instead of 1995 for Lithuania. The heteroscedastic t-test was applied to the different files in the same year, pair t-test for the same file in two different years. 3) The nearest available data instead of 2005 is used for Portugal, and instead of 1995 for Bulgaria and Romania. MS Office Excel 2003 software. ** indicate the 5%-significance level. Data source: Taxation Trends in the European Union (2007)*

We have moreover reached the conclusion that while for the taxation of labor and consumption, tax competition does not take place and has manifested itself in changes of the implicit tax rates or in their different development in the researched countries, it is quite the contrary, for capital. It can be seen that the effective capital taxation in the new countries is continuously declining but is growing in the original fifteen countries. If we take into consideration the development of the share of corporate taxes, which has

not changed in the case of the new member-countries, but has grown in the original fifteen, then there are, on the one hand, the efforts of the new members to attract capital by a low tax burden (ITR). However, on the other hand, stronger factors, which attract in the long-term, profits under the jurisdiction of the original member countries and do not allow tax collection to be moderated.

Quite a lot is known about these factors; see e.g. The Global Competitiveness Report (2008). They are the factors linked with the more advanced countries with a built-up infrastructure and a solid and steady legal framework, etc. The new EU member countries cannot compete in most cases with these factors and one of the easiest ways for them is apparently both the nominal and effective reduction of taxes. It is however hard to say, whether this procedure might be called "harmful" tax competition. To conclude, one may say that it could not be proven using the applied tools that the new EU member countries would effectively implement what the European Union calls "harmful tax competition".

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FINANCIAL MANAGEMENT PRACTICES OF COLLEGE STUDENTS

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ABSTRACT

With mortgage foreclosure rates at an all time high and more than one-million Americans expected to file bankruptcy in 2008, it is safe to conclude that many Americans have overextended themselves with debt. This study tests the hypothesis that many Americans do not have the knowledge, skills or habits essential for effective management of personal finances. This investigation seeks to determine the reasons for financial misconduct and to discover measures that will assist college students in improving financial management practices.

JEL: D14

INTRODUCTION

Given the current mortgage foreclosure crisis and an expected increase in the filing of bankruptcies in 2008, it is more important than ever to analyze and evaluate the financial management skills of young Americans because their personal financial decisions will have an impact on the economy for many years to come. In 2006, college- and university-enrolled students, between the ages of 18 and 24, made up 39.7% of the U.S. population, according to the Census Bureau's American Community Survey. By understanding the financial management skills and habits of today's college students, financial-related organizations can promote products and services that appeal to and help this group make better financial management decisions. Banks and other financial institutions play an important role in personal financial decision-making. By presenting products and services specifically aimed at college students, these organizations can tap into this large market segment.

The growing usage rate of debit cards issued by banking institutions has had a dramatic impact on the methods used by individual customers to manage personal finances. Today's internet-savvy college students are inclined to use convenient online financial management products and services more so than the in-house products and services upon which their parents rely. In addition, the message of credit card responsibility appears to be reaching the target college market, especially concerning credit card utilization.

Movement toward a cashless society is progressing each year. This shift may be of concern for financial institutions since cash seems to have a more tangible sense of value than plastic. Although college students have a plethora of financial management information available to them, the financial product and service industry as well as schools should consider the long-term effects of inadequately educating students. Institutions of higher learning have a duty to provide financial counseling to students and assess the need for additional financial management courses and requirements.

LITERATURE REVIEW

Almost 40% of the U.S. population ages 18 to 24 are enrolled in higher education programs. Many financial institutions, such as banks and credit unions, are offering products and services to address the needs and wants of college students. For instance, Wachovia Corporation is offering a free student checking account geared toward "time-crunched and budget-conscious students." The account offers

flexible savings options, a student card that provides credit and cash card options, free online banking with BillPay, overdraft protection, and a covered card, which allows a student to avoid a one-time overdraft fee, overdraft transfer fee, or insufficient funds fee (Wachovia Corporation, 2008). U.S. Bank has entered into partnerships with many colleges and universities to offer student-focused services and goods, such as provision of on- or near-campus offices. U.S. Bank also offers a student identification/ATM card, linked to a U.S. Bank account, permitting students and employees to use a single card as both a school ID card and ATM card (U.S. Bank, 2002).

Bank-issued debit cards have become very popular, especially among time-deprived college students. Visa Corporation reports that debit card purchases make up half of its total transactions. According to Visa Corporation, there are several reasons for the astronomical growth in debit card usage, including time efficiency, convenience and security over cash. Furthermore, storeowners prefer debit cards rather than credit cards due to less credit risk evasion and greater cost reduction (Der Hovanesian, 2003). Reddy (2007) reports a substantial rise in consumer debit card usage to 25.3 billion transactions per year, totaling $1 trillion versus credit card usage of 21.7 billion transactions per year, totaling $2.1 trillion.

While debit card utilization is on the rise, paper checks and cash usage is declining. The issuance of paper checks has decreased by 6.4% annually since 2003 (Reddy, 2007). The increased popularity of debit cards over traditional checks has led to college students paying monthly expenses, such as rent, utility bills, and medical expenses with debit cards in lieu of checks. According to a 2003 study of financial and payment organizations conducted by the Federal Reserve Bank of Cleveland, the number of electronic payments have increased in the United States from equaling check payments in 2003 to representing over two-thirds of America's 93.3 billion non-cash transactions, totaling $75.8 trillion (Der Hovanesian, 2003). Another report by the Federal Reserve Bank of Cleveland states that cash is losing appeal with consumers possibly due to the risk associated with theft. The prediction is that cash's popularity will continue to fall as electronic payments offer even greater expediency and value to consumers (Bauer & Littman, 2007).

Technology has had a tremendous impact on all industries. Virtually every American, particularly college students spend a great deal of time in front of a computer. Therefore, it is not surprising that most students conduct personal business online. One study found that 86% of respondents from ten colleges and universities have performed online banking transactions (Jones, 2002). Anderson (2006) reports that electronic banking has made it convenient for students to accomplish banking functions, such as verifying balances, transferring funds, paying bills and making deposits and withdrawals at anytime. Over one-half of Citibank's checking account consumers report using the firm's online services, according to Anderson, who also found in a 2005 financial knowledge survey that 86% of sample banks focus on the entire population of students. Anderson believes that today's consumers no longer need a traditional relationship with banks. Anderson also concludes that current students are impressed by banks offering services such as one-time overdraft forgiveness (Anderson, 2006).

Credit card usage by college students seems to be decreasing as evidenced by a 7% decline of outstanding balances from 2000 to 2001 (Austin and Phillips, 2001). However, the reduction in credit card usage by college students may be partly attributable to legislation in several states restricting student solicitation by credit card companies on campus. Companies have an obligation to offer financial management education to students regarding credit card utilization rate, quantity of credit cards held, and payment information (Austin & Phillips, 2001).

For many, entering college or a university is a life-evolving transition from childhood into adulthood. According to Howe (2001), college is often the first taste of freedom a young adult has, making it is easy for students to become financially overextended. Howe divides college expenses into three types: tuition and college charges, housing and school meals and miscellaneous costs. Of the three types,

miscellaneous costs are the most difficult to control because they are the most challenging to approximate and include a wide array of items (Howe, 2001). In addition, Preston, states that most university students in the United States graduate with an average student loan payback of $19,000, a 58% rise from a decade ago (Preston, 2008). Increased efforts to educate college students about the true cost of debt could reduce the misuse of credit.

Financial institutions have an obligation to prepare students for the world of finance. Williams (2006) reports that in 2006, only eight states had a personal finance course requirement for college students, and only 50% of high school students completed an economics class that taught basic concepts of financial management. Faculty, administrative executives, and school board members of all universities, colleges and high schools must realize the importance of teaching good financial management practices to current students because their financial management conduct will affect future economic conditions for everyone.

There is a wealth of financial-related information readily available for college students. Nexity Bank offers internet banking advantages and tips to students and parents on its web site. One such tip is that students obtain an online checking account with parent accessibility, which would allow parents to periodically check and deposit money into the account. The firm advises students and parents to request overdraft protection, to select a bank that permits electronic bill pay in order to take advantage of time- and money-savings, and to choose a bank with several ATM locations for quick cash needs and one that refunds ATM fees (Nexity Bank, 2000). Suggestions to students and parents include taking measures such as investing in a credit union rather than a banking institution, indulging only after depositing into a savings account, storing receipts, and learning and applying investment skills. Other recommendations to students include joining university-sponsored activities rather than off-campus activities, avoiding road trips or attending group-only events, and beginning an entrepreneurial venture while in college (J. D. Roth, 2006).

OBJECTIVES

The primary objective of this study was to determine the personal financial management habits and skills of college students. There were several secondary research objectives regarding students' choices of banking institution, as well as debit card, automatic bill pay, automatic withdrawal and credit card usage. In addition, the study sought to discover college students' patterns concerning checking and savings accounts, bill payments, checking credit scores and use of a monthly budget. Finally, study objectives included determining the primary source of financial management knowledge and deriving a subjective rating of personal financial management skills.

METHODOLOGY

This research study began on January 22, 2008 and concluded on March 12, 2008. A twenty-three question questionnaire relating to personal financial management practices and opinions of college students was developed, pre-tested twice, and changed to ensure validity of questions and responses. The questionnaire also included a section for demographic information. Students completed questionnaires during the first two weeks of February 2008. The research study used the non-probability convenience sampling method. See Table 1 for demographic information.

The sample population consisted of 300 students and was representative of the southeast Louisiana university's student demographics including: 47.65% of students are between the ages of eighteen and twenty, 63% of students are female, 84% of students are single, most students report household income of $20,000 or less annually. Representation of students from individual colleges within the university was representative of college enrollment with the exception of the College of Business, which had representation double that of enrollment.

Table 1: Demographics

Age	Percentage	Gender	Percentage
18-20	47.65%	Male	36.79
21-23	34.56%	Female	63.21
24-29	11.07%	**Marital Status**	
30-39	3.69%	Single	83.62
40+	3.02%	Married or Living with a Significant Other	16.38
Annual Household Income		**College**	
No Income	7.33%	Arts, Humanities, and Social Sciences	15.65%
≤ $10,000	42%	Business	26.87%
$10,001-$20,000	22%	Education and Human Development	16.33%
$20,001-$30,000	10.67%	Nursing and Health Sciences	15.65%
$30,001-$40,000	3%	Science and Technology	11.56%
> $40,000	4.33%	General Studies	8.5%
No Response	10.67%	Graduate School	5.44%

Demographics of the student respondents including age, gender, relationship status, annual household income, and college within the university. All demographics were representative of the study university's population with the exception of high participation from within the College of Business.

Survey participants selected the top three reasons for choosing their present banking institution. Students also reported the frequency of bank-issued debit card usage, the rate and mode of validating checking account balance, and the occurrence of checking account reconciliation. Respondents reported monthly issuance of paper checks, use of automatic bill pay and direct withdrawal systems, bill paying habits, and credit card usage. Surveyed students also reported individual learning sources of financial management skills, presence or absence of a written monthly budget, frequency of obtaining credit ratings, and subjective opinions of their personal financial management skills.

The data was encoded and analyzed using SPSS analysis software. Comparisons were made between findings obtained from this study and those of five similar studies: the 2000 TERI/IHEP, Student Monitor, and Nellie Mae studies reported by the United States General Accounting Office in 2001, a 2006 University of Minnesota finance study, and a 2006 Louisiana State University/University of Georgia financial literacy study.

FINDINGS

According to results from this research study, college students' top three reasons for choosing a banking institution are: free checking services at 62.75%, number and location of branches and automated teller machines at 49.33%, and use of the same bank as parents at 48.66%. The least important reason for bank selection, according to this survey, was credit union membership. Of 300 respondents, 290 students reported that becoming a member of a credit union was not a deciding factor in choosing a banking institution. When survey participants chose the "Other" option, the most common reasons stated for choosing a banking institution included requirements or banks not offering accounts to non-resident students. Listed in Table 2 is the statistical data regarding the main reason students choose their current banking institution (see Table 2).

Study results concerning amount of monthly savings showed little relation to income. Of the nearly one-third of the sample population who responded to how much they save each month, 30.56% reported saving no money. In comparison, the University of Minnesota financial literacy study of 532 college students revealed that 73% of those surveyed reported depositing to a savings account regularly (Adams, 2006). It was found in the Southeastern Louisiana University study that more than 50% of students who

do save, reported saving more than $100 each month and the remaining percentage reported saving between $20 and $100 each month. One cross-tabulation shows statistical data regarding college students who do save in relation to department of enrollment: College of Business, 53.49%; College of Science and Technology, 60%; General Studies, 52.95%; and Graduate School, 70%. Organizations that offer financial services and products should consider additional savings promotions to reach the 31% who are not currently saving and to increase the monetary savings amount of those who already do so.

