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DISCRETIONARY DELETIONS FROM THE S&P 500 INDEX: EVIDENCE ON FORECASTED AND REALIZED EARNINGS

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ABSTRACT

The literature in the area of index changes finds evidence that index changes are information free events. However, Denis, McConnell, Ovtchinnikov and Yu (2003) find evidence contrary to this theory. This study extends the work of Denis, McConnell, Ovtchinnikov and Yu (2003) in an attempt to complete the assessment of the information hypothesis of index changes. Denis, McConnell, Ovtchinnikov and Yu (2003) address only index additions and do not examine index deletions in their study. Our contribution is in filling this void in the literature by examining forecasted and realized earnings of firms discretionary deleted from the S&P 500 index in the period October 1989 – December 2007. The study finds that contrary to the prediction of the information hypothesis the earnings forecasts and actual earnings of firms discretionary removed from the S&P 500 index on average increase.

JEL: G12; G14

KEYWORDS: S&P 500 discretionary deletions, S&P 500 changes, earnings forecasts

INTRODUCTION

There are more than $1 trillion invested in assets indexed to the S&P 500 index. Most of these assets are held in index mutual funds and exchange traded funds (ETFs). Naturally, when there are S&P 500 index changes because of the large trading activity associated with the portfolio rebalancing of index funds and ETFs there will be significant price pressures on the added or deleted from the index firms' stock prices. The widely accepted theory in the area of index changes is that the changes lack information content, as suggested by Shleifer (1986) among others. This theory stems from the S&P U.S. Indexes committee's statement that if a firm is selected for inclusion in an index, the firm does not necessarily have an "investment merit." The information hypothesis suggests that the addition to an index is not an information free event and should result in a permanent increase in the stock price of the added firm. The reason is the increased exposure of the added firm to monitoring by the capital markets which results in better performance of the added firm. Denis, McConnell, Ovtchinnikov and Yu (2003) provide evidence of improved performance by firms included in the S&P 500 index. However, if true this hypothesis must hold not only for added firms but also for deleted from the index firms. If a company is removed its exposure to capital markets monitoring diminishes and management should have a smaller motivation to keep up the good performance. Therefore, if the information hypothesis holds and a firm is removed from the S&P 500 index the firm's forecasted and actual earnings should decrease.

Denis et al. (2003) address only index additions and do not examine index deletions in their study. Our contribution is in filling this void in the literature by examining forecasted and realized earnings of firms discretionary deleted from the S&P 500 index in the period October 1989 – December 2007. This study extends the work of Denis et al. (2003) in an attempt to complete the assessment of the information hypothesis of index changes. This study finds that the number of firms with analyst following diminishes after removal from the index indicating decreased monitoring. The study also finds that contrary to the prediction of the information hypothesis the earnings forecasts and actual earnings of firms discretionary removed from the S&P 500 index on average increase.

The paper is organized as follows: in the next section a brief review of the literature is provided, followed by discussion of the data and methodology used in the paper. After analysis of results the paper concludes.

LITERATURE REVIEW

The literature in the area of index changes finds evidence in support of the theory of index changes being information free events. The major studies in the area are by Shleifer (1986), Harris and Gurel (1986), Dhillon and Johnson (1991), Beneish and Whaley (1996), Lynch and Mendenhall (1997) and Wurgler and Zhuravskaya (2002). Shleifer (1986) performs an event study of S&P 500 index additions by comparing the announcement period excess stock return to the added firm's bond rating. The author finds no information content of the additions. And so do Harris and Gurel (1986), and Lynch and Mendenhall (1997) who find that the initial price increase is reversed within a month of the firm's addition which is inconsistent with the information content theory. If additions have information content the increase should have had a permanent effect on the stock price. Dhillon and Johnson (1991), Beneish and Whaley (1996), and Wurgler and Zhuravskaya (2002) are the studies which suggest that additions might have information content but do not perform formal tests.

Contrary to these findings of additions lacking information content, Denis et al. (2003) provide evidence in support of the information content of index changes. The authors find that firms newly added to the S&P 500 index in the period 1987 through 1999 experience an increase in realized earnings per share and forecasted earnings per share. Denis et al. (2003) measure improved performance by the added firm pre and post addition and relative to a benchmark firm. Denis et al. (2003) use two benchmark companies in their analysis. The first benchmark consists of all firms that can be identified from the Institutional Brokers' Estimates System International, Inc. (I/B/E/S) database to have a current and one-year ahead median EPS forecast for the same pre-announcement period and the same post-announcement period as for the firm of interest. The second benchmark consists of firms selected based on the "industry, size, and liquidity (ISL) matched companies" framework. The authors take the whole I/B/E/S database and sort it by using the 12 Fama-French industry portfolios. They divide each industry portfolio into three other portfolios based on market capitalization, and an additional division into three other portfolios based on liquidity.

Denis et al. (2003) reasoning is that it might be possible that when a firm is added to the S&P 500 index the firm's operation and performance are exposed to greater scrutiny by the investment community and management respectively improves performance. This response can be explained with the greater cost to the manager's reputational capital if she allows for S&P 500 firm to perform poorly. The authors find improvement in the performance of firms added to the S&P 500 index and suggest that another possible explanation is that the S&P 500 index committee might be selecting firms with superior potential to be included in the index. This is contrary to the committee's statement that if a firm is selected for inclusion in the index, the firm does not necessarily have an "investment merit". Denis et al. (2003) findings support the information hypothesis of the price reaction to index additions.

However, if true the information hypothesis must hold not only for added firms but also for deleted from the index firms. If a company is removed from the index its exposure to capital markets monitoring should diminish and management should have a smaller motivation to keep up the good performance. Therefore, if the information hypothesis holds and a firm is removed from the S&P 500 index the firm's forecasted and actual earnings should decrease. Dash (2002) finds temporary effects in the returns of firms discretionary deleted from the S&P 500 index. Dash studies S&P 500 index deletions in the period January 1, 1998 to June 25, 2002. He finds that within six days of the effective deletion of a firm from the S&P 500 index the negative returns reverse. Similarly, Chen, Noronha, and Singal (2006a, b) find a temporary (3 months) effect due to a deletion from the index. These findings have some support for the

price pressure hypothesis and might have implications for our analysis. Naturally, it is expected to see permanent deterioration in the earnings forecasts and actual earnings by these firms if the information hypothesis holds. However, if there is a reversal in the price of the discretionary deleted firms then the negative return is due only to supply and demand imbalances and not to changes in the fundamentals of the firm that is deleted. Therefore, there should not be any changes in the earnings expectations and realized earnings of deleted firms.

DATA AND METHODOLOGY

The Institutional Brokers' Estimates System International, Inc. (I/B/E/S) database is utilized to identify earnings forecasts and realized quarterly earnings of discretionary deleted firms. Compustat provided the annual accounting information of firms discretionary deleted from the S&P 500 index.

Table 1: Descriptive Statistics of Discretionary Deleted Firms in the Period October 1989 – December 2007 Two Years before Deletion from the S&P 500 Index, in the Year of the Deletion from the Index, and Two Years After Deletion from the S&P 500 Index (Annual Data)

		mean	median	stdev	min	max
2 years before deletion	TA	3276.14	1531.18	6197.56	97.61	36680.50
	Debt	729.75	265.10	1427.51	0.00	9834.00
	Employees	18.68	10.60	23.00	0.65	112.50
	EPS	0.62	0.57	2.78	-11.43	12.56
	Price	27.50	20.31	26.29	0.81	170.06
	Leverage	0.21	0.21	0.19	0.00	0.94
Deletion year	TA	3329.81	1411.59	7527.81	74.55	44320.40
	Debt	941.22	287.50	2462.65	0.00	15916.00
	Employees	17.60	9.00	22.23	0.80	96.40
	EPS	-0.92	0.02	3.38	-15.23	4.63
	Price	14.86	11.98	12.66	0.56	64.88
	Leverage	0.24	0.24	0.19	0.00	0.92
2 years after deletion	TA	4213.99	1388.00	13172.93	78.34	97161.00
	Debt	998.30	259.00	2873.04	0.00	21011.00
	Employees	15.95	9.00	19.30	0.13	88.40
	EPS	-0.39	0.49	5.47	-38.25	15.51
	Price	16.58	12.19	16.57	0.07	107.00
	Leverage	0.24	0.22	0.20	0.00	0.96

This table shows the mean, median, standard deviation, minimum and maximum of the total assets, debt, number of employees earnings per share (EPS), stock price, and leverage for the sample of 77 discretionary deleted firms, two years before deletion, in the deletion year, and two years after deletion. EPS for 2 years after deletion data has a significant outlier, Armstrong Holdings Inc. has $-38.25 of EPS. The outlier is replaced with the sample mean.

Table 1 presents descriptive statistics for firms discretionary deleted from the S&P 500 index in the period October 1989 – December 2007. The table includes information of discretionary deleted firms' average total assets, leverage, market price at fiscal year end, earnings per share (EPS) and number of employees. The following items from Compustat are used in the analysis: Data6 – Total Assets, Data9 - LT Debt, Leverage computed as Data9/Data6, Data199 - Price-Fiscal Year – Close, Data58 - EPS (Basic) Exclude Extraordinary Items (Annual), Data29 - Number of Employees. The descriptive statistics are for

variables at the time of the discretionary deletion, two years prior to deletion and two years after deletion from the S&P 500 index.

Only 77 firms out of 118 discretionary deleted firms have complete data for the deletion year, two years before and two years after deletion. For comparison, 99 firms out of 118 discretionary deleted firms have complete current and two years before data. The table exhibits deterioration of all parameters of the discretionary deleted firms in the two year period before the firms' deletion from the S&P 500 index on annual basis. However, the only item which deteriorates two years after the deletion is the number of employees. The rest of the firms' characteristics improve two years after the firms' deletion from the S&P 500 index.

This study examines earnings forecasts and actual earnings of firms discretionary deleted from the S&P 500 index by using methodology similar to Denis et al. (2003). Discretionary deleted firms are removed from the index because they do not meet one or several of the S&P 500 index criteria. The index criteria set requirements for share price, liquidity, market capitalization, earnings and others for a company to be selected for inclusion in the index. There are non-discretionary deletions due to merger, acquisition, bankruptcy, spin-off or other company specific event which might cause a firm to seize to exist. Similar to Chen, Noronha, and Singal (2006a, b) firms with anticipated major corporate event which might cause a firm to be discretionary deleted are excluded from the analysis. For example, Enron and WorldCom which were removed from the index because of anticipation by investors that these firms will go bankrupt are excluded from the sample. Indeed, within two months of deletion from the S&P 500 these firms filed for bankruptcy. This study is derived from on-going concern firms engaged in discretionary deletion from the S&P 500 index. Dash (2002) finds that large proportion of the discretionary deleted firms is shifted into the S&P MidCap 400 or S&P SmallCap 600 indexes.

Only discretionary deletions are examined in this study. A company can be removed from the S&P 500 index because of a certain company event which will cause the firm to seize to exist. Examples of such deletions are mergers, acquisitions or bankruptcies or anticipated such major corporate events. Alternatively, a firm might be removed from the index because it does not meet one or more of the seven criteria necessary for a firm to be in the S&P 500 index. The seven criteria are: U.S. domicile, corporate form of organization, positive earnings, market capitalization, price level, public float and sector classification. The decision for removal of a firm from the S&P 500 index is made by the S&P U.S. Indexes Committee. The committee consists of Standard and Poor employees who meet regularly to decide on additions and deletions from the S&P indexes. In this study our focus is on discretionary deletions only because the rest of the deletions are clearly affected by fundamentals changes.

To a certain extent Denis et al. (2003) methodology is followed in this study. Denis et al. (2003) do not attempt to find the causality relation of whether a firm is included in the index because it has a superior potential, or it gets superior performance after it joins the index in result of higher monitoring standards. Similarly, this paper does not attempt to find the causality relation of whether a firm is discretionary removed from the index because it has the inferior performance or it gets inferior performance after it is removed from the index. Also, Livnat and Mendenhall (2006) methodology is used for the computation of earnings forecasts. Unadjusted earnings forecasts are used and matched with actual earnings while controlling for stock – splits and day-of-the-week effects. After the adjustments the median analyst earnings per share (EPS) forecast, 90 days prior to the EPS announcement is used.

The analysis focuses on the period October 1989 – December 2007 because in October 1989 the S&P started pre-announcing index changes. The consensus in the literature is that this date represents a major structural change in the S&P 500 index methodology (Chen, Noronha, and Singal, 2006a, b). Naturally, there are other changes to the index methodology, such as the regular revision of the minimum required level of market capitalization for a firm to be included in the index, the change in the composition of the

S&P U.S. indexes committee to name a few. Thus, to strengthen our conclusions several robustness tests are performed. A separate sample, only of firms identified by S&P (via Lexis-Nexis) of being moved from the S&P 500 into the S&P MidCap 400 or S&P SmallCap 600 indexes is examined. Additionally, a matching exercise to check whether our findings hold only for the deleted firms or are true for all firms similar to Denis et al. (2003) methodology is performed. However, the matching framework in this study differs with Denis et al. (2003) in that plus or minus 40% of market capitalization and two digits Standard Industry Classification (SIC) code is used to identify the matching firms sample.

ANALYSIS

Only 50 discretionary deleted firms have complete data in the I/B/E/S database two years after discretionary deletion on both actual and analyst median forecasted EPS. For comparison, 70 firms have data for both analyst estimates and actual EPS in the year of deletion from the S&P 500 index. Compare these numbers to the 77 firms that have data for EPS on Compustat. This suggests that 77 firms are fully operational after deletion. These facts can be explained with the decrease in analyst following after firms are removed from the S&P 500 index.

Table 2 displays average analyst median estimates and actual EPS for the sample of 50 discretionary deleted firms. Clearly, the average analyst forecast of discretionary deleted firms earnings estimates deteriorate two years after deletion. However, it appears that the actual performance of the deleted firms improves.

Table 2: Average Median Estimate and Actual Quarterly EPS for Firms Discretionary Deleted from the S&P 500 Index

		mean	median	stdev	min	max
2 years before deletion	medest EPS	0.51	0.35	0.79	-1.95	3.35
	actual EPS	0.23	0.25	0.63	-3.40	1.53
Deletion year	medest EPS	0.40	0.21	0.59	-0.62	2.45
	actual EPS	0.13	0.16	0.68	-3.39	1.38
2 years after deletion	medest EPS	0.32	0.14	0.67	-0.52	3.90
	actual EPS	0.20	0.14	0.33	-0.58	0.80

This table shows the mean, median, standard deviation, minimum and maximum of the average analyst median estimates and actual EPS for the sample of 50 discretionary deleted firms, two years before deletion, in the deletion year, and two years after deletion. American Airlines Inc. has an analyst forecast of $-13 which is an outlier. It is replaced with the sample mean.

Robustness tests are performed by matching discretionary deleted firms with firms that are still in the S&P 500 index similar to Denis et al. (2003) methodology. The matching framework in this study differs with Denis et al. (2003) in that plus or minus 40% of market capitalization and two digits SIC code is used to identify the matching firms which are still in the S&P 500 index. The rapid loss of analyst following caused the matching of discretionary deleted firms and firms that are still in the S&P 500 index to become problematic. Our attempt to perform matching resulted in less than ten matching pairs which are not sufficient for generalization of results in this section of our analysis.

The following regression equations are estimated to identify the determinants of the median quarterly earnings forecast (Medest) and the actual earnings (Actual):

$$\text{Medest} = \alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved}), \quad (1)$$

$$\text{Actual} = \alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved}), \quad (2)$$

where variable Time is number of days after deletion from the S&P 500 index, variable After is a dummy variable identifying observations after deletion (the number one identifies the observations after deletion, zero otherwise), variable AfterTime is an interaction variable computed as the product of dummy variable identifying after deletion observations and time after deletion, and variable Moved is a dummy variable identifying observations for companies that are moved to a lower capitalization S&P index. Ordinary Least Squares estimates are obtained. The results presented in Table 3.

Table 3: Multivariate Analysis of Median Estimate and Actual Quarterly EPS for Firms Discretionary Deleted from the S&P 500 Index

	before deletion models		**after deletion models**		**combined before and after models**	
	medest	actual	medest	actual	medest	actual
Intercept	0.4257***	0.2018***	0.2655***	0.1250***	0.3710***	0.1477***
Time	-0.0001***	-0.0001***	0.0001***	0.0001***	-0.0001***	-0.0001***
After					-0.1712***	-0.0878**
Aftertime					0.0002***	0.0001***
Moved					0.1075***	0.1064***
Adj R-sq	0.0252	0.0175	0.0099	0.0157	0.0409	0.0305
Number of observations	3905	3905	1378	1378	5283	5283

This table shows the regression estimates of the equations:
Medest = $\alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved})$,
Actual = $\alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved})$
*The first column shows results for median estimate and actual EPS regressions prior to deletion, the second column shows results after deletion and the third column combined data before and after deletion. The figure in each cell is the regression coefficient. Significant difference from zero at the 10 percent, 5 percent and 1 percent level is denoted with *, ** and ***, respectively.*

The analysis suggests that before deletion from the index the consensus among the analysts following the companies is that the earnings will deteriorate which they do, suggested by the significant negative regression coefficient. In contrast, the companies that still have analyst following after deletion from the S&P 500 index on average improve their actual earnings, suggested by the significant positive regression coefficient. There are fewer firms with forecasted earnings expressed in the fewer observations for the After Deletion Models in the analysis. The improvement in actual earnings is accompanied with an increase in the expected earnings for these companies. This is contrary to the information hypothesis prediction of deterioration of both forecasted and actual earnings of companies deleted from the S&P 500 index. The moved variable suggests that results are similar for firms discretionary deleted and moved to another S&P index.

Another approach to the analysis of the information hypothesis is to examine the behavior of the difference between the median estimate and actual EPS and standardized earnings surprises and earnings revisions for firms discretionary deleted from the index around the event of deletion. The following regression equations are estimated to identify the determinants of the difference between the median estimate and actual EPS (Diff) and standardized earnings surprises (Sue3):

$$\text{Diff} = \alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved}) , \quad (3)$$
$$\text{Sue3} = \alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved}) , \quad (4)$$

where variables are as discussed above with the addition of variable Match which is a dummy variable indicating matching firms. The standardized earnings surprises (sue3) are defined by Livnat and Mendenhall (2006) as the difference between the actual and median earnings estimates multiplied by the

quarterly adjustment factor and divided by the end of quarter stock price. Not all firms have available data for the adjustment factors and that is why the sample sizes are smaller relative to the earlier analysis.

Ordinary Least Squares estimates are obtained. Results of the multivariate analysis of the two earnings surprises measures are presented in Table 4, column Earnings Surprises. The results for the time variable suggest that as time goes by analysts tend to provide lower estimates for the difference between median EPS estimates and actual EPS for all firms, at the same time the standardized earnings surprises tend to increase for all firms. However, the results for aftertime are significant and show increase in the difference between expected and actual earnings for discretionary deleted firms but decrease in standardized earnings surprises. These findings are again in contrast to the information hypothesis which suggests that both expected and actual earnings should diminish so there should not have been any significant earnings surprises. Our attempt to perform matching robustness tests resulted in less than ten matching pairs which are not sufficient for generalization of results for earnings surprises.

Table 4: Multivariate Analysis of Difference between Median Estimate and Actual Quarterly EPS (diff), and Standardized Earnings Surprises (sue3), and Revisions for Firms Discretionary Deleted from the S&P 500 Index

	Earnings Surprises		*Revisions*		*Revisions (Match)*	
	diff	sue3	revision	revisionp	revision	revisionp
Intercept	0.2233***	-0.0031	48.2437***	160.9786***	17.1523***	3.6163**
Time	-0.00005***	0.000009***	0.0095**	0.0231	-0.0004	-0.0007**
After	-0.0834	-0.0062	-113.1326***	83.5163	-2.1779	2.7895*
Aftertime	0.0001***	-0.000009**	-0.0067	-0.0595	-0.0010	-0.0005
Moved	0.0011	0.0009	-2.5809	-70.3621*	-14.6648***	-2.1835*
Match					-3.6421**	-0.5664
Adj r-sq	0.0118	0.0156	0.0004	0.0001	0.0032	0.0003
Number of observations	5283	3007	75701	75701	14886	14886

This table shows the regression estimates of the equations:
Diff = $\alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved})$,
Sue3 = $\alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved})$,
Revision = $\alpha + \beta 1(\text{Time}) + \beta 2(\text{After}) + \beta 3(\text{AfterTime}) + \beta 4(\text{Moved}) + \beta 5(\text{Match})$,
RevisionP = $\alpha + \beta 1(\text{Time}) + \beta 2(\text{After}) + \beta 3(\text{AfterTime}) + \beta 4(\text{Moved}) + \beta 5(\text{Match})$.
*The first column shows results for earnings surprises, the second column shows results for revisions and the third column for revisions with matched sample of firms. The figure in each cell is the regression coefficient. Significant difference from zero at the 10 percent, 5 percent and 1 percent level is denoted with *, ** and ***, respectively.*

Next, the behavior of EPS forecasts revisions is examined. Revision is defined as the difference between current EPS estimate and the previous EPS estimate. The following regression equations are estimated to identify the determinants of the revisions for firms discretionary deleted from the index around the event of deletion (Revision) and the standardized revision variable (RevisionP):

$$\text{Revision} = \alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved}) + \beta_5(\text{Match}), \quad (5)$$
$$\text{RevisionP} = \alpha + \beta_1(\text{Time}) + \beta_2(\text{After}) + \beta_3(\text{AfterTime}) + \beta_4(\text{Moved}) + \beta_5(\text{Match}), \quad (6)$$

where independent variables are discussed above. Revision is the difference between current and previous EPS estimate. Revisionp is the ratio of the difference between current EPS estimate and the previous EPS estimate and the previous EPS estimate. Ordinary Least Squares estimates are obtained. Results for all discretionary deleted firms are presented in Table 4, column Revisions. The results suggest that the fewer

analysts following removed firms tend to revise their earnings estimates more often in negative direction for the deleted firms, suggested by the significant negative coefficient for the after variable.

Robustness tests focus on a sample of matching firms and moved to another index firms. The matching firms are selected based on current and three years prior plus minus 40% market capitalization and same two digits SIC code. The results are presented in Table 4, column Revisions (Match). These results suggest that both the removed firms and the matching firms which are still S&P 500 index members experience increase in earnings revisions in negative direction which means that the information hypothesis does not hold. If the information hypothesis held the results should have been in opposite direction to what is found in this study since the information hypothesis suggests that firms in the S&P 500 index tend to perform better because of the capital markets monitoring.

CONCLUSION

This study extends the work of Denis et al. (2003) in an attempt to complete the assessment of the information hypothesis. A realized and forecasted earnings per share of firms discretionary deleted from the S&P 500 index in the period October 1989 – December 2007 are examined. The performance of the deleted firms prior to deletion is compared to the performance of the firms after the deletion. Also, the performance of the deleted firms is compared to the performance of a matching sample of firms. The matching firms are identified by taking all S&P 500 firms on the deletion day using current and three years prior plus or minus 40% of market capitalization and two digits SIC code. The results suggest that the number of firms with analyst following diminishes significantly in the two year period after removal from the S&P 500 index. Also, firms with analyst following after deletion from the S&P 500 index experience an increase in earnings forecasts and actual earnings, contrary to the prediction of the information hypothesis. The small number of observations in the earnings surprises analysis posed a limitation to our study. In a future research, when more observations will be available the analysis will be extended. Another natural extension of this study is examining the characteristics and behavior of the analysts who end covering a deleted firm and the behavior of analysts who continue following a deleted firm.

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THE IMPACT OF APARTHEID AND INTERNATIONAL SANCTIONS ON SOUTH AFRICA'S IMPORT DEMAND FUNCTION: AN EMPIRICAL ANALYSIS

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ABSTRACT

In this paper we ascertain South Africa's aggregate import demand function over the period 1950 to 2008 utilizing the bounds testing approach to cointegration, and the unrestricted error-correction model. Our study empirically investigates the impact of apartheid (1950-1994), in particular the period of international sanctions (1981-1994) against the apartheid government, on South Africa's imports. Further, we utilize the autoregressive distributed lag model to estimate short-run and long-run import elasticities. Our results reveal that imports depend positively on the levels of domestic economic activity and foreign exchange reserves but negatively on relative prices. In addition, apartheid has had a significant short-run negative impact on import demand, but is insignificant in the long-run. Furthermore, international sanctions affected import demand positively in the short-run, but negatively in the long-run We argue that appropriate public policy is necessary to reduce the economy's reliance on imports of capital and intermediate goods, especially oil, while simultaneously diversifying its exports base. Strengthening trade relations with other developing countries will give it an exchange rate advantage, improve its balance of payments, create macroeconomic stability, growth, and with that, alleviate unemployment and poverty in South Africa.

JEL: F14, F31

KEYWORDS: South Africa, aggregate import demand, real exchange rates, elasticity

INTRODUCTION

Empirical investigation of the import demand function has been one of the most active research areas in international economics. Over the past three decades, numerous researchers have estimated aggregate import demand functions predominantly for developed countries essentially because of data constraints on developing economies. The traditional import demand function generally relates the aggregate quantity of imports to real income, the relative price of imports, and the lagged quantity of imports to capture any partial adjustment of desired to actual imports. However, this specification has several drawbacks, among them, the negligence of non-stationarity present in most macroeconomic variables, which causes serious statistical inference problems.

With the development of cointegration techniques for modeling nonstationary variables, the estimation of import demand functions has gained renewed attention. Since most studies have concentrated on the experience of industrialized countries, it is difficult to draw general conclusions from these findings to developing countries. This paper overcomes this problem by focusing on South Africa, a developing country. Our objective is to investigate South Africa's long-run import demand function and its associated short-run dynamics for the period 1950-2008. This import demand function is estimated using the bounds testing approach to cointegration and the error-correction model.

We proceed in the next section with a review of the literature and a brief history of South Africa. Thereafter we show the alternative forms of the estimated import demand function for South Africa. In the subsequent section a description of the variables and data used for estimation is presented. Empirical

results of cointegration tests and error-correction model estimates are presented and discussed in the section thereafter. The final section concludes the paper with policy recommendations.

LITERATURE REVIEW AND HISTORICAL BACKGROUND

Brief History of South Africa with Special Reference to Imports

South Africa is at the same time an African economic giant and a middle-income dualistic developing country (Truett & Truett, 2003). Until the financial crisis of 2008, it was deemed one of the fastest growing economies on the globe and was characterized as an emerging market ripe for foreign and domestic investment. Unfortunately, while South Africa boasts such dominance and growth, it also suffers serious economic problems associated with low exchange rate reserves, declining exports, increased imports, abnormally high unemployment rates, falling foreign reserves, and balance of payments constrictions (Saayman, 2010; Ngandu, 2008, 2009; Truett & Truett, 2003). However, while other developing countries suffered these problems because of their colonial heritage (Razafimahefa and Hamori, 2005, Gumede, 2000), South Africa suffered these problems primarily because of the rigidities imposed by the apartheid state (Thompson, 2000; Truett & Truett, 2003; Liu and Saal, 2001).

The apartheid era officially spanned the period 1948-1994, but was in effect for almost 100 years (Liu and Saal, 2001; Thompson, 2000). The apartheid economy thrived at first, but began to stagnate rapidly by the 1970's until its demise in the 1990's. This was due to the distorted allocation of resources, and the resultant inefficiencies created by racializing the economic structures of accumulation to serve the minority white race (Truett & Truett, 2003; Edwards, 2001). This stagnation was further reinforced by international sanctions, first in the form of an arms and oil embargo, and then through disinvestment from South Africa (Thompson, 2000). The apartheid government responded defensively to these sanctions by creating further rigidities through import substitution industries, high import tariffs, and subsidies for export promoting industries (Ngandu, 2009; Truett and Truett, 2003; Liu and Saal, 2001). During this late stage apartheid era, private investment contributed negatively to growth (-12.5%) and import substitution industries (ISI) accounted for 9.7% of GDP. GDP itself recorded average growth rates of only 1% in the 1980–90 period, and inflation manifested double-digits (World Bank, 2010). These macroeconomic indices were higher than the average by international standards, and it was clear that the apartheid regime operated in survival mode, constantly solving short-term problems rather than focusing on long-term policies. However, in hindsight, analysts paid scant attention to how these policies manifested themselves in the apartheid era's aggregate import demand function, which is the objective of this study.

The end of the apartheid era brought with it a change in South Africa's economic structure. The new post-apartheid government began to recreate a more open economy with the help of international governments who also eliminated international sanctions against South Africa (Department of Trade and Industry, 2010; World Bank, 2010; Truett & Truett, 2003; Edwards, 2001). To transform apartheid's survival mode of production to a dynamic mode, the new government implemented a series of strategic policies, among them: privatize parastatals, promote private investment, reduce tariffs and export subsidies, loosen exchange controls, cut taxes on corporate dividends, and enforce intellectual property rights, creating a more competitive international environment (Saayman, 2010; Kabundi, 2009; Edwards, 2001). As such, GDP increased steadily so that by 2007 real GDP growth reached 5%, inflation decreased to 3.9% (2005), private investment dramatically increased from negative rates to 15.1%, and exports increased exponentially from 11.5% in 1990 to 29.1% of GDP in 2001 (World Bank, 2010). South Africa also recorded its first ever budget surplus in history, helping it contain its external debt to 26% of GDP, which was lower than other similarly developing countries (Statistics South Africa, 2010).

South Africa's imports grew remarkably at a growth rate of 8.6% between 1995 and 2008. Table 1 displays the main sources of imports while Table 2 shows the composition of these imports. Asia is the

largest source of imports accounting for nearly 42.9% of imports in 2009, while Asia and Europe together account for more than 75% of imports. As the largest supplier of imports, China provides machinery and mechanical appliances, textiles and textile articles, base metals and articles of base metal, and products of the chemical or allied industries. Imports from Germany and the US consist mainly of machinery and mechanical appliances. Manufacturing goods account for the largest share of South Africa's imports and mining accounts for the second-largest share (Saayman, 2010). However, the share of manufacturing imports has decreased from 86.2% in 1992 to 74.9% in 2008 while the share of mining imports increased from 7.7% to 22.1% during the same period. (Department of Trade and Industry, 2010). It is a member of the World Trade Organization, is allowed to benefit from the US African Growth and Opportunity Act (AGOA), and most of its products can enter the United States market duty free (US Department of State, 2010; Kabundi, 2009). In fact, South Africa's fiscal structure, debt management, and trade policies, have been considered international best practices by international organizations (World Bank, 2010).

Table 1: Major Sources of South African Imports, 2009

Region/Country	Value of Imports (Millions of US$)	Share of Total Imports (%)
Asia	27,526.1	42.9
Europe	22,164.7	34.5
Americas	8,296.4	12.9
Africa	4,800.2	7.5
Pacific	1,259.2	2.0
China	8,418.0	13.1
Germany	7,520.0	11.7
United States	4,943.6	7.7
Saudi Arabia	3,168.3	4.9
Japan	3,129.2	4.9
Iran	2,628.4	4.1
United Kingdom	2,567.5	4.0
France	2,023.6	3.2
Nigeria	1,854.5	2.9
India	1,832.8	2.9

Note: This table shows the major sources of imports by continent and country, to South Africa. Data is taken from the Department of Trade and Industry, Republic of South Africa (2010).

Table 2: Major Imports to South Africa, 2009

HS	Product	Value of Imports (Millions of US$)	Share of Total Imports (%)
27	Mineral fuels, mineral oils and related products	13,694.48	21.3
84	Nuclear reactors, boilers, machinery and mechanical appliances	9,871.64	15.4
85	Electrical machinery and equipment and parts thereof	6,906.53	10.8
87	Passenger Vehicles	4,603.83	7.2
98	Special classification provisions	3,564.09	5.6
90	Optical photographic, cinematographic, measuring, checking,	1,842.85	2.9
30	Pharmaceutical products	1,602.52	2.5
39	Plastics and articles thereof	1,561.79	2.4
29	Organic chemicals	1,111.49	1.7
38	Miscellaneous chemical products	1,023.69	1.6
88	Aircraft, spacecraft and parts thereof	904.55	1.4
73	Articles of iron or steel	886.73	1.4
48	Paper and paperboard; articles of paper pulp	839.33	1.3
40	Rubber and articles thereof	824.77	1.3
28	Inorganic chemicals; organic or inorganic compound	791.55	1.2
10	Cereals	762.53	1.2
72	Iron and steel	740.03	1.2
64	Footwear, gaiters and the like; parts of such articles	571.90	0.9
15	Animal or vegetable fats and oils	553.20	0.9
62	Articles of apparel and clothing accessories, not knitted	514.80	0.8

Note: This table shows the major import products to South Africa. Data is taken from the Department of Trade and Industry, Republic of South Africa (2010).

Post-apartheid South Africa seems braced for sustained growth and economic upward mobility. Indigenous Africans comprising 78% of the population are projected to rise exponentially to the ranks of middle-class from just over 23% to 70% by 2026 (Statistics South Africa, 2010), leading to increases in the demand for all goods, including imports. However, although South Africa seems to be developing favorably, it faces grave challenges, among them, increased dependence on energy, intermediate and capital goods imports (see Table 2), an export economy that is dependent on natural resources, decreased foreign reserves, and exchange rate unpredictability (Saayman, 2010; Wabiri and Amusa, 2010; Kabundi, 2009; Truett & Truett, 2003; Edwards, 2001). Its currency, the *Rand*, has been more unstable than most of the world's currencies and this in turn has contributed to macroeconomic instability. The current account deficit and balance of payments shortcomings have become palpable (The Guardian, 2010). Politically, officials are beginning to debate the return of protectionist policies that were so prevalent in the apartheid era. However, to inform effective policy, one has to understand the aggregate import demand function for South Africa, which is the objective of our current study.

CURRENT STATE OF THE LITERATURE

Although considerable research has been undertaken on import demand functions, we only present the findings of studies that analyze the determinants of aggregate imports using refined econometrics techniques that test for non-stationarity. Our literature also focuses primarily on developing countries.

Akinlo (2008) employs a translog cost function to examine the substitution relations among capital, labor, and imports in Nigeria. Results indicate that domestic capital is a substitute for both labor and imports, although their elasticity values decrease over time, so that a current reduction in import prices is less significant on capital demand than before. Labor and imports have a complementary relationship so that lower import prices would positively affect the demand for domestic labor. Similarly, import prices affect the prices of domestic investment goods appreciably. These results suggest that, *ceteris paribus,* the relaxation of restrictions on foreign trade would lead to lower import prices and hence higher economic growth in Nigeria, leading to increased foreign reserves, and a better exchange rate.

Razafimahefa and Hamori (2005) analyze the long-run aggregate import demand functions of two very similar countries, Madagascar and Mauritius, for the period 1960-2000. Their results reveal that Madagascar's long-run income elasticity (0.855) is higher than for Mauritius (0.671), indicating a greater amount of income increases are used in imports in Madagascar than in Mauritius. The long-run relative price elasticities are almost equal for both countries (approximately -20), and demonstrate a huge sensitivity of relative prices to import demand. Further, stabilization and devaluation policies under structural adjustment policies (SAP) imposed in the 1980's have been effective in reducing import demand and therefore the external deficit. However in Madagascar, after the (SAP) era, imports remained low constricting economic growth, while in Mauritius imports increased again, and economic growth soared. The authors conclude that the most decisive objective of policy must not be to rely solely on reducing imports, but to encourage economic growth and exports simultaneously.

Narayan and Narayan (2005) approximate a disaggregated import demand model for Fiji using relative prices, consumption, investment, and exports using a small sample size for the period 1970 to 2000. They find that in the long- and short-run, consumption, investment, and exports have an inelastic and positive impact on import demand. However, while an increase in relative prices reduces imports, the relationship is inelastic (-0.6) reflecting a dependence on imports. Since Fiji is a price-taker, it has no control over import prices, leading the authors to favor monetary policies that affect relative prices, and export policies that enhance exports for balance of payments and exchange rate stability.

Dutta and Ahmed (2004) determine the long-run aggregate import demand function for Bangladesh from 1974 to 1994. Drawing on two different error correction models, the static cointegrating regression

equation and a vector autoregression method in which they include a dummy variable to portray the effects of import liberalization policies, they find a unique long-run relationship among quantities of imports, import prices, GDP, and foreign reserves. However, while both models convey statistically significant results, the second model reveals a slower rate of adjustment and hence a prolonged period of disequilibrium in the markets before attaining long-run equilibrium. Moreover, liberalization policy was not fully effective because the macroeconomic problems responsible for low import demand were ignored by policy-makers.

Tsionas and Christopoulos (2004) examine the import demand function of five industrial countries, namely, France, Italy, Netherlands, UK, and the US. They use maximum likelihood cointegration analysis, dynamic Ordinary Least Squares (OLS) and fully modified OLS to estimate the long-run import demand functions. They also investigate the short-run dynamics of import demand in these countries. Their results show significant long-run effects from relative prices and incomes, as well as significant short-run effects from temporary shocks. However, differences in their results emerge when they consider dynamic OLS versus fully modified estimation.

Matsubayashi and Hamori (2003), using quarterly data for different G7 countries in different periods under the flexible exchange rate system, analyze the stability of the aggregate import demand function for these countries. Results indicate no stable cointegrating relation between real import, real GDP, and relative import price for all G7 countries. Upon modifying their study to factor structural changes, results become significant for France and Germany, but not for the other countries, meaning that enhancing the domestic business environment will only influence the quantity of imports for certain countries.

Using annual data over the period 1973–1997, Tang (2002) establishes the long-run relationship of the Japanese aggregate import demand function. The author confirms that the long-run equilibrium relationship between imports and real income is positive and unit elastic (0.99), and between imports and relative prices is negative and inelastic (-0.82), implying that economic growth increases imports, and an increase in relative prices decreases the demand for imports less than proportionally. Both these conditions reduce Japan's trade balance, which given its trade balance surplus, is an objective of macroeconomic policies.

Gumede (2000), studies the import demand function for South Africa from 1972-1997. His results show long-run significant income elasticity (1.06) of import demand, but short-run elasticities are less significant. However, in terms of relative price elasticity, labor-intensive industries are more sensitive (-3.0) than capital-intensive industries (-0.71). These findings highlight the dependency of the South African economy on capital goods imports. He argues that because export demand has not grown significantly over the period, it has contributed to a foreign exchange problem, exacerbating the job creation dilemma faced by the economy.

Senhadji (1998) estimates a structural import demand function for 77 developed and developing countries and finds that the average price and income elasticities are higher in the long-run than in the short-run. Moreover, he argues that developed countries in general have higher income elasticities and lower relative price elasticities than developing countries, reinforcing results by Akinlo (2008), Agbola and Damoense (2005), Narayan and Narayan (2005), Razafimahefa and Hamori (2005), Dutta and Ahmed (2004), Gumede (2000), and Mwega (1993), among others.

MODEL SPECIFICATION

Since South Africa is a small developing open-economy, it a price-taker with respect to imports, and therefore permits our use of single-equation techniques for estimating the aggregate import demand function. We assume that only normal goods are imported, and that as a developing country, real foreign

exchange reserves comprises an important variable in the function. Further, we assume that apartheid and international sanctions have significantly affected import demand so they are included in the model.

The long-run aggregate import demand function for South Africa (in natural logs) is thus specified as

$$\ln M_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln RP_t + \beta_3 \ln FR_t + \beta_4 D_{1t} + \beta_5 D_{2t} + \varepsilon_t \qquad (1)$$

where M_t is the real import volume in period t; Y_t is the real GDP in period t; RP_t is the relative price of imports in period t; FR_t is the real foreign exchange reserves in period t; D_{1t} is a dummy variable representing the apartheid era (1950-1994) in South Africa; D_{2t} is a dummy variable representing the period of economic sanctions (1981-1994) against South Africa; and ε_t is the error term.

The first explanatory variable, Y_t in the specified model measures the real GDP of South Africa. Economic theory suggests that income in the importing country is a major determinant of a country's imports and has a positive impact. Thus, *a priori*, it is expected that $\beta_1 > 0$. The second explanatory variable, RP_t measures the relative price of imports, and is calculated as the ratio of import price to domestic price. Economic theory posits that an increase in the relative price of imports discourages imports so β_2 is expected to be negative. The third explanatory variable, FR_t measures the availability of foreign reserves, which can be used to represent the ability to import. Following Hoque and Yusop (2010), we have included the real foreign exchange reserve variable to capture the impact of export earnings on import demand, as export earning is one of the major sources of foreign reserves. This variable does not appear in the traditional import demand function. However, it is an important determinant of imports for developing countries. Since higher real foreign reserves tend to encourage imports, we would expect that $\beta_3 > 0$. The expected signs of β_1, β_2, and β_3 are borne out in empirical results by Hoque and Yusop (2010), Akinlo (2008), Agbola and Damoense (2005), Narayan and Narayan (2005), Razafimahefa and Hamori (2005), Dutta and Ahmed (2004), Tsionas and Christopoulos (2004), Tang (2004, 2002), Matsubayashi and Hamori (2003), Gumede (2000), Senhadji (1998), and Mwega (1993), among others.

The last two explanatory variables are dummy variables. D_1 represents the era of apartheid in South Africa and is defined to take the value 1 for years between 1950 and 1994 and 0 otherwise. D_2 represents the period of economic sanctions against South Africa, taking the value 1 for years between 1981 and 1994 and 0 otherwise. These two variables are expected to capture the impact of apartheid and economic sanctions on South Africa's imports. The signs of β_4 and β_5 can be either negative or positive.

Given recent advances in time-series analysis, in estimating the long-run model outlined by Equation (1), it is now common practice to distinguish short-run effects from long-run effects. For this purpose, equation (1) must be specified in an error-correction model (ECM) format following Pesaran, Shin, and Smith (2001), which has been used in many recent studies, including Hoque and Yusop (2010), Hye (2008), Narayan and Narayan (2005), Razafimahefa and Hamori (2005), and Tang (2002, 2003, and 2004). Using the bounds testing approach to cointegration analysis, we rewrite Equation (1) in an ECM format in Equation (2) below.

$$\begin{aligned}\Delta \ln M_t = {} & \alpha_0 + \sum_{i=1}^{n} \beta_i \Delta \ln M_{t-i} + \sum_{i=0}^{n} \gamma_i \Delta \ln Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta \ln RP_{t-i} + \sum_{i=0}^{n} \eta_i \Delta \ln FR_{t-i} + \\ & + \alpha_1 D_{1t} + \alpha_2 D_{2t} + \lambda_1 \ln M_{t-1} + \lambda_2 \ln Y_{t-1} + \lambda_3 \ln RP_{t-1} + \lambda_4 \ln FR_{t-1} + \omega_t \end{aligned} \qquad (2)$$

with all variables defined previously, except the first difference operator, which is Δ. Pesaran et al's (2001) bounds testing approach is based on two procedural steps. The first step involves using an F-test or Wald test to test for joint significance of the no cointegration hypothesis $H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$ against an alternative hypothesis of cointegration, $H_1 : \lambda_0 \neq 0,\ \lambda_1 \neq 0,\ \lambda_2 \neq 0,\ \lambda_3 \neq 0,\ \lambda_4 \neq 0$. This test is performed using Equation (2). The advantage of this approach is that there is no need to test for unit roots, as is commonly done in cointegration analysis. Pesaran, et al. (2001) provide two sets of critical values for a given significance level with and without a time trend. One assumes that the variables are I(0), and the other assumes that the variables are I(1). If the computed F-values exceed the upper critical bounds value, H_0 is rejected signaling cointegration among the independent variables. If the computed F-value is below the critical bounds values, we fail to reject H_0. Finally, if the computed F-statistic falls within the bounds, the result is inconclusive. After establishing cointegration, the second step involves estimating the short-run and long-run coefficients of the cointegrated model, the mathematical derivation of which can be found in Pesaran et al. (2001).

