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ACCOUNTING CONSERVATISM, ENVIRONMENTAL UNCERTAINTY AND THE CAPITAL STRUCTURE

Ahsan Habib*, Mahmud Hossain**

Abstract

The purpose of this paper is to examine the effect of reporting conservatism on firm's capital structure decisions and the role of environmental uncertainty as a moderating variable. While the role of conservatism has been investigated in certain debt-contracting setting, evidence is sparse about the effect of conservatism on the degree of financial leverage. We examine this issue using a sample of Australian firms from 1992 to 2005. We find that accounting conservatism positively affect a firm's leverage structure. Further, we find that the relation between accounting conservatism and firm leverage is moderated by environmental uncertainty context; however this finding is not robust to all three proxies that we used to measure conservatism.

Keywords: Conservatism, Financial Leverage, Environmental Uncertainty, Australia

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1. Introduction

This study examines the effect of reporting conservatism on a firm's capital structure decisions and how that association is moderated by environmental uncertainty. In their seminal paper, Miller and Modigliani (1958) show that in a perfect capital market, firms should be indifferent to the choice between debt and equity. However, subsequent theoretical developments have provided alternative explanations for firm-level capital structure decisions. The proponents of trade-off theory argue that managers make capital structure decisions based on the trade-off between the benefits of debt (e.g., the tax deductibility of interest and a reduction in agency costs related to free cash flow) and the cost of debt (e.g., bankruptcy costs and shareholder/bondholder conflict of interests) (Miller and Modigliani, 1963; DeAngelo and Masulis, 1980). Pecking order theory demonstrates that capital market frictions (e.g., transaction costs, information asymmetry) make it costly for firms to raise funds externally, and, as a result, firms finance operations by relying first on internal funds, then on debt and finally on equity (Myers, 1984; Myers and Majluf, 1984).

A large volume of empirical literature investigates the relative superiority of one theory over another with respect to the determinants of capital structure choices. For example, a positive association between firm profitability and a high debt ratio is consistent with trade-off theory, whereby profitable firms can reduce their tax obligations because they have relatively lower bankruptcy costs (Warner, 1977). Pecking order theory, in contrast, suggests that profitable firms should rely more on internal sources of financing and less on debt financing. The empirical evidence is consistent with this proposition (Baskin, 1989; Hovakimian, Opler, Titman, 2001; Shyam-Sunder and Myers, 1999).

Accounting researchers have attempted to link capital structure decisions with accounting conservatism. Conservative accounting practices require a higher degree of verification for recognising gains than for recognising losses, which means that conservatism reflects the differential ability of accounting earnings to recognise economic losses relative to economic gains (Basu, 1997). This definition of conservatism is commonly referred to as news-dependent or conditional conservatism,[1] and has

[1] In contrast to news-dependent conservatism, news-independent or unconditional conservatism in accounting occurs through the application of accounting policies that consistently accelerate expenses or defer revenues, resulting in a lower profit figure than would otherwise be reported (Ruddock, Taylor, and Taylor, 2006). Our focus on 'news-dependent' conservatism is justified by the fact that the timely recognition of losses encouraged by this conservatism measure is an important determinant of earnings quality, where earnings are used for contracting purposes. To

been shown to affect different aspects of debt contracting. Watts (2003) argues that debt contracting has a strong impact on the demand for conservatism. Lenders participate less in firms' economic gains than shareholders, but are adversely affected by losses. Relative to shareholders, lenders prefer financial statement information that more efficiently incorporates economic losses to ensure that management does not favour shareholders over lenders. Empirical evidence lends support to this theory by showing that conservatism helps lenders through the timely signalling of default risk, as found in accelerated covenant violations (Zhang, 2008), and lenders reduce interest rates when borrowers are relatively more conservative (Ahmed, Billings, Morton, and Harris, 2002).

Although the role of conservatism has been investigated in certain debt-contracting settings, evidence is sparse about its effect on the degree of financial leverage or capital structure. We examine this issue using data from Australia where the 'tax imputation system'[2] adopted in 1987 reduced the tax incentive of using debt in Australia, thus allowing alternative theories to be tested (Qiu and La, 2010). Evidence on the determinants of capital structure in Australia is mixed. For instance, Allen (1991, 1993) and Cassar and Holmes (2003) find that more profitable firms choose to use less debt financing, which contradicts the pecking order theory, whereas Twite (2001) finds the opposite. Twite (2001) and Cassar and Holmes (2003) both report that growth firms use more debt, a finding that also contradicts the pecking order theory. Cassar and Holmes (2003) also report a negative relation between asset tangibility and debt financing, providing evidence to refute the bankruptcy cost theory.

We extend the research on the determinants of capital structure in Australia by incorporating 'accounting conservatism' as an additional explanatory variable. We then examine whether this association is moderated by environmental uncertainty defined as "the unpredictability of the actions of customers, suppliers, competitors and regulatory groups" (Govindarajan 1984). High environmental uncertainty increases the risk of accurately assessing future earnings and accentuates information asymmetry. Demand for accounting conservatism to reduce information asymmetry and benefit debt trading becomes more pronounced in this environment.

This study contributes to the literature in three ways. First, to the best of our knowledge this study is the first in Australia to examine the role of accounting conservatism in capital structure decisions. The Australian environment is unique because the 'tax imputation system' adopted in 1987 reduced the tax incentive of using debt, thus allowing alternative capital structure theories to be tested. Second, whereas previous studies test the beneficial effect of conservatism, such as whether accounting conservatism benefits firms by reducing the cost of debt, this study extends the extant literature by examining the role of accounting conservatism in capital structure decisions. Third, we include environmental uncertainty as a contextual variable to explain capital structure decisions. We believe that studying the association between reporting conservatism and capital structure decisions in particular contexts will provide more significant insights.

The remainder of the paper proceeds as follows. The next section provides a brief review of the literature and develops testable hypotheses. Section 3 explains the research design issues. Section 4 introduces the sample selection criteria and some descriptive statistics. Section 5 explains the main tests result. Section 6 concludes.

2. Literature review and hypotheses development

Since the introduction of the MM (1958) capital structure irrelevance theory, researchers have searched for explanations for capital structure and have generated important insights into the relevance of capital structure decisions in the presence of market friction. This stream of research incorporates the effects of taxes, bankruptcy costs, information asymmetry, agency issues and other types of friction on corporate leverage decisions. The trade-off theory and pecking order theory that resulted from this work have generated a number of testable propositions on the determinants of capital structure (Harris and Raviv, 1991).

Accounting conservatism has been linked with debt contracting benefits and has provided some interesting empirical results. The contracting explanation for conservatism begins with the premise that a firm is a nexus of contracts among rational agents (Jensen and Meckling, 1976). Accounting numbers are used to write, monitor and enforce these contracts. Such accounting-based contracting motivates managers to bias earnings upwards (e.g., to maximise their bonuses). Accounting conservatism is demanded to counteract this tendency, which requires early recognition of bad news and hence biases earnings downward. Ball, Robin and Sadka (2008) directly test the 'contracting' and 'value relevance'

provide a broader perspective on the effect of conservatism on firm's capital structure decisions, we use two other conservatism measures that are not tied to 'news-independent' measure.

[2]Following the adoption of the tax imputation system in 1987, Australian shareholders now receive full credits for tax paid at the corporate level when they receive dividends. The elimination of double taxation is in contrast to the US regulatory setting, where shareholders pay tax at the corporate level and individual level when they receive dividends (Qiu and La, 2010).

explanations to better understand the primary driver of the demand for accounting conservatism. The 'contracting hypothesis' suggests that accounting conservatism exists to facilitate efficient contracting, whereas the 'value relevance hypothesis' offers a symmetric relation between earnings and stock returns. Ball et al. (2008) use the size of the debt and equity markets as a crude proxy to differentiate the two hypotheses and report a significant positive relation between timely loss recognition measures and debt market size. The relationship between timely loss recognition measures and the equity market, however, is either negative or statistically insignificant.

There are several theoretical arguments and some empirical evidence to support the benefits of conservatism for lenders of capital. Conservatism enhances creditor value by facilitating debt covenants to prevent managers and shareholders from expropriating value. The inherent conflict of interest between shareholders and bondholders may result in managers taking opportunistic action (such as making liquidating dividends to shareholders), which exposes creditors to significant losses in the event of company liquidation (Watts, 2003; Ahmed et al., 2002). Ahmed et al. (2002) propose that conservatism mitigates bondholder-shareholder agency costs, as manifested in excessive dividend distributions, by reducing the amount of reported earnings available for distribution. This lowers opportunistic unwarranted payments to shareholders by managers.[3] Accounting conservatism also aids the timely transfer of decision rights from a firm's management to its creditors when the firm experiences adverse economic conditions (Nikolave, 2010). Empirically, Zhang (2008) finds support for this argument by revealing that more conservative firms are more likely to violate debt covenants then their less conservative counterparts, and transfer decision-making rights to creditors earlier. The specific findings are that (a) conservatism benefits lenders through the acceleration of covenant violations, which transfers decision-making rights from shareholders to debt holders, thereby reducing the default risk, and (b) as a result of the decrease in default risk, the debt holders of conservative firms are more willing to accept lower interest rates, thereby reducing the borrower's cost of debt, as proxied by interest rates.

Accounting conservatism also increases bondholder value, because accounting-based debt covenants limit self-serving managerial decisions such as investing in negative net present value projects or taking on additional debt. Because conditional conservatism requires the recognition of losses earlier than gains, debt covenants provide early warning signals to creditors of probable covenant violations. Moerman (2008) suggests that conservatism decreases information asymmetry by (i) enhancing the borrower's corporate governance and (ii) providing more and higher quality information to debt market participants. Accordingly, Moerman (2008) predicts and finds that a timely loss recognition strategy improves the quality of a borrower's financial reporting and decreases the bid-ask spread at which the borrower's loans are traded.

In contrast to the theoretical and empirical evidence on the beneficial role of accounting conservatism in debt contracting, there is a paucity of evidence on the association between conservatism and financial leverage. Feras and Putnam (2011) recently filled this void by documenting a positive association between accounting conservatism and the degree of financial leverage for US companies. Because the demand for leverage is a function of the cost of debt and conservatism lowers the cost of debt (Zhang, 2008), this documented positive association makes sense.[4] We first test whether this positive association also holds in Australia. There is some evidence of conditional conservative accounting practice among Australian firms (Ruddock et al., 2006; Balkrishna, Ruddock, and Taylor, 2007). Whether such conditional conservatism is associated with capital structure decisions, however, remains unexplored. We develop the following hypothesis (in alternative form):

> H_1: There is a positive association between accounting conservatism and financial leverage.

Environmental uncertainty, capital structure and conditional conservatism

We consider environmental uncertainty as a contextual factor that may moderate the association between accounting conservatism and a firm's leverage decisions. Environmental uncertainty is defined as "the unpredictability of the actions of customers, suppliers, competitors and regulatory groups" (Govindarajan, 1984). Firms operating under high environmental uncertainty suffer from acute information asymmetry problems. For example, Akerlof (1970) describes the combined impact of

[3] Ahmed et al. (2002) use the market value-based conservatism proxy following Beaver and Ryan (2000) the accruals-based conservatism proxy [(net income before extraordinary items + depreciation-operating cash flows*-1)/total assets].

[4] Feras and Putnam (2011), however, caution that such a finding needs to be evaluated in light of the association between conservatism and the cost of equity capital. If conservatism decreases the cost of equity capital to the same or a higher degree than it does the cost of debt capital, then the relationship between conservatism and financial leverage is insignificant (e.g., there is no relationship) or even negative (e.g., conservatism decreases financial leverage in the firm's capital structure). The extant empirical evidence, however, fails to find any effect of conservatism on the cost of equity capital (Francis, LaFond, Olsson, and Schipper, 2004).

uncertainty and information asymmetry on the used car market. Based on a laboratory experiment, Umanath, Ray and Campbell (1996) provide evidence that, under conditions of asymmetric information, principals prefer contracts wherein the incentive portion of the total compensation increases with an increase in the agent's perceived environmental uncertainty. Research on trading on asset prices finds that the price is determined by both information asymmetry among investors about the future cash flow of assets and investor uncertainty about the preferences and endowments of other investors in the market (Saar, 2002).

In the debt-contracting process, lenders demand accounting conservatism because they bear a downside risk with no upside potential. We argue that such demand is intensified for firms operating in an environment of high uncertainty. Such firms suffer from severe information asymmetry problems, which cause an increase in their agency costs, and as the agency costs increase so too does the demand for accounting conservatism. For example, LaFond and Roychowdhury (2008) find that the demand for conservatism increases (decreases) as the severity of the agency problem increases (decreases). Hui, Morse and Matsunaga (2009) find that as the level of information asymmetry decreases due to the provision of more earnings forecasts by management, a firm's financial statements become less conservative. Francis and Martin (2010) study the relationship between accounting conservatism and acquisition profitability and find that although accounting conservatism is associated with more profitable acquisitions, this relationship is stronger for firms operating in volatile environments and experiencing high degrees of information asymmetry. Based on the results from the accounting conservatism literature, we suggest that the effect of conservatism on a firm's capital structure is more pronounced when the agency costs are high. This leads to the following proposition.

> ***H_2*:** The positive association between accounting conservatism and firm leverage is stronger for firms operating under high environmental uncertainty.

3. Research design issues

To examine the moderating role of environmental uncertainty on the association between accounting conservatism and firm capital structure, we first operationalise the three constructs.

3.1 Financial leverage/capital structure

We specify financial leverage in terms of book value and market value. Book value financial leverage is measured as total debt (short-term debt + long-term debt) / total assets. Market value financial leverage is measured as total debt / market value of assets, where the market value of assets = total assets- total shareholders' equity + the market value of the firm's common equity. Market value of equity is derived by multiplying the share price at the end of the fiscal year by the number of outstanding shares.

3.2 Accounting conservatism

Three measures of accounting conservatism proxies are used in this study. Our first conservatism measure is based on Basu (1997) and is referred to as the differential timeliness measure. The underlining assumption of the differential timeliness measure is that conservatism results in timely loss recognition but untimely gain recognition. Accordingly, conservatism should result in a stronger correlation between earnings and stock returns during bad news periods (when returns are negative) than between earnings and stock returns during good news periods (when returns are positive). *Con_diff* as the ratio of the relative timeliness of a firm's incorporation of bad news relative to good news in its earnings. This ratio, referred to by Givoly, Hayn and Natarajan (2007) as the differential timeliness ratio, is captured by $(\beta_1+\beta_2)/\beta_1$in the following regression.

$$E_{it}/P_{it-1} = \alpha_i + \alpha_{1i}DR_{it} + \beta_1 R_{it} + \beta_2 R_{it}*DR_{it} + \varepsilon_{it}, \quad (1)$$

> Where $E_{it}$is the earnings per share for firm *i* in fiscal year *t*; P_{it-1} is the price per share for firm *i* at the beginning of the fiscal year *t*; R_{it} is firm's *i* 15-month return ending three months after the end of fiscal year *t;* and DR_{it} is a dummy variable that equals 1 during periods of bad news (e.g., $R_{it}< 0$) and 0 during periods of good news (e.g., $R_{it}>0$).

Our second measure of conservatism is the degree of accumulation of non-operating accruals. According to Givoly and Hayn (2000), the accumulation of negative non-operating accruals is a product of the recording of bad news, and is thus an indication of conservatism. We define *Con_nonopaccr* as the ratio of non-operating accruals to total assets. We first calculate total accruals as the difference between net income and operating cash flow. We then calculate operating accruals as the sum of Δaccounts receivable - Δinventories - Δprepaid expenses + Δaccounts payable + Δtaxes payable. Non-operating accruals is then the difference between total accruals and operating accruals. We deflate these values by total assets to control for heteroscedasticity. We determine the average of (non-operating accruals /total assets) using the current and the preceding four years' observations. We multiply the average asset deflated non-operating accruals by negative 1 so that higher values indicate greater conservatism.

Our third measure of conservatism is the ratio of the skewness in earnings divided by the skewness in cash flow and is denoted as C*on_nskew*. When the

recognition of bad news in earnings is timelier than that of good news, then the earnings distribution will be negatively skewed (Givoly and Hayn, 2000; Zhang, 2008). We measure skewness using the current and preceding four years' of earnings and cash flows observations. We multiply the average skewness by negative 1 so that higher values indicate greater conservatism.

Despite its popularity, differential timeliness measure is criticised in the literature. To begin with, Givoly and Hayn (2000) and Dietrich, Muller and Reidl (2007) are concerned that differential timeliness measure induces biases in the coefficient estimates and R^2 measures, thus leading researchers to mistakenly interpret reported results as evidence of conservatism.[5] Givoly and Hayn (2000) also explain that management disclosure policy on the timing of good news releases versus bad news releases affects the relationship between prices and returns, which may result in misleading conservative measures based on the reverse regression proposed by Basu (1997). Roychowdhury and Watts (2007) explain that Basu's (1997) measure of differential timeliness measure to gauge conservatism is based on single-period returns and earnings, and thus the generated estimates measure the average degree of conservatism for each single-period but do not assess the cumulative effect of conservatism from previous years.

On the other hand, although *Con_nonopaccr* and *Con_nskw* overcome the problem of relying on stock returns to proxy for periods of good/bad news, they are not without limitations. In particular, negative non-operating accruals or a negatively skewed earnings could be due to earnings manipulation rather than accounting conservatism.

3.3 Measurement of environmental uncertainty

A parsimonious proxy for the extent of environmental uncertainty is the coefficient of variation of sales, which is based on external market conditions and is thus more appropriate as a measure of environmental uncertainty (Bergh and Lawless 1998; Dess and Beard 1984; Ghosh and Olsen 2009; and Habib, Hossain, and Jiang, 2011).[6] The coefficient of variation of sales is calculated as follows.

$$CV(Z_i) = \frac{\sqrt{\frac{\sum_{k=1}^{5}(z_i - \bar{z})^2}{5}}}{\bar{z}} \quad (2)$$

where, CV is the coefficient of variation, z is the sales observations for each firm in each year and $\bar{z}$ is the mean sales value. This firm-specific measure of environmental uncertainty is calculated using historical data over a four-year period that includes the current year, and is validated as an objective measure of environmental uncertainty by Synder and Glueck (1982). We label this environmental uncertainty measure EU_{sales}.

3.4 Regression specifications

We first estimate a baseline regression model to test the relationship between financial leverage and a vector of the firm characteristic variables. We include accounting conservatism as our primary variable of interest. The model is expressed as follows:

$$FLEV_{it} = \alpha_1 + \beta_1 CON_{it} + \beta_2 PROFIT_{it} + \beta_3 DIV_{it} + \beta_4 SIZE_{it} + \beta_5 DEP_{it} + \beta_6 TAN_{it} + \beta_7 AZ_{it} + \beta_8 GROWTH_{it} + \beta_9 INDLEV_{it} + \varepsilon_{it} \quad (3)$$

Where,

$FLEV_{it}$: denotes the book value leverage or market value leverage for firm i in year t as defined in section 3.1;

CON_{it} :denotes one of the three conservative measures as discussed in section 3.2;

PROFIT: firm profitability measured as operating income divided by total assets;

DIV: firm's payout ratio measured as common stock dividends divided by total assets;

SIZE: firm size measured as the natural logarithm of total assets;

DEP: depreciation expense measured as depreciation and amortisation deflated by total assets;

TAN: assets' tangibility measured as fixed assets divided by total assets;

AZ: Altman's (1968) Z-score, the ex ante probability of financial distress is measured using [3.3 EBIT + 1.0 sales + 1.4 retained earnings + 1.2 working capital/ total assets];

GROWTH: growth opportunities proxied by sales growth and is measured as [$sales_t$-$sales_{t-1}$/total $assets_t$];

INDLEV: industry leverage is the median industry leverage.

[5]Givoly et al. (2007, p. 69) identify three characteristics of the information environment that are unrelated to reporting conservatism but nevertheless affect the differential timeliness (Basu, 1997) measure. These characteristics are referred to as the 'aggregation' effect, the 'nature of the economic events' effect and the 'disclosure policy effect'.

[6]Early research on environmental uncertainty is based on managerial perceptions of external environmental volatility (Lawrence & Lorsch 1967; Duncan 1972). This research proposes a causal connection between environmental volatility and managerial perceptions of environmental uncertainty. Tosi, Aldag and Storey (1973) use market, technological and earnings volatility as three objective measures of environmental volatility but do not find a strong correlation with the Lawrence and Lorsch (1967) instrument.

The pecking order theory expects a negative association between leverage and profitability (Myers, 1984), which suggests that firms prefer to finance assets with internally generated funds to avoid the costs associated with external financing. Trade-off theory, in contrast, argues that higher profitability decreases the expected costs of distress and lowers tax expense by utilising more debt, and thus predicts a positive relationship between the two variables. Jensen (1986) suggests that increased leverage acts as a monitoring mechanism to prevent managers from taking suboptimal decisions associated with the free cash flow agency problem. Accordingly, leverage and dividends may be inversely related. However, a high dividend payout ratio may also indicate that the firm is profitable, thereby increasing its ability to borrow (Doukas and Pantzalis, 2003). Accordingly, in this case the relationship between dividends and debt is positive. Firm size is expected to have a positive association with leverage, as larger firms have lower expected bankruptcy costs (Titman and Wessels, 1988; Graham, Lemmon and Schallheim, 1998; Barclay and Smith, 1995). DeAngelo and Masulis (1980) explain that depreciation is a type of non-debt-related corporate tax shield. Consequently, the higher the depreciation expense, the lower the tax benefits of debt financing. Accordingly, we expect a negative relationship between depreciation and a firm's degree of financial leverage. Firms with more tangible assets can use them as collateral for increased borrowing, and we thus expect a positive association between tangibility and leverage. However, the amount of fixed assets that a firm owns is positively related to the operating leverage. According to Mandelker and Rhee (1984), financial leverage and operating leverage are substitutes. Thus, based on this argument, the relationship between fixed assets and financial leverage may be negative. A higher Z score reflects greater financial soundness, and we thus expect a negative association between this distress score and financial leverage. We follow previous studies (e.g., Graham, et al. 1998; Barclay and Smith, 1995; Rajan and Zingales, 1995) and argue that growth firms tend to protect their investment opportunity set by lowering the amount of debt in their capital structure. We thus expect an inverse relationship between sales growth and degree of financial leverage. The association between industry leverage and leverage is hypothesized to be positive.

To test H_2, we first partition the sample observations into high and low environmental uncertainty categories and then run regression equation (3) for the two sub-samples. Firm-year observations pertaining to more (less) than the median environmental uncertainty measure are categorised as high (low) environmental uncertainty observations respectively.

4. Sample selection and descriptive statistics

Our sample spans the period from 1992 to 2005. We start with 1992 because direct method cash flow reporting became mandatory in that year. We need cash flow data to calculate the total accruals to derive non-operating accruals. To calculate our first conservatism measure, *con-diff*, we start with a sample of 10,227 firm-year observations from 1991 to 2005 for which there is available return and capital structure data. We lose 3,819 firm-year observations because of insufficient observations to run the firm-specific differential timeliness regression. This leaves us with a sample of 6,409 firm-year observations. We require companies to have at least seven years of consecutive data including the current year to derive meaningful regression coefficients. Our final sample for this conservatism measure is 2,545 firm-year observations. For our second and third conservatism measures, we begin with an initial sample of 15,773 firm-year observations. This initial sample size is larger than the first conservatism measure because we don't require stock return data. We then exclude 1,274 observations pertaining to the financial services industry. Financial institutions are excluded because of the differing regulatory nature of their capital structure choices. We then conduct a baseline regression analysis of the determinants of capital structure excluding the conservatism variable. The purpose of running this regression is to benchmark this study with earlier Australian studies on the determinants of capital structure. None of the earlier empirical studies on capital structure in Australia used such a large sample size, and their findings are inconclusive, too. Our final sample size for the *con_nonopaccr* and *con_nskew* measures is 8,828 firm-year observations. The reduction is primarily due to the fact that we measure firm-level conservatism by using the current and preceding four years' observations.

Panels A and B of Table 1 provide some descriptive statistics on the test variables. The average of the *con_diff* and *con_nonopaccr* measures is 1.09 and 0.55, respectively, whereas that of *con_nskew* is -0.48. The *con_diff* value is comparable to that calculated by Ferris and Putnam (2011), who report an average of 1.11. The average and median of the other two conservatism measures differ markedly. We report descriptive statistics for the independent variables based on the much larger sample size for the *con_nonopaccr* and *con_nskewness* analysis. Unreported descriptive statistics based on the much smaller sample size of the *con_diff* analysis are generally similar to those derived with the larger sample. The average book and market leverage is 17% and 13% of total assets, respectively. Average profitability of the firm-year observations is -0.12. Sample firms exhibit very low dividend payout propensities and low growth opportunities. Their tangible assets represent about 38% of total assets. A negative average Z score suggests that our sample

companies are not financially sound, although the median value is positive.