Table 2: Reasons for Choosing Current Banking Institutions

Reason	Percentage	Reason	Percentage
Free Checking	62.75%	Gift for Opening Account	13.76%
Bank and/or ATM Locations	49.33%	Availability of Deposited Funds	9.4%
Bank Parents Use	48.66%	Researched Several Banks and Felt This Bank Could Best Serve All of My Needs	8.05%
Parents Set-Up Account for Me at This Bank	29.87%	Other	6.38%
Recommendation of Friends or Family (other than parents)	21.48%	Employer Offered Direct Deposit of Pay Through This Bank Only	5.03%
Services Offered	15.10%	Through Employment or Other Relationship, Became Eligible for Credit Union Membership	3.36%

Table shows respondents top three reasons why they choose their current banking institution. Results revealed that the most common reasons for choosing individual institutions were not related to the institution's ability to serve their financial management needs.

Financial advisors recommend budgeting and consistent account reconciliation, however 35% of surveyed students admit to having no written monthly budget and not reconciling their checking account balance. Adams (2006) found in her study that 41% of college students have a monthly budget to guide them in financial management decisions, and graduate students are more likely to adhere to a budgeting plan than are undergraduate students. Interestingly, Adams found that 37% of respondents admitted to exceeding their set budgets (2006). Less than 9% of students in the Southeastern Louisiana University study who have a budget do not reconcile their bank statement, while 17.5% of those with a budget reconcile their account once monthly. Twenty-nine out of 300 respondents never reconcile or obtain checkbook balance from their bank's web site. In the Adams study, 78% of those surveyed verified account balances online; in contrast, 76% of participants in this study reported using the bank web site to confirm account balances (Adams, 2006). Almost 45% of those who use their debit cards more than once a week never reconcile their checking account balance. Sixty-four of 300 respondents write between one and five checks monthly, but do not reconcile their checking account.

Regarding debit card usage, 74.6% of survey respondents use debit cards more than once weekly, 34.5% use the cards 2 to 6 times per week, 14.7% use debit cards once a day, and 25.4% use them more than once daily. Of debit card users, 43% never reconcile their checking account, while 42.75% balance their checking account a minimum of once a month. Students who use their debit cards more than once weekly are less likely to check account balances by website, phone, ATM, or in-branch than those who use their debit cards less than once weekly. Of those who use their debit cards more than once per week, 31.39% issue no paper checks each month and 60.5% issue one to five checks each month. Of respondents reporting debit card usage of less than once a week, 22% reported writing no checks each month and 61% reported writing one to five checks each month.

A surprising finding was that 34.6% of respondents do not own a credit card. The majority of those surveyed across all age groups and all colleges possess no more than one credit card. Only 30% of students 22 years of age and 36% of students 21 years of age have two or more credit cards. Nursing

students comprise the largest group of cardholders at 69%. Two outlier respondents reported having six or more credit cards. Almost 51% of credit card holders in this study reported never checking their credit score, but there appears to be a positive correlation between the number of credit cards held and frequency of checking credit score among those who do check their credit scores. According to two studies reported by the United States General Accounting Office, over 60% of college students are credit card holders, and 50% of respondents obtain a credit card during their first year in college. These studies report that only 6% to 13% of college students hold four or more credit cards, while 67% hold only one card
(2001). The same resource cites a 2001 Nellie Mae study of 256 undergraduate private loan applicants, which found that 78% of respondents were cardholders, and while the mean cards per student was three, 32% held four or more credit cards (United States General Accounting Office, 2001).

The payment of bills on time or early is an important part of financial management, and according to findings, 71% of respondents in this study pay bills on time and do not use credit cards to pay other bills. In fact, 35% of surveyed credit card holders reported paying bills before they are due. Only 9% of respondents pay one or more of their bills late each month; 55% of these claimed an annual income of less than $20,000. The use of automatic bill pay and automatic withdrawal systems do not appear to have a significant effect on the percentage of students paying bills on time. Of those surveyed, 73.5% do not use automatic bill pay, 72% do not use direct account withdrawal to pay bills, while 11% reported using both services.

Cude, et al (2006) found that students are not likely to write NSF checks and usually pay bills in a timely manner, but are less apt to save, budget and balance checking accounts. The Cude study also showed that the family effect on financial management skills is significant; students learn primarily by example, and students appreciate college-disseminated information about financial matters (2006).

MAJOR FINDINGS

An investigation of the cross-tabulation concerning students' learning source of financial management skills and success was conducted to determine whether a correlation exists. In the Cude, et al (2006), 70% of respondents reported both mother and father as the most important factors affecting financial management conduct. A large percent of surveyed students in the Cude, et.al study reported learning financial management skills from a parent or other relative, whereas a smaller percentile learned finance skills from a friend, significant other, teacher, self and church (2006).

Similarly, students reported parents as the most common means of acquiring financial management skills in this study by 65%, while 23% of students reported learning the skills on their own. Of students who learn from parents: 28% reported saving no money on a monthly basis, 63% possess one or more credit cards, 72% never check credit score, and 75% have no written budget (Table 3). On a positive note, the same group reported bill payment on time or early by 88% and reconciliation of checking account at least once monthly by 43%. Among self-learned students, 33% do not save monthly, 45% do not check credit score, 80% do not have a budget, 75% have one or more credit cards, whereas 90% pay bills on time or early and are almost as likely to never reconcile their checking account as they are to reconcile it once or more monthly.

Survey participants were asked to rate their personal financial management performance. Forty percent of respondents rated their financial management performance as "well," and 54% responded with a rating of "okay". Among those who rated their performance as "well" or "okay," it was found that 31.15% have two or more credit cards and 20.79% use credit cards to pay one or more bills monthly. Furthermore, 28.51% do not save monthly; 33.62% save $100 or less each month; 61.07% never check credit score; and 41.97% do not reconcile checking accounts (Table 3)

Table 3: Study Findings

Variable	Learned Financial Management Habits from Parents	Felt They Managed Their Personal Finances Well or Okay
Number of Credit Cards		
0	36.09%	34.06%
1	36.69%	34.78%
2	17.75%	19.20%
3	7.10%	7.61%
4	1.18%	1.81%
5	0.59%	1.81%
6 or More	0.59%	0.72%
Average Savings Each Month		
0	26.28%	28.51%
≤ $100	38.36%	33.62%
$101-$250	15.75%	17.87%
$251-$500	9.59%	13.19%
$501-$750	2.05%	2.55%
$751-$1,000	3.42%	2.98%
≥ $1,000	2.74%	2.13%
Number of Bills Paid Each Month Using a Credit Card (not debit card)		
0	82.46%	79.21%
1	11.11%	10.04%
2-3	4.68%	6.81%
4 or More	1.75%	3.94%
Frequency of Checking Credit Report / Credit Score		
Never	72.09%	61.07%
Less Once a Year	12.79%	17.86%
Once a Year	15.12%	21.07%
Frequency of Balancing (Reconciling) Checkbook / Checking Account		
Never	41.52%	41.97%
Once a Year	1.75%	1.46%
A Few Times a Year	5.85%	6.20%
Every Two Months	7.60%	6.93%
Every Month	29.24%	26.64%
More Than Once a Month	14.04%	16.79%
Presence of a Written Monthly Budget		
Yes	25.15%	27.24%
No	74.85%	72.76%

Major findings regarding financial management habits based upon parents as source of financial management skills and respondents' perceptions of their individual financial management.

DISCUSSION AND RECOMMENDATIONS

Results of this study indicate that college students have inadequate personal financial skills. While many feel they are managing their finances well or okay and appear to be aware of the risks associated with credit card usage, the documented practices of many students suggest otherwise. Failing to reconcile accounts, payment of bills with credit cards and neglecting to construct a budget shows that students are remiss, not considering the problems this behavior could cause in the future.

Students are often choosing banking institutions without carefully considering how the institution could best serve their individual financial management needs. The allure of free checking, convenience of branch locations, or using the bank their parents use has replaced sound financial reasoning. This, combined with failure to reconcile checking accounts, minimal use of resources to check account balances, and refusal of automatic bill paying systems, suggests that while students have greater accessibility to information through their banking institutions, they are less likely than previous generations to use it to manage their finances.

Today's students are more likely to perform transactions with debit cards rather than traditional paper checks and the countless credit cards held by past students; however, some students still rely on credit

cards to pay bills that they unable to pay on time with checks. In addition, most students are not budgeting and not checking credit scores as often as they should. Students seem to lack a full understanding of how this misconduct could adversely affect their long-term financial success.

One interesting finding of this study is that the way in which the people of past generations manage finances strongly influences the way people of future generations behave. As a result, a new generation of students will be entering the 'real-world' with less than optimal financial management skills and a false sense of how well they are performing financially. Consistent saving, reconciling accounts, monitoring account balances, developing a written monthly budget, and routine checking of credit scores are all financial management practices that students should consider important and should be applying before entrance into a college or university. Unfortunately, most college students surveyed in this study who feel they are managing their finances well or okay are not performing these functions. Furthermore, many of these study participants have two or more credit cards and use credit cards to pay monthly bills. It is apparent that students who learn financial management skills from their parents or through life experience are not practicing them in a sensible way on their own and need formal education and guidance regarding these important financial management concepts.

CONCLUSION

This study had some limitations; the main limitation is that it occurred at one university during one week of the spring 2008 semester. In addition, it would have been preferable to use the probability random sampling method rather than the non-probability convenience sampling method. There were comparisons made between findings of this study and five similar studies, but this study was limited to college students attending one regional university located in the southern United States. However, the purpose of this study is to provide a deeper understanding of the financial management habits of young Americans and to encourage other related studies.

In summary, this study suggests a lack of proper education regarding strong personal financial management skills. Without greater effort to educate students before college entry and reinforcement of financial management skills during college, society may have to deal with a generation of Americans who will financially overextend themselves, resulting in further bankruptcies and mortgage foreclosures. Results from this study suggest that parents are not fulfilling the duty of properly teaching their children these essential skills, perhaps because of parents' inability to correctly manage their own personal finances or because personal finance discussions do not occur in some households.

Educators should emphasize to students the importance of developing good financial management skills. In today's high school classrooms, students should be learning basic financial management skills. Additionally, all colleges and universities should require students to complete basic personal financial management courses before graduation. A basic understanding of credit, investing, budgeting and development of long-term financial goals will prepare students and help them to live without the stress of debt and financial instability suffered by so many.

All companies within the financial industry should improve methods of relaying customer information regarding the financial management practices necessary to achieve financial stability. Web-based information, courses, pamphlets, or assistance lines are good communication channels for financial firms to use in providing consumers with useful financial management tools, before they default. This, in turn, will build customer loyalty. Financial institutions must realize that failure to educate their customers will result in long-term organizational losses similar to those associated with the current home mortgage crisis.

APPENDIX

Appendix 1: Student Financial Management Survey

**** Please check the box next to your choice of answer for each question or fill in the blank.****

1. Please check the top 3 reasons why you chose your banking institution:

- □ The bank offered free checking.
- □ The bank offered a free gift for opening an account.
- □ It is the bank my parent(s) use.
- □ My parent(s) set-up an account for me at this bank.
- □ Based on the recommendation of friends and family (other than parents).
- □ I researched several banks and felt that this particular institution could best serve all of my needs.
- □ My employer offered direct deposit of my pay through this bank only.
- □ Through employment or other relationship, I could become a member of a credit union.
- □ Bank and/or ATM locations.
- □ Availability of deposited funds.
- □ Services offered.
- □ Other _____

2. How often do you use the debit card issued by your bank? (Instead of cash, check, or credit card)

□ Never □ Less than once a week □ Once a week
□ 2-6 times a week □ Once a day □ More than once a day

3. How many times a month do you obtain your checking account balance using the bank's website? _____

4. How many times a month do you obtain your checking account balance using an ATM? _____

5. How many times a month do you obtain your checking account balance using the bank's phone system? _____

6. How many times a month do you obtain your checking account balance through the bank's lobby or drive-thru?
-------- --

7. How often do you balance (reconcile) your checkbook/checking account?

□ Never □ Once a year □ A few times a year
□ Every two months □ Every month □ More than once a month

8. How many paper checks do you use each month?

□ 0 □ 1-5 □ 6-10 □ 11 or more

9. Do you use an automatic bill paying system offered by your bank through their website?

□ Yes □ No

10. Do you use direct withdrawal by a business from your checking account to pay any of your bills?
(Arranged through the business, not your bank.)

□ Yes □ No

11. When paying your bills:

- □ I usually pay more than one bill per month late.
- □ I usually pay one bill per month late.
- □ I usually pay my bills on time.
- □ I usually pay my bills before they are due.

12. How often do you use a credit card (not attached to your checking account) to pay a bill?

□ Never □ About one bill each month
□ 2-3 bills each month □ 4 or more bills each month

13. How many credit card accounts do you currently have?
(With or without an available balance.)

□ 0 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 or more

14. Where (or from whom) did you learn your financial management skills?
Please check the 1 that provided the most guidance that you in your day-to-day financial management.