DATA SOURCES AND VARIABLES

Annual data for the period 1950-2008 are used in estimating our models. The data on nominal imports, the import price index, real GDP, foreign exchange reserves series, and domestic price index are taken from the International Monetary Fund's *International Financial Statistics Yearbook (2009)*. Nominal imports in *Rands* are deflated by the import price index (2005 = 100) to obtain the real import variable for South Africa. The real GDP variable is computed in millions of 2005 constant *Rand.* The relative price of imports series is constructed as the ratio of the import price index (2005=100) to domestic price index, as measured by the consumer price index (CPI) (2005=100). To obtain the real foreign reserves series, we deflated the nominal foreign exchange reserves series by the CPI.

EMPIRICAL RESULTS

Cointegration among Variables

Table 3 presents the bounds test results of cointegration for aggregate imports of South Africa. Comparing the computed *F*-statistics against its critical values, which are extracted from Pesaran et al. (2001), we can establish the bounds test for cointegration. Using equation (2), each variable in our specified equation (1) is defined as a dependent variable in the calculation of the *F*-statistic and the estimated *F*-statistics are reported in Table 3.

Table 3: *F*- test Results for Cointegration

Critical Value Bounds of the F-Statistic: Intercept and No Trend

	10 percent level		5 percent level		1 percent level	
k	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
3	2.72	3.77	3.23	4.35	4.29	5.61

Calculated F-statistic:

$F_M(M \mid Y, RP, FR)$	7.042***
$F_Y(Y \mid M, RP, FR)$	1.736
$F_{RP}(RP \mid M, Y, FR)$	3.139
$F_{FR}(FR \mid M, Y, RP)$	2.952

*Note: This table shows the results of the ARDL bounds testing for cointegration. The Critical values are taken from Pesaran, Shin, and Smith (2001, Table CI(iii) Case III, p. 300). k is the number of regressors. *** indicates the statistical significance at the 1 percent level.*

As seen in Table 3, when the dependent variable is taken to be import demand, the calculated *F*-statistic, 7.042, is higher than the upper bound critical value of 5.61 at the 1 per cent level of significance,. This result implies that the null hypothesis of no cointegration cannot be accepted for South Africa and a unique cointegration relationship between imports and its determinants is observable. However, when Y, RP, and FR are each taken as dependent variables, the calculated *F*-statistic, 4.29, is lower than the lower bound critical value at the 1 per cent level. Therefore, we fail to reject the null hypothesis in each case and there is no cointegration among the independent variables, which is expected.

Long-Run and Short-Run Elasticities

Having established a long-run cointegrated relationship between import demand and its determinants, the second step involves estimating the long- and short-run elasticities, which are presented in Tables 4 & 5. As can be seen in Table 4 all the long-run estimated elasticities exhibit the theoretically expected signs. Adjusted $\overline{R}^2$ is also very high, indicating that these variables strongly explain the long-run elasticities in the import demand function for South Africa. Income is statistically significant at the 1% level, and has an elastic effect on import demand. More specifically, a 1% increase in GDP or income will increase imports by 1.07%, which is equivalent to Gumede's (2000) elasticity value of 1.06. Foreign reserves is also statistically significant at the 1% level, but has a highly inelastic (0.1485) impact on import demand, lending credence to scholars' concerns that this factor contributes to volatility in the exchange rate. However, import demand, while inversely related to relative prices and highly inelastic (-0.0878), is not statistically significant. Because South Africa is highly dependent on the imports of intermediate and capital goods, this result makes sense, and reinforces the concern of its impact on the balance of payments deficit. This result however, contradicts most of the results by other studies, among them, Hoque and Yusop (2010), Akinlo (2008), Agbola and Damoense (2005), Narayan and Narayan (2005), Razafimahefa and Hamori (2005), Dutta and Ahmed (2004), Tsionas and Christopoulos (2004), Tang (2004, 2002), Matsubayashi and Hamori (2003), Gumede (2000), Senhadji (1998), and Mwega (1993).

Table 4: Long-run Elasticities for South Africa's Import Demand Function (1950-2008)

Dependent variable: $\ln M_t$		
Explanatory Variables	**Coefficient**	***t*-statistic**
Constant	-2.2081**	-2.737
$\ln Y_t$	1.0743***	18.479
$\ln RP_t$	-0.0878	-0.718
$\ln FR_t$	0.1485***	4.828
D_{1t}	-0.0221	-0.278
D_{2t}	-0.1302**	-2.413
Adjusted R-squared ($\overline{R}^2$)	0.9641	

*Note: This table shows the long-run elasticities of the estimated import demand function for South Africa.*** and ** indicate statistical significance at the 1% and 5% level, respectively.*

Table 4 also reveals that the coefficient for apartheid-era dummy variable, D_1, is negative but insignificant, meaning that the apartheid era has had an adverse but statistically insignificant impact on the import demand function in the long-run. These results indicate that ISI policies did not work so that import demand was relatively unaffected in the apartheid era. The coefficient for the economic sanctions period dummy variable, D_2, is negative and significant indicating that international sanctions negatively affect import demand in the long-run. To our knowledge, no other study has been able to establish this result.

The estimated short-run elasticities are presented in Table 5 showing that all the expected coefficient signs are met, and they are statistically significant at either the 1% or the 5% level. Upon comparing Table 5 with Table 4, it is clear that income is about three times more elastic in the short-run than in the long-run. Similarly, relative prices and foreign reserves are less inelastic in the short-run than in the long-run. Interestingly, while relative prices are insignificant in the long-run, they are significant in the short-run. These results show that change takes place much faster in the short-run than in the long-run.

Table 5: Error-Correction Representation for the Selected ARDL Model

Dependent variable: $\Delta \ln M_t$		
Explanatory Variables	Coefficient	*t*-statistic
Constant	-0.0053	-0.221
$\Delta \ln M_{t-2}$	-0.2332***	-2.989
$\Delta \ln Y_t$	2.8632***	6.510
$\Delta \ln RP_t$	-0.3210**	-2.061
$\Delta \ln FR_{t-1}$	0.0411**	2.183
D_{1t}	-0.0699***	-3.523
D_{2t}	0.0537**	2.117
ECM_{t-1}	-0.3636***	-4.496
Diagnostics		
R^2	0.711	
$\overline{R}^2$	0.669	
$\chi^2_{Auto}(2)$	1.893	p-value: 0.162
$\chi^2_{Norm}(2)$	0.236	p-value: 0.681
$\chi^2_{White}(2)$	1.129	p-value: 0.386
$\chi^2_{RESET}(2)$	2.408	P-value: 0.127

Note: This table shows the results of the short-run elasticities of the error-correction model.
**** and ** indicate statistical significance at the 1% and 5% level, respectively.*

In Table 5, unlike Table 4, the coefficient for D_1 is not only negative, but also significant at the 1% level, meaning that in the short-run, unlike the long-run, apartheid has had a significant impact on South Africa's import demand function. Therefore, in the short-run, the government adopting strong ISI policies worked effectively to reduce import demand. The relationship, although 3 times less inelastic than in the long-run, is still relatively very small at only (-0.0699). The coefficient for D_2 is positive and significant at the 5% level indicating that international sanctions positively affected import demand in the short-run, which is opposite from the long-run process, and contrary to expectations. The error correction term, ECM_{t-1}, gauges the rate at which import demand adapts to changes in the regressors before returning to its equilibrium level. More importantly, the error-correction term of the short-run model is statistically significant at the 1% level with the expected negative sign. The coefficient for ECM_{t-1} is 0.3636 and indicates that once the model in Equation (2) is shocked, convergence to equilibrium is relatively slow with only 36% of adjustment occurring in the first year.

Table 5 also reveals that none of the diagnostic tests are statistically significant, suggesting no evidence of autocorrelation in the disturbance of the error term. The model passes the Jarque-Bera normality tests indicating that the errors are normally distributed. The RESET test signifies that the model is correctly specified while the F-forecast tests indicate the predictive power/accuracy of the model. Finally, the

adjusted R^2 of 0.67 indicates that 67 per cent of the variation in import demand is explained by the variables in the model. Hence, based on these statistical properties, it is reasonable to say that the model is well behaved.

CONCLUSIONS, LIMITATIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

In this paper, we have estimated an aggregate import demand function for South Africa during 1950-2008 using the bounds testing approach to cointegration. Our results suggest that a unique cointegration relationship between imports and its regressors, namely, relative prices, exchange reserves, and income, exists. This unique relationship enabled us to study the short-run and long-run elasticities of South Africa's import demand function. These results indicate that income and real foreign reserves are positive and significant in the short and long-runs and are consistent with other findings. However, clear differences exist in the relative prices coefficient between the short-run and the long-run: in the long-run, the coefficient (-0.0878) is highly inelastic and not statistically significant, which contradicts other studies; however, in the short-run, the coefficient is less inelastic and significant, supporting other studies. In all cases our results show that change takes place much faster in the short-run than in the long-run and support the theory that increasingly defensive apartheid strategies over time led to greater inflexibility in the market for imports to changes in relative prices and foreign reserves..

The study employed two dummy variables to capture the impact of apartheid and international sanctions on import demand. Our results contradict historical explanations: The coefficient for D_1 is negative and significant in the short-run, but insignificant in the long-run, meaning that apartheid has only had a short-run impact South Africa's import demand function. In the long-run, import substitution policies failed because of the economy's reliance on intermediate and capital goods imports. The coefficient for D_2 is positive and significant at the 5% level in the short-run, but opposite from the long-run when the coefficient is negative. Therefore, in the short-run, international sanctions positively influenced import demand, but in the long-run, it negatively affected South Africa's import demand function.

This study is the first of its kind to incorporate an analysis of apartheid and international sanctions on South Africa's import demand function and our results provide ideas for further research that could overcome the limitations of the present model. Since the economy has been characterized by exchange rate volatility, which has affected its trade structure, future studies could include this variable as a fourth regressor to capture its effect on import demand, allowing for results that are more robust. In addition, a third dummy variable could be added to the model to capture the period of international commitment to the post-apartheid economy, spanning the period 1995-2008. Comparing the effects of international commitments with that of international sanctions may better inform international agencies on the appropriate steps in fostering economic regime changes globally.

From a policy perspective, South Africa clearly must focus on monetary and fiscal policies that would reduce its imports of capital and intermediate goods, especially oil, while simultaneously focusing on diversifying its export base. Strengthening trade relations with other developing countries will also give it a foreign exchange rate advantage, thereby increasing its foreign reserves, and in turn, its balance of payments. To complement trade policies, domestic private investment must be targeted in labor-intensive industries. All these changes will ultimately contribute to a more stable exchange rate, greater macroeconomic stability, growth, and with that, an improvement of unemployment and poverty problems that characterize South Africa's economy.

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MULTI-NATIONAL EVIDENCE ON CALENDAR PATTERNS IN STOCK RETURNS: AN EMPIRICAL CASE STUDY ON INVESTMENT STRATEGY AND THE HALLOWEEN EFFECT

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ABSTRACT

This research tries to find evidence for the Halloween effect by presenting an assessment of the profitability of the "Sell in May, and go away" investment strategy associated with this phenomenon. We present significant proof of the existence of the Halloween effect; it was observed in 29 of the 31 countries under study. There appears to be a difference in the seasonal returns between developed and emerging markets. Attention is also paid to the Halloween effect at the industry level. Here, a comparison between the "Sell in May, and go away" investment strategy and the buy-and-hold strategy proves the first to be superior.

JEL: G110, G120

KEYWORDS: January Effect, Investment Decisions

INTRODUCTION

Recent studies have shown the existence of seasonal patterns in industry returns. More specifically, stock market returns tend to be significantly lower during the summer period (May up to and including October) than during the winter period (November up to and including April) (Bouman and Jakobsen, 2002). This irregularity or anomaly is also known as the Halloween effect, or the "Sell in May, and go away" strategy.

The "Sell in May, and go away" investment strategy, associated with the Halloween effect, means that investors sell their stocks in May - because of the supposedly lower returns in the summer period - and invest their proceeds in risk-free assets, such as short-term Treasury bonds. They will hold on to these risk-free assets until the Halloween ('October 31') and then sell them, investing the returns again in their market portfolio. The very existence of exploitable seasonal patterns is in contradistinction with the theory of efficient markets, which makes the Halloween effect a remarkable phenomenon. This paper belongs to the body of literature which questions the efficiency of the stock markets by showing that certain stock returns patterns are related to particular calendar time periods, such as the January effect, the Monday effect and the turn-of-the-month effect. There are two opposing views on the issues of market efficiency and the Halloween effect. The one view, advocated by Bouman and Jakobsen (2002), supports the latter's existence. The debate on the Halloween effect among different authors is therefore concerned with a much broader issue, namely that of the perpetuation of the existence of the efficient market theory on the one hand, or its very extinction on the other. In our research we have attempted to find out whether there is any evidence for the Halloween effect and whether the "Sell in May, and go away" investment strategy associated with this phenomenon is profitable. In order to find out which vision concerning the seasonal patterns in stock returns is the most reliable we combined the views presented by both Jakobsen and Bouman (2002) and Maberly and Pierce (2004).

In order to shed light on the relationship between seasonal patterns and stock exchange returns we investigated 31 countries by comparing the differences between winter and summer returns and testing

these differences statistically by means of a regression analysis. The regression analysis was extended by adding control variables in the same manner it was done in the 2004 Maberly and Pierce paper. The control variables consisted of the January effect and data outliers.

After assessing the evidence for the Halloween effect we looked at the impact of the January effect on this phenomenon. The January effect can be described as the tendency of stocks to rise between the last day of December and the first week of January (Haug and Hirschey, 2006). This implies that the January effect causes greater differences between the seasonal returns, which (partially) explains the Halloween effect.

Data outliers formed the other control variable used. We applied two control variables: the October 1987 stock market crash and the August 1998 Ruble crisis in which the Russian government announced moratorium on debt repayment (Henry and Nixon, 1998). Because both of the outliers represent summer periods they contributed to the widening of the seasonal gap and hence corroborated the existence of the Halloween effect. When, however, these data outliers were controlled for, the gap between the seasons decreased and thus also the significance of the Halloween effect, which meant that in the case of the US the Halloween effect disappeared (Maberly and Pierce, 2004).

The first question we tried to answer was whether the winter returns were significantly larger than the summer returns once the January effect and the data outliers were taken into account. Since we chose to use the perspective of the efficient market theory we adjusted our expectations accordingly. We expected to find evidence for neither the Halloween effect nor for the January effect. We did expect that controlling for the data outliers would increase the summer mean returns and hence decrease the Halloween effect, if it existed.

The second question dealt with determining possible differences in the seasonal returns between mature and emerging markets. Emerging markets are less integrated than mature markets, which means that the first have less co-movement, making them more unreliable.

The third question was concerned with finding evidence for the Halloween effect at the industry level. Also here we started from the theory of efficient markets, assuming to find no evidence for the Halloween effect at the industry level.

The final and most important question in this study pertains to whether the "Sell in May, and go away" investment strategy is more profitable than the simple buy-and-hold strategy. Can investors make money by applying the Halloween effect theory? Using once again the efficient market theory as our point of departure, we expected that the simple buy-and-hold strategy would be more profitable because of the lack of transaction costs.

The Halloween effect is an interesting topic for several reasons. First of all, it has considerable economic significance. If the Halloween effect truly exists to a significant degree, it could change people's investing behaviour. The simple buy-and-hold strategy would then perish and make place for the "Sell in May, and go away" investing strategy. Second, the Halloween effect is interesting because although it has been detected and identified, it still exists. So far neither the investors nor the markets have been able to adjust themselves adequately to this phenomenon. Thirdly, the Halloween effect is, unlike other calendar effects, an exploitable anomaly in that it is associated with much lower transaction costs than, for example, the Weekend effect or the Turn of the month effect.

Fourthly, by examining the seasonal returns of countries on different continents we could establish to what degree the markets are integrated and how this integration evolves over time.

Finally, this study may unravel the Halloween puzzle by presenting another question: if the Halloween effect exists, how can this phenomenon be explained? Why are there differences in seasonal returns and why do they exist? As stated earlier, the Halloween puzzle is closely related to the efficiency of the markets and their ability to adjust returns on the basis of available information.

This paper is arranged as follows. First of all the literature review is presented. Section I explains the Halloween puzzle, the methodology and data used. Section II presents the methodology and results obtained. The section describes some general trends in the data. In section III the results are discussed and possible explanations for the Halloween effect are given. Finally, in section IV we establish a link between the results obtained and their possible explanations. This is also the concluding section.

LITERATURE REVIEW

In the 2002 paper Bouman and Jakobsen (2002) examined 37 countries and found evidence for the Halloween effect in 36 of them. The other view, supported by Maberly and Pierce (2004), rejects the existence of an exploitable anomaly such as the Halloween effect. In their 2004 paper they re-examine the Bouman and Jakobsen (2002) study, concluding that the Halloween effect as it occurred in the United States of America disappeared after certain adjustments had been made. These adjustments pertained to the influence exerted by the January effect and data outliers on the stock returns. This finding refutes the existence of the Halloween effect as an exploitable anomaly and reconfirms the theory of efficient markets.

These studies add to the literature which presents evidence for higher stock returns during periods which are not directly linked to financial events, such as the seasons of the year [Hirshleifer and Shumway (2003), Kamstra, Kramer and Levi (2003)], Democratic/Republic Presidency [Santa-Clara and Valkanov (2003)] and Congress in Session [Ferguson and Witte (2006)].

The paper of De Santis and Imrohoroglu (1997) states that emerging markets have a higher volatility associated with higher returns in comparison with mature markets. On the basis of this information we could expect to find bigger differences in seasonal returns in the mature markets than in the emerging markets.

In their 2003 paper Kamstra, Kramer, and Levi link Seasonal Affective Disorder (SAD) with risk aversion (Kamstra et. al., 2003). It appears that once people's depression levels increase they become less inclined to subject themselves to risk.

As stated earlier, recent evidence shows the existence of seasonal patterns in industry returns. And although differences between seasons indeed appear to be significant in some markets, we should not be overly alarmed by this finding. It does question, however, the efficiency of these markets. According to the efficient market theory it is not possible for investors to benefit from market timing activities such as the Halloween effect, because financial markets are supposed to respond to all information generally known. In this way it should not be possible for companies to outperform the market by repeatedly playing the same "trick" or using a market trading mechanism, since the market accounts for these factors by incorporating the whole spectrum of market information so that companies' returns are automatically adjusted. If one assumes that markets are indeed efficient, this means that the probability of finding higher winter than summer returns is 50%. The reason why the Halloween effect is a puzzle is because in more than 50% of the cases the winter returns appear to be higher than the summer returns.

DATA AND METHODOLOGY

In order to test whether the Halloween effect actually exists we investigated for 31 countries whether the winter returns were indeed significantly higher than the summer returns. A regression technique resembling the simple-mean test was used to check whether seasonal differences were in fact present and significant. The regression is represented by:

$$R_t = \mu + \alpha_1 S_t + \varepsilon_t \quad (1)$$

Where:

- R_t is the dependent variable which stands for monthly compounded stock returns.
- S_t represents the season dummy and equals 1 for the winter period and 0 for the summer period. μ Is a constant and ε_t is the usual error term.

This is the core regression used. During the remainder of the paper it is extended by other (control) variables. Please note that when the dummy variable S takes the value 0 for the summer period, the whole regression is reduced to:

$$R_t = \mu \quad (2)$$

which means that μ indicates the summer stock market returns. When the season dummy equals 1 for the winter period, the regression becomes:

$$R_t = \mu + \alpha_1 \quad (3)$$

which means that $\mu + \alpha_1$ represents the winter returns. When α_1 is positive and significant, the null hypothesis can be rejected. A positive and significant α_1 equals a significant difference between the summer and winter stock market returns.

The regression technique resembles a simple mean test according to which one tries to find out whether there is a significant difference among the groups. The advantage of the regression is that the formula can be very easily extended by adding other variables which are required to test the rest of the hypotheses.

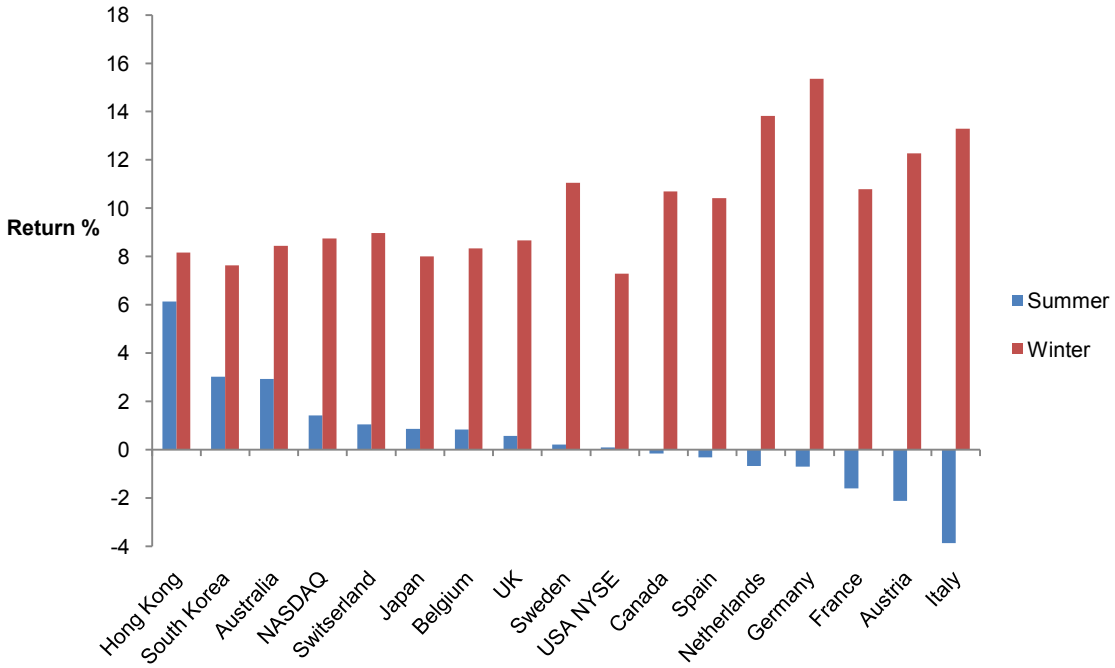
We used the monthly stock returns of value-weighted stock markets. For this research 17 developed and 14 developing countries were examined, amounting to a total of 31 countries. The countries investigated are: Australia, Austria, Bangladesh, Belgium, Canada, Chile, China, Czech Republic, France, Germany, Hong Kong, Hungary, India, Italy, Japan, Malaysia, Mexico, Netherlands, Poland, Portugal, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States of America.

The US is the only country represented by two stock exchanges: the New York Stock Exchange and NASDAQ. This is because NASDAQ is one of the world's largest stock exchanges which could simply not be neglected in the research. There are two major reasons why so many emerging markets were included in the research. First of all, adding these markets provided us with a clearer picture of the Halloween effect. Secondly, this approach enabled us to make a comparison of the seasonal returns of the mature markets with those of the emerging markets.

RESULTS

Figure 1 shows the average stock market returns for the developed countries in the summer and winter periods. Firstly, we can see that in all 17 countries the winter returns are higher than the summer returns. According to the efficient market theory the chance of such a finding is 0.000763%. The probability was calculated as follows: 0.5^17. This difference between seasons is rather pronounced in all countries, except in Hong Kong, South Korea, and Australia. Another interesting finding is that in most countries the average summer returns are around 0%.

Figure 1: Average Winter and Summer Returns in Developed Markets

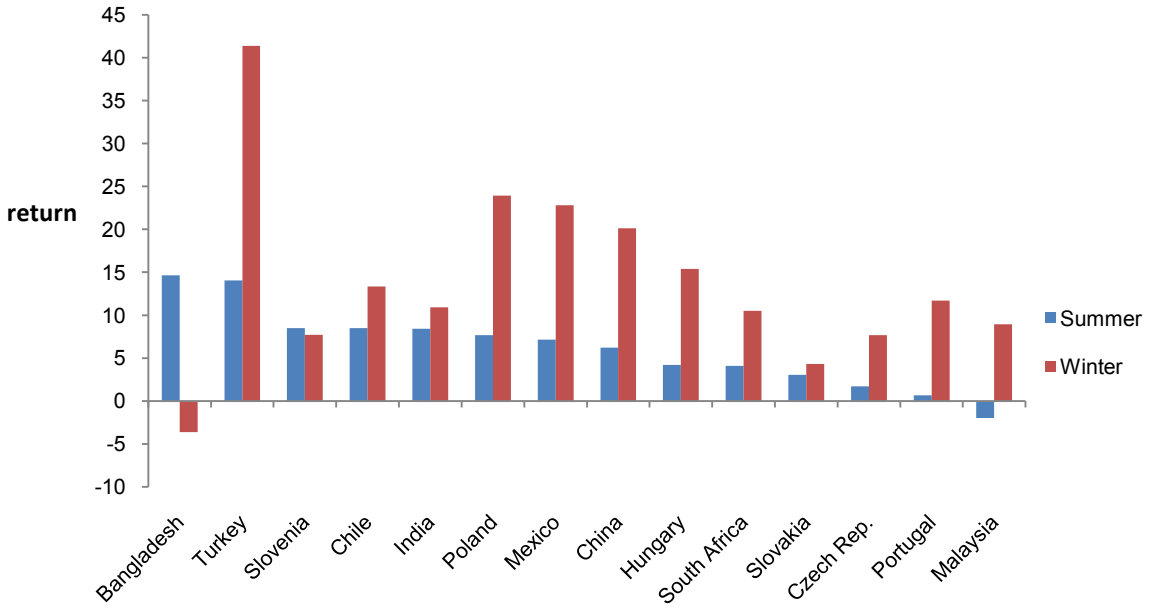


Average winter and summer returns in developed markets expressed as a percentage.

Figure 2 presents the results for the emerging markets. Here 12 out of the 14 countries show higher winter than summer returns. The probability is rather small, namely 0.56%. The probability was calculated as follows: 0.5^17. The probability was calculated as follows: 0.5^14*(NcR 14-2). An interesting observation is that only one of the 14 emerging markets shows negative summer returns, while no less than17 of the developed markets show this result. Although at this point some preliminary statements about the economic significance of these results could certainly be made, the prominent question is, however, whether they are also statistically significant.

As we can see in table 1, in 16 of the 31 countries the winter returns are significantly higher than the summer returns; here the significance level is 10%. In eight countries the "Sell in May, and go away" effect seems to be very strong on a 1% significance level (see table 1). This finding supports the existence of seasonal differences. However, it is interesting to note that all eight countries exhibiting a strong "Sell in May, and go away" effect are developed countries.

Figure 2: Returns in Winter and Summer in Emerging Markets



Average returns during the winter period (November-April) and the summer period (May-October) in emerging markets expressed as

In 29 of the 31 countries the winter returns are higher than the summer returns, while this difference is actually significant in 16 of these countries. So far the results do in fact provide support for the existence of the Halloween effect. The next step is now to include the control variable to check for the effect in countries where the winter returns are higher than the summer returns, and to determine the significance of these results.

First we investigate the effect of controlling for the January effect on the gap between the winter and summer returns. In January, especially in the first week of this month, stocks show a tendency to rise in price (the so-called January effect). As a result the winter returns are higher, since January falls in the winter period. By controlling for the January effect we could obtain a clearer picture of the winter returns, enabling us to make a more reliable comparison between the winter and the summer returns. The first column of table 2 shows the mean winter returns prior to the January effect adjustment, and the second column represents the adjusted winter returns.

The third column indicates that the effect of controlling for the excessive January returns is negative for 23 of the 31 countries. For 14 of the 17 developed markets and 9 of the 14 emerging markets the adjusted winter returns appear to be lower than the non-adjusted winter returns. So the next question is how controlling for the January effect influences the significance of the "Sell in May, and go away" effect.

Table 1: Results for All Stock Exchanges Investigated

Country	Number of Observations	Mean	Standard Deviation	Season Differences	T-value of the Halloween Effect
Australia	180	0.62	3.40	4.13	1.148
Austria	264	0.70	6.76	14.4	2.584 ***
Bangladesh	216	0.69	13.24	-18.28	-1.495
Belgium	216	0.31	4.80	7.50	1.936 *
Canada	468	0.53	4.59	7.38	2.697 ***
Chile	216	1.69	6.49	4.86	0.739
China	204	1.82	19.25	13.90	0.205
Czech Rep.	156	0.38	6.69	-2.96	0.89
France	252	0.61	5.76	12.40	2.641 ***
Germany	516	0.54	5.53	8.54	2.612***
Hong Kong	516	1.09	9.72	2.04	0.185
Hungary	204	1.60	10.21	11.21	1.377
India	252	1.51	9.00	2.49	0.201
Italy	276	0.73	6.71	17.07	3.619 ***
Japan	684	0.71	5.13	7.14	2.902 ***
Malaysia	336	0.53	8.42	10.92	1.895 *
Mexico	240	2.39	8.63	15.68	1.286
Netherlands	300	0.78	5.74	11.34	2.709 ***
Poland	192	2.15	13.65	16.28	0.683
Portugal	180	0.67	6.29	11.04	1.897 *
Slovakia	156	3.76	6.69	1.30	0.042
Slovenia	168	1.24	6.66	-3.92	-0.037
South Africa	144	1.00	6.23	6.42	0.844
South Korea	396	0.85	7.71	4.61	0.996
Spain	252	0.71	6.47	10.73	1.915 *
Sweden	264	0.91	6,79	10.84	2.199 **
Switserland	192	0.70	4.84	7.92	1.764 *
Turkey	240	3.82	17.88	27.35	1.722 *
United Kingdom	348	0.72	4.92	8.11	2.123 **
United States (NYSE)	684	0.59	4.09	7.19	3.695 ***
United States (NASDAQ)	300	0.84	8.84	7.31	1.285

*Notes: This table shows the results for all the 31 stock exchanges (calculated on the basis of value weighted index returns. The number of observations stands for the number of months used per country. For all countries the last month observed was December 2007. Mean stands for monthly mean returns expressed as percentages. This also applies to the standard deviation (on a monthly basis and expressed as percentages). Season difference stands for the difference between the winter returns and the summer returns, expressed as percentages. Finally, the last column presents the associated t-values per country. The addition * means that the t-values are significant at a 10% significance level, ** at a 5% significance level and *** at a 1% significance level.*

The January effect is positively significant in eight of the 31 countries, in five countries at a 10% significance level, and in three countries at a 1% significance level. The positive relationship between the monthly mean returns and the January dummy means that controlling for the January effect results in lower winter returns. These lower winter returns will, in turn, lead to a smaller winter-summer gap, which decreases the impact of the "Sell in May, and go away" effect. When looking at the season dummy, the January effect is significant in 13 of the 31 countries, which is a reduction of three countries (see table 1 and 3).

Table 2: Effect of the January Dummy on the Winter Returns

Country	Mean Winter	Mean Winter January Adjusted	January Effect	Mean Summer
Australia	7.06	8.65	1.59	2.93
Austria	12.27	6.75	**-5.52**	-2.13
Bangladesh	-3.65	9.93	13.58	14.63
Belgium	8.33	6.69	**-1.64**	-0.83
Canada	7.21	5.14	**-2.07**	-0.16
Chile	13.34	18.64	5.30	8.48
China	20.11	19.58	**-3.81**	6.21
Czech Rep.	7.67	6.46	**-1.21**	1.71
France	10.79	7,54	**-3.25**	-1.61
Germany	7.84	4.58	**-3.26**	-0.70
Hong Kong	8.16	10.01	1.85	6.13
Hungary	15.40	12.68	**-2.72**	4.19
India	10.91	17.92	7.01	8.42
Italy	13.29	9.54	**-3.75**	-3.78
Japan	8.00	5.88	**-2.12**	0.86
Malaysia	8.94	4.72	**-4.22**	-1.98
Mexico	22.81	24.21	1.40	7.13
Netherlands	10.66	8.63	**-2.03**	-0.68
Poland	23.94	21.18	**-2.76**	7.66
Portugal	11.70	6.37	**-5.33**	-0.66
Slovakia	4.33	3.21	**-1.12**	3.03
Slovenia	7.71	10.67	2.96	8.50
South Africa	10.51	9.83	**-0.68**	4.10
South Korea	7.63	8.60	0.97	3.02
Spain	10.41	5.86	**-4.55**	-0.32
Sweden	11.05	8.62	**-2.43**	0.20
Switserland	8.97	8.76	**-0.21**	1.05
Turkey	41.40	39.77	**-1.63**	14.05
United Kingdom	8.67	8.09	**-0.58**	0.57
United States (NYSE)	7.28	6.03	**-1.25**	0.09
United States (NASDAQ)	8.74	4.75	**-3.99**	1.42
Developed markets	9.2	7.30	**-1.90**	0.45
Emerging markets	13.08	13.94	0.86	6.2
World market	10.95	10.30	**-0.65**	3.05

Notes: Results of the effect of the January dummy on the winter returns. Column one shows the mean returns for the winter periods in all the country. Column two lists the monthly mean winter returns controlled for the January dummy. Column three indicates the actual effect of the January dummy (calculated by subtracting the values of column one from column two). The bold numbers in column three represent the negative January effect. Column four shows the monthly mean summer returns for comparison. The adjusted January effect is defined as the excess returns achieved in January on top of the mean summer returns (Bouman, and Jakobsen, 2002).

Since in 23 of the 31 countries the January returns are higher than the returns earned during the rest of the year we can establish that the January effect exists. This means that the January effect actually increases the seasonal gap in stock market returns in these countries. This finding contradicts both our initial expectations and the efficient market theory.

The next step is to look at the effect of data outliers on the strength of the Halloween effect. We expected the 1987 stock market crash as well as the 1998 Ruble crisis to be positively related to the Halloween effect. In order to test this hypothesis we compared the gap between the seasons before and after controlling for these data outliers.

In 26 of the 31 countries the t-values of the outlier dummy are significant at a 10% significance level (see table 3). In all countries, except for Slovakia, the t-values are negative. The information gathered so far is broadly sufficient to conclude that the October 1987 stock market crash and the August 1998 Ruble Crisis are negatively related to the performance of stock exchanges worldwide. This finding is hopeful for the critics of the "Sell in May, and go away" effect, since the highly significant t-values of the outlier dummy might explain why the summer returns are so much lower than the winter returns. But even though the outlier dummy is significant in 26 of the 31 countries, we still need to take a look at the effect of the outlier dummy on the monthly mean returns during summer. Since both outliers occur during the summer

season the mean value of the summer returns of the 31 countries should generally move up after they are controlled for. So before discussing the rest of the results presented in table 3, let us take a look at the adjusted summer returns.

Table 3: Results after Controlling for The January Effect, T-Values of Adjusted Halloween Effect and the T-Value of The Outliers

Country	T-value Halloween Effect controlled for the January Effect	T-value January Effect	T-value Halloween Effect Controlled for Outliers	T-value Outliers
Australia	1.112	-0.07	0.958	-2.783***
Austria	2.332**	0.424	2.3**	-3.94***
Bangladesh	-1.463	0.136	-1.572	-1.116
Belgium	1.824*	0.143	1.823*	-2.254**
Canada	2.309**	0.868	2.367**	-7.038***
Chile	0.471	0.774	0.427	-5.144***
China	0.141	0.179	0.148	-0.804
Czech	0.559	0.96	0.713	-3.489***
France	2.608***	-0.314	2.525**	-1.93*
Germany	2.174**	1.048	2.347**	-5.206***
Hong Kong	-0.387	1.87*	-0.061	-3.974***
Hungary	0.502	2.762***	1.159	-3.654***
India	0.39	-0.657	0.11	-1.015
Italy	4.013***	**-1.817***	3.392***	-3.214***
Japan	2.068**	2.335**	2.73***	-3.57***
Malaysia	1.672*	0.44	1.027	-6.172***
Mexico	0.993	0.473	1.19	-3.799***
Netherlands	2.727***	-0.49	2.392**	-5.126***
Poland	0.366	0.948	0.519	-2.386**
Portugal	1.145	2.27**	1.737*	-2.404**
Slovakia	0.226	-0.617	0.053	0.145
Slovenia	-0.885	2.816***	-0.193	-2.015**
South Africa	0.231	1.928*	0.473	-5.331***
South Korea	0.696	0.838	0.977	-0.218
Spain	1.373	1.516	1.536	-5.26***
Sweden	1.83*	0.881	1.878*	-4.48***
Switserland	1.841*	-0.538	1.547	-4.155***
Turkey	1.1	1.826*	1.576	-2.502**
United Kingdom	1.988**	0.101	1.801*	-5.272***
United States (NYSE)	3.452***	0.221	3.347***	-6.771***
United States (NASDAQ)	0.38	2.849***	0.908	-4.021***

*Notes: The first column shows the t-values of the corrected Halloween effect. The second column shows the t-value of the January effect. Addition * means that the t-values are significant at a 10% significance level, ** at a 5% significance level and *** at a 1% significance level. The bold value for Italy refers to the fact that the January dummy is negatively related to the monthly mean returns. This negative relationship is significant at a 10% significance level. The third column shows the t-values of the adjusted Halloween effect. The fourth column shows the t-value of the outliers. The addition * means that the t-values are significant at a 10% significance level, ** at a 5% significance level and *** at a 1% significance level.*

Table 4 displays the summer returns after the adjustment of the outlier dummy was made. The third column shows the effect of controlling for the outliers on the monthly mean summer returns. It becomes clear that in 30 of the 31 countries the "outlier adjusted" summer mean returns are higher than the "non outlier adjusted" summer mean returns. Slovakia is the only country where the outliers actually have a positive effect on the summer returns. Furthermore, the outliers have a bigger effect on the summer returns in the emerging markets than on those in the developed markets (1.81% versus 1.12%).

It seems clear that controlling for the outliers decreases the gap between the winter and the summer returns. However, the central question is in how many countries the gap between winter and summer returns is significant. Before the outlier adjustments there were 16 countries where the winter returns were significantly higher than the summer returns on a 10% significance level (see table 1). When controlling for the outliers this picture changes. As table 3 shows, in 12 countries the winter returns are

still significantly higher than the summer returns. We can conclude that the data outliers are indeed positively related to the Halloween effect; after controlling for the outliers the summer mean returns increase in all countries except for one. This means a decrease in the gap in returns between the seasons, which shows that the Halloween effect is in fact smaller than initially assumed; it has lost significance in four countries (see table 1 and 3).

Table 4: Effect of the Outlier Dummy on the Summer Returns

Country	Mean Summer	Mean Summer Outlier Adjusted	Outlier Effect	Mean Winter
Australia	2.93	3.83	0.90	7.06
Austria	-2.13	-0.33	1.80	12.27
Bangladesh	14.63	15.48	0.85	-3.65
Belgium	-0.83	-0.21	0.62	8.33
Canada	-0.16	0.43 *	0.59	7.21
Chile	8.48	10.63	2.15	13.34
China	6.21	6.62	0.41	20.11
Czech Rep.	1.71	3.68	1.97	7.67
France	-1.61	-1.05	0.56	10.79
Germany	-0.70	0.32 *	1.02	7.84
Hong Kong	6.13	6.30	0.17	8.16
Hungary	4.19	6.85	2.66	15.40
India	8.42	8.84	0.42	10.91
Italy	-3.78	-2.41	1.37	13.29
Japan	0.86	1.34	0.48	8.00
Malaysia	-1.98	0.89 *	2.87	8.94
Mexico	7.13	12.53	5.40	22.81
Netherlands	-0.68	1.10 *	1.78	10.66
Poland	7.66	10.06	2.40	23.94
Portugal	-0.66	0.39 *	1.05	11.70
Slovakia	3.03	2.90	**-0.13**	4.33
Slovenia	8.50	9.48	0.98	7.71
South Africa	4.10	7.16	3.06	10.51
South Korea	3.02	3.06	0.04	7.63
Spain	-0.32	2.26 *	2.58	10.41
Sweden	0.20	2.29	2.09	11.05
Switserland	1.05	2.17	1.12	8.97
Turkey	14.05	7.07	3.02	41.40
United Kingdom	0.57	3.21	2.64	8.67
United States (NYSE)	0.09	0,84	0.75	7.28
United States (NASDAQ)	1.42	3.58	2.16	8.74
Developed markets	0.45	1.57	1.12	9.2
Emerging markets	6.2	8.01	1.81	13.08
World market	3.05	4.48	1.43	10.95

*Notes: Results of the effect of the outlier dummy on the summer returns. Column one shows the mean returns for the summer periods in all countries. Column two lists the mean monthly summer returns controlled for the outlier dummy. Column three indicates the actual effect of the outlier dummy (this is calculated by subtracting the values of column one from column two). Column four shows the monthly mean winter returns for comparison. The * in column two stands for countries which had negative monthly mean summer returns prior to the outlier adjustment and positive summer returns after the adjustment. The bold number in column three represents the only country where the outlier effect on the summer returns was negative. All numbers are given as percentages.*

Finally, we have to establish the combined impact of the January effect and the data outliers on the Halloween effect. From table 5 it becomes clear that the Halloween effect is significant in ten of the 31 countries at a 10% significance level. In two of these ten countries the season dummy is significant at a 1% level. As expected the combined effect of both control variables has again decreased the gap between the winter and summer returns. Before controlling for the January effect, the "Sell in May, and go away" effect was significant in 16 of the 31 countries at a 10% significance level (see table 1). After controlling for the outliers, this number dropped to 12 countries (see table 3). When controlling for the January effect 13 of the 31 countries showed a significant "Sell in May, and go away" effect at a 10% significance level (see table 3). So after controlling for both the outliers and the January effect, we can establish that the "Sell in May, and go away" effect is significant in ten countries. This means that the "Sell in May, and go away" effect loses its statistical significance after controlling for certain variables. It does occur,

however, in almost one third of the countries with statistical significance (see table 5). Another important observation is that all of the ten countries with significant results for the season dummy in table 5 are developed countries. So after controlling for certain variables the "Sell in May, and go away" effect is no longer significant in any of the emerging markets (see table 1 and table 5).