Table 1. Descriptive statistics and correlation analysis

Panel A: Descriptive statistics

Variables	Mean	Median	S.D.	25%	75%
BKLEV	0.18	0.11	0.22	0.00	0.28
MKTLEV	0.13	0.068	0.17	0.00	0.28
Con_diff	1.09	0.55	16.40	-1.09	1.73
Con_nonopaccr	0.022	0.0026	0.14	-0.03	0.04
Con_nskew	-0.48	-0.23	11.51	-1.18	0.81
PROFIT	-0.12	0.00	0.44	-0.14	0.08
DIV	0.017	0.00	0.03	0.00	0.03
SIZE	7.59	7.48	0.99	6.88	8.22
DEP	-0.04	-0.03	0.07	-0.06	-0.0026
TAN	0.38	0.28	0.37	0.04	0.63
AZ	-2.57	0.12	10.51	-2.07	1.43
GROWTH	0.0021	0.007	0.53	-0.03	0.14
INDLEV	0.10	0.09	0.09	0.018	0.20

Panel B: Correlation analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
BOOKLEV (1)	1												
MKTLEV (2)	.806**	1											
Con_diff (3)	-	0.02	1										
Con_nonopaccr	.048**	.043**	-0.02	1									
Con_nskew (5)	-.003	-.005	-	.009	1								
PROFIT (6)	-.016	.161**	0.0064	-	-	1							
DIV (7)	.018	-	0.03	-	.012	.302**	1						
SIZE (8)	.238**	.347**	-0.001	-	.005	.505**	.379**	1					
DEP (9)	-	-	0.004	.050**	-	.223**	-.009	.011	1				
TAN (10)	.289**	.329**	-0.02	-	.004	.153**	.185**	.359**	-	1			
AZ (11)	-	.143**	0.05	-	-	.750**	.229**	.499**	.161**	.132**	1		
GROWTH (12)	-	.019	0.0072	-.002	-	.203**	.096**	.158**	.049**	.037**	.240**	1	
INDLEV (13)	.221**	.320**	0.05	-	-	.227**	.233**	.300**	-.008	.195**	.217**	.049**	1

Note: The descriptive statistics for the book and market leverage measures are based on 8,840 and 7,134 firm-year observations, respectively. The control variable statistics are based on the larger sample. *Con_diff* is based on 2,545 firm-year observations. The correlation analysis is based on a sample of 7,177 firm-year observations with non-missing observations for the variables listed in the table.

** and * denote significance level at the 1% and 5% levels, respectively (two-tailed test).

Variable definitions:

FLEV: denotes the book value leverage or market value leverage for firm i in year t as defined in section 3.1;

Con_nonopaccr: the ratio of non-operating accruals to total assets. Non-operating accruals is the difference between total accruals and operating accruals deflated by total assets. We determine the average of (non-operating accruals /total assets) using the current and the preceding four years' observations and multiply by negative 1 so that higher values indicate greater conservatism;

Con_nskew: the ratio of the skewness in earnings divided by the skewness in cash flow. We measure skewness using the current and preceding four years' of earnings and cash flows observations and multiply the average skewness by negative 1 so that higher values indicate greater conservatism;

PROFIT: firm profitability measured as operating income divided by total assets;

DIV: firm's payout ratio measured as common stock dividends divided by total assets;

SIZE: firm size measured as the natural logarithm of total assets;

DEP: depreciation expense measured as depreciation and amortisation deflated by total assets;

TAN: assets' tangibility measured as fixed assets divided by total assets;

AZ: Altman's (1968) Z-score, the ex ante probability of financial distress is measured using [3.3 EBIT + 1.0 sales + 1.4 retained earnings + 1.2 working capital/ total assets];

GROWTH: growth opportunities proxied by sales growth and is measured as [$sales_t$-$sales_{t-1}$/total $assets_t$];

INDLEV: industry leverage is the median industry leverage.

Before estimating our models, we compute pairwise correlations between the explanatory variables. As expected, the correlation between the two leverage measures is 0.81 ($p \leq 0.01$, two tailed). The correlation between both book and market-leverage and non-operating accruals-based conservatism measure is positive and statistically significant. But the correlation is insignificant for two other conservatism measures. Except for firm profitability and dividend, all the control variables are correlated with book leverage. Interestingly, the correlation between Con_nonopaccr and all the

control variables but firm growth are significant, but none of the control variables is correlated with the third conservatism measure. Of the independent variables, the highest correlation is between profitability and distress risk at 0.75. The other high (and statistically significant, ($p \leq 0.01$, two tailed) correlations are between firm size and profitability (0.51) and firm size and distress risk (0.499). Further, firm profitability and industry leverage are significantly correlated ($p \leq 0.01$ two tailed) with most of the independent variables. The highest variance inflation factor is 2.48, which is less than 10, thus indicating that collinearity is unlikely to be a major concern in this study (Neter, Wasserman and Kunter, 1983).

5. Test results

5. 1 Accounting conservatism and capital structure

Table 2 presents a multivariate analysis of the determinants of capital structure in Australia. The coefficient signs and significance are generally similar for both the book and market-based leverage measures. We first report a baseline model that does not include conservatism variable. The coefficient on profitability is positive, which supports the trade-off theory. Profitable firms are less likely to experience bankruptcy, and can thus utilise more debt to reduce their tax burden. The negative and highly significant coefficient on dividend suggests that debt acts as an alternative monitoring mechanism. The coefficient on depreciation is negative and significant (t-statistics of -7.30) for the book leverage measure, supporting the proposition of DeAngelo and Masulis (1980) that a higher level of depreciation expense lowers the tax benefit derived from debt in the capital structure. The coefficient on TAN is positive and statistically significant. More tangible assets can be used as collateral for increased borrowing, and this positive coefficient supports that view. The coefficients on AZ are negative and significant as expected (t-statistics of -9.42 and -6.24 for the book and market leverage measures, respectively). The coefficient on firm growth negative and significant (t-statistics of -2.84 and -3.29 for the book and market leverage measures, respectively), which is consistent with the proposition that high growth firms tend to lower debts on the balance sheet to protect their investment opportunity sets. Finally, as expected, the coefficient on industry leverage is positive and statistically highly significant at better than the 1% level. The adjusted R^2 of the models is 18% for the book leverage and 28% for the market leverage measure.

Table 2. Regression of firm leverage on accounting conservatism and other firm variables

$$FLEV_{it} = \alpha_1 + \beta_1 CON_{it} + \beta_2 PROFIT_{it} + \beta_3 DIV_{it} + \beta_4 SIZE_{it} + \beta_5 DEP_{it} + \beta_6 TAN_{it} + \beta_7 AZ_{it} + \beta_8 GROWTH_{it} + \beta_9 INDLEV_{it} + \varepsilon_{it} \quad (3)$$

Panel A: Book leverage

Variables	**Baseline model**		**Con_nonopaccr**		**Con_nskew**		**Con_diff**	
	Coefficient	*t-stat*	*Coefficient*	*t-stat*	*Coefficient*	*t-stat*	*Coefficient*	*t-stat*
Constant	-0.35***	-15.55	-0.43***	-13.11	-0.59***	-9.31	-0.42***	-13.60
Con_nonopaccr	-	-	0.11***	3.77	-	-	-	-
Con_nskew	-	-	-	-	0.00024	0.91	-	-
Con_diff	-	-	-	-	-	-	0.0000097	1.30
PROFIT	0.034***	2.88	0.01	0.52	0.0005	0.033	-0.0019	-0.06
DIV	-1.10***	-20.62	-1.05***	-15.52	-1.03***	-15.16	-0.85***	-6.06
SIZE	0.05***	23.26	0.06***	20.51	0.06***	20.39	0.08***	13.78
DEP	-0.36***	-7.30	-0.37***	-5.82	-0.34***	-5.50	-0.39***	-3.33
TAN	0.11***	15.55	0.10***	12.29	0.101***	12.29	0.05***	3.83
AZ	-0.005***	-9.42	-	-5.84	-0.0041***	-6.05	0.00***	-3.53
GROWTH	-0.017***	-2.84	-0.02***	-2.66	-0.0191**	-2.44	-0.02	-1.26
INDLEV	0.55***	6.18	0.58***	4.53	0.71	4.61	-0.85***	-6.06
Year & industry dummies	Yes		Yes		Yes		Yes	
Adjusted R^2	0.18		0.18		0.17		0.19	
N	14,499		8,840		8,840		2,545	

Panel B: Market leverage

Variables	**Baseline model**		**Con_nonopaccr**		**Con_nskew**		**Con_diff**	
	Coefficient	*t-stat*	*Coefficient*	*t-stat*	*Coefficient*	*t-stat*	*Coefficient*	*t-stat*
Constant	-0.29***	-15.36	-0.44***	-12.74	-0.50***	-10.86	-0.35***	-14.85
Con_nonopaccr			0.069***	4.57	-	-	-	-
Con_nskew			-	-	0.000058	0.80	-	-
Con_diff			-	-	-	-	0.0000092*	1.45
PROFIT	0.03***	6.12	0.02***	3.48	-0.0037	-0.23	0.01	0.48
DIV	-1.27***	-26.39	-1.33**	-23.95	-0.87***	-10.83	-1.35***	-14.13
SIZE	0.05***	22.90	0.05***	21.31	0.065***	19.24	0.06***	15.27
DEP	-0.021	-0.800	-0.07	-2.12	-0.33***	-4.83	-0.15**	-2.18
TAN	0.12***	21.46	0.10***	14.90	0.11***	11.17	0.06***	5.73
AZ	-0.001***	-6.24	-0.0009***	-3.38	-0.004***	-5.92	0.00***	-2.70
GROWTH	-0.01***	-3.29	-0.007*	-1.75	-0.019**	-2.29	-0.01	-0.85
INDLEV	0.56***	6.63	0.061***	5.38	0.53***	4.11	0.99***	4.24
Year & industry	Yes		Yes		Yes		Yes	
Adjusted R^2	0.28		0.26		0.19		0.27	
Observations	11,634		7,183		7,183		2,274	

Notes: The t-statistics associated with the independent variables are two-tailed, whereas those for the conservatism measures are one-tailed.
***, **and * represent statistical significance at 1%, 5% and 10% levels, respectively (two-tailed test).

Variable definitions:
FLEV: denotes the book value leverage or market value leverage for firm i in year t as defined in section 3.1;
Con_diff: is the ratio of the relative timeliness of a firm's incorporation of bad news relative to good news in its earnings, the differential timeliness ratio, is captured by $(\beta_1+ \beta_2)/ \beta_1$ from the regression $E_{it}/P_{it-1} = \alpha_i +\alpha_{1i}DR_{it} + \beta_1 R_{it} +\beta_2 R_{it}*DR_{it} +\varepsilon_{it}$, where $E_{it}$is the earnings per share for firm *i* in fiscal year *t*; P_{it-1} is the price per share for firm *i* at the beginning of the fiscal year *t*; R_{it} is firm's *i* 15-month return ending three months after the end of fiscal year *t;* and $DR_{it}$is a dummy variable that equals 1 during periods of bad news (e.g., $R_{it}< 0$) and 0 during periods of good news (e.g., $R_{it}>0$). We require companies to have at least seven years of consecutive data including the current year to derive meaningful regression coefficients;
Con_nonopaccr: the ratio of non-operating accruals to total assets. Non-operating accruals is the difference between total accruals and operating accruals deflated by total assets. We determine the average of (non-operating accruals /total assets) using the current and the preceding four years' observations and multiply by negative 1 so that higher values indicate greater conservatism;
Con_nskew: the ratio of the skewness in earnings divided by the skewness in cash flow. We measure skewness using the current and preceding four years' of earnings and cash flows observations and multiply the average skewness by negative 1 so that higher values indicate greater conservatism;
PROFIT: firm profitability measured as operating income divided by total assets;
DIV: firm's payout ratio measured as common stock dividends divided by total assets;
SIZE: firm size measured as the natural logarithm of total assets;
DEP: depreciation expense measured as depreciation and amortisation deflated by total assets;
TAN: assets' tangibility measured as fixed assets divided by total assets;
AZ: Altman's (1968) Z-score, the ex ante probability of financial distress is measured using [3.3 EBIT + 1.0 sales + 1.4 retained earnings + 1.2 working capital/ total assets];
GROWTH: growth opportunities proxied by sales growth and is measured as [$sales_t$-$sales_{t-1}$/total $assets_t$];
INDLEV: industry leverage is the median industry leverage.

With respect to the effect of conservatism on firm leverage, H_1hypothesizes a positive association between the two, because conservatism enhances creditor value by helping debt covenants to prevent managers and shareholders from expropriating value. We use three measures of conservatism and two leverage measures. The coefficient on our first conservatism measure, *con-diff*, is positive for both the book and market leverage measures but statistically significant only for the market leverage measure (t-statistic of 1.45, significant at better than the 10% level, one-tailed test). Our second and third conservatism measures use financial statement information rather than the association between earnings and stock return as in the *con_diff* measure. The coefficient on the second conservatism measure, *con_nonopaccr*, is positive and statistically significant at better than the 1% level (t-statistic of 3.77 and 4.57 for the book and market leverage measures, respectively). Finally, the coefficient on *con_nskew*, although positive in both leverage regressions, is statistically insignificant. We thus conclude that although accounting conservatism appears to positively affect a firm's leverage structure, this benefit is not consistent across conservatism measures. All of the control variables except firm profitability have the expected signs and are statistically significant.

5.2 Accounting conservatism, environmental uncertainty and capital structure

We now present the results for the empirical test of H_2, which holds that the beneficial role of accounting conservatism is context dependent, one such context being a firm's exposure to environmental uncertainty. Firms operating in uncertain environments suffer from greater information asymmetry problems than firms that operate in relatively stable environments. One of the desirable properties of accounting conservatism is the reduction of information asymmetry through the timelier recognition of accounting losses. We thus expect the association between leverage structure and accounting conservatism to be more positive for firms operating in an environment of high uncertainty. To test this hypothesis, we separately run equation (3) for firm-year observations pertaining to high and low uncertain environments. Our parsimonious proxy for the extent of environmental uncertainty is the coefficient of variation of sales (CV of sales), which is based on external market conditions and is developed in equation (2). Panels A and B of Table 3 presents the regression results for the book and market leverage-based measures, respectively.

Table 3. Environmental uncertainty, reporting conservatism and capital structure

$$FLEV_{it} = \alpha_1 + \beta_1 CON_{it} + \beta_2 PROFIT_{it} + \beta_3 DIV_{it} + \beta_4 SIZE_{it} + \beta_5 DEP_{it} + \beta_6 TAN_{it} + \beta_7 AZ_{it} + \beta_8 GROWTH_{it} + \beta_9 INDLEV_{it} + \varepsilon_{it} \quad (3)$$

Panel A: Book leverage

Variables	High EU						Low EU					
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
Constant	-	-9.66	-	-6.00	-0.32***	-6.16	-	-6.28	-	-14.92	-0.49***	-14.92
Con_diff	0.00**	1.65	-	-	-	-	0.00	-0.02	-	-	-	-
Con_nonopac	-	-	0.13**	2.43	-	-	-	-	0.12*	3.86	-	-
Con_nskew	-	-	-	-	0.000013	1.85	-	-	-	-	-	-1.50
PROFIT	0.00	-0.13	-0.01	-0.50	-0.02	-0.88	0.00	0.02	0.03	1.63	0.02	0.90
DIV	-	-3.41	-	-	-0.99***	-	-	-5.12	-	-11.03	-1.09***	-10.88
SIZE	0.08**	12.53	0.05**	10.18	0.05***	10.29	0.07***	7.86	0.0***	19.65	0.07***	19.70
DEP	-0.35	-1.62	-	-2.82	-0.21***	-2.59	-0.24*	-1.70	-	-2.65	-0.20**	-2.09
TAN	0.01	0.91	0.12**	8.24	0.12***	8.24	0.09***	3.67	0.08**	9.39	0.08***	9.47
AZ	0.00**	-2.51	0.00**	-3.83	0.00***	-4.11	-	-2.77	0.00**	-4.34	0.00***	-4.40
GROWTH	-0.02	-0.43	-	-2.22	-0.02**	-1.99	-0.01	-0.96	0.00	-0.10	-0.01	-0.21
INDLEV	0.78**	3.84	0.59**	2.41	0.60**	2.49	1.77***	3.13	0.62**	5.07	0.72***	5.63
Adjusted R^2	0.24		0.12		0.12		0.14		0.23		0.23	
N	1,273		4,418		4,414				4,422		4,414	

Panel B: Market leverage

Variables	High EU						Low EU					
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
Constant	-0.35	-6.71	-	-6.97	-	-6.57	-0.41***	-10.83	-	-	-	-13.63
Con_diff	0.00	1.15	-	-	-	-	0.000013	0.23	-	-	-	-
Con_nonopaccr	-	-	0.10***	3.90	-	-	-	-	0.04**	2.55	-	-
Con_nskew	-	-	-	-	0.00*	1.55	-	-	-	-	-0.00**	-2.48
PROFIT	0.00	0.10	0.02	1.63	0.01	0.85	0.01	0.56	0.03***	3.15	0.02***	3.29
DIV	-	-	-	-	-	-	-1.43***	-9.30	-	-	-	-15.54
SIZE	0.06***	8.69	0.04***	11.05	0.04***	10.80	0.06***	12.19	0.06***	18.85	0.05***	18.15
DEP	-0.04	-0.53	0.00	0.07	0.03	0.61	-0.14	-1.13	-0.06	-0.83	-0.10	-1.49
TAN	0.08***	4.70	0.09***	10.47	0.09***	9.57	0.04***	3.05	0.09***	9.91	0.09***	10.66
AZ	0.00	-1.21	0.00	-0.75	0.00	-1.48	0.00***	-2.74	0.00***	-4.05	0.00***	-3.41
GROWTH	0.00	-0.32	-0.01	-1.62	0.00	-1.15	-0.02	-0.67	0.00	-0.04	0.00	0.12
INDLEV	0.36	1.46	0.75***	3.14	0.65**	2.50	0.50***	3.89	0.58***	4.60	0.64***	5.21
Adjusted R^2	0.33		0.18		0.18		0.15		0.34		0.33	
N	1,137		3,591		3,587		1,137		3,591		3,587	

Notes: The t-statistics associated with the independent variables are two-ailed, whereas those for the conservatism measures are one-tailed.

Variable definitions:
FLEV: denotes the book value leverage or market value leverage for firm i in year t as defined in section 3.1;
Con_diff: is the ratio of the relative timeliness of a firm's incorporation of bad news relative to good news in its earnings, the differential timeliness ratio, is captured by $(\beta_1 + \beta_2)/\beta_1$ from the regression $E_{it}/P_{it-1} = \alpha_i + \alpha_{1i}DR_{it} + \beta_1 R_{it} + \beta_2 R_{it} * DR_{it} + \varepsilon_{it}$, where $E_{it}$is the earnings per share for firm *i* in fiscal year *t*; P_{it-1} is the price per share for firm *i* at the beginning of the fiscal year *t*; R_{it} is firm's *i* 15-month return ending three months after the end of fiscal year *t;* and $DR_{it}$is a dummy variable that equals 1 during periods of bad news (e.g., $R_{it} < 0$) and 0 during periods of good news (e.g., $R_{it} > 0$). We require companies to have at least seven years of consecutive data including the current year to derive meaningful regression coefficients;
Con_nonopaccr: the ratio of non-operating accruals to total assets. Non-operating accruals is the difference between total accruals and operating accruals deflated by total assets. We determine the average of (non-operating accruals /total assets) using the current and the preceding four years' observations and multiply by negative 1 so that higher values indicate greater conservatism;
Con_nskew: the ratio of the skewness in earnings divided by the skewness in cash flow. We measure skewness using the current and preceding four years' of earnings and cash flows observations and multiply the average skewness by negative 1 so that higher values indicate greater conservatism;
EU: environmental uncertainty proxied by the coefficient of variation of sales, calculated as follows:

$$CV(Z_i) = \frac{\sqrt{\sum_{k=1}^{5} \frac{(z_i - \bar{z})^2}{5}}}{\bar{z}} \qquad (2)$$

where, CV is the coefficient of variation, z is the sales observations for each firm in each year and $\bar{Z}$ is the mean sales value. This firm-specific measure of environmental uncertainty is calculated using historical data over a four-year period that includes the current year, and is labelled as $EU_{sales.}$
PROFIT: firm profitability measured as operating income divided by total assets;
DIV: firm's payout ratio measured as common stock dividends divided by total assets;
SIZE: firm size measured as the natural logarithm of total assets;
DEP: depreciation expense measured as depreciation and amortisation deflated by total assets;
TAN: assets' tangibility measured as fixed assets divided by total assets;
AZ: Altman's (1968) Z-score, the ex ante probability of financial distress is measured using [3.3 EBIT + 1.0 sales + 1.4 retained earnings + 1.2 working capital/ total assets];
GROWTH: growth opportunities proxied by sales growth and is measured as [$sales_t$-$sales_{t-1}$/total $assets_t$];
INDLEV: industry leverage is the median industry leverage.

For the book leverage-based measure, the coefficient on *con_diff* is positive and statistically significant at better than the 5% level for the high environmental uncertainty firm-year observations (t-statistic, 1.65, one-tailed test). The corresponding coefficient for the low environmental uncertainty observations is statistically insignificant. This supports the hypothesis that a firm's leverage structure is influenced by accounting conservatism for firms with high information asymmetry as proxied by environmental uncertainty. The coefficient on our second conservatism measure, *con_nonopaccr*, however, is positive and statistically significant for both the high and low environmental uncertainty contexts (t-statistics of 2.43 and 3.86, respectively). Finally, the coefficient on our third conservatism proxy, *con_nskew*, is positive and significant at better than the 5% level for high environmental uncertainty observations, but negative and marginally significant for low environmental uncertainty observations. However, the regression results are weaker for the market-based leverage measure. The coefficients on *con_nonopaccr* and *con_skew* are positive and significant for the high environmental uncertainty observations, but the coefficient of *con_diff* is not. Similar to Panel A, the coefficient on *con_nonopaccr* is also positive and significant for low environmental uncertainty observations. We conclude that the effect of accounting conservatism on firm leverage is somewhat moderated by the level of environmental uncertainty.

In a test of the relationship between capital structure and accounting conservatism, it is critical to explore the potential impact of endogeneity on the empirical findings. In particular, while capital structure may be a function of accounting conservatism, there is also the possibility that accounting conservatism may be endogenously determined with respect to firm capital structure. Ordinary least squares provide a biased estimate of the effect of conservatism on capital structure in this case because accounting conservatism is correlated with the regression's disturbance term. To address endogeneity, we first use one-year-lagged CON measures instead of using contemporaneous CON values as an independent variable in equation (2). The ccoefficient on lagged NONOPACCR is positive and statistically significant at better than the 5% level (coefficient value 0.06, t-statistic 2.20). We also use one-year-lagged leverage measures as independent variables in a regression of NONOPACCR on lagged leverage measure and control variables. The coefficient on BKLEV is positive but not statistically significant at the conventional significance level.[7]

[7] It should be noted that standard econometric solution to endogeneity problem is to implement some type of instrumental variables estimation procedure. Instrumental

6. Concluding remarks

The purpose of this study is to examine the effect of reporting conservatism on a firm's capital structure decisions and the role of environmental uncertainty as a moderating variable. Various accounting researchers have attempted to link accounting conservatism with capital structure decisions. However, although the role of conservatism has been investigated in certain debt-contracting settings, evidence of the effect of conservatism on the degree of financial leverage is sparse. We examine this issue using a sample of Australian firms for the period 1992 to 2005 and find that accounting conservatism positively affects a firm's leverage structure. We also find that the relation between accounting conservatism and firm leverage is moderated by the degree of environmental uncertainty, but this finding is not robust to all three proxies that we use to measure conservatism.

This study has several limitations. First, the selection criteria for the sample and missing data may limit the generalisability of the results. Second, the results should be interpreted with caution because we use only one proxy to measure a firm's environmental uncertainty (an important contextual variable). Nevertheless, despite of these caveats our work contributes to the literature on the association between capital structure and financial reporting quality.

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A COMPARATIVE ANALYSIS OF THE EFFECT OF BOARD CHARACTERISTICS AND GOVERNANCE INDICES ON COMPANIES' COSTS OF FINANCING: THE CANADIAN EVIDENCE

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Abstract

The objective of this study is to examine the effect of board of directors' characteristics compared to that of governance indices that measure board quality, on the costs of financing Canadian firms. We find that the majority of board characteristics have an important and significant effect on the cost of equity capital, the cost of debt and the average cost of capital. On the other hand, in the case of the financing costs studied, we find that the effect of governance indices that assess the quality of boards of directors is not clearly established. Particularly, our results reveal that individual measures of the characteristics of boards of directors allow for a better explanation of companies' costs of financing than do multi-factor commercial and academic governance indices.