- □ Parents
- □ Other family or friends
- □ High school course
- □ College course
- □ Presentation by a financial institution
- □ Church or other faith based organization
- □ Celebrity financial advisor (Suze Orman, Dave Ramsey, etc)
- □ I've figured it out on my own.
- □ Other _____

15. Do you have a written monthly budget?
□ Yes □ No

16. How often do you check your credit report or credit score?
□ Never □ Less than once a year □ Once a year

17. I feel that I manage my personal finances:
□ Well □ Okay □ Poorly

18. What is your average monthly income?
Your own personal income.
Joint income if married or living with significant other.
Include money given or loaned to you by the government, financial aid, parents, etc.
$_____

19. Which of the following best describes your relationship status?
□ Single □ Married or living with significant other

20. How much money do you save each month?
$_____

21. What College are you in?

- □ The College of Arts, Humanities and Social Sciences
- □ The College of Business
- □ The College of Education and Human Development
- □ The College of Nursing and Health Sciences
- □ The College of Science and Technology
- □ The Division of General Studies
- □ The Graduate School

22. What is your age? _____

23. Gender: □ Male □ Female

** When you have completed the survey, please return it to the student who gave it to you.**

Thank you for your time.

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INFORMATION SPILLOVERS IN THE SPOT AND ETF INDICES IN TAIWAN

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ABSTRACT

This paper empirically explores the impact of the spot index on the exchange trade fund (ETF) indices in Taiwan, with the vector autoregressive (VAR) model revealing positive relationships between the six time-series variables. Our results indicate that the ETF 52 index has the greatest volatility as well as the most negative returns, whilst also suggesting the existence of at least five cointegrating vectors among the variables; thus, through the concept of cointegration, we demonstrate that vectors will not arbitrarily wander far from each other in long-run relationships. We also examine Granger (1980) causality in the relationships between the variables and find that the guiding relationship exists within the spot index, with stronger indications of the spot index leading the ETF indices. Among the six time-series variables, depending on the decomposition of the forecast residual variance, the spot index is the least affected by external forces. Furthermore, the spot index is affected mainly by its own shocks, and less so by those of the other time-series variables. Although the spot index variance decomposition can identify all but its own excess shocks, none of the indices can consistently trace out the effects of one-unit impulses.

JEL: G11, G13, G14

INTRODUCTION

There are many theories on financial trading throughout the world, with evidence having already been presented of linkages across financial markets, particularly with regard to the capital markets of the more developed economies. The disappearance of international investment barriers which has occurred over recent decades, combined with globalization (and its effects on further liberalization), have led to continuing progress in international financing, which has in turn accelerated the correlations between economic activity and international financing.

The significant expansion in derivative securities facilitates the more effective administration by investors of their individual stock market positions. In the context of capital markets, extensive efforts have been undertaken to develop new index products within the equity markets, whilst within the stock exchange indices, the primary role of ETF derivatives involves the measurement of the trend in the securities dependent upon financial records. The Dow Jones Industrial Average (DJIA) is the most significantly quoted and traded stock index, with the index information provided by the index being widely reported in the global media; therefore, following the emergence of ETFs and subsequent trading in them, the DJIA may well be the easiest stock index to track. The first ETF, the Standard & Poor's Depositary Receipts (SPDR) 500 fund, began trading in January 1993; however, up until the present day, the Nasdaq 100 Trust (QQQ) fund has remained the most active of all the global markets, in terms of overall trading volume.

In April 2002, the Taiwan Stock Exchange Corporation (TSEC) introduced the first Taiwanese ETF, the Taiwan Top 50 Tracker Fund, which is calculated using the trading prices of the largest 50 listed companies by market value. According to Morgan Stanley research on the global ETF market, the assets of ETF have grown from $0.13 billion USD in December 2003 to $1.89 billion USD in December 2006, and the Taiwan market is the 7th largest ETF market in terms of total assets at the end of December 2006.

This study uses the vector autoregression approach to reexamine the existing evidence on the spot and ETF indices. Our study differs from many of the prior studies in that it analyses the causal impact of the spot index on the ETF indices in Taiwan by taking into consideration the dynamic data relationship. The presence of these indices in Taiwan represents the product of a joint venture between the Taiwan Stock

Exchange Corporation (TSEC) and the FTSE Group; the FTSE indices are widely used for trading in an extremely diverse range of index-linked funds and structured products across 58 different countries.

We also undertake further investigation into the role of the lead/lag relationship between the spot index and the five different stock indices currently making up the Taiwan Stock Exchange (TSE). The rationale for this investigation is the need to gain a better understanding of the characteristics of various trading strategies and to explain the spillover effects arising from the disclosure of information. The TSEC/FTSE partnership collectively guides both local market sophistication and international indexing capabilities which provide investors with the tools to achieve purposeful direction within the Taiwanese market.

For reasons of simplicity, it is typical for time-series data to be examined with the following three objectives in mind: (i) an attempt to determine which of the index contracts maintains the lead/lag position; (ii) an examination of whether related/assured feedback trading exists amongst ETF traders; and (iii) an investigation into the entire effects arising from the disclosure of information between the index returns in Taiwan and the ultimate effects on the trading behavior of ETF investors.

The remainder of this paper is organized as follows. The literature review is discussed in section 2. The next section describes the data and the methodology adopted for this study. Section 4 presents and explains the empirical results, followed in Section 5 by presentation of the conclusions drawn from this study.

LITERATURE REVIEW

Based upon significant research undertaken into the long-run co-movements of stock prices in the international stock markets, Taylor and Tonks (1989) provide strong evidence of cointegration, demonstrating the presence of cointegrational relationships between stock prices in the markets of the Netherlands, Germany, the UK and Japan; although not the US. Furthermore, from their observations of nine major stock markets (Australia, Germany, Hong Kong, Japan, Singapore, South Korea, Taiwan, the UK and the US), Kwan et al. (1995) also present evidence to show that these markets are not 'weak form efficient', given that significant lead/lag relationships are discernible between them. It has, however, been inferred by both Chan et al. (1992) and Hung and Cheung (1995) that cointegration is not discernible for these Asian markets, with specific reference to their equity markets.

It is suggested, in particular by Ghosh et al. (1999), that some Asian stock markets have a long-run equilibrium relationship, whilst others do not. Furthermore, until quite recently, Wong et al. (2004) pursued quite strong arguments on the issue of co-movements between stock markets in the major developed economies (i.e., those of the US, the UK and Japan) along with the concept of cointegration in the emerging markets of Asia (Malaysia, Thailand, South Korea, Taiwan, Singapore and Hong Kong). Wong et al. (2004) point to the existence of a co-movement relationship between Singapore, Taiwan and Japan and between the UK, the US and Hong Kong; however, they could find no long-run cointegrational relationships between the emerging markets of South Korea, Malaysia and Thailand and the developed markets of the Japan, the UK and the US.

Other research over recent decades points to the existence of certain correlations with the financial markets (for example, Edwards, 1988; Harris, 1989; and Antoniou and Holmes, 1995). In more specific terms, Tse (1999) undertakes an examination of the price discovery process and the transference of volatility between the spot index and DJIA futures markets through the evaluation of an exponential GARCH model in the Chicago Board of Trade (CBOT); Tse subsequently went on to present evidence of the existence of bi-directional feedback, noting that price discovery occurs first of all in the futures market.

The dynamic relationship which exists between the spot and futures markets of the Dow Jones Industrial Average (DJIA) is demonstrated by Gokce and Petrie (2002) using a vector autoregressive (VAR) model. Their results provide evidence of two-way causality; nevertheless, the impact on futures return volatility from a single unit increase in spot returns is found to be inferior to the impact on the spot return volatility

from a single unit increase in futures returns. They also note, however, that increased movement in spot trading leads to a reduction in overall volatility levels in both spot and futures returns. Intraday price formation in the US equity index markets is examined by Hasbrouck (2003) using a vector error correction model (VECM) to demonstrate that small denomination futures contracts (i.e., electronically traded mini futures) provide price discovery across the S&P500 and Nasdaq-100 indices. Furthermore, such findings indicate that price discovery is shared between the ETF and regular futures contracts in the S&P400 Mid Cap index.

The analysis of Tse, Bandyopadhyay and Shen (2006) reveals discernible intraday price discovery, both in the DJIA index markets and in its three derivatives, DIAMOND exchange-traded funds (ETFs), regular floor-traded futures and electronically-traded mini (E-mini) futures. Tse et al. (2006) adopt the vector error correction model (VECM) to identify the actual data-generation process, with their results indicating that E-mini futures provide the greatest contribution to price discovery, followed by DIAMOND ETFs, with the DJIA index itself and the regular floor-traded futures providing only a minimum contribution to price discovery. Thus, there is an apparent correlation between market integration and asset pricing.

DATA PROCESSING AND METHODOLOGY

We explore the stock and ETF indices of the TSE; the base period is the inauguration of the stock index in 1966, with the subsequent formation of the TSEC indices following the order of: (i) the launch of the TSEC Taiwan 50 (ETF 50) index on 30 April 2002; (ii) the launch of the TSEC Taiwan Mid-Cap 100 (ETF 51) index and the TSEC Taiwan Technology (ETF 52) index on 30 June 2003; and (iii) the launch of the TSEC Taiwan Dividend-plus (ETF 56) index and the Taiwan 8 industries (ETF 58) index on 31 July 2006. The intraday sample period runs from 15 January 2007 to 15 July 2008 with the five-minute data subsequently being rerun from the local databank of the Taiwan Economic Journal (TEJ). A total of 19,710 five-minute observations are examined in this study in an attempt to explore the information spillover effects between the various indices.

Vector autoregression (VAR) methodology is adopted in this study, using high-frequency time-series data to identify the level of information spillovers between the stock index and the ETF indices. The return for interval *t* on day *i* is:

$$R_{i,t} = \ln(I_{i,t} / I_{i,t-1}) \tag{1}$$

where *R* is the last index return/change for the stock index, the Taiwan 50 index, the Taiwan Mid-Cap 100 index, the Taiwan Technology index, the Taiwan Dividend-plus index and the Taiwan 8 industries index.

Prior to running the tests for cointegration and causality, we should point out that all of the variables concerned are stationary; thus, considering the stationary nature of the individual variables, the first determinate test will be the unit root test. Dickey and Fuller (1979) describe the situation under the following three equations:

$$\Delta Y_t = a_0 + \beta Y_{t-1} + a_2 t + \varepsilon_t \tag{2}$$

$$\Delta Y_t = a_0 + \beta Y_{t-1} + \varepsilon_t \tag{3}$$

$$\Delta Y_t = \beta Y_{t-1} + \varepsilon_t \tag{4}$$

The discrepancy between the three linear regressions affects the existence of the deterministic elements α_0 and $\alpha_0 t$. The first regression includes both a drift (α_0) and a linear time trend ($\alpha_2 t$), the second reduces the

deterministic element and the third is a pure random walk model. The coefficient of interest is β. If $\beta = 0$, then the equation has a unit root; that is, the variables are non-stationary, which means that they will differ under diverse situations.

The lag length of the test equations is determined by the Schwartz Bayesian Criterion (SBC), where the error term is a 'white-noise' process. According to the information criterion, the SBC model is superior to models with large sample characteristics; this criterion is therefore adopted in this study. The cointegration of the variables is then examined to determine whether those variables which are individually non-stationary will subsequently become stationary when associated with the linear regression models.

One of the fundamental properties of the cointegrated variables is that their time paths are affected by the magnitude of any deviations from long-run equilibrium. If the equilibrium is meaningful, then there must be an indication that the equilibrium error item is stationary; this could refer to any long-run relationship between the stationary and non-stationary variables.

Following the Johnansen (1988) approach, the results of the maximum likelihood estimation indicate the total number of cointegrated vectors, with the numbers of the test characteristic roots of the estimated variables being given by the trace and maximum eigenvalues statistics. Our main area of interest in this study is in the hypothesis of no cointegration between the variables ($\gamma = 0$) vis-à-vis the alternative hypothesis of one or more cointegrated vectors ($\gamma > 0$). Thus we have Equations (5) and (6):

$$\lambda_{trace}(\gamma) = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \tag{5}$$

$$\lambda_{\max}(\gamma, \gamma+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \tag{6}$$

where $\hat{\lambda}_i$ are the estimated eigenvalues and T refers to the total number of available observations.