Table 5: T-values of the Halloween Effect, the Outlier Effect and the January Dummy

Country	T-value Halloween Effect Controlled for the Outlier Effect and the January Effect	T-value Outlier Effect	T-value January Effect
Australia	0.932	-2.775***	-0.072
Austria	206**	-3.934***	0.436
Bangladesh	-1.537	-1.158	0.136
Belgium	1.691*	-2.249**	0.144
Canada	1.982**	-7.037***	0.912
Chile	0.163	-5.14***	0.819
China	0.087	-0.802	0.179
Czech	0.386	-3.489***	0.99
France	2.499**	-1.93*	-0.316
Germany	1.915*	-5.206***	1.074
Hong Kong	-0.629	-3.984***	1.897*
Hungary	0.268	-3.719***	2.848***
India	0.302	-1.014	-0.657
Italy	3.805***	-3.228***	**-1.848***
Japan	1.898*	-3.582***	2.335**
Malaysia	0.801	-6.163***	0.459
Mexico	0.913	-3.815***	0.416
Netherlands	2.432**	-5.119***	-0.511
Poland	0.206	-2.368**	0.959
Portugal	0.985	-2.433**	2.302**
Slovakia	0.236	0.145	-0.615
Slovenia	-1.043	-2.058**	2.844***
South Africa	-0.178	-5.396***	2.111**
South Korea	0.679	-0.218	0.837
Spain	0.99	-5.277***	1.596
Sweden	1.516	-4.478***	0.913
Switserland	1.64	-4.148***	-0.557
Turkey	0.955	-2.514**	1.847*
United Kingdom	1.682*	-5.264***	0.105
United States (NYSE)	3.145***	-6.766***	0.075
United States (NASDAQ)	-0.023	-4.074***	2.978***

*Notes: The first column shows the t-values of the Halloween effect controlled for the Outlier effect and the January effect. The second column lists the t-values of the Outlier effect. The third column shows the t-values of the January dummy. Addition * means that the t-values are significant at a 10% significance level, ** at a 5% significance level and *** at a 1% significance level. The bold value for Italy means that the January dummy is negatively related to the monthly mean returns. This negative relationship is significant at a 10% significance level.*

Next, we have to address the following questions: What is the effect of the type of market on the "Sell in May, and go away" effect and is there a significant difference between the emerging and the developed markets with respect to winter and summer returns? In order to address the stated questions we conducted another regression analysis.

Table 6: Significant Level

t-value "market type" dummy	t-value Halloween Effect
-1.545	6.497 *

*Notes: The first column shows the t-value of the "market type" dummy. The second column gives the t-value of the first dummy variable S_t The values with an extra added * are significant at a 1% significance level.*

The first outcome of the regression analyses is the t-value (-1.545) of the market dummy. This value does not seem to be statistically significant at a 10% significance level (see table 6). So the first thing we can conclude is that the relationship between monthly mean returns and the type of market (developed versus

emerging) is not significant. The relationship is in fact negative; in this case it means that monthly mean returns are more negatively related to developed markets than to emerging markets. This information basically tells us that the overall mean returns are lower in developed markets than in emerging markets. Table 4 confirms this.

The second outcome of the regression analysis shows the relationship between the season dummy and the dependent variable. It seems that this relationship is significant (1 % significance level) and positive (6.497*). Monthly mean returns are positively related to the winter season for both types of markets. The central question again is, of course, whether the seasonal differences between the market types are significant.
Table 6 shows the average winter and summer returns in both types of markets. It becomes clear that the average returns of both seasons are higher in the emerging markets. Again however, although the gap between the seasons is bigger in the developed markets the crucial question is whether this difference is significant. It appears that the type of market plays a significant role in the discrepancy in the seasonal returns. This difference is rather large; it has a 5% significance level (see table 7).

Table 7: Significant Level

f-value "difference in the Halloween effect between different market types"	Significance
4.267 **	0.039

*Notes: Table 7 shows the significance of the difference in season returns between the developed and emerging markets. Column 1 shows the f-statistic while column 2 shows the significance. * Sign means that the f-value is significant at a 5% significance level.*

So with respect to the second question we can conclude that the difference in the seasonal returns between developed and emerging markets is significant. Emerging markets are characterized by higher average returns over the year. These higher returns are mainly caused by the higher summer returns compared to those of the developed markets. The higher summer returns in emerging markets lead to a lower gap in seasonal returns. As our previous results show, the "Sell in May, and go away" effect is the strongest and most prominent in the developed markets. This finding is in line with our expectations.

Our third topic of discussion pertains to the Halloween effect at industry level. To investigate this issue we used a sample of in total three countries of which six industries were studied per country. The countries were the Netherlands, Sweden, and the United Kingdom. The sectors observed were consumer goods, consumer services, energy, financials, industrials, and beverages/food.

We can see that in 15 of the 18 sectors the winter returns are higher than the summer returns (the probability calculation is approximately 0.3% assuming efficient market theory). The probability was calculated as follows: 0.5^18*(NcR 18-3). The Netherlands shows the smallest number of sectors where the winter returns are higher than the summer returns, namely four. Sweden is second with five out of six sectors. In the United Kingdom all sectors have higher winter than summer returns. This pattern may be related to the length of the time frame during which the countries were studied. It seems that the longer this timeframe, the larger the number of industries which exhibit higher winter than summer returns. Again the central question is whether the season effects are significant, and if so, at what level. In 6 of the 18 industries the winter returns are significantly higher than the summer returns. What is striking to see is that in the Netherlands none of the six sectors exhibit significant differences in season returns. In Sweden and the UK half of the sectors show significant differences between the seasons. The reason for the lack of significant differences in the Netherlands (see table 7) appears not to be caused by high summer returns but by the low returns obtained during the winter period. This may simply be explained by the smaller amount of data, obscuring the actual situation in the Netherlands. In this respect we refer to the general index for the Netherlands, which shows significant differences between the seasons even after controlling for the outlier dummy and the January dummy (see table 5)

Table 8: Halloween Effect at Sector Level and Significance of the "Sell In May, and Go Away" at Sector Level

Country	Sector	Number of Observations	Winter Returns	Summer Returns	T-Value "Sell In May"
Netherlands	Consumer services	72	**5.595**	0.867	1.434
	Consumer goods	72	**6.494**	-0.659	0.507
	Energy	72	-0.199	0.874	-0.22
	Financials	72	**5.815**	-3.301	0.396
	Industrials	72	**10.71**	-7.519	0.137
	Beverages/food	72	-7.786	-5.267	0.283
Sweden	Consumer services	144	**23.727**	6.2	1.568
	Consumer goods	144	**14.878**	3.295	1.531
	Energy	144	7.515	14.078	-0.71
	Financials	144	**16.53**	-1.552	**2.348****
	Industrials	144	**16.773**	-3.096	**2.844*****
	Beverages/food	144	**12.621**	1.602	**2.099****
United Kingdom	Consumer services	156	**8.746**	-4.429	**2.29****
	Consumer goods	156	**5.803**	-1.086	0.865
	Energy	156	**8.251**	2.497	0.911
	Financials	156	**7.841**	1.413	0.514
	Industrials	156	**8.556**	-5.81	**1.731***
	Beverages/food	156	**10.365**	-2.24	**1.891***

*Notes: Table 7 summarizes the results of the industry analysis for the three countries. Column 1 lists all the industries. Column 2 shows the number of monthly means observed per country per industry. Column 3 and column 4 indicate the winter and the summer returns per industry per country. The bold values in column 3 represent the industries where the winter returns are higher than the summer returns. The fifth column shows the t-value of the "Sell in May" effect. The sign * means that the t-values are significant at a 10% significance level, ** at a 5% significance level and *** at a 1% significance level.*

In conclusion we can establish that there is some overlap in seasonal differences among the different sectors. Sweden and the United Kingdom can be better compared because the timeframes during which they were studied are almost the same. Here the results for the beverages/food and industrials sectors are identical. We can also see that the energy sector does not appear to be suitable for the "Sell in May, and go away" investment strategy.

Finally, the most important question we have to answer is whether investors can actually benefit from the "Sell in May, and go away" investment strategy. If the returns obtained during the summer period are higher than the interest rate offered on treasury bills minus the transaction costs, the buy-and-hold-strategy will prove more profitable (see table 9).

Buy-and-hold "wins", if:

$$r_{summer} > i_{T\text{-}bill} - TC \quad (4)$$

where r_{summer} stands for returns during summer, $i_{T\text{-}bill}$ stands for interest rate on t-bills, and TC stands for transaction costs.

Table 9: Sell in May versus Buy-and-hold

Country	Observation Period	Halloween Mean	Halloween Standard Deviation	Buy-and-Hold Mean	Buy-and-Hold Standard Deviation
Australia	1993-2006	13.55	4.98	9.708	7.93
Austria	1986-2006	21.48	12.02	9.63	19.01
Belgium	1990-2006	14.69	7.9	7.73	12.45
Canada	1969-2006	15.99	8.57	6.79	11.90
Chile	1993-2006	16.81	11.15	15.4	16.65
Czech Rep.	2001-2006	-2.82*	9.73	0	14.14
France	1988-2006	17.52	9.16	9.14	14.91
Germany	1965-2006	15.10	9.79	6.86	15.17
Italy	1992-2006	23.54	12.32	10.16	18.00
Japan	1989-2006	4.43	11	-2.09	15.53
Netherlands	1983-2006	17.30	9.34	9.73	14.44
Poland	2001-2006	22.60*	10.8	25.55	17.15
Portugal	1994-2006	18.18	15.39	7.74	19.84
Slovakia	2001-2006	19.10*	24.2	27.65	26.73
Slovenia	2003-2006	18.32*	16.08	27.83	16.97
South Africa	1996-2006	23.50	10.34	14.52	16.06
South Korea	2001-2006	21.13	15.13	17.79	21.27
Spain	1987-2006	19.21	11.69	9.53	15.90
Sweden	1987-2006	20.33	12.56	11.88	18.06
Switserland	1989-2006	13.20	8.79	10.45	13.20
United Kingdom	1979-2006	17.82	6.64	9.25	10.30
United States (NYSE)	1955-2006	14.09	7.44	6.81	10.35
United States (NASDAQ)	1983-2006	16.13	19.35	9.89	23.04
Average total		**16.57**	**11.49**	**11.39**	**16.04**

*Notes: Table 9 shows the results concerning the profitability of the "Sell in May, and go away" strategy and the buy-and-hold strategy. The third column shows the yearly mean returns for the Halloween "Sell in May", and the fourth column indicates the standard deviation. The fifth column represents the yearly mean for the buy-and-hold strategy. The last column shows the standard deviation for the buy-and-hold strategy. Addition * means that the yearly returns obtained by following the Halloween strategy were lower than the yearly returns obtained by following the buy-and-hold strategy.*

The interest rates were taken from the data stream per country investigated. The transaction costs, on the other hand, were equalized across all countries and fixed at a rate of 0.1% per single transaction. This number was based on the information provided by the website of ABN AMRO. In addition, the transaction costs were estimated to be 0.1% on future markets (Solnik, 1993).

Table 9 shows the results obtained for the 23 markets investigated. It seems that the "Sell in May" strategy outperforms the buy-and-hold strategy in 19 of the 23 markets. Interestingly, the four markets where the buy-and-hold strategy outperforms the "Sell in May" strategy are all located in Central-Eastern Europe. These countries are the Czech Republic, Slovakia, Poland and Slovenia. This can firstly be explained by the limited time spans during which these four countries were studied. Slovenia was

observed for only four years, while the other countries were examined for six years. Short timeframes increase the impact of outliers, thereby undermining the reliability of the entire picture.

Table 10: Summer Returns Comparing the Czech Republic, Poland, Slovakia and Slovenia

Country	Observation Period	Average Summer Returns	Observation Period	Average Summer Returns
Czech Rep.	1995-2007	1.71	2001-2006	7.2
Poland	1992-2007	7.66	2001-2006	9.21
Slovakia	1995-2007	3.03	2001-2006	12.86
Slovenia	1994-2007	8.5	2003-2006	7.87

Notes: Table 10 compares the summer returns in the different periods for the four countries.

Furthermore, as indicated, three countries show higher summer returns during the sample period than their average summer returns (see table 10). Especially in the Czech Republic and Slovakia this difference is remarkable. This is not the case in Slovenia where the average summer returns are higher than the summer returns during the four year sample period. However, we should remember that in Slovenia this is generally the case (see figure 2). So here there is no evidence of the Halloween effect. Another point worth mentioning is that the Czech Republic and Poland show no significant difference between their winter returns and their summer returns (see table 1); in these countries the winter returns are higher than the summer returns. Given the overall high summer returns in Slovenia as well as in the other three countries during the observation period, "buy-and-hold" is a more profitable strategy for these countries than "Sell in May, and go away".

When looking at the average score of the 23 markets we can conclude that the Halloween strategy is definitely the ultimate winner with an average annual mean of 16.57% versus the 11.39% of the buy-and-hold strategy. Further, in addition to the higher returns, the Halloween strategy's standard deviation level is more than 4.5% lower than that of buy-and-hold (see table 9). The "Sell in May, and go away" strategy appears to outperform the simple buy-and-hold approach on two fronts by offering higher annual returns combined with a lower standard deviation. When comparing the two it becomes clear that the Halloween strategy is less risky and generates more money than the buy-and-hold strategy. This finding is not in line with our initial expectations.

DISCUSSION

In this section we will present some arguments for the existence of the Halloween effect. Our first argument refers to its economic significance. An irregularity can only exist if it is economically significant. In turn, economic significance depends on economic benefits and costs. Costs include, among many things, transaction costs, which are often not accounted for when analysing an irregularity. As a result, irregularities often only exist in theory. In our analysis, however, we did include transaction costs, and because the "Sell in May, and go away" investment strategy still proved superior we can reject transaction costs as one of the explanations for the Halloween effect.

Our second argument for the existence of the Halloween effect or of any other anomaly for that matter, is data mining. Data mining is the process of retrieving knowledge from data-bases stored in data marts or data warehouses (Cooper and Schindler, 2001). However, data mining can be problematic, especially when researchers do not report the number of unsuccessful mining attempts before presenting a particular pattern (McQueen, Grant and Thorley, 1999). In this way they do not show the full picture of their research. "Too much digging" is a well-known pitfall of data mining (Leinweber, 1998). This, however, does not apply to the Halloween effect since its existence has been recognised for over a long period of time and in most of the countries studied. The second pitfall of data mining is the lack of theory. In the case of the Halloween effect there is no formal theory; it is merely based on an old market

saying which goes: "Sell in May, and go away". This saying was known long before any empirical tests were ever performed in this area. This means that the Halloween effect is not a 'product' of empirical findings. Hence this phenomenon is not associated with the data mining fallacy.

The third argument for the Halloween effect concerns the concept of risk. It makes perfect sense to question whether the level of risk throughout the year is actually sufficiently in balance with the expected returns according to the Halloween effect. The Capital Asset Pricing Model (CAPM) states that the expected rates of return as demanded by the investors depend essentially on two factors. First of all, on the time value of money, and second on the risk premium (Brealey, Myers and Marcus, 2004). Ghysels, Santa-Clara, and Valkanov (2005) have investigated the trade-off between the variance of stock market return and its mean. They observe a positive and significant relationship between risk and return. Since the winter returns are higher than the summer returns, we would expect to find a higher rate of risk during the winter. This, however, does not seem to be the case (see table 4). We can thus reject risk as one of the explanations for the Halloween effect.

A fourth factor proving the existence of the Halloween effect could be the January effect. As we can read from table 3, controlling for the January effect decreases the strength of the Halloween effect. We can therefore argue that the January effect is indeed related to the Halloween effect, although it can only partially explain the latter's existence.

The data outliers used are the fifth possible explanation for the Halloween effect. Table 5 tells us that in most countries the Halloween effect weakened once the data outliers were controlled for. Therefore we can conclude that these data outliers also partially explain the existence of the Halloween effect.

The sixth argument for the Halloween Effect is the vacation period. This can be explained as follows. Investment activities are associated with risk. During the vacation time the number of investors temporarily decreases, which means that the group dealing with risk becomes smaller. This smaller group demands higher risk premiums, which in turn leads to a decrease in prices during the vacation shift. This price decrease occurs automatically because the market offers the investors higher returns.

Seasonal Affective Disorder (SAD) is the seventh factor in the explanation of the Halloween effect. SAD, also known as winter depression, is a mood disorder which manifests itself every winter. People suffering from SAD experience serious mood changes during this time. The psychological cause of SAD is associated with a lack of daylight. A common treatment for SAD is light therapy. Avery (Avery et. al., 2001) has tested the influence of light therapy by using the Hamilton Depression Rating.

Their study shows that the larger the number of hours of sunshine during a week, the more positive the patients responded. Low returns are generally expected during the winter period. Once the days are getting longer again, SAD decreases and people regain their confidence in taking risks. The fact that the portfolios of investors become riskier during this period is an illustration of this pattern. And as soon as portfolios become riskier, the expected returns increase as a result of the higher risk a premium, which in turn leads to an increase in the stock returns. SAD has a significant effect on stock market returns, especially in countries located at higher latitudes (Kamstra et. al., 2003). What is important to mention, however, is that Kramer et. al., have not taken the total hours of daylight and sunshine into account. What happens if autumn is extremely sunny and the number of hours of sunlight is higher than average? Does this affect the expected outcome? These issues have not been discussed yet, making SAD a rather weak factor in the explanation of the Halloween effect. Moreover, no real differences have been found among countries at different latitudes.

The eighth factor is the optimism cycle. The optimism cycle is based on the idea that people, financial forecasters, and investors in particular, are in general excessively optimistic (Doeswijk, 2005). According

to this theory there is a seasonal cycle in how investors feel about the market and perceive the future. As the end of the year approaches investors start looking forward to the next year by displaying levels of optimism about possible future earnings which are basically too high. Chung and Kryzanowski (2000) show that also forecasters of the S&P 500 index tend to be too optimistic about the possible earnings in the next year. It is mainly this "over optimism" which creates a seasonal pattern in the industry returns. As a result of this excessive optimism in the beginning of the year the stock returns increase; investors are willing to take more risk and so they invest more. However, the level of optimism starts to decrease once reality presents itself. This happens usually after the first quarter results have been made public. During this time the investors realise that their view was too optimistic, and from that moment on their pessimism about the future increases. The optimism cycle theory recommends investors to overweigh equities during the "positive" period and underweigh them during the "pessimistic" period. The positive period spans from the last couple of months of the year until the first months of the next year, which is almost similar to the winter period of the Halloween effect.

The weather could be regarded as yet another factor which influences the seasonality in the stock market returns. Saunders (1993) studies the effect of the weather in New York City on the index changes of NYC stock-listed companies. Weather creates and shapes the environment, which in turn affects people's moods. Mood changes can influence the willingness of investors to take risks. In this way, the weather can affect investing behaviour. Saunders (1993) argues that sunny days increase investors' optimism, resulting in higher market returns. Cloudy days, on the other hand, make investors more pessimistic and less willing to take risks, leading to lower market returns. Saunders also verifies that the difference in stock market returns between the sunniest and the cloudiest days is statistically significant. Cao and Wei (2005) examine the relationship between temperature and stock market returns. Together with length of day and number of hours of sunshine, temperature is considered as the most influential weather variable. In their paper Schneider et al. (1980) conclude that high temperature is mostly associated with predominant feelings of indifference and lethargy, whereas cold temperatures mainly coincide with feelings of aggression. It is this aggression which affects investors in terms of their mood and risk perception, making them more risk-oriented. High levels of temperature are thus linked with lower levels of risk taking. The inverse relationship between temperature and stock market returns is a possible explanation for this seasonal cycle.

CONCLUSION

This research has provided evidence for the existence of the Halloween effect. Significant differences were found between the winter and summer returns in most countries examined. We also established that in most countries both the January effect and the data outliers have a moderating effect on this gap between the seasonal returns.

Further, we observed a significant difference in the strength of the Halloween effect between mature and emerging markets in terms of their seasonal returns. We have come to the conclusion that the Halloween effect is stronger in the developed markets than in the emerging markets. With respect to our industry-level analysis, in which we investigated six industries in three different countries, we can conclude that in 15 of these 18 industries the winter returns were higher than the summer returns (see table 7). In addition, in two of the three countries the energy sector showed higher summer than winter returns.

Finally, we compared the profitability of the "Sell in May, and go away" investment strategy with that of the buy-and-hold strategy. It appeared that in 19 of the 23 countries studied the "Sell in May" strategy proved to be more profitable. The four countries to which this finding did not apply were all located in Central-Eastern Europe. It has to be added however that their observation period was rather short. During the observation period their summer returns were higher than the average summer returns, which made the buy-and-hold strategy more profitable for these countries.

It must be noted, however, that neither the outliers nor the January effect was taken into account in our calculation. In order to create a realistic picture we did not control for these variables. Because in real life one cannot perfectly control for the effect of data outliers neither did we control for it. So by not including them we tried to mimic real life. Obviously, if we had controlled for the outliers and the January effect, the profitability of the Halloween strategy would have decreased.

A limitation of this research pertains to the difficulty to apply the "Sell in May, and go away" investment strategy to best advantage in real life. This is because of the value-weighted index used in our calculations for each country. The value-weighted index changes the mean values and involves huge transaction costs. However, the "Sell in May, and go away" principle still allows investors to adjust their market portfolio each year when they sell their safe assets. Using a value-weighted index was the most accurate way of imitating reality.

In order to find out more about the Halloween effect more countries still need to be investigated. This is necessary to expand our knowledge of the impact of the Halloween effect on a global level. Examining more countries would also contribute to increasing our understanding of the differences between developed and emerging markets. In addition, more research should be conducted on the industry-level to trace the origins of the Halloween phenomenon. Bouman and Jakobsen (2002) mention that the Halloween effect goes back as far as the UK stock market in the late 17th century. However, if one argues that investors are not aware of the opportunity offered by the Halloween effect, one implies that it could disappear if one really wanted it to. If everybody were to invest in risk-free assets during the summer, all parties would benefit. If this actually happened, the interest rates earned by the risk-free assets would decrease, thereby lowering the summer pay-off of the "Sell in May, and go away" investment strategy. This means that there is a point at which the Halloween and the buy-and-hold payoffs are equalized, depending among other factors on how many investors choose to follow the Halloween strategy.

This line of reasoning could be one of the many solutions to the Halloween puzzle, namely the percentage of investors who invest according to the Halloween strategy. In other words, the larger the number of investors adopting the Halloween strategy, the less these investors will benefit from it. This circumstance then automatically leads to a decrease in the number of people using the Halloween strategy, which again diminishes its impact and thereby its rationale.

On the other hand, the Halloween effect could be a phenomenon which is embedded in the entire spectrum of external factors which influences people's behaviour. Perhaps the priorities of investors differ depending on the seasons; earning maximum profits may have less priority during the summer than during the winter.

It is clear that the Halloween effect cannot be explained by one factor, but that it is influenced by many different aspects in many different fields. And although the true reason for its existence is hard to pinpoint, we know that it is out there and that it pays off to pursue this strategy. So while continuing our investigation into the true causes of the Halloween effect, let us go about our business in our usual manner and simply enjoy the profits it generates.

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CORPORATE SPIN-OFFS AND SHAREHOLDERS' VALUE: EVIDENCE FROM SINGAPORE

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ABSTRACT

A Parent company occasionally spins off a wholly owned subsidiary or division, if it helps improve operational efficiency, reduce information asymmetry, reduce tax liability, and improve corporate governance. Therefore, it is suggested that corporate spin-offs create shareholders' value. It is also suggested that spin-off decisions may result in redistribution of wealth from debt holders to shareholders, because a part of the total assets of parent company are transferred to a newly incorporated independent company that replaces the wholly owned subsidiary or division. This study examines the value effect of 25 such corporate spin-off events that occurred in Singapore. Results show that parent shareholders gain about 15.73 percent value after spin-offs. Of which, 6.62 percent gain occurs in spin-off stocks while the remaining 9.11 percent occurs in parent stocks. The finding is consistent with the argument that corporate spin-offs have economic benefits to help increase shareholders' value. It is also found that total spin-off value gain is significantly correlated with the debt asset ratio of parent firms, which sheds light on the possibility of wealth redistribution from the bondholders to shareholders due to change in parent capital structure after spin-off.

JEL: G14

KEYWORDS: Spin-offs, Shareholder Value, Parent Stock, Spin-off Stock, and Divestiture.

INTRODUCTION

Corporations occasionally require restructuring their entity through merging with other corporations, acquiring other firms, and divesting certain divisions or subsidiaries. Shareholder value increases after mergers and acquisitions because of synergy and better governance, which is well documented in literature [for example, Block, (1968) Mandelker (1974), Eckbo (1992), Conn and Connell (1990), Healy *et. al.* (1992), Jayaraman *et. al.* (2004), Kruse, *et. al*. (2007) and Bris *et. al.* (2008)]. Corporate divestiture by disposition of a unit of business through spin-off or sell-off is occasionally undertaken if the business unit does not perform well or becomes less important for core business activities, while it is worth more if the unit can be operated as a separate entity or sold off at a good price. It is documented that such corporate divestitures have a positive effect on the shareholders value due to removal of diseconomies, increase in efficiency, and paying more attention to core business [Rosenfeld (1984), Tehranian *et. al.* (1987), Comment and Jarrell (1995), Borde *et. al*. (1998), Mulherin and Boone (2000), Dittmar and Shivdasani (2003), and Coakley *et.. al.* 2008 are among many studies]. While the corporate divestiture can be implemented in many different ways, the spin-off is considered as an important divestiture method as a part of corporate restructuring.

Spin-offs involve separation of a subsidiary or division from its parent company by creating an independent company where the parent shareholders retain a proportionate equity interest. There is neither dilution of equity nor transfer of ownership from the current shareholders, and involve no cash transaction. The primary consequence of spin-off is that the asset base of the parent company declines and the spun-off company becomes a separate decision-making entity with the assets received from the parent. The original shareholders still control both the parent and the spun-off firms, but debt holders cease to have any claim on the spun-off's assets and earning. This paper examines whether corporate restructuring through spin-off of a subsidiary or division can help increase shareholders' value.

It is understandable that corporations may spin off a business unit that is not performing well or not vital

to the company's core business if the business unit can operate effectively as a separate entity; hence, shareholders may be benefited. They can also benefit from spinning off a subsidiary, which arises from agency problem between the shareholders and bondholders. After restructuring, the shareholders receive proportionate stakes in the parent and spun-off entities, but the debtholders retain claim only on the parent assets and earning. Although the assets of spun-off entity are transferred from the parent firm, the bondholders' stakes in the transferred assets are ceased but shareholders' stakes are retained. Thereby, shareholders may benefit through the redistribution of bondholders' value. The present evidence on spin-offs effect on shareholders' value is mostly available from developed markets, particularly from the US and Europe, and those studies largely focused on the value addition due to the removal of diseconomies and increase in operating efficiency. This study examines the corporate spin-offs effect on shareholders' value in Singapore, a newly developed country in Asia, with a focus on the possibility of value redistribution from the bondholders. We are motivated to study this market because all spin-off proposals pass through stringent legal process, and no subsidiary can separate from its parent if it contributes more than 50 percent of the parent's operating profit.

This study examines the value effect of 25 corporate spin-off events occurred in Singapore during 1975-2005. Results show that parent shareholders gain about 15.73 percent value after spin-offs. Of which, 6.62 percent gain occurs in spin-off stocks while the remaining 9.11 percent in parent stocks. The finding is consistent with the argument that corporate spin-offs have economic benefits to help increase shareholders' value. It is also found that spin-off value gain is significantly correlated with the debt asset ratio of parent firms, which sheds light on the possibility of wealth redistribution from bondholders to shareholders due to changes in parent capital structure after spin-off. The rest of paper is organized in five more sections. The literature review is presented in Section 2. Hypotheses are constructed in Section 3. Methodology is described in Section 3. Sample characteristics are stated in Section 4. Results and discussions are presented in sections 5. Conclusion is given in Section 6.

LITERATURE REVIEW

There is documented evidence that shareholders' value does increase following the announcement of corporate spin-offs. For example, Hite and Owers (1983), Miles and Rosenfeld (1983), Schipper and Smith (1983), Kudla and McInish (1988), Seifert and Rubin (1989), Vijh (1994) Johnson *et. al.* (1996), Cusatis *et. al*. (1993 and 1994), and Krishnaswami and Subramaniam (1999), Huson and MacKinnon (2003), and Veld and Veld-Merkoulova (2004) are among the many other studies that examined the effects of corporate spin-offs. Of these all studies used the US data, except Veld and Veld-Merkoulova (2004) who use European data. Corporate spin-offs events are also found in the major Asian markets, like Japan and Singapore. However, these spin-offs are yet to be adequately examined by academic researchers. There are two studies worthy of mention that examine Japanese and Singapore spin-offs. Ito (1995) found that Japanese firms use spin-offs as a corporate instrument to achieve growth, but did not examine market reaction to spin-off announcements. Koh *et. al.* (2005) found that share value significantly increases in the Singapore market following the announcement of different types of corporate divestures events including spin-offs.

Researchers conclude that shareholders' value increases following spin-off events may occur for a variety reasons. For example, Schipper and Smith (1983) suggest that spin-offs reduce diseconomies and inefficiency of excessive diversity while achieving operational efficiency through more focused business. Krishnaswami and Subramaniam (1999) suggested that spin-offs mitigate information asymmetry about profitability and operating efficiency of different subsidiaries. Gertner *et. al.* (2002) and Ahn and Denis (2004) found that subsidiary spin-offs improve the efficiency of capital allocation. Goolsbee and Maydew (2002) and Veld and Veld-Merkoulova (2004) found that spin-offs provide tax benefits to shareholders when the IRS allows corporations to account for non-taxable spin-off transaction

by considering the allocation of proportionate spun-off shares to the parent shareholders as stock dividends. Qian and Sudarsanam (2007) found that spin-offs create shareholder value by enhancing corporate governance and mitigating agency problems in European markets. From the above studies it appears that spin-offs of a subsidiary may create value due to (i) reduction of operational diseconomies and inefficiency, (ii) reduction of information asymmetry, (iii) reduction of tax liability, and (iv) improvement of corporate governance in restructured parent and spun-off firms.

Researchers also argued that shareholder value increases after spin-offs may also occur due to wealth redistribution from the bondholders to shareholders due to agency problem between them. Galai and Masulis (1976) showed that a portion of the parent bondholders' collateral is removed through spin-off since it takes away a part of the parent's assets to create a legally independent firm where the parent shareholders receive proportionate stake. Therefore, bondholders' value is declined as their default risk increases in the parent firm after spin-off, whereas shareholders enjoy the full benefit from the spun-off firm. This is possible because non-existence of complete and perfect capital market allows the shareholders to expropriate bondholder value (Miller, 1977). Similarly, Myers (1977) suggested that firms with risky debts might reject positive net present value investments, since some of the investment benefits could accrue to the bondholders leaving the shareholders with less wealth. Hence, they could by-pass the bondholders and parent bankruptcy by undertaking the project through a spin-off company (Hennessy, 2000). The wealth redistribution hypothesis though suggested long ago, earlier empirical studies gave less attention to it. So far, Maxwell and Rao (2003) provide evidence consistent with wealth redistribution hypothesis as discussed above. They found that bondholders suffer a significant negative abnormal return during the month of the spin-off announcement, and this is related to the loss of collaterals in the parent firm.

Although the above literature suggest that corporate spin-off is a value addition event for the shareholders, sometimes it may be opposite, particularly when the spin-off process is a fundamentally inefficient method of distributing stock to the people who may not necessarily want it (Constantinos and Norman, 1992). However, the mainstream academic research found that on average corporate divestitures by spin-offs create shareholder value. If any corporate spin-off destroys shareholders value then such proposal would not get approval at the shareholders general meeting.

HYPOTHESES

Literature reviews suggest that corporate shareholders' value can be increased due to the benefits of spin-off decision and wealth redistribution from the bondholders to shareholders. Prior empirical studies documented using data from developed markets that shareholders' value gain occurs after the spin-off decision, but it is import to examine whether similar shareholders' value gain also occurs in emerging markets. This is because legal framework and market structure may not be similar in all countries.
For example, spin-offs in Singapore generally results out of corporate restructuring of parent firms under sections 211-216 of the Companies Act. Section 6 of Listing Manual of the Stock Exchange of Singapore (SES), currently renamed as Singapore Exchange (SGX), governs the listing of spin-off stocks. According to these regulations, separation of a subsidiary or division that requires transfer of parent assets to a newly created spun-off firm goes through a vetting process conducted by the higher court before the implementation of spin-off decision. In addition, a subsidiary cannot be listed on SES as a separate entity after spin-off if it accounts for more than 50 percent of the parent's profit. These legislations seem to safeguard the interests of stakeholders. Hence, the Singapore spin-offs that passed through stringent legal process may provide genuine spin-off benefits, and value destruction is unlikely. Therefore, the first hypothesis is formulated as follows

H1: *Corporate spin-offs in Singapore will yield abnormal returns in the parent share prices around the period of announcement.*

The spin off benefits will not only occur in parent firms but also occur in the spun-off subsidiaries that are converted into new entities. Since the subsidiary that was not able to perform well under the parent control will now be able to perform well, as it becomes a separate decision making entity. However, the spin-off shares may be underpriced when they are allocated to the parent shareholders. Underpricing of spin-off stocks may be required as uncertainty remains about the success of spun-off firm as an independent entity listed on the exchange. However, new listing underpricing is a common phenomenon in almost all stocks markets (Ljungqvist, A., 2006). Aftermarket price correction generally occurs, but owners of the newly listed stocks can have net value gain from new listings. Therefore, the second hypothesis is formulated as follows:

H2: *Spin-off stocks in Singapore will yield abnormal initial returns after their listing on the exchange.*

If the above two hypotheses are accepted then it can be suggested that shareholders gain value both in the parent and spin-off firms. Thereby, the combined value of the parent and spin-off stocks would be greater than the value of parent stock alone before the spin-off decision. This means corporate spin-offs in Singapore adds value for the shareholders.

METHODOLOGY

This study examines changes in shareholders' value after spin-off decision. This can be determined by examining stock price behavior around the spin-off event using standard 'event study' methodology. In Singapore, the process of spin-offs takes several months (often more than one year) to complete following the press announcement. This is because the spin-off decision can be implemented after arrival of court's vetting report and approval of the spin-off proposal in shareholders' general meeting. Afterwards, the spun-off company can apply for listing on the exchange and trading of stocks starts after listing approval. Therefore, spin-off is not a single announcement event but it contains a series of events. Hence, the parent stock return is examined around the period of (a) spin-off announcement, (b) spin-off completion/*ex*-date and (c) listing of spin-off stocks using a wider window period covering the three events. The relevant announcement dates, ex-dates and spin-off listing dates are identified from the announcement clips maintained at the Stock Exchange of Singapore.

Parent stocks returns around the three spin-off events are examined over a long period starting from 10 months before the announcement through to 10 months after the spin-off stock listing. Since a wider window is used to cover the three events, the abnormal returns over the period are estimated using monthly data. Abnormal returns are also estimated using daily and weekly data around the specific events (announcement, ex-date and listing) using a narrower window to take a close view of the impact of each event. However, the analysis is provided based on the wider window results using monthly data. Next, the initial excess return is calculated to examine the listing day market performance of spin-off stock. The aftermarket performance is also examined up to 10 months from spin-off stock listing. Finally, total change in the shareholders' value is estimated by combining the value changes occurring both in the parent and spun-off subsidiary over the test window period.

Test Models: Abnormal returns of parent stocks are estimated using the market model as follows:

$$AR_t = \frac{1}{N}\sum_{i-1}^{N}(R_{it} - \hat{\alpha} - \hat{\beta}R_{mt}) \quad (1)$$

Where, AR_t is abnormal return of the parent stock portfolio at event time period t; R_{it} is return of stock *i* at event time t; R_m is market return at time t; α_i is intercept of the market model; β_i is systematic risk of stock *i*; and N is number of stocks.

In the above model, the market return (R_m) is calculated based on Strait Times Index (STI Index). The STI index includes large and active firms only. The constituent stocks of this index account for about two-thirds of the total market capitalization in Singapore. In estimating the model parameters, the stock and market returns are transformed into log-returns because of their statistical properties (Fama, 1976). This may provide the best estimates of true parameters. The parameters are estimated over -60 to -3 months relative to the spin-off announcement date using monthly data, and corrected for thin-trading effect using Scholes and William (1977) method. Finally, cumulative abnormal returns for the parent firms are calculated as:

$$CAR_t = \sum_{t=-r}^{t=+s} AR_t \quad (2)$$

Where, CAR_t is cumulative abnormal return for the parent stocks portfolio at the event time period *t*, which starts from t = - r until *t* = +s and AR_t is defined above.

The average initial return of spin-off stocks in excess of market return (henceforth initial excess return) is calculated as follows:

$$IER_t = \frac{1}{N}\sum_{i=1}^{N}(IR_{it} - R_{mt}) \quad (3)$$

Where, IER_t is market adjusted initial excess return of the spin-off stock portfolio at event time *t*; IR_{it} is the initial return of spin-off stock *i* at time *t* calculated as $(P_{it} - P_{io})/P_{io}$ [P_{it} is closing price on the first day of trading and P_{io} is issue price of spin-off stock *i*]**;** R_{mt} is market return for the corresponding event period t.

Performances of spin-off stocks in aftermarket periods are measured using the mean-adjusted return method. It is difficult to estimate the systematic risk (β) of newly listed spin-off stocks as no historical price data are available. Therefore, the market model that adjusts for risks (as in Equation 1) cannot be applied here. Instead, the mean-adjusted or market-adjusted return models can be used to estimate the returns of stocks. Brown and Warner (1980 and 1985) found that the mean-adjusted model works like other models if events are not clustered. Therefore, average aftermarket abnormal return of the spin-off stocks portfolio is calculated using the mean-adjusted return model:

$$AMAR_t = \frac{1}{N}\sum_{i=1}^{N}[R_{it} - E(R_{it})] \quad (4)$$

Where, $AMAR_t$ is aftermarket abnormal return of the spin-off stocks at event time *t*; R_{it} is the return of stock *i* at event time *t*; $E(R_{it})$ is expected return of spin-off stock *i* at event time *t*, which is the mean return calculated over a comparison period. The comparison period is from the month +4 to month +10 relative to the day of spin-off listing. N is the number of stocks in the spin-off portfolio. Finally, the aftermarket cumulative abnormal return of spin-off stocks is calculated as follows:

$$AMCAR_t = \sum_{t=1}^{t=+s} AMAR_t \quad (5)$$

Where, $AMCAR_t$ is after market cumulative abnormal return for event time *t* = 1 until t = +s; and $AMAR_t$ is defined above.

Test Statistics: The parametric and non-parametric test statistics are calculated to find the significance of abnormal return of both parent and spin-off portfolios. The cross-sectional *t-statistics* are calculated by using the standard deviation of abnormal returns. The Wilcoxon Signed Rank Test (non-parametric test) is applied as a counterpart *t-test* to overcome the small population problem. Moreover, *t-test* suggested in Brown and Warner (1980) is applied to test the significance of cumulative abnormal returns over selected intervals.

SAMPLE CHARACTERISTICS

A total of 80 major corporate restructuring cases occurred in Singapore during January 1975 to December 2005. Only 25 cases were identified as pure spin-off events where both the parent and spin-off companies are simultaneously listed on the exchange following the spin-off event. For a spin-off to be included in the sample set, the parent stocks must have trading records over at least 30 months before the spin-off listing. This is required for the calculation of parameters α and β. Hence, a total of 50 firms were selected to construct the two portfolios of parent and spin-off firms with 25 firms in each portfolio. The required information was gathered from Company Handbook, SES Journal, SES Fact Book, and Daily Financial News. All these documents are available at Singapore Stock Exchange. However, the daily price data of the stocks of two portfolios were collected from SES database. Later, weekly and monthly-adjusted price data sets were constructed to calculate returns.

Characteristics of Parent and Spin-off Firms: The distribution shows that 25 spin-off cases occurred over the sample period (1975-2005) and the yearly distribution was fairly uniform. The average assets size of the parent firms was S$1,374 million and debt-asset ratio was 0.57. The spin-off firms were relatively smaller than the parents because of regulations. The mean size of spin-off firms relative to the size of the parent was 0.237. The length of the spin-off process ranged from as low as 62 days to a high of 479 days with an average of 229 days. Fifteen spin-off stocks became listed and started trading within an average of 18 days from spin-off *ex*-date, nine stocks were listed and started trading immediately after the *ex*-date, and one stock was already listed before the spin-off. Most of the parent stocks were thinly-traded with a mean trading frequency of 72.8 percent. The average unadjusted beta (1.18) of the parent stock portfolio was lower than the corrected Scholes-William beta (1.27) suggesting a downward bias due to non-synchronous effect on the systematic risk of the portfolio stocks.

EMPIRICAL FINDINGS

Performance of Parent Stocks

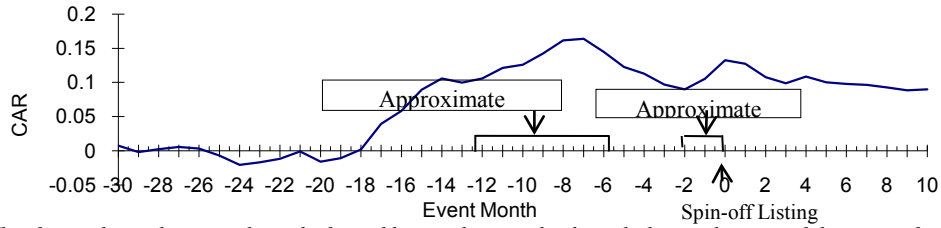
Figure 1 shows the general trend of risk-adjusted monthly CAR of 25 parent stocks around the spin-off announcement, *ex*-date, and listing periods over a time span of -30 months to +10 months relative to the spin-off listing (final event of spin-off process). Table 1 reports the risk-adjusted monthly ARs and CAR of the parent stocks over the same period covering the three spin-off events. In Figure 1, the CAR line moved without much change over the period of -30 to -18 months. After the event month -18, CAR increased significantly until the month -7. This behavior may reflect the effect of spin-off announcement, because most spin-off announcements came out during this period. After month –7, CAR declined until month –2 which may reflect uncertainty on the outcome of court vetting on spin-off proposal. However, uncertainty of spin-off implementation resolves on the *ex*-date when shareholders approve the spin-off proposal following court's decision.

Findings show that CAR started to increase from month -2, which may indicate *ex*-date effect due to uncertainty resolution. The increasing trend of CAR is continued until the event month 0, which may be due to upcoming spin-off listing on the market. Since the interval between the *ex*-date and the spin-off listing/first trading day is short, it is difficult to separate the *ex*-date effect from the listing effect. Only 15 firms went to *ex*-date before the spin-off listing date. The average duration between the *ex*-date and listing date is 18 days with a maximum of 71 days.

During the post-listing period of +1 to +10 months, CAR declined slowly due to possible price correction after spin-off listing, but it never came down to the pre-announcement period level. This indicates that the spin-off effect is mostly captured around the announcement period and increase in parent value took place following the spin-off event. The evidence therefore lends support to Hypothesis 1. A part of the value

gained after the spin-off announcement seemed to be lost in the post-announcement period. This could be due to uncertainly of successful spin-off materialization through a lengthy court vetting process. The lost value is mostly re-captured around the *ex*-date and listing date when the uncertainly is resolved and spin-off eventuates.