Keywords: Board of Directors' Characteristics, Governance Indices, Costs of financing

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1. Introduction

In recent years, increasing attention has been paid to corporate governance around the world particularly after the collapse of several international companies and recurring financial crises. Therefore, corporate governance mechanisms have been constantly evaluated and reformed by policymakers and market participants to develop a framework of best governance practices that can improve firm performance and avoid such crises. The governance-performance relationship literature has gradually progressed from studies that used simple or multiple governance mechanisms to those that used multifactor governance indices. However, the increased attention paid to governance indices both commercial and academic and to multifactor consolidated measures has been the subject of much criticism in recent studies (Bhagat et al., 2008; Bebchuck & Hamdani, 2009; Bozec & Bozec, 2012). In fact, it is not clear if the governance indices perform any better than individual measures of corporate governance mechanisms. The governance indices integrate different governance mechanisms that do not necessarily have the same weight and the same level of importance in the corporate governance system. Although various disciplinary mechanisms (internal or external) are designed to protect the interests of stakeholders from possible abuse by managers, the board of directors occupies a privileged place among the whole array of these mechanisms (Fama & Jensen, 1983).Indeed, the board plays a central role in the resolution of conflicts of interest, reduces information asymmetry and promotes the increase of firm value. Accountability, transparency and disclosure constitute a few of the roles fulfilled by accounting in the governance process. The board of directors is the governance mechanism where most of the strategies and decisions related to these aspects are developed and monitored. Nevertheless, the ability of the board of directors to successfully achieve its allotted roles depends largely on its characteristics(Hendry & Kiel, 2004).

The dominant approach for assessing governance quality in general is to build an index with several aspects of corporate governance. This approach is considered, by some researchers (Gompers et al., 2003; Brown & Caylor, 2006;

Bebchuk et al., 2009), to be of great importance based on the belief that company performance depends on the quality of the governance system. However, another stream of research considers the specific characteristics of the board as determinants of the quality and the effectiveness of corporate governance (Bhagat & Bolton, 2008). It is board characteristics that are highlighted and analyzed more than other governance features by both the leading provider of commercial indices and most of the academic measures This raises the question as to whether the individual measures of board characteristics can be as effective as corporate governance indices that integrate a number of different components of the governance system, including board characteristics.

To this end, our study proposes to evaluate the effect of the board of directors' characteristics compared to corporate governance indices on the financing costs of Canadian companies through its two principal components, the cost of debt and the cost of equity capital. We consider this issue to be relevant in several areas. First, the attention paid to the financial role of the board of directors constitutes a relatively new concern compared to previous accounting research which generally studied the effect of board characteristics on various measures of the financial performance or only on a specific financing cost and not on the costs of several financing resources (Lambert et al., 2007; Gupta et al., 2009). Second, the majority of the previous accounting studies were restricted to assessing the board of directors' characteristics, primarily through the independence of its members, its size, the independence of its audit committee or the financial motivations of the directors (Anderson et al., 2004). However, these characteristics, despite being the most studied dimensions of the board of directors, do not constitute the only engine of its effectiveness. Therefore, we considered it useful to take into account other characteristics which seem to support and improve the effectiveness of the board of directors. Third, a large number of earlier studies relating to similar research questions were undertaken in American or European contexts which differ from the Canadian context. The case of Canada is different because Canadian firms use a specific governance system, characterized by a principle-based governance approach (*Complain or Disclose system*), with strong legal and extra-legal institutions aimed at protecting investors. They operate within a socio-economic environment which has many distinguishing features that may influence both the governance practices and the financing costs. Finally, and particularly, this study is the first, to our knowledge, to provide an empirical comparative analysis between individual governance measures, board characteristics, and governance indices assessing board quality through their effect on companies' costs of financing.

The board's characteristics are mainly related to the independence of directors, the duality of functions of the chief executive officer (CEO) and chairman of the board, the size and operation of the board, the financial motivation of directors, their expertise and experience, the size and independence of the audit committee and the representation of women and financial institutions in the firm's board of directors.

To compare the effect of individual measures of boards' characteristics to multifactor governance indices on firms' costs of financing by equity capital and by debt, we conducted our study on a sample of 192 Canadian companies listed on the Toronto Stock Exchange and belonging to the composite market index S&P/TSX. In general, our findings show the importance of a board's characteristics in determining the cost of equity capital, the cost of debt and also the average cost of capital. In particular, the results of our analyses show the superiority of the individual measures of board characteristics relative to synthesized governance indices measuring the quality of the board, in explaining the variations in the cost of financing for Canadian companies. The remainder of this paper is structured as follows. In the second section, we present the literature review and develop the hypotheses of our research. The methodology of investigation is presented in a third section. Finally, in the last section, we analyze and discuss the results obtained.

2. Review of literature and research hypotheses

2.1. Board of directors and costs of financing

Occupying a central and privileged place in the corporate governance system, an efficient board of directors ensures better control of the opportunism of leaders and a better transparency in the revealed information through a better audit of the countable and financial reporting process. Therefore, it allows a reduction in the exposure of the firm to market risk which will, in turn, promote a reduction in its costs of financing. In fact, the governance literature review supports the finding that firms with a good system of governance present less risk of agency to the shareholders, lenders and other stakeholders, resulting in a better financial performance. The effectiveness of the boards of directors in the achievement of these functions depends largely on their characteristics (Hendry & Kiel, 2004;Gouiaa & Zéghal, 2009). This leads to our first general research hypothesis:

> **H1:** Strong board characteristics allow for reducing companies' costs of financing both by equity capital and by debt.

2.1.1. Independence of board members

According to agency theory, board effectiveness increases with the proportion of independent

directors. Accordingly, corporate governance reports recommend companies introduce independent directors to their board. Several previous studies have also argued that the presence of independent outside directors on the board improves its effectiveness (Zéghal et al., 2011). If lenders and shareholders are interested in the governance mechanisms which delimit managerial discretion and opportunism and improve the accounting and financial reporting process, an effective control supported by independent directors will result in lower costs of financing. In our research, we test the following hypothesis:

H1.1: Board independence has a negative effect on the costs of equity capital and debt.

2.1.2. Board size

This is a characteristic that seems to have a significant influence on the board's performance and efficiency. The accounting literature review has showed that board size plays a significant role in the directors' ability to control the managers and to supervise the accounting and financial process (Lambert et al., 2007; Ghosh et al., 2010). Indeed, large boards generally constitute effective supervisors of the reporting process for investors and creditors through the improvement of the transparency and reliability level in the financial statements. Thus, board size will promote reducing costs of financing both by equity capital and by debt through a better assessment of a firm's default risk. This leads to the following research hypothesis:

H1.2: Board size has a negative effect on the costs of equity capital and debt.

2.1.3. Separation of roles of CEO and chairman of the board

For the board to be effective and to perform its critical functions, it is essential that the position of the chairman and CEO be separate. According to Fama & Jensen (1983), separation between management and control in large firms reduces conflicts of interest and consequently agency costs. Several previous studies have shown that the combination of functions has a negative effect on financial statement quality (Peasnell et al., 2005; Ghosh et al., 2010), and on financial firm performance (Chen et al., 2009).Therefore, we expect investors and creditors should benefit through improved financial transparency and reliability and will require a lower risk premium that will result in lower costs of financing. This leads to the following research hypothesis:

H1.3: Separation of the roles of CEO and chairman of the board has a negative effect on the costs of equity capital and debt.

2.1.4. Independence of audit committee

The accounting literature review has shown that the existence of an independent audit committee enhances financial reporting quality and represents a good corporate governance mechanism (Abbott et al., 2004). Greater disclosure transparency assured by independent audit committees promotes reducing the costs of financing by reducing the level of uncertainty about the economic situation, the financial performance and consequently the level of the estimated default risk (Raghunandan & Rama, 2007). When the levels of risk and uncertainty are high, investors and creditors require a large risk premium for compensation (Anderson et al., 2004). This leads to the following hypothesis:

H1.4: The independence of the audit committee has a negative effect on the costs of equity capital and debt.

2.1.5. The size of audit committee

This is a characteristic that seems determinant of the audit committee's effectiveness in monitoring the financial reporting process. Beasley & Salterio (2001) find that, as audit committee size increases beyond the mandated minimum requirement, firms are more likely to include outside independent directors on the audit committee. This in turn enhances audit committee effectiveness. Improving disclosure transparency through better accounting and financial information and a better level of voluntary disclosure allowed by larger audit committees will result in a better assessment of the business and its risks by shareholders and lenders (Lambert et al., 2007). Thus, effective control exercised by a large audit committee should reduce the costs of financing both by equity capital and by debt. This leads to the following research hypothesis:

H1.5: The size of the audit committee has a negative effect on the costs of equity capital and debt.

2.1.6. Representation of financial institutions in the board

The representation of these institutions in firms' boards of directors reduces information asymmetry and improves the quality and the efficiency of control over the financial accounting process (Kroszner & Strahan, 2001). In fact, representatives of banks and other financial institutions can limit managerial opportunism through a better control of management actions that will, consequently reduce risks and

agency costs faced by shareholders and lenders (Easley &O'Hara, 2004). Therefore, investors and creditors will require a lower risk premium when granting funds to the company. This should result in lower costs of financing by equity capital and by debt. This leads to the following research hypothesis:

H1.6: The representation of financial institutions in the board of directors has a negative effect on the costs of equity capital and debt.

2.1.7. Board tenure

A literature review shows that boards of directors are more attentive and more effective in the control of managers to the extent that their directors are qualified and experienced(Anderson et al., 2004). Gompers et al. (2003) have found a positive relation between the directors' tenure, measured through the number of years during which directors occupy these positions, and the efficiency of the board in monitoring managers and particularly the reliability of accounting and financial information. Indeed, boards composed of competent and experienced members allow for more effective control over the financial accounting process and managerial decisions and this promotes, consequently, a more transparent disclosure without manipulations and discretionary adjustments (Raghunandan & Rama, 2007; Francis et al., 2008). Therefore, the higher the board tenure is, the lower are the risks and agency costs for shareholders and creditors (Anderson et al., 2004; Coles et al., 2008). This leads to the following research hypothesis:

H1.7: Board tenure has a negative effect on the costs of equity capital and debt.

2.1.8. Meeting frequency of the board and its audit committee

The frequency of board activity denotes the level of diligence and scrutiny exercised by the directors (Ghosh et al., 2010). In enhancing the quality of control exercised by the board and its audit committee over the managers and the financial accounting process, meeting frequency should allow for reducing costs of financing by reducing risk levels and agency costs faced by both shareholders and lenders. In fact, when the board and the committees meet more often, it is seen as a signal that governance mechanisms are performing their functions effectively and this reduces the risk of manipulation and discretionary adjustments of the information disclosed (Coles et al., 2008). Because audit committees need to be proactive and ask probing questions about financial reporting, committees meeting more frequently are likely to demand a higher quality of reporting from management and external auditors. This leads to the following research hypothesis:

H1.8: Meeting frequency of the board of directors and its audit committee has a negative effect on the costs of equity capital and debt.

2.1.9. Representation of women in the board

Improving disclosure transparency, boards with a strong representation of women should reduce financing costs by reducing the level of risk that shareholders and creditors assess before investing their money. Indeed, when women are represented in the board of directors, they seek to show other directors and stakeholders that they are also competent in the fulfillment of their duties, making the board more effective in terms of guaranteeing reliable information and an efficient control of the accounting and financial reporting process. This results in a lower uncertainty and risk premium that creditors and investors will require. Also, in addition to their experience and different points of view, women bring new knowledge and new contacts to the board of directors for which relationships are the greatest asset (Adams & Ferreira, 2009). This leads to the following research hypothesis:

H1.9: The representation of women in the board of directors has a negative effect on the costs of equity capital and debt.

2.1.10. Directors' ownership

According to agency theory, the percentage of capital held by the directors can constitute a sufficient incentive for exerting effective control over managers and also over the financial accounting process (Jensen & Meckling, 1976). Thus, independent shareholder directors are more responsive and effective in ensuring a more transparent disclosure that meets the requirements of creditors and investors (Cremers & Nair, 2005; Chen et al., 2009). Consequently, they will face reduced risks and limited agency costs, which should result in lower costs of financing both by equity capital and by debt. This leads to the following research hypothesis:

H1.10: The ownership of independent outside directors has a negative effect on the costs of equity capital and debt.

2.2. Board characteristics and governance indices

Recently, the dominant approach to evaluating the quality of a firm's corporate governance is to construct an index comprised of multiple dimensions of a firm's governance structure (Gompers et al., 2003; Brown & Caylor, 2006; Bebchuk et al., 2009). The corporate governance indices that are currently in use have been either developed by commercial

providers or self-constructed by academic researchers. These indices combine different attributes of the governance system so as to detect the overall quality of corporate governance. Although this evaluation approach to overall governance quality is expanding, some governance scholars still consider specific board characteristics to be the critical determinants of corporate governance quality (Bhagat & Bolton, 2008). To this end, our study sought to compare the effect of governance indices, both academic and commercial, with board characteristics in the detection of governance system quality and to compare the effects of each on companies' costs of financing.

2.2.1. Governance indices

In recent years, researchers and providers of governance services have created measures of corporate governance overall quality that collapse the multiple dimensions of a company's governance into one index(Bozec & Bozec, 2012).The governance indices have been either developed by commercial developers or self-constructed by academic researchers. These indices vary considerably with respect to which attributes of firms' corporate governance are considered sufficiently important to be included. The first indices were created and developed by academics and researchers. But the stream of governance research rapidly generated commercial indices that are designed primarily for institutional investors pursuing information about the quality of a firm's corporate governance system as an aid for portfolio decisions, and to firms that want to signal their governance quality to investors (Bebchuketal.,2009).The main difference between academic researchers and commercial providers in developing governance indices is based on the expertise of these providers and on the analytical approach to corporate governance (Bhagat et al., 2008).

First, the weights given to governance features in the commercial indices differ by feature from one to another and from one company to another. Indeed, commercial indices are generally based on a number of governance factors which are not equally weighted. For example, the weight assigned to the components of the ROB index (Report on Business developed by the Globe & Mail) is based on their correlations with the level of risk and past performance of the company. Furthermore, the scores for these indices and the weights of the items that compose them are also modified and updated to better reflect market trends in corporate governance. Thus, the weighting scale of commercial indices items can be significantly affected by the subjective judgment of analysts based on their experience and knowledge of the companies involved.

Moreover, commercial indices can be expressed in relative terms with each firm rated relative to industry or size peers (Bozec & Bozec, 2012). Indeed, the classification adopted by the commercial developers is linked to other firms in the same industry, the same market or the same region while academic indicators give absolute ratings of the quality of governance practices regardless of comparable companies. Thus, if the weight assigned to a particular governance feature is not consistent with those used by financial market participants in assessing corporate governance quality, incorrect inferences and conclusions will be drawn from empirical studies (Bhagat & Bolton, 2008).In addition, commercial indices generally do not give equal importance to the different attributes of the governance system. Indeed, we find that board characteristics are those most studied while other mechanisms are not included or are poorly weighted (Renders et al., 2010).On the other hand, academic indices are based on a smaller number of governance features that are directly targeted to the studied firms. The governance attributes they select are equally weighted, each taking the value one or zero (binary) to note the presence or absence of a governance practice. Academic indices are supposed to be less subjective than commercial indices. Indeed, they are based on a simple count of the value assigned to each governance feature and are usually expressed as absolute measures (Bozec & Bozec, 2012). When the indices are self-built, researchers have the opportunity to select the sample and the governance attributes that they consider relevant.

Thus, it appears that academic indices are less subjective than commercial indices and, therefore, we expected the academic indices developed by researchers to be more efficient than commercial indices in explaining variations in companies' costs of financing. This leads to our second general research hypothesis:

> **H2**: Academic governance indices perform better than commercial indices in the explanation of variations in companies' costs of financing.

2.2.2. Board characteristics versus governance indices

Although the dominant approach to assessing the quality of a firm's governance system recently is to construct an index including multiple dimensions of firms' governance structure, some governance scholars consider specific board characteristics to be the critical determinants of corporate governance(Brown & Caylor, 2006; Bebchuck et al., 2009).In fact, the board of directors occupies a central and privileged place in the corporate governance system through its role in the control and assurance of transparent disclosure to stakeholders (Ghosh et al., 2010). Corporate law provides the board of directors with the authority to make, or at least ratify, all

important firm decisions, including decisions about investment policy, management compensation policy, and board governance itself. Also, board characteristics are emphasized by the providers of commercial and academic indices over other governance features like the takeover-related governance factors, showing through this the importance of board characteristics in the effectiveness of the governance system. This raises the fundamental question of our research which is whether individual measures of board characteristics can be as effective as measures of corporate governance as indices that consider multiple features of the governance system and the board characteristics.

First, providers and developers of governance indices generally ignore any potential interactions between governance attributes in terms of complementary or substitution relationships. In fact, constructing governance indices by assigning positive weights to all the governance attributes might result in an inaccurate measure of the quality of a company's governance system. Good governance attributes are generally treated as complementary to the governance system when, in fact, they might be substitutes (Bozec & Bozec, 2012). Thus, if various governance attributes contained in the same index are substitutes, the quality of one governance attribute can compensate for the need for another governance dimension (compensatory effect).This substitution hypothesis is supported by a number of studies that have shown a negative relation between governance attributes and even between board of directors' characteristics (Gillan et al., 2007).

Second, if the substitution effect implies some governance attributes are captured by the index and others are not, cross-sectional differences in corporate governance practices can occur, but not necessarily differences in performance (Bebchuck et al., 2009). In any case, not taking into account possible interactions between governance dimensions could result in inaccurate measurement of the governance quality. In addition, the effect of possible substitution between the governance index and other provisions that are not included will inevitably exacerbate the problem of endogeneity (Bozec & Bozec, 2012).

Third, evaluating the quality of a firm's governance system from individual measures of board characteristics rather than a multi-factor index might also be justified on econometric grounds. The more numerous the governance attributes that must be identified in order to assess the quality of the governance system of the firm, the greater the possibility of error in recording the value of any component and therefore the greater the opportunity for errors in the assessment of the overall quality of the governance system (Bhagat & Bolton, 2008). In this context, the association analysis between the overall quality of the governance system and firm performance is often mis-specified with the use of the governance indices since they present a higher level of imprecision in the estimation of governance quality (Brown & Caylor, 2006; Bebchuck et al., 2009).

Finally, the construction of an index requires that all variables be weighted. The weights assigned by a commercial provider in particular to the individual board characteristics and other governance dimensions are very important (Core et al., 2006). Indeed, if the weights are not consistent with weights used by market participants in assessing the relationship between corporate governance and business performance, then erroneous conclusions will be drawn about the relationship between governance and performance, even if the governance index components are properly measured.

Thus, the use of multifactor indices, including different dimensions and characteristics of the corporate governance system instead of individual board characteristics, increases empirical problems associated with the measurement, the endogeneity, the optimization across governance choices and features and the eventual substitution relationship between the dimensions included (Bhagat et al., 2008). Therefore, the use of a single governance feature rather than the governance indices in evaluating corporate governance quality, promotes attenuation and mitigation of these problems. In this context, the board of directors, considered as the central mechanism of corporate governance, has recently received considerable attention. Indeed, the board is able to help to reduce the agency costs of the business and can control managers and executives. Board characteristics are considered attributes of its effectiveness and success in fulfilling its roles (Anderson et al., 2004; Brown & Caylor, 2006; Gouiaa & Zéghal, 2009). They represent the factors responsible for ensuring effective monitoring of important business decisions and supervising implemented management measures. Consequently, board characteristics may be excellent governance measures since they can be used instead of governance indices to assess overall corporate governance quality and therefore to analyze the effect on companies' costs of financing. This leads to our third and main research hypothesis:

> **H3**: Individual measures of board characteristics allow a better explanation of companies' costs of financing than corporate governance indices.

3. Research methodology

3.1. Sample description and data

To test our hypotheses, we analyze the 2010 annual reports of the Canadian companies belonging to the /TSX Composite index, representing the main stock index on the Canadian stock market (245 companies).Among the companies constituting the S&P/TSX Composite index, we eliminate the foreign

companies as well as the Canadian companies involved in the financial sector (banks, insurance, etc.). These companies have been excluded from the sample because accounting policies relative to this industry are very specific and quite different from those applicable to non-financial firms. This treatment is also justified by the fact that the restriction to non-financial firms increases the homogeneity of the sample and improves the robustness and comparability of our findings. In addition, the governance system of financial institutions is very specific and differs from that of non-financial firms (Macey & O'Hara, 2003). We also exclude the companies for which one of the variables was missing and the foreign companies belonging to the market index and subject to specific regulations, which reduces our final sample to 192of the companies listed on the Toronto stock exchange (TSX).

Data for this study were collected from different databases. On the one hand, stock information was collected from the TSE-CFMRC database (Toronto Stock Exchange - Canadian Financial Markets Research Centre) and from the financial section of the website http://ca. finance.yahoo.com / for the period of the study. On the other hand, accounting and financial data as well as analysts' forecasts were extracted from the Research Insight database (COMPUSTAT). In addition, we collected information regarding the two governance indices used in this research, GM Index (Globe & Mail) and BSC Index (Board Shareholder Confidence Index), from their respective websites. Finally, board characteristics data, as well as all non-available data at the above databases were collected manually from the companies' annual reports for 2010. These reports have been downloaded from the online database SEDAR (System for Electronic Document Analysis and Retrieval).

3.2. Measurement of variables

3.2.1. Costs of financing

*a. Cost of equity capital **(COST_EQ)**:*we use the ex-ante model of Easton (2004) to estimate the cost of equity capital. The model of Easton is based on the estimation of abnormal earnings defined as current earnings of the period plus profits of reinvested dividends of the previous period less the forecasted normal earnings based on the earnings of last period. This model assumes that abnormal earnings as defined persist in perpetuity. The choice of this model is justified on the one hand by its simplicity as it doesn't require a lot of data and secondly, by the superiority of methods based on the abnormal earnings growth in estimating the cost of equity capital particularly the PEG models (Price-Earnings Growth) compared to other ex-ante models estimating this cost of financing. Thus, the cost of equity capital is estimated through the following formula:

$$r_{PEG} = \sqrt{\frac{eps_2 - eps_1}{P_0}}.$$

In this model, eps_1corresponds to analysts' average forecast of earnings per share for the next year, $eps_2$is analysts' average forecast of earnings per share in two years, and $P_0$the share price at the end of the current year. In the context of estimating the ex-ante cost of equity in 2010, we use forecasts of earnings per share for 2011and2012taken from I/B/E/Sdatabase *(Institutional Brokers' Estimate System)* at the end of 2010.

*b. Cost of debt**(COST_DEB)**:*this dependent variable is estimated by the yield spread which is measured as the difference between the weighted-average yield to maturity on the firm's outstanding (non-provisional) publicly traded debt and the yield to maturity on a Treasury security with a corresponding duration, where the weight of each debt issue is the fraction of the amount outstanding for that issue divided by the total market value of all outstanding traded debt for the firm. The yield on a corporate debt security is defined as the discount rate that equates the present value of the future cash flows to the security price. This value is collected from the Research Insight database for 2010.

*c. Average cost of capital **(AVC_CAP)**:*this cost of capital is calculated by weighting the cost of different sources of financing by their ratios in the capital structure of the firm. The relative weights to each source of financing are evaluated based on book values.

3.2.2. Board characteristics

a. Board independence**(BRD_IND)**:following previous studies (Abbott et al., 2004; Peasnell et al., 2005; Zéghal et al., 2011), we measured the independence of the board of directors by the percentage of independent[8]external directors serving on the board.
b. Board size **(BRD_SIZE)**: in accordance with previous studies (Anderson et al., 2004: Coles et al., 2008), board size was measured by the number of directors serving in the board.
c. Separation of functions of CEO and chairman of the board**(DUAL)**: in accordance with previous studies (Beasley& Salterio, 2001; Peasnell et al., 2005), separation of the roles of CEO and Chairman of the Board was measured by a dummy variable that takes the value one if there is separation of functions and zero otherwise.