Causality, as shown by Granger (1980), refers only to the effects of the past value of the dependent variable on the current value of the independent variables. In other words, Granger causality actually measures whether the current and past values of the dependent variables are of any assistance in forecasting the future values of the independent variables. We consider the following equation models:

$$x_t = a_0 + a_1 x_{t-1} + ... + a_n x_{t-1} + \beta_1 y_{t-1} + \beta_2 y_{t-2} + .. + \beta_n y_{t-n} + \varepsilon_t \tag{7}$$

$$y_t = a_0 + a_1 y_{t-1} + ... + a_n y_{t-1} + \beta_1 x_{t-1} + \beta_2 x_{t-2} + .. + \beta_n x_{t-n} + \mu_t . \tag{8}$$

The null hypothesis is that y does not Granger cause x in Equation (7), and that x does not Granger cause y in Equation (8). Finally, when there is no convincing evidence from the time-series data that a variable is actually exogenous, each variable can be considered symmetrically under 'natural expansion of transfer function' analysis; in other words, it is of no consequence that one of the variables is dependent whilst the others are independent. Sims (1980) notes that the primary aim of VAR analysis is to determine the interrelationship between the variables, and not to ascertain the parameter estimation. Furthermore, the multivariate generalization of an autoregressive process is:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + ... + \beta_p Y_{t-p} + e_t , \tag{9}$$

where $Y_t = an(n,1)$ is the vector containing each of the n variables; $\beta_0 = an(n,1)$ is the vector of the intercept terms; $\beta_i = (n, n)$ are the matrices of the coefficients; and $e_t = an(n,1)$ is the vector of the error terms.

EMPIRICAL RESULTS

The descriptive statistics of the spot and ETF indices, dependent upon the time-series variable measures, are presented in Table 1, with all of the descriptions provided within the table referring to the variable specifications. Each of the time-series variables has platykurtic distribution with positive skewness, with the one exception of the ETF 58 index. Although the standard deviation of the variables is quite substantial for the ETF 51 index, there is a much smaller standard deviation for the ETF 50 index. Furthermore, as evidenced by the Jarque-Bera normality test, none of the six time-series variables have normal distribution.

Table 1: Descriptive Statistics of the Six Time-series Variables for the Spot and ETF Indices

	Spot Index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
Mean	8464.054	6071.397	8541.978	7963.262	6713.645	6924.518
Median	8433.180	6057.520	8416.175	7851.200	6759.510	7019.175
Maximum	9851.590	7086.700	10496.44	9572.920	7991.070	8296.630
Minimum	6834.240	4878.260	6553.900	6126.640	5480.550	5733.600
Std. Dev.	630.1139	410.6779	754.9518	708.6602	519.1793	607.2309
Skewness	0.148807	0.148580	0.133094	0.136220	0.115905	-0.048095
Kurtosis	2.237010	2.557973	2.704490	2.488966	2.376991	2.075479
Jarque-Bera	550.8352	232.9823	129.9074	275.4302	362.8908	709.5528
P-value	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**
No. of Obs.	19,710	19,710	19,710	19,710	19,710	19,710

*This table presents details of the appropriate values between the spot and ETF indices. ** indicates significance at the 1% level.*

The correlation matrix of the spot and ETF indices is presented in Table 2, which shows that the relationship is better between the spot and ETF 50 indices, which are also positively correlated in the time-series variables.

Table 2: Correlation Matrix for the Spot and ETF Indices

	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
Spot index	1.000000	–	–	–	–	–
ETF 50	0.986173	1.000000	–	–	–	–
ETF 51	0.945368	0.915268	1.000000	–	–	–
ETF 52	0.856066	0.871955	0.926732	1.000000	–	–
ETF 56	0.952658	0.936302	0.861829	0.757126	1.000000	–
ETF 58	0.861954	0.849881	0.682949	0.528341	0.934201	1.000000

This table presents the correlation matrix describing the relationships between the spot and ETF indices.

Table 3 presents the results of the descriptive statistics for the variation in the changes/returns. It is clear from this table that each of the average returns has a negative position; in other words, the financial market does not represent a good situation. Furthermore, when comparing volatility and returns, it is also clear that the ETF 52 index still has the greatest volatility and negative financial returns. Both the ETF 52 and ETF 56 indices have positive skewness, whereas this is negative in all of the other variables.

Table 3: Descriptive Statistics of Changes/Returns for the Six Time-series Variables in the Spot and ETF Indices

	Spot index	**ETF 50**	**ETF 51**	**ETF 52**	**ETF 56**	**ETF 58**
Mean	-0.000294	-0.000356	-0.000471	-0.000535	-0.000162	-4.82E-05
Median	-0.000203	-0.000298	-0.000000	-0.000310	-0.000115	0.000133
Maximum	2.357228	2.255341	2.287601	2.746763	2.064519	1.874421
Minimum	-2.316735	-2.496755	-2.599057	-2.278043	-2.031064	-2.316454
Std. Dev.	0.085418	0.101347	0.103556	0.116695	0.095906	0.091554
Skewness	-1.836502	-0.648120	-1.764487	0.089452	0.332635	-1.020657
Kurtosis	134.2787	101.5608	112.5587	96.34095	97.61094	100.7007
Jarque-Bera	14163863	7978787	9867283	7154831	7351188	7842211
P-value	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**	0.0000**

This table provides details of the appropriate values of the changes/returns of the spot index and ETF indices.
*** indicates significance at the 1% level.*

Leptokurtic distribution is demonstrated by each of the six time-series variables, whilst the Jarque-Bera tests for normality clearly indicate that the variables do not have normal distribution. Furthermore, as shown in Table 4, although positive correlations are revealed between each of the six time-series variables, the correlations between the spot index and each of the ETF indices are much more significant. Thus, market investors could simultaneously respond to a general shock which would cause them to shift their position in a positive direction, thereby rejecting normality at the 1 per cent level for all of the variables.

Table 4: Correlation Matrix of Changes/Returns for the Six Time-series Variables in the Spot and ETF Indices

	Spot index	**ETF 50**	**ETF 51**	**ETF 52**	**ETF 56**	**ETF 58**
Spot	1.000000	–	–	–	–	–
ETF 50	0.868688	1.000000	–	–	–	–
ETF 51	0.832858	0.751863	1.000000	–	–	–
ETF 52	0.799025	0.865714	0.782757	1.000000	–	–
ETF 56	0.769487	0.842331	0.717623	0.744093	1.000000	–
ETF 58	0.861861	0.851793	0.784121	0.736118	0.843863	1.000000

This table presents the correlation matrix of the relationships between the changes/returns of the spot and ETF indices.

The results of the unit root test are presented in Table 5, with Table 6 also presenting the results obtained under appropriate distancing. As Table 5 shows, we cannot reject the null hypothesis in this study of source variables.

Table 5: Unit Root Test Results for the Six Time-series Variables

	Spot index	**ETF 50**	**ETF 51**	**ETF 52**	**ETF 56**	**ETF 58**
ADF statistic	-0.498480	-0.571837	-0.660943	-0.750448	-0.324169	-0.188062
PP statistic	-0.492496	-0.566558	-0.647167	-0.740357	-0.327602	-0.197665
Lag length	2	2	3	2	2	2

This table presents the results of the unit root test on the six time-series variables. The null hypothesis is (H_0): $\beta = 0$; the alternative hypothesis is (H_1): $\beta < 1$.

By appropriate differencing (Table 6), the data-generating process is also found to be non-stationary, whilst further demonstrating strategy adoption. Clearly, it is a simple matter to explain that the six time-series variables are all stationary and that they reject the null hypothesis; such a procedure is integrated in the order of 1, and is described by I(1).

Table 6: Unit Root Test Results for the Six Time-series Variables, by Appropriate Differencing

	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
ADF statistic	-102.8860**	-108.6910**	-86.71183**	-89.18715**	-108.6621**	-106.330**6
PP statistic	-132.4686**	-152.4152**	-141.8740**	-157.9868**	-157.1629**	-149.7439**
Lag length	1	1	2	2	1	1

*The null hypothesis is (H_0): $\beta = 0$; the alternative hypothesis is (H_1): $\beta < 1$. ** indicates significance at the 1% level, ADF critical value: -2.5652.*

The Johansen (1988) cointegration test can be adopted to observe the effects; that is, to determine whether or not a cointegration relationship exists. Table 7 reports the results of the cointegration test for the change/return series variables. We take note of the trace and maximum eigenvalue statistics from the two types of test statistics presented in Table 7, and note that we can also acquire at least five cointegrating numbers.

Table 7: Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalues	Trace Statistic	5% Critical Value	1% Critical Value
None**	0.203040	16256.31	82.49	90.45
At most 1**	0.143658	11785.38	59.46	66.52
At most 2**	0.130666	8730.203	39.89	45.58
At most 3**	0.100509	5971.655	24.31	29.75
At most 4**	0.097657	3884.901	12.53	16.31
At most 5**	0.090120	1860.527	3.84	6.51

*This table reports the results of the Johansen test for cointegration within the series. ** indicates rejection of the hypothesis at the 1% level.*

The process involved in concluding that long-run equilibrium relationships exist between any set of integrated variables is a relatively simple one, with the behavior of investments indicating that they cannot arbitrarily wander far from each other in long-run relationships. Thereafter, the greater the number of cointegration vectors, the more steady the system will be (Dickey et al, 1994). In contrast to these results, any lack of cointegration implies that no long-run equilibrium relationships exist between any of the time-series variables.

Table 8 explores the results of the test for Granger (1980) causality, which clearly indicates that there is one-way Granger causality running from the ETF 50 and spot indices to the ETF 56 index, from the ETF 51 index to the ETF 58 index and from the ETF 52 index to the ETF 56 index. All of the others variables indicate bi-directional information spillovers.

According to the strength of the *F*-statistic, the spot index is the first lead operator among the time series, with the greatest effects of the spot index being felt by the ETF 56 index. The next sequence is that for the ETF 50 index, whilst the third sequence is that for the ETF 58 index; thus, the ETF 51 index is only slightly affected by the spot index. These results clearly indicate that these indices are prone to changes induced by causal relationships; thus, market trading strategies will be employed by investors based upon the information spillover effects.

Strictly speaking, there is a requirement to specify an appropriate lag length when using the vector autoregression (VAR) model. Therefore, in the present study, we adopt a maximum equal lag length of 8. If the residual series is still found to be autoregressive, then a more appropriate lag length will need to be added. The 'illustrative purpose decomposition' of the residual variance provides an indication of the proportion of the movement in a sequence attributable to its 'own' shocks, vis-à-vis the movement attributable to the shocks of the other variables.

Table 8: Granger Causality Tests

Null Hypothesis	F-Statistic	Probability
ETF 50 does not Granger cause the spot index	3.72712	0.00023**
The spot index does not Granger cause ETF 50	138.868	0.00000**
ETF 51 does not Granger cause the spot index	4.58431	0.00001**
The spot index does not Granger cause ETF 51	43.2700	0.00000**
ETF 52 does not Granger cause the spot index	2.77543	0.00457**
The spot index does not Granger cause ETF 52	96.1180	0.00000**
ETF 56 does not Granger cause the spot index	2.35835	0.01562
The spot index does not Granger cause ETF 56	180.063	0.00000**
ETF 58 does not Granger cause the spot index	6.52969	0.00000**
The spot index does not Granger cause ETF 58	116.278	0.00000**
ETF 51 does not Granger cause ETF 50	29.4228	0.00000**
ETF 50 does not Granger cause ETF 51	8.79558	0.00000**
ETF 52 does not Granger cause ETF 50	9.66074	0.00000**
ETF 50 does not Granger cause ETF 52	19.2403	0.00000**
ETF 56 does not Granger cause ETF 50	0.77623	0.62374
ETF 50 does not Granger cause ETF 56	39.8273	0.00000**
ETF 58 does not Granger cause ETF 50	7.17318	0.00000**
ETF 50 does not Granger cause ETF 58	23.6730	0.00000**
ETF 52 does not Granger cause ETF 51	5.05651	0.00000**
ETF 51 does not Granger cause ETF 52	32.6528	0.00000**
ETF 56 does not Granger cause ETF 51	3.51634	0.00045**
ETF 51 does not Granger cause ETF 56	88.9378	0.00000**
ETF 58 does not Granger cause ETF 51	1.24703	0.26677**
ETF 51 does not Granger cause ETF 58	36.1483	0.00000**
ETF 56 does not Granger cause ETF 52	2.46549	0.01146
ETF 52 does not Granger cause ETF 56	29.2887	0.00000**
ETF 58 does not Granger cause ETF 52	10.9880	0.00000**
ETF 52 does not Granger cause ETF 58	20.1622	0.00000**
ETF 58 does not Granger cause ETF 56	43.3168	0.00000**
ETF 56 does not Granger cause ETF 58	6.14069	0.00000**

*This table presents the results of the Granger causality test. The null hypothesis is that y does not Granger cause x; the alternative hypothesis is x does not Granger cause y. ** indicates significance at the 1% level.*

For the sake of brevity, we concentrate here on the forecasting of the residual variance within the VAR system for only 1, 4, 7, 10, 13 and 16 days. The results are presented in Table 9, from which we can see that within the VAR ordering, the total one-period decomposition for the spot index is totally attributable to its own innovation, whilst that for the residual variance of the ETF 50 index is attributable both to its own innovations and those of the spot index.