Figure 1: Risk Adjusted Monthly Cumulative Abnormal Return Around Announcement, Ex-date, and Spin-off



This figure shows the general trend of monthly cumulative risk-adjusted abnormal return of the parent firms over a long window period from 30 months prior to spin-off listing on the exchange to 10 months following the listing. The long window period covers three events related to spin-offs, namely the announcement of spin-off, completion of spin-off (ex-date), and listing of spun off subsidiary on the exchange.

Table 1 shows that, over -30 to +10 months relative to spin-off listing, 13 ARs are statistically significant in parametric tests and 14 ARs are significant in non-parametric tests. The significant ARs are clustered around the three periods (i) over -18 to -15 months (indicating anticipation of information about spin-off announcement), (ii) over -11 to -7 months (indicating possible effect of announcement), and (iii) over -1 to 0 months (indicating possible effect of *ex-date* and spin-off listing). Most of the ARs over -18 to 0 months are positive but not significant. In the post-listing period over +1 to +10 months, 8 ARs are negative and 2 ARs (for months +4 and +10) are positive. All these ARs are insignificant except the one in month +2. In non-parametric test, 3 ARs are significant.

Results show that CAR over the period of -30 to -19 months is only -1.08 percent, which is not significant. Next over the period of -20 to -8 months, CAR increased to 17.45 percent, which is significant at less than the 1 percent level. This indicates significant value increase for the parent stocks after spin-off announcements. In the following period of -7 to -2 months, the CAR drops to -7.36 percent that is significant at less than 1 percent level. This indicates value loss due to post-announcement uncertainty until the outcome of spin-off court vetting is known. The CAR over the period of -1 to 0 months is 4.26 percent, which significant at less than the 1 percent level. This indicates value increase around the period of *ex*-date and spin-off stock listing because of materializing the spin-off decision. It is difficult to distinguish the *ex*-date value gain from the listing period value gain at this stage. The AR of 2.73 percent (significant at less than 1 percent level) on the listing month 0 may be attributed to spin-off listing effect on the parent stock. During the post-listing period of +1 to +10 months, CAR drops to -4.30 percent that is significant at 10 percent level. This indicates the value loss after transfer of subsidiary assets from the parent to spin-off firm. Nevertheless, the CAR over the entire period of -30 to +10 months is found to be 8.97 percent, which is significant at 5 percent level. This indicates the total value increase due to three spin-off events. Therefore, the findings generally accept hypothesis 1 by documenting that parent stockholders gained about nine percent of value from the spin-off.

Robustness Checks

The study examines the effect of three spin-off events (announcement, ex-date, and spin-off listing) separately using both monthly and weekly data to check robustness of the earlier findings that used a wider window covering the three events together. Panel A of Table 2 shows the CAR of parent stocks

over selected intervals around the individual event starting from 10 months before announcement through to 10 months after the spin-off listing.

Table 1: The Performance of Parent Stocks over Announcement, ex-date, and Spin-off Listing Periods

Panel A: Event Month	AR	t statistics	Number of Positive AR	Wilcoxon *z* Score	CAR
-30	0.0078	0.601	16	0.991	0.0078
-29	-0.0096	-0.641	10	-0.732	-0.0018
-28	0.0045	0.357	13	0.151	0.0027
-27	0.0030	0.302	11	0.346	0.0057
-26	-0.0023	-0.137	13	0.118	0.0034
-25	-0.0105	-0.822	6	-1.608	-0.0071
-24	-0.0135	-0.962	11	-0.701	-0.0206
-23	0.0041	0.398	11	0.501	-0.0165
-22	0.0051	0.525	10	0.031	-0.0114
-21	0.0106	0.568	12	0.232	-0.0008
-20	-0.0149	-1.127	11	-0.901	-0.0157
-19	0.0049	0.351	9	-0.181	-0.0108
-18	0.0130	1.897*	15	1.962**	0.0022
-17	0.0371	2.575**	14	2.456**	0.0393
-16	0.0191	1.846*	13	1.655*	0.0584
-15	0.0312	2.854***	19	2.538**	0.0896
-14	0.0160	0.914	16	1.657*	0.1056
-13	-0.0059	-0.381	10	-0.810	0.0997
-12	0.0062	0.422	8	0.201	0.1059
-11	0.0153	2.379**	18	2.765***	0.1212
-10	0.0049	1.889*	17	2.177**	0.1261
-9	0.0160	-1.994*	9	0.516	0.1421
-8	0.0192	3.162***	22	3.321***	0.1613
-7	0.0024	2.222**	18	2.457**	0.1637
-6	-0.0189	-0.047	11	-0.016	0.1448
-5	-0.0221	-1.932*	6	-1.743*	0.1227
-4	-0.0100	0.003	13	0.215	0.1127
-3	-0.0156	-1.261	11	-0.1609	0.0971
-2	-0.0070	-0.549	12	-0.608	0.0901
-1	0.0153	2.056**	20	2.475**	0.1054
0	0.0273	2.836***	19	3..156***	0.1327
1	-0.0055	-0.242	10	-0.798	0.1272
2	-0.0196	-1.907*	7	-1.867*	0.1076
3	-0.0086	-0.987	9	-0.741	0.0990
4	0.0098	0.851	15	0.799	0.1088
5	-0.0086	-0.652	12	-0.247	0.1002
6	-0.0022	-1.041	8	-1.891*	0.0980
7	-0.0013	-0.586	10	-0.584	0.0967
8	-0.0040	-1.521	9	-1.233	0.0927
9	-0.0040	-1.036	6	-1.461	0.0887
10	0.0010	1.568	13	1.890*	0.0897

Panel B: Significance of CAR over Selected Intervals

Month intervals	CAR	t statistics
-30 to -19	-0.0108	-0.518
-20 to -8	0.1745	4.363***
-7 to -2	-0.0736	-3.255***
-1 to 0	0.0426	3.550***
1 to +10	-0.0430	-1.801*
-30 to +10	0.0897	2.167**

*Panel A presents the monthly risk-adjusted abnormal return (AR) and cumulative abnormal returns (CAR) of 25 parent firms along with their respective parametric t-statistics and non-parametric Wilcoxon z score. The event months from -11 to -7 are identified as the period around spin-off announcements, while the event months -2 and -1 are identified as the period of spin-off completion (ex-date) and the event month 0 is considered as spin-off listing month. The Panel B presents the CAR in selected interval of time. The level of significance is denoted in asterisks, e.g., ***, **, and * indicate significance at 1, 5, and 10 percent levels*

Parent shareholders earn about 8.84 percent CAR (t value is 2.714) over the span of period from -10 to -1 month prior to spin-off announcement. The abnormal return on the spin-off announcement month is 3.08 percent (t value is 2.541). Therefore, parent stockholders earn a total of 11.92 percent CAR by the end of announcement month. This finding affirms the acceptance of hypothesis 1. After spin-off announcement, investors need to wait an average of 229 days for implementation of the decision, which creates uncertainty on spin-off materialization. Therefore, they incur 3.11 percent CAR loss over the period from one month after announcement through to one month before the *ex*-date. However, they earn 2.57 percent abnormal return on the *ex*-date, as uncertainty resolves. A further 2.03 percent CAR increase occurs over the period between *ex*-date and spin-off listing day. This identifies recapture of lost value after spin-off materialization. The parent shareholders incur 4.30 percent CAR loss over the next 10 months possibly due to transfer of subsidiary assets. The weekly results in Panel B of Table 2 provides a closer picture of spin-off value effects around the three events, which are largely similar to the results based on monthly data. Finally, both results (using monthly and weekly data) show that spin-off in Singapore yields abnormal return for parent shareholders not only around the announcement period but also around the period of ex-date and spin-off listing.

Performance of Spin-off Stocks

Table 3 shows that spin-off stocks earn on average about 37.12 percent initial excess return (hereafter IER) with a minimum of -0.2 percent and maximum of 198 percent. The average IER is significant at the

Table 2: Value Effect of Spin-offs on the Parent Stocks around the Announcement, Ex-date, and Spin-off Listing Periods

	Panel A: Risk-adjusted monthly CAR	
Month intervals	**CAR**	**t statistics**
AD-10 to AD-1	0.0884	2.714**
AD	0.0308	2.541**
AD+1 to ExD-1	-0.0311	-3.114***
ExD	0.0257	3.336***
ExD+1 to LD	0.0203	1.772*
LD+1 to LD+10	-0.0430	-1.801*
	Panel B: Risk-adjusted weekly CAR	
Week intervals	**CAR**	**t statistics**
AD-15 to AD-1	0.0504	2.401**
AD	0.0201	2.508**
AD+1 to ExD-1	-0.0298	-1.861*
ExD	0.0244	2.235**
ExD+1 to LD-1	0.0198	1.685
LD	0.0194	2.260**
LD+1 to LD+15	-0.0238	-2.374**

*This Table presents the value effect of spin-off decision around three event dates separately: namely, announcement of spin-off, completion of spin-off process, and listing of newly created spun-off company. The Panel A provides value effects based on monthly cumulative abnormal return (CAR) while the Panel B provides the same based on weekly CAR. The abbreviation of AD, ExD, and LD refer to the announcement date, ex-date, and listing date respectively. In ten cases, the length of interval between ex-date and listing/first trading date is zero. CAR over this period is therefore calculated for the remaining fifteen parent stocks. The length of monthly and weekly holding periods however also varies from the case to case depending on actual length of the interval. The level of significance is denoted in asterisks, e.g., ***, **, and * indicate significance at 1, 5, and 10 percent levels.*

1 percent level in both t-test and signed rank test. The statistical distribution shows a maximum of nine spin-off listings yield IERs between 31 and 45 percent, followed by five yields between 16 and 30 percent and four between 46 and 60 percent. As a whole, 24 spin-off listings yield positive initial returns on the listing day. It appears that spin-off stocks, which have history with their listed parents, are underpriced since uncertainty remains about the success of spun-off subsidiary as independent entity. In addition, market overreaction towards the new listings may partially contribute to spin-off initial under pricing.

Therefore, having a proportionate stake in spin-off firms, parent shareholders gain about 37 percent value on the first day of the spin-off trading. This initial value gain is far larger than 4.3 percent value loss in the old parent firms during post spin-off period. Therefore, this study accepts the hypothesis 2 that spin-off stocks in Singapore yield abnormal initial returns after their listing on the exchange. The findings in Panel A of Table 4 show that market price of spin-off stocks are corrected downward in the aftermarket periods, posting eight negative monthly AMARs over 10 months following the listing day. However, most of these AMARs are insignificant, except those of the month +2 and +5. The findings in Panel B of Table 4 show that the spin-off stock prices are corrected towards downward to a great extent over the period of two months (about 9 weeks) after start of trading. After two months following the spin-off listing, the AMCAR stands at -9.46 percent that is significant at 5 percent level. The AMCAR further decreases to -11.67 percent over the following three months period ended on +5 Month. The aftermarket loss in value is partially recovered over the subsequent five months period ended on +10 Month. The AMCAR finally stands at -9.17 percent, which is significant at 10 percent. The weekly results in Table 5 below also reveal a similar performance of the spin-off stocks in the aftermarket period.

Total Effect on Shareholders' Value

Table 5 summarizes the initial and aftermarket value effect of a spin-off on the shareholders' value at the spin-off firm level. On the first day of spin-off trading, stockholders gain an initial excess return of 37.12 percent. In aftermarket periods, however, the gain in value due to market overreaction has been corrected.

Table 3: Market-Adjusted Initial Excess Return of Spin-off Stocks

Panel A: Distribution of Initial Excess Returns (IER)

Interval of IER	Number of firms
less than 0.15	2
0.16 to 0.30	5
0.31 to 0.45	9
0.46 to 0.60	4
0.61 to 0.75	2
0.76 to 0.90	1
0.91 to 1.00	0
1.01 and above	2
Total	25

Panel B: Summary Statistics of IER

Mean	: 0.3712	t value	: 3.637***
Median	: 0.3455	Wilcoxon z score	: 4.341***
St. Deviation	□□0.5101	No. of positive IER	: 24
Minimum	: -0.002		
Maximum	: 1.98		

*This table presents the distribution of market-adjusted initial excess return from investment in newly created spin-off stocks, measuring the level of spin-off underpricing. The market-adjusted initial excess return is computed because no historical price data are available to estimate the systematic risk parameter of the newly created spin-off firms. The level of significance is denoted in asterisks, e.g., ***, **, and * indicate significance at 1, 5, and 10 percent levels.*

The aftermarket cumulative abnormal returns (AMCAR), over the periods from +1 to +30 days, +1 to +15 weeks, and +1 to +10 months are respectively -5.99 percent, -11.03 percent and -0.0917 percent. The overreaction effect appears to be corrected within 2 to 3 months following the spin-off listing. Therefore, the net value gain of the spin-off stocks stands at respectively 31.13 percent, 26.09 percent and 27.95 percent on the 30th day, 15th week and 10th month from the first day of listing/trading. These findings reaffirm the hypothesis 2 that spin-off stocks in Singapore yield abnormal initial returns after their listing on the exchange, and a larger part of the initial value gain is sustained over the long term period up to 10 months following listing.

The acceptance of hypotheses 1 and 2, based on empirical results, suggest that parent shareholders gain value both in the parent and spin-off firms. Therefore, after spin-off materialization, total value of parent

and spin-off firms is greater than the value of undivided parent firm before the spin-off. Results in Table 6 show that shareholders gain about 15.73 percent adjusted value over the period from 10 months before to 10 months after spin-off materialization. Of the 15.73 percent total adjusted value gain, about 6.62 percent gain occurs in spin-off stocks while the remaining 9.11 percent occurs in parent stocks. The value effects based on daily and weekly returns also show similar findings. The total adjusted value effects based on daily and weekly returns are about 15.12 and 14.23 percent respectively.

Table 4: Aftermarket Performance of Spin-off Stocks (Using Monthly Data)

Panel A: Monthly Aftermarket Abnormal Return (AMAR) and Cumulative Abnormal Return (AMCAR)

Event Months	AMAR	t stat for AMAR	Number of Positive ER	Wilcoxon *z* Score	AMCAR
1	-0.0205	-0.512	10	-1.372	-0.0205
2	-0.0741	-3.857***	5	-3.291***	-0.0946
3	-0.0096	-0.602	12	-0.505	-0.1041
4	-0.0021	-0.095	13	-0.337	-0.1062
5	-0.0105	-0.929	8	-1.754*	-0.1167
6	0.0218	1.690	15	1.601	-0.0949
7	-0.0108	-0.673	9	-0.817	-0.1057
8	0.03307	1.657	16	1.442	-0.0726
9	-0.0017	-0.124	10	0.0721	-0.0743
10	-0.0174	-1.221	11	-1.105	-0.0917

Panel B: Significance of AMCAR over Selected intervals

Month Intervals	AMCAR	t Statistics
1 to 2	-0.0946	-2.260**
1 to 5	-0.1167	-1.870*
1 to 10	-0.0917	-1.810*

*The Panel A presents the monthly aftermarket abnormal return (AMAR) and aftermarket cumulative abnormal returns (AMCAR) of 25 spin-off firms along with their respective parametric t-statistics and non-parametric Wilcoxon z score. The Panel B presents the AMCAR in selected interval of time over a period of 10 months in aftermarket. The level of significance is denoted in asterisks, e.g., ***, **, and * indicate significance at 1, 5, and 10 percent levels.*

Table 5: Initial and Aftermarket Value Gain in Spin-off Stocks

Interval from Listing Date	IER/ AMCAR	t Statistics	Net Gain in Value[c]
0 (First Trading Day)	0.3712[a]	3.637***	0.3712
+1 to +30 Day	-0.0599[b]	-2.251**	0.3113
+1 to +15 Week	-0.1103[b]	-2.654**	02609
+1 to +10 Months	-0.0917[b]	-1.810*	0.2795

*This table presents the net value gain in spin-off stocks during the period from the first day of market trading to 10 months in aftermarket. The net value gain is computed by aftermarket cumulative abnormal return (AMCAR) from the Initial Excess Return (IER). The level of significance is denoted in asterisks, e.g., ***, **, and * indicate significance at 1, 5, and 10 percent levels.*

Table 6: Total Spin-off Value Effect on Parent and Spin-off Stocks

STOCKS	Value Effect Measured by Cumulative Abnormal Returns		
	Days AD-30 to LD+30	Weeks AD-15 to LD+15	Months AD-10 to LD+10
Parent Stocks	0.0774	0.0805	0.0911
Spin-off Stocks	0.3113	0.2609	0.2797
Total Value Gain (Unadjusted)	0.3887	0.3414	0.3708
Spin-off stocks (adjusted)[a]	0.0738	0.0618	0.0662
Total Value gain (adjusted)[b]	0.1512	0.1423	0.1573

This table shows the total shareholders' value increase in both parent and spin-off firms because of separation between the parent and subsidiary. The average value of spin-off assets that are transferred from parent firms is about 23.7% of total parent assets. Therefore, value effect on the spin-off stocks are adjusted to parent equivalent level. (e.g., 0.3113 X 0.237 = 0.0738). The adjusted total value gain is computed by combining the value gain in parent stocks with the adjusted value gain in spin-off stocks.

Spin-off Effects and Parent Debts

The results presented above document shareholders' value increase in the Singapore market following spin-off events, which is consistent with the literature that suggests a value increase occurs due to the spin-offs economic benefits. The shareholders value may also increase due to wealth redistribution effect. This is because a portion of the debtholders' collateral in parent firm is removed through separation of a subsidiary/division, and a spin-off firm is created to take control of the removed parent assets. In the spin-off firm, parent shareholders receive a proportionate ownership while debtholders lose their claim on the assets that are transferred to the spin-off firm. Therefore, the value of parent debt reduces due to debtholders' risk increase after reduction of collateral. Since debts of parents firms in Singapore are not usually publicly traded, a test of bond value behavior using listed bond returns is not possible. Therefore, this study indirectly examines the wealth redistribution effect of spin-off.

If transfer of assets from parent firms to spin-off firms could result in stockholders' value increase at the cost of debtholders' value, then a positive relationship can be expected between the parent debt-asset ratio and shareholders' value gain. Table 7 reports Pearson's rank correlation coefficient between the parents' debt asset ratio (DAR) after spin-off materialization and cumulative abnormal returns of the parent and spin-off stocks. It is found that correlation between the parent DAR ratio and parent CAR is about 0.465, which is significant at 5 percent level. This may shed indirect light on the possibility of wealth redistribution from bondholders to shareholders due to changes in the parent capital structure following spin-off materialization. It is also found that parent capital structure has no significant effect on the spin-off value *per se*. This may suggest that spin-off value *per se* largely depends on the economic benefits of separating subsidiary business operation from parent control. Finally, correlation coefficient between the parent DAR and total value gain in the parent and spin-off firm together is found to be 0.361 that is significant at 10 percent level. In conclusion, the study documents the value effect of corporate spin-offs in Singapore that supports spin-off value effect theories and evidence from developed markets, but does not rule out the possibility of wealth redistribution from the debtholders to shareholders.

Table 7: Correlation between the Parent Debt Asset Ratio (DAR) and Cumulative Abnormal Returns of Parent and Spin-off Stocks

Cumulative Abnormal Returns	Pearson's Rank Correlation □□
Parent (AD-10 to LD+10 months)	0.465
Spin-off (0 to +10 months)	0.308
Total Cumulative Abnormal Returns of both Parent and Spin-off stocks	0.361

This table reports the level of correlation between the parent capital structures (debt-asset ratio) with the value increase in both parent and spin-off firms. The evidence tends to lend some support for the wealth redistribution hypothesis discussed in the paper. The estimated Pearson's rank correlations (ρ) are found to be statistically significant as the critical values of ρ (n=25) are lower than estimated correlation.

CONCLUSIONS

Corporate spin-offs involves separation of a subsidiary/division from its parent by converting it into an independent firm. As a part of the restructuring the business operations of parent firm, the assets of spin-off subsidiary/division are transferred to a newly created firm known as 'spin-off company'. The parent shareholders receive proportionate ownership stakes in the spin-off company, but debtholders lose their claim on the assets transferred to this company. The mainstream literature suggests that a subsidiary spin-off creates value due to (i) reduction of operational diseconomies and inefficiency, (ii) reduction of information asymmetry, (iii) reduction of tax liability, and (iv) improvement of corporate governance in restructured parent and spin-off companies. Corporate spin-offs may also help increase shareholders' value due to redistribution of wealth from the debtholders to shareholders. This is because assets of the subsidiary/division are transferred to a newly incorporated company where the parent bondholders have no claim on the assets and earnings. A good number of studies provide evidence of a shareholders' value

increase after spin-offs. Most of available evidence are from the developed markets, which tend to support different economic value effects from spin-offs. Moreover, these studies largely examine only the parent share value after the announcements of spin-offs. The total value effects on the parent and spin-off shares together remains yet out of research focus. Therefore, this study put documents new evidence on spin-off value effects in the Singapore market, which is a major emerging market in South East Asia.

The study utilized a total of 25 corporate spin-offs occurred in Singapore over the period of 1975 to 2005. The effect of spin-offs has been examined over a window period from 10 months before announcement through to 10 after the spin-off listing. A longer test window is needed because implementation of spin-off takes an average of 229 days from the day of announcement, and the period has to cover a sequence of three events related to spin-off: (i) spin-off announcement, (ii) spin-off ex-date, and (iii) spin-off listing. The study results show that parent shareholders gain about 15.73 percent adjusted value over the test period. Of the 15.73 percent total adjusted value gain, about 6.62 percent gain occurs in spin-off stocks while the remaining 9.11 percent occurs in parent stocks. The finding is consistent with the argument that corporate spin-offs have economic benefits that help increase in shareholders' value. It is also found that total spin-off value gain is significantly correlated with the debt asset ratios of the parent firms, which sheds light on the possibility of wealth redistribution from the bondholders to shareholders due to change in the parent capital structure after spin-off event.

The paper concludes that corporate spin-offs have a value effect in the Singapore market as is found earlier in the developed markets. While the spin-off value addition could be the result of several economic benefits accruing from separation of a subsidiary/division from its parent company, the redistribution of wealth from debtholders to shareholders cannot be ruled out. Finally, readers should take note of some inevitable limitations, e.g., relatively small size though it covers entire population and use of a wider test window may somewhat affect the results due to other factors though efforts are given to clean up data.

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CORPORATE GOVERNANCE AND CASH HOLDINGS: A COMPARATIVE ANALYSIS OF CHINESE AND INDIAN FIRMS

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ABSTRACT

In this study, we examine the impact of concentrated ownership on cash valuation and the level of cash holdings in firms the emerging nations of China and India. Agency theories suggest that firms with high levels of concentrated ownership are subject to greater extraction of private benefits from cash holdings. Our study utilizes Chinese firms data from 1993-2006 and Indian firms data from 2003-2006. We examine the relationship between firm valuation and cash holdings with different levels of governmental ownership concentration, family ownership levels and foreign ownership levels. Our findings show that Chinese firms with high levels of government ownership have larger cash holdings suggesting more opportunities for private benefits extraction thus leading to lower firm valuation. In contrast, we find that Indian firms with high level of family ownership have low cash holdings and record better performance. Chinese investors view governmental ownership as a determinant that reduces firm value. Indian investors see high levels of family ownership as a factor that enhances firm value. This study enhances the body of knowledge concerning the nature of cash holdings and firm value in emerging nations of China and India.

JEL: G31, G34

KEYWORDS: Cash Holdings, ownership structure, corporate governance, Chinese firms, Indian firms, firm valuation.

INTRODUCTION

The subject of corporate governance has gained added importance in recent years in part because of notoriety of such failures as Enron, Parmalat and others. Corporate governance encompasses the different relationships between parties with interests in a business organization. In recent years, the relationships between a large controlling shareholder and minority shareholders have attracted particular attention. Dyck and Zingales (2004) note that controlling shareholders can obtain some benefits that are not attainable by other shareholders. These benefits are known as the private benefits of control. The controlling party can extract private benefits by using company's money to pay for perquisites. The controlling shareholder may also extract private benefit by having exclusive access to private information the firm's business which in turn gives a significant advantage to the large shareholder over minority shareholders when making decisions based on the private information.

There are few accurate estimates of the type and magnitude of private benefits extracted by controlling shareholders. It is generally accepted that minority shareholders are better protected when private benefits of control are curbed and financial development is enhanced (Laporta et al., 1997). Recent corporate governance literature utilizes the measure of the size of firm cash holdings as a means of determining the degree of private benefit extraction (Jensen, 1986). Liquid assets such as cash can be converted into private benefits at lower cost (Myers and Rajan, 1998). Thus, controlling shareholders do indeed try to maximize their benefits and hold more liquid assets in countries in which it is easier to appropriate such private benefits, then minority shareholders should value liquid assets in those countries less than they do in countries where it is more difficult for majority shareholders to do so (Dittmar et al., 2003; Kalcheva

and Lins, 2007 and Pinkowitz et al., 2006). Investors will tend to discount the value of cash holdings if they expect controlling shareholders to partly consume cash holdings as private benefits and they will place higher value on dividends as a result (Pinkowitz et al., 2006).

Concentrated ownership in the form of family control or government control of public firms is common in Europe and East Asia. The value of control benefits is significant in these countries. In China, ownership of most listed companies is heavily concentrated in the Chinese government hands (Xu and Wang, 1999). The Chinese government is usually the controlling shareholder and as such significant inside information about the company is transmitted to the controlling shareholder. In India a high degree of ownership concentration exists in privately owned firms. Many of the Indian privately owned firms have a high level of family ownership. The existing high levels of concentrated ownership in both China and India provide a basis for studying the degree of private benefit extraction by controlling shareholders as well as the effect such extraction of benefits will have on firm valuation.

In this paper, we investigate 1) the impact of agency problems on the level of cash holdings in Chinese and Indian firms and 2) the effect of majority ownership concentration on Chinese and Indian investor's valuation of cash and dividends. The remainder of the paper is organized as follows: Section 2 is the literature review of previous studies. Section 3 covers the empirical hypotheses to be tested in the paper. Section 4 reports the results. Finally, section 6 concludes the paper.

LITERATURE REVIEW

The free cash flow hypothesis asserts that shareholders desire to limit managements' access to free cash flow in order to prevent shareholder-management conflicts (Jensen, 1986 and Stulz, 1990). The free cash flow hypothesis recognizes the tradeoff inherent in cash holdings, i.e., providing sufficient internal capital to managers to efficiently fund viable investment projects while at the same time curtailing management from excessive cash consumption fund projects and do perquisite consumption benefitting managers to the detriment of shareholders. If control is lacking, it is difficult, if not impossible, to convince self-interested managers to allow cash reserves to flow as benefits to shareholders.

Previous studies on cash reserves in the U.S. provide mixed evidence about the impact of large cash holdings on shareholders. Managers may hold cash for precautionary reasons (Opler et al., 1999). Mikkelson and Partch (2003) find that large cash holdings may improve firm value and do not create conflict of interest between managers and shareholders. Harford (1999) concludes that firms with large cash holdings have a greater propensity to make value-decreasing acquisitions. Dittmar and Mahrt-Smith (2007) find that shareholders assign diminished value to cash reserves and firms where it is likely that significant agency problems will be present at that firm. Faleye (2004) finds that the presence of significant excess cash reserves will likely lead to shareholder proxy contests which will ultimately result in executive turnover and greater cash distributions to shareholders. Thus a powerful incentive exists for managers to avoid large cash reserves.

In a study covering several countries, Dittmar, et al. (2003) find that in countries with greater shareholder protection, there are less firm cash holdings. This reflects shareholder desire to limit management's control over cash reserves. Minority shareholders value cash holdings less in countries with low shareholder protection (Pinkowitz, Stulz and Williamson, 2006). This is consistent with the hypothesis that poor shareholder protection will enable management and/or controlling shareholders to extract excessive private benefits from cash reserves. A similar conclusion was formed by Lins and Kalcheva (2007) finding that study how country-level investor firms with weak shareholder rights hold more cash which in turn bolsters the assertion that increased cash holdings can be abused by managers and/or controlling shareholders.

The effects of the state ownership on Chinese firm value have been covered in several studies (Wei and et al., 2003; Wei, Xie and Zhang, 2005). These studies suggest that firms with high government ownership

tend to engage in non-value maximization behavior. Wei, Xie and Zhang (2005) study the ownership structure and firm valuation in privatized Chinese firms from 1991-2001. They find that high levels of state ownership are negatively related to firm valuation. In addition, they report a convex relationship between Tobin's Q and state ownership and a positive relationship between institutional ownership and Q. Overall, their results suggest that when firms transition from state-owned firm to a privatized firm in which the government retains significant ownership, then the ensuing conflicts of interest which arise among different block shareholders causes firm value to decrease. D'Souza, Hassan, Wei and Varela (2003) study the pre- and post-privatization financial and operating performance of 208 Chinese firms from 1990-1997. They find that higher state ownership in Chinese firms result in decreased performance.

Khanna and Palepu (2000), find that insider ownership (a proxy for family ownership) is positively related to the performance of group affiliates and unaffiliated firms alike. In India, family-owned firms are considered to be reflective of a high level of product quality. Family ownership provides continuity of ownership because ownership is passed from generation to generation. Family-owned businesses are politically influential and have priority access to financial markets. Family-owned firms which are part of a business group may have additional access to internal capital if the group owns a bank or other financial institution. Sarkar and Sarkar (2000) find that Indian firm value increases if the holdings of directors exceed 25%. Also, they find no evidence of private benefit extraction in the studied Indian firms and they find a linear relationship between foreign ownership and company performance using the measure of rate of return on assets and return on sales.

Several factors have been found to influence the valuation of cash held by firms. Faulkender and Wang (2006) find that firm valuation of cash declines when firm policies direct the distribution of cash in the form of dividends – rather than repurchases. Dittmar and Mahr-Smith (2007) study the relationship between corporate governance and the value of cash holdings. They find that cash is more highly valued in well-governed firms as opposed to poorly-governed firms.

HYPOTHESIS DEVELOPMENT

According to LaPorta et al. (1999), firms controlled by large shareholders can encounter agency problems which pit the controlling shareholder against other minority shareholders. The controlling shareholder attempts to maximize his welfare by influencing the decision of management. When the controlling shareholder's interests are perfectly aligned with the interests of outside investors, then the outside investors benefit when the controlling shareholder takes actions which maximizes his welfare. However, when the interests of the controlling shareholder and outside investors are not perfectly aligned, then agency problems arise causing the controlling shareholder to maximize his welfare while at the same time harming the interests of outside investors. The benefits that the controlling shareholder extracts at the expense of other investors are referred to as the private benefits of control. The level of such benefits is in large part dependent on how well the interests of outside minority investors are protected in the firm's country. It should be noted that as a controlling shareholder obtains more private benefits, the outside investors' assessment of firm value falls.

In China, the government is the large controlling shareholder in large number of Chinese firms, while in India there is family ownership concentration in large number of firms, thus we hypothesize the following:

H_{1a}: The higher the level of government ownership in Chinese firms, the lower the firm value since the government will try to extract private benefits of control based on its relatively large ownership of firms.
According to Brockman et al (2007), family owned firms in the United States exhibit superior performance and incur lower costs of capital relative to non-family firms. Also, the cash holdings of such firms are valued at premium over non-family firms. Anderson and Reeb (2003) and Villalonga and Amit

(2006) show that family ownership, control and management affect firm value positively. Therefore, we hypothesize the following:

H_{1b}: The higher the family ownership in firms in India, the higher the firm value since the concentrated family ownership will do its best to increase firm value and profitability.

In a world of perfect financial markets and no contracting costs, firms invest in all available positive net present value projects. They pay out the funds they cannot invest in such projects to shareholders. Funds paid to shareholders are funds that controlling shareholders cannot employ to further their own self interests. Controlling shareholders would alternatively use these distributed funds to increase their own personal wealth or to improve their controlling position in the firm. Thus, controlling shareholders prefer to keep funds in liquid assets because liquid assets can more readily be converted to private benefits of control. Liquid assets can immediately be invested in projects that provide personal benefit to controlling shareholders. As Myers and Rajan (1998) assert, it is easier to make cash disappear than to make a plant disappear. Therefore, we propose the following hypothesis:

H_{2a}: The higher the degree of government ownership in Chinese firms, the higher the likelihood of holding relatively higher levels of cash.

H_{2b}: The higher the degree of family ownership in Indian firms, the lower the likelihood of holding relatively higher levels of cash.

According to LaPorta et al., (2000b) firms experience greater pressure to pay dividends in countries providing poor investor protection because firm resources are more likely to be subject to the extraction of private benefits by controlling shareholders. In firms in a country with poor investor protection, shareholders gain when the firm pays out liquid assets in the form of dividends because such dividends can then be invested at a rate outside the firm which will be higher than the rate of return on the liquid assets invested inside the firm. This is due to the fact that the rate of return on assets invested inside the firm is reduced when the controlling shareholder extracts part of such assets in the form of private benefits of control. However, this reason is not true for family controlled firms, because family ownership is found to lower the agency costs between founding families and shareholders, thus there is better alignment of interests between families and shareholders; and the family ownership provides better monitoring on management (Brockman et al. 2007). From here, we hypothesize:

H_{3a}: Higher dividend payout ratios are valued higher in Chinese firms.

H_{3b}: Lower dividend payout ratios are valued higher in Indian firms.

DATA AND METHODOLOGY

The sample of firms used in this study is comprised of all the Chinese firms present in the CSMAR database during the period 1993-2006. In our sample, we excluded financial sector firms (banks, insurance companies, etc.) since their cash policies and accounting procedures differ from that of other industrial sectors. The sample consists of 1164 firms over a 14 year time span. The sample of Indian firms are composed of group affiliates and standalone private firms in the BSE 500 (Bombay Stock Exchange) index during 2003-2006 included in the PROWESS data base from the Centre for Monitoring the Indian Economy (CMIE). Our sample includes firms from the Manufacturing and Services industries only. The sample of Indian firms consists of 334 firms over the 5 year period. Both our samples are based on annual data.

In order to investigate the value of liquid assets and dividend payouts in firms with different government ownership levels, different family concentration levels and different foreign ownership concentration levels, we follow the regression model of Pinkowitz et al. (2006) that examines the relationship between firm related institutional factors and cash valuation. In our analysis, we use the sum of the market value of equity plus the book value of debt as a proxy for the value of the firm.

$$V_{i,t} = \alpha + \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dV_{i,t+1} + \beta_{16} dL_{i,t} + \beta_{17} dL_{i,t+1} + \varepsilon_{i,t} \quad (1)$$

Where, X_t is the level of variable X in year t divided by the level of assets in year t; dX_t is the change in the level of X from year t − 1 to year t, $X_t - X_{t-1}$, divided by assets in year t; dX_{t+1} is the change in the level of X from year t to year t+1, $X_{t+1} - X_t$, divided by assets in year t; V is the market value of the firm as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt; E is earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits; NA is net assets defined as total assets minus liquid assets and L corresponds to liquid asset holdings; RD is research and development (R&D) expense I is interest expense; and D is dividends defined as common dividends paid. When R&D is missing, we set it equal to zero.

We expect the change in liquid asset holdings to contribute less to firm value in high government ownership firms and more in high family owned firms, so that β_{16} should be lower in the subsample high government owned firms and higher in high family owned firms. Also, we expect the change in dividends to have a positive impact on firm value in high government ownership, while it would not have the same high positive impact in family concentrated firms.

Descriptive Statistics

The descriptive statistics for the sample are contained in Table 1 including the mean, median, standard deviations of all the different variables used in the study. The variables used in this study are based on annual data for both the Chinese and the Indian firms. Panel A of Table 1 provides the descriptive statistics of Chinese firms. The cash holdings variable, the primary variable in the study, has a mean of 18.7%, a median of 14.2% with a standard deviation of 9.4%. The sample has little skewness. Government ownership is 21.4% while insiders own an average of 2.8% of the outstanding shares. The government ownership variable is highly skewed because some of the Chinese listed companies have high government ownership while others have very little. The board independence variable reflects a mean of 54.7% and a median of 81.4%. The average firm in the sample has sales of approximately $4 billion Renminbi; assets of approximately $4.7 billion Renminbi; a leverage ratio of 21.7%; market to book ratio of approximately 2.64; cash flows to assets of approximately 17%; capital expenditures to assets of about 5.1%; and acquisition to assets of approximately 1.8%. The percentage of revenue devoted to R&D is about 1.7% and the percentage of the working capital from the total assets is approximately 7.1%. The percentage of firms' shares owned by foreign investors has a mean of 11.7%. This variable is skewed since the median value of foreign ownership percentage is 40.5%. In our sample, the firms have a relatively low payout ratio which is 2% on average. The average earnings per share ratio is 2.6%.

Panel B of Table 1 provides the descriptive statistics of Indian firms. The cash holdings variable, the primary variable in the study, has a mean of 13.1%, a median of 16.9% with a standard deviation of 5.8%. Family ownership is 37.8% while board independence is 11.8% insiders own an average of 56.7% of the outstanding shares. The average firm in the sample has sales of approximately $54 billion Rupees; assets of approximately $79 billion Rupees; a leverage ratio of 37.4%; market to book ratio of approximately

4.69; cash flows to assets of approximately 29.5%; capital expenditures to assets of about 6.8%; and acquisition to assets of approximately 3.2%.

Table 1: Descriptive Statistics of Chinese And Indian Firms

	Mean	Median	Standard Deviation
Panel A: Chinese firms			
Cash Holdings	0.187	0.142	0.094
Inside Ownership	0.028	0.351	1.681
Government Ownership	0.214	0.351	2.374
Board Independence	0.547	0.814	0.184
Sales (Millions of RMB)	3,987	1,587	2,584
Assets (Millions of RMB)	4,748	1,684	3,369
Leverage	0.217	0.197	0.157
Market-to-Book	2.64	1.95	1.32
Cash Flow/Assets	0.172	0.157	0.084
Working Capital/Assets	0.071	0.057	0.065
CF Volatility	0.087	0.062	0.041
R&D/Sales	0.017	0.001	0.027
CapEX/Assets	0.051	0.048	0.042
Acquisition/Sales	0.018	0.001	0.013
Payout Ratio	0.019	0.030	0.064
Earnings	0.026	0.036	0.136
Net Assets	3,861	2,917	1,364
Interest Expense	156	67	127.34
Foreign	0.117	0.405	1.361
Panel B: Indian firms			
Cash Holdings	0.131	0.169	0.058
Family Ownership	0.378	0.413	0.147
Insider Ownership	0.567	0.621	0.238
Board Independence	0.118	0.241	0.184
Sales (Millions of Rupees)	58,415	86,647	45,698
Assets (Millions of Rupees)	79,214	104,367	56,368
Leverage	0.374	0.423	0.234
Market-to-Book	4.69	5.23	1.654
Cash Flow/Assets	0.295	0.312	0.094
Working Capital/Assets	0.094	0.125	0.089
CF Volatility	0.098	0.136	0.097
R&D/Sales	0.044	0.057	0.013
CapEX/Assets	0.068	0.074	0.035
Acquisition/Sales	0.032	0.041	0.019
Payout Ratio	0.021	0.029	0.015
Earnings	0.032	0.041	0.022
Net Assets	49,241	52,364	32,157
Interest Expense	139	153	108
Foreign	0.143	0.193	0.087
Diversification factor	3.9	4	2.1

This table provides summary statistics for the sample. The dataset comprises 1164 Chinese firms and 334 Indian firms; the Chinese sample covers the period from 1993 to 2006, while the Indian sample covers the period 2003 to 2006. The descriptive statistics based on annual data, include: ratio of cash to total assets (Cash Holdings), equity ownership of the top five officers (Inside Ownership), government ownership, ratio of independent directors on the board to total directors (Board Independence, non-government representative, non-family representative), family ownership representing the ratio of same family owned shares out of the total, sales, total assets, firm leverage (Leverage), ratio of the market value to book value of assets (Market-to-Book), ratio of cash flow to net assets (CF/Assets), ratio of net working capital to net assets (Working Capital/Assets), standard deviation of cash flows for the past five years (CF Volatility), ratio of research and development to sales (R&D/Sales), ratio of capital expenditures to net assets (CapEx/Assets), and ratio of acquisition to sales (Acquisition/Sales), the percentage of the dividends distributed to the shareholders (Payout ratio), earnings before extraordinary items plus interest, deferred tax credits and investment credits (Earnings), the total assets minus cash (Net assets), the interest expense, and percentage of foreign investors in the company (Foreign). Finally, for the Indian firms the diversification factor represents the number of diversified affiliates related to a firm.

The percentage of revenue devoted to R&D is about 4.4% and the percentage of the working capital from the total assets is approximately 9.4%. The percentage of firms' shares owned by foreign investors has a mean of 14.3%. The average payout ratio is 2.1% while the average earnings per share is 3.2%. The

diversification factor which represents the number of divisions or affiliates within an Indian firm has a median value of 4.

The results of the descriptive statistics give us an idea about the differences between Chinese and Indian firms. Indian firms seem to invest more in their operations, having higher capital expenditure and working capital ratios, higher acquisition ratio and higher R&D ratios. The cash holdings of Indian firms are lower than the Chinese counterpart.

Table 2: Correlations – Chinese and Indian Firms

	Cash Holdings	**Inside Ownership**	**Government Ownership**	**Board Independence**
Panel A: Chinese firms				
Inside Ownership	-0.141**			
Government Ownership	0.214***	-0.028*		
Board Independence	-0.057**	0.374**	-0.518***	
Net Assets (Millions of RMB)	-0.236*	0.196**	-0.174*	0.241**
Panel B: Indian firms				
	Cash Holdings	Inside Ownership	Family Ownership	Board Independence
Inside Ownership	-0.23**			
Family Ownership	-0.35***	0.325**		
Board Independence	0.057	0.044	-0.114*	
Assets (Millions of RMB)	-0.158*	0.311**	0.381*	0.384

*this table provides data on the correlations between cash holdings, governance variables, and firm size. the data set comprises1164 firms covering the period from 1993 to 2006 and 334 indian firms covering the period 2003 to 2006. *, ** and *** are significant at 10%, 5% and 1% respectively.*

Panel A in table 2 contains the correlation coefficients between cash holdings, governance proxies, and firm size. Cash holding is positively related to government ownership and the companies' assets. Cash holding is negatively related to insider ownership and board independence. Insider ownership is negatively related to government ownership while it is positively related to board independence and firm size. Overall, a more independent board, with higher insider ownership tends to have lower cash holdings. High government ownership firms tend to have low independence and high cash holdings. This may be an indicator that the government is using its large ownership concentration to extract private benefits from the firms.

Panel B in table 2 contains the correlation coefficients between cash holdings, family ownership variable, and firm size. For Indian firms, cash holding is negatively related to family ownership and insider ownership. Insider ownership is positively related to family ownership and firm size. Overall, Indian firms with more family concentrated ownership tend to have less cash holdings. This may also be an indicator that family concentration in firms reduces the agency relationship conflicts and creates more alignment between the shareholders, which in turn reduces the extraction of private benefits of control by a large concentrated group.