[8]A director is independent, according to the Canadian regulation (NI52-110 related to audit committee), if he or she has no direct or indirect material relationship with the issuer. A material relationship is a relationship which could, in the view of the issuer's board of directors, be reasonably expected to interfere with the exercise of a member's independent judgement.

d. Audit committee independence **(AUD_IND)**:this variable is measured by the percentage of the independent directors serving on the audit committee. This measure was used by several previous studies such as Anderson et al. (2004) and Ghosh et al. (2010).
e. Audit committee size **(AUD_SIZE)**: in accordance with previous studies (Peasnell et al., 2005; Leung & Horwitz, 2010), the size of the audit committee is measured by the number of directors serving on this committee.
f. Representation of financial institutions in the board **(REP_FI)**: following the previous study of Kroszner & Strahan (2001), we measured this variable by a dummy variable that equals one when there are representatives of financial institutions (banks, financial establishments or credit organizations) in the board of directors of the company and zero otherwise.
g. Board tenure **(BRD_TEN)**: this variable is measured by the average of the function duration of directors in the company's board of directors. It corresponds to the sum of the number of years that the directors serve on the board divided by the number of directors. This measure was used by Anderson et al. (2004) and Gouiaa & Zéghal (2009).
h. Meeting frequency of the board and its audit committee: in accordance with previous studies (Peasnell et al., 2005; Ghosh et al., 2010), the meeting frequency of the board of directors **(BRD_FRQ)** and the audit committee **(AUD_FRQ)**is measured by the number of board and audit committee meetings per year.
i. Representation of women in the board **(REP_WOM)**:we measured this variable by a dummy variable that equals one when there are women represented in the board of directors and zero otherwise. This measure was used in previous studies such as Adams & Ferreira (2009).
j. Ownership of independent directors **(IND_OWN)**: following previous studies (Cremers & Nair, 2005; Chen et al., 2009), we measured the ownership of independent directors by the percentage of capital owned by external independent directors serving on the board.

3.2.3. Governance indices

*a. G&M governance index **(GM_INDEX)**:* this commercial governance index focuses on different features of the board structure. It constitutes a part of a multifactor index, *Report On Business (ROB)*, and is developed by the Canadian newspaper, the Globe & Mail. GM_INDEX is a proxy to assess a corporate governance system and measure information transparency about governance practices. More precisely, this multifactor index includes four dimensions of corporate governance. The first dimension, board composition, (maximum of 31 marks out of 100), evaluates the independence of the directors serving on the board, the audit committee, the compensation committee and the remuneration committee. The second dimension evaluates compensation policy (maximum of 27 marks out of 100) and detects the ownership of directors and the CEO. The third dimension assesses shareholder rights (maximum of 30 marks out of 100). Finally, the fourth dimension measures the level and the quality of information on corporate governance (maximum of 12 marks out of 100).Since its publication in October 2002, this index has been used in several studies (Foerster & Huen, 2004; Ben Amar & Boujenoui, 2008).We focus initially on the sub-index (GM_INDEX) related to board composition as it evaluates the quality of this governance mechanism. Then, in an additional analysis, we use the overall index (ROB_INDEX) developed by G&M. The score of this index equals the sum of assigned values to each item of the index. A higher value of this index theoretically implies a strong governance system and an effective board complying with the rules and requirements of good governance.

*b. Board Shareholder Confidence Index **(BSC_INDEX)**:*this academic governance index has been developed since 2003 by the Clarkson Centre for Business Ethics and Board Effectiveness of the Joseph L. Rotman School of Management at the University of Toronto. This academic index provides an analysis of the quality of governance practices related to boards of directors of publicly traded Canadian companies listed on the S&P/TSX Composite Index. It has been used by several previous studies (Beekes et al., 2007; Switzer & Cao, 2011).The BSC Index is comprised of the factors often used by active shareholders to assess boards of directors. It captures factors affecting shareholders' confidence in the boards' abilities to fulfill their duties. Factors assessed by this index are related to the independence and ownership of directors, the structure and system of the board, and past board practices in terms of compensation and directors and CEO nomination. Each company is ranked between AAA (the highest value) and C (the lowest value) of each item of the index, with AAA representing the best corporate governance structure and C representing the other extreme. An overall score is given by the aggregation of scores for the eight dimensions evaluated separately. This overall score ranges from AAA+ (best governance quality) to C (lowest governance quality).

Inspired by the construction methodology of the BSC index and transformations wrought by Beekes et al. (2007) and Switzer& Cao (2011), we transformed the overall score ranging from C to AAA+ in a metric variable theoretically ranging between 20 and 100 in order to facilitate the analysis of this index. The final value of the BSC index, as core between C and AAA+ in the Clarkson system, is converted into a digital

value by adding the sum of allocated deductions for each item of the index to the raw score of 100. Thus, a higher value of this index reflects a better quality of the board.

3.2.4. Firms' characteristics

a. Firm size **(FIRM_SIZE)**:is measured by the natural logarithm of the book value of total assets. It was used by several studies (Chen et al., 2009; Zéghal et al., 2011).
b. Profitability **(ROA)**: following previous studies (Beekes et al., 2007; Leung & Horwitz, 2010), we measured firm profitability by the Return on Assets ratio which is equal to the earnings before interest and taxes (EBIT) divided by total assets.
c. Growth opportunities **(MB)**:in accordance with previous studies (Ben Amar & Boujenoui, 2008; Gouiaa &Zéghal, 2009), this variable is measured by the Market-to-Book ratio which is equal to the market capitalisation divided by the book value of equity.
d. Leverage **LEV)**: following the studies of Anderson et al. (2004) and Leung & Horwitz (2010), leverage is measured through the level of debt in the capital structure based on the book values, which correspond to the total financial debts divided by the total assets.
e. Volatility **(VOLAT)**:the level of firm risk is measured by the volatility of securities' return which is equal to the standard deviation of monthly stock returns. This measure was also used by Anderson et al. (2004) and Lambert et al. (2007).
f. Industry **(IND)**:to measure this variable, we used four dummy variables for the four main industries: **IND1** (Energy), **IND2** (Material), **IND3**(Manufacture) and **IND4** (Services). Each variable is measured by a dummy variable that equals one if the firm belongs to the specific industry and zero otherwise. This measure was used by several studies (Beeks & Brown, 2006; Ben Amar & Boujenoui, 2008; Leung & Horwitz, 2010).

3.3. Research models

In order to compare the effect of individual measures of board characteristics to complex indices assessing overall governance and board quality on the main costs of financing of Canadian companies (cost of equity capital, cost of debt and average cost of capital), we use the following model:

$$COST\_CP/COST\_DEB/AVC\_CAP=\beta_0 + \beta_1 BRD\_SIZE + \beta_2 BRD\_IND + \beta_3 SEP\_FCT + \beta_4 AUD\_SIZE + \beta_5 AUD\_IND + \beta_6 IND\_OWN + \beta_7 BRD\_FRQ + \beta_8 AUD\_FRQ + \beta_9 BRD\_TEN + \beta_{10} REP\_FI + \beta_{11} REP\_WOM + \beta_{12} FIRM\_SIZE + \beta_{13} ROA + \beta_{14} MB + \beta_{15} LEV + \beta_{16} VOLAT + \beta_{17} IND + \varepsilon$$

Then, we substitute board characteristics by the governance indices selected in our study to compare the explanatory power of these indices with respect to the individual measures of board characteristics in determining companies' costs of financing by equity capital, by debt, and the average cost of capital. For this we use the following model:

$$COST\_CP/COST\_DEB/AVC\_CAP=\beta_0 + \beta_1 GM\_INDEX / BSC\_INDEX + \beta_2 FIRM\_SIZE + \beta_3 ROA + \beta_4 MB + \beta_5 LEV + \beta_6 VOLAT + \beta_7 IND + \varepsilon$$

Owing to the fact that all the dependent variables are continuous and follow a normal distribution, we use multiple linear regression models to estimate these equations. However, the application of the linear regression model is subjected to several conditions.

3.3.1. Checking for the absence of heteroscedasticity

Given that the problem of autocorrelation of errors does not arise for individual data (cross-section analysis), we test the possible existence of a problem of heteroscedasticity of errors. Within this framework, we used the test of White. The results of this test show that there is no problem of heteroscedasticity in all the regression models used in our study.

3.3.2. Checking for the absence of multicollinearity between independent variables

To test for the absence of multicollinearity problems, we calculated the Pearson correlation coefficients between independent variables and we calculated the Variance Inflation Factor (VIF). An analysis of the correlations between independent variables shows that all the correlation coefficients are smaller than 0.8 which corresponds to the limit from which we would generally start to have serious multicollinearity problems. Moreover, tables2, 4 and 5 show that any VIF that is found does not exceed the limit of 3. This leads us to conclude that problematic multicollinearity is not present.

4. Results analysis

4.1. Descriptive Analysis

Descriptive statistics presented in the first part of table 1 related to continuous variables (Part A)indicate that the average cost of equity capital for Canadian companies is equal to 11%. These statistics reveal that this cost of financing varies between 1.3% and 29.9% showing significant differences between Canadian firms. These results also reveal differences in the cost of debt ranging between 0.1% and 69.5% with an average of 12.1%. We observe that the average cost of capital is equal to 11%.

These statistics also show that the average board size is approximately 9 directors (9.171) and varies between 4 and 16 directors. An examination of board composition reveals that on average 74.1% of board directors are independent in accordance with the Canadian NI 52-110, and own on average 1.50% of the company's stocks. Moreover, the average size of the audit committee is 4 directors (3.829). The average percentage of independent directors serving on the audit committee is 95.40%. Moreover, these results show that Canadian boards of directors meet at least two times and not more than 20 times with an average of 9.5 meetings per year and that audit committees meet 3 to 11 times with an average of five times per year. These results also reveal that the average board tenure is 7.726 years. As indicated in Part B of table 1, the dual structure in which the functions of CEO and chairman are not separated is the one most often adopted by Canadian companies (60.98%). These results also show that 56.10% of the companies studied have one or more representatives of financial institutions in their boards. Finally, these results indicate that women are represented in 54.88% of the boards of Canadian companies. These results indicate that despite efforts into encouraging the presence of women on boards, women are, in fact, not represented in almost half of Canada's largest companies. In addition, the descriptive analysis shows that the Canadian firms studied have an average debt level of 25.4% with an average level of risk, measured by the volatility of stock returns, of 110%.

Table 1. Descriptive statistics

Part A :ContinuousVariables

Variables	N	Mean	Median	S.D.	Min	Max
COST_EQ	192	0.110	0.107	0.054	0.013	0.299
COST_DEB	192	0.121	0.068	0.177	0.001	0.695
AVC_CAP	192	0.110	0.095	0.074	0.014	0.518
BRD_SIZE	192	9.171	9.000	2.372	4.000	16.000
BRD_IND	192	0.741	0.750	0.135	0.250	1.000
AUD_SIZE	192	3.829	4.000	0.940	3.000	6.000
AUD_IND	192	0.954	1.000	0.125	0.333	1.000
IND_OWN	192	0.015	0.003	0.041	0.000	0.266
BRD_FRQ	192	9.500	8.500	3.798	2.000	20.000
AUD_FRQ	192	5.366	5.000	1.568	3.000	11.000
BRD_TEN	192	7.726	7.236	3.606	1.000	17.867
FIRM_SIZE	192	3.463	3.417	0.533	2.469	4.613
ROA	192	2.173	3.161	5.615	-16.144	15.533
LEV	192	0.254	0.234	0.164	0.002	0.740
MB	192	2.156	1.833	2.634	-6.591	21.762
VOLAT	192	1.100	1.050	0.590	0.056	2.625
GM_INDEX	192	19.244	20.000	5.241	8.000	28.000
BSC_INDEX	192	67.573	69.500	12.894	38.000	90.000
ROB_INDEX	192	62.845	62.000	15.570	27.000	95.000

Part B :DummyVariables

SEP_FCT			
	Value	**Frequency**	**Percentage**
Separation of functions of CEO and chairman	1	75	39.02%
Duality of functions of CEO and chairman	0	117	60.98%
REP_FI			
No representation of financial institutions in the board	0	84	43.90%
Representation of financial institutions in the board	1	108	56.10%
REP_WOM			
No representation of women in the board	0	87	45.12%
Representation of women in the board	1	105	54.88%

4.2. Multivariate Analysis

4.2.1. Analysis of the effect of board characteristics on the costs of financing

The results of the regression models (table 2) examining the effect of board characteristics on the costs of financing show satisfactory explanatory powers with statistically significant Fisher coefficients. The values of adjusted R^2 indicate that 37.8% of the variation in the cost of equity, 28.9% of the variation in the cost of debt and 35.3% of the variation in the average cost of capital is explained by board characteristics and control variables. The results of this analysis show that board size, tenure and audit committee size have a negative and statistically significant impact on the cost of equity capital. These results also show that boards in which women and financial institutions are represented reduce this cost of financing. Moreover, our findings reveal that, on the one hand, firm size has a negative and statistically significant effect on the cost of equity capital but, on the other hand, debt level of the firm and the volatility of its stocks returns have a positive and significant impact on this cost of financing. Results analysis of the regression model studying the effect of board characteristics on the cost of debt (table 2) shows that larger boards, with greater ownership of independent directors, larger audit committees, experienced and competent directors and where financial institutions are represented allow for a reduction in companies' costs of debt. This analysis also shows that larger companies with lower leverage significantly benefit from lower costs of debt. Finally, the results of the regression model analyzing the effect of board characteristics on the average cost of capital show that larger boards composed of qualified and experienced directors and in which financial institutions are represented have a negative and significant effect on the average cost of capital. These results highlight the importance of board characteristics in general by showing that the more efficient and the stronger the board, the lower the costs of financing.

Table 2. The effect of board characteristics on costs of financing

Dependant variables : Costs of financing										
Variables	**Predicted sign**	***COST_EQ***			***COST_DEB***			***AVC_CAP***		
		Coef. β	**Sig.**	**VIF**	**Coef. β**	**Sig.**	**VIF**	**Coef. β**	**Sig.**	**VIF**
Intercept		0.016**	0.046	0.000	0.006**	0.020	0.000	0.027**	0.019	0.000
BRD_SIZE	-	**-0.082***	0.061	1.645	**-0.055***	0.075	1.516	**-0.134***	0.072	0.762
BRD_IND	-	-0.224	0.194	2.111	-0.015	0.918	0.743	-0.181	0.182	2.277
SEP_FCT	-	-0.037	0.763	2.100	-0.019	0.889	0.691	-0.064	0.612	0.583
AUD_SIZE	-	**-0.166****	0.027	0.740	**-0.267***	0.098	1.367	-0.213	0.166	1.592
AUD_IND	-	-0.156	0.287	1.445	-0.055	0.726	2.189	-0.132	0.378	1.413
IND_OWN	-	-0.059	0.196	0.891	**-0.199***	0.085	0.678	-0.104	0.386	1.058
BRD_FRQ	-	-0.119	0.330	1.723	-0.079	0.154	1.359	-0.017	0.295	2.250
AUD_FRQ	-	-0.078	0.150	2.219	-0.140	0.258	2.034	-0.076	0.519	1.405
BRD_TEN	-	**-0.088***	0.100	1.556	**-0.198****	0.015	1.839	**-0.239***	0.071	2.124
REP_FI	-	**-0.103****	0.042	2.078	**-0.135****	0.034	1.125	**-0.194***	0.088	0.796
REP_WOM	-	**-0.173***	0.068	0.539	-0.072	0.589	0.740	-0.065	0.161	1.541
FIRM_SIZE	-	**-0.156****	0.029	1.343	**-0.278***	0.083	1.739	**-0.229***	0.083	1.662
ROA	-	-0.027	0.823	1.891	0.028	0.134	2.179	0.023	0.265	1.466
MB	-	-0.149	0.193	1.315	-0.065	0.160	2.006	-0.016	0.894	0.846
LEV	+	**0.199***	0.092	0.679	**0.026***	0.085	1.769	**0.093***	0.086	0.954
VOLAT	+	**0.018***	0.084	0.790	0.066	0.191	2.028	**0.094****	0.042	1.324
IND1	+/-	0.054	0.378	1.127	-0.173	0.216	2.016	-0.074	0.401	1.191
IND2	+/-	0.148	0.308	2.199	0.015	0.922	1.251	0.049	0.174	0.751
IND3	+/-	0.171	0.163	1.710	0.015	0.926	1.220	**0.023***	0.088	1.402
IND4	+/-	-0.090	0.550	2.170	-0.163	0.314	0.499	-0.129	0.403	0.732
N = 192		**AdjustedR^2 = 0.378 F = 2.93*****			**Adjusted R^2 = 0.289 F = 2.37*****			**Adjusted R^2 = 0.353 F = 2.85*****		

***: significant at 1% level **: significant at 5% level *: significant at 10% level

4.2.2. Analysis of the effect of governance indices on the costs of financing

With the aim of taking the results we found that related to the effect of individual measures of board characteristics and comparing them to other measures assessing the quality of this governance mechanism and particularly governance indices assessing the quality of the board in determining companies' costs of financing, we analyze the effect of two governance indices GM_INDEX and BSC_INDEX.

We start this analysis by examining the correlation between these two governance indices and the individual measures of board characteristics. The obtained results (table 3) show positive correlations between BSC_INDEX and all board characteristics. However, separation of functions, ownership of independent directors and board tenure are not positively correlated to the GM_INDEX. Our results (table 3) indicate that these correlations are statistically significant only for the characteristics related to board independence, tenure and audit committee size. All the other correlations between individual characteristics and the two studied indices are not statistically significant. These results show the limitations of these two indices, particularly the commercial index GM_INDEX, in the effective evaluation of the quality and attributes of the board of directors since they are significantly correlated to a reduced number of key features of this governance mechanism. In addition, our findings show the existence of a substitution relationship between board characteristics since they are not all positively and significantly correlated with the studied governance indices.

Table 3. Analysis of the correlations between governance indices and board characteristics

	BRD_SIZE	BRD_IND	SEP_FCT	AUD_SIZE	AUD_IND	IND_OWN	BRD_FRQ	AUD_FRQ	BRD_TEN	REP_FI	REP_WOM
GM_INDEX	0.117	0.209	-0.087	0.221	0.131	-0.028	0.069	0.156	-0.230	0.070	0.104
	(0.296)	(0.060)	(0.435)	(0.046)	(0.242)	(0.804)	(0.539)	(0.162)	(0.038)	(0.534)	(0.354)
BSC_INDEX	0.156	0.435	0.182	0.221	0.104	0.015	0.146	0.156	0.001	0.143	0.134
	(0.162)	(0.000)	(0.102)	(0.046)	(0.354)	(0.896)	(0.190)	(0.163)	(0.995)	(0.200)	(0.229)

In this analysis, we substitute board characteristics by governance indices analyzing the quality of the board in the regression models seeking to examine the effect of this governance mechanism on the costs of financing by equity capital, by debt and on the average cost of capital. The results of these regression models, shown in table 4, reveal the superiority of the individual measures of board characteristics in explaining the differences in Canadian companies' costs of financing.

On the one hand, the results of the regression models presented in table 4 reveal lower explanatory powers than those that incorporate board characteristics. These limited explanatory powers show the superiority of the individual measurements of board characteristics compared to synthesized commercial indices in explaining differences in the costs of financing. In addition, the coefficients associated with the governance index are not statistically significant and do not show signs consistent with the theoretical predictions in all models analyzing the impact of this index on the costs of financing by equity capital, by debt and on the average cost of capital. Therefore, our findings reveal that this commercial governance index does not detect the effect of the quality of the board of directors on the costs of financing of Canadian firms.

On the other hand, the regression models analyzing the effect of the academic governance index (BSC_INDEX) on the costs of financing (table 4) show that the explanatory powers of this index are greater than those provided by the commercial index (GM_INDEX). These results thereby confirm our second research hypothesis. However, these enhanced explanatory powers related to the academic index remain lower than those of the individual measurements of board characteristics showing once again the superiority of the individual measures compared to governance indices in the determination and the explanation of companies' costs of financing. Moreover, these results show that this measure of board efficiency has a negative and significant effect only on the average cost of capital. Indeed, our findings show a negative but insignificant effect of this governance index on the cost of equity capital and the cost of debt. In addition, the obtained results show that the effect of the volatility of firm's stock returns, respectively, on the cost of equity, the cost of debt and the average cost of capital is not significant using indices GM_INDEX and BSC_INDEX instead of the individual measures of board characteristics.

In conclusion, our findings reveal that the two studied governance indices cannot assess the effectiveness and the true quality of the board of directors and consequently do not explain variations in the companies' costs of financing. In addition to the low quality of these indices, these results can be explained by the substitution relationship between the different attributes and characteristics of the board of

directors and therefore limit the powers of governance indices.

Table 4. The effect of governance indices on the costs of financing

Dependant variables : Costs of financing																			
Variables	**Predicted sign**	***COST_EQ***						***COST_DEB***						***AVC_CAP***					
		Coef. B	**Sig.**	**VIF**	**Coef. B**	**Sig.**	**VIF**	**Coef. B**	**Sig.**	**VIF**	**Coef. B**	**Sig.**	**VIF**	**Coef. B**	**Sig.**	**VIF**	**Coef. B**	**Sig.**	**VIF**
Intercept		0.016**	0.029	0.000	0.014*	0.088	0.000	0.013**	0.025	0.000	0.026**	0.034	0.000	0.021*	0.065	0.000	0.019**	0.012	0.000
GM_INDEX	-	-0.026	0.198	1.572				0.059	0.261	0.989				0.007	0.159	1.505			
BSC_INDEX	-				-0.140	0.194	1.999				-0.010	0.134	0.563				**-0.054***	0.097	0.965
FIRM_SIZE	-	**-0.212*** **	0.010	2.006	**-0.258** **	0.031	1.026	**-0.260***	0.061	0.852	**-0.234***	0.067	0.983	**-0.248***	0.060	2.249	**-0.262** **	0.031	1.045
ROA	-	-0.034	0.771	1.505	-0.055	0.961	1.199	0.030	0.158	1.094	0.031	0.135	0.862	0.028	0.183	0.693	0.027	0.225	1.553
MB	-	-0.148	0.183	1.364	-0.175	0.121	1.174	**-0.032***	0.079	0.152	-0.030	0.180	1.547	-0.055	0.622	0.741	-0.065	0.566	0.834
LEV	+	**0.179***	0.090	2.134	**0.170***	0.074	1.948	**0.005****	0.027	0.097	**0.093***	0.099	2.177	**0.065***	0.096	0.705	**0.088***	0.094	1.671
VOLAT	+	0.021	0.141	0.911	0.017	0.202	0.481	0.067	0.175	2.236	0.064	0.653	1.222	**0.219****	0.012	1.956	**0.085***	0.061	1.489
IND1	+/-	0.076	0.279	0.594	0.091	0.182	1.645	-0.207	0.233	1.940	-0.104	0.309	1.098	-0.069	0.387	0.830	-0.056	0.372	0.734
IND2	+/-	0.174	0.179	1.554	0.148	0.255	1.617	0.081	0.556	1.461	0.082	0.557	1.325	0.048	0.178	2.193	0.068	0.209	1.028
IND3	+/-	0.064	0.644	0.742	0.012	0.936	1.833	0.023	0.988	1.861	0.003	0.984	1.817	0.058	0.110	0.772	**0.014***	0.093	2.096
IND4	+/-	-0.098	0.495	1.154	-0.127	0.378	1.349	-0.075	0.620	0.513	-0.076	0.623	1.009	-0.060	0.674	0.753	-0.071	0.624	0.706
N = 192		**Adjusted R^2 = 0.120 F = 2.07*** **			**Adjusted R^2 = 0.148 F = 2.15*** **			**Adjusted R^2 = 0.072 F = 1.37****			**Adjusted R^2 = 0.108 F = 1.69****			**Adjusted R^2 = 0.131 F = 2.01*** **			**Adjusted R^2 = 0.164 F = 2.34*** **		

***: significant at 1% level **: significant at 5% level *: significant at 10% level

4.2.3. Additional analysis: the effect of a multifactor governance index on the costs of financing

In this additional analysis, we substitute board characteristics by a commercial governance index evaluating various dimensions of corporate governance (ROB_INDEX) in three regression models seeking to examine the effect of the governance system on the cost of equity capital, the cost of debt and the average cost of capital. The results of the regression models analyzing the effect of this index on the costs of financing (table 5) show once again the superiority of the individual measures of board characteristics in explaining differences in the costs of financing of Canadian companies. Indeed, the explanatory powers generated by the use of this index are less important than those generated by using board characteristics and governance indices GM_INDEX and BSC_INDEX.

The insignificant effect of this multifactor governance index on the costs of financing of Canadian firms shows the limits of governance indices in the detection of the overall quality of the corporate governance system. These findings confirm the results of Gillan et al. (2007) showing the limitations of multi-dimensional indices in assessing the effectiveness and the quality of the governance system. The insignificant effect of this index can be explained by, among other things, the substitution relationship between the different governance dimensions that makes the index ineffective in detecting the effect of corporate governance on the costs of financing.