Furthermore, the first period decomposition for the ETF 51 index is affected by its own innovations and those of the ETF 50 and spot indices; the first period decomposition for the ETF 52 index is affected by its own innovations and those of the ETF 50, ETF 51 and spot indices; the first period decomposition for the ETF 56 is affected by its own innovations and those of the ETF 50, ETF 51, ETF 52 and spot indices; and the first period decomposition for the ETF 58 is affected by its own innovations and those of the other variables.

Table 9: Decomposition of Forecast Residual Variance in the Six Time-series Variables

Dependent Variable	Lag Days	By the Residual Item in					
		Spot Index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
Spot Index	1	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
	4	99.32557	0.147699	0.119885	0.004716	0.038426	0.363708
	7	99.27295	0.170992	0.126394	0.012406	0.044470	0.372856
	10	99.19560	0.177715	0.184730	0.016668	0.047696	0.377592
	13	99.19471	0.178203	0.184899	0.016795	0.047726	0.377670
	16	99.19427	0.178252	0.185025	0.016893	0.047757	0.377800
ETF 50	1	82.34370	17.65630	0.000000	0.000000	0.000000	0.000000
	4	76.98454	22.35429	0.118952	0.151228	0.211789	0.179197
	7	76.97661	22.33979	0.128587	0.154107	0.215083	0.185826
	10	76.94581	22.33288	0.156355	0.157020	0.220370	0.187570
	13	76.93896	22.33665	0.158110	0.158080	0.220585	0.187606
	16	76.93883	22.33666	0.158188	0.158103	0.220596	0.187625
ETF 51	1	71.71787	0.017862	28.26427	0.000000	0.000000	0.000000
	4	70.07946	0.513485	28.73006	0.058171	0.049155	0.569669
	7	69.99022	0.557005	28.71454	0.085398	0.063486	0.589351
	10	69.95218	0.572881	28.70311	0.093639	0.081807	0.596381
	13	69.94717	0.579364	28.70117	0.093908	0.081976	0.596412
	16	69.94698	0.579410	28.70133	0.093959	0.081988	0.596435
ETF 52	1	69.08158	8.884989	3.278030	18.75540	0.000000	0.000000
	4	64.89456	11.02122	3.536491	19.62486	0.477103	0.445767
	7	64.88293	11.02114	3.535276	19.61718	0.487447	0.456027
	10	64.85784	11.02015	3.561933	19.61025	0.492191	0.457638
	13	64.85519	11.02249	3.562590	19.60965	0.492192	0.457888
	16	64.85514	11.02249	3.562600	19.60965	0.492205	0.457914
ETF 56	1	66.0061	6.782012	1.035319	0.228115	25.94844	0.000000
	4	60.10494	10.56350	1.049314	0.210339	27.96775	0.104160
	7	60.06439	10.57943	1.063858	0.221142	27.95676	0.114423
	10	60.00796	10.57911	1.120266	0.226844	27.93515	0.130675
	13	60.00101	10.58680	1.121521	0.227599	27.93204	0.131036
	16	60.00088	10.58680	1.121564	0.227685	27.93196	0.131116
ETF 58	1	77.59679	2.312982	0.719634	1.218849	3.258634	14.89311
	4	71.69752	3.480598	0.786766	1.247683	3.584942	17.20249
	7	73.64731	3.485843	0.805515	1.252852	3.594479	17.21400
	10	73.59952	3.488875	0.828627	1.256860	3.608032	17.21809
	13	73.59756	3.490476	0.829369	1.256943	3.607951	17.21776
	16	73.59748	3.490488	0.829385	1.256986	3.607970	17.21769

This table provides details of the respective variance decompositions for each of the endogenous variables; the variance decomposition provides information on the relative importance of each random innovation with regard to its effect on the variables.

It is clear from Table 9 that among the six time-series variables, the trading behavior within the spot index is least affected by external forces. By contrast, the trading behavior in the ETF 58 index is most heavily influenced by the other five external forces; for example, the 99 per cent volatility for the intraday index change on the 16th day is self-explanatory, whereas for the ETF 58 index, the figure is only 17 per cent. Further detailed analysis reveals that the spot returns will affect the other variables, thereby shedding some light on the fact that the characteristics of the spot index in Taiwan have significant impacts on the financial market. This is consistent with Table 8, which shows that the largest *F*-statistic of the spot index has the greatest effect on all of the other variables. For simplicity, we investigate the spillovers from the changes (returns) over 16 trading days.

It is a fairly simple matter to identify the speed of the information spillovers arising from a single standard unit shock in the spot index from Table 10. Only the spot index variable elicits instantaneous changes, whilst the other five variables are at zero state in the first period. In the next period, only the ETF 56 and ETF 58 indices have negative impulse responses, with each of the other three variables being positive. In principle, it is possible to trace out the time path of the effects of each of these positive/negative shocks.

Table 10: Impulse Response to a Unit Shock for the Spot Index

Period	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
1	0.084841	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.005134	0.002723	0.002572	0.000511	-0.000853	-0.004831
3	-0.005115	0.000710	0.001391	-0.000242	0.001392	0.001788
4	-0.001593	-0.001694	0.000449	-0.000156	-0.000375	-0.000150
5	0.000064	-0.001141	0.000504	-0.000602	-0.000661	-0.000564
6	0.001623	0.000027	0.000361	0.000334	0.000052	0.000049
7	0.000194	-0.000636	0.000315	0.000298	0.000072	0.000610
8	-0.001108	-0.000591	0.001970	0.000213	0.000455	0.000484
9	-0.000047	-0.000373	-0.000586	-0.000517	0.000180	0.000185
10	0.000130	0.000144	-0.000231	-0.000022	-0.000043	-0.000322
11	0.000080	0.000166	0.000022	-0.000431	0.000034	-0.000006
12	-0.000035	-0.000036	0.000101	-0.000041	-0.000026	0.000061
13	-0.000534	-0.000084	0.000042	-0.000076	-0.000020	-0.000048
14	0.000062	-0.000060	-0.000044	-0.000071	0.000056	-0.000084
15	0.000093	-0.000021	-0.000068	0.000035	0.000045	0.000032
16	-0.000006	0.000008	0.000052	0.000038	0.000013	0.000040

The table shows the appropriate value of the impulse response function for the spot index; the impulse response function traces the effects of a one-time shock.

The very slight effects of the information spillovers in the ETF 50 index are revealed in Table 11, from which we can see that the instantaneous impact of a one-unit change in the ETF 50 index is its influence not only on the spot index, but also on the ETF 50 index itself.

Table 11: Impulse Response to a Unit Shock for the ETF 50 Index

Period	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
1	0.088707	0.041076	0.000000	0.000000	0.000000	0.000000
2	0.003039	-0.024676	-0.003204	0.003926	-0.004367	-0.003594
3	-0.006294	0.001021	0.001348	-0.000366	0.001503	0.001782
4	-0.000434	-0.001400	0.000391	-0.000078	-0.000676	-0.001529
5	0.000055	-0.000333	0.000169	-0.000034	-0.000457	0.000284
6	0.001774	0.000394	0.000769	0.000541	0.000366	0.000784
7	-0.001454	0.000080	0.000617	0.000121	-0.000115	-0.000031
8	0.000339	-0.000318	0.001186	-0.000291	0.000676	0.000143
9	-0.000380	0.000083	-0.000919	-0.000397	-0.000215	0.000317
10	0.000217	0.000436	0.000784	-0.000254	0.000225	-0.000259
11	0.000031	-0.000771	-0.000423	0.000324	-0.000148	0.000046
12	-0.000044	0.000002	0.000036	-0.000058	0.000009	0.000004
13	0.000018	-0.000004	-0.000044	-0.000044	0.000047	-0.000074
14	0.000066	-0.000016	-0.000057	-0.000017	0.000004	0.000017
15	-0.000006	0.000069	0.000049	0.000014	0.000038	0.000038
16	-0.000023	0.000030	0.000050	-0.000044	-0.000012	-0.000017

The table shows the appropriate value of the impulse response function for the ETF 50 index; the impulse response function traces the effects of a one-time shock.

The results of the effects of information spillovers in the ETF 51 index are presented in Table 12. It would appear that the spot and ETF 51 indices will remain the same when the ETF 51 index responds positively in the first period; thereafter, there are no consequential impulse responses in the ETF 51 index.

Table 12: Impulse Response to a Unit Shock for the ETF 51 Index

Period	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
1	0.086189	–0.001360	0.054107	0.000000	0.000000	0.000000
2	0.006576	–0.006808	–0.012157	0.001661	–0.000920	–0.007339
3	–0.006698	–0.000491	–0.000847	0.001525	0.001940	0.002413
4	–0.001712	–0.002580	–0.002574	0.001077	0.000814	–0.001202
5	0.000281	–0.001860	0.000687	–0.001156	–0.001117	0.000403
6	0.001247	0.000270	0.001356	–0.000762	–0.000347	–0.000745
7	0.000200	–0.001107	0.000799	–0.001010	–0.000424	–0.001220
8	–0.000231	–0.000585	0.000528	0.000785	0.001369	0.000862
9	–0.000429	0.000360	0.000233	–0.000423	0.000316	0.000203
10	0.000266	0.001127	0.000492	–0.000312	0.000002	–0.000090
11	0.000091	–0.000753	–0.000074	0.000158	–0.000132	–0.000029
12	–0.000047	–0.000289	0.000078	0.000040	–0.000038	0.000062
13	–0.000047	–0.000226	–0.000088	0.000054	0.000009	–0.000060
14	–0.000044	–0.000030	–0.000076	0.000004	0.000009	0.000045
15	0.000000	–0.000060	0.000085	–0.000047	0.000035	0.000018
16	–0.000004	0.000026	0.000039	–0.000046	0.000010	–0.000018

The table shows the appropriate value of the impulse response function for the ETF 51 index; the impulse response function traces the effects of a one-time shock.

The trivial effects of the information spillovers in the ETF 52 index are reported in Table 13, which shows a positive direction for these effects in the first period, with the exceptions of the ETF 56 and ETF 58 indices, which maintain a zero state. The results indicate that the impulse response will also return to zero.

Table 13: Impulse Response to a Unit Shock for the ETF 52 Index

Period	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
1	0.093757	0.033624	0.020423	0.048852	0.000000	0.000000
2	0.001798	–0.019161	–0.007959	–0.017018	–0.007631	–0.007722
3	–0.007511	0.000724	0.001012	–0.000705	0.002488	0.000774
4	–0.001070	–0.002228	0.000934	0.000140	–0.000809	–0.000757
5	0.000340	–0.000199	0.000154	–0.000488	–0.001197	–0.000422
6	0.001697	0.000660	0.000064	0.000204	0.000049	–0.000911
7	–0.000461	–0.000574	–0.000261	–0.000352	0.000111	–0.000652
8	0.000497	–0.000310	0.001722	0.000353	0.000817	–0.000281
9	–0.000175	–0.000021	–0.000671	–0.000222	0.000050	0.000273
10	–0.000092	0.000632	0.000653	0.000032	–0.000078	0.000304
11	–0.000065	–0.000615	–0.000324	0.000171	–0.000053	–0.000190
12	–0.000060	–0.000042	0.000068	–0.000010	0.000008	–0.000009
13	–0.000024	–0.000045	0.000025	0.000030	–0.000000	–0.000026
14	–0.000047	–0.000040	0.000021	–0.000015	–0.000030	0.000033
15	–0.000020	0.000018	0.000012	0.000012	0.000030	0.000017
16	–0.000021	0.000009	0.000021	–0.000047	0.000004	–0.000047

The table shows the appropriate value of the impulse response function for the ETF 52 index; the impulse response function traces the effects of a one-time shock.

Table 14 reports the noise effects of information spillovers in the ETF 56 index. The first period impulse

responses for the ETF 56 index are positive movements in the spot, ETF 50 and ETF 51 indices, whilst the ETF 52 reveals negative movement and the ETF 58 index remains at a zero state. It should also be noted that there is no consistency in the shocks.