MULTIVARIATE REGRESSION ANALYSIS

Our study examines the relation between cash holdings and various controls for firm specific variables in a multivariate setting using cross-sectional regressions. The dependent variable is cash holdings, i.e. the log of cash to total assets ratio. The independent variables are governance-related variables and firm specific factors affecting cash holdings. The regression coefficients of the different variables address the predictions of our hypotheses relating governance to cash ratios.

Models 1 through 3 of panel A of Table 3 provide the analysis of the relation between corporate cash holdings and governance/company specific variables for Chinese firms. The results in Models 1 and 3 suggest that the government ownership is positively and significantly related to cash holdings. Higher government ownership leads to larger corporate cash holdings. Also, there is a negative relationship

between the board independence variable and the cash holdings which is consistent with our hypotheses. The results in Model 2 suggest that the cash flow volatility affects negatively the cash holdings of Chinese firms. We do not find any significant relationship between the firm's ROE level and its cash holdings, thus suggesting that the Chinese minimum rate of return regulatory requirement is not an important factor in determining Chinese firm cash levels.

Table 3: Regression Analysis – Cash Holdings

	Cash Holdings	**Cash Holdings**	**Cash Holdings**
Panel A: Chinese Firms			
Intercept	0.069	0.051	0.084
Inside Ownership	0.014*		0.011*
Government Ownership	0.041***		0.032***
Board Independence	-0.015*		-0.021
Log Sales (Millions of RMB)		0.185	0.019
Log Net Assets (Millions of RMB)	0.171***	0.0168**	0.0145**
Leverage		-0.145*	-0.095*
Market-to-Book		0.251	0.341
Cash Flow/Assets		0.051**	0.044*
Working Capital/Assets		-0.041*	-0.032*
CF Volatility		-0.019**	-0.022**
R&D/Sales		0.0174	0.084
CapEX/Assets		-0.0185*	-0.036*
Acquisition/Sales		-0.0391	-0.0486
ROE		-0.015	-0.024
Payout Ratio		-0.271**	-0.317**
Panel B: Indian Firms			
Intercept	0.017	0.037	0.045
Inside Ownership	-0.031*		-0.024*
Family Ownership	-0.158***		-0.087**
Board Independence	-0.008*		-0.421
Log Sales (Millions of Rupees)		0.413	0.584
Log Net Assets (Millions of Rupees)	-0.259	0.0168	0.0398
Leverage		-0.084*	-0.054*
Market-to-Book		0.618	0.287
Cash Flow/Assets		0.107*	0.039*
Working Capital/Assets		-0.074*	-0.061*
CF Volatility		-0.125	-0.291
R&D/Sales		0.517	0.244
CapEX/Assets		-0.052*	-0.043*
Acquisition/Sales		-0.014	-0.0587
Diversification factor		-0.071**	-0.085**
Payout Ratio		-0.474	-0.325

*this table provides regression results of the determinants of cash holdings; three different specifications are used, the first using only governance variables as the independent variables, the second using accounting variables, and the third using both governance and accounting variables. *, ** and *** are significant at 10%, 5% and 1% respectively.*

Models 1 through 3 of panel B of Table 3 provide the analysis of the relationship between corporate cash holdings and governance/company specific variables for Indian firms. The results in Models 1 and 3 suggest that family ownership is negatively and significantly related to cash holdings. Higher family ownership leads to lower corporate cash holdings. Also, there is a negative relationship between the board independence variable and the cash holdings which is consistent with our hypotheses. Family ownership and board independence provide monitoring on the management thus, reducing the agency relationship conflicts and having a positive impact on firm performance. The results in Model 2 suggest that the firms with higher investment opportunities and lower cash flow volatility tend to have lower cash holdings. Also, we find that highly diversified Indian firms tend to have lower cash holdings.

Overall, the results indicate that for Chinese firms, large government concentrated ownership results in larger cash holdings held by the firm. In Indian firms, large family ownership concentration results in lower cash holdings held by the firm. Indian firms seem to show better use of cash in profitable projects.

Thus family and insider ownership has more positive impact on the firm when compared to the impact of government ownership of Chinese firms.

Table 4: Regression Analysis – Firm Value

	Firm Value	Firm Value	Firm Value
Panel A: Chinese Firms			
Intercept	0.374	0.514	0.611
Inside Ownership	-0.250**		-0.315**
Government Ownership	-0.687***		-0.487***
Board Independence	0.269**		0.614**
Sales (Millions of RMB)		0.748	
Net Assets (Millions of RMB)	0.374**	0.359**	
Leverage		-0.276*	
Market-to-Book		0.354**	0.571***
Cash Flow/Assets		0.036**	
Working Capital/Assets		0.011*	
CF Volatility		-0.344**	
R&D/Sales		0.251	
CapEX/Assets		0.289	
Acquisition/Sales		0.151	
ROE		0.514	0.817
Payout Ratio		0.415***	0.698***
Panel B: Indian Firms			
Intercept	0.217	0.722	1.374
Family Ownership	1.589***		1.544***
Insider Ownership	0.969***		0.617***
Board Independence	0.239		0.399
Log Sales (Millions of Rupees)		0.369	
Log Net Assets (Millions of Rupees)	0.714*	0.689*	
Leverage		-0.117*	
Market-to-Book		0.417**	0.327**
Cash Flow/Assets		0.628***	
Working Capital/Assets		0.371**	
CF Volatility		-0.074*	
R&D/Sales		0.317*	
CapEX/Assets		0.117*	
Acquisition/Sales		0.475*	
Diversification factor		1.379***	1.527***
Payout Ratio		0.117	-0.271*

*This table provides regression results of the determinants of the firm value using three different specification; the first using only governance variables as the independent variables, the second using accounting variables, and the third using both governance and company specific variables. The firm value is defined as the market value of equity plus the book value of debt. Panel A shows the results of Chinese firms, while panel B provides the results of Indian firms. *, ** and *** are significant at 10%, 5% and 1% respectively.*

In Table 4, we examine the impact of corporate governance variables and firm specific variables on the firm value using multivariate cross-sectional regressions. In all three models, the value of the firm is defined as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt. Panel A provides the results for Chinese firms, while panel B provides the results for Indian firms. For Chinese firms, the results show that government ownership has a negative effect on firm value. The payout ratio has a positive effect on firm value. Both results are consistent with our hypotheses. Also, we find a significant positive relationship between the board independence variable and firm value which is also consistent with our hypotheses. The Model 2 results suggest that firms with higher future investment opportunities and lower cash flow volatility tend to have higher values. Finally, we do not find any significant relationship between the firm's ROE level and the firm value. This suggests that regulatory impact is not as important as firm specific variables in determining Chinese firm value.

For Indian firms, the results show that family ownership concentration has a significantly positive impact on the firm value. Also, insider ownership has a positive effect on firm value. Both models 1 and 3

provide similar result. The Model 2 results suggest that firms with higher future investment opportunities and lower cash flow volatility tend to have higher values. Finally, we find that firms with higher diversification factors are valued higher than those with lower diversification factors. These results are consistent with the argument that family firms have better corporate governance. Therefore they use their cash in a value enhancing manner in positive NPV projects which increases the firm value. Diversification also seems to be a positive value enhancing option for family concentrated firms.

MARKET VALUE OF CASH HOLDINGS

To further test our hypotheses and provide more robust results, we estimate the regression model given by equation (1). We deflate all variables by total assets to control for heteroskedasticity. We follow Fama and French (1998) and estimate equation (1) using Fama–MacBeth (1973) regressions.

Table 5: Impact of Ownership Concentration of Firm Value for Chinese Firms

	High Government	Low Government	p-value of Difference	Low Foreign	High Foreign	p-value of Difference
Intercept	0.81	0.84	0.3841	0.62	0.79	0.0000
	(0.041)	(0.043)		(0.015)	(0.051)	
E_t	2.36	1.96	0.3751	3.15	4.02	0.1574
	(0.517)	(0.329)		(0.436)	(0.218)	
dE_t	-0.69	-0.32	0.1241	-0.78	-0.41	0.0068
	(0.421)	(0.205)		(0.308)	(0.119)	
dE_{t+1}	1.21	1.84	0.2869	0.38	1.32	0.0001
	(0.621)	(0.241)		(0.284)	(0.145)	
dNA_t	0.34	0.68	0.0041	0.38	1.16	0.0011
	(0.024)	(0.084)		(0.251)	(0.173)	
dNA_{t+1}	0.23	0.31	0.4185	0.05	0.18	0.2958
	(0.051)	(0.071)		(0.076)	(0.048)	
RD_t	-4.05	5.21	0.0000	0.61	4.89	0.0000
	(1.573)	(0.841)		(0.712)	(0.887)	
dRD_t	7.23	3.82	0.1574	4.25	4.64	0.8194
	(3.982)	(2.373)		(1.527)	(1.387)	
dRD_{t+1}	5.31	7.56	0.6521	4.52	9.11	0.0314
	(3.721)	(2.043)		(1.814)	(1.402)	
I_t	-3.81	-2.63	0.0000	-0.68	-3.07	0.0004
	(0.854)	(1.025)		(0.517)	(0.923)	
dI_t	1.39	-0.82	0.0023	0.51	-0.44	0.1841
	(0.597)	(0.769)		(0.891)	(0.499)	
dI_{t+1}	-1.36	-2.86	0.0115	-0.91	-2.17	0.0602
	(0.782)	(0.567)		(0.668)	(0.428)	
D_t	7.95	3.44	0.0011	10.23	5.12	0.0017
	(2.341)	(1.694)		(2.188)	(1.856)	
dD_t	-1.07	0.87	0.0574	-2.57	0.65	0.0024
	(0.674)	(0.536)		(1.547)	(0.436)	
dD_{t+1}	2.67	1.76	0.9517	4.52	-0.85	0.0118
	(0.841)	(0.718)		(1.748)	(1.188)	
dV_{t+1}	-0.23	0.12	0.1423	0.04	0.03	0.9053
	(0.087)	(0.013)		(0.185)	(0.041)	
dL_t	0.18	0.86	0.0004	0.21	0.91	0.0015
	(0.175)	(0.176)		(0.206)	(0.185)	
dL_{t+1}	0.28	0.71	0.0000	0.31	0.47	0.3984
	(0.117)	(0.204)		(0.157)	(0.138)	

This table presents the results of the value regressions, the regressions are run independently for each subsample. The firm value is defined as the market value of equity plus the book value of debt. The firm value is found for two samples: government ownership concentration and foreign ownership percentage – government ownership sample being divided by the median value of 35%; above 35% is high government ownership, below 35% is low government ownership; foreign ownership being divided by the median value of 40%; above 40% is high foreign ownership while below 40% is low foreign ownership.

In Tables 5 and 6, we present the estimates of the regressions for China and India. In table 5, we use two subsamples with the first divided by the government ownership concentration. The 35% median value of government ownership is the dividing point of the two samples due to the large degree of skewness present in the data. The second subsample is divided by the level of foreign investors in Chinese firms.

The median value of 40% is employed as the dividing point. In Table 6, we use also two subsamples with the first divided by the family ownership concentration. The 40% median value of family ownership is the dividing point of the two samples. The second subsample is divided by the degree of diversification in the Indian firms in our sample. The median value of 4 is employed as the dividing point.

We find that cash contributes significantly more to the firm value in firms with lower government ownership and higher foreign investor concentration. Our regression allows us to isolate the impact of a change in cash holdings while keeping all other variables in the regression unchanged. Consequently, we can evaluate the impact of an increase in cash that brings about an increase in total assets by the same amount as opposed to an exchange of fixed assets for cash. In high government concentration firms, a one RMB increase in cash holdings results in an increase in firm value of 0.18 RMB. In low government concentration firms, a one RMB increase in cash holdings results in an increase of 0.86 RMB. We find that a one RMB increase in non-cash assets is associated with an increase of 0.34 RMB in firm value in high government ownership firms while the same increase in the non-cash assets results in an increase of 0.68 RMB in firm value for low government ownership firms. The regression is consistent with a greater discount for cash than for fixed assets for firms with high levels of government concentration. A 1 RMB of cash contributes 0.68 RMB less to firm value for high government ownership firms while a 1 RMB of fixed assets contributes 0.34 RMB less. The regression provides no evidence that earnings are valued more in low government ownership firms.

The second regression reported in Table 6 divides the subsamples by utilizing the percentage of foreign investors out of the total number of investors. The results show that firms with relatively more foreign investors show a stronger relationship between changes in cash and firm value. We find that an additional 1 RMB of cash accumulated over the most recent year results in a 0.21 RMB change in firm value for firms with low foreign investor concentration. The same 1 RMB change in cash accumulated over the most recent year results in a change of 0.91 RMB in firms with high foreign investor concentration. Thus we conclude that increases in other assets are discounted less in countries with poor investor protection than are increases in cash. However, in contrast to the regression that uses the government ownership, firms with higher foreign ownership are valued more regardless of firm characteristics. In sum, the two regressions displayed in Table 6 strongly support hypotheses 1 and 2. Further, both regressions in Table 6 support hypothesis 3. If cash is valued less in high government ownership firms, we would expect payouts to be worth more. For firms with high government ownership concentration, dividend payout is valued 4.51 RMB more than in firms with low government concentration. The difference between the two coefficients is significant at better than the 1% level. Also, in firms with low foreign ownership the dividend payout is valued at 5.11 RMB more than in firms with high foreign ownership. Our results show that high government ownership or low foreign ownership in Chinese firms is not a desirable factor for investors. In those type of firms, investors value dividends higher while valuing cash less.

We follow the same analysis for Indian firms by dividing the sample of Indian firms by family concentration and diversification factor. We find that cash contributes significantly more to the firm value in firms with high family concentration and higher diversification factor in Indian firms. In high family concentration firms, a one Rupee increase in cash holdings results in an increase in firm value of 0.76 Rupees. In low family concentration firms, a one Rupee increase in cash holdings results in an increase of 0.34 Rupees. A 1 RMB of cash contributes 0.42 Rupees less to firm value for low family concentrated firms than for high family concentrated firms. We also find that earnings are valued higher in firms with high family concentration than in firms with low family concentration; the difference being 0.38 Rupees. Finally, dividend payout is valued less in firms with high family concentration than in low family concentration; the difference being 2.49 Rupees. Also, we find that R&D expense is value more in firms with high family concentration than in firms with low family concentration, the difference being 0.40 Rupees more.

Table 6: Impact of Ownership Concentration of Firm Value for Indian Firms

	High Family Ownership	Low Family Ownership	p-value of Difference	High Diversification	Low Diversification	p-value of Difference
Intercept	0.77	0.83	0.2945	0.51	0.66	0.0000
	(0.052)	(0.038)		(0.027)	(0.037)	
E_t	0.85	0.47	0.0017	0.76	0.51	0.0004
	(0.017)	(0.051)		(0.023)	(0.027)	
dE_t	-0.74	-0.41	0.5391	-0.58	-0.67	0.0374
	(0.847)	(0.189)		(0.215)	(0.223)	
dE_{t+1}	0.97	1.17	0.3581	0.34	0.97	0.0271
	(0.568)	(0.394)		(0.511)	(0.347)	
dNA_t	1.07	0.77	0.1547	0.42	1.37	0.0741
	(0.387)	(0.157)		(0.510)	(0.397)	
dNA_{t+1}	0.51	0.42	0.4428	0.33	0.41	0.3277
	(0.281)	(0.119)		(0.274)	(0.557)	
RD_t	0.81	0.41	0.0005	0.77	0.53	0.0003
	(1.458)	(1.563)		(1.334)	(1.217)	
dRD_t	3.15	3.82	0.1574	1.33	1.41	0.5611
	(0.584)	(2.373)		(1.124)	(1.238)	
dRD_{t+1}	3.47	7.56	0.6521	1.84	1.47	0.4412
	(1.847)	(2.043)		(1.855)	(1.774)	
I_t	-2.14	-2.63	0.0000	-1.54	-2.12	0.0011
	(0.368)	(1.025)		(1.253)	(2.778)	
dI_t	1.36	-0.82	0.0023	-0.27	-1.12	0.1223
	(0.854)	(0.769)		(0.364)	(0.358)	
dI_{t+1}	-2.02	-2.86	0.0115	-0.88	-1.98	0.0847
	(0.591)	(0.567)		(0.741)	(0.214)	
D_t	1.36	3.85	0.0018	1.32	3.99	0.0008
	(0.487)	(0.173)		(0.841)	(0.128)	
dD_t	-1.35	-1.96	0.2745	2.41	5.27	0.0374
	(0.485)	(0.674)		(1.852)	(1.658)	
dD_{t+1}	1.86	1.97	0.8647	3.21	8.36	0.5678
	(1.087)	(0.258)		(0.914)	(2.695)	
dV_{t+1}	-0.44	-0.52	0.4571	0.36	0.52	0.7590
	(0.137)	(0.287)		(1.847)	(0.337)	
dL_t	0.76	0.34	0.0021	0.86	0.41	0.0009
	(0.128)	(0.237)		(1.025)	(0.563)	
dL_{t+1}	0.38	0.47	0.2715	1.21	1.33	0.3274
	(1.294)	(1.847)		(0.338)	(0.441)	

This table presents the results of the value regressions, the regressions are run independently for each subsample. The firm value is defined as the market value of equity plus the book value of debt. The firm value is found for two samples: The firm value is found for two samples: family ownership concentration and diversification factor – family ownership sample being divided by the median value of 40%; above 40% is high family ownership, below 40% is low family ownership; diversification factor being divided by the median value of 4; above 4 is highly diversified firm while below 4% is low diversified firm.

The second regression reported in Table 6 divides the subsamples by the degree of diversification factor. The results show that diversified firms show a stronger relationship between changes in cash and firm value. We find that an additional 1 Rupee of cash accumulated over the most recent year results in a 0.86 Rupees change in firm value for more diversified firms. The same 1 Rupee change in cash accumulated over the most recent year results in a change of 0.41 Rupees in firms with low diversification factor. In sum, the two regressions displayed in Table 6 strongly support our hypotheses regarding family ownership benefits on firm value. Also, we find that the dividend payout is valued higher in firms with low diversification factor than in firms with high diversification factor, the difference being 2.67 Rupees. Finally, R&D expense is value higher in firms with high diversification factor than in firms with low diversification factor, the difference being 0.24 Rupees.

CONCLUSIONS

In this paper, we examine factors affecting Chinese and Indian firm cash holdings. We also study the effect of concentrated ownership on private benefit extraction in firms it controls and the effect such

extraction has on firm valuation in the Chinese and Indian settings. We test whether lower agency costs in family firms lead to higher cash valuation and higher agency costs in high government owned firms lead to lower cash valuation. Previous studies suggest that family firms have better financial performance and lower agency costs (Anderson and Reeb, 2003; Villalonga and Amit, 2006). While high government owned firms have lower performance and higher agency costs (Hassan, D'Souza, Wei and Varela, 2003; Wei, Xie and Zhang, 2005).

We test three main hypotheses. First, minority shareholders value cash holdings less in high government ownership firms while they value it more in high family firms. Second, high government ownership negatively affects firm value while high family ownership firms affect positively firm value. Third, minority shareholders value dividends more in high government ownership firms while they value it less in high family owned firms. In order to test for robustness, we also employed the foreign investor concentration variable and diversification factor in testing hypothesis 3. Our results strongly support all three hypotheses. We find that high government ownership negatively affects firm value. Investors discount the value of cash holdings in high government ownership firms and prefer instead to receive larger dividend payouts from those firms. Conversely, investors assign higher value to cash holdings in firms with high family ownership and they do not assign high value for dividends paid by firms with high family ownership compared to low family ownership.

Our paper sheds light on one of the most important topics in corporate finance, the impact of large concentrated ownership on the firm's performance and valuation. We find that in the Chinese case, the government concentration has negative impact on firm value while in the Indian case, the family concentration have positive impact on firm value.

The study is based mainly on data provided by two different sources, namely the Chinese CSMAR database and the Indian PROWESS database. Each data provider has a different format presenting the data, thus we tried our best to use variables that closely match when comparing the Chinese and Indian firms. As a result, some subjectivity was involved when we selected the particular data used for this study. We believe that we were consistent in our work and accurate, in which the results are robust in all material respects. To check the robustness of our results, we used several different specifications in the regression analysis. An extension of our study can be done using a more complete data set covering a wider time period to verify if our findings would stay the same over longer period of time. In doing so, our conclusions can be stronger and the results more robust.

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FOREIGN DIRECT INVESTMENT (FDI): DETERMINANTS AND GROWTH EFFECTS IN A SMALL OPEN ECONOMY

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ABSTRACT

In an attempt to attract foreign direct investment, many African countries embarked on various reforms. Nigeria, like many African countries, took some steps towards trade reforms and macroeconomic regime and introduced measures aimed at improving the FDI regulatory framework. In the form of stocktaking, this study examines the determinants of FDI, the causal relationship among factors affecting economic growth in Nigeria, including the formal investigation of the export-led and FDI-led growth hypotheses in Nigeria for the period between 1970 and 2005. We found that Nigeria's potential market size, the degree of export orientation, human capital, providing enabling environment through the provision of infrastructural facilities, and macroeconomic stability are important determinants of FDI flows. Further, our results confirms that foreign direct investment leads to economic growth and that government consumption expenditure, openness to international trade and human capital are complementary to economic growth. Controlling for domestic investment growth as well as other factors, causality tests show support for both the export-led growth and FDI-led growth hypotheses for Nigeria.

JEL: F21, F23, O55

KEYWORDS: Foreign Direct Investment, Exports, Growth

INTRODUCTION

Foreign Direct Investment (FDI) has long been a subject of great interest in the field of international development. In an era of volatile flows of global capital, the stability of FDI and its emergence as an important source of foreign capital for developing economies has once again renewed interest in its linkages with sustainable economic growth.

Nigeria, like many developing countries, is in dire need of foreign investment to complement the domestic investment and resources. In addition, the supply side of the Nigerian economy requires a massive injection of foreign resources to generate the necessary increase in output which is required to reduce the rate of inflation, promote growth in the industrial sector and stimulate the acquisition of foreign technology which would further enhance economic growth.

However, Nigeria did not take advantage of the first FDI boom of the late 1980s, primarily because of macroeconomic instability, frequent policy reversals, restrictions on some sectors of FDI and on the reparation of profits and capital. Considerable amount of FDI flow into Nigeria began after 1986 when some of the restrictions were lifted and infrastructure sectors were opened to private participation (the 1986 adjustment program constitute a bold policy response to attract foreign investors, correct internal and external imbalance). FDI flow into Nigeria has increased rapidly since 1999 due to the privatisation of banks, energy and telecommunication sectors, and gradually improving macroeconomic policy framework. In recent years, FDI represents by far the most important source of external financing for many African countries and Nigeria in particular. In 2005, FDI represented about 35.1 percent of total net GDP in Nigeria.

A number of studies have examined the effects of FDI on growth in developing countries. Though these studies have made useful contributions towards an understanding of the role of FDI in economic growth, however, their statistical approach raises a critical methodological issue. Many of the investigations make an a priori presumption that FDI responds to or causes economic growth, and few have considered the feedback and the long run equilibrium relationship between FDI and economic growth. Investigation of the causal link between FDI and growth has important implications for development strategies.

Also, few studies that have examined the determinants of FDI, and relationship between economic growth and FDI for Nigeria were based on surveys with the exception of Dimowo and Edo (1996), and Akinlo (2004), while other studies model the relationships between FDI and growth for a broad cross section of countries. Some studies on developing countries found positive relationships between FDI and growth, conditional on various variables including initial income, financial development, trade openness, human capital development, and other proxies for host country absorptive capacity. However, findings from the various cross-sectional studies on the relationship between FDI and growth in developing countries cannot be generalized. There is need for country specific studies on the subject matter to shed more light on the debate and allow for more country specific policies.

The question, then, is whether FDI has a positive effect on the Nigerian economy, and if so, what the governments can do to attract more. Examining the motivations for direct investment in Nigeria and the extent to which FDI contributes to growth, the study seeks to shed light on appropriate policies to pursue in order to encourage higher volumes of FDI and their likely implications for economic growth. In order to avoid the pit-fall in previous studies, this paper aims to first investigate causality between FDI, exports, and economic growth and the effect of FDI on per capita gross domestic product (GDP) growth in Nigeria over the period 1970:1-2005:4. These, of course, constitute the objectives of this paper.

The paper is structured into five sections. Following the introduction, section two contains the literature review while section three focuses on the research data and methodology. In section four, we present the research findings while the last section contains the conclusion.

LITERATURE REVIEW AND BACKGROUND

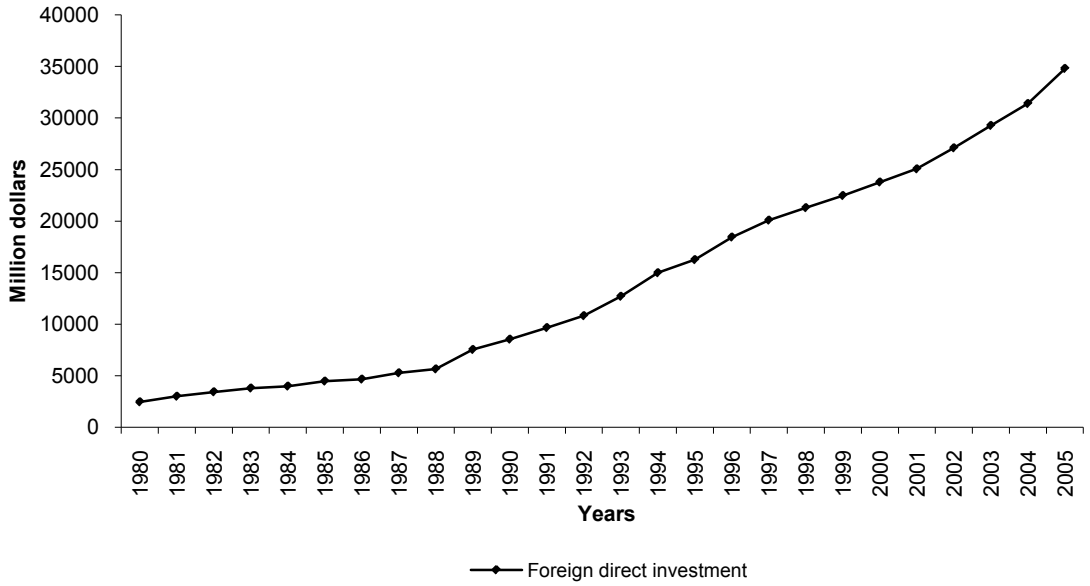
This section is into two parts. The first part focuses on the trend of foreign direct investment in Nigeria while the second part deals with the empirical relationship between FDI and growth respectively.

FDI Trend in Nigeria

It is generally known that FDI flow into the less developed countries, (including Nigeria), increased substantially in the 1990s. The FDI into Nigeria during this period averaged between US$1 to US41.5 billion, with an aggregate investment totaling US$20 billion at the end of 1999. This was half of Nigeria's GDP. In 1999, FDI to Nigeria was US$1.01 billion which was 0.2 percent of world's total of US$865 billion, 0.7 percent of developing country's total of US$ 207 billion and 15 percent of Africa's US$ 9 billion. This makes Nigeria one of the major recipients of FDI in Africa, with the Republic of South Africa, Egypt, Morocco and Tunisia, in that order. The total FDI flow into Nigeria was US$3.2 billion and US$ 3.5 billion for 2004 and 2005 respectively. Figure 1 provides a trend of annual FDI flow into Nigeria between 1980 and 2005.

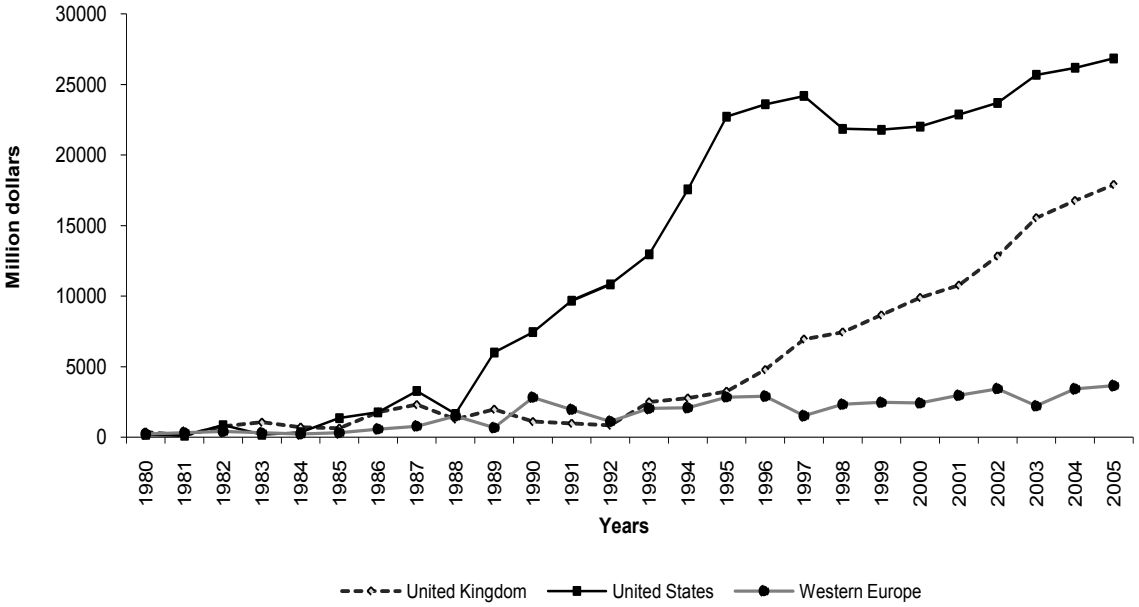
A breakdown of the sources of FDI inflow to Nigeria as depicted in figure 2 revealed that the United States (US) and the United Kingdom (UK) accounted for most FDI to Nigeria. Since 1988, the US has been the most important source of FDI flows to Nigeria accounting for approximately 21.5 percent of inflows in 2005. This represents a marked-shift from the 1980-1988 period in which the inflow from both the US and the UK were about the same.

Figure 1: Flow of Foreign Direct Investment into Nigeria 1980 – 2005



The figure shows the total inflow of FDI into the Nigerian economy between 1980 and 2005

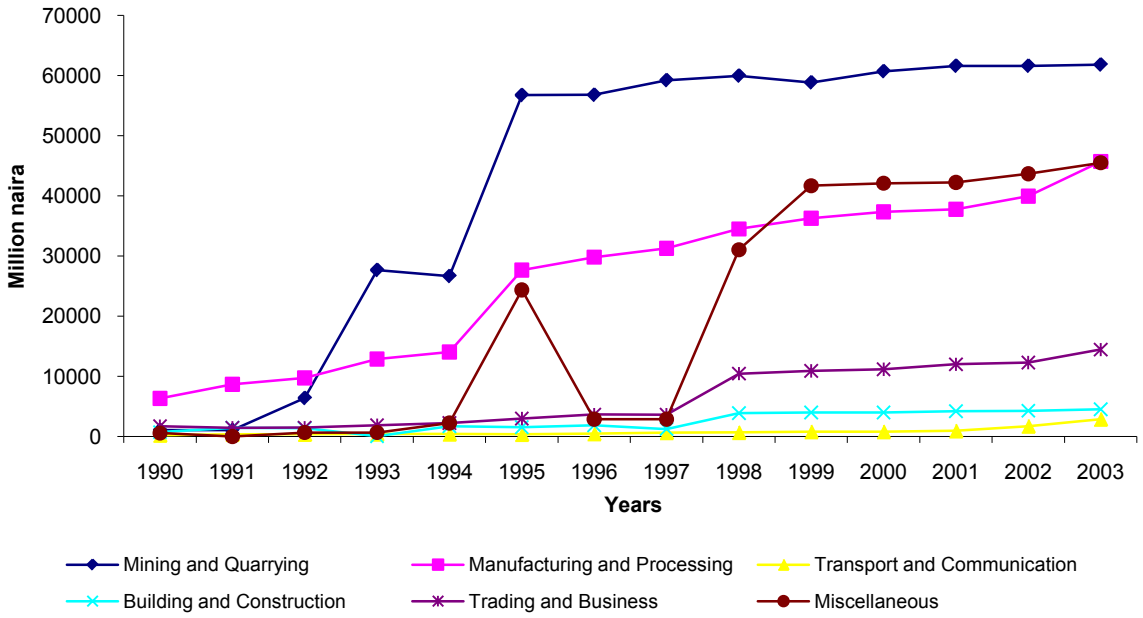
Figure 2: Flow of Foreign Direct Investment by Origin 1980 – 2005



The figure revealed the flow of FDI from the United States, UK and Western Europe into Nigeria between 1980 and 2005.

As cursory observation of the FDI inflow from sectoral perspective as shown in figure 3 revealed that the primary sector remains the largest recipient of FDI flows accounting for 45 percent of inflow. Within the primary, oil and gas are the industries with the lion share. In 2003, the oil and gas sectors attracted inflows worth US $67,563 million and $67,617 million respectively. In 2005, most of the FDI to Nigeria, especially those from Europe and USA were mainly in the oil and gas sector, with an increasing percentage in the manufacturing sector.

Figure 3: Component of Foreign Direct Investment in Nigeria 1990 – 2003



This figure shows the inflow of FDI into the sectors of the Nigerian economy between 1990 and 2003

As depicted in figure 3, FDI inflow into the manufacturing sector is gradually becoming encouraging. This might not be unconnected with economic reforms in this sector and the various incentives introduced by the government since 1995 and the on-going diversification of the Nigerian economy from the oil sector to the non-oil sector.

The Empirical Relationship between FDI and Growth

There is a growing consensus that FDI is positively correlated with economic growth. Theoretically, this view has been bolstered by recent developments in growth theory, which highlight the importance of improvements in technology, efficiency and productivity in stimulating growth. The FDI increases the rate of technical progress in the host country through 'contagion' effect from more advanced technology and management practices by the foreign firms. This contagion or knowledge diffusion (often referred to as externalities or efficiency 'spill-over') can lead to improvements in productivity and efficiency in local firms; see Borensztein et al. (1998) for details. In its simplest form, a spill-over occurs when a local firm improves its productivity by copying some technology used by multinational affiliates/corporation (MNC) in the local market.

Nunnenkamp and Spatz (2002) found significant Spearman correlations between FDI flows and per capita GNP, risk factors, years of schooling, foreign trade restrictions, complementary production factors, administrative bottlenecks and cost factors. Campos and Kinoshita (2003) use panel data to analyse 25 transition economies between 1990 and 1998. Their findings revealed that FDI is influenced by economy clusters, market size, the low cost of labor, and abundant natural resources. Besides all these factors, the following variables presented significant results: sound institutions, trade openness, and lower restrictions to FDI inflows. Holland et al (2000) reviewed several studies for Eastern and Central Europe, producing evidence of the importance of market size and growth potential as determinants of FDI.

Findings by Dees (1998) revealed that FDI has been important in explaining China's economic growth, while De Mello (1996) finds a positive correlation for selected Latin American countries. A recurring

theme seems to be the need for the host country to have achieved a certain threshold of development – the absorptive capacity for the new technology. For instance, Lipsey, Blomstrom, and Zejan (1994) found that FDI has a significant positive influence on growth rates but the influence seems to be confined to higher income developing countries. The authors interpret this result as signifying that the host country must be capable of absorbing the new technology manifested in the FDI. At a more specific level, this absorptive capacity is conceived as a certain level of human capital. Tang, Selvanathan and Selvanathan (2008) explored the causal link between FDI, domestic investment and economic growth in China between 1988 and 2003 using the multivariate VAR and ECM. There results indicate that there is a bi-directional causality between domestic investment and economic growth while there is a single directional causality from FDI to domestic investment and economic growth.

With regard to Africa, most of the studies on FDI in Africa are descriptive, and are often based on surveys that seek to explore the motivation to invest in Africa (Basu and Srinivasan, 2002; Jenkins and Thomas, 2002) with very few focusing on the relationship between FDI and economic growth. Asiedu (2002) explored whether the factors that influence FDI in developing countries also influence FDI flows to SSA countries. Using cross-sectional data from 71 developing countries, she concludes that some variables that are significant for FDI flows to developing countries do not seem to be important for FDI flows to SSA. These include the rate of return on investment and better infrastructure. In a study that examined the relationship between business climate and FDI in SSA, Morisset (2000) concludes that a better business environment tends to compensate for the lack of natural resources and large domestic markets.

Balasubramayam, Salisu, and Sapsford (1996 and 1999) found tentative evidence regarding the importance of a certain threshold of the host's human capital. Their studies also found that FDI's growth contribution is significantly greater in outward-oriented or neutral trade regimes than with import substitution trade strategy. This finding reinforces the results from the pioneering study by Bhagwati (1978). A recent panel data analysis of the effects of foreign direct investment (FDI) on economic growth conducted by Lumbila (2005) using data from some African countries revealed that FDI exerts a positive impact on growth in Africa. Also, factors such as trained human capital and an attractive investment climate stemming from a developed infrastructure, lower country risk and stable macro environment in the host countries, enhance the impact of FDI on growth.

However, a dissenting view is echoed in Rodrik (1999) who argues that the effect of FDI on economic growth tends to be weak, and suggests that much if not most of the correlation between FDI and superior economic performance is driven by reverse causality: MNCs tend to locate in the more productive, fast growing, and profitable economies. Rodrik cites a Bosworth and Collins (1999) study on total capital flows, that does not find the 'crowding –in' effect of Borenzstein, De Gregorio and Lee (1995) – instead Bosworth and Collins (1999) find that the positive effect of FDI on domestic fixed investment tends to fall off significantly when more country characteristics are controlled for. That result notwithstanding, Bosworth and Collins (1999) also find that FDI inflows tend to raise a country's economic growth rate through their positive impact on total factor productivity.

DATA AND METHODOLOGY

We use time series data from 1970:1 to 2005:4 to estimate all equations. The data were compiled from various volumes of the Central Bank of Nigeria publications i.e. Statistical Bulletin, Economic and Financial review; International Financial Statistics, a publication of the International Monetary Funds (IMF) and the World Bank Economic Indicators (see appendix for details). In examining the determinants of FDI, the general form of the model estimated is:

$$FDI = \alpha + \beta_1 \Delta RGDPG + \beta_2 \Delta RGDPC + \beta_3 \Delta EXP + \beta_4 \Delta INF + \beta_5 \Delta ILLIT + \beta_6 \Delta GFCF + \beta_7 \Delta TELE + \beta_8 \Delta LIB + \varepsilon \quad (1)$$

where the upper case denotes natural logarithms, RGDPG represents growth rate of real GDP, RGDPC is the real GDP per capita, EXP represents exports as a percentage of GDP (measures of openness), INF denotes annual rate of inflation based on consumer price index, ILLIT is the rate of adult illiteracy, GFCF represents the gross fixed capital formation (as percentage of GDP), TELE is the telephone lines per 1000 people, LIB represents a measure of liberalisation (dummy variable), Δ is the difference operator, and ε is uncorrelated error terms. Next, the relationship between FDI and economic growth is examined by employing a mode which is a variant of the one developed by the Transnational Corporation and Management Division of the United Nations Department of Economic Social Development, see UN (1992). Its structure (which assumes a linear function) is:

$$Gr = \phi + \varphi_1 \Delta L + \varphi_2 \Delta K_p + \varphi_3 \Delta K_f + \varphi_4 \Delta H + \varphi_5 \Delta EXP + \varphi_6 \Delta C_g + \varphi_7 \Delta B_g + \varphi_8 \Delta F_n + \varphi_9 D + \varphi_{10} T + \mu \quad (2)$$

In equation 2, Gr is the real GDP, L is the labor, K_p and K_f are stock of private and foreign capital respectively; Cg is the real government consumption, EXP is the real export, H is human capital proxied by the share of students in the university, polytechnics and colleges of education in the population, D is the adjustment dummy, 1 for adjustment period 1986 to 2005 and 0 otherwise, F_n stands for financial depth measure as ratio of money supply broadly defined to GDP, B_g is budget balance over GDP. T is the time trend to capture secular trend in output during the period of study. While equation (2) captures the impact of important variables on GDP growth, it does not account for the possibility of a bi-directional relationship between growth and FDI highlighted in the literature. To capture these possible temporal causality relationships, the technique of Granger causality can be employed. The test involves estimating the following regressions:

$$Gr_t = a_0 + \sum_{j=1}^{p} a_j \, Gr_{t-j} + \sum_{j=1}^{p} b_j \, K_{f,\,t-j} + \mu_t \quad (3)$$

$$K_{ft} = m_0 + \sum_{j=1}^{p} m_j \, K_{f,\,t-j} + \sum_{j=1}^{p} e_j \, Gr_{t-j} + v_t \quad (4)$$

$$Gr_t = z_0 + \sum_{j=1}^{p} z_j \, Gr_{t-j} + \sum_{j=1}^{p} \eta_j \, EXP_{t-j} + \mu_{1t} \quad (5)$$

$$EXP_t = r_0 + \sum_{j=1}^{p} r_j \, EXP_{t-j} + \sum_{j=1}^{p} s_j \, Gr_{t-j} + \omega_t \quad (6)$$

where Gr_t, K_{ft} and EXP_t are stationary time series, μ_t, v_t, ω_t and μ_{1t} are uncorrelated error terms and p is the lag order selection. However, if there exist co-integration between FDI and GDP, and exports and GDP, the appropriate format is to investigate the long run causality in the error correction model (ECM). By equation (3), K_f (FDI) Granger causes Gr (GDP) if $b_j \neq 0$. Also, equation (4) shows that Gr Granger cause K_f if $e_j \neq 0$. From equation (5) EXP (exports) Granger causes Gr (GDP) if $\eta_j \neq 0$, while in equation (6) Gr (GDP) Granger causes EXP (exports) if $s_j \neq 0$. Bi-directional Granger causality is obtained if $b_j \neq 0$, $e_j \neq 0$, $\eta_j \neq 0$ and $s_j \neq 0$.

EMPIRICAL RESULTS

Our data is tested for unit root using the Augmented Dickey Fuller (ADF), and Phillips-Perron tests with a constant and deterministic trend. The results of the ADF tests are presented in Table 1 below.

Table 1: Nigeria- Tests for Stationarity with Constant and Time Trend, Sample 1970-2005

Variables	Levels	First Difference	Critical Value (5%)	Critical Value (1%)
INF	-2.21	-4.93*	-3.55	-4.77
EXP	-2.08	-4.52*	-3.55	-4.77
GDP	-1.22	-4.54*	-3.55	-4.77
RGDPC	-2.73	-6.23*	-3.55	-4.77
GFCF	-3.06	-4.06**	-3.55	-4.77
TELE	-2.11	-7.23*	-3.55	-4.77
KP	-1.46	-4.54*	-3.55	-4.77
KF	-1.87	-7.48*	-3.55	-4.77
ILLIT	-2.25	-5.74*	-3.55	-4.77
L	-3.15	-8.74*	-3.55	-4.77
CG	-2.78	-5.89*	-3.55	-4.77
GR	-1.49	-6.78*	-3.55	-4.77
H	-1.59	-4.73*	-3.55	-4.77
BG	-2.60	-3.56**	-3.55	-4.77
FN	-1.52	-6.83*	-3.55	-4.77

*This table summarises the Augmented Dickey Fuller (ADF) tests results. It shows that all the variables are not stationary at levels except gross fixed capital formation, (GFCF). However, stationarity is achieved through first difference. Similar results were obtained when we employed Philip-Perron approach.Notes: Mackinnon (1996) critical values for rejection of hypothesis of a unit root * Denotes significance at 1% level; ** Denotes significance at 5% level*

Our results in Table 1 revealed that all the variables are integrated of order one $I(1)$ with the exception of GFCF which is $I(0)$. Therefore, having established that our variables are stationary, we used the Johansen-Juselius (1990) technique to test for co-integration.