Table 5. The effect of multifactor governance index on the costs of financing

Dependant variables : Costs of financing										
Variables	**Predicted sign**	***COST_EQ***			***COST_DEB***			***AVC_CAP***		
		Coef. β	**Sig.**	**VIF**	**Coef. β**	**Sig.**	**VIF**	**Coef. β**	**Sig.**	**VIF**
Intercept		0.026**	0.047	0.000	0.075**	0.039	0.000	0.045**	0.046	0.000
ROB_INDEX	-	-0.019	0.363	2.084	-0.026	0.538	1.107	0.018	0.147	1.298
FIRM_SIZE	-	**-0.192****	0.048	1.929	**-0.193***	0.089	0.903	**-0.201***	0.079	1.763
ROA	-	-0.071	0.675	1.813	0.097	0.191	1.286	0.019	0.206	0.902
MB	-	-0.201	0.153	1.691	**-0.049***	0.081	0.398	**-0.051***	0.087	1.043
LEV	+	**0.156***	0.092	1.903	**0.015***	0.085	0.125	0.048	0.185	0.906
VOLAT	+	0.064	0.198	1.105	0.092	0.178	1.432	**0.183***	0.072	2.071
IND1	+/-	0.046	0.367	0.721	-0.175	0.306	1.409	-0.081	0.456	1.238
IND2	+/-	0.224	0.158	1.209	0.092	0.685	1.897	0.019	0.338	2.072
IND3	+/-	0.057	0.785	0.865	0.010	0.923	1.585	0.106	0.123	0.945
IND4	+/-	-0.090	0.417	1.309	-0.073	0.649	0.642	-0.069	0.795	0.628
N = 192		**Adjusted R^2 = 0.073 F = 1.27****			**Adjusted R^2 = 0.069 F = 1.32****			**Adjusted R^2 = 0.091 F = 1.47****		

***: significant at 1% level **: significant at 5% level *: significant at 10% level

5. Summary and Conclusion

In conclusion, the obtained results showed the importance of the effect of individual measures of board characteristics compared to governance indices on the costs of financing for Canadian companies. Indeed, our findings highlight the importance of board characteristics in general by showing that the more efficient the majority of these characteristics are, the lower the costs of financing by equity capital and by debt. Particularly, our results reveal the superiority of the individual measures of board's characteristics compared to synthesized governance indices measuring the quality of the board, in explaining the variations in the costs of financing for Canadian companies. We find that the studied governance indices cannot evaluate the quality of the board of directors and consequently do not explain effectively the variations in the costs of financing. In fact, the existence of a substitution relationship between the different characteristics of the board of directors limits the power of the governance indices in determining and explaining variations in costs of financing. We conclude that governance indices are highly imperfect and that investors and policymakers should exercise extreme caution in attempting to draw inferences regarding a firm's quality or future stock market performance from its ranking on any particular governance measure.

So, if investors have to make a choice between using a governance index and one governance dimension to predict performance from the quality of a firm's governance, they would do better to analyse the quality and the effectiveness of the board of directors through an evaluation of its characteristics. Our findings also reveal the power of board characteristics to assess governance quality and will encourage institutional investors to reduce or eliminate their need to use commercial services to measure a firm's governance quality.

Nonetheless, our study has a few limitations. First, we could not include all board and governance characteristics because the required data is not publicly available. Second, our results are based on a sample of 192 Canadian companies in 2010. Results from a larger sample using more recent data might provide additional insights. Finally, it would also be interesting to integrate the influence of the institutional environment differences in the explanation of the costs of financing of the companies through an international comparison.

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AGENCY ISSUES IN STOCK OPTION '6 AND 1' EXCHANGE: REVISITED

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Abstract

Prior studies (Coles et al., 2006; Carter and Lynch, 2007) do not find significant evidence that managers' actions reduce stock price prior to the option reissue date in the stock option '6 and 1' exchanges. This paper reinvestigates the stock price pattern with a larger sample and a better control group. We find that stock return prior to option reissue date is significantly lower for option exchange programs that include top executives than who do not. Following the option reissue, the stock return is higher for option exchange programs that include top executives than who do not. This finding suggests that top management may have incentives to increase future option payouts by holding down stock price from increasing.

Keywords: Agency Issue, '6 and 1' Exchange, 'Executive' Option Reissues, Stock Return

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I. Introduction

Employee stock options (ESO) have long played a critical role as an effective means to resolve conflicts of interest between employees and shareholders by aligning employees' interests with those of shareholders. However, deep-out-of-the-money options - that is, options whose exercise price is much higher than the stock price - cannot sufficiently play the role as incentives for managers (Hall and Murphy, 2002). To resolve this problem, firms often implement stock option repricing by canceling the deep-out-of-the-money options and reissuing options with a lower exercise price.[9]

In 2000, FASB issued a new rule, FIN 44 whereby firms engaging in option repricing were required to follow variable method accounting to recognize any stock price changes for the repriced options in the income statement.[10] However, FIN 44 also provided an exception that if firms reissue the options at least 6 months and 1 day after cancellation, option repricing would simply be considered a new grant of option and firms would be exempt from recording any expense/gains in the subsequent periods in the financial statements. This exception potentially created a new agency issue that managers participating in this program could have an incentive to manage the stock price at the option reissue date, in order to obtain a lower exercise price on these new options (Carter and Lynch, 2007; Coles et al. 2006).

[9] Nonetheless, option repricing has drawn heavy criticism from the financial press and large institutional investors, in that option repricing rewards management for poor performance and transfers wealth unjustifiably from shareholders to executives (Moore, *The Wall Street Journal*, March 10, 1999, p. C2; Reingold, *Business Week*, February 15, 1999, p. 38). This criticism also leads to SEC's decision that firms listed on NYSE or Nasdaq cannot implement option repricing without shareholders' approval from the effective date, June 30th, 2003.

[10] The variable method requires that firms recognize compensation expense if stock price at the end of fiscal period subsequent to option repricing is higher than the new exercise price of the repriced options. However, if stock price decrease after the period of stock price increase, firms should recognize negative expense up to the cumulative amount of compensation expense firms recognized in the previous periods. According to Carter and Lynch (2003), during the 12-day window between the FASB announcement (December 4, 1998) and the proposed effective date (December 15, 1998), many firms repriced options in an attempt to avoid the variable accounting method

The ability for managers to manage stock prices arise because option reissue dates could be predicted with a high certainty by managers at least 6 months and 1 day before the option reissue dates. Since most options are granted with the exercise price equal to the market price on that day there is an incentive for managers to lower the stock price on the reissue date to obtain a potential gain at the option exercise. Two prior studies examined this issue and found some evidence that managers do attempt to manage earnings downwards using accruals management (Coles et al., 2006; Carter and Lynch, 2007). However, they do not find significant negative impact on stock prices prior to the reissue date. They attribute this to the stock market seeing through the management actions. Lee (2007) using a smaller sample does find some evidence of negative market reaction prior to the reissue date.

We revisit this issue given that the firms' board of directors choosing to initiate an option exchange program can include all employees including top executives or exclude top executives from participating from the exchange. In fact, about a third of all exchange programs during our period of study explicitly exclude top executives from the stock option exchange program. While it is possible for agency cost to arise when top executives are allowed to participate in the option exchange program since they have the ability to engage in and influence managerial actions and earnings which could have an impact on stock price, non-executives do not have the influence or ability to manage earnings or stock price. In addition, excluding top executives from the exchange program provides them no incentives to manage earnings or stock price. None of the earlier studies consider this difference in agency cost by firms engaging in stock option exchange programs when considering managerial actions to impact stock price.

Our paper differs from prior papers on several dimensions. One, we directly study if there is evidence of differences in the stock return pattern during the cancellation and reissue period between stock option exchange firms that include and those who exclude top executives. Second, unlike previous studies that used repricing firms that used the traditional approach of cancelling and reissuing new options on the same day as a control, our study only includes firms that engage in option exchange program using the 6 months and 1 day approach and compare between firms that include and exclude top executives from participation. So our control firms are those who exclude top executives from participating from the stock option exchange program. Third, our sample period uses the full period from 2000 to 2005 during which the 6 months and 1 day methodology was implemented by firms engaging in resetting option incentives for underwater options. Prior papers are restricted from 2000 to 2002 (Coles et al., 2006; Carter and Lynch, 2007; Lee, 2007; Zheng, 2003). Following implementation of SFAS 123R in 2005 by the FASB, the option exchange program using the 6 months and 1 day methodology has generally not been used.

Using the total 328 option exchange programs implemented from 2000 to 2005, we find that the cumulative abnormal stock return prior to 'executive' option reissues is significantly lower than that of 'non-executive' option reissues, suggesting that managers take some opportunistic actions prior to option reissues in an attempt to curb stock price increase or delay actions to increases stock price. Consistent with prior studies, our result shows that the average cumulative stock return prior to executive option reissue dates shows no significant changes in stock price. However, there is a significant increase in the stock price during the 60 days prior to the reissue date for the option exchange firms who exclude top executives from participating. No significant stock price change during the 120 days window of cancellation and reissue of the new options for the option exchange program firms that include participation of top executives could imply that firms are holding back the stock price relative to the firms with no top executive participation or there is no new information for these firms. Consistent, with prior evidence, we do not find the stock price declining during the period cancellation and reissue of the new options. In addition, the difference in cumulative abnormal stock returns between the two groups is much more pronounced in the last 60 days close to option reissue dates. As a further test, we compare the post-reissue cumulative abnormal stock returns of the two groups and the pre-reissue cumulative abnormal stock returns. We find that, for firms that allow top executives to participate in the option exchange program, post–reissue cumulative abnormal stock returns is about 9.5% compared to the pre-reissue cumulative abnormal stock returns of 2.4%. For firms who do not allow top executives to participate in the option exchange program post–reissue cumulative abnormal stock returns is about 2.9% compared to the pre-reissue cumulative abnormal stock returns of 9.8%. This result is suggestive of the top executives in firms that allow them to participate in the option exchange program to curb stock price until after the reissue date potentially providing gains at a future exercise date.

The remainder of this paper is organized as follows. Section II provides a brief explanation of the institutional background of option exchange programs. Section III reviews prior literature and describes the motivation of the study. Section IV explains the sample selection of option reissue firms implementing option exchange programs. Section V reports the results of our stock return analyses around option reissue dates focusing on the comparison between executive option reissues and non-executive option reissues. Section VI concludes the paper.

II. Institutional Background and Prior Literature

Stock option repricing is the practice of canceling underwater options (options whose exercise price is greater than the current stock price) and reissuing options with a lower exercise price (Saly, 1994).[11] Firms often reprice employee stock options in order to potentially (1) restore performance-based incentives (Hall and Murphy, 2002; Brenner et al., 2000; Chance et al., 2000; Chidambaran and Prabhala, 2003), (2) retain valuable or talented key employees (Carpenter, 2000), and (3) realign managerial incentives to firm risk (Lambert et al, 1991; Gilson and Vetsupens, 1993; Coles et al., 2005).

During the period from 2000 to 2005, firms implemented a new form of option repricing, which is often called the stock option exchange program. In this program, firms reissued options 6 months and 1 day after cancellation. The implementation of this option exchange program is primarily attributed to the accounting treatments of option repricing. Until the period of SFAS No. 123 regime, option repricing had been simply considered a kind of new 'fixed' option grants with new exercise prices, so firms executing option repricing had not been required to recognize compensation expense related to option repricing. However, repricing also can be considered a modification of 'variable' options in the sense that repricing is essentially characterized by a change in exercise price of existing options. As a reflection of this perspective, the FASB announced in December 1998 that it would clarify soon that firms repricing stock options should record compensation expense in accordance with the "variable method" of accounting for stock options. In March 2000, FIN 44 was issued as an approval of the FASB 1998 announcement. This final rule mandated firms to use variable accounting method in accounting for the stock option repricing. Thus, under the variable accounting method prescribed by this new rule, any option repriced must be marked to the market every accounting period for the repricing date through the date of exercise (or expiration, if left unexercised).

However, FIN 44 also provided the exception that if firms reissue the options at least 6 months and 1 day after cancellation, option repricing would simply be considered a kind of new fixed option grants and firms would be exempt from recording that expense in the subsequent periods. Due to this accounting benefit, firms with underwater options wanting to reset management incentives could choose to either cancel and reprice stock options on the same day and account for it using variable method of accounting or choose to cancel and reissue stock options six months and 1 day later and consider this as an issuance of a new option grant. We call the second method as stock option exchange program.

Almost all firms implementing option exchange programs reissued options at the first business day that was six months and one day after the cancellation of the options (Coles et al., 2006; Carter and Lynch, 2007). The exception also allowed the firms to announce the cancellation and reissue date to all participants prior to the cancellation. In this case, the cancellation date and reissue was public information to participants. Thus, the option reissue dates under the option exchange program could be predicted with a high certainty by managers and outside investors. In other words, option reissues under the option exchange programs could be classified as 'scheduled' or 'fixed-date' option grants in which the granting dates could not be timed by managers. This unique feature prominently distinguishes option reissues under the option exchange programs from the traditional option repricings or other general forms of option grants, in that the traditional option repricings or other general forms of option grants can be timed or backdated by managers who attempt to maximize their option values (Callaghan et al., 2004; Yermack, 1997; Chauvin and Shenoy, 2001; Lie, 2005).

Nonetheless, the option exchange program potentially gives rise to new agency issues derived from the predictability of reissue dates. That is, it provides a unique environment in which managers can attempt to engage in various opportunistic actions surrounding the scheduled or predicted option reissue dates in an attempt to lower stock price at the reissue dates. Thus, this study attempts to find evidence that managers take some opportunistic actions around option reissues in option exchange programs.

The stock returns around option reissues executed under the option exchange programs were investigated by Coles et al. (2006), Carter and Lynch (2007), and Lee (2007). Generally the studies did not find overall stock returns during 6 months and 1 day period to be negative. Based on this finding, Coles et al. (2006) interpret this finding as evidence that market participants do not respond to managers' effort to reduce stock price through accounting accruals because they can anticipate and perceive managers' opportunistic actions prior to option reissues. Carter and Lynch (2007) conclude that they do not find evidence that managers take deliberate actions to lower the stock price prior to option reissues.[12] Both of these studies use all option exchange firms using the 6 months and 1 day approach and use a control sample of firms repricing stock options in a day using the traditional method.

[11] In the traditional option repricing, options are cancelled and reissued at the same date.

[12] However, Carter and Lynch (2007) and Lee (2007) provide additional evidence that stock returns immediately prior to option reissues are significantly negative, supporting that managers take opportunistic actions immediately before option reissues.

We believe the incentive effect to lower stock price to ensure a lower exercise price for the new options is different depending on whether top executives are included in the exchange or they are excluded. We believe that only using option exchange program firms using the 6 months and 1 day for the treatment and control sample is better methodology to study the incentive mechanism Therefore, in this study, we empirically test this alternative explanation by comparing stock returns between executive and non-executive stock option reissues.

According to Carter and Lynch (2007), 62% of the option exchange programs executed from 2000 to 2002 are available to at least some executives, and 54% are available to all executives. Though non-executives hold a large share of options outstanding (Core and Guay, 2001, Callaghan et al. 2010) and repricings typically reach employees beyond the executive level (Overman, 1999) they do not have the ability to direct or manage actions that could have an impact on the earnings or stock price. The underlying premise for the comparison between executive and non-executive stock option reissues is that the eligibility of top executives to participate in the option exchange program likely incurs higher agency costs than that of non-executives does. In other words, top executives who are eligible to participate in option exchange program are more likely to engage in opportunistic actions to curb stock price rises prior to option reissues, than non-executives. For example, top executives tend to have easier access to a variety of resources needed to engage in some opportunistic actions than non-executives. Also, top-executives tend to be directly involved in the decision making process for financial reporting and investment decisions, and they can utilize other indirect channels in order to at least partially influence the decision making process. Therefore, the stock return patterns around option reissue dates can be different depending on whether top executives are eligible for option exchange programs. Specifically, we hypothesize that the stock return would be significantly lower prior to the reissue date for firms allowing top executives to participate in the option exchange compared to those firms who do not.

III. Sample Design

We identify sample firms that undertook option exchange programs over the period of 2000 through 2005 from a search of SEC filings such as tender offer statements, 10-Ks, 10-Qs and proxy statements in Lexis/Nexis and Mergent database.[13] In March 2001, the SEC required firms implementing option exchange programs to file tender offer statements. Thus, for option exchange programs implemented after March 2001, we can use tender offer statements as a supplemental data source in addition to 10-Ks, 10-Qs, or proxy statements. However, tender offer statements do not make sure that the firm actually went through option exchange programs, because they provide only information on plans to implement option exchange programs in the future. Therefore, the SEC documents such as 10-Ks, 10-Qs, or proxy statements are required to ensure that firms actually implemented the option exchange programs.[14]

Table 1 summarizes the sample selection process to collect sample option exchange programs implemented from 2000 to 2005. The total number of SEC documents initially retrieved with the search strings is 3,292. From the SEC documents, we exclude the total 2,828 SEC documents that match the search strings but either pertain to duplicate events or do not pertain to option exchange programs. Also, we exclude 95 option exchange programs where we do not find SEC documents showing that options were actually reissued after cancellation. As a last step, we exclude 41 option exchange programs which are missing return information from the CRSP database. From the above sample selection process, we select the 328 option exchange programs as a final sample for my study.

Table 2 presents descriptive statistics related to the characteristics of the 328 sample option exchange programs implemented from 2000 to 2005.[15] Panel A provides a distribution by year of the sample option exchange programs. Around 74% of the total option exchange programs were offered in 2001 and 2002, and the number of implemented option exchange programs declines post 2002. Pursuant to the schedules of the option exchange programs, around 71% of the option exchange programs reissued options in 2002 and 2003. Following the adoption of SFAS 123R a 'fair-value-based method' of accounting for stock options we do not find any option exchange programs offered after June 15, 2005, which is the effective date of SFAS 123R.

Panel B provides the distribution of employee eligibility for stock option exchange. Of the 328 option exchange programs in our sample, 183 (56%) allow all employees including top executives to

[13] The main search string used in Lexis/Nexis is "option! w/10 six month w/10 one day and filing-date = 2000 [2001; 2002; 2003; 2004; 2005; 2006; 2007] and not form-type (proxy plm)". We adopt this search string from the study by Carter and Lynch (2007). In addition to this search string, we also use the search strings, ""six months and one day" w/10 cancel!", "6 Months Plus 1 Day", "Six Month Plus One Day", and "Six Months Plus One Day".

[14] According to Carter and Lynch (2007), some of the announced option exchange programs appeared not to have been completed (that is, the options were never cancelled or the firm filed for bankruptcy or was acquired, etc.).

[15] Carter and Lynch (2007) report that the total 168 option exchange programs were offered from 2000 to June 30, 2002. According to Coles et al. (2006), the total number of option exchange programs implemented from 2001 to 2002 is 159.

participate in the exchange. In another 105 (32%) option exchange programs top management is explicitly excluded and only non executives are allowed to participate in the option exchange. We have 40 (12%) option exchange programs in which we are unable to determine the participation of top executives. We exclude from our analysis when comparing return information between option exchange programs including and excluding top executives.

Panel C provides the industry distribution of sample option exchange programs. Similar to Carter and Lynch (2007) and Coles et al. (2006), the "business services" industry with two-digit SIC code 73 forms the largest proportion of option exchange firms with "Electronic & other electric equipment" with two-digit SIC code 36 being next with 38% and 25%, respectively. This industry distribution is also similar as that of traditional repricers, which is reported in Carter and Lynch (2003) and Chidambaran and Prabhala (2003).

V. Stock Return Analyses

In this section, we examine stock return patterns around option reissue dates in order to investigate whether managers take actions that translate to reduce the stock price prior to option reissues. Following the event study methodology of Dodd and Warner (1983), we calculate daily market-adjusted abnormal returns for the option reissue firms by using the CRSP NYSE/AMEX/Nasdaq value-weighted index. The market model estimation period includes both a pre-event (days −480 to −241) and a post-event period (days +121 to +360), with day 0 defined as the reissue date identified in the SEC documents.[16] Adopting this approach can exclude some systematic stock price movements that would be expected preceding the reissue dates, as well as following the reissue dates. For the validity of estimation period, each option exchange firm is expected to have at least 100 days of stock returns during the estimation period. From this process, we compute the daily abnormal stock returns for the 313 option reissue events out of the total 328 events.[17]

Figure 1 depicts the mean cumulative raw return and cumulative abnormal return for each event day from -120 through +120, with day 0 defined as the reissue date for all 313 option exchange firms. We use -120 to +120 as our test window since firms cancel the options six months and 1 day prior to reissue which is equivalent to 120 days prior to day '0'. We include the 120 days following the reissue to observe the pattern of returns following the stock option reissue. In contrast with the traditional option repricing, the stock return prior to option reissue dates does not show a sharply declining pattern (see Fig. 1 in Callaghan et al., 2004). Instead, it appears a little flat at the level of zero from the cancellation date to the 60 days prior to option reissues, and starts to slightly increase from the relative day of -60. This result is consistent with the prior studies (Carter and Lynch, 2007; Coles et al., 2006)[18].

However, it would be premature to interpret the flat or slightly increasing stock return pattern as evidence that managers do not take any opportunistic actions to lower stock price prior to option reissues. Instead, the eligibility criterion of option exchange programs can provide a potential explanation for this flat or slightly increasing stock return pattern. As shown in Panel B of Table 2, the 32% of option exchange programs exclude the top executives from participation in the program. If top executives are not eligible for the option exchange programs, their incentive to lower stock price prior to option reissues would be very weak. To study if there is a difference in stock returns during the cancellation and reissue period between firms who include top executives in the stock option exchange program and those who do not, we run the cumulative stock return for each group separately. In a sense, we consider the firms with stock option exchange programs eligible for only low level employees to be a more appropriate control group to investigate managers' opportunistic incentive to affect stock price prior to the option reissue date.

For the statistical tests of difference in stock returns between 'executive' option reissue firms and 'non-executive' option reissue firms, we perform independent two-sample t-test for the mean difference and Wilcoxon rank-sum test for the median difference. For these tests, we divide the whole period of day -120 through +120 with day 0 defined as the reissue date, into four periods, two periods of 60 days each in the pre period and two periods of 60 days each in the post period.

Table 3 reports the statistical test results for the difference in cumulative raw stock returns between the executive option reissue firms and non-executive option reissue firms. The mean cumulative raw return in 'Pre-period' in executive option reissue firms (0.0181) is lower than that in non-executive option reissue firms (0.1213). This difference is statistically

[16] We do not include the period of days −240 to −121 in our estimation period, prior papers (Callaghan et al. 2004) have shown that stock price of these firms drop significantly during the 6 months prior to the option repricing or in this case option cancellation. Therefore, the inclusion of this period in the estimation period might lead to a downward bias in estimated coefficients of market model, easily producing positive abnormal returns in event period.

[17] For the 15 option reissue events, the number of stock return dates in the estimation period is less than 100 days in CRSP database.

[18] We also replicated Carter and Lynch (2007) using the option reissues implemented from 2000 to 2002, which are the subsample of our sample from 2000 to 2005. We find a similar stock return pattern as that in Carter and Lynch (2007).

significant at the 10% level. Next, we use the two 60 day pre-periods. We find no difference in market reaction in the 60 days following the cancellation of the stock options. However, in the 60 day period prior to the new option reissue we find the market reaction for the non-executive option stock option programs are significantly higher than for firms who include top executives in their stock option exchange programs. In fact, there appears to be no market reaction in the option exchange programs that include top executives. The difference in market reaction between exchange programs including top executives and those that do not is about 8.2% using the mean cumulative raw returns and about 15.0% using the median cumulative raw returns. This finding can be interpreted as managers who are included in the stock option exchange programs are more likely to attempt to lower stock price prior to option reissue dates than managers who are not. In the post period following the issuance of new stock options, we find that the mean stock price increases by 10.9% for firms engaging in stock option exchange including top executive compared to mean stock price increasing at 7.3% for exchange programs that do not include top executives. In this case we find no difference in stock return in the post period between exchange programs who include top executives and those who do not. The results are similar for the median test.

We repeat the tests using the cumulative abnormal returns and present the results in Table 4. The results are similar as those for cumulative raw returns in Table 3. The mean cumulative abnormal return in 'Pre-period' is lower in stock option exchange firms who allow top executive participation (2.9%) than that in stock option exchange firms who do not allow top executive participation (9.8%). But, this difference is not statistically significant for the full 120 days between cancellation and reissue. However, in the 60 day period preceding the reissue date, we find the mean and median cumulative abnormal returns is significantly lower in stock option exchange program firms who allow top executive participation compare to those who do not. This result suggests that managers are more likely to suppress the stock price increase or delay actions that increase stock price prior to executive option reissues when it is in their interest to do so through the benefit of obtaining a lower exercise price at reissue date in order to get potential gain at a future option exercise date.