Table 14: Impulse Response to a Unit Shock for the ETF 56 Index

Period	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
1	0.073998	0.023719	0.009268	–0.004350	0.046396	0.000000
2	0.006256	–0.020209	–0.002978	0.000413	–0.020518	–0.002601
3	–0.003984	0.000191	0.001316	–0.000010	0.000777	0.001675
4	–0.001421	–0.001145	0.000323	–0.000517	–0.000504	–0.000133
5	0.000275	–0.001451	0.000347	–0.000355	–0.000545	–0.000541
6	0.001035	–0.000135	0.001047	–0.000589	0.000933	0.000335
7	–0.000117	–0.000452	0.000458	0.000734	–0.000313	0.000741
8	–0.000213	–0.000543	0.002298	–0.000186	0.000692	0.000917
9	–0.000415	–0.000037	–0.000129	–0.000647	0.000128	0.000371
10	0.000248	0.000801	0.000033	–0.000304	0.000253	–0.000728
11	0.000084	–0.000903	–0.000354	0.000251	–0.000117	0.000153
12	–0.000056	–0.000063	0.000057	0.000001	–0.000048	0.000091
13	–0.000029	–0.000062	0.000002	–0.000096	0.000005	–0.000055
14	0.000073	–0.000042	–0.000041	–0.000088	0.000014	–0.000076
15	0.000097	0.000048	–0.000026	–0.000011	0.000070	0.000024
16	–0.000019	0.000028	0.000047	0.000012	0.000011	0.000034

The table shows the appropriate value of the impulse response function for the ETF 56 index; the impulse response function traces the effects of a one-time shock.

Table 15 reveals the insignificant information spillover effects of the ETF 58 index, with the impulse responses in the first period all being positive, with the one exception of the negative response for the ETF 52 index.

Table 15: Impulse Response to a Unit Shock for the ETF 58 Index

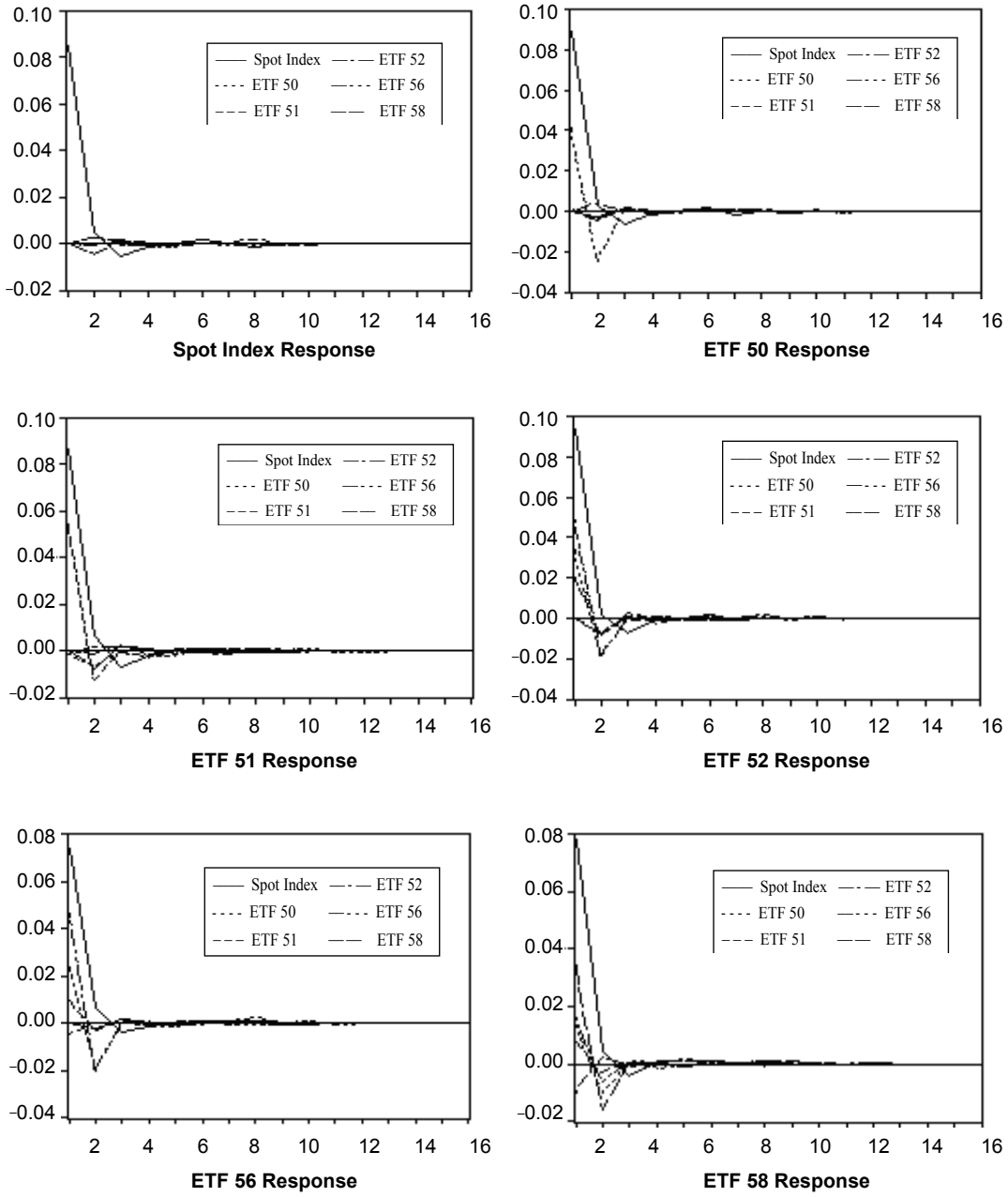
Period	Spot index	ETF 50	ETF 51	ETF 52	ETF 56	ETF 58
1	0.078390	0.013534	0.007549	–0.009825	0.016064	0.034342
2	0.004320	–0.010316	–0.002914	0.002644	–0.006400	–0.016237
3	–0.004476	0.000357	0.000517	–0.001019	0.001330	0.000577
4	0.000123	–0.001529	0.000519	–0.000369	0.000098	0.000120
5	–0.000739	–0.008270	0.000958	–0.000547	–0.000991	0.001514
6	0.000963	–0.000145	0.000767	–0.000384	0.000314	–0.000151
7	0.000402	–0.000107	–0.000361	–0.000294	–0.000077	–0.000131
8	0.000688	–0.000636	0.001232	–0.000643	0.001165	0.000845
9	–0.000041	0.000062	–0.000423	–0.000021	–0.000049	0.000726
10	–0.000184	0.000247	0.000543	0.000010	0.000002	–0.000399
11	0.000016	–0.000369	–0.000253	–0.000062	–0.000024	–0.000048
12	0.000091	–0.000075	–0.000017	–0.000077	0.000026	0.000065
13	–0.000018	–0.000024	0.000010	0.000005	0.000022	0.000038
14	0.000012	–0.000031	0.000026	–0.000027	–0.000015	0.000015
15	0.000022	0.000020	–0.000047	–0.000037	0.000039	0.000030
16	0.000021	–0.000006	0.000260	–0.000040	0.000016	–0.000006

The table shows the appropriate value of the impulse response function for the ETF 58 index; the impulse response function traces the effects of a one-time shock.

In summary, we can find no consistent directions in the impulse responses; and indeed, we find that they

may asymptotically converge to their long-run levels. In other words, investors will apply different trading strategies in the subsequent period. The impulse responses for the six time-series variables, based upon a one-unit innovation shock within 16 days, are illustrated in Figure 1, where we graphically demonstrate that these impulse responses do not exist at, or converge quickly to, a zero state. This is consistent with the values presented in the tables.

Figure 1: Index Responses to Cholesky One S.D. Innovations



The figure illustrates the spillovers in changes/returns within sixteen days; an impulse response traces the effects of a one-unit standard innovation.

CONCLUSIONS

This study presents evidence of cointegration between the spot index and the ETF indices, with the results showing that there are at least five cointegrating vectors among the variables. Our results suggest the existence of long-run relationships between a set of integrated variables, and therefore, that investments will not arbitrarily wander far from each other in situations of long-run equilibrium.

On the other hand, the findings of the application of the Granger causality test examining the causality linkages between the variables indicate that among all of the exchange trade fund indices, the spot index leads first. Our results further suggest that Granger causality runs one-way from the spot index to the ETF 56 index, from the ETF 50 index to the ETF 56 index, from the ETF 51 index to the ETF 58 index and from the ETF 52 index to the ETF 56 index, with all of the other variables revealing bi-directional information spillover effects; as such, market trading strategies are apparent as a result of information spillovers, and this will affect the other variables.

Depending on the stationary nature of the variables in a VAR system, this will provide two policy indications for investors. Firstly, the forecast residual variance decomposition explains the proportion of the change in a sequence attributable to its own shocks vis-à-vis the shocks of other variables; therefore, the spot index is mostly affected by its own shocks, but less so by shocks from the other variables. Furthermore, in addition to the correlation with itself, the spot index is closely correlated to the other variables.

Secondly, it is clear that the changes which a one-unit shock may induce in the shift of the time-series variables are in fact only temporary; in other words, there are no consequent impulse responses in the time trend. Generally speaking, investors can apply such information spillover to manage risky situations and their resultant trading actions; consequently, such information spillovers may be capable of promoting trading interest within both the spot index and the ETF indices.

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SURVIVAL-ABILITY OF FIRM: EMPIRICAL EVIDENCE FROM MALAYSIA

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ABSTRACT

Malaysia like many other Asian countries was affected by the 1997 Financial Crisis. During this Financial Crisis, many companies succumbed. Pomerleano (1998) found that leverage of the companies if unchecked can be detrimental to the health of the company. He concluded that excess leverage at the micro level and also poor profitability resulted in the 1997 East Asian crisis. The aim of this study is to analyze the survival-ability of a sample of Malaysian public listed companies (PLCs) by analyzing the impact of financing decision of the sample firms. Both financing and operatig leverage, along with the performance of the companies is evaluated. This study adopts a non-parametric approach to measure the company's survival-ability in terms of their financing decision for their production process. In order to achieve this main objective, the study attempts (i) to identify, using Data Envelopment Analysis (DEA), the survivors among the PLCs based on their financing decisions and (ii) to analyze the effects of leverage on the survival of the PLCs. This article contributes to current literature in two areas, namely; the evaluation of the survival-ability of the PLCs via their financing decisions. Secondly, the use of financial and operating liability leverage in evaluating survival-ability of the companies.

JEL: D320, D920, G320

INTRODUCTION

Like many other countries Asia, Malaysia was also the victim of the 1997 Financial Crisis. Those times witnessed the fall of many corporations. A number of companies listed on the Malaysia Exchange known as Bursa Malaysia, were put under the PN4 category. Following the 1997 crisis, Bursa Malaysia issued the Practice Note in 2001. According to the note, companies that are categorized as PN4 are companies that face some financial problems and are no longer able to continue to form part of the original sector. This means that companies which used to appear in a particular business sector, for example the "consumer sector" would be removed from its original business sector and be placed in the new PN4 sector. However, once the PN4 companies have implemented their regularization plan and no longer fit the criteria of PN4 companies, they will be removed from the PN4 sector and be placed back in their appropriate business sectors. Hence, the motivation of the study is to find out what has caused some of the public listed companies (PLCs) to succumb to the crisis while others survived. However, some of those companies that had managed to overcome the crisis finally succumbed too when the global crisis hit the world in 2001. This is evident by the increasing number of PLCs that were either put under the PN4 category or has ceased to exist.

According to Pomerleano (1998), leverage if unchecked can be detrimental to the health of the firm. He concluded that it was excess leverage at the micro level and also poor profitability that have caused the 1997 East Asian crisis. Hence, this study uses leverage to analyze the survival-ability of a sample of public listed companies (PLCs) in Malaysia by analyzing the financing decision. Through leverage, both the financing and operating leverage, the performance of these companies is analyzed. Survival-ability of the PLCs is related to the ability of the PLCs to efficiently make decisions about financing of its production activities.

The main objective of this study is to analyze the survival-ability of the PLCs through the utilization of their financing decisions. In order to achieve this main objective, the study attempts (i) to identify, using Data Envelopment Analysis (DEA), the survival-ability of the PLCs based on their financing decisions and (ii) to analyze the effects of leverage on the survival-ability of the PLCs. The study adopts a non-parametric approach to measure the company's survival-ability. The data cover the period from 1996, 1998–2000, which is a period of four years. The period is divided into three phases of analysis: 1996, which is prior to the 1997 crisis; 1998, which is in the aftermath of the crisis; and 1999–2000, the post-crisis period. This approach allows us to conduct a before and after crisis analysis.

The variables selected for the study are based on their relevance and usefulness in analyzing the survival-ability of the company. PLCs that survived based on their leverage would be located on the efficiency frontier. The study will then analyze the impact of their leverage on the performance of the companies. This article contributes to current literature in two aspects, namely; the evaluation of the survival-ability of the PLCs through their financing decisions and in evaluating the survival-ability of the companies via through leverage.

The remaining part of the paper is structured as follows. Section 2 reviews the relevant literature while section 3 provides an overview of the manufacturing sector in Malaysia. The following section 4 describes the methodology used and the empirical analyses and results will be presented in section 5. Section 6 concludes the discussion.