Table 2: Cointegration Results (with a Linear Trend)

Null	*Alternative r*	*λ max*	*Critical Value (95%)*	*Trace*	*Critical Value (95%)*
Panel (A): Estimates of λ max and trace tests					
0	1	34.70*	27.07	61.67*	47.21
≤1	2	14.51	20.97	26.97	29.68
≤2	3	8.70	14.07	12.45	15.41
≤3	4	3.70	3.76	3.70	3.76
Panel (B): Estimates of co-integrating vector					
G_r	L	H	K_p	Kf	
1.000	0.601(4.22)	-0.211(-8.32)	0.119(2.18)	-0.217(-6.55)	

The table reports the long run relationship among the variables. Panel A of this table reports both the trace and maximum eigenvalue statistics for the co-integration tests using Johansen techniques while panel B revealed the estimates of the cointegrating vector.

The results in Panel A of Table 2 reports both the trace and maximum eigenvalue statistics for co-integration tests. The null hypothesis of no co-integration can be rejected using λ-max or the trace statistics. They are both greater than their critical values at 5% level of significance. This implies that there exists a unique co-integrating vector among the variables involved. The co-integrating equation normalised on the growth variable as reported in panel B of Table 2 showed that labor and private capital have a negative sign while foreign capital and human capital are positive (The signs are reversed because of the normalization process) and their coefficients are all significant as shown by the t –ratio (see, parentheses). Since the existence of co-integration among these variables is confirmed, the next step is to test the causal relationships among FDI flows, openness through trade, and GDP growth. The literature offers different statistical methods to determine the optimal lags in Granger causality tests. The Schwarz and Bayesian Criterion (SBC) and the Akaike Information Criterion (AIC) are used to determine the optimal lag lengths in the ARDL and error correction models (Hsiao, 1981). The causal directions are

detected by F - statistics and the signs of the causal effects are determined by adding the coefficients on lagged independent variables (Ram, 1988).

We first test if K_f (FDI) Granger causes y (GDP) by estimating the unrestricted equation (3), and restricted equation (3) by dropping lagged K_f. The F statistic yields a value of 8.197 which exceeds the critical values of $F_{0.01} = 5.53$. Thus, we can reject the null hypothesis $(b_j = 0)$ and conclude that adding lagged values of K_f does improve the statistical results. This implies that FDI Granger causes GDP growth, thus providing evidence for FDI-led growth hypothesis. In other words, the GDP growth rate improves with the inclusion of past changes in FDI. The same procedure was carried out for equations (4), (5), and (6). The results from equation (4) indicate that GDP growth does not Granger cause FDI in Nigeria (F statistic 4.29, below the critical value of $F_{0.01} = 5.53$) which implies a unidirectional relationship between GDP and FDI.

Our results from equations (5) and (6) suggest that exports Granger cause GDP growth, but GDP growth does not Granger cause export. The former results provide evidence that exports play a relevant role in explaining economic expansion and also support the export-led hypothesis. These results suggest that liberalization in Nigeria has had a significant impact on the economy thanks to higher levels of exports due to a more flexible trade policy. Further, our results revealed that exports Granger cause FDI (F statistic 7.92, is higher than the critical value of $F_{0.01} = 5.53$), however, FDI does not Granger cause exports.

Table 3 reports the estimated regressions results on the determinants of FDI. From the table, the inflation variable is significant and has the expected sign. This implies that macroeconomic stability is an important determinant of FDI inflow to Nigeria. We can infer from our results that liberalisation of the Nigerian economy has encouraged FDI inflows and thus support the proposition that foreign investors are more likely to invest in countries that have opened up their economy.

Also, the estimated coefficient of the market size variable (RGDPC) has the expected positive sign and was significant. This implies that the level of per capita income has implications on market seeking FDI to Nigeria. Other things being equal, an increasing level of per capita income would enhance the inflow of FDI. A similar market variable, the growth rate of real GDP that measures the growth prospects of the economy, has positive and significant coefficients in three of the four regressions. This finding further confirms the hypothesis that a growing economy attracts more FDI. An important finding is the positive and significant effect of export orientation (.i.e. openness). This finding suggests that FDI in Nigeria is of the vertical type which is normally export oriented and tends to be unaffected by the market size of the host economy.

The degree of export orientation of the economy is more germane than market size to foreign investors who tend to locate in the export sector. The main export items in Nigeria come from the primary sector .i.e. mining, agriculture and services sectors which account for more than half of approved FDI projects. Although it has been argued that political instability in the host country could discourage the inflow of FDI, and most of the empirical studies supported this argument, however, some empirical evidence suggested that political factors played an insignificant role in firms' decision to invest abroad (see Swain and Wang, 1997 and Zhang, 2002).

The human capital variable which is measured by the rate of adult illiteracy is statistically significant and has the right sign suggesting that an economy with high fraction of unskilled workers is likely to be much less productive and less attractive to foreign investors. As expected, given the recent huge spending by

the government on infrastructural facilities in Nigeria and reforms in the telecommunication sector, it coefficient is positive and significant. This confirms the hypothesis that the development of telecommunication (.i.e. infrastructure) has positive impact in attracting FDI in Nigeria.

Table 3: Results of OLS Estimation, Dependent variable: FDI Inflows (Percent of GDP)

Independent variables	3.1	3.2	3.3	3.4
Constant	-0.510(0.112)**	-0.642(0.017)**	-0.778(0.015)**	-0.801(0.009)**
RGDP growth	0.540(0.011)**	0.644(0.009)**	0.718(0.006)**	0.849(0.003)**
RGDP per capita	1.711(0.615)**			
Export	2.176(0.008)**	3.244(0.002)**	3.142(0.004)**	2.277 (0.007)**
Inflation	-0.581(0.031)**	-0.592(0.029)**	-0.601(0.020)**	-0.599(0.026)**
Lib Dummy	1.225(0.027)**	2.484(0.012)**	2.180(0.017)**	1.871(0.024)**
Illiteracy			-1.521 (0.623)**	
Telephone				-3.481(0.057)*
GFCF				-6.577(0.214)*
Adjusted R^2	0.62	0.64	0.61	0.60
LM-SC[1]	0.0358(0.742)	0.714(0.679)	0.061(0.802)	0.521(0.511)
LM-FF[2]	0.224(0.544)	0.278(0.674)	0.284(0.594)	0.266(0.576)

*Figures in parenthesis denote p – values, ** significant at 5 percent, and * significant at 10 percent. 1: LM-SC denotes the lagrange multiplier test for residual serial correlation. The null hypothesis for the test is that there is no serial correlation and the test statistic is distributed as* χ^2 *with 1 degree of freedom. The 95 percent and 90 percent critical values for* χ^2 *are 3.72 and 2.81 respectively. 2: LM-FF denotes Ramsey's RESET test of functional form. The null hypothesis for the test is that the regression model is specified correctly. The 95 percent and 90 percent critical values for* χ^2 *at 1 degree of freedom are 3.72 and 2.81 respectively.*

Having established that our variables are co-integrated, we use the information obtained from L.R tests to generate error correction models (ECM) that capture the short and long run behaviours of the output relationship. The coefficient of the ECM (i.e. ECM_{t-1}) denotes the speed of adjustment back to the long run relationship among variables while changes in relevant variables represent short run elasticities. The results of the vector error correction are subjected to a number of diagnostic checks, including stability, within equation residual serial correlation, heteroscedasticity and normaility tests. In Table 4, we provide the results for output growth relationship in Nigeria for the period 1970 – 2005. The main results indicated that the correlation between growth and FDI is positive. The positive and statistically significant effect of government consumption expenditure contradicts the crowding-out effect predicted by the neoclassical growth model. This is an indication that the government continues to play an important role in the development process. Indeed, part of the government spending was used to build infrastructure and institutions to attract foreign investment.

The coefficient of financial development (F_n) measures the level of financial development in Nigeria and has negative implications for the growth-FDI relationship. Our results showed that the relationship between financial development and growth within the period under investigation is negative. This result could imply that the liberalised domestic market and the deregulated international financial markets encouraged capital flight abroad where risk-adjustment returns are higher. From Table 4, labor and human capital are positive and statistically significant in all versions of the growth regressions. This might be expected given the on going reforms in Nigeria. In fact, this does not only confirm the important role of labor in a growing economy, it is also likely that the level of efficiency with which the stock of technical knowledge is translated into technologies in the market via the higher education system has continued to improve. The higher institutions witnessed increased enrolments during the period under investigation.

Table 4: Nigeria: Error Correction Model (Dependent Variable $\Delta \ln Gr_t$)

Variables	4.1	4.2	4.3	4.4	4.5	4.6
Constant	0.19(2.03)	0.17(2.26)	0.21(4.13)	0.24(2.99)	0.18(2.06)	0.26(3.71)
$\Delta \ln L_t$	0.14(3.11)	0.16(2.02)	0.11(2.12)	0.12(1.97)	0.17(2.08)	0.24(2.73)
$\Delta \ln H_t$	0.04(2.74)	0.06(3.07)	0.08(2.09)	0.09(3.10)	0.07(2.47)	0.05(3.07)
$\Delta \ln K_p$	0.20(1.72)	0.18(1.89)	0.17(1.91)	0.14(1.99)		
$\Delta \ln K_f$	0.22(2.22)	0.24(4.01)	0.23(1.97)	0.25(4.18)	0.23(2.40)	0.28(3.23)
$\Delta \ln EXP$	0.19(1.98)	0.17(3.23)	0.20(3.24)		0.23(4.10)	0.13(3.19)
$\Delta \ln C_{gt}$				0.19(2.48)	0.27(3.14)	0.26(3.54)
$\Delta \ln F_n$	-0.015(1.96)	-0.091(1.89)		-0.051(3.79)	-0.042(2.31)	-0.15(3.54)
D	0.006(1.98)		0.004(2.01)	0.006(2.56)	0.007(2.81)	0.004(2.2)
ΔB_g			0.07(3.89)	0.05(3.90)	0.03(1.99)	0.04(3.44)
T	0.002(2.88)	0.004(2.02)		0.003(1.98)	0.005(2.31)	0.002(3.3)
ECM_{t-1}	-0.13(-2.44)	-0.17(-3.23)	-0.16(-2.91)	-0.21(-6.11)	-0.11(-2.77)	-0.22(-3.4)
R^{-2}	0.83	0.75	0.69	0.71	0.76	0.74
S.E	0.007	0.006	0.009	0.008	0.006	0.0008
D.W	2.02	1.98	2.06	2.01	2.05	2.04
AR (1)	0.32	0.35	0.33	0.39	0.38	0.37

This table provides a summary of the estimates of the adjustment to the long run equilibrium relationship. The result shows that the ECM terms, representing the speed of adjustment to long run equilibrium, are negative and significant. The correlation between growth and FDI; growth and human capital are positive while the relationship between financial development and growth is negative.

Previous studies (Barro 1991) found a positive and significant effect of the higher education enrolment rate, when used as a proxy for human capital. Moreover, the positive but not statistically significant effect of domestic investment might not be unconnected to the relatively small nature of private investment in the economy. This attests to the domineering effect of the government in the Nigerian economy for many years. So also, the budget balance over GDP has a positive and significant effect on growth which implies that a reduction in the budget deficit would likely facilitate the private sector's access to bank credit and thus stimulate economic activity. The growth rate of real export has a significant positive effect on growth, see Edwards (1992). The time trend has significant positive effect within the period under consideration. The measure of liberalization has positive and significant effect. This could imply that the likely enabling environment that comes with a liberalized economy would, other things being equal, attract foreign investors.

The ECM terms are negative and significant in all equations and the relative fit and efficiency of the regressions conforms to theoretical predictions. The ECM coefficient in equations 4.1 to 4.6 has the right sign and is highly significant. The regression results from equation 4.6 revealed that deviations from long run growth in this period are corrected by 22 percent in the following year.

CONCLUDING COMMENTS

The links between FDI and growth has been examined for the Nigerian economy. The paper focused on the determinants of FDI, the causal relationships among factors affecting economic growth in Nigeria, including the formal investigation of the export-led and FDI-led growth hypotheses, for the period between 1970 and 2005. We found that Nigeria's potential market size, the degree of export orientation, human capital, providing enabling environment through the provision of infrastructural facilities, and macroeconomic stability are all important determinants of FDI flows. We observed that foreign firms do not simply come to Nigeria to take advantage of any single location factor, but are more importantly driven by a whole myriad of often conflicting and competing reasons.

By and large, our results revealed that foreign direct investment leads to economic growth in Nigeria and that domestic investment, openness to international trade and human capital are complementary to

economic growth. In fact, economic growth has been driven largely by human capital development, growth of exports, FDI and government consumption expenditure, as would be expected. Controlling for domestic investment growth as well as other factors, causality tests also show support for both the export-led growth and FDI-led growth hypotheses.

The significant positive effect of liberalization on FDI indicates that an enabling environment that comes with a liberalized economy is likely to attract foreign investors. The policy implication of this for Nigeria is that to induce FDI, the Nigerian government needs to focus on improving the investment climate through measures of liberalization as well as creating an efficient bureaucracy that facilitates the entry and speedy operation of foreign investors. Also, the positive and significant effect of economic growth on FDI emphasizes the crucial role of economic growth in stimulating investment by foreign as well as domestic investors. In conclusion, given the positive FDI growth impact in Nigeria, improving growth rates signal a country's economic growth prospects and encourage foreign investors. Thus, keeping up the growth momentum and ascertaining its sustainability is a key to attracting more FDI. As data become available, study that examines impact of FDI on various sectors of the Nigerian economy will complement this research.

APPENDIX

Variable	Definition of the variable	Proxy
$RGDPG$	growth rate of real GDP	percentage change in real GDP was used as a proxy for growth in output.
$RGDPC$	Real GDP per capita	the real GDP divided by population
EXP	exports	Exports as a percentage of GDP (measures of openness. Export goods without crude oil (flows). It was deflated by an export price index, 1993=100
INF	Rate of inflation	The rate of inflation
$ILLIT$	Rate of illiteracy	Below primary educational attainment
$GFCF$	Gross fixed capital formation	The gross fixed capital formation as a percent of GDP
$TELE$	Telephone	Telephone lines per 1000 people
LIB	Government Policy	Measure of liberalization policy of the government (dummy variable)
K_f	Stock of foreign direct investment	The series was deflated by an implicit price index. The stock of FDI was obtained through the perpetual inventory model of the form: $K_t = K_{t-1} + I_t - \delta K_{t-1}$ where K_{t-1} is the stock of capital at time $t-1$. I_t is the flow of gross investment during period t and δ is the rate at which private and foreign capital depreciates in period $t-1$. In this research, an initial stock of 8 years and 5% depreciation were considered in the calculations.
K_p	Stock of private capital	The series was deflated by an implicit price index.
H	Human capital	Students enrolled in secondary school. Series was interpolated from annual to quarterly data
L	Labor	Remunerated workers (economically active labor force). The series was interpolated from annual to quarterly data.
C_g	Government consumption	The original series was in real terms; it was converted to US dollars and was seasonally adjusted
F_n	Financial depth	This series is a ratio between broad money taken as M1 divided by GDP. The series were in current prices
B_g	Budget balance	This series is the ratio between budget balance divided by GDP. Both series were taken in real terms
T	Time Trend	1970-2005

The choice of independent variables is constrained by data availability, as is mostly the case with time-series data in developing countries. For example, time-series data on some of the determinants such as tariff rates, trade taxes, real wages, and corruption index that are used in some studies of this nature are not readily available for Nigeria over the period of the study.

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EVIDENCE ON THE PERFORMANCE OF COUNTRY INDEX FUNDS IN GLOBAL FINANCIAL CRISIS

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ABSTRACT

During the October 9, 2007-March 9, 2009 period, the U.S. stock market experienced the worst bear market in its history since the Great Depression. Empirical studies show that exchange-traded country index funds can provide portfolio diversification benefits to investors in bull markets. However, they may not be good investment opportunities in bear markets. In this paper, we demonstrate that most country index funds had worse performance than the U.S. S&P 500 Index and they provided little or no diversification benefits to U.S. investors during the October 9, 2007-March 9, 2009 bear market.

JEL: G11; G15; G21; G28

KEYWORDS: Financial crisis, bear market, country index funds, Sharpe and Treynor portfolio performance measures, principal components analysis, portfolio diversification

INTRODUCTION

Studying the risks and returns of global stock markets is a popular research topic in finance. Meric and Meric (2001) compare the risks and returns of the world's major stock markets and conclude that the U.S. stock market is one of the world's best investment opportunities for global investors.

Empirical studies show that global diversification can help reduce portfolio risk. Exchange-traded country index funds have become an attractive global investment vehicle in recent years. They make it easy for investors to achieve global diversification. In a recent paper, G. Meric et al. (2008) study global portfolio diversification in a bull market and they conclude that investing in country index funds can provide high returns and significant portfolio diversification benefits to U.S. investors.

Several recent empirical studies demonstrate that investment returns behave differently in bull and bear markets. I. Meric et al. (2008) study and compare the portfolio diversification implications of the co-movements of global sector indexes in bull and bear markets. Meric et al. (2002) find that global investments do not provide significant diversification benefits to investors in global bear markets.

All countries of the world experienced a severe financial crisis in 2008. It resulted in a recession and a severe meltdown in global stock markets. The causes and consequences of the 2008 crisis are being studied extensively in the current literature (see, e.g., Wang et al., 2010).

The movements in the stock market tend to lead the movements in the economy. The stock market return statistics indicate that the bear market in the U.S. started on October 9, 2007, well before the financial crisis and recession, and ended on March 9, 2009, again well before economic recovery. The first objective of our study is to compare the risks and returns of country index funds during the October 9, 2007-March 9, 2009 bear market.

Meric et al. (2002) find that correlation between national stock markets increases and the benefits of global portfolio diversification decreases in bear markets. Therefore, although the G. Meric et al. (2008) study finds that country index funds can provide significant portfolio diversification benefits in a bull market, it is likely that they provided little or no portfolio diversification benefits to investors during the October 9, 2007-March 9, 2009 bear market. Testing this hypothesis is the second objective of our study with a sample of 23 Ishares country index funds.

The paper is organized as follows. In the next section, we review the literature on the portfolio diversification implications of the co-movements of global stock markets, stock market crashes, and the 2008 financial crisis. In the section titled "data and methodology," we explain the data used in the study and the methodology employed to test the hypothesis. In the section titled "results," we present the empirical findings of our study. In the last section, we present our concluding comments, explain the limitations of our study, and offer suggestions for future research.

LITERATURE REVIEW

The benefits of global portfolio diversification are extensively studied in the literature. Empirical studies show that returns on stocks are more closely correlated within a country than between countries. Therefore, global diversification is recommended to reduce portfolio risk (see, e.g., Solnik, 1974; Lessard, 1976; Watson, 1978; and Meric and Meric, 1989).

Studying the impact of stock market crashes on stock returns has long been a popular research topic in finance. Seyhun (1990) studies investor overreaction in the 1987 stock market crash. Wang et al. (2009) study the determinants of stock returns in several stock market crashes. In a forthcoming study, Wang et al. (2010) examine and compare the determinants of stock returns in the 1987 and 2008 stock market crashes and they find that, although liquidity shortage and technical insolvency risk were not important factors effecting stock returns in the 1987 crash, they were significant determinants of stock returns in the 2008 crash.

Roll (1988), King and Wadhwani (1990), Malliaris and Urrutia (1992), and Meric and Meric (1998) study the impact of the 1987 stock market crash on the co-movements of national stock markets. Meric and Meric (2000), Pan et al. (2001), and Yang et al. (2003) examine the effects of the 1997 and 1998 emerging stock market crashes on the stock returns in developed countries. Hon et al. (2004), Wang et al. (2008), Fernandez (2008), and Nikkinen et al. (2008) investigate the impact of the September 11, 2001 terrorist attacks in the U.S. on the world's stock markets.

During the October 9, 2007-March 9, 2009 period, the U.S. stock market experienced the worst stock market meltdown in its history since the Great Depression. The S&P 500 Index lost 56 percent of its value during this period. The bear market in the U.S. also effected the stock markets of all other countries. The market value of stocks traded on the world's major stock exchanges lost about 61.3 percent of their value from October 9, 2007 to March 9, 2009.

The October 9, 2007-March 9, 2009 stock market meltdown was triggered by a financial crisis in the U.S. in the fall of 2008. While there were many antecedents that contributed to the 2008 financial crisis, the economists of the Federal Reserve Bank of St. Louis conclude that analysts blame the crisis on three interrelated causes. 1) The rapid growth in house prices and subsequent collapse of U.S. house prices. 2) A decline in mortgage underwriting standards highlighted by a plethora of subprime mortgages being issued. 3) Laxity in risk management by financial firms engaged in originating, distributing, and investing in mortgages, mortgage backed securities, and derivative financial instruments. (Federal Reserve Bank of St. Louis, 2009)

Banks created off-balance-sheet affiliated entities such as Structured Investment Vehicles (SIV) to purchase mortgage-related assets that were not subject to regulatory capital requirements. They also turned to short-term "collateralized borrowing" like repurchase agreements, so much so that investment banks were on average rolling over a quarter of their balance sheet every night. (Berly et al., 2008)

In the fall of 2008, financial markets worldwide went into a tailspin. Governments held emergency meetings trying to determine a corrective course of action to mitigate the impact of the financial meltdown on their economy. Governments devised stimulus packages to infuse money into shaky economies, trying to preserve jobs, create jobs, fund shovel ready projects which focused mostly on infrastructure projects, invest in green technology and jobs, and so forth. The impact of the financial meltdown in the U.S had devastating consequences for wealthy nations (the G20), and for emerging markets.

Countries in the E.U. faced similar economic downturns (Charlemagne, 2009). Japan faced its worst economic crisis since the end of World War II. Unemployment in Japan increased sharply contributed to in part by the deteriorating export sector, especially in cars and electronics. Hong Kong, Singapore, South Korea, and Taiwan faced serious economic problems. Export expansions and investment into international services, such as finance, helped make Hong Kong, Singapore, South Korea, and Taiwan, modern, dynamic economies. Their fortunes seem to be in reverse as they battle the worse downturn since the 1997-1998 emerging markets crisis. Singapore faced its worse economic recession since its independence from Malaysia in 1965. In an interview for, the *New York Times*, President of Taiwan stated: "The financial tsunami makes it possible to rethink economic development strategy as to whether we should rely so much on exports." (Bradsher, 2009).

DATA AND METHODOLOGY

The study examines 23 Ishares country index funds that traded between October 9, 2007 and March 9, 2009. The list of the funds included in the study, their ticker symbols, total asset levels, expense ratios, and dividend yields are presented in Table 1. The fund with the largest asset size is the U.S S&P 500 index fund (IVV). The Brazil (EWZ) and China (FXI) index funds also have considerable size. The Netherlands (EWN) and Belgium (EWK) funds are the smallest index funds in the sample in terms of asset size. The average asset size of the 23 funds in the sample is about 2.97 billion dollars. The U.S. S&P 500 index fund (IVV) has the lowest and the China index fund (FXI) has the highest expense ratios (0.09% and 0.73%, respectively). The average expense ratio for all funds in the sample is 0.55%. The Taiwan index fund has the highest and the South Korea index fund has the lowest dividend yields (4.91% and 0.88%, respectively). The average dividend yield for all funds in the sample is 2.74%.

Daily returns data are used in the study for the October 9, 2007-March 9, 2009 period. The daily closing share prices of the funds, adjusted for dividends and splits, were downloaded from the "Yahoo/Finance" web site. The daily returns were computed as the natural log difference in the share prices, $\ln (P_{i,t}/P_{i,t-1})$. Daily return observations used in the analysis is 355 for each fund for the October 9, 2007-March 9, 2009 period. These observations are used in the calculation of average daily returns, the standard deviation of returns, and the correlation with the U.S. market. The daily return matrix used in the principal components analysis to analyze the portfolio diversification implications of the co-movements of fund daily returns has 355x23=8165 observations.

The S&P 500 index fund (IVV) is used as the market proxy for the U.S. stock market. The market risk contribution of a country index fund to a well-diversified portfolio is measured by the fund's beta computed by regressing the fund's daily returns against the U.S stock market daily returns.

Table 1: Ishares Country Index Funds Included in the Study[a]

Index Funds	Ticker Symbol	Asset Size in Millions of U.S. Dollars	Expense Ratio (%)	Dividend Yield (%)
U.S	IVV	21,800	0.09	2.02
Brazil	EWZ	11,200	0.65	2.61
China	FXI	10,090	0.73	1.23
Japan	EWJ	4,780	0.56	1.29
Taiwan	EWT	3,400	0.52	4.91
South Korea	EWY	2,830	0.65	0.88
Canada	EWC	2,790	0.55	1.61
Australia	EWA	2,420	0.55	4.01
Hong Kong	EWH	1,890	0.55	3.44
Singapore	EWS	1,430	0.55	3.14
Germany	EWG	983	0.55	2.77
Mexico	EWW	976	0.55	1.27
U.K.	EWU	896	0.55	3.54
South Africa	EZA	579	0.66	3.43
Malaysia	EWM	552	0.56	2.59
Spain	EWP	320	0.56	4.66
France	EWQ	313	0.55	3.71
Switzerland	EWL	294	0.56	1.48
Sweden	EWD	220	0.55	1.93
Austria	EWO	214	0.55	3.42
Italy	EWI	147	0.59	3.28
Netherlands	EWN	93	0.55	3.28
Belgium	EWK	66	0.56	2.57
Average		2,969	0.55	2.74

[a]*The study covers the October 9, 2007-March 9, 2009 period. Daily index returns of the funds are used in the analysis. Daily return observations for each fund for the study period is 355. These return observation are used in comparing the average returns and risk levels of the funds. To assess the portfolio diversification benefit of each fund, the correlation between its daily returns and the S&P 500 index fund returns was calculated. To evaluate the portfolio diversification implications of the co-movements of the fund returns, the principal components analysis (PCA) technique is used. The analysis is applied to a data matrix of 355x23=8,165, daily return observations for the 23 funds.*

The market risk of an investor's portfolio is:

$$\beta_p = \sum_{i=1}^{N} w_i \beta_i \quad (1)$$

where β_p is the portfolio's market risk, w_i are the weights of the investments in the portfolio, and β_i are the betas of the country fund investments. Therefore, the contribution of a country index fund to a well-diversified portfolio is measured by the fund's beta.

We compare the performance of the country index funds with the Treynor (1965) and Sharpe (1966) performance measures (see Reilly and Brown, 2008) during the October 9, 2008-March 9, 2009 period. In the Treynor method, a higher Treynor ratio (TR) statistic indicates a better performance. The TR statistic is calculated as follows:

$$TR_i = (R_i - R_{rf}) / \beta_i \quad (2)$$

where TR_i is the Treynor ratio for country fund i, R_i is the realized return from the fund, R_{rf} is the risk-free rate, $(R_i - R_{rf})$ is the excess return for the fund, and β_i is the beta of the fund.

In the Sharpe method, a higher Sharpe ratio (SR) statistic indicates a better performance. The SR statistic is calculated as follows:

$$SR_i = (R_i - R_{rf}) / \sigma_i \quad (3)$$

where SR_i is the Sharpe ratio for country index fund i, R_i is the realized return from the fund, R_{rf} is the risk-free rate, $(R_i - R_{rf})$ is the excess return for the fund, and σ_i is the standard deviation of the fund's returns.

Principal components analysis (PCA) is a multivariate statistical analysis technique widely used in evaluating the portfolio diversification prospects of global stock markets (see, e.g., Meric and Meric, 1989). We use the PCA technique to study the portfolio diversification benefits of country index funds during the October 9, 2007-March 9, 2009 period. In this technique, the correlation matrix of the country index funds is used as input in a PCA computer program and several statistically significant principal components with eigen values greater than one are extracted. The technique clusters the country index funds into principal components in terms of the similarities of their return movements. The country index funds clustered in the same principal component are closely correlated and investing in those funds would provide minimal portfolio diversification benefit to global investors. Global investors should invest in the index funds with the highest factor loadings in different principal components to maximize the portfolio diversification benefit.

RESULTS

All country index funds had substantial losses during the October 9, 2007-March 9, 2009 bear market. The percentage loss of each fund is presented in the second column of Table 2. The U.S. S&P 500 index fund lost 56% of its value during this period. The Malaysian (-42.5%), Japanese (-51.6%), Swiss (-51.6%), Brazilian (-55.5%), and Taiwanese (-55.9%) funds had the smallest losses. The Belgium (-74.6%), Austrian (-74.4%), Italian (-71.1%), South Korean (-69.1%), Swedish (-68.1%), and Dutch (-65.9%) funds had the largest losses. It is interesting to note that five of the six funds with the largest losses are European funds. The average loss for all 23 funds is 61.3%.

The standard deviation of daily returns representing the funds' total risk is presented in the third column of Table 2. The funds with the lowest daily return volatility are the Malaysian (2.25%), Swiss (2.26%), U.S. (2.31%), Japanese (2.53%), and Canadian (2.75%) funds. The funds with the highest daily return volatility are the Chinese (4.69%), Brazilian (4.49%), South African (4.15%), South Korean (4.15%), and Swedish (3.56%) funds. The average daily return volatility for all funds is 3.16%.

Country fund betas are calculated by regressing each fund's returns against the S&P 500 index fund returns. The beta figures are presented in the fourth column of Table 2. By definition, the beta of the S&P 500 index fund is 1.0. The Malaysian (0.69), Swiss (0.85), Japanese (0.94), and Canadian (0.96) funds have the lowest betas. The Chinese (1.71), Brazilian (1.64), South African (1.57), and South Korean (1.47) funds have the highest betas. The average beta for all funds is 1.17.

Exchange-traded country index funds are good opportunities for high returns and portfolio diversification benefits in a bull market (see Meric at al., 2008). However, they are not good investments in bear markets. Since they generally have high betas, their returns tend to fall more than the S&P 500 index returns (a proxy for the U.S. stock market) in bear markets. Furthermore, the U.S. stock market and foreign stock markets move closer together in bear markets and the correlation between them increases. Therefore, foreign portfolio investments are not good diversification prospects for U.S. investors in bear markets (see Meric et al., 2002).

Table 2: Country Index Fund Returns, Risks, and Correlation with the U.S. Stock Market in the October 9, 2007-March 9, 2009 Bear Market

Index Funds[a]	Total Return[b]	Risk		Correlation with the U.S. Stock Market[e]
		Std. Deviation of Daily Returns[c]	Beta[d]	
Malaysia	-42.5 %	2.25 %	0.69	0.708
Japan	-51.6 %	2.53 %	0.94	0.858
Switzerland	-51.6 %	2.26 %	0.85	0.866
Brazil	-55.5 %	4.49 %	1.64	0.845
Taiwan	-55.9 %	3.19 %	1.13	0.816
U.S.	-56.0 %	2.31 %	1.00	1.000
Spain	-57.6 %	2.91 %	1.11	0.881
Canada	-57.6 %	2.75 %	0.96	0.803
South Africa	-58.0 %	4.15 %	1.57	0.870
Hong Kong	-58.0 %	3.36 %	1.27	0.872
China	-61.8 %	4.69 %	1.71	0.844
France	-62.0 %	2.83 %	1.11	0.906
Germany	-63.0 %	2.91 %	1.12	0.887
U.K.	-63.7 %	2.92 %	1.14	0.897
Mexico	-63.8 %	3.17 %	1.20	0.876
Singapore	-64.2 %	3.12 %	1.16	0.857
Australia	-64.4 %	3.49 %	1.29	0.850
Netherlands	-65.9 %	2.84 %	1.09	0.887
Sweden	-68.1 %	3.56 %	1.35	0.874
South Korea	-69.1 %	4.15 %	1.47	0.819
Italy	-71.1 %	2.77 %	1.04	0.870
Austria	-74.4 %	3.24 %	1.10	0.786
Belgium	-74.6 %	2.83 %	1.02	0.836
Average	-61.3 %	3.16 %	1.17	0.850

[a] *The twenty-three Ishares country index funds included in the study.*
[b] *Total returns of the twenty-three index funds during the October 9, 2007-March 9, 2009 period.*
[c] *The standard deviation of the daily returns of the index funds during the October 9, 2007- March 9, 2009 period.*
[d] *The Capital Asset Pricing Model (CAPM) betas of the index funds. The beta is calculated by regressing the returns of each index fund against the S&P 500 Index returns for the October 9, 2007-March 9, 2009 period.*
[e] *The Pearson correlation coefficients between the returns of the country index funds and the S&P 500 Index returns during the October 9, 2007-March 9, 2009 period. All correlation coefficients are statistically significant at the 1-percent level.*

The Pearson correlation coefficients between the S&P 500 index fund (IVV) and the country index funds during the October 9, 2007-March 9, 2009 period are presented in the fifth column of Table 2. All correlation coefficients are statistically significant at the 1-percent level. A high correlation coefficient with a country index fund indicates that the fund is not a good portfolio diversification prospect for U.S. investors.

The correlation statistics indicate that all country index funds were highly correlated with the S&P 500 index fund (IVV) during the October 9, 2007-March 9, 2009 period (i.e., none of the country index funds was a good portfolio diversification prospect for U.S. investors during this period). Among the country index funds, the Malaysian (0.708) and Austrian (0.786) funds were the best portfolio diversification opportunities and the French (0.906), U.K. (0.897), German (0.887), and Dutch (0.887) index funds were the worst portfolio diversification prospects for U.S. investors during the October 9, 2007-March 9, 2009 period.

The regional average loss, daily return volatility, beta, and correlation figures are presented in Table 3. The European country index funds appear to have had the most losses during the October 9, 2007-March 9, 2009 bear market. The country index funds in the other parts of the world appear to have had similar average losses during this period. In terms of riskiness as measured by daily return volatility and beta, the South African Index Fund is riskier compared with the funds in the other parts of the world. The European country index funds have a lower average daily return volatility and beta compared with the

Table 3: Regional Returns, Risks, and Correlation with the U.S. Stock Market during the October 9, 2007-March 9, 2009 Bear Market

Regions	Total Return	Risk		Correlation with the U.S. Stock Market
		Std. Deviation of Daily Returns	Beta	
Europe (10 funds)	-65.2 %	2.90 %	1.09	0.869
Asia (8 funds)	-58.4 %	3.34 %	1.21	0.827
Americas (4 funds)	-58.2 %	3.18 %	1.20	0.841
Africa (1 fund)	-58.0 %	4.15 %	1.57	0.870

funds in the other parts of the world. The average correlation coefficient figures imply that country index funds in different parts of the world were all highly correlated with the U.S. stock market and they provided little diversification benefit to U.S. investors during the October 9, 2007-March 9, 2009 bear market.

The performance rankings of the country index funds with the Treynor and Sharpe methods during the October 9, 2007-March 9, 2009 period are presented in Table 4. The Malaysian and Swiss index funds have the best performance with both methods. The U.S. S&P 500 index fund (IVV) is ranked #3 with the Treynor method and #5 with the Sharpe method. The county index funds with the worst performance are the Austrian, Belgium, South Korean, Swedish, Australian, and Italian funds with both methods. It is interesting to note that four of the six funds with the worst performance are European funds.

Table 4: Rank Ordering the Country Index Funds with the Sharpe and Treynor Portfolio Performance Measures: October 9, 2007-March 9, 2009

Index Funds[a]	Sharpe Ratio Rank[b]	Treynor Ratio Rank[c]
Malaysia	1	1
Switzerland	2	2
U.S.	3	5
Japan	4	3
Canada	5	4
France	6	8
Spain	7	6
Taiwan	8	7
Germany	9	9
Brazil	10	10
Hong Kong	11	11
U.K.	12	13
South Africa	13	14
Netherlands	14	12
Mexico	15	16
Singapore	16	17
China	17	15
Italy	18	18
Australia	19	19
Sweden	20	20
South Korea	21	22
Belgium	22	23
Austria	23	21

[a] *The twenty-three country index funds included in the study.*
[b] *The performance rank of the funds with the Sharpe Ratio:* $SR_i = (R_i - R_{rf}) / \sigma_i$
[c] *The performance rank of the funds with the Treynor Ratio:* $TR_i = (R_i - R_{rf}) / \beta_i$

We use the correlation matrix of the country index funds as input in the principal components analysis (PCA) computer program to extract the statistically significant principal components with eigen values

greater than one for the October 9, 2007-March 9, 2009 period. The analysis yields only one statistically significant principal component (i.e., all country index funds are clustered in only one principal component because they are highly correlated). The factor loadings of the principal component extracted are presented in Table 5.

Table 5: Principal Components Analysis: October 9, 2007-March 9, 2009 Period

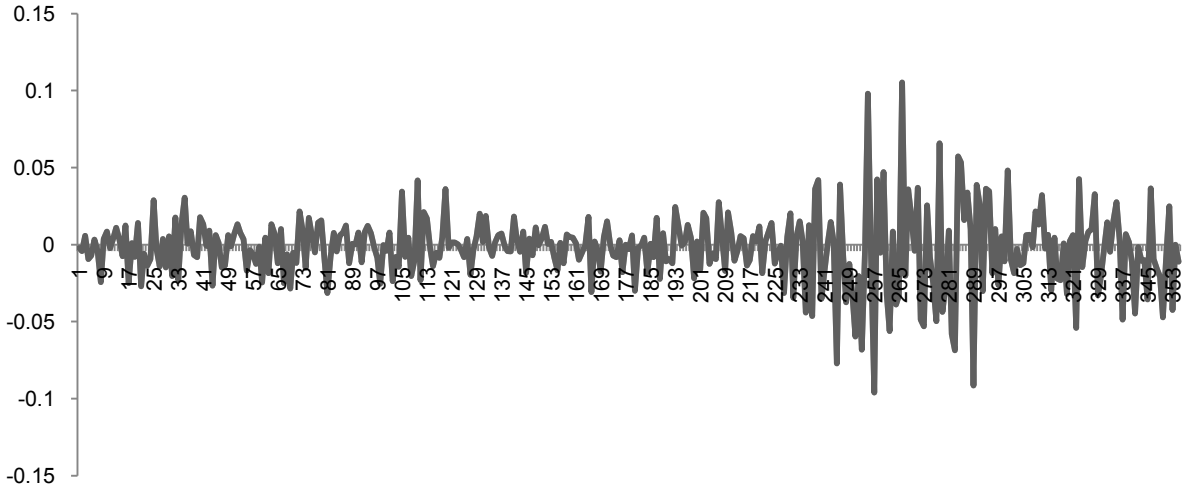
Index Funds[a]	Factor Loadings of the Principal Component[b]
France	0.965
U.S.	**0.948**
U.K.	0.945
Spain	0.944
Germany	0.942
Netherlands	0.941
Italy	0.939
Sweden	0.926
Australia	0.919
Switzerland	0.910
Brazil	0.906
South Africa	0.905
Hong Kong	0.904
Japan	0.903
Singapore	0.896
Mexico	0.894
Belgium	0.890
China	0.887
South Korea	0.877
Austria	0.873
Taiwan	0.863
Canada	0.855
Malaysia	0.761

[a] *The twenty-three country index funds included in the study.*
[b] *The correlation matrix of the index funds was used as input in the PCA computer program to obtain the factor loadings of the country index funds.*

The principal component has an eigen value of 18.8 and it explains 81.9 percent of the variation in the original data matrix. The country index funds with a high factor loading in the principal component are more correlated with the other country index funds. Therefore, they provide less diversification benefit in global portfolios. The country index funds with a low factor loading in the principal component are less correlated with the other country index funds. Therefore, they provide more diversification benefit.

The returns of the S&P 500 Index in Figure 1 indicate that the October 9, 2007-March 9, 2009 period can be divided into two sub-periods for further analysis. Return volatility was relatively low during the first eleven months and ten days of the bear market until September 19, 2008. The S&P 500 Index lost only about 20 percent of its value during this period. However, after this date, a free fall and extreme volatility in the market started, which continued until March 9, 2009. During this shorter five-month-twenty-day period, the S&P 500 Index lost another 36 percent of its value as of the October 9, 2007 starting point of the bear market.

Figure 1: S&P 500 Index Returns during the October 9, 2007-March 9, 2009 Period



This figure shows the daily returns of the S&P 500 Index during the October 9, 2007-March 9, 2009 period. The first 226 daily return observations correspond to the October 9, 2007-Sebtember 19, 2008 period when there was relatively less volatility in returns. The daily return observations between 227-355 correspond to the September 19, 2008-March 9, 2009 period with considerable volatility in returns.

To determine if the co-movements of the country index funds changed significantly from the October 9, 2007-September 19, 2008 period to the September 19, 2008-March 9, 2009 period, in this section of the paper, we apply the PCA technique to these two sub-periods separately. The factor loadings of the country index funds for the October 9, 2007-September 19, 2008 sub-period are presented in Table 6.

Table 6: Factor Loadings of the Principal Components: October 9, 2007-September 19, 2008 Period[a]

Index Funds	Prin. Com. #1	Prin. Com. #2
France	**0.792**	*0.391*
Italy	**0.848**	*0.402*
Germany	**0.841**	*0.444*
Netherlands	**0.836**	*0.418*
Spain	**0.827**	*0.418*
Sweden	**0.820**	*0.412*
Belgium	**0.812**	*0.383*
Switzerland	**0.801**	*0.416*
Austria	**0.792**	*0.391*
U.K.	**0.749**	*0.507*
South Africa	**0.676**	*0.574*
Canada	**0.657**	*0.428*
Austria	**0.624**	*0.605*
Brazil	**0.612**	*0.569*
Hong Kong	*0.381*	**0.840**
China	*0.383*	**0.832**
South Korea	*0.374*	**0.826**
Singapore	*0.462*	**0.803**
Taiwan	*0.352*	**0.787**
U.S.	*0.599*	**0.683**
Mexico	*0.541*	**0.678**
Malaysia	*0.336*	**0.654**
Japan	*0.501*	**0.644**

[a] *The higher factor loading of each index fund in either principal component is shown in bold. The factor loading of the fund in the other principal component is shown in italics.*

There are two statistically significant principal components for this sub-period. It indicates that it was possible to obtain some significant portfolio diversification benefit by investing in country index funds with high factor loadings in two different principal components during the October 9, 2007-September 19,

2008 period. Index funds with high factor loadings in different principal components are less correlated and they can provide greater portfolio diversification benefit.

The highest factor loadings of the country index funds in each principal component are shown in bold. The factor loadings of these funds in the other principal component are shown in italics. The first principal component is dominated by European index funds. These funds all have high factor loadings in the first principal component and including these funds in the same portfolio would provide very little portfolio diversification benefit. Investors who invest in these funds should prefer to invest in the country index funds with high factor loadings in the second principal component for better portfolio diversification. Similarly, the Asian index funds have high factor loadings in the second principal component. Investors who invest in these funds should prefer to invest in European index funds with high factor loadings in the first principal component for greater portfolio diversification benefit.