We also perform additional statistical tests to investigate whether the difference in post-period and pre-period stock returns are different between firms who include top executives and those who do not in the option exchange program. Using the mean cumulative raw returns in Table 3, we find that the difference in post-period returns compared to pre-period returns for stock option exchange firms who include top executives is 9.1% compared to those who do not is at -4.8%. This result suggests that executives in firms who include top executives in the exchange programs may potentially have incentives to curb stock price rises prior to option reissues and delay the actions boosting stock price to the period subsequent to option reissues compared to firms who do not include top executives in the exchange program. The results are similar using the cumulative abnormal returns presented in Table 4.

VI. Conclusion

This paper investigates an agency issue embedded in employee stock option exchange programs that managers can have a strong incentive to lower stock price at the option reissue date at the expense of shareholder wealth. In fact, prior studies have investigated stock returns around option reissues in order to find empirical evidence to support the agency issue through efforts to increase negative accruals to reduce earnings (Carter and Lynch, 2007; Coles et al., 2006; Lee, 2007). However, prior studies do not find a negative market reaction prior to reissue date.

We reinvestigate this issue using a much larger sample and having the option exchange firms be their own control using firms engaging in option exchange program which includes the top managers and those who do not. Our argument is based on the fact that when top executives are included in the stock option exchange program they potentially have an incentive and ability to take actions to reduce the stock pre in order to get a lower exercise price at the reissue. Non-executives may have an incentive to get a lower exercise price on the reissued options but they do not have the ability to effectively engage in actions to reduce the stock price. Thus, we investigate cumulative abnormal stock returns around the total 328 option reissues executed under the full option exchange programs implemented from 2000 to 2005.

The stock return analysis focusing on the comparison between stock option exchange programs that includes top executives and those who do not show that the cumulative abnormal stock return prior to 'executive' option reissues is significantly lower than that of 'non-executive' option reissues. Based on the results, we conclude that managers take some opportunistic actions in order to curb stock price rises prior to executive option reissues. Also, the difference in cumulative abnormal stock returns between the two groups is much more pronounced in the periods close to option reissue dates, implying that managers are more likely to curb stock price increase or delay actions to increase stock price as the option reissue date approaches. Furthermore, we find that, in stock option exchange programs that include top executives, the stock return pattern start to significantly rise immediately after option reissues whereas it is almost flat prior to option reissue date. The overall results suggest the agency issue that managers curb stock price rises prior to executive option reissues or delay

some actions leading to a stock price increase subsequent to option reissue date.

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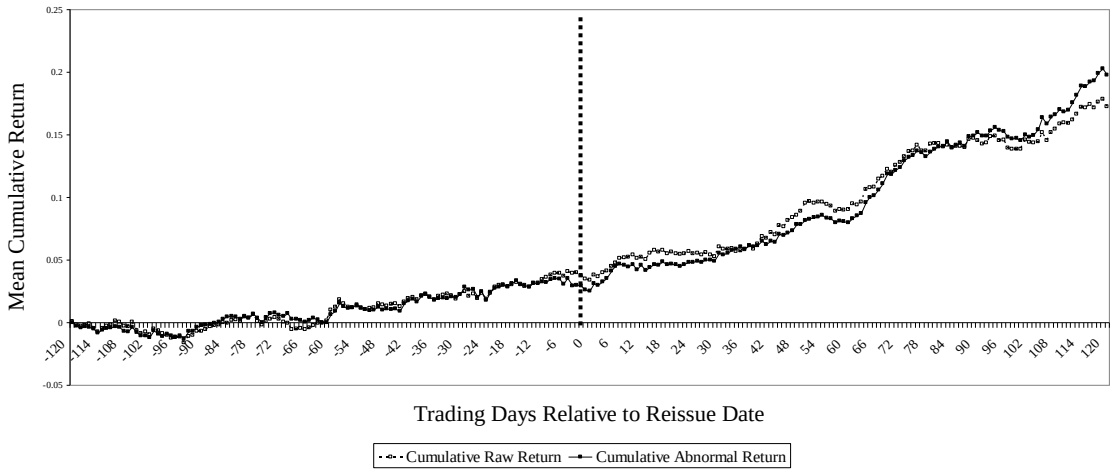
Figure 1. Daily cumulative stock returns around the reissue dates for all sample reissue firms



This figure shows mean daily cumulative raw and abnormal stock returns around the reissue dates for all sample reissue firms. The sample includes 313 option reissue events that occur during the period 2000 to 2005. We estimate cumulative

returns for the 241-day period starting in day -120 through day +120, with day 0 defined as the reissue date identified in the SEC documents.

Table 1. Sample Selection Process

Total SEC documents retrieved from by the search strings	3,292
Less: SEC documents that do not pertain to option exchange programs	(485)
Less: SEC documents that duplicate option exchange programs	(2,343)
Base option exchange programs implemented from 2000 to 2005	**464**
Less: Option exchange programs from only tender offer statements	(95)
Less: Option exchange programs of firms with missing in CRSP database	(41)
Sample option exchange programs implemented from 2000 to 2005	**328**

Table 2. Sample Description of Option Exchange Programs

Panel A: Year Distribution

	Offer		Cancellation		Reissue	
	Frequency	%	Frequency	%	Frequency	%
2000	6	1.83	3	0.91		
2001	140	42.68	130	39.63	54	16.46
2002	104	31.71	108	32.93	128	39.02
2003	66	20.12	74	22.56	104	31.71
2004	11	3.35	12	3.66	34	10.37
2005	1	0.30	1	0.30	8	2.44
Total	328	100.00	328	100.00	328	100.00

Panel B: Eligibility

Eligibility	Frequency	%
Available to all employees including top executives	183	55.79
Unavailable to top executives	105	32.01
Undetermined	40	12.20
Total	328	100.00

Panel C: Industry Distribution

Two digit SIC code	Industry	Frequency	Percent
10	Metal mining	1	0.305
20	Food & kindred prodcuts	1	0.305
22	Textile mill products	2	0.610
23	Apparel & other textile products	1	0.305
25	Furniture & fixtures	1	0.305
27	Printing & publishing	3	0.915
28	Chemical & allied product	13	3.963
30	Rubber & misc. plastics products	1	0.305
34	Fabricated metal products	2	0.610
35	Industrial machinery & equipment	22	6.707
36	Electronic & other electric equipment	81	24.695
37	Transportation equipment	6	1.829
38	Instruments & related products	13	3.963
39	Misc. manufacturing industries	1	0.305
42	Trucking & warehousing	1	0.305

45	Transportation by air	2	0.610
48	Communications	19	5.793
50	Wholesale trade - Durable goods	3	0.915
53	General merchandise stores	1	0.305
55	Automotive dealers & services stations	1	0.305
56	Apparel & accessory stores	1	0.305
58	Eating & drinking places	1	0.305
59	Miscellaneous retail	2	0.610
62	Security & commodity brokers	1	0.305
63	Insurance carriers	1	0.305
67	Holding & other investment offices	2	0.610
70	Hotels, rooming houses, camps, and others	2	0.610
72	Personal services	1	0.305
73	Business services	125	38.110
78	Motion pictures	1	0.305
80	Health services	4	1.220
82	Educational services	1	0.305
83	Social services	1	0.305
87	Engineering & management services	8	2.439
89	Services, (not elsewhere classified)	1	0.305
0	Undetermined	1	0.305
Total		328	100.000

Table 3. Comparison of Cumulative Raw Returns

The table compares cumulative raw returns surrounding option reissue dates between the two groups, 'Exec' and 'Nonexec.' The 'Exec' group includes the option exchange programs available to all employees including top executives, while the 'Nonexec' group includes ones unavailable to top executives. '*Difference*' denotes 'Exec' minus 'Nonexec.' We compute cumulative raw returns for the periods surrounding the day 0 defined as the reissue date identified on the SEC documents. 'Period-2' denotes the period starting in day -120 through day -61. 'Period-1' denotes the period starting in day -120 through day -1. 'Pre-period' denotes the period starting in day -120 through day -1. 'Period+1' denotes the period starting in day 1 through day +60. 'Period+2' denotes the period starting in day +61 through day +120. 'Post-period' denotes the period starting in day +1 through day +120. Numbers in parentheses denote *t*-statistics (z-statistic) for means (medians) and difference in means (medians). Numbers in parentheses denote *p*-values of t-statistic (Wilcoxon Z-statistic) for means (medians). ***, **, and * denote significance at less than the 1%, 5%, and 10% levels, two-tailed tests, respectively.

	Period-2	**Period-1**	**Pre-period**	**Period+1**	**Period+2**	**Post-Period**
Mean						
Exec	0.0279	0.0054	0.0181	0.03734	0.0424	0.1094**
	(0.3511)	(0.8491)	(0.6466)	(0.2220)	(0.1632)	(0.0259)
Nonexec	0.0138	0.0876***	0.1213***	0.05299	-0.0143	0.0734
	(0.6465)	(0.0029)	(0.0100)	(0.1020)	(0.6465)	(0.1517)
Difference	0.0141	-0.0822**	-0.1032*	-0.01565	0.0567	0.0360
	(0.7387)	(0.0424)	(0.0980)	(0.7238)	(0.1928)	(0.6096)
Median						
Exec	-0.0656	-0.0575	-0.0666	-0.04090	-0.0220	-0.0189
	(0.3769)	(0.2616)	(0.2973)	(0.8238)	(0.8715)	(0.6464)
Nonexec	-0.0052	0.0922***	0.0842**	-0.00141	-0.0246	-0.0341
	(0.9769)	(0.0025)	(0.0266)	(0.4171)	(0.2846)	(0.7342)
Difference	-0.0604	-0.1497***	-0.1508**	-0.0395	0.0026	0.0152
	(0.5011)	(0.0030)	(0.0191)	(0.9438)	(0.3718)	(0.8192)

Table 4. Comparison of Cumulative Abnormal Returns

The table compares cumulative abnormal returns surrounding option reissue dates between the two groups, 'Exec' and 'Nonexec.' The 'Exec' group includes the option exchange programs available to all employees including top executives, while the 'Nonexec' group includes ones unavailable to top executives. '*Difference*' denotes 'Exec' minus 'Nonexec.' We compute cumulative abnormal returns for the periods surrounding the day 0 defined as the reissue date identified on the SEC documents. 'Period-2' denotes the period starting in day -120 through day -61. 'Period-1' denotes the period starting in day -120 through day -1. 'Pre-period' denotes the period starting in day -120 through day -1. 'Period+1' denotes the period starting in day 1 through day +60. 'Period+2' denotes the period starting in day +61 through day +120. 'Post-period' denotes the period starting in day +1 through day +120. Numbers in parentheses denote *p*-values of t-statistic (Wilcoxon Z-statistic) for means (medians). ***, **, and * denote significance at less than the 1%, 5%, and 10% levels, two-tailed tests, respectively.

	Period-2	**Period-1**	**Pre-period**	**Period+1**	**Period+2**	**Post-Period**
Mean						
Exec	0.02701	-0.0243	0.0291	0.02443	0.0336	0.0948**
	(0.3458)	(0.3466)	(0.5287)	(0.4183)	(0.2399)	(0.0422)
Nonexec	0.01341	0.0512*	0.0976**	0.02728	-0.0089	0.0287
	(0.6388)	(0.0649)	(0.0448)	(0.3118)	(0.7341)	(0.4746)
Difference	0.0136	-0.0755**	-0.0685	-0.0029	0.0425	0.0661
	(0.7363)	(0.0459)	(0.3039)	(0.9438)	(0.2727)	(0.2816)
Median						
Exec	-0.02715	-0.0764**	-0.0788	-0.03810	-0.0095	-0.0089
	(0.8368)	(0.0202)	(0.2014)	(0.5977)	(0.9744)	(0.5048)
Nonexec	-0.01518	0.0468*	0.0057	-0.00320	-0.0068	-0.0478
	(0.8924)	(0.0955)	(0.1744)	(0.7166)	(0.5326)	(0.9008)
Difference	-0.0120	-0.1232***	-0.0845*	-0.0349	-0.0027	0.0389
	(0.7981)	(0.0049)	(0.0598)	(0.4554)	(0.6605)	(0.8639)

OPPORTUNITIES FOR THE ACHIEVEMENT OF ECONOMIES OF SCALE IN FREIGHT TRANSPORT

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Abstract

In the interest of both the national economy and the commercial freight industry, government freight transport policy formulators and freight transport industry decision makers should take cognisance of (a) the opportunities that exist for the achievement of economies in freight transport; (b) the subgroups of economies that can enhance efficiency attainment in the freight transport industry; (c) prevailing cost levels and structures within the five modes of freight transport; and (d) the salient economic features of the freight transport market. This paper presents an overview of these four aspects. The research approach and methodology combine (a) a literature survey; (b) an analysis of the cost structures of freight transport modes; and (c) interviews conducted with specialists in the freight transport industry.

Keywords: Economies of Density, Economies of Distance, Economies of Scale, Economies of Scope, Efficiency, Modes of Freight Transport, Transport Cost Structure

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1 INTRODUCTION

Defining the economic role of the various modes of freight transport should be one of the basic ingredients of both an economically rational government transport policy and the effective functioning of freight transport industries. The goal of the research was therefore to compile an overview of the most salient aspects of efficiency achievement that can give guidance in transport policy formulation and in corporate freight transport decision making. The research approach and methodology combine (a) a literature survey; (b) an analysis of the cost structures of freight transport modes; and (c) interviews conducted with specialists in the freight transport industry. In this paper, the results of the research are described qualitatively. Section 2 supplies a background and overview of opportunities for the achievement of economies in freight transport In Section 3, the subgroups of economies achievable in the freight transport industry are discussed. Section 4 deals with aspects of efficiency within the five modes of freight transport, and a concluding summary is contained in Section 5.

The intended meaning of certain terms used and conventions followed in this paper are as follows:

- *Cost structure* refers to the relationship between the fixed and variable components of total costs. Numerically, this is usually expressed as fixed cost or variable cost as a fraction of total costs. In this paper, preference is given to fixed cost as a proportion of total costs.
- *Cost*, *expenditure* and *price* are used synonymously.
- *Total costs* refer to the full transaction prices borne by an operator, including all indirect taxes, plus subsidies if any inputs are subsidised.
- *Fixed costs* refer to expenses that cannot be avoided if a trip does not take place.
- *Variable costs* refer to expenses that are avoided if a trip does not take place.
- *Direct costs* are specific to an individual product (or cost carrier), and are fully allocated to it.
- *Indirect costs* refer to costs that are incurred jointly or commonly on different products (or cost carriers) so that the deemed cost of each one can only be apportioned arbitrarily.
- *Cheaper* means at a lower total cost per output unit at similar load factors.
- *More expensive* means at a higher total cost per output unit at similar load factors.

2 BACKGROUND AND OVERVIEW

Economies of scale exist when an expansion of the output capacity of a firm, fleet or plant causes total production costs to increase less than proportionately to the increasing output capacity. However, economies of scale in transport often also refer to vehicle size rather than to that of a firm, fleet or plant, especially in the case of ships and pipelines. Ships –

notably bulk carriers – and pipelines often operate as separate business entities. In this sense, the prerequisite for economies of scale, and thus of falling average unit cost, is a cost structure that is characterised by a high ratio of fixed to total cost, so that with increasing output capacity, the fixed cost per unit of output declines faster than the variable cost increases per additional unit of production within the output capacity.

Contributing to scale economies is the spreading of a fixed cost over extended output capacity –for example fixed overhead costs spread over increased fleet output capacity. Fixed overhead costs, i.e. time-bound corporate management-related costs common to all the activities of a firm, remain constant within certain ranges of fleet size. The fact that dividing fixed overhead costs by an increasing number of output units, which are too small to necessitate larger overhead costs, results in smaller average overhead cost per unit is axiomatic. However, additional to overhead costs, the average cost of another (second) group of input units often becomes cheaper, while a further (third) group of inputs may enjoy increasing returns to scale as output rises. It is not always clear why an expansion of output capacity of a transport firm can cause average production costs per unit to decrease with the increasing output capacity up to a certain level of output. In freight transport, the answer lies in emerging efficiency gains (i.e. the second group) and productivity activators (the second group of inputs) that are specific to, firstly, vehicle fleets; secondly, individual vehicles; and, thirdly, transport facilities and infrastructure.[1] How the supply and utilisation of these three groups of assets can contribute to attaining economies of scale, and why these economies are eventually reversed, are discussed in the following three subsections.

2.1 Increasing fleet size and maximising use of its capacity

The following list contains five of the most pertinent factors that can contribute to economies of fleet size:

- *Specialisation and division of labour.* A growing fleet size, concomitant with more employees, can afford management greater opportunities for specialisation and labour division within its workforce. In a large fleet, skilled workers can be employed in specialised tasks and become more proficient at them. This should result in productivity gains. In small firms, individuals must perform a variety of tasks, in none of which they are probably afforded sufficient opportunity to excel, thus becoming the proverbial 'jack of all trades and master of none'. Owing to specialisation of labour, there is also division of labour, i.e. work is divided among several specialists. For example, transport activities will be conducted by drivers, packers, dispatchers, mechanics, schedulers, etc. Switching between tasks wastes time, which is avoided by division of labour.
- *Specialisation and scheduling of capital assets*. This is similar to specialisation and division of labour, but extends to the coordinated application of all inputs. An expanding fleet size generates opportunities for vehicles and handling equipment to be applied more productively: as fleet size increases, (a) diversity in customer needs may arise, creating opportunity for greater scope so that more suitable vehicles can be dedicated to more suitable tasks, which should enhance productivity; and (b) flexibilities may emerge by scheduling vehicles in such a way that the same ones are used productively during consecutive shifts by different crews. In so doing, the fleet is operated productively over the longest possible operating periods, thereby increasing the average productivity per vehicle.
- *Indivisibilities.* Large fleets can often afford to install special equipment and facilities that small operations would find too costly. These include vehicle workshops and terminal facilities, such as those for sorting and consolidation, whose aim is mainly to reduce average unit costs. Very large fleets can sometimes offer greater financial security to obtain the necessary loan funding to invest in extraordinary costly capital assets and infrastructure extensions with a view to improving efficiency (i.e. productivity) in the longer term. For example, in rail transport the conversion of a single- to a double-track system may quadruple the capacity of the line, given adequate future growth in demand, potentially geometrically increasing future productivity of the freight rail system.
- *Costly operational expenditure.* Large fleets may have enough financial strength to venture into costly operational actions that can potentially improve productivity. For example, promotional campaigns of similar scale in the national media cost the same regardless of the size of the advertising business. This is said to potentially benefit larger advertisers more than smaller ones because, firstly, the larger ones can perhaps better afford such campaigns and bear the risk of advertisement failure; and, secondly, in the case of success their sales volumes and concomitant revenue will increase, while smaller operators, for which the promotional expense and risk were too prohibitive in the first instance, will by default forfeit an opportunity to sell redundant transport capacity or to productively increase their scale of transport supply.
- *Reduced transaction costs.* Larger fleets can obtain bigger discounts or rebates with, for example, bulk purchasing of fuel, spare parts, group short-term insurance and finance costs (i.e. lower interest rates) with multiple-vehicle

acquisition. Although opportunities for greater functional scope through vehicle specialisation may arise, the fleet may still have the opportunity to standardise on vehicle types and benefit from minimising spare-part inventories, hence directly reducing average costs.

Although the unit cost of production may fall as the firm or fleet size increases, there are several reasons why this process is eventually reversed:

- *Loss of management control.* As a fleet becomes bigger and more complex, a loss of management control over the entire organisation arises, problems of coordination increase, and the growth of bureaucracy distracts managers' focus from the production process. Communication lines become longer, with management finding it increasingly difficult to remain directly involved. This loss of management control decreases overall productivity.
- *Administrative creep.* As management grows, it generates administration: not only do more managers and the introduction of extra management tiers create more bureaucracy in the form of more non-core control processes, but the human-resource aspects of the greater number of managers also need to be administered, as well as the affairs of the new administrative staff themselves. Instead of managing transport production, it is the organisation itself which increasingly has to be managed, with additional costs associated with more office space, administrative computer and communication infrastructure, and stationery and stores, resulting in diseconomies of scale.
- *Geographical location.* When a fleet initially commences business, it will probably be at or close to the optimal location. As fleet activities increase in a growing market, (a) congestion at the plant will step in; and (b) transport costs to and from new distant customers will increase the fleet's average unit costs. Increasing fleet size in the longer term implies building additional fleet facilities, and these will not necessarily be at optimal locations. While this might relieve congestion at facilities, it may contribute to extra travel cost and unproductive driving time, and consequently productivity also decreases.

2.2 Increasing vehicle sizes and maximising use of their capacity

The spatial carrying capacity of a vehicle is the volume or cube of the payload space, the cost of which is proportional to the surface area of its outer dimensions. A vehicle's volumetric carrying capacity can thus increase at a greater rate than the costs of the increased capacity. This is known as the 'two-thirds rule' – the volumetric capacity of a vehicle or a freight container can be doubled at only a two-thirds increase in cost. Also, engine size and number of crew members required increase less than proportionally to an increase in vehicle size. These relationships account for the trend towards, firstly, wide-body aircraft, rail wagons and bulk-cargo vessels being built and operated as large as is technically feasible; secondly, long-haul road vehicles whose length, width and height are manufactured to the maximum that road-traffic legislation allows; and, thirdly, pipelines with a large diameter. Technological feasibility permitting, pipelines can be built to whatever size is required – the only effective limit on this comes from the demand side of the market. There is no sense in constructing pipelines of larger capacity than future demand will require.

2.3 Intensifying the use of facilities and infrastructure

When the capacity (i.e. maximum ability) of facilities and infrastructure is well utilised, the result is a lower average total unit cost for these facilities in relation to when they are underutilised. The unit cost decreases as long as there is no congestion. When increasing the utilisation of the links (i.e. the travelled ways) of a transport network, the unit cost decreases until the level of traffic starts to cause delays due to congestion. Whenever congestion endures and forecasting indicates that demand will grow even further, one should contemplate capacity expansion. Whenever demand growth can be sustained, incremental expansion of infrastructure may result in substantial economies of scale.

In the case of transport facilities, the reduced cost associated with size increase can be explained by simple arithmetic. A single-truck square-shaped garage with an area of 36 m^2 requires an enclosing wall of 24 linear metres. A square-shaped garage that is 100 times bigger, i.e. 3 600 m^2, requires an enclosing wall of only 10 times the length, i.e. 240 linear metres. In the case of infrastructure – for example with rail transport – converting a single- to a double-track line may quadruple the capacity of the line by eliminating directional conflict, and a quadruple track should more than double capacity as it permits segregation by speed.[2] However, there is no rationale for building infrastructure of larger capacity than will be required.

3 SUBGROUPS OF ECONOMIES IN FREIGHT TRANSPORT

From the above it is clear that while economies of scale in their strictest form are considerably important in the freight transport industry, there are circumstances under which it is not merely the pure size of the output capacity of a firm, fleet or plant that causes total production costs to increase less than proportionately to the increasing output capacity. but also a growth in output capacity, in which

opportunities arise to obtain the benefits of increasing returns to scale. Returns to scale refer to the long-run relationship between inputs and output. The returns can be shown by their effect on long-run average costs – if output rises by a larger percentage than inputs, there are increasing returns to scale, and thus decreasing long-run average cost per unit of output, in this case contributing to economies of scale. Subsequently, economies of scale in freight transport are often enhanced by the attainment of one or more of three subgroups of economies: economies of density, economies of scope, and economies of distance. These are discussed in the following paragraphs.

3.1 Economies of density

Economies of density exist when the total cost to transport units of freight from their points of departure to their intended destinations decreases by increasing utilisation of existing vehicle fleet and infrastructure capacity within a market area of given size. Economies of density are enhanced by, first, using high-capacity technology to carry and handle large bulk loads; second, minimising loading and unloading times; third, utilising traffic consolidation (i.e. load, trip, route and freight-handling terminal consolidation); and fourth, maximising the immediate and continuous utilisation of vehicles. (Immediate utilisation refers to the measure to which the carrying capacity of vehicles is utilised, while continuous utilisation refers to the number of revenue-kilometres or revenue-trips covered per time period.)

A quantity of goods can often be transported at a lower unit cost when moved together in one consignment or load, or in one uninterrupted flow, rather than in different consignments or loads. This type of economy stems from the fact that one can serve the largest possible portion of a market with the same technology. The same volume of throughput occurs, but the movement is concentrated (or consolidated) into one process, permitting more intensive use of the capital involved.

To achieve economies of density, one usually needs specialised technology to handle large volumes of a specific or homogeneous type of goods. The inherent danger of this is the empty return trip. To reap the optimum rewards of specialisation, handling equipment at terminals should allow for rapid loading and unloading of freight in order to maximise the number of full vehicle load-kilometres per unit of time. Economies of density necessitate the maximum utilisation of large, durable equipment over as long a period as possible.