LITERATURE REVIEW

Efficiency is a crucial factor for the survival of firms. According to Bain (1969), survival is the only test of the ability of a firm to cope with problems such as buying inputs, finding customers, introducing new products and techniques and so on. Hence, efficiency is defined as survival-ability. Literatures on the survival of the firm have its basis in the earlier work of Schumpeter (1934) in which his creative destruction theory expounded the idea that inefficient firms will not be able to survive in a competitive environment. Hence, it is important to stress the importance of efficiency in order to ensure the survival-ability of the firm. Zingales (1998) in his assessment of the effects of financing choices on the survival of firms concluded that if leverage affects the performance of the firm, then the financing decision of the firm will have to be taken into account. According to him, it is not only the fittest of the firm which is translated in the form of economic efficiency of the firm, but also the fattest of the firm which is translated in the form of the financial resources which are important ingredients for the survival of firms.

According to Carlson (1975), there are three major financial decisions that help to determine the efficiency of the operations of a firm. The investment decision focuses on (i) working capital management, which determines the cash, inventory, and receivable levels, and (ii) allocation of capital to long-term purposes. The financing decision focuses on (i) long-term funds such as term loans, conditional sales contracts, and leases, and (ii) short-term funds such as trade credit, commercial paper, receivables and inventories. The dividend decision focuses on (i) active and (ii) passive or residual dividend. Stiglitz (1974) includes both the investment and dividend decisions as financing decisions. This study, however, considers both the investment and financing decisions as one financing decision, since both require financing instruments in order to finance them. This will give rise to both financial and operating liability leverage.

The financing decisions that are found to be related to the leverage of the firm in the past have been viewed as arising from funding activities. That is, a firm borrows in order to obtain funds for its operations. According to Nissim and Penman (2003), there are two sources of a firm's leverage, funding activities (e.g. bank loans, and bond issuance) and operating activities (e.g. trade payables, deferred

revenues and pension, etc). Both of these activities determine the sources of leverage namely, financial leverage and operating liability leverage. Leverage is measured by dividing total liabilities by equity.

In measuring efficiency, Ramanathan (2003) used Data Envelopment Analysis (DEA). He tried to evaluate how well a decision making unit (DMU) performed when compared with its peers. Thus, the efficiency of each firm is computed in the relative sense and not absolute. It is relative to the best performing DMU (or DMUs if there is more than one best-performing DMU). The best-performing DMU is assigned an efficiency score of unity or 100 per cent, and the performance of other DMUs varies between 0 and 100 per cent relative to this best performance. Hence, the performance of firm could be used as an indicator of efficiency.

The literature in the area of survival-ability of firms is limited. Many of these studies are focused on survival-ability of manufacturing firms and looked at the utilization of physical inputs used in the production of goods and services. In terms of financial and operating leverage, no study has been undertaken.

METHODOLOGY

The target population in this study is comprised of the PLCs that were registered in the states of Selangor and Kuala Lumpur. These companies are mainly involved in the manufacturing of consumer, industrial and technology related products. Manufactured products contribute to about half of export revenues, oil about 30%, and other commodities about 20%. Overall, the manufacturing sector in Malaysia contributes approximately 35% of the country's gross domestic product, accounting for 80% of total exports (Economic Report, 2001). This indicates that there was an efficient utilization and management of resources, materials and inputs necessary for the production of goods and services (www.npc.org.my.).

The study uses financial data, which were obtained from the Annual Companies handbook. Due to the unavailability of data, this study divides the analysis into 3 phases, which are 1996, 1998 and 1999–2000. This period is sufficient to analyze the survival-ability of the financial decision-making of the companies. It also allows the evaluation of performance before the crisis of 1997 and in the post-crisis period.

The literature of DEA does not propose any specific criteria for the selection of inputs and outputs; hence, no specific rule is made in determining the procedure for selection of inputs and outputs. Since the focus on the performance of PLCs via the financing decision, therefore, the variables are selected based on their relevancy to the study. The independent variables were selected based on their ability to affect the financing decisions of the company. Following Nissim and Penman (2003), financing decisions include both financial leverage and operating liabilities leverage. Both will affect the company's performance and hence, its survival-ability. If usage of such instruments enables a company to performance efficiently, then it can be concluded that the company will survive. However, a company's performance may also be affected by other factors, such as the efficiency of physical inputs and the managerial capability of the company. Since the focus of this study is on the effects of the financing decisions on firms' survival-ability, other factors are assumed constant.

Therefore, the variables that affect the financing decision of firms are namely; one, financial leverage which measures the degree to which a company depends on debt financing to finance its production activity. The debt ratio = (LT Financial Debt + ST Financial Debt)/Total Assets indicates the financial leverage. Two, operating liability leverage, which according to Nissim and Penman (2003), measures the degree to which other liabilities such as trade payables, deferred revenues, and pension liabilities are used in running the production operations of the company. Operating liability leverage = Operating Liabilities/Net Operating Assets. Operating liabilities comprise trade payables, pension and amount of

credit sales. However, only trade payables, which are accounts payable for goods received from suppliers, are available in the report; hence, it is used to indicate part of the financing decisions of the companies.

In order to evaluate the survival-ability of the company, a DEA model is used to rank the companies in terms of their financial performance. The DEA model used is based on the BCC model in ratio form with variable returns to scale, and the radial input-oriented approach where the inputs are minimized while the outputs are kept at their current level. By considering *o* PLCs of which each is producing *s* different outputs using *m* different inputs, each of the PLCs becomes a focal PLC when its survival-ability score is computed. The survival-ability of the PLC can be measured by calculating an index of survival-ability, where represents the financing performance index for a group of peer PLCs, called a survival-ability Index (*SI*).

$$SI_o = \frac{\sum_{r=1}^{s} u_r y_{ro} + u_{io}}{\sum_{i=1}^{m} v_i x_{io}} \tag{1}$$

where,

$\boldsymbol{y_{ro}}$ = the quantity of the *r*th output produced by the *o*th PLC during the period under observation.

$\boldsymbol{x_{io}}$ = the quantity of the *i*th input used by the *o*th PLC during the period under observation.

$\boldsymbol{u_r}$ = the output weight which will be determined by solving the model.

$\boldsymbol{v_i}$ = the input weight which will be determined by the solving the model.

$\boldsymbol{u_o}$ = variable that efficiently allows variable returns to scale in the PLC under evaluation and is determined from solving the model.

i = unit for the input from 1 to *m*.

r = unit for output from 1 to *s*.

o = a focal PLC that take a value from 1 ,…., *n*

The SI_o ratio is maximized subject to the following:

$$\frac{\sum_{r-1}^{s} u_r y_{ro} + u_o}{\sum_{i=1}^{m} v_i x_{io}} \leq 1 \tag{2}$$

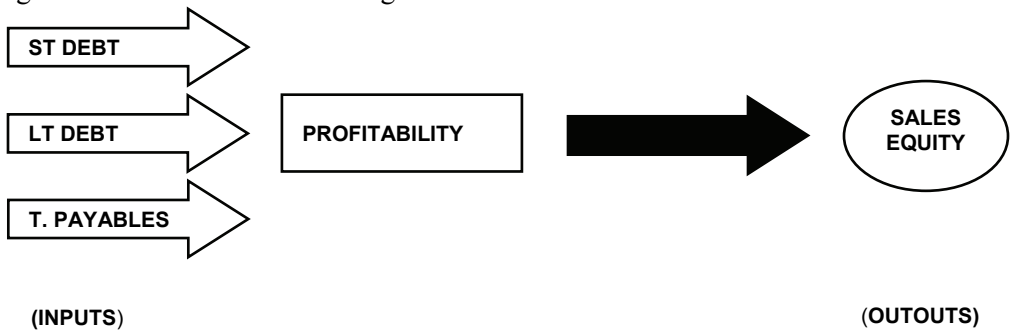
$$\frac{u_r}{\sum_{i=1}^{m} v_i x_{io}} \geq 0 \tag{3}$$

$$\frac{v_r}{\sum_{i=1}^{m} v_i x_{io}} \geq \varepsilon \tag{4}$$

The input and output values as well as all inputs are assumed to be greater than or equal to 1. The weights u_r for each PLC maximize the PLC's survival-ability indices. The DEA program identifies a group of optimally performing PLCs that are defined as DMUs with perfect *SI*, and assigns them a score of one. These perfect *SI* PLCs are then used to create a frontier, against which all other PLCs are compared. If a PLC is classified as a non-frontier PLC, it means that one or more ratios of that PLC might be deficient with respect to the PLCs on the frontier. Perfect *SI* PLCs are identified by their ability to utilize the same level of inputs and produce the same level or higher outputs. In economics, these PLCs define the revealed best-practice frontier. DEA then uses a mathematical method to calculate a performance measure for each PLC relative to all other PLCs, based on the requirement that all observations lie on or below the frontier (Ramanathan, 2000).

In the process of utilizing the financing resources, the BCC model in ratio form is used to compute the survival-ability index (*SI*). The inputs are Long Term Debt, Short-term Debt and Trade Payables while the outputs are Sales and Equity. Long-term debt, short-term debt and trade payables are considered as inputs, as they are used as the medium of financing the production activities of the companies. Sales and equity are considered as outputs, since they are the final outputs of the whole production process (Feroz et al., 2001; Zhu, 2000 and Zhu; 2004). Equity shows the value of a company and can be viewed as collateral in order to obtain funding in the future. All the variables listed are measured in Ringgit Malaysia, as the monetary term is a better indicator of the quantity of high tech products rather than the physical term.

Figure 1: Utilization of Financing Instruments



Adopted with modification from Zhu (2004) and Chong (2006)

Figure 1 above depicts the whole process of the utilization of the financing instruments in the production process of the firm. Thus, in order for a company to be able to survive, *SI* must be equal to 1. Hence, in the evaluation of the performance of companies, all these inputs are used to obtain the outputs that enable the PLCs to be located on the survival-ability frontier.

The issue of dimensionality relates to the number of variables (inputs and outputs) and sample size (Hughes and Yaisawarng, 2004). They studied the dimensionality effect from varying numbers of variables for a fixed sample size. According to them, the number of variables in relation to sample size may overstate the number of survivors among the PLCs; hence, there is a need to test the effect of dimensions on the model. A model selection technique based on a multivariate statistical analysis was proposed by Serrano Cinca and Mar Molinero (2001). They have developed various models based on a dataset for Chinese cities. According to them, it is possible to find out why a particular DMU performed better under some models and not under other models. According to Mar Molinero (2006), a PROperty-FITting (ProFit) technique which was developed by D. Carrol and Chang in 1968 could be used in order to assess this phenomenon. It provides external analysis of a configuration by a set of property ratings or rankings in row-conditional format by a scalar products (vector) model using either a linear or a continuity transformation of the data. A "property" is a characteristic of each data point in the

representation. In trying to resolve the dimensionality issue, this study adopted a similar approach to that used by Serrano Cinca and Mar Molinero (2001) to select the best model in order to distinguish the most survival-abled company in the sample. Another issue is sensitivity, in which case the DEA performance index can also be sensitive to the choice of (i) sample size, (ii) number of variables and (iii) association among variables used in the model (Galagedera and Silvapulle, 2004). According to Zhu (2004), calculated frontiers of DEA models are stable if the frontier DMUs that determine the DEA frontier remain on the frontier after particular data perturbations are made. He provides a super-efficiency model to compute a stability region in which a particular PLC remains efficient and hence, continues to survive. According to Zhu (2001), using the super-efficiency model to analyze the sensitivity of DEA efficiency classification can be easily achieved and the results are stable.

For this study, various models were designed by varying the variables and sample size in order to come up with a suitable model. A super-efficiency test was used to chose the model for determining its stability. A survival-ability rate of one indicates that the company is on the survival-ability frontier. This indicates that the company is efficient, hence, it should be able to survive. Companies that achieve less than one indicate that they lie below the survival-ability frontier. This indicates that they are less efficient, however, they may be to less able to survive if they are not able to improve their performance. The software called the Efficiency Measurement System (EMS) is used to calculate the survival-ability of the financing instruments. The software is free for academic users available at the web address (http://www.wiso.uni-dortmund.de/lsfg/or/scheel/ems/#feat).

In order to identify the survival-abled PLCs, one model of survival-ability is required. Researchers in DEA acknowledged that the use of DEA in calculating DEA efficiency ranking can be affected by the different combination of inputs and outputs. Hence, many researchers such as Zhu (1998), Serrano Cinca and Mar Molinero (2003) have come up with various means of dealing with the problem. Therefore, in order to choose a suitable model, this study takes similar approach by these earlier researchers where various different models are developed and later analyzed from combinations of various inputs and outputs. The approach enables different models with different combination of inputs and outputs to enable the PLCs to attain efficient level to ensure their survival-ability. However, due to time constraints and the complexity involved in massive datasets involving multiple inputs and outputs combinations, this study settled for combinations of three inputs and two outputs.