The S&P 500 index fund appears to be quite highly correlated with funds with high factor loadings in both principal components. However, it has a higher factor loading in the second principal component than in the first principal component. This result implies that U.S. investors could obtain slightly more portfolio diversification benefit by investing in the country index funds with high factor loadings in the first principal component than in those with high factor loadings in the second principal component.

The factor loadings of the country index funds for the September 19, 2008-March 9, 2009 period are presented in Table 7. There is only one principal component for this period. It indicates that all stock markets went down sharply and the global diversification opportunities were limited during this period. All index funds have very high factor loadings in the principal component. It implies that all country index funds were highly correlated during this period implying limited diversification opportunities for global investors. The Malaysian index fund has the lowest factor loading in the principal component. It indicates that the Malaysian index fund provided somewhat greater diversification opportunity to investors compared with the other funds during the September 19, 2008-March 9, 2009 period.

Table 7: Principal Components Analysis: September 19, 2007-March 9, 2009 period

Index Funds	Factor Loadings of the Principal Component
France	0.973
U.S.	**0.964**
U.K.	0.960
Spain	0.959
Germany	0.954
Netherlands	0.953
Italy	0.951
Sweden	0.938
Hong Kong	0.937
Japan	0.937
Brazil	0.936
Australia	0.935
China	0.929
South Africa	0.924
Switzerland	0.919
Taiwan	0.912
Mexico	0.902
Singapore	0.906
Belgium	0.903
South Korea	0.892
Canada	0.882
Austria	0.878
Malaysia	0.844

We can derive the following conclusion from the sub-period analysis in this section. There may be some global diversification opportunities to investors during relatively mild bear markets. However, the diversification benefits decrease sharply during strong global bear markets.

CONCLUDING COMMENTS

During the October 9, 2007-March 9, 2009 period, the U.S. stock market experienced the worst bear market in its history since the Great Depression. In this paper, we have studied the risks, returns, and portfolio diversification benefits of investing in country index funds with a sample of 23 Ishares country index funds during this period. We have demonstrated that U.S. investors would lose more and they would obtain limited diversification benefit by investing in most country index funds during the October 9, 2007-March 9, 2009 bear market.

Empirical studies show that global investments can provide significant portfolio diversification benefits to investors in bull markets. However, the benefits of global diversification decrease significantly during bear markets. Our correlation and principal components analysis results in this study indicate that investing in country index funds provided very little diversification benefit to U.S. investors during the October 9, 2007-March 9, 2009 bear market.

The bear market was relatively mild during the October 9, 2007-September 19, 2008 period and relatively strong during the September 19, 2008-March 9, 2009 period. Principal components analysis applied to these two sub-periods separately indicate that there were some significant global portfolio diversification opportunities during the October 9, 2007-September 19, 2008 period. However, there were no significant global portfolio diversification opportunities during the September 19, 2008-March 9, 2009 period. The conclusion that can be derived from our period analysis is that correlation between the world's stock markets increases sharply as they all decline at a rapid pace and the benefits of global portfolio diversification decrease significantly in a severe global bear market.

Ishares is the most important provider of exchange-traded single-country index funds. A limitation of our study is that, for consistency in sampling units, we used only Ishares country index funds in our study. Future research may expand the scope of the analysis by including the country index funds of some other exchange-traded-index-fund providers such as Power Shares, SPDR, Market Vectors, Clamore/Alpha Shares, Direxion, iPath, Wisdom Three, etc.

Another limitation of our study is that we apply our analysis only to the October 9, 2007-March 9, 2009 bear market. To determine if there is inter-temporal consistency in the results, future research may also apply the analysis to other earlier bear markets. However, exchange-traded country index funds are a relatively new investment vehicle. Studies applied to earlier bear markets may have to use national stock market indexes instead of country index funds.

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PREDICTORS OF NET TRADE CREDIT EXPOSURE: EVIDENCE FROM THE ITALIAN MARKET

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ABSTRACT

In light of multiple motivations for the use of trade credit, firms tend to supply and receive trade credit at the same time, so the choice to engage in one of these activities could influence the other. Many studies proposed in the literature define models of trade credit and provide empirical evidence, looking mainly at only one aspect of trade policy at a time. The few studies comparing gross and net exposure models are based on a limited set of variables or on a limited time horizon. In the context of one of the more relevant world markets (Italy), this paper compares models for gross and net exposure, demonstrating a significant difference in the statistical fitness of the two models and in the characteristics of the explanatory variables. The results demonstrate the existence of a strict relationship between trade credit and debt choices and suggest some unique features of net models compared to gross ones.

JEL: G31,G32, C31

KEYWORDS: trade credit, Italy

INTRODUCTION

Trade credit represents a way for large and financially strong firms to extend credit to small and financially weak ones (Schwartz, 1974). According to traditional theories (Omiccioli, 2005), the use of trade credit is determined by features of the economic sector and characteristics of the firm (Petersen and Rajan, 1997), but market power, on both the demand and supply sides, could influence a firm's trade credit/debt decisions (Mian and Smith, 1992; Wilson and Summers, 2002).

Empirical evidence confirms the intense use of trade credit by small firms (Berger and Udell, 1998) but shows that large firms also receive it and small firms also extend it (Rajan and Zingales, 1995; Nielsen, 2002). Moreover, in light of the multiple motivations for the use of trade credit, firms tend to supply and receive trade credit at the same time, so the choices to offer/accept trade credit are influenced by each other (Kiyotaki and Moore, 1997) as the decision to extend trade credit is financed by trade debt (Fabbri and Klapper, 2008). Although more recent studies have underlined the need to consider both trade debt and credit choices, there is no evidence about the impact on the explanatory variables that could be attributed to the choice of gross relative to net amount/duration. The comparison of gross and net models could be useful to demonstrate, as hypothesised in some theoretical works, that some types of variables affect net exposure more significantly than gross exposure.

This paper reviews the literature on the motivations of supply and demand for trade credit, stressing the roles of different explanatory variables in gross and net exposure. The empirical analysis, performed in the context of one of the more developed world markets (Italy), demonstrates that models constructed based on net exposure fit statistically better than gross ones, and the main differences among the explanatory variables of the net and gross models primarily involve the types of firm-specific variables considered in the models. The main policy implication concerns the approach that must be adopted in evaluating the trade credit/debt dynamics: normally, firms adopt a trade credit/debt structure that is coherent for the amount and for the duration, so it is important to pay attention to all events (i.e., the

dilution risk) that could affect this close relationship. On the basis of the results obtained, financial instruments constructed based on trade receivables (i.e., factoring, asset based lending) must not only consider the characteristics of the credit assigned, but also evaluate the overall credit/debt trade exposure of the seller.

The remainder of the article is organized as follows. In the next section a literature review is provided. This section is followed by a presentation of the data, methodology and empirical results. The paper closes with a summary, brief conclusions and implications for the evaluation of the phenomenon.

LITERATURE REVIEW

According to traditional theories (Omiccioli, 2005), the supply and demand for trade credit are determined by the features of the economic sector and the characteristics of the firm (Giannetti et al., forthcoming). Trade credit allows firms to separate the delivery of the good/service in time from the payment of the price, so the buyer benefits from an extended period of time to verify the quality of the supply (Long et al., 1993): the inspection need depends on the relevant economic sector, according to the innovation, complexity, customisation and perishability of the supplied good. Both the terms (Ng et al., 1999) and volumes (Giannetti et al., forthcoming) of trade credit available vary according to the type of product/service supplied: given the economic sector and product type (Lee and Stowe, 1993), buyers consider discounts for cash payments as low quality signals regarding the supply, while the extension of trade credit is considered to be a more effective solution than minimum quality guarantees (Faith and Tollison, 1981). As it concerns the contract enforcement, the type of product also affects the buyer's opportunistic behaviour: services and tailor-made products are exposed to a lower risk of diversion (Burkart and Ellingsen, 2004), even though their lower level of liquidity can affect the recovery value in case of the debtor's default (Mian and Smith, 1992).

Besides the relevant economic sector, the use of trade credit is also influenced by characteristics of the firm. According to the theory of real motivations, suppliers extend trade credit to support sales (Nadiri, 1969), while financial motivations stress the position of trade debt in the firm's financial structure (Lewellen et al., 1980). To support sales, suppliers can use trade credit as a mean of price discrimination between cash and delayed payments by means of a two-part terms approach (Ng et al., 1999): the buyer can pay the price at the end of the delay period or benefit from a discount for payment shortly after the purchase. If trade credit is evaluated as an investment, then the delayed payment and the price cannot be considered as independent (Schwartz, 1974).

Moreover, the combined supply of finance and goods allows trade creditors to modify the offer conditions without modifying the price (Schwartz and Withcomb,1979). Lastly, price discrimination can affect the fiscal effects of trade credit: other conditions being equal, suppliers with a high tax rate prefer to extend trade credit to buyers facing a low tax rate, particularly if the Value Added Tax is refunded to suppliers in the case of the debtor's default (Florentsen et al., 2003). Nevertheless, the use of trade credit to support sales is not limited to price discrimination: the counterparties can agree to delay the payment for a few days to minimise the financial flow variability due to the dynamics of receipts and payments and the pertinent transaction costs (Ferris, 1981).

Besides price discrimination, suppliers can also extend trade credit to stabilise the demand, both at the micro and macro levels. On the micro level, trade credit allows firms to protect their non-salvageable investments in their relationships with buyers (Smith, 1987), to transfer the inventory warehousing costs to buyers by promoting a push strategy (Emery, 1987), and to benefit from the customer's inertia and performing payment behaviour due to the high costs of supplier switching (Cunãt, 2007), particularly for non-standardised goods/services (Giannetti et al., forthcoming) that favour the building of long-lasting trade relationships (Summers and Wilson, 2003), even if the debtor is experiencing difficulties in the

reimbursement of the debt (Wilner, 2000). At the macro level, trade credit supports sales during economic downturns (Meltzer, 1960), particularly by extending delayed payment plans to new customers (Nielsen, 2002); moreover, the extension of trade credit is particularly relevant as a smoothing tool when the demand is characterised by a seasonal trend (Paul and Wilson, 2006).

Trade debt allows buyers to delay payment for the inputs until after the revenues are realised (Lewellen et al., 1980); thus, they can use it as either a substitute or a complement for other financial sources. Theories on the substitution effect indicate that in the presence of market imperfections, the suppliers' cost of financial sources is lower than the buyers' cost, or in other words, suppliers have higher liquidity. Therefore, buyers can use trade debt as a substitute (Meltzer, 1960) and residual (Jaffee and Stiglitz, 1990) source compared to bank credit and, at times of monetary shortage, the size of the firm may be irrelevant (Nielsen, 2002).

Theories supporting the complementary use of trade and financial debt stem from the competitive advantage based on the combined supply of finance and goods that allows firms to improve the operative efficiency of the counterparties taking part in the transaction (Mian and Smith, 1992), compared to alternative financial sources. First of all, suppliers benefit from a competitive advantage in the acquisition of information on a firm's creditworthiness (Berger and Udell, 1998), which is particularly relevant for evaluating young and opaque firms. Second, suppliers benefit from continuous exchanges during the trade relationship that allow them to track the buyer's creditworthiness based on updated information (McMillan and Woodruff, 1999). Third, if the debtor defaults, suppliers can easily recover the assets due to their knowledge of the supplied goods (Myers and Rajan, 1998), and they can extract value from the collateral assets in a way that is not always easy for other creditors (Longhofer and Santos, 2003); this advantage of trade credit suppliers over financial intermediaries is particularly relevant in common law countries (Frank and Maksimovic, 2004).

As trade credit is mainly intended for traders or intermediaries in the distribution channel, its dynamics can be more affected by the bargaining power of the counterparties involved in the inter-firm transaction than by the characteristics of the firm and the economic sector as predicted by traditional theories (Van Horen, 2005). On the supplier side, trade credit is extended when the exploitation of market power ensures effective price discrimination (Mian and Smith, 1992). On the demand side, market power can be exploited by large buyers toward suppliers that extend trade credit even if it causes a financial disadvantage (Wilson and Summers, 2002). Empirical evidence shows that large buyers exploit their market power, particularly in trade relationships with small suppliers (Summer and Wilson, 2003) and in developing countries (Van Horen, 2007), where the use of trade credit is strongly connected with reputation (Fisman and Love, 2003) and is considered an indicator of market competitiveness (Hydman and Serio, forthcoming). However, the empirical evidence for transactions involving larger firms does not support this hypothesis (Banarajee et al., 2004).

Firms tend to supply and accept trade credit at the same time, and the choices to offer and accept trade credit may be influenced by each other (Kiyotaki and Moore, 1997). Empirical evidence from developed countries shows that firms suffering from excessive customer market power balance the supply of trade credit with trade debt by adopting a matching strategy of the net trade credit position at the levels both of volumes and of terms (Fabbri and Klapper, 2008). In addition, small firms in developed countries do not adjust their trade credit supply, while large firms are found to adapt trade credit and debt to smooth their financial cycle (Marotta, 2005), particularly during times of monetary tightness (Brechling and Lipsey, 1963), when trade credit defaults of small and constrained firms rise as they run up against large firms acting as final providers of liquidity (Boissay and Gropp, 2007).

DATA AND METHODOLOGY

Sample

The sample consists of all accounting information available for Italian firms on the AIDA-Bureau Van Dijk database for the time period of 1999-2008. The choice of accounting data for the Italian market constrains the choice of frequency because half-year reports are unavailable for most of the firms (Table 1).

Table 1: Sample characteristics

Geographical Area	N° Firms
North	8878
Center	1853
South and Islands	857
Not Classified	264
Overall	11561

Sector	N° Firms
Agriculture	1995
Construction	238
Consultant	1703
Energy	199
Entertainment	203
Finance and Insurance	377
Media	577
Instruction	59
Manufacturing	2446
Mining	0
Tourism	103
Transportation	2935
Utilities	241
Wholesale	512
Not Classified	237

Year	Firms
1999	7695
2000	8136
2001	8594
2002	9068
2003	9448
2004	10198
2005	10617
2006	11115
2007	11716
2008	11731

N° Years available	Firms
Only 1 year	0
2 years	658
3 years	495
4 years	452
5 years	739
6 years	433
7 years	495
8 years	502
9 years	565
10 years	7485

Source: AIDA-Bureau Van Dijk data, processed by the authors

The database encompasses 11,824 firms and, based on the standard Italian ATECO 2007 (For further details on the ATECO 2007 classification, see the site of the Italian Institute of Statistics (ISTAT) at the following address: www.istat.it) classification, it is also well diversified in terms of geographical area Firms in northern Italy and firms in the manufacturing and mining sectors predominate in the sample. The sample is coherent with the Italian market, in which more firms are located in the north because of the high efficiency of service and infrastructure available there, and is predominantly specialised in the manufacturing or transport sectors.

Some firms do not have data for all the years considered, so the sample size varies over time on the basis of data availability, but for each year there are not fewer than 7600 firms (year 1999), and the number of firms considered is growing over time. More than 63.30% of the firms included in the sample remain in the sample for the entire time period considered, and none of them have data available for only one year. The core sample is thus not variable over time, and the results are not significantly affected by the survivorship bias.

On the basis of the literature available, the analysis of trade credit policy considers both the amount and duration of trade credit offered and obtained by each firm and look at some features of the firm, sector and market that could affect firm choices. The explanatory variables, classified by type, are summarised in Table 2.

Summary statistics of data available for the overall time period (1999-2008) are summarized in the following table. The entire sample is used to construct some benchmark variables (like Sector trade credit

/debt amount / duration and Ratio sales / sector) used in the analysis while, because of the lack of some firm-specific data, more than 60% of the firms previously identified could not be considered for the analysis of trade credit/debt firms' choices.

Table 2 : Explanatory Variables for Trade Credit Identified in the Literature

Name	Description	Type of Variable	Main References
Firm age	N° years from the firm's year of birth and the evaluation date	Firm	Petersen and Rajan (1997), Pike and Cheng (1998), Ng et al. (1999), Paul and Wilson (2006), Wilson and Summers (2002), Fabbri and Klapper (2008), Van Horen (2005)
Geographical Area	Dummy variable for North, Center and South and Islands	Firm	Marotta (2005); Petersen and Rajan (1997)
Listed	Dummy variable with value 1 for listed companies	Firm	Petersen and Rajan (1997)
Total Assets	Total assets at time t	Firm	Long et al. (1993), Petersen and Rajan (1997), Wilson and Summers (2002), Peek et al. (1998), Van Horen (2005)
Employees	No. of Employees	Firm	Giannetti et al. (forthcoming); Fabbri and Klapper (2008)
BT debt	Short term $debt_t$	Firm	Long et al. (1993)
MLT debt	Bank $debt_t$ / Total $Asset_t$	Firm	Russo and Leva (2005)
Fixed assets	Fixed Assets/Assets	Firm	Giannetti et al. (forthcoming)
Revenues growth	Mean revenue growth $rate_{t,t-1}$	Firm	Wilson and Summers (2002)
Trade credit growth	Yearly growth rate of trade $credit_t$	Firm	Petersen and Rajan (1997)
Inventory coverage	N° days for which inventory available at time t ensure production cycle	Firm	Russo and Leva (2005)
Debt interest rate	Mean interest rate for bank $lending_t$	Firm	Marotta (2005); Russo and Leva (2005)
Profit margin	Operating $margin_t$ / $Sales_t$	Firm	Wilson and Summers (2002), Petersen and Rajan (1997)
Output inventory	Output $inventory_t$ / $Inventory_t$	Firm	Petersen and Rajan (1997)
Cash Flow / Sales	Cash $flow_{t-1}$ / $Sales_t$	Firm	Ng et al. (1999), Wilson and Summers (2002)
Cash sales	($Sales_t$ –Trade $credit_t$)/Total $Assets_t$	Firm	Long et al. (1993)
Current asset ratio	Current $Assets_t$ / Total $Assets_t$	Firm	Petersen and Rajan (1997)
Solvency	$Rating_t$	Firm	Long et al. (1993)
Sector trade credit amount	Mean amount of sector trade credits	Sector	Petersen and Rajan (1997), Long et al. (1993), Giannetti et al. (forthcoming), Marotta (2005)
Sector trade debt amount	Mean amount of sector trade debts	Sector	Petersen and Rajan (1997), Long et al. (1993), Giannetti et al. (forthcoming), Marotta (2005)
Sector trade credit amount	Mean duration of sector trade credits	Sector	Petersen and Rajan (1997), Long et al. (1993), Giannetti et al. (forthcoming), Marotta (2005)
Sector trade debt amount	Mean duration of sector trade debts	Sector	Petersen and Rajan (1997), Long et al. (1993), Giannetti et al. (forthcoming), Marotta (2005)
Inventory turnover	N° day for inventory $turnover_t$	Sector	Russo and Leva (2005)
Brand equity	Fixed assets at time t / $Sales_t$	Market	Van Horen (2007), Bhattacharya (2008)
Brand equity net	(Fixed assets at time t - Goodwill) / $Sales_t$	Market	Van Horen (2007), Bhattacharya (2008)
Ratio sales/sector	$Revenues_t$ / Sector Total $Revenue_t$	Market	Fabbri and Klapper (2008), Van Horen (2007)

Source: Authors' elaboration

Table 3: Summary Statistics of Variables

Name of the Variable	N° Observations	Mean	Dev.st	Max	Min
Trade debt amount	80,863.00	17,397,022.53	29,441,267.17	1,000,352,833.00	0.00
Trade credit amount	80,467.00	21,292,260.31	31,994,500.49	978,061,049.00	0.00
Trade debt duration	86,732.00	103.56	87.79	1,997.99	0.01
Trade credit duration	73,079.00	147.63	96.52	554.52	0.02
Firm age	111,833.00	25.33	23.43	108.00	0.00
Geographical Area	118,250.00	-	-	-	-
Listed	115,610.00	-	-	-	-
Total Assets	99,052.00	72,859,273.54	147,552,637.58	1,993,714,059.00	2.00
Employees	99,608.00	6,397.19	1,974,252.10	651,588,038.00	0.00
BT debt	96,914.00	38,044,966.85	78,938,375.90	1,935,834,679.00	0.00
MLT debt	64,189.00	15,420,034.25	53,309,835.15	1,460,317,212.00	0.00
Fixed assets	72,347.00	4,021,737.81	20,416,476.04	1,014,121,997.00	0.00
Revenues growth	74,085.00	0.05	0.26	1.00	-1.00
Trade credit growth	81,087.00	0.05	0.31	1.00	-1.00
Inventory coverage	75,576.00	105.97	95.18	499.92	0.01
Debt interest rate	95,895.00	0.03	0.24	1.00	0
Profit margin	98,325.00	72,560,399.88	120,067,462.95	2,161,859,658.00	-456,825,139.00
Inventory / Revenues	65,595.00	0.12	0.37	10.00	0.00
Output inventory	65,724.00	7,274,246.48	17,446,279.36	1,526,260,995.00	0.00
Output inventory/Inventory	65,724.00	0.63	0.35	1.00	0.00
Cash Flow / Sales	98,263.00	1.87	430.07	10.00	-10.00
Cash sales	98,577.00	1.32	2.61	298.60	-2.24
Current asset ratio	72,347.00	0.04	0.07	1.00	0.00
Solvency*	67,512.00	25.18	19.06	100.00	-47.64
Sector trade credit amount	115,880.00	20,697,019.53	6,896,593.61	52,238,387.57	5,060,496.86
Sector trade debt amount	115,880.00	16,961,915.69	5,491,377.99	37,216,673.82	3,627,188.14
Sector trade credit duration	115,880.00	103.99	18.45	161.94	52.02
Sector trade debt duration	115,880.00	157.45	46.84	379.55	92.79
Inventory turnover	79,195.00	57.72	59.49	499.86	0.01
Brand equity	82,378.00	-0.11	97.89	6,945.00	0.00
Brand equity net	82,378.00	0.05	3.88	1,072.58	0.00
Ratio sales/sector	98,325.00	0.00	0.00	0.01	0.00

** Solvency is a rating assigned by AIDA Bureau VanDijk that could vary from -100 to 100. For further details about computation methodology see AIDA-Bureau Van DijK website*
Source: AIDA-Bureau Van Dijk data, processed by the authors

Methodology

The analysis of determinants of trade credit policy considers the demand, the supply and the net exposure. For each feature, the approach considers both the duration and the amount of the trade credit/debt. The formulas can be summarised as follows:

$$Trade\,Credit\,Amount_t = \alpha_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it} \quad (1)$$

$$Trade\ \ Debt\ Amount_t = \alpha_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it} \quad (2)$$

$$Trade\,Credit\,Duration_t = \alpha_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it} \quad (3)$$

$$Trade\,Credit\,Duration_t = \alpha_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it}\,, \quad (4)$$

where the variable representing the time/amount of trade credit/debt is regressed on some features of the firm (X_{it}), the sector (Y_{it}) and the market (Z_{kt}) that have been identified in the literature as possible explanatory variables or indices.

The huge number of regressors identified in the literature makes it necessary to define selection criteria for reducing the number of estimators. The approach selected is the stepwise forward approach, with the cut-off for including a variable fixed at 0.01%. In the analysis no assumption are done on the order of the

variables to be included and all possible models combination are tested in order to define the model that fit the best.

The fitness of a model based on amount and term conditions is not strictly comparable for the higher variance that characterises the first type of models compared to the others. To test the impact of the choice of net measures with respect to gross ones, we compare the fitness statistics for each model.
Following Fabbri and Klapper (2008), the analysis of net exposure is performed with the same model proposed for the gross estimates, including as explanatory variables for the amount or duration of trade credit (debt) the amount or duration of the trade debt (credit), as in the following formulas:

$$Trade\,Credit\ Amount_t = \alpha_t + \tau_t Trade\ \ Debt\ Amount_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it} \quad (1a)$$

$$Trade\ \ Debt\ Amount_t = \alpha_t + \tau_t Trade\,Credit\ Amount_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it} \quad (2a)$$

$$Trade\,Credit\ Duration_t = \alpha_t + \tau_t Trade\,Debt\ Duration_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it} \quad (3a)$$

$$Trade\,Credit\ Duration_t = \alpha_t + \tau_t Trade\,Debt\ Duration_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it}, \quad (4a)$$

If the new variables included improve the fitness of the model and are statistically representative, the trade credit and debt decisions may be considered to be strictly interrelated. The next step of the analysis is to study the main differences between gross and net models to evaluate whether the second approach displays any distinctive features compared to the standard gross approach.

RESULTS

Models of Trade Credit/Debt Amount

On the basis of the previously explained methodology, we present an analysis of the dynamics of trade credit amounts, considering the characteristics of the firm, the sector and the market in which the credit is offered or received. The results of the models based on gross and net exposure are presented separately for trade credit (Table 4) and trade debt (Table 5).

The comparison between gross and net models shows that the choice to consider the net exposure significantly increases the fitness of the model (normally doubled) and thus demonstrates that choices about credit and debt are closely related (Fabbri and Klapper, 2008). The variables that are relevant and persistent in explaining the amount of trade credit/debt do not change when passing from the gross to the net position, although the intensity of the relationship changes. As concerns the variables, regarding the firm's characteristics, the geographical area appears poor relevant, with the exception of the South and the Island for which available data show that they traditionally use intensively trade debt (Cannari et al., 2005).

Table 4: Cross Sectional Regression of Trade Credit Amount

	1999		2000		2001		2002		2003	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade debt amount	-	0.54***	-	0.16***	-	0.47***	-	0.18***	-	0.25***
Firm age	0.13***	0.05***	0.16***	0.06***	0.11***	-	0.08***	-	0.10***	0.02
Nord	-	-	-	-	-	-	-	-	4.18***	2.31**
Center	-	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-	-	-	-	-	-	-	-
Listed	15.20***	-	9.98***	-	16***	-	18.80***	5.91***	16.90***	6.58***
Total Assets	-	0.10***	-	0.23***	-	0.15***	-	0.16***	-	0.15***
Employees	-	-	-	-	-	-	-	-	-	-
Short term	36.80***	-	46.50***	-	63.90***	-	45.90***	-	28.20***	5.42*
MLT debt	0.36***	-0.12***	0.57***	-0.22***	0.86***	-0.02	0.62***	-0.02	0.38***	0.00
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	-	-	-	-	-	-
Δ Trade credit	-	-	-	-	-	-	0.09***	0.02***	-	-
Inventory	-	-	-	-	-	-	-	-	-	-
[illegible]										
Debt interest rate	-	0.41**	-	-	-	-	0.54**	-	-2.64***	0.40**
Profit Margin	-	-	-	-	-	-	-	-	-	-
Inventory /	-	-	-	102,00***	-	-	-	-	-	-
Output inventory	-	-	-	-	-	-	-	-	-	-
Output	-	-	-	-	-	-	-	-	-	-
Cash flows / Sales	-	-	-	-70.10***	-	-	-	-	-	-
(Revenues – trade	-	-	-	-	-	-	-	-	-	-
Net	7.60**	16.10***	8.27**	12.00***	-	8.31***	17.00***	28.00***	8.37***	21.9***
Solvency	-	-	0.11**	-	-	-	-	-	-	-
Sector trade credit	0.89***	0.57***	-	-	0.64***	-	0.57***	0.33***	0.63***	0.28***
Inventory turnover	-	-	-	-	-	-	-	-	-	-
Brand equity	-	-	-	-	-	-	-79.40***	-44.10***	-10.2***	-11.10***
Brand equity net	-	-	40.00***	35.60***	-	-	80.20***	26.00***	-	-
Ratio sales /	3.63***	1.12**	1.04**	-	2.82***	-1.52***	-	-	4.45***	-0.54**
Constant	-30.90***	-8.47***	-24.80***	10.30***	-52.10***	1.53	-36.20***	-5.10*	-9.06*	-7.28**
Adj R-squared	0.23	0.66	0.40	0.78	0.42	0.78	0.41	0.72	0.31	0.70
Number of obs	2264	2263	2091	2090	2263	2256	2432	2421	2653	2640

	2004		2005		2006		2007		2008	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade debt amount	-	0.66***	-	0.77***	-	0.72***	-	0.69***	-	0.69***
Firm age	0.09***	-	0.06**	-	0.09***	-	0.07***	-	-	-
Nord	-	-	-	-	-	-	-	-	-	-
Center	-	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-	-	-	-	-	-	-	-
Listed	12.00***	8.48***	10.50***	-	-	-	-	-	-	-
Total Assets	-	-	-	-	-	-	-	-	-	-
Employees	-	-	-	-	-	-	0.99***	-	0.70**	-
Short term	35.50***	-	43.10***	-	46.40***	-	38.40***	-	39.80***	10.80***
MLT debt	0.34***	0.09***	0.42***	0.08***	0.50***	0.14***	0.32***	0.05***	0.27***	0.08***
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	-	-	-	-	-	-
Δ Trade credit	-	-	-	-	-	-	-	-	-	-
Inventory	-	-	-	0.02**	-	0.04***	-	0.03***	-	-
Debt interest rate	-	-	-	-	-	0.71***	-	0.65***	-	0.66***
Profit Margin	-	-	-	-	-	-	-	-	-	-
Inventory /	-	-	-	-	-	-	-	-	-	-
Output inventory	-	-	-	-	-	-15.20**	-25.00***	-20.90***	-	-18.30***
Output	-	-	-	-	-	-	-	-	-	-
Cash flows / Sales	-	-	-	-	-14.10**	-	-	-	-	-
(Revenues – trade	-	-	-	-	-	-	-	-	-	-
Net	17.10***	25.20***	22.30***	30.50***	26.80***	32.50***	32.90***	34.90***	8.67***	12.90***
Solvency	-	0.13***	-	0.15***	0.14***	0.20***	0.13***	0.21***	-	0.14***
Sector trade credit	0.50***	0.39***	0.43**	-	0.55***	-	0.37***	0.32***	0.31**	0.36***
Inventory turnover	-	-	-	-	-	-	-	-	-	-
Brand equity	-19.40***	-	-35.80***	-	-	-	-	-	-	-
Brand equity net	19.60**	-	31.00***	-	-13.20**	-	-	-	-11.40**	-
Ratio sales /	2.43***	-	3.59***	-	5.12***	-	5.55***	-	4.85***	-
Constant	-18.00***	-3.93	-21.90***	2.17	-39.50***	-4.22*	-31.40***	-13.40***	-12.70**	-9.63**
Adj R-squared	0.25	0.50	0.27	0.54	0.30	0.55	0.26	0.49	0.23	0.46
Number of obs	2763	2745	3183	3178	3299	3296	3540	3531	3482	3479

This table shows the cross section estimates for each year of the following equations: $Trade\ Credit\ Amount_t = \alpha_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it}$ *and* $Trade\ Credit\ Amount_t = \alpha_t + \tau_t Trade\ \ Debt\ Amount_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it}$ *where* X_t *are firm specific features,* Y_t *are sector mean characteristics and* Z_t *are market power proxies.* ***, ** *and* * *indicate significance at 1,5,10 percent levels respectively.*
Source: AIDA-Bureau Van Dijk data, processed by the authors

Table 5: Cross Sectional Regression of Trade Debt Amount

	1999		2000		2001		2002		2003	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade credit amount	-	0.32***	-	0.14***	-	0.29***	-	0.68***	-	0.46***
Firm age	0.08**	-	0.08***	-	0.09***	-	0.07**	-	0.12***	-
Nord	-	-	-	-	-	-	-	-	-	-
Center	-	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-	3.93**	-	-	-	-	-	-
Listed	11.10***	-	11.50***	-	10.20***	-	10.60***	-	-	-
Total Assets	-	0.13***	-	0.18***	-	0.14***	-	-	-	0.19***
Employees	-	-	-	-	-	-	-	-	-	-
Short term debt/Debt	38.00***	0.67	40.20***	-	51.80***	-	51.10***	16.9***	-	-48.80***
MLT debt	0.36***	-0.15***	0.44***	-0.22***	0.61***	-0.22***	0.47***	-	-	-0.76***
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	-	-	-	-	-	-
Δ Trade credit	-	-	-	-	-	-	0.06***	-	-	-
Inventory coverage	-	-	-	-	-	-	-	-	0.05**	-
Debt interest rate	-	-	-	-0.42**	-	-0.31**	-	-0.636***	-7.56***	-4.85***
Profit Margin	-	-	-	-	-	-	-	-	-	-
Inventory / Revenues	-	-	-94.50***	-38.60***	-	-	-	-	-	-
Output inventory	-	-	-	-	-	-	-	-	135.00***	63.20***
Output	-	-	-	-	-	-	-	-	-28.00***	-14.40***
Cash flows / Sales	-	-12.20**	32.60*	-	-	-	-	-	-	-
(Revenues – trade	-	0.97**	-	-	-	-	-	3.14***	-	6.74***
Net inventory/Assets	-	-	-	-	-	-1.773053	-11.20***	-23.00***	-23.90***	-18.10***
Solvency	-	-	-	-	-	-	-	-	-	-
Sector trade debt	-	-	0.64***	0.31**	0.63***	-	-	-	-	0.40**
Inventory turnover	-	-	-	-	-	-	0.05***	0.13***	-	-
Brand equity	-	-	66.60***	-	-	-	-58.70***	-	-	-
Brand equity net	-	-	-36.90**	-34.70***	-	-	84.50***	-	-	-
Ratio sales / Sector	2.96***	-	1.34***	-	4.25***	1.17***	4.51***	2.28***	7.07***	0.87**
Constant	-20.10***	9.76***	-30.10***	5.48***	-43.60***	10.10***	-25.70***	-1.299648	70.70***	65.60***
Adj R-squared	0.22	0.73	0.33	0.70	0.39	0.79	0.29	0.56	0.47	0.76
Number of obs	2268	2263	2092	2090	2273	2256	2432	2421	2648	2640

	2004		2005		2006		2007		2008	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade credit amount	-	0.14***	-	0.51***	-	0.23***	-	0.45***	-	0.43***
Firm age	0.08***	-	-	-	0.06***	-	0.06**	-	-	-
Nord	-	-	-	-	-	-	-	-	-	-
Center	-	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-	-	-	4.01***	-	3.54**	-	3.31**
Listed	-	-	-	-	-	-	-	-	-	-
Total Assets	-	0.17***	-	-	-	0.14***	-	-	-	-
Employees	-	-	-	-	-	-	0.90***	0.54***	0.79***	0.60***
Short term debt/Debt	44.00***	5.75*	54.00***	30.90***	57.40***	11.10***	56.70***	41.00***	44.90***	26.30***
MLT debt	0.33***	-0.15***	0.44***	0.20***	0.49***	-0.09***	0.38***	0.24***	0.28***	0.17***
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	-	-	-	-	-	0.01***
Δ Trade credit	-	-	-	-	-	-	-	-	-	-
Inventory coverage	-	-	-	-	-	-	-	-	-	-
Debt interest rate	-	-	-	-	-0.59**	-0.969***	-0.56**	-0.671***	-	-0.785***
Profit Margin	-	-	-	-	-	-	-	-	-	-
Inventory / Revenues	-	-	-	-	-29.20***	-22.00***	-	-	-	-
Output inventory	-	-	-	6.06	-	0.90	-	8.76*	-	5.76
Output	-	-	-	-	-	-	-	-	-	-
Cash flows / Sales	-	-	-	-	-	-	-	-	-	-
(Revenues – trade	-	1.68***	-	2.45	-	0.98**	-	-	-	0.95**
Net inventory/Assets	-	-	-	-19.8***	-	-	-	-18.50***	-	-
Solvency	-	-	-	-	-	-	-	-	-	-
Sector trade debt	-	-	-	0.34**	-	-	-	-	-	-
Inventory turnover	-	-	-	0.10***	0.07***	0.09***	-	0.09***	-	0.08***
Brand equity	-	-23.50***	-39.30***	-	-	-	-	-	-	-
Brand equity net	-	16.00***	38.70***	-	-	-	-	-	-	-
Ratio sales / Sector	3.95***	1.69***	4.84***	3.01***	8.20***	4.06***	7.58***	5.03***	5.74***	3.82***
Constant	-10.70**	8.51***	-17.40***	-16.80***	-29.80***	3.70	-24.60***	-13.30***	-8.12**	-6.30**
Adj R-squared	0.29	0.64	0.33	0.58	0.37	0.67	0.38	0.57	0.30	0.51
Number of obs	2756	2745	3189	3178	3308	3296	3536	3531	3484	3479

This table shows the cross section estimates for each year of the following equations:

$$Trade\ Debt\ Amount_t = \alpha_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it} \quad \text{and} \quad Trade\ Debt\ Amount = \alpha_t + \tau_t Trade\ Debt\ Amount + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it}$$

*where X_t are firm specific features, Y_t are sector mean characteristics and Z_t are market power proxies. ***, ** and * indicate significance at 1,5,10 percent levels respectively.Source: AIDA-Bureau Van Dijk data, processed by the authors*

Contrary to previous studies (see Long et al. (1993) for all of them), variables standing for the firm's creditworthiness and reputation are not significant, like "Age", "Listed" or "Fixed Assets", are rare significant for trade debt, both for the gross and the net position, while for trade credit the significance is higher even though the persistence appears limited. As it concerns bank credit access variables, Medium/long-term debt is found to have a positive effect on the gross amount of trade credit but a negative effect on the net trade credit position: this evidence suggests that trade credit is financed through trade debt and that its growth requires an adjustment of liabilities; as trade debt net position is negatively affected by medium/long debt, results do not confirm the financial motivations of trade debt (Russo and Leva, 2005). While the average cost of funds is predominantly not significant, the incidence of short term bank debt affects positively the offer of gross trade credit and, more persistently, trade debt both for the gross and net position: evidences exclude the substitution relationship between trade debt and bank credit as predicted in previous literature (Meltzer, 1960).

The timeframe required to obtain the goods does not affect both trade credit and debt, while the goods inventories turnover affects negatively trade credit and positively trade debt (Russo and Leva, 2005), both for the gross and net position: the evidence suggests that firms do not adapt passively trade credit to address marketing motivations. Consistently, cash holdings are negatively affected by trade credit both at gross and net positions, and, although less persistently, they are positively associated with trade debt only when the net position is taken into consideration. Economic sector variables are found to be significant with good persistence for the trade credit amount (Giannetti et al., forthcoming), although when passing to the net position, the intensity of the relationship decreases; on the trade debt side, sector variables show poor persistence.

Market power variables are significant only when the relative dimension of the firm is considered relative to the sector dimension (Summers and Wilson, 2003): as concerns the gross trade credit, the variable is positively and persistently related, while its influence is lower when considering the net position. Turning to the trade debt side, the variable is positive and persistent, even though the influence is weaker when passing to the net position.

Model of Trade Credit/Debt Duration

The analyses of trade credit and debt duration are presented separately (see, respectively, Tables 6 and 7). For both aspects, the analysis presented considers both the gross and net approaches, stressing the main differences in the fitness of the model and in the roles of different explanatory variables.

The results show, as hypothesised by Kiyotaki and Moore (1997), the existence of a positive and persistent relationship between trade credit days and trade debt days: in general, the relationship is stronger for the duration analysis than for the amount analysis. The characteristics of the explained variables make it necessary to use more explanatory variables than were used for predicting the amount of credit/debt, and the fitness of the model is significantly lower.

As concerns the firm characteristics, variables regarding the firm's dimension, reputation and creditworthiness are not significant to explain both trade credit and debt duration both for the gross and net position: the evidence suggests that credit/debit terms are poorly obtained as negotiation between the counterparties as confirmed by the absence of relevance of market power variables.