3.2 Economies of scope

Economies of scope are achieved when the cost of producing two or more products together, in either a joint or a common process, is less than the total cost of producing them separately.

Joint products (also called by-products) are the inevitable and inseparable consequence of a single production process. For example, an outbound journey automatically gives rise to an inbound one. This implies that if a full vehicle load has to be hauled from home depot A to point B, carriage of a back haul from point B to home depot A would reduce the average cost of the two hauls so that it would be lower than the cost of carriage from A to B only, as the vehicle inevitably has to return to its home depot. Failure to solicit available back-haul business is a lost revenue opportunity (i.e. a waste), and therefore implies failure to deal with joint costs profitably.

Common production (also called shared production) occurs when different products are deliberately produced together in a common process. In this case, the similarities of the production processes permit the use of the same technology. The cost that arises in this instance is common and therefore shared among the commonly produced products. For example, when the same vehicle can be used to transport passengers and freight, and when fleet capacity exceeds the demands set by seasonally fluctuating contractual agreements, the spare capacity can be filled with spot-market shipments solicited through reduced tariffs.

Achieving economies of scope requires compatible technology that can accommodate product diversification. This implies that one must be able to share the technology among two or more users, and capacity should be available to accommodate product diversification.

3.3 Economies of distance

Economies of distance (also known as long-haul economies) are attained when the total transport cost per ton-km decreases as the trip distance increases. Economies of distance arise when there are trip-specific fixed costs that are not affected by the distance of the journey, and also by cost items that increase less than proportionally to an increase of distance. Examples of the former are terminal costs, such as aircraft landing fees and seaport charges; train marshalling (shunting) costs; trip documentation; and loading, stowing and unloading costs. As one has to pay these costs regardless of the distance, doubling the length of a haul does not result in doubling them. An example of the latter is the declining aircraft fuel consumption rate on a flight after take-off when the cruising altitude has been reached.

Note that economies of distance are not synonymous with increasing the number of full vehicle-load kilometres – this is an economy of density. For example, making 10 trips of 12 km each is more costly than one trip of 120 km. The lower cost of the latter reflects an economy of distance. However, economies of density can be achieved in

both cases if all the work is done with existing fleet capacity.

4 EFFICIENCY WITHIN MODES OF FREIGHT TRANSPORT

4.1 Air transport efficiency

4.1.1 Air transport cost level and structure

The cost to transport a unit of freight by air is the highest of all modes of transport. This results from the limited carrying capacity and high capital and other operating costs of aircraft. On a full-trip basis, the cost differential becomes bigger for door-to-door services when the origins and destinations of freight shipments are well separated from airports, necessitating the use of feeder and delivery services.

The cost structure of air transport is characterised by fairly balanced proportions of fixed and variable costs.[3] With freight-only services, the fixed costs normally exceed the variable costs somewhat, and vice versa for passenger-only services. With combined passenger–freight services, the fixed and variable cost components are approximately even. Because of the high start-up costs, the financial barriers to entry into the airfreight market are high, more so when commencing with freight-only services, and slightly less so with combined services where the common supply of passenger and freight service leaves room for less immediate investment in freight terminals.[4] The high cost of entry into the air transport market stems from the initial cost of acquiring aircraft, the immediate long-term commitment to essential overhead cost items (e.g. terminals) and the prior recruitment of highly skilled and specialised staff. The higher need for investment in freight terminals and related facilities when an airline's business orientation towards freight services increases suggests that significant economies of scale exist in air-freight operation.[5]

4.1.2 Economies achievable in air transport

4.1.2.1 Economies of fleet size

In air transport, there is a technical limit to the economies of scale that one can achieve by increasing the fleet size. Making use of a large fleet without increasing the number of airports visited requires frequent and large operations. This is feasible only if there is a continuously high demand for the large number of aircraft.[6] Although increasing fleet size does not necessarily result in significant economies of scale, a large fleet, but with mixed operations, may result in significant economies of scope. It may be more economical for one carrier to undertake both scheduled and charter flights than for separate carriers to specialise in one of the two types of service. Air and sea transport enjoy similar economies of fleet size – the second highest level after rail transport. However, air and rail transport do not generally compete with each other.

4.1.2.2 Economies of vehicle size

In seasonal or peak-oriented markets, operating large aircraft with flexible cargo–passenger combinations may result in increased loads and thus increased economies of scope.[7] In order not to prolong aircraft turnaround times at airports, large aircraft require effective procedures and equipment to load and unload them quickly. Air and sea transport enjoy similar economies of vehicle size – the second highest level after pipeline transport. However, air and pipeline transport are not in competition with each other.

4.1.2.3 Economies of infrastructure extension

An obstacle to effective logistics service delivery with air transport is its inability to provide door-to-door service. Airfreight operators are in direct competition with passenger airlines for airport access, as areas of high demand for passenger destinations are often also areas of high demand for freight. The prevalence of airport congestion (both in the air and on land) at major passenger hub airports contributes to the fact that freight-only operations tend to be at night and/or based around regional airports.[8] Adapting terminal facilities at regional and other subordinate airports that are close to concentrated areas of freight supply and demand to accommodate airfreight traffic effectively should enhance the accessibility and market coverage of this mode of transport. This could lead to total transit time savings, and reduce the cost of providing airfreight services. However, business logic requires that the value of improved airport accessibility, greater market coverage, transit time savings through less congestion and reduced cost of airport access and egress, and other benefits, must offset the cost of such airport infrastructure upgrades and extensions.

4.1.2.4 Economies of distance

On condition that intermediate landing is not necessary and that the crew does not need to change, longer route lengths give rise to significant economies of distance. With no intermediate landings, large time savings are achieved, as well as savings with those variable cost items that do not vary according to the length of flights. These are:

- aircraft maintenance necessitated by the number of landings (e.g. wheel fittings, tyres);
- charges for traffic control and navigation close to airports;
- landing charges;

- terminal services (such as cleaning; power connection; and charges for cargo handling, loading and unloading, and parking); and
- additional fuel consumption immediately after take-off.

These five points become less significant as flight lengths increase. For example, the fuel consumption rate of a Boeing 737-200(F) between Johannesburg and Cape Town (in South Africa) carrying a payload of 20 tons over the route length of 1 271 km is 330 litres per ton payload. The comparative fuel consumption with the same aircraft and payload for the 502 km route between Johannesburg and Durban is 170 litres per ton payload carried. The fuel consumption rate per ton of freight on the latter route is 52 per cent of the former, while the route length of the latter is only 40 per cent of the former. This is because the aircraft consumes between 1 200 and 1 300 litres of extra fuel to reach its cruising altitude, after which it cruises at 4,24 ℓ/km, hence an economy of distance.[9]

Air and sea transport enjoy similar economies of distance – after rail transport, the second highest level.

4.2 Road transport efficiency

4.2.1 Road transport cost level and structure

The cost to transport a unit of freight by road is (after air transport) the second highest, and the third highest of all modes of transport on short trips, where road is cheaper than rail transport.[10] In view of the fact that rail transport achieves considerably more economies of distance than road transport, road transport becomes progressively more expensive than rail transport for all classes of freight as trip distances increase above approximately 500 km. For trips shorter than roughly 150 km, road transport is virtually always cheaper than rail transport. For all types of goods that can possibly be carried either by road or rail transport between the same trip origins and destinations, the equal cost distance of the two modes lies between approximately 150 and 500 km. (For example, the equal-cost distance for the shipment of standard intermodal containers and units of palletised freight by road and rail is approximately 500 km.) Comparing road freight costs with other modes over all route distances, pipeline is cheaper than road transport. Over equal distances, the unit cost in ton-km to carry freight by sea is substantially lower than road transport. However, road transport is cheaper than inter-port sea carriage when, firstly, the sailing distance between the ports is too short for vessels to gain sufficient economies of distance; and/or, secondly, the trip origins and destinations of freight shipments are significantly remote from the ports, and vice versa when the inter-port distance is substantially long and/or the origins and destinations are close to the ports.

The fixed costs of operators with non-specialised fleets who carry truck loads and do not own any terminal facilities are very low. The financial barriers to market entry for these operators, especially in cases where their vehicles are hired or leased, even more so for single-vehicle operations, are very low, and this market segment is highly competitive.[11] Of all freight transport industry segments, the aforementioned non-specialised truck-load (TL) road haulage is the closest to perfect competition. Against this, specialised carriers and carriers of part-loads, also called less-than-truck-load (LTL), and parcels generally require terminals. This increases their fixed costs, and they face some financial barriers to entry. Their unit costs decrease with increased traffic volume (economies of density) and distance of haulage (long-haul economies). Although specialised and LTL carriers operate in an oligopolistic market, it is one in which competition is reasonably intensive and mostly based on the price charged. Fleet sizes in the road freight market vary between one vehicle (often owner-driver operators) and more than a thousand.

Larger road transport carriers who own suitable terminals can achieve considerable economies of scope by sorting and then consolidating heterogeneous part loads effectively into homogeneous containerised shipments, thereby creating an economy of density, which in turn enhances economies of scale. However, none of these potential advantages preclude competition from smaller operators, which indicates that the achievement economies of scale in road transport is not strong.[12]

Of all forms of transport, road transport has the smallest proportion of fixed costs to total costs, making this market sector highly competitive, and thus less prone to monopolistic or oligopolistic behaviour. Among the factors leading to the high proportion of variable costs are the following:

- The fuel consumption of road transport vehicles is relatively high, making fuel cost a proportionally large variable cost component.
- Road infrastructure is publicly owned. Governments to a great extent recover road-user cost responsibility through levies included in the price of fuel (of which the consumption is already high) and toll tariffs, thereby converting a fixed cost responsibility into a variable transport expenditure.
- Freight terminal facilities (whenever a road haulier actually owns such facilities) are less capital intensive than the terminal facilities of other forms of transport.

As can be deduced from Table 1, combination vehicles that are permanently engaged in long-distance carriage, fixed costs vary between approximately 35 and 40 per cent of total costs, and

for rigid goods vehicles permanently employed in local delivery and collection work the fixed and variable costs are fairly evenly balanced. Whenever long-distance operations involve frequent travelling on tolled roads and high payments of overtime remuneration and overnight allowances, variable costs may rise to 70 per cent of total costs.[13]

Table 1. Typical cost structures of different sizes of road freight vehicles based in the Western Cape and used in professional haulage (May 2012 values)

COST ITEM	TYPE OF VEHICLE AND CARRYING CAPACITY					
	Light delivery vehicle: 1 ton	**Rigid truck: 4 tons**	**Rigid truck: 8 tons**	**Rigid truck: 15 tons**	**Combination vehicle: 20 tons**	**Combination vehicle: 32 tons**
Overhead cost per year	**R25 090 (10,1%)**	**R48 150 (10,0%)**	**R60 640 (9,1%)**	**R81 150 (9,0%)**	**R104 700 (6,9%)**	**R119 780 (6,6%)**
Standing costs per year	**R125 452 (50,8%)**	**R240 742 (49,8%)**	**R303 207 (45,6%)**	**R405 772 (44,7%)**	**R523 509 (34,7%)**	**R598 904 (33,2%)**
Depreciation						
Interest	R28 640	R46 430	R65 980	R102 060	R122 570	R134 900
Insurance	R9 110	R15 260	R23 480	R39 120	R39 000	R59 040
Licence	R15 180	R25 430	R39 130	R65 200	R75 450	R90 110
Crew	R492	R1 302	R4 467	R9 732	R14 439	R19 524
	R72 030	R152 320	R170 150	R189 660	R272 050	R295 330
Annual running costs	**R96 540 (39,1%)**	**R194 450 (40,2%)**	**R300 500 (45,3%)**	**R419 650 (46,3%)**	**R881 690 (58,4%)**	**R1 085 360 (60,2%)**
Fuel						
Lubricants	R57 180	R114 370	R166 350	R213 130	R559 910	R655 220
Maintenance	R1 430	R2 860	R4 160	R5 330	R14 000	R16 380
Tyres	R31 130	R63 640	R98 070	R148 060	R183 700	R233 550
	R6 800	R13 580	R31 920	R53 130	R124 080	R180 210
Total annual haulage cost	**R247 082 (100%)**	**R483 342 (100%)**	**R664 347 (100%)**	**R906 572 (100%)**	**R1 509 899 (100%)**	**R1 804 044 (100%)**
Annual kilometres	48 000	48 000	48 000	48 000	110 000	110 000
Operating days per year	225	225	225	225	245	245
Fuel cost (diesel)	11,0ℓ/100km @1 083,0c/ℓ	22,0ℓ/100km @1 083,0c/ℓ	32,0ℓ/100km @1 083,0c/ℓ	41,0ℓ/100km @1 083,0c/ℓ	47,0ℓ/100km @1 083,0c/ℓ	55,0ℓ/100km @1 083,0c/ℓ
Lubricants	2,5% of fuel	2,5% of fuel	2,5% of fuel	2,5% of fuel	2,5% of fuel	2,5% of fuel
Maintenance	64,85c/km	132,58c/km	204,31c/km	308,46c/km	167,0c/km	212,32c/km
Tyres	14,17c/km	28,29c/km	66,50c/km	110,69c/km	112,80c/km	163,83c/km

Source: Compiled by the author from various sources
Notes: Diesel price: coastal wholesale price for the period 2 May to 5 June 2012 of low-sulphur diesel plus 5c/ℓ; licence fees for the Western Cape applicable throughout 2012.

4.2.2 Economies achievable in road transport

4.2.2.1 Economies of fleet size

Increased road vehicle fleet sizes, coupled with productive utilisation of this greater capacity, can result in some economies of scale. Although the achievement of economies of scale emanating from fleet size is moderate, it is, in relative terms, the second highest of the various modes after rail transport. Own facilities, such as terminals – particularly for specialised carriers – provide opportunities for economies of scale.[14] Potential sources of economies of scale are a workshop owned by the business for vehicle maintenance and repairs; standardisation of vehicles, which reduces the quantity of spare-part inventories; discount on bulk purchases; and so on.

4.2.2.2 Economies of vehicle size

As the carrying capacity of road vehicles increases, vehicle-specific costs increase less than proportionally. Vehicle-specific costs are running costs, such as fuel and oil consumption, maintenance and tyre wear. Also, engine size and the number of crew members required increase less than proportionally to an increase in vehicle size.[15] The costs of dispatching and load documentation tend to

remain the same regardless of the size of the load or shipment that various vehicles can carry. These relationships account for the trend towards long-haul road vehicles whose length, width, height and gross mass are often the maximum that road-traffic legislation allows. Although the achievement of economies of vehicle size in road transport is significant, it is, in relative terms along with rail transport, the lowest, resulting mainly from the limits of vehicle dimensions prescribed through legislation.

4.2.2.3 Economies of infrastructure extension

In view of the fact that governments typically recover road-user cost responsibility, except licence fees, through levies included in the price of fuel and through toll tariffs, thereby converting a fixed-cost responsibility into variable transport expenditure, road transport businesses do not gain significantly from enlarged road capacity. However, with standing costs being fixed, at least on a monthly basis, extensive travelling (many kilometres per month) and the avoidance of travelling during periods of traffic congestion so as to increase trip speeds, some economies of density, albeit small, in terms of infrastructure use can be attained.

4.2.2.4 Economies of distance

Generally, owing to the high ratio of vehicle running costs (which accumulate as distances increase) to total costs of individual vehicles, and the relatively small terminal facilities or absence of own facilities, road transport does not enjoy significant economies of distance – in fact it is the second lowest of all modes of transport, with pipeline transport having the least.

A few trip-specific operating cost items are incurred on certain journeys. These are:

- toll fees payable where applicable;
- permit fees, in the case of trips into neighbouring countries;
- escort fees, when certain abnormal loads are carried;
- overtime remuneration and accommodation allowances for vehicle crews; and
- documentation and handling costs at trip ends when consignors and consignees are unable to provide handling equipment.

The first four of the five points above are, whenever they occur, usually less than proportionally related to distance, therefore they can contribute somewhat to economies of distance. It is only the fifth item that is not affected by trip distance at all. Being a relatively small cost item, it is too small to contribute significantly towards economies of distance. All five of these cost items are avoided if a trip is not undertaken, and therefore they are variable costs. Their occurrence will increase the variable cost as a proportion of total cost.

4.3 Rail transport efficiency

4.3.1 Rail transport cost level and structure

Overland pipeline transport is the cheapest mode for those types of commodities that can be transported by pipeline. Either rail or road transport is the cheapest mode of transport for all those commodities that cannot be carried by pipeline. In view of the fact that rail transport achieves considerable economies of distance, it becomes cheaper than road transport for all classes of freight transport as trip distances increase above approximately 500 km. However, for trips shorter than roughly 150 km, road transport is virtually always cheaper than rail transport. For all types of goods that can possibly be carried either by road or rail transport between the same trip origins and destinations, the equal cost distance lies between approximately 150 and 500 km.[16]

Owing to the large initial cost as an absolute quantum and the high ratio of fixed costs in freight rail transport, the breakeven point between revenue and total cost occurs at a very high level of production. This means that a large volume of freight services must be sold before a profit can be realised. This may imply that a profit can only be realised if there is one incumbent rail operator in the market, i.e. a natural monopoly.[17]

Economic features such as high barriers to entry, economies of scale and high breakeven points have historically meant that rail freight transport has been a highly concentrated intramodal market. In terms of the number of market participants, the supply of rail freight transport is (after pipeline transport) the second most highly concentrated of all transport modes. Since the 1990s in Europe and Australia, ownership of rail infrastructure and of train operations have been organisationally divorced. With this arrangement, any prospective rail transport operator may gain open access to existing rail infrastructure and tracks under certain prescribed conditions. The advocates of this new rail transport agreement argue that this reduces the barriers to entry and limits monopolies, making the rail transport market more competitive. The potential (or possible threat) of easy market entry is said to incite the incumbent operator to function more efficiently and effectively. Despite these reforms, few new operators have entered the rail freight market.[18] In countries where the infrastructure ownership and train operations have been divorced, operators have mainly entered the market to satisfy a very specific shipper need or small niche market. Experience has thus far shown that intra-rail competition under the new dispensation gives room for the formation of duopolies, and not larger oligopolies with three or more incumbent competitors.[19]

Rail transport competes with road transport for break-bulk and containerised freight. Because the unit

cost decreases when output capacity increases, rail transport gains substantial economies of scale (mainly through advantages of density and of distance) with high utilisation – and even more so in the case of a double-track operation with long trains.[20]

Although rail transport is more expensive than pipeline transport, it can effectively compete with a parallel pipeline service when it has adequate available capacity, and the pipeline operates at levels close to capacity.[21]

Rail transport competes with inter-port sea transport for all types Owing to the high capital investment in rail infrastructure (railway lines and terminal facilities such as large administrative buildings, stations, marshalling and classification yards, sheds, goods depots and workshops) and the longevity of rolling stock, such as locomotives and freight wagons, the ratio of fixed to total costs is very high – the second highest of all modes of transport (after pipeline transport). Approximately 75 per cent of rail transport costs are fixed over the short term.[22]

4.3.2 Economies achievable in rail transport

4.3.2.1 Economies of fleet size

Economies of fleet size in rail transport are attained through operating long trains, the carrying capacity of which is well utilised, and not simply by operating a large vehicle fleet of wagons and locomotives. In this context, rail transport enjoys the highest level of economies of fleet size of all modes of transport.

There are considerable economies in hauling more wagons per train and employing a stronger locomotive whenever train lengthening requires this. However, there comes a point where an additional locomotive will be needed with further train lengthening. Demand permitting, logic dictates that several wagons should be added when an extra locomotive is employed to keep the required train and locomotive traction power efficiently in balance. The economies stemming from operating the longest trains technically possible and employing multiply-linked locomotives are that, firstly, only one locomotive crew remains necessary for multiply-linked locomotives; secondly, traffic scheduling and control of a few long trains are simpler and potentially safer than operating several short trains, which in total carry the same payload volume or mass as a single long train; and, thirdly, the utilisation of railway lines increases because the required minimum-time headways and following distances between short and long trains differ proportionally less than the difference in train length.

4.3.2.2 Economies of vehicle size

As efficiency requires that the same gauge be used throughout the system, the width of rail wagons is limited by the gauge of the railway line, and the height by overhead clearances along the way. The length of wagons is limited by their structural robustness to withstand the pressure exerted by payload mass on wagon sections not directly supported by sets of axles and wheels, and by the maximum axle mass loads that railway infrastructure can accommodate. Although the achievement of economies of vehicle size in rail transport is significant, it is in relative terms along with road transport the lowest, resulting mainly from the limits of vehicle dimensions dictated by technical considerations described above.[23]

4.3.2.3 Economies of infrastructure extension

With rail transport, the move from a single- to a double-track system may quadruple the capacity of the line by eliminating directional conflict, and a quadruple track should more than double the capacity as it additionally also permits segregation by speed. However, there is no sense in building railway lines of larger capacity than will be required.[24] As is indicated in the next subsection, extension of rail route lengths to link distant origins and destinations has the potential to encapsulate long-haul advantages, therefore, under the banner of infrastructure extension, both economies of density and of distance may accrue. However, such beneficial interaction between increasing returns to scale due to greater traffic density and a gain in efficiency through long-haul advantage is dependent on (a) sufficient demand; and (b) firm size. In rail transport, 'size of the firm' conventionally incorporates 'fleet size' and 'network size'.

4.3.2.4 Economies of distance

In view of the fact that rail transport has relatively high terminal costs, it enjoys substantial economies of distance as trip length increases – the highest of all modes of transport.

As is indicated in subsection 4.3.2.3, when analysing rail transport, one should distinguish between unit costs (for example the cost per ton-km) decreasing due to economies of density and of distance. Through economies of density and distance, a rail transport operation may enjoy a natural monopoly on a particular route. On condition that the utilisation of train-carrying capacity is high, the former economy stems from its cost structure, which is characterised by a relatively high ratio of fixed to total cost so that with increasing the annual distances of all trains collectively, the fixed cost per unit of performance (train-kilometres and eventually ton-km) declines faster than the variable cost increases per additional unit of performance within the output capacity, and the latter economy from the high amount of terminal operating costs (at trip ends) that do not change as trip distances increase.

4.4 Pipeline transport efficiency

4.4.1 Pipeline transport cost level and structure

Overland pipeline transport is the cheapest mode of transport, and is substantially cheaper than road and rail transport.[25] For example, between Durban and Gauteng in South Africa, pipeline tariffs per litre of fuel over a route of 704 km are approximately half those of rail and one-fifth of those of road transport.[26] It is therefore clear that a Durban-based petroleum wholesaler that does not have access to pipeline or rail transport between Durban and Gauteng is subject to the likelihood of competitive foreclosure of marketing its product(s) in Gauteng.[27]

In terms of the number of market participants, the supply of pipeline transport is the most highly concentrated of all transport modes. The absolute number of firms is low, but the significant measure of concentration is the number of participants in a specific transport market segment or corridor. With a few exceptions, there is but one crude oil, one products and one natural gas pipeline connecting producing areas or refineries and areas of consumption. This high degree of monopoly power results from declining unit costs with increases in capacity, so that the lowest costs are achieved by a concentration of output in a single pipeline. A high degree of concentration is efficient, and changes towards a more competitive market structure through economic regulation would entail high losses in efficiency, therefore pipeline operations that can fulfil entire market demand are natural monopolies.[28]

In view of the abovementioned considerations, financial stakeholders in pipeline operations tend to consolidate and start with a large initial investment, which tends to yield higher returns, partly because of economies of scale and partly because of inherent performance characteristics (for example, a 30 cm pipe operating at capacity transports three times the quantity carried by a 20 cm pipe).[29] The gains from scale are substantial. For example, the lowest cost for a throughput of 100 000 barrels of crude oil per day in a 45 cm pipeline would be approximately double the cost per barrel when compared to carrying 400 000 barrels per day in an 80 cm pipeline over the same distance.

The implications for the industry are important. It would be extremely wasteful, for example, for four competing refineries in a consuming area in which each used crude oil from the same area of origin to build four pipelines. If, for example, each required 100 000 barrels per day, then building four parallel 45 cm pipelines instead of a single 80 cm pipeline would double the cost per barrel for transport. Efficiency dictates a common system for use of the same pipeline in such circumstances. It also follows that costs for carrying petroleum on a route that has a large pipeline will be much lower than on other routes not thus provided. There will be external economies in locating large refining capacity in the same area.

Although pipeline transport is the least expensive mode of transport overland, rail transport can effectively compete with a parallel pipeline service when it has adequate spare capacity and the pipeline operates at levels close to capacity.