Table 1: Inputs and Outputs for DEA Model of Survival-Ability

Inputs:		**Symbol**
Long-Term Debts	X_1	a
Short-Term Debts	X_2	b
Total Payables	X_3	c
Outputs:		**Symbol**
Sales	Y_1	1
Total Assets	Y_2	2
Equity	Y_3	3

Table 1 shows the various inputs and outputs for DEA model of survival-ability. The long-term debts (X_1), short-term debts (X_2), and total payables (X_3) are a, b and c respectively.

The outputs such as sales (Y_1), total assets (Y_2) and equity (Y_3) are 1, 2 and 3 respectively. The twenty seven models developed for each of the respective stages of production together with their factor loadings are shown in Table 3. Factor loading refers to a coefficient that appears in a factor pattern matrix or a factor structure matrix. On orthogonal analysis, factor loadings are equivalent to bivariate correlations between the observed variables and its components (Hatcher and Stepanski (2004).

In order to select the suitable model, Principal Components Analysis (PCA) is used. This decision is further supported by the work of Zhu (1998), Premachandra (2001) and Serrano Cinca and Mar Molinero (2001a, 2003), in which PCA has been proven to be a good support for DEA in the evaluation of the performance of DMUs. PCA is used as a data reduction technique and can be used as a measure to address the dimensionality issue. It is a method for producing the small number of constructed variables desired from the larger number of variables that were originally collected. It is carried out to determine which survival-ability model accounts for a larger portion of the total variance in the original set of the models. A factor analysis is then conducted for the two underlying factors, which explains the relative positions of the various survival-ability models.

A Property Fitting (ProFit) procedure is used in order to determine the fit of the model. A multiple regression method is used to perform the analysis. With the combination of this method and PCA the suitable model is selected. Using DEA, this selected model is then used to evaluate the survival-ability of the PLCs. The principal component extracted is the linear combination of optimally weighted models. The component scores are then plotted onto a graph, showing the similarities and differences between the various models. The ProFit procedure is used to plot the PCA graph on the survival-ability models. Here a similar approach to that taken by Serrano Cinca and Mar Molinero (2001a) is adopted, whereby models are treated as variables while the survival-ability rating is treated as observation.

Table 2: Principal Component Scores

Component	Eigenvalue	Proportion	Cumulative
1	16.31	0.61	0.61
2	5.29	0.20	0.80
3	1.80	0.07	0.87
4	1.51	0.06	0.92

An eigenvalue greater than 1 means it has accounted for a greater amount of variance that has been contributed by one variable

Table 2 shows the principal component scores for the financing process whereby only four components are retained. A component that has eigenvalue of more than 1 is retained and interpreted. This is because each of the observed variables in the component contributes one unit of variance to the total variance in the data set. Hence, a component that has eigenvalue greater than 1 means it has accounted for a greater amount of variance that has been contributed by one variable. This component accounts for a considerable meaningful amount of variance that is worthy of being retained (Hatcher and Stephanski, 2004). The next step is to look at the loadings of these models, which determine the performance ranking of the model.

Table 3 shows the models and their factor loadings. Models with an asterisk indicate that they include all the three leverages as the inputs. Factor loading is the weight given to a variable in the construction of a principal component. It also represents the correlation between an original value and its factor. The first component extracted accounts for a maximal amount of total variance in the observed variables. The total variance refers to the sum of the variances of the observed variables. Since the purpose of the study is to evaluate the survival-ability of the financing decisions, it is appropriate that the three components of leverage should be present in the model of survival-ability. The minimum acceptable cut off for a factor loading is 30. For a sample size of less than 100, the lowest factor loading to be considered significant is ± 30 (Hair et al., 1998).

Table 3: Factor Loadings

Models	PC1	PC2	Models	PC1	PC2
A123	14	48	AC13	91	34
AB123	33	75	AC123	88	2
ABC12*	24	87	B123	77	23
ABC13*	24	87	BC12	25	89
ABC23*	89	5	BC13	25	91
ABC123*	91	34	BC23	29	79
AC12	92	18	BC123	21	90

** include all the three leverage as the inputs.*

Figure 2: Principal Components of the Efficiency Model

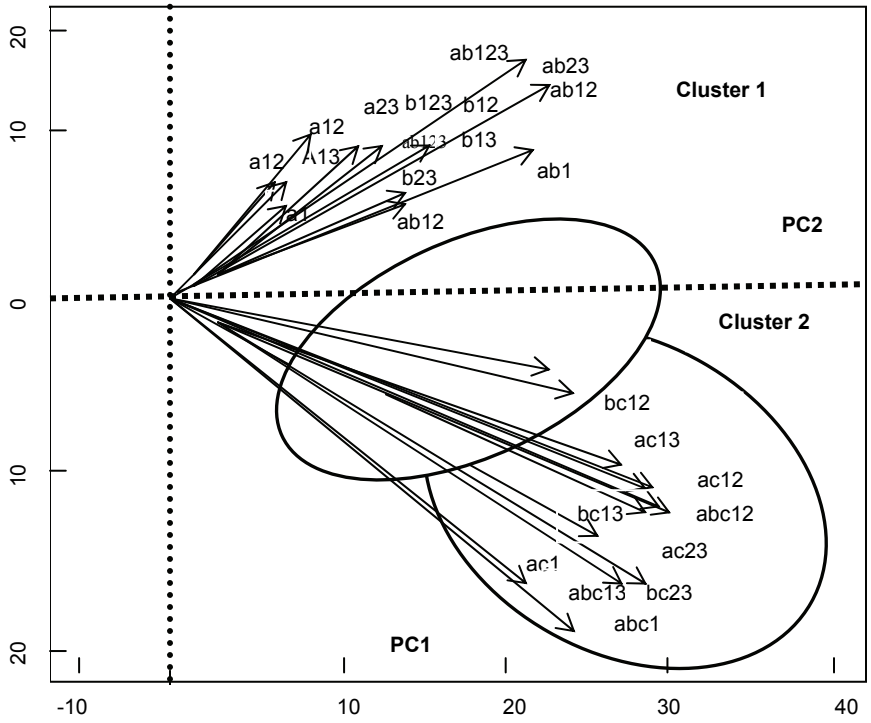


Figure 2 shows there are only two distinct clusters of models. Each model in a cluster has some similarities; hence, it makes no difference to choose one over the others. Since the three funding instruments have to be present in the model, the appropriate models would be those that have all the three instruments present. Such models are abc1, abc12, abc13 and abc123. These models all have higher factor loadings; with abc13 having the highest, abc12 and abc123 each with a score of 91, and abc1 is having 89. Hence, it is appropriate to choose abc13 over the others, since it contains output such as sales and equity. Total assets are considered inappropriate, as it is considered as the outcome of higher revenues from sales.

ANALYSIS

Table 4 shows the descriptive statistics for the 96 PLCs in the sample. The data analyzed are taken from period before the crisis, that is 1996 and period after the crisis, which is 2000.

Table 4: Descriptive Statistics for PLCs

		2000 (Post Crisis Period)				1996 (Pre Crisis Period)			
Variable	N	Min	Max	Mean	SD	Min	Max	Mean	SD
LTDEBT	96	0	3,188,490	123,164	381,843	0	2,563,149	114,019	336,272
STDEBT	96	0	7,216,780	217,337	775,415	0	3,435,521	125,876	378,014
TPAYABLE	96	680	2,413,339	167,681	384,873	0	750,666	61,698	131,392
EQUITY	96	7,559	5,062,161	377,817	669,834	8550	2,898,952	314,349	507,592
SALES	96	23,727	5,271,390	665,969	1,151,206	24181	23,044,929	992,248	2,648,375

Descriptive statistics for the 96 PLCs, 1996 as before-crisis period, and 2000 as after-crisis period

Leverage in terms of long-term, short-term and trade payables that these PLCs have acquired and utilized before the crisis ranges from a minimum of 0 to a maximum of RM2,563,149.00, a minimum of 0 to a maximum of RM3,435,521.00, and a minimum of 0 to a maximum of RM750,666.00, respectively. On the average PLCs acquired and utilized RM114,019.00, RM125,876.00 and RM61,698.00 of long-term debt, short-term debt and trade payables respectively. However, after the crisis leverage of firms ranges from a minimum of 0 to a maximum of RM3,188,490.00, a minimum of 0 to a maximum of RM7,216,780.00, and a minimum of RM680 to a maximum of RM2,413,339.00, respectively. On the average PLCs acquired and utilized RM123,164.00, RM775,414.00 and RM167,681.00 of long-term debt, short-term debt and trade payables respectively. The outputs that PLCs on the average produced before the crisis were sales RM992,248.00 and equity RM314,349.00 respectively. However, after the crisis the sales for PLCs on the average dropped to RM665,969.00. However, equity increased to RM377,817.00.

Figure 3: PCA Analysis on the Performance of PLCs based on Financing Decisions

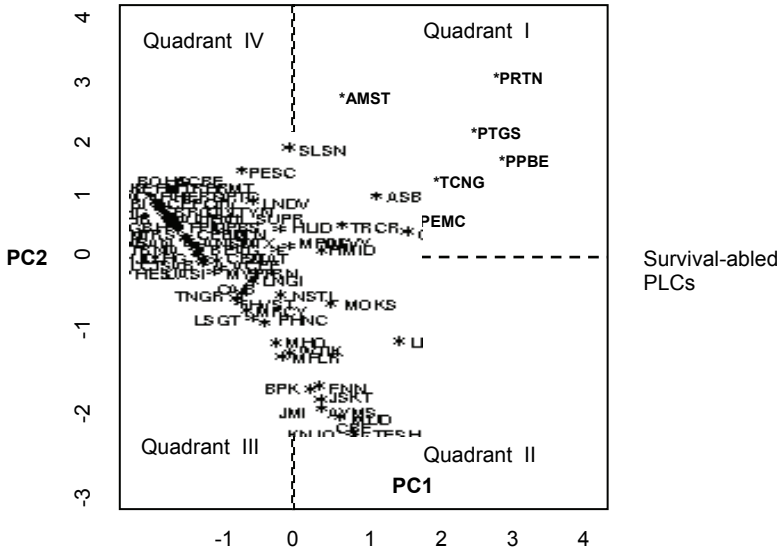


Figure 3 shows three quadrants; each related to the survival-ability of the PLCs. On the right-hand side of Figure 3, quadrant I contains PLCs that have higher survival-ability rate while quadrant II contains a lower survival-ability rate. On the left-hand side, quadrant III contains PLCs that have higher survival-inability rate, and quadrant IV contains PLCs that have lower survival-ability rate.

In term of performance of PLCs, Figure 3 shows that during the process of utilizing the financial and operating leverage, PLCs such as PRTN, PPBE, PEMC AMST, ADPG and PTGS are found clustered on the upper right-hand side of Figure 3; hence they are termed as survival-abled PLCs. This indicates that in these PLCs have the highest survival-ability rate and they shared some similarities in terms of their financing decisions. This means that in terms of the mixture of leverage utilized to produce the output were about same. PLCs located on the lower right part of Figure 3 have a lower survival-ability rate while those that are located closer to the lower left of Figure 3 have a higher survival-inability rate. It means they are least able to survive in the long run if they do not increase their performance. These are the PLCs that have the highest probability of falling into the PN4 category if they do not improve their performance. These PLCs may be highly leveraged and hence unable to finance large investments; thus, they may not be able to compete and be forced to liquidate. For survival-inabled PLCs, such as CIHG, FCBI, UNZ, GBH and KSM clustered on upper left-hand side of the Figure 3, indicates that these PLCs have a lower survival-inability rate. They are termed as survival-inabled PLCs. This also indicates that they have some similarities in terms of the mixture of leverage that they utilized in their production activities.

CONCLUSION

In this study, we found that the mixture of financing leverage and operating leverage that the PLCs used, determine the survival-ability of PLCs. The issue of dimensionality was resolved by creating dimensions of model that were used to evaluate the performance of the financing decisions, while the issue of the sensitivity of the models was resolved by performing sensitivity tests on the models. The EMS used in this study has an avenue for sensitivity testing in the form of a super-efficiency technique. The result shows that PLCs that are already on the frontier do not exhibit changes when the test is performed. This goes to show that the models used are stable to evaluate the survival-ability of the PLCs. The PLCs remained stable when sensitivity test are performed on all the models that were used in the computation of the efficiency of the financing process.

During the period before and after the crisis, it was found that PLCs such as PRTN, PPBE, PEMC AMST, ADPG and PTGS shared some similarities in terms of their financing decisions. The mixture of leverage that were utilized to produce the output were about the same for this companies. They are considered as survival-abled PLCs. Survival-inabled PLCs, or firms with lower survival rate, have to be cautious in term of their financing decisions. As if they are highly leveraged and they are not able to improve their performance, they will be put under the category of PN4 category.

This study only studies PLC involved in the manufacturing sector. Future research may need to cover a wider range of PLCs across industries. Even though, this study has some limitations, in term of the coverage of the sample understudy, Its contributions to the current literature in areas such as the evaluation of survival-ability of PLCs in Malaysia via the financial leverage and operating liability leverage.

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