Table 6: Cross Sectional Regression of Trade Credit Duration

	1999		2000		2001		2002		2003	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade debt duration	-	0.12***	-	0.07***	-	0.16***	-	0.09***	-	0.09***
Firm age	-	-	-	-	-	-	-	-	-	-
Nord	-	-	-	-	-	-	-	-	-	-
Center	-	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-	-	-	-	-	-	-	-
Listed	-	-	-	-	-	-	-	-	-	-
Total Assets	-	-	-	-	-	-	-	-	-	-
Employees	-	0.00**	0.00**	0.00**	0.00**	0.00**	0.00***	0.00**	0.00***	0.00***
Short term debt/Debt	0.29***	0.17**	0.24**	0.23***	-	-	-	-	-	-
MLT debt	-	-	-	-	-	-	-	-	0.00***	0.00***
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	0.03***	0.00***	-	-	-	-
Δ Trade credit	-	-	-	-	-	-	-	-	-	-
Inventory coverage (days)	0.00**	-	0.00***	-	0.00***	-	-	-	0.00***	-
Debt interest rate	-	-	-	-	-	-	-	-	-	-0.79**
Profit Margin	-	-	-	-	-	-	-	-	-	-
Inventory / Revenues	-	-	-	-	-	-	-	-	-	-
Output inventory	-	-	-	-	-	-	-	-	-	-
Output inventory/Inventory	0.15***	0.16***	0.22***	0.19***	-0.0714	-	0.13***	0.18***	0.09**	-
Cash flows / Sales	-	-	-	-	-	-0.42**	-	-	-	-
(Revenues – trade credit) /	-	-	-	-	-	-	-	-	-	-
Net inventory/Assets	0.68***	0.64***	0.57***	0.54***	0.27***	0.28***	0.85***	0.85***	0.59***	0.61***
Solvency	-	-	-	-	-	-	-	-	-	-
Sector trade debt	-	0.00**	-	-	0.00**	0.00***	-	-	-	-
Inventory turnover (days)	-	-	-	-	-	-	-	-	-	-
Brand equità	-	-	-	-	-	-	-	-	-	-
Brand equity net	-	-	-	-	-	-	0.17**	-	-	-
Ratio sales / Sector	-	-	-	-	-	-	-	-	-	-
Constant	76.46***	58.81***	102.21**	95.76***	96.79***	58.16***	95.97***	77.71***	123.17***	100.97***
Adj R-squared	0.38	0.45	0.39	0.46	0.24	0.30	0.42	0.47	0.45	0.46
Number of obs	2266	2189	2091	2030	2269	2190	2435	2343	2654	2541

	2004		2005		2006		2007		2008	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade debt duration	-	0.10***	-	0.09***	-	0.13***	-	0.20***	-	0.13***
Firm age	-	-	-	-	-	-	-	-	-	-
Nord	-	-	-	-	-	-	-	-	-	-
Center	-	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-0.07**	-0.07**	-0.07**	-0.07**	-	-	-	-
Listed	-	-	-	-	-	-	-	-	-	-
Total Assets	-	-	-	-	-	-	-	-	-	-
Employees	0.00***	0.00***	0.00***	0.00**	0.00***	0.00**	0.00***	0.00***	0.00***	0.00***
Short term debt/Debt	-	-	-	-	0.14**	-	-	-0.16***	0.32***	-
MLT debt	0.00**	0.00**	0.00***	-	-	-	-	-	-	-
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	-	-	-	-	-0.00**	-
Δ Trade credit	-	-	-	-	-	-	-	-	-	-
Inventory coverage (days)	0.00***	-	0.00***	-	0.00**	-	0.00***	-0.00***	0.00***	-
Debt interest rate	-1.00**	-	-	-	-	-	-1.26***	-	-	-
Profit Margin	-	-	-	-	-	-	0.44**	0.60***	-	-
Inventory / Revenues	-	-	-	-	-0.52***	-	-	-	-	-
Output inventory	-1.65***	-1.32***	-1.05***	-1.34***	-0.67***	-1.05***	-1.25***	-1.55***	-1.06***	-1.11***
Output inventory/Inventory	0.28***	0.24***	0.15***	0.23***	-	0.13***	0.13***	0.23***	0.10**	0.13***
Cash flows / Sales	-	-	-	-	-	-	-	-	-	-
(Revenues – trade credit) /	-0.45***	-0.41***	-0.46***	-0.43***	-0.33***	-0.30***	-0.28***	-0.23***	-0.27***	-0.23***
Net inventory/Assets	0.79***	0.78***	0.86***	0.88***	0.93***	0.87***	1.01***	1.01***	0.30***	0.78***
Solvency	-0.00***	-	-0.00***	-	-	-	-	0.01***	-0.00***	-
Sector trade debt	0.00***	-	-	-	0.00***	0.00**	0.00***	0.00***	0.00***	0.00***
Inventory turnover (days)	-	-	-0.00***	-	-0.00***	-	-0.00**	0.01***	-0.00***	-
Brand equità	-	-0.48***	-	-0.17**	-	-	0.39***	-	-	-
Brand equity net	0.21**	0.77***	-	-	-	1.40***	-	-	-	-
Ratio sales / Sector	-	-	-	-	-	-	-	-	-0.00***	-
Constant	81.67***	78.38***	103.91***	76.31***	55.22***	46.39***	-3.96	-43.83**	59.14***	35.95***
Adj R-squared	0.41	0.49	0.47	0.49	0.44	0.46	0.35	0.42	0.32	0.39
Number of obs	2766	2650	3188	3046	3324	3193	3571	3422	3506	3361

This table shows the cross section estimates for each year of the following equations:

$$Trade\ Credit\ Duration_t = \alpha_t + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it}$$

and

$$Trade\ Credit\ Duration_t = \alpha_t + \tau_t Trade\ \ Debt\ Duration + \sum_{i=1}^{n} \beta_{it} X_{it} + \sum_{j=1}^{n} \gamma_{jt} Y_{jt} + \sum_{k=1}^{o} \delta_{kt} Z_{kt} + \varepsilon_{it}$$

where

X_t are firm specific features, Y_t are sector mean characteristics and Z_t are market power proxies. ***, ** and * indicate significance at 1,5,10 percent levels respectively. *Source: AIDA-Bureau Van Dijk data, processed by the authors*

Table 7: Cross Sectional Regression of Trade Debt Duration

	1999		2000		2001		2002		2003	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade credit duration	-	0.28***	-	0.15***	-	0.26***	-	0.21***	-	0.19***
Firm age	-	-	-	-	-	-	-	-	-	-
Nord	-	-	-	-	-	-	-	-	-	-
Center	0.12**	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-	-	-	-	-	-	-	-
Listed	-	-	-	-	-	-	-	-	-	-
Total Assets	-	-	-	-	-	-	-	-	-	-
Employees	-	-	-	-	-	-	-	-	-	-
Short term debt/Debt	0.67***	0.58***	0.62***	0.62***	0.50***	0.47***	0.63***	0.69***	0.92***	0.91***
MLT debt	-	-	-	-	-	-	-	-	0.00***	0.00***
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	-	-	-	-	-	-
Δ Trade credit	-	-	-	-	-	-	-	-	-	-
Inventory coverage (days)	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
Debt interest rate	-	-	-	-	-3.30***	-3.06***	-	-	-	-2.37***
Profit Margin	-	-	-	-	-	-	-	-	-	-
Inventory / Revenues	-	-	-	-	-1.34**	-1.33**	-	-	-	-
Output inventory	0.96**	1.34***	2.34***	2.53***	1.90***	1.98***	1.01***	1.07***	1.24***	1.38***
Output inventory/Inventory	-	-	-	-	-0.62***	-0.59***	-	-	-	-0.46***
Cash flows / Sales	3.04***	3.06***	-	-	2.20***	2.20***	-	2.31***	0.96***	1.00***
(Revenues – trade credit) /	-	-	-	-	-0.14***	-0.09***	-	-	-	-0.26***
Net inventory/Assets	-0.151**	-	-	-	-0.16***	-0.22***	-	-	-	-0.26***
Solvency	-	-	-	-	-0.01***	-0.01***	-	-	-	-0.01***
Sector trade debt	-	-	-	-	-	-	-	-	-	-
Inventory turnover (days)	-	-	-	-	-0.01***	-0.02***	-	-	-	-0.01***
Brand equità	1.95***	1.73***	0.76***	0.73***	1.57***	1.50***	1.68***	1.53***	0.78***	0.73***
Brand equity net	-	-	-	-	-	-	-	-	-	-0.67***
Ratio sales / Sector	-	-	-	-	-	-	-	-	-	-
Constant	159.84***	145.30***	194.13***	181.69***	169.14*	142.43*	188.06***	147.14***	155.54***	132.97*
Adj R-squared	0.48	0.49	0.52	0.53	0.47	0.49	0.47	0.49	0.50	0.51
Number of obs	2192	2189	2032	2030	2201	2190	2349	2343	2548	2541
	2004		**2005**		**2006**		**2007**		**2008**	
	Gross	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**	**Gross**	**Net**
Trade credit duration	-	0.25***	-	0.19***	-	0.29***	-	0.39***	-	0.31***
Firm age	-	-	-	-	-	-	-	-	-	-
Nord	-	-	-	-	-	-	-	-	-	-
Center	-	-	-	-	-	-	-	-	-	-
South and Islands	-	-	-	-	-	-	-	-	-	-
Listed	-	-	-	-	-	-	-	-	0.56**	-
Total Assets	-	-	-	-	-	-	-	-	-	-
Employees	-	-	-	-	-	-	-	-	-	-
Short term debt/Debt	0.79***	0.75***	0.71***	0.70***	0.72***	0.70***	0.86***	0.85***	0.90***	0.74***
MLT debt	-	-	-	-	-	-	-	-	0.00***	-
Fixed Asset	-	-	-	-	-	-	-	-	-	-
Δ Sales	-	-	-	-	-	-	-	-	-	-
Δ Trade credit	-	-	-	-	-	-	-	-	-	-
Inventory coverage (days)	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
Debt interest rate	-3.60***	-3.42***	-3.50***	-3.43***	-5.23***	-4.88***	-4.35***	-4.15***	-3.92***	-3.95***
Profit Margin	0.03**	-	-	-	-	-	-	-	-	-
Inventory / Revenues	-1.07**	-	-1.06**	-1.07**	-1.47***	-	-2.86***	-2.23**	-2.20***	-2.00***
Output inventory	1.04***	1.40***	1.67***	1.90***	1.09***	1.30***	0.72***	1.26***	1.02***	1.34***
Output inventory/Inventory	-0.33***	-0.42***	-0.44***	-0.47***	-0.41***	-0.43***	-0.35***	-0.41***	-0.39***	-0.43***
Cash flows / Sales	1.41***	0.52**	1.57***	1.56***	1.92***	1.70***	3.59***	2.85***	2.71***	2.48***
(Revenues – trade credit) /	-0.35***	-0.25***	-0.349***	-0.26***	-0.25***	-0.15***	-0.20***	-0.10***	-0.19***	-0.12***
Net inventory/Assets	-0.21***	-0.42***	-0.378***	-0.54***	-0.25***	-0.50***	-0.30***	-0.67***	-0.27***	-0.51***
Solvency	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
Sector trade debt	0.00***	0.00***	-	-	0.00***	0.00***	0.00***	0.00***	0.00***	-
Inventory turnover (days)	-0.01***	-0.01***	-0.02***	-0.02***	-0.01***	-0.01***	-	-0.01***	-0.01***	-0.01***
Brand equità	0.28***	0.65***	-	-	1.19***	1.05***	0.72***	0.70***	-	0.10
Brand equity net	-	-1.10***	-	-	-1.34***	-2.54***	-0.67***	-0.64***	-	-
Ratio sales / Sector	-	-	-	-	0.00***	0.00***	-	-	-	0.00***
Constant	143.60***	130.96***	189.31***	172.75***	139.53*	116.44*	100.01***	82.09***	59.14***	126.16*
Adj R-squared	0.51	0.52	0.50	0.51	0.48	0.50	0.45	0.50	0.46	0.49
Number of obs	2658	2650	3053	3046	3199	3193	3423	3422	3363	3361

This table shows the cross section estimates for each year of the following equations:

$$Trade\ Debt\ Duration_t = \alpha_t + \sum_{i=1}^{n}\beta_{it}X_{it} + \sum_{j=1}^{n}\gamma_{jt}Y_{jt} + \sum_{k=1}^{o}\delta_{kt}Z_{kt} + \varepsilon_{it}$$

and

$$Trade\ Debt\ Duration_t = \alpha_t + \tau_t Trade\ \ Debt\ Duration + \sum_{i=1}^{n}\beta_{it}X_{it} + \sum_{j=1}^{n}\gamma_{jt}Y_{jt} + \sum_{k=1}^{o}\delta_{kt}Z_{kt} + \varepsilon_{it}$$

where

*X_t are firm specific features, Y_t are sector mean characteristics and Z_t are market power proxies. ***, ** and * indicate significance at 1,5,10 percent levels respectively.Source: AIDA-Bureau Van Dijk data, processed by the authors*

Trade credit duration is negatively affected by the goods inventories at both the gross and net levels. Cash holdings negatively affect trade credit days, although the intensity falls when passing to the net position. Inventories affect only the duration of trade debt: consistently, the inventory coverage days affect it directly for both the gross and net positions, while there is an inverse relationship between the inventory turnover days and the trade debt duration. This could be justified on the basis of a lack of confidence on the part of suppliers in firms with longer production cycles (Russo and Leva, 2005).

The impact of the cost financial debt is negative and significant on trade credit duration only for a few years, and moreover, the gross and the net positions do not matter; on the trade debt duration side, the variable is persistently significant, underlining the fact that the higher the cost of bank debt, the fewer the firm's trade debt days, both for the gross and net positions As concerns the availability of financial debt, evidence shows that this availability is significant for trade credit duration only for a few years, both for the gross and the net positions, and that trade debt duration is affected directly and persistently by the available external financial sources. The results obtained for the cost and amount of debt are consistent with the hypothesis that a higher interest rate applied by financial intermediaries signals an increase in the firm's risk level, which is also considered by suppliers in determining the duration of the credit offered (Marotta, 2005).

As expected, unsecured inventories positively affect trade credit duration with a similar intensity between gross and net values; opposite results are shown for the trade debt duration, both for the gross and net positions (Long et al., 1993). Final goods inventories affect only the trade debt duration directly and persistently, both for the gross and net positions; meanwhile, the fraction of final goods in the total inventories shows an inverse relationship with trade debt duration. The results are coherent with the thesis that suppliers are more interested in the inventory of inputs for final products/services because for these types of items, the marketability/usefulness of inventories is directly related to the firm's production/selling process (Petersen and Rajan, 1997). Unsecured inventories positively affect the duration of trade credit, with a similar level of intensity between gross and net values; opposite results are shown for the trade debt duration, both for the gross and net positions. The liquidity of the firm is persistently significant according to an inverse relationship with both trade credit and debt duration for both the net and the gross positions.

The solvency variable does not capture the implications of trade credit and debt, so it shows a negative relationship, particularly more persistently for the trade debt duration. Surprisingly, the sector is more relevant for the trade credit duration, both for the gross and the net positions, than for the trade debt duration: the unexpected evidence for the sector (Petersen and Rajan, 1997) can be attributed to the characteristics of the variables used, which do not consider only the trade credit/debt terms, but also the possible payment delays.

CONCLUSIONS

Trade credit literature points out some links between debt and credit choices but there is a lack of empirical analysis in order to test the relevance of the trade credit/debt explanatory variables on both gross and net models. The analysis proposed considers of the main world market (Italy) and collect a wide database with all variables considered in literature in order to study the trade credit and debt choices. The methodology adopted for the analysis is standard linear regression model constructed in order to explain the amount and duration for both trade credit and debt. The final model for each feature studied is defined using a stepwise forward procedure that allow to identify the model that fit the best on the data.
Results shows that trade credit and debt choices are closely related, and the strategy adopted by each firm cannot be explained by looking only at one side of its trade policy. Considering the amount of credit, the choice of gross or net exposure does not affect the type of explanatory variables used, but this choice significantly affects the fitness of the model: models of net trade credit/debt exposure demonstrate double

the statistical significance of their gross counterparts. Looking at the duration of the trade credit, the difference in the significance of models based on gross and net exposures is smaller, but the effects of this choice could significantly modify the types of explanatory variables that are the most relevant for each model.

The main policy implication concerns the approach that must be adopted in evaluating the trade credit/debt dynamics: normally, firms adopt a trade credit/debt structure that is coherent for the amount and for the duration, so it is important to pay attention to all events (i.e., the dilution risk) that could impair this close relationship. On the basis of the results obtained in this study, financial instruments constructed on trade receivables (i.e., factoring, asset-based lending) must not only consider the characteristics of the credit assigned, but also evaluate the overall credit/debt trade exposure of the seller. Further developments should define some controlling variables to test whether the results obtained here are more or less relevant for some types of firms (i.e., small and medium firms) (Berger and Udell, 2006) or for sectors characterised by a higher or lower level of dependence on customers or suppliers (Burkart and Ellingsten, 2004). A new analysis employing a smaller sample could be employed to consider some variables related to the relevance of each customer, which would allow us to evaluate whether the firm adopts different trade credit/debt policies on the basis of customer/supplier characteristics (Banjeree et al., 2004).

ENDNOTES

The article is a joint effort by the two authors and the single sections could be ascribed as follows: introduction, literature review and conclusions by Lucia Gibilaro and empirical analysis by Gianluca Mattarocci.

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THE DIFFERENT PROPORTION OF IC COMPONENTS AND FIRMS' MARKET PERFORMANCE: EVIDENCE FROM TAIWAN

William S. Chang, Ming Chuan University

ABSTRACT

The study adjusts Pulic's (2000) intellectual capital approach, "Value Added Intellectual Coefficient (VAIC™), to measure firms' value creation and market performance. The research here adds two new intellectual capital components, Research and Development (R&D) expenditure and intellectual property, into Pulic's approach. Data were collected from 2005-2007 annual reports of companies listed on the Taiwan Stock Exchange Corporation (TSEC) and Market Observation Post System (MOPS). The results support the hypothesis that firms' intellectual capital has a positive impact on market performance and its profitability in a modified VAIC method. The author finds that R&D expenditure and intellectual property (TCE) capture additional information about value creation. Furthermore, firms with a different intellectual capital contribution create a different market performance. Thus, in the knowledge-based economy, not only should the value of intellectual capital (IC) be considered, but also the allocation of IC. Finally, both information technology (IT)- and Non-IT corporations must value and manage their intellectual capital, particularly R&D and intellectual property, in order to create long-term competitiveness and create a higher market return.

JEL: G30

KEYWORDS: Intellectual capital, R&D expenditure, intellectual property, VAIC™

INTRODUCTION

The concept of Intellectual Capital (IC) helps executives to elucidate the intangible resources and knowledge assets of an organization. In existing IC research, a greater emphasis is placed on the antecedents of IC, and the causal relationship between IC and market performance. However, there is little research into why components of IC evolve relatively differently, and into the causal relationship between certain IC components and market performance during a certain period. The accumulation of IC is a dynamic and continuous process. Because, of resource limitations, firms are able to engage in the creation of intellectual capital given a certain time frame, different weights are often distributed to different subcomponents of IC. The question of how firms recognize the potential offered by intellectual capital over others, and the relationship between the organization's priorities and market performance are, therefore, pragmatic.

This paper adopts the IC perspective to survey the evolutionary dynamics of intellectual capital. A basic argument is that firms often cultivate IC in a similar and possibly sequential manner, which may be a consequence of organizational adaptation to the industrial environment over time, while heterogeneity in intellectual assets between firms may be the result of firms' actions in the environment. In terms of the generally accepted consensus on the content of IC, three interdependent IC components are examined in this study: human capital, structural capital and social capital. Because the sample in this study is mainly high technology firms, the study also considers the relative change in technological capital (Chang, 2007). A regression analysis is presented using the financial data of companies in Taiwan.

The remainder of the paper is organized as follows. First, the study briefly reviews existing literature relevant to the study, and then develops some testable hypotheses. Following is a discussion of the

empirical results and the implications of the research findings. The final section provides some concluding comments and a discussion of the limitations of this research.

LITERATURE REVIEW

When the success of a competitive strategy is dependent on the firm's invisible assets, the proper allocation of invisible assets is also largely determined by the content of the strategy (Itami, 1987). The issue of fit among organization, resources and environment is a dynamic process. The alignment between organizational system, structures, processes and changes in the environment significantly impact an organization's market performance in resource acquisition and performance. Whether such an adaptation is environmentally derived or out of managerial choice (see Hrebiniak & Joyce, 1985 for more discussion on organizational adaptation), the history of intellectual capital depicts the progress of an organization's market performance. Intellectual capital is an emerging topic of interest to firms, which derives an increasing financial performance from sharing information, knowledge and innovation. Considerable research and appropriate praxis have been developed to measure a company's intellectual capital, among which the following can be cited: Itami (1987), Coleman (1988), Burt (1992), Edvinsson & Malone (1997), Brooking (1996), Stewart (1997), Ross *et al.* (1997), Sveiby (1997), and Bounfour (2002), etc.

Human Capital, Structural Capital and Social Capital

Human capital (HC) refers to individual employee's knowledge, skills, abilities, and experience in an organization (Bontis, 1998; Bounfour, 2002; Brooking, 1996; Edvinsson & Malone, 1997; Ross *et al*., 1997; Stewart, 1997, Sullivan, 1998; Nelson & Winter, 1982). Furthermore, HC has been defined on an individual level (Hudson, 1993) as being a firm's combined individual capabilities for creating business value for the organization. HC is a source of innovation and strategic renewal, depending on how effectively an organization uses it. In an economic sense, the term focuses on the value of individual tacit knowledge possessed and produced by the members of the organization (Becker, 1992; Nelson & Winter, 1982). Undoubtedly, HC cannot be directly owned by the company (Edvinsson & Malone, 1997) and can be withdrawn from an organization or can be imitated by competitors when employees leave. Thus, an organization not only pays attention to its investment in human capability, but also embeds human activities in the process at the organizational level as structural capital.

Structural capital (SC) is the supportive infrastructure and information systems which enable individuals' know-how to be turned into group property. The concept of SC allows intellectual capital to be measured and developed in an organization. The SC of the organization is conceived as being a product process which contains elements of efficiency, transaction time, procedural innovativeness, and access to information for codification into knowledge. Therefore, SC is extremely important to organizations, as it is the only type of intellectual capital an organization actually owns (Bontis, 1998; Bounfour, 2002; Brooking, 1996; Edvinsson & Malone, 1997; Ross *et al*., 1997; Sillivan, 1998; Stewart, 1991; Winter, 1987, Youndt & Snell, 2004). SC also deals with the mechanisms and structures of the organization which can help and support its employees (i.e. HC) in their quest for optimum intellectual performance, and therefore, overall business performance. The reason for this is that, even though an individual has a high level of intelligence, if an organization has poor systems and procedures by which to track his or her actions, the overall intellectual capital will not reach its greatest potential (Winter, 1987). Thus, SC also refers to institutionalized knowledge and codified human knowledge/experience stored in systems, processes, databases, routines, patent, manuals, structures, and the like.

According to Edvinsson & Malone (1997), SC will enable a firm to develop relationships within internal networks, as well as those which are external to the firm. Not only is the process coordinated together with employees within the organization, but it also influences the nature of the relationships which are developed between the clients/customers and firms in the wider network. The following paragraph

reviews the concept of customer capital, which is otherwise referred to as social capital, external capital and relationship capital (Swart, 2006).

Social capital (SC) mainly comprises knowledge of marketing channels and customer relationships, and Bontis (1998) proposes that the value of relationships, including those of customers, suppliers, and competitors, plays a major role in firms' future opportunities for growth. Furthermore, SC alludes to issues like customers' trust, and the understanding and loyalty of the relationship between a firm and its customers. Hence, the purpose of building either individual or organizational capability is to create SC which will allow companies to enhance their financial capital on a sustainable basis (St. Onge, 1996, Wright, 2000). The essence of customer capital is the value, namely the contribution to current and future revenue, which results from an organization's relationship with its customers. Some studies address the relationship between customer satisfaction and financial performance, but very few of them actually provide empirical results. Some researchers find that there is a significantly positive relationship between customer satisfaction and financial performance (Ittner & Larker, 1998a; Banker *et al*., 2000), but others do not (Ittner and Larker, 1998b; Arthur Anderson&Co., 1994). Theorists quickly point out that the importance of social capital is that, since employees are free, there is a significant risk that organizations may incur a capital loss unless individual knowledge is transferred, shared, transformed, and institutionalized (Youndt and Snell, 2004). This highlights the need for investing, not only in structural capital (internal side) to efficiently enhance the organizational process, but also in social capital (external side) to protect the knowledge-based sources of advantage organizations, and sustain their potentially competitive advantage.

Research & Development (R&D) Expenditure and Intellectual Property

Investment in research and development (R&D) is one of the fundamental ways for organizations to create new knowledge and increase their performance. R&D investment increases the opportunities for organizational members to identify and apply technology and its associated options to their products and processes in order to increase firms' profitability. The more an organization invests in R&D, the more it supports its individual members to enhance their knowledge and expertise and thus, it builds human capital and increases its performance. R&D also establishes that most of the outcomes of research and development efforts become codified and institutionalized in patents, routines, processes, databases, and other organizational level repositories as organizational (or structural) capital (Hall, 1992). In order to make their knowledge difficult for competitors to imitate, organizations expend considerable efforts in combining stands of knowledge possessed by individuals and creating integrated knowledge which is embedded in their processes, routines, and products (Grant, 1991) which is called intellectual property.

In recent years, R&D expenditure and intellectual property have received more attention, because ideas and innovations related to the products or processes have become the most important resource, replacing land, energy, and raw materials. Particularly in terms of information technology and telecoms, the roles of R&D expenditure and intellectual property have changed rapidly. In R&D expenditure, Abernethy *et al*. (2003) examine several studies, and conclude that there is a significant positive rate of return on R&D expenditure in the corporate sector, and that corporate returns may be twice the rate of return on tangible investment. Chen *et al*. (2005) also advise that R&D expenditure has a positive effect on profitability, and that intellectual property has a positive effect on firms' value and financial performance. Intellectual property represents a proprietary technological advantage which may enable a firm to either actively enter a new market, or protect its processes in the current market situation before its competitors imitate it (Sullivan 1998), and increases the ability of the firm to obtain a return on its investment in R&D (Porter, 1980). Therefore, intellectual property is expected to be positively related to R&D investment (Hayton, 2005) and directly influence firms' financial performance.

METHODOLOGY AND HYPOTHESIS DEVELOPMENT

This study analyzes the financial data of companies on the Taiwan Stock Exchange between 2005 and 2007, and Table 1 outlines the sample selection procedure for the study. Having deleted off-market firms, missing data on the selected variables, and a net income of less than 0 in the current year, the final sample consists of a total of 1773 firm-year observations, including 854 IT companies and 918 non-IT companies. Missing data generally occurs in the value of the selected intellectual capital variables.

Table 1: Sample Selection and Sample Firms' Profile – Sample Selection Procedure

	Firm-years
Listed companies during 2005~2007	2140
Deleting missing number and off-market companies	365
Final sample	177
IT Companies	854
Non-IT Companies	918

The table shows the process of sampling selection. After deleting the missing number and off-market companies, the final sampling includes 854 IT companies and 918 non-IT companies.

Pulic's Valued Added Intellectual Capital Approach (VAIC^{TM})

While many survey methods (internal measures) are proposed in addition to those based on accounting information (external measures), it is difficult to compare companies using such methods (Boremann, 1999; Pulic, 2000 and 2004). Therefore, this research adopts an accounting tool for IC management, namely the Valued Added Intellectual Capital (VAIC^{TM}) (Pulic, 2000) to evaluate the intellectual capital. A primary focus of this method is the efficiency of resources which creates value for the firms. The basic principle of VAIC^{TM} is to calculate the value added (VA) of a firm by subtracting input from output, excluding labor expenses from the input. In financial terms, this is equal to (1):

$$VA = GM - sgaExp. + LExp. = Operating\ Income + LExp. \quad (1)$$

where VA is value added; GM is gross margin; sgaExp.: selling, general, and administrative expenses; LExp.: labor expenses that Pulic (2000b) calls human capital.According to Pulic (2000b), the value of human capital (HC) and structural capital (SC) is described by the labor expenses and the difference between VA and HC. From this description, HC and SC are denoted as follows:

$$HC = LExp. \quad (2)$$
$$SC = VA - HC \quad (3)$$

where HC is human capital; SC is structural capital; Pulic states that human capital and structural capital are reciprocal. The less the participation of human capital, the more structural capital is involved. The next step is to evaluate social capital, and according to Pulic's VAIC, social capital is calculated by the capital employed which equals the book value of the net assets of the firm.

$$SC = CE\ (capital\ employed) = Book\ Value\ of\ Net\ Assets \quad (4)$$

In terms of technology capital, R&D expenditure and intellectual properties are taken into consideration, and the study includes R&D expenditure and the value of intellectual property as a proxy for technological capital (TC), following Chang's research (2007). To account for the effect, the study uses the same denominator of the dependent variable (Tobin's *q*) as the scaling variable for technological

capital.

$$\text{Technology Capital Efficiency TCE} = \frac{\text{R\&D Expenditure + Value of Intellectual Property}}{\text{Book Value of Common Stocks}} \quad (5)$$

The study sets out to calculate the efficiency of the four forms of IC, and Tobin's *q* is adopted as a proxy of the firm's market performance (*MPerf*) with those resources. Up to this point, the study has four indicators (predicting variables) and one dependent variable:

Human Capital Efficiency HCE = VA / HC

Structural Capital Efficiency SCE = SC / VA

Social Capital Efficiency CEE = VA / CE

$$\text{Technology Capital Efficiency TCE} = \frac{\text{R\&D Expenditure + Value of Intellectual Property}}{\text{Book Value of Common Stocks}}$$

$$\text{MPerf} = \frac{\text{Market Value of Equity + Book Value of Debt}}{\text{Book Value of Assets}}$$

Market value of equity variable is based on closing share prices on the last trading day of the year

Hypothesis Development

To test the relationship between the weight of the IC components and firms' market performance in IT- and Non-IT market scope, a series of regression analyses is conducted, which substitutes for the various performance measures as dummy and dependent variables.

Hypothesis 1 (H_1): There is a positive relationship between intellectual capital components including HCE, SCE, CEE and TCE, and market performance.

$$MPerf_t = \alpha_0 + \alpha_1 HCE_t + \alpha_2 SCE_t + \alpha_3 CEE_t + \alpha_4 TCE_t + \varepsilon_t \quad (6)$$

By setting the dummies for companies which are listed separately on the Taiwan Stock Exchange (TWSE), such as IT companies and non-IT companies, as well as the different IC-components, H1 allows us to test the difference between the location of the listing of the companies. IT and non-IT are dummy variables for companies which are listed on the Taiwan Stock Exchange, while HCE, SCE, CEE and TCE are different IC-components as described above. Coefficients β1 and β2 will be equivalently significant if Hypothesis 2 is true.

Hypothesis 2 (H_2): There is no difference regarding that companies are IT or non-IT companies.

$$MPerf_t = \beta_1 IT_t + \beta_2 NonIT_t + \alpha_1 HCE_t + \alpha_2 SCE_t + \alpha_3 CEE_t + \alpha_4 TCE_t + \varepsilon_t \quad (7)$$

To investigate the relationship between market performance and IC-components of different weights, equation 8 is used, and a different return of market performance is included in the subsequent tests. A key postulate is that the relationship between market performance and IC-components will be misleading if the effect of different IC allocations is ignored. In the test, a null hypothesis is used to examine the relationship between the return of market performance and IC components across different weights of IC-components.

$$\ln(MPerf_t) = \alpha_0 + \alpha_1 HCE_t + \alpha_2 SCE_t + \alpha_3 CEE_t + \alpha_4 TCE_t + \varepsilon_t \quad (8)$$

$$\text{Test}: \begin{cases} \ln(MPerf_t) \geq r_1, HCE, SCE, CEE, TCE \text{ with different weight} \\ r_1 < \ln(MPerf_t) < r_2, HCE, SCE, CEE, TCE \text{ with different weight} \\ \ln(MPerf_t) \leq r_3, HCE, SCE, CEE, TCE \text{ with different weight} \end{cases}$$

$H_{3a}: w_{HCE} = w_{SCE} = w_{CEE} = w_{TCE}$

H_{3b}: Not all w_i is equal

EMPIRICAL RESULTS

Tables 2 and 3 present descriptive statistics and a correlation analysis of the dependent and the independent variables. The mean Tobin *q* is about 20.6420 and 16.4452 for IT and non-IT companies. In the light of the high degree of correspondence with Tobin Q and HCE (0.3006), and with SCE (0.4477), and with CEE (0.3064), and with CEE (0.3064) and with TCE (0.2920), the results for VAIC subcomponents demonstrate that an increase in value creation efficiency influences the profitability and market performance of IT firms. For non-IT companies, the market performance is correlated with IC components 0.1282, 0.4068, 0.2229, and 0.3021 respectively. Furthermore, the Tobin *q*-TCE relationships (0.2920 and 0.3021) are highly correlated, which roughly supports H_1, that firms with more R&D expenditure and intellectual property have a significantly positive effect on firms' value and financial performance. Therefore, R&D expenditure and intellectual property should be included when calculating firm's intellectual capital and analyzing their value creation.

Table 2: Descriptive Statistics for Selected Variables

Variable		Average	Variance	Std dev.	Skewness
Tobin Q	IT Company	20.6420	114.8787	10.7182	2.8419
	Non-IT Company	16.4452	39.5528	6.2891	2.0465
HCE	IT Company	3.5381	28.8494	5.3712	9.6178
	Non-IT Company	4.7898	122.0005	11.0454	7.6010
SCE	IT Company	0.5611	0.0481	0.2194	-0.4925
	Non-IT Company	0.5304	0.0665	0.2578	-0.2068
CEE	IT Company	0.4089	0.1312	0.3622	4.7353
	Non-IT Company	0.3055	0.0745	0.2729	3.9539
TCE	IT Company	0.0466	0.0053	0.0725	4.8599
	Non-IT Company	0.0174	0.0011	0.0334	4.5094

The mean Tobin q is about 20.6420 and 16.4452 for IT and non-it companies. For IC components, the mean are 3.5381, 0.5611, 0.4089, and 0.0466 respectively in IT companies; 4.7898, 05304, 0.3055, and 0.0174 respectively in non-IC companies. Variance, Std dev. and skewness are shown in Table 2.

Table 4 shows the results of testing H_1 and H_2. Firstly, the modified VAIC approach is supported both by IT and non-IT companies, in that explanatory power is increased from 27% to 34% (*F*-value = 111.8566) and 21% to 31% (*F*-value = 103.9851) respectively. The relationship between intellectual capital and market performance (H_1) has received support (*p*-value = 0.0000, 0.0000, 0.0000, and 0.0000 respectively) in IT companies, and SCE, CEE, and TCE are proved (*p*-value = 0.0000, 0.0000, and 0.0000 respectively) while HCE is not (*p*-value = 0.3854). This also makes the difference as to whether these companies are

listed in IT or Non-IT companies (H_2).

Table 3: Correlation Analysis of Selected Variables

		Tobin Q	HCE	SCE	CEE	TCE
Tobin Q	IT Company	1.0000				
	Non-IT Company	1.0000				
HCE	IT Company	0.3006	1.0000			
	Non-IT Company	0.1282	1.0000			
SCE	IT Company	0.4477	0.4702	1.0000		
	Non-IT Company	0.4068	0.4393	1.0000		
CEE	IT Company	0.3064	0.0434	0.1423	1.0000	
	Non-IT Company	0.2229	-0.0826	-0.0209	1.0000	
TCE	IT Company	0.2920	-0.0780	-0.037	0.2021	1.0000
	Non-IT Company	0.3021	-0.1063	-0.1155	0.2363	1.0000

The results for VAIC subcomponents demonstrate that Tobin Q has highly correspondent with HCE, SCE, CEE, CEE and TCE in value creation efficiency influence both IT and non-IT firms' profitability and market performance. Furthermore, the Tobin q-TCE relationships are highly correlated that roughly support H_1 that firms with more R&D expenditures and intellectual property have significantly positive effect on firms' value and financial performance.

Table 4: Analysis of the relations of *MPerf* and IC in different Company Type

Coefficient	**VAIC Approach**				**Modified VAIC Approach**			
	IT		Non-IT		IT		Non-IT	
	Adj. R^2	*F*-value	Adj. R^2	*F*-value	Adj. R^2	*F*-value	Adj. R^2	*F*-value
	0.2700	106.0234	0.2179	86.17847	0.3423	111.8566	0.3100	103.9851
	Beta	p-value	Beta	p-value	Beta	p-value	Beta	p-value
Intercept	7.0404	0.0000***	9.3880	0.0000***	5.4786	0.0000***	8.4605	0.0000***
HCE	0.2455	0.0002	-0.0238	0.2010	0.2837	0.0000***	-0.0152	0.3854
SCE	17.2964	0.0000***	10.4881	0.0000***	17.6898	0.0000***	11.1777	0.0000***
CEE	7.3993	0.0000***	5.2648	0.0000***	5.6986	0.0000***	3.5896	0.0000***
TCE					40.9514	0.0000***	59.3982	0.0000***
					F-test	**p-value**		
Hypothesis: IT Comp.= Non-IT Comp.					4.4430	0.0000****		

*Table 4 shows modified VAIC approach have higher explanatory power than Pulic's VAIC approach both in It and non-IT companies. In modified VAIC approach, HCE, SCE, CEE, and TCE are significant in IT companies while HCE is not significant in non-IT firms. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

In earlier hypothesis testing, support was found in the relationship between market performance and intellectual capital (Table 4), and the results of a further investigation into the different allocation in intellectual capital considering IT- and non-IT companies' return of market performance, confirm that companies place different weights, and distribute their resources of intellectual capital across different returns of market performance. In IT companies (Table 5), firms' return on market performance is highly associated with its IC value creation, while there is no significance between the first 20% and 40%~60% level, and 20%~40% and 60%~80% level. Additionally, the results (Table 6) clarify that HCE, SCE and CEE are negatively related to the firms' return, while TCE is significantly positively correlated to the return of market performance. This may indicate that even though IT companies need more employees to develop their designs and products, this may also erode its profits if they do not have a well-supported infrastructure, and information systems which are able to turn individual know-how into group property.

In non-It companies (Table 7), only the relationship between the first 20% level and the level of 60%~80% is insignificant. The results illustrate that HCE, SCE, CEE and TCE are not significant in the

ranking of the first 20%. SCE and CEE are significantly positively related to the firm's return on market performance, and furthermore, firms' will obtain a higher return if they invest in the development of TCE. In conclusion, employers should understand the level of market return they desire, so that they can decide how to distribute their investment in intellectual capital.

Table 5: Analysis of the Companies' Return of *MPerf* and IC Considering Critical Value

ln(*MPerf*)	IT Companies *F*-Value (*p*-value)				
	0~0.2	**0.2~0.4**	**0.4~0.6**	**0.6~0.8**	**0.8~1.0**
0 ~0.2	1.0000				
0.2~0.4	13.2879 (0.0000***)	1.0000			
0.4~0.6	0.9625 (0.4226)	0.0724 (0.0000***)	1.0000		
0.6~0.8	12.3085 (0.0000***)	0.9623 (0.3478)	12.7877 (0.0000***)	1.0000	
0.8~1.0	0.6582 (0.0169**)	0.0495 (0.0000***)	0.6839 (0.0269**)	0.0535 (0.0000***)	1.0000

ln(*MPerf*)	Non-IT Companies *F*-Value (*p*-value)				
	0~0.2	**0.2~0.4**	**0.4~0.6**	**0.6~0.8**	**0.8~1.0**
0 ~0.2	1.0000				
0.2~0.4	8.2474 (0.0000***)	1.0000			
0.4~0.6	1.8296 (0.0000***)	0.2218 (0.0000***)	1.0000		
0.6~0.8	0.8838 (0.2582)	0.1072 (0.0000***)	0.4831 (0.0001***)	1.0000	
0.8~1.0	4.8887 (0.0000***)	0.5928 (0.0033***)	2.6720 (0.0000***)	5.5312 (0.0000***)	1.0000

*IT firms' return of market performance is highly associated with its IC value creation. In here, we compare different firms' return level in first 20%, 20%~40%, 40%~60%,60%~80%, and 80%~100% level. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

SUMMARY AND CONCLUSION

This study is based on intellectual capital and financial perspectives, and examines the application of the concept of intellectual capital to value creation. The research attempts to connect intellectual capital deployment with changes in corporate market performance, and particularly tries to establish a line between the two. Based on research conducted by Edvinsson and Malone (1997), Ross *et al*. (1997), Sveiby (1997), Stewart (1997), Bontis (1998) and Chang (2007), this study proposes to use a taxonomy for corporate intellectual capital, namely human capital (HCE), structural capital (SCE), social capital (CEE), and R&D expenditures and intellectual property (TCE). The study analyzes the financial data of companies on the Taiwan Stock Exchange between 2005 and 2007, and after deleting off-market firms, missing data of the selected variables, and firms with a net income of less than 0 in a current year, the final sample consisted of a total of 1773 firm-year observations, including 854 IT companies and 918 non-IT companies.

Table 6: Analysis of the relations of *MPerf* and IC Considering Different ln(*MPerf*) in IT Companies

ln(*MPerf*)		0~0.2		0.2~0.4		0.4~0.6		0.6~0.8		0.8~1.0	
		Adj. R^2	***F*-value**								
		0.4707	25.5105 (0.0000***)								
		Beta	***p*-value**								
	HCE	(7.7311)	0.0000***								
0~	SCE	4.3965	0.2931								
0.2	CEE	0.0000	N/A								
	TCE	21.6545	0.1623								
				Adj. R^2	***F*-value**						
				0.4138	20.4731 (0.0000***)						
				Beta	***p*-value**						
	HCE			(40.7938)	0.0004***						
0.2~	SCE			(36.3379)	0.0034***						
0.4	CEE			(34.4426)	0.0040***						
	TCE			0.0000	N/A						
						Adj. R^2	***F*-value**				
						0.3488	15.8169*** (0.0000***)				
						Beta	***p*-value**				
	HCE					(3.5907)	0.3885				
0.4~	SCE					9.4430	0.1261				
0.6	CEE					0.0000	N/A				
	TCE					75.6531	0.0000***				
								Adj. R^2	***F*-value**		
								0.2493	10.2670 (0.0000***)		
								Beta	***p*-value**		
	HCE							(61.7723)	0.0017***		
0.6~	SCE							(56.0410)	0.0099***		
0.8	CEE							(59.1923)	0.0039***		
	TCE							0.0000	N/A		
										Adj. R^2	***F*-value**
										0.2890	12.0898 (0.0000***)
										Beta	***p*-value**
	HCE									(6.3901)	0.3006
0.8~	SCE									30.0183	0.0010***
1.0	CEE									0.0000	N/A
	TCE									45.6573	0.0110***

*The results clarify that HCE, SCE, CEE and TCE are highly related to the firms' different level of return. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

According to the predicted hypotheses, the correlation between Tobin *q* and IC components are positively related, which is a similar finding to most research studies which discuss intellectual capital and firms' market performance. To make a further comparison with VAIC^{TM}, the explanatory power of the modified VAIC model was increased from 27% to 34% (F-value = 111.8566) and 21% to 31% (F-value = 103.9851) respectively in IT- and non-IT companies, and the directional signs for HCE(+), SCE(+), CEE(+), RDE(+), and IPE(+) are significantly positively associated with firms' value and profitability, while HCE is not significant in non-IT companies. Compared with the findings of most researchers, the results support that an investment in the development of TCE has had an impact on their competitive advantage, and that a higher market performance is consistent with a higher investment in TCE, which was illustrated by both IT companies and non-IT companies. Furthermore, if companies invest more in their intellectual capital, they will create higher return on market performance. Moreover, the findings of the study indicate that, when industries conduct a business evaluation in the future, not only should the value of IC be considered, but IC allocation is also a critical aspect which should not be ignored. It is important that firms and managers should value and manage their IC, particularly R&D and intellectual property, in order to create long-term competitiveness and achieve a higher value.

Table 7: Analysis of the relations of *MPerf* and IC Considering Different ln(*MPerf*) in Non-IT Companies

ln(*MPerf*)		0~0.2		0.2~0.4		0.4~0.6		0.6~0.8		0.8~1.0	
		Adj. R^2	***F*-value**								
		(0.0144)	0.6039 (0.6607)								
		Beta	***p*-value**								
0~0.2	HCE	0.0108	0.9192								
	SCE	(2.6363)	0.2605								
	CEE	(0.1953)	0.8816								
	TCE	(15.0869)	0.3474								
				Adj. R^2	***F*-value**						
				0.2327	9.4939 (0.0000***)						
				Beta	***p*-value**						
0.2~0.4	HCE			(0.0293)	0.8104						
	SCE			12.0158	0.0000***						
	CEE			2.8790	0.0579*						
	TCE			59.1333	0.0017***						
						Adj. R^2	***F*-value**				
						0.2972	12.8391 (0.0000***)				
						Beta	***p*-value**				
0.4~0.6	HCE					(0.0323)	0.4108				
	SCE					6.9569	0.0001***				
	CEE					5.9838	0.0000***				
	TCE					29.0948	0.0703*				
								Adj. R^2	***F*-value**		
								0.2530	10.4814 (0.0000***)		
								Beta	***p*-value**		
0.6~0.8	HCE							0.0029	0.9338		
	SCE							9.4736	0.0008***		
	CEE							(0.0512)	0.9876		
	TCE							69.4119	0.0000***		
										Adj. R^2	***F*-value**
										0.2042	7.9924 (0.0000***)
										Beta	***p*-value**
0.8~1.0	HCE									0.0519	0.6159
	SCE									14.6685	0.0001***
	CEE									3.7412	0.1802
	TCE									80.4388	0.0031***

*The results clarify that HCE, SCE, CEE and TCE are highly related to the firms' different level of return while 0~0.2 return level is not significant. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

This research is not without its limitations, the first of which is that the results use Tobin *q* as firms' different levels of market return. Additional research could examine other financial ratios, and eventually introduce clearer interactions between a firm's market performance and its IC components. Secondly, researchers may adopt different methodology to examine the interaction among IC components, and finally, future research could revisit some of the basic assumptions of the Pulic's VAIC™ method and assess their potential consequences for the validity of empirical testing and results.

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