Despite the fact that tank ships run empty during return trips, pipeline transport can only compete cost-wise with sea transport between the same origin and destination if the pipeline route is considerably shorter than the sea route, or where sea transport is subject to exceptional charges, such as heavy canal dues.[30] An example is the 254-km long trans-Israel crude oil pipeline route between Eilat on the Red Sea and Ashkelon on the Mediterranean coast. This route is substantially shorter than the one around Africa, and cheaper than using the Suez Canal.[31]

As with rail transport, pipelines provide their own right of way. Since the pipe component, the pumps and the tank and plant facilities are highly specialised and durable, fixed cost constitutes a high portion of the total cost – the highest of all modes. Pipeline transport is highly efficient when the utilisation of capacity remains consistently high. Transport cost per unit carried rises rapidly if actual usage falls below capacity because of the high ratio of fixed to total operating cost. Because the fixed costs of pipeline transport are proportionately much higher than variable costs, and continuous pumping may take place with no need for any return flow and there is no materials handling, economies of scale prevail in pipeline transport. Because of the high capital costs of a pipeline, the financial barrier to entering the market is high. Approximately 85 to 90 per cent of pipeline transport costs are fixed over the short term.[32]

4.4.2 Economies achievable in pipeline transport

4.4.2.1 Economies of vehicle size and infrastructure extension

Pipeline transport has unique characteristics: the carrying unit (i.e. the 'vehicle') is also the infrastructure. On the principle of economies of density, an increase in pipe diameter can result in a lower unit cost. The fundamental relationships involved depend upon the principles of geometry concerning the relation between the surface area of a pipe's wall and its volume. Consider a circular cross-section of a pipe. Because the area of a circle is πr^2, its area increases with the square of the radius. The circumference increases only in proportion to the radius, since the circumference is $2\pi r$. The friction that must be overcome to move a liquid commodity through a pipeline is the friction between the liquid and the wall of the pipe, therefore increasing the diameter of a pipe will increase the quantity of liquid

in the pipe faster than it will increase the area of the wall of the pipe in contact with the liquid. Consequently, there are gains in economies in the propulsion power required to pump the same quantity of commodity by increasing the diameter of the pipe. There are also economies in the cost of the pipe itself. For larger pipes, the quantity of body steel per unit of pipe-carrying capacity is less than for smaller pipes.

Pipeline transport does not necessarily require a return journey or return pumping process. This eliminates joint costs. Because cost is incurred without adding value each time goods are handled at a terminal or storage facility, a primary logistics objective is to eliminate handling wherever possible. With the carriage of crude oil and petroleum products by pipeline, this objective is fully met. Commodity intake, haulage and discharge are combined in one process, usually a remote-controlled one.

An uninterrupted and prolonged throughput of a large volume of homogeneous product increases economies of density. Should such continuous pumping with a specific product not be sustainable, common production can make petroleum pipelines more cost effective, since a variety of petroleum products can be pumped consecutively, thereby enhancing the achievement of economies of scale through economies of scope.

4.4.2.2 Economies of distance

Longer pipelines do not give rise to significant economies of distance; in fact this is almost non-existent – the lowest of all modes of transport. The reason for this is that additional pump stations and more pipes in direct proportion are required for longer distances.[33]

4.5 Sea transport efficiency

4.5.1 Sea transport cost level and structure

The total unit cost to carry freight by sea is the lowest of all modes of transport. Over equal distances the unit cost in ton-km to carry freight by sea is substantially lower than any of the three modes of land transport. However, these three modes can be cheaper than inter-port sea carriage when, firstly, the sailing distance between the ports is too short for vessels to gain sufficient economies of distance; secondly, the trip origins and destinations of freight shipments are accessible by road, rail or pipeline, but are significantly remote from the ports, and vice versa, when the inter-port distance is substantially long and/or the origins and destinations are close to the ports; and thirdly, where sea transport is subject to exceptional charges, such as heavy canal dues.

The cost structure of sea transport is similar to that of air transport. It is characterised by balanced proportions of fixed and variable costs. Sea transport does not need a supplied right of way. The travel 'way' involved, namely the sea, does not require investment, and seaports are not owned or supplied by shipping firms. Expenses in ports can be as high as a third of direct voyage costs;[34] however, these obligations only arise when a port is visited.

4.5.2 Economies achievable in sea transport

4.5.2.1 Economies of fleet size

As is the case with air transport, economies of scale are possible with large individual vessels and not necessarily with large fleet operations. Single-ship operators or those operating a few ships – for example charter ships – are often able to compete with larger scheduled conference liners, which indicates that sea transport enjoys little in terms of economies of fleet size.

4.5.2.2 Economies of vehicle size

Like most forms of transport, shipping benefits through economies of scale are associated with operating larger ships.[35] Larger ships result in lower costs per ton (in the case of bulk shipping) and lower costs per standard container (in the case of container shipping);[36] however, larger ships may cause problems for other areas of the maritime industry, mostly at the ports. Bigger ships require wider entrance channels, deeper draughts, larger cranes and other loading and unloading equipment, as well as sufficient storage space to hold the volumes of freight before or after loading and unloading them. Air and sea transport enjoy similar economies of vehicle size –, the second highest after pipeline transport.

4.5.2.3 Economies of infrastructure extension

Evidence exists that in port operations a fourfold increase in container port size can reduce the cost of handling container traffic by approximately one-quarter.[37] However, seaports are not owned or supplied by shipping firms, so ship owners may not automatically reap the benefits of improved port efficiencies. Port charges are levied by the owning port authority. Whether or not a portion of the value of efficiency improvements and other cost advantages are passed on to visiting ships will depend on the policy of the governing port authority. Often, the various commercial ports in a country reside under the control of a single port authority, which may set uniform port charges for similar port services throughout, regardless of the different cost structures and changing degrees of competitiveness among ports.

4.5.2.4 Economies of distance

Generally, for container vessels and the various types of bulk carriers, expenses in ports are in the order of a third of direct voyage costs (this can constitute up to roughly 40 per cent if the ship itself or its cargo requires prolonged and/or special berthing and handling arrangements).[38] In view of the high terminal expenditure and the fact that the 'way' of travel involved – the sea – does not require investment or any significant expenses apart from navigational support that may sometimes be necessary, ships enjoy substantial economies of distance as voyage lengths increase. Air and sea transport enjoy similar economies of distance – the second highest after rail transport.

5 SUMMARY

The cost to transport a unit of freight by air is the highest of all modes of transport, and by road the second highest on long trips and third highest on short trips, where road is cheaper than rail transport. In view of the fact that rail transport achieves considerably more economies of distance than road transport, the latter becomes progressively more expensive than the former for all classes of freight as trip distances increase above approximately 500 km. For trips shorter than roughly 150 km, road transport is almost always cheaper than rail transport. For all types of goods that can possibly be carried either by road or rail transport between the same trip origins and destinations, the equal cost distance of the two modes lies between approximately 150 and 500 km. Overland pipeline transport is the cheapest mode for those types of commodities that can be transported this way. Either rail or road transport is the cheapest mode of transport for all those commodities that cannot be carried by pipeline. The total unit cost to carry freight by sea is the lowest of all modes of transport. Over equal distances, the unit cost in ton-km to carry freight by sea is substantially lower than any of the three modes of land transport. However, these three modes can be cheaper than inter-port sea carriage when, firstly, the sailing distance between the ports is too short for vessels to gain sufficient economies of distance; secondly, the trip origins and destinations of freight shipments are accessible by road, rail or pipeline, but are significantly remote from the ports, and vice versa when the inter-port distance is substantially long and/or the origins and destinations are close to the ports; and thirdly, where sea transport is subject to exceptional charges, such as heavy canal dues.

The factors contributing to scale economies in freight transport are, firstly, the spreading of fixed cost commitments over extended output capacity; secondly, certain inputs that can be obtained more cheaply as output rises; and thirdly, the employment of new indivisible inputs that enjoy increasing returns to scale. In freight transport, the latter two factors are achieved through emerging efficiency gains and productivity activators that are specific to, firstly, increasing fleet size and maximising use of its capacity; secondly, increasing vehicle sizes and maximising use of their capacity; and thirdly, extending the capacity of transport facilities and infrastructure, and intensifying the use thereof. Subsequently, economies of scale in freight transport are often enhanced by the attainment of one or more of three subgroups of economies: economies of density, economies of scope, and economies of distance.

Economies of scale in transport often refer to vehicle rather than firm, fleet or plant size, especially in the case of ships and pipelines. Ships, notably bulk carriers, and pipelines often operate as separate business entities. **Pipeline transport** has unique characteristics: the carrying unit (i.e. the 'vehicle') is also the infrastructure. On the principle of economies of density, an increase in pipe diameter can result in a lower unit cost. An uninterrupted and prolonged throughput of a large volume of homogeneous product increases economies of density. Should such continuous pumping with a specific product not be sustainable, common production can make petroleum pipelines more cost effective, since a variety of petroleum products can be pumped consecutively, thereby enhancing the achievement of economies of scale through economies of scope.

In **rail transport**, under the banner of infrastructure extension, economies of both density and distance may accrue. However, such beneficial interaction between increasing returns to scale due to greater traffic density and a gain in efficiency through long-haul advantage is dependent on (a) sufficient demand; and (b) firm size. In rail transport, 'size of the firm' conventionally incorporates both 'fleet size' (where this refers to train length) and 'network size' (where this refers to route kilometres).

Although increasing fleet size in **air transport** does not necessarily result in significant economies of scale, a large fleet, but with mixed operations, may result in significant economies of scope. It may be more economical for one carrier to undertake both scheduled and charter flights than for separate carriers to specialise in one of the two types of service. Similarly, it may be more economical for one airline operator to offer both passenger and freight services than for separate carriers to specialise in one of the two types of service.

Large **road transport** carriers who own suitable terminals can achieve considerable economies of scope by sorting and then consolidating heterogeneous part loads effectively into homogeneous containerised shipments, thereby creating an economy of density, which in turn enhances economies of scale. It is therefore clear that while in freight transport, economies of scale in its strictest form – that of being dependent on the size of

the firm (i.e. the number of vehicles in its fleet) -- are considerably important, it cannot be divorced from the attainment of one or more of three subgroups of economies: economies of density, economies of scope, and economies of distance.

Table 2 provides a comparative summary of the most salient economic features of the five modes of freight transport.

Table 2. Comparison of salient economic features of transport modes

Economic charateristics	Air	Road	Rail	Pipeline	Sea
Cost level	Highest	Second highest	Moderate	Second lowest	Lowest
Cost structure (fixed-to total-cost ratio)	Balanced (second lowest, similar to sea)	Lowest	Second highest	Highest	Balanced (second lowest, similar to air)
Economies of fleet size	Second lowest (similar to sea)	Second highest	Highest (achievable through long trains)	Lowest, non-existent (referring to number of pipes)	Second lowest (similar to air)
Economies of vehicle size	Second highest (similar to sea)	Lowest, although achievement is still significant (similar to rail)	Lowest, although achievement is still significant (similar to road)	Highest (referring to pipe diameter)	Second highest (similar to air)
Economies of distance	Second highest (similar to sea)	Second lowest	Highest	Lowest (almost non-existent)	Second highest (similar to air)

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BOARD COMPOSITION AND INTERLOCKING DIRECTORATE EVOLUTION AS A CONSEQUENCE OF THE RECENT FINANCIAL CRISIS: EVIDENCE FROM ITALIAN LISTED COMPANIES

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Abstract

The recent systemic crisis that has affected the financial markets and real economies of major industrialized countries has had significant effects on the corporate governance and key organizational choices of large firms.
In this context, the present study aims to verify whether the international crisis has significantly changed the structure of the interlocking directorate network that links large firms in the regulated Italian market. To this end, the first part of the paper presents an analysis of the evolution of corporate governance in the main European regulated markets through a comparative analysis of some synthetic statistical data observed at the end of the years 2006, 2008 and 2010. In the second part, after framing the concept of interlocking directorate in a theoretical perspective, we examine the evolution of the network of personal ties between large Italian listed companies in the period of observation (2006-2010) using Social Network Analysis.

Keywords: Interlocking Directorates, Social Network Analysis, Financial Crisis, Corporate Governance Evolution, Board of Directors, Corporate Networks

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1. Introduction

In the recent past, international literature has often focused on the nature and scope of the systemic crisis that has affected the financial markets and real economies of major industrialized countries since the second half of 2008. The changed economic environment, which is still characterized by a high degree of instability and uncertainty, has had a significant impact on corporate results and, in many cases, has also had relevant repercussions on the evolution of corporate governance, on the composition of governing bodies and, more generally, on the main organizational choices of firms.

The aspects most analysed in this context, especially in international literature, include the potential effects of the crisis on both the evolution and the intensity of personal relations that directly and indirectly exist between large firms.

Ties of a personal nature established between companies that share one or more board directors is a phenomenon - also known as interlocking directorate – that is present in all areas of international business, but is particularly widespread in Europe and especially in the Italian market, where large firms often belong to corporate groups structured in pyramid form. To be noted is that major Italian companies, including those listed in the regulated market, are often owned of a small number of family firm groups; consequently, unlike companies in other geographical contexts, they are characterized by cross-shareholding relationships and share common directors. Authoritative literature considers this a relevant factor distinguishing Italian firms that warrants further examination and discussion as this affects the governance structure, the related decision-making capacity of enterprises and, more generally, business performance.

Despite the significant number of interlocked companies, national literature has paid scarce attention to this issue. Although more recent studies have shown growing interest in analysing the causes of the formation of personal ties between companies, and the consequences of this phenomenon on business

results, at the domestic level no studies have focused on the repercussions of the crisis on the structure of the network and the higher (or lower) intensity of the phenomenon in question.

The present work intends to contribute to the theoretical debate by examining the effects of the crisis on the structure of interlocking directorates that link major companies listed on the Italian regulated market.

The first part of the research examines the most significant changes in the composition of governing bodies of listed companies operating in the main European regulated markets and purposes a comparative analysis of some synthetic statistical data observed at the end of the years 2006, 2008 and 2010.

The second part, specifically dedicated to the theme of personal ties between companies, first frames the concept of interlocking directorate in a theoretic perspective by systematically examining the main authoritative contributions in literature.

Subsequently, we examine the effects of the financial crisis on changes in the interlocking directorate network in large Italian listed companies. Applying the Social Network Analysis technique, we compare the main synthetic indicators suggested by literature (density, betweenness, closeness, etc.) that enable examining the evolution of the network in the aforementioned observation period (2006, 2008 and 2010).

The concluding section offers some brief observations that also include insights on the possible future developments of this research.

2. The composition of the governing bodies of companies listed on EU regulated markets in 2006-2010

Prior to the description and analysis of the network of interpersonal ties between companies operating in Italy, it seems appropriate to provide some data on the composition and evolution over time of the governing bodies of companies listed on the main regulated markets.

This premise is crucial to frame the interlocking phenomenon as part of the broader issue concerning the evolution of corporate governance mechanisms in the European context following the systemic crisis that occurred in the second half of 2008.

The analyses described in this section first aim to highlight the differences in the corporate governance structure of companies operating in the main European regulated markets: these differences, referring to board composition and the specific characteristics of directors (in terms of nationality, gender, independence, etc.), suggest that the interlocking phenomenon has specific characteristics depending on the territorial context in which it is observed. In this perspective, numerous studies have previously identified, for example, the significant differences between the interlocking directorate networks in Italy, France and Germany (notwithstanding their particular characteristics showing a high degree of density and duplication of interlocks) compared to those observed in the United Kingdom and the United States (more extensive but less dense) (Comet and Pizarro, 2011; Windolf and Beyer, 1996; Windolf, 2002; Santella *et al.*, 2008).

The analyses are also intended to provide information on the evolution of the governance of European firms in the period 2006-2010 to verify, albeit indicatively, whether the effects of the 2008 international crisis - still ongoing - have led to significant changes in the composition of the governing bodies of the companies surveyed.

Moving onto the data analysis[19], to be first noted is that while the number of directors that constitute the boards of companies operating in the main European markets ranges from 12.80 (year 2006) to 12.10 (year 2010), considerable differences emerge in some national contexts (see table 1).

Particularly significant is the case of German companies where the average number of directors (over 17 units), although lower than in 2006 (-10 %), remains the highest when compared with other European countries such as the Netherlands where the average number of directors stood below the threshold of 9 units.

The comparison of the data for the period 2006-2010 also captures differences in evolutionary terms between the different national contexts: countries with more numerous governing bodies showed a downward trend in the number of components (particularly Germany and Italy) while the UK and Switzerland showed an increase in board size, particularly in the Anglo-Saxon context, where the average number of directors in 2006, equal to 8.30, increased in 2010 to 12.4 (approximately + 49.4%).

In dynamic terms, both these trends could be viewed as a consequence of the 2008 crisis, taking into account, in this sense, that board size depends on many variables that lead to alternately favouring more or less extensive governing bodies (Coles *et al.*, 2008).

On the one hand, the need to accelerate the decision-making process and simultaneously contain administration costs may have led the first group of companies (those with a larger board) to reduce the

[19] The data examined in this section are the result of a re-elaboration of the information in the European Corporate Governance Report published every two years by Heidrick & Struggles International (www.heidrick.com). These reports provide detailed information on companies listed on the main European regulated markets: Austria (ATX), Belgium (BEL 20), Denmark (C20), Finland (OMX Helsinki), France (CAC40), Germany (DAX30) Italy (S & P MIB), Netherlands (AEX), Norway (OBX), Poland (WSE), Portugal (PSI20), Spain (IBEX35), Sweden (OMX Stockholm), Switzerland (SMI) and the United Kingdom (top 50 of the FTSE).

number of board directors. On this point, literature has repeatedly shown that numerically restricted boards are more effective than those that are excessively large (Lipton and Lorsch, 1992; Yermack, 1996; Eisenberg *et al.*, 1998).

Conversely, in companies with smaller boards, the crisis may have determined the need to increase the number of directors in order to acquire knowledge (Dalton *et al*., 1999) and new interpersonal skills (Booth and Deli, 1996), which could prove essential in effectively addressing the crisis according to what some authors postulate in the resource dependence theory perspective (Pfeffer, 1972; Pfeffer and Salancik, 1978).

Table 1. Average number of directors per board

Country	2006	2008	2010	Δ 2008-2010	Δ 2006-2010
Netherlands	8.6	8.9	8.7	*-2.2%*	*1.2%*
Switzerland	9.8	10.5	10.4	*-1.0%*	*6.1%*
Sweden	10.8	10.8	10.7	*-0.9%*	*-0.9%*
United Kingdom	8.3	8.5	12.4	*45.9%*	*49.4%*
Belgium	12.9	12.7	13.8	*8.7%*	*7.0%*
Italy	15.5	13.4	13.9	*3.7%*	*-10.3%*
France	14.3	14.6	14.2	*-2.7%*	*-0.7%*
Spain	14.7	14.3	14.3	*0.0%*	*-2.7%*
Portugal	14.1	13.	15.2	*16.9%*	*7.8%*
Germany	19.1	17.7	17.1	*-3.4%*	*-10.5%*
European average	12.8	11.8	12.10	*2.5%*	*-5.5%*

Table 2 instead summarizes the age of directors: the European average in 2010, although showing a slight decrease compared to 2006, is around the 58-year threshold. The moderately high level of the average age of board members corroborates the largely unanimous studies that consider director seniority (and related experience) as a positive factor to improve corporate performance and to avoid the risk of business failure (Platt and Platt, 2012). The slight decrease (-1.2%) in the average European age in the period 2006-2010, although in contrast with expectations based on the theories formulated in literature, may be justified on the grounds of a possible regeneration of the board of directors with the entry of younger directors in the aftermath of the crisis. The choice of a partial generational renewal of the board is supported in studies according to which the presence of younger directors ensures the greater efficiency and effectiveness of the decision-making process, a greater propensity towards changes in the business model, in response to changes in the context of reference, and the improved ability to plan future strategies (Houle, 1990; Taylor, 1975; Waelchli and Zeller, 2013).

Also in this case, significant differences emerge between countries with respect to more restricted levels of seniority (in Sweden, for example, the average value is 55.5 years) and those with an average age that systematically exceeds the threshold of 62 years.

Table 2. Average age of board directors

Country	2006	2008	2010	Δ 2008-2010	Δ 2006-2010
Sweden	57.1	57.1	55.5	*-2.8%*	*-2.8%*
Portugal	55.8	55.9	57.3	*2.5%*	*2.7%*
Belgium	58.9	57.6	57.8	*0.3%*	*-1.9%*
Germany	58.7	60.1	57.8	*-3.8%*	*-1.5%*
United Kingdom	58.8	59.7	58.0	*-2.8%*	*-1.4%*
Italy	58.2	59.6	59.8	*0.3%*	*2.7%*
Spain	56.6	58.9	59.8	*1.5%*	*5.7%*
Switzerland	59.3	59.5	60.2	*1.2%*	*1.5%*
France	60.8	61.6	60.4	*-1.9%*	*-0.7%*
Netherlands	62.9	62.4	62.4	*0.0%*	*-0.8%*
European average	59.1	59.00	58.40	*-1%*	*-1.2%*

In continuing the analysis, it is also useful to examine the composition of boards of directors in terms of the different nationalities of their members with respect to the country in which the registered office of each company examined is located. We find a significant difference among the countries observed: in some cases (the UK, the Netherlands and Switzerland), the percentage of foreign directors is over 40% and significantly above the European average. This circumstance, according to literature (van Veen and Elbertsen, 2008; MacLean *et al.*, 2006), is influenced by the characteristics (ownership structure, corporate governance systems adopted, etc.) that distinguish the firms operating in each country examined.

In a dynamic perspective, a general increase of foreign members on European boards (except exclusively Portugal) was recorded in the period 2006-2010 with an increase of the European average from 18% (year 2006) to 24% (year 2010). This trend can first be explained by the ongoing globalization of business activities and financial markets. Consequently, in view of the ongoing international crisis, companies need to establish new relationships in territorial contexts that go beyond the local to take advantage of the possibility of extending their markets of reference (Luo, 2005; Andersen, 1993; Sanders and Carpenter, 1998).

Not to be underestimated is that the growing number of foreign directors may also be linked, in some cases, to the need to create greater governance control over the management of foreign subsidiaries, requiring the appointment of trusted directors, in accordance with the authoritative opinion of Mizruchi (1996) who interprets interlocking directorate as a management control and coordination tool.

Table 3. Percentage of non-national directors on the board

Country	2006	2008	2010	Δ 2008-2010	Δ 2006-2010
Spain	7.6%	10%	10%	*0.0%*	*31.6%*
Germany	7.3%	8%	11%	*37.5%*	*50.7%*
Italy	7.9%	11%	12%	*9.1%*	*51.9%*
Portugal	22%	21%	17%	*-19%*	*-22.7%*
France	20%	26%	27%	*3.8%*	*35%*
Sweden	15.8%	21%	31%	*47.6%*	*96.2%*
Belgium	25%	36%	34%	*-5.6%*	*36%*
United Kingdom	31%	41%	40%	*-2.4%*	*29%*
Netherlands	36%	54%	47%	*-13%*	*30.6%*
Switzerland	45%	45%	53%	*17.8%*	*17.8%*
European average	18%	23%	24%	*4.3%*	*33.3%*

Another useful factor to examine is gender equality on the boards of large firms: in this case, albeit within the generalized condition of a lack of female directors on the boards of major listed companies, significant differences emerge in the European context. The percentage of women on boards of directors in some countries exceeds 10% (with the remarkable example of Sweden, which stands at around 30%) as opposed to other countries where the female constituent does not exceed the share of 5% (Italy and Portugal).

As regards the temporal profile, we observe a gradual increase in the number of women in governing bodies, with an average European value that went from 8.4% in 2006 to 12% in 2010 (+ 42.9%). This increase can be reasonably attributed to the increasing focus of companies (and the world economy in general) on gender equality, in adherence to recent empirical evidence emphasizing the positive effects of a greater number of women in terms of decision-making efficiency and management control ability (Huse *et al*., 2009; Nielsen and Huse, 2010a, 2010b).

Table 4. Proportion of woman on the board

Country	2006	2008	2010	Δ 2008-2010	Δ 2006-2010
Italy	2.3%	3%	3%	*0.0%*	*30.4%*
Portugal	0.7%	3%	4%	*33.3%*	*471.4%*
Belgium	5.3%	8%	8%	*0.0%*	*50.9%*
Spain	3.1%	6%	9%	*50%*	*190.3%*
France	7.5%	8%	11%	*37.5%*	*46.7%*
Switzerland	7.2%	9%	11%	*22.2%*	*52.8%*
United Kingdom	15.2%	15%	12%	*-20%*	*-21.1%*
Germany	12.4%	11%	13%	*18.2%*	*4.8%*
Netherlands	9.0%	13%	15%	*15.4%*	*66.7%*
Sweden	21.3%	22%	29%	*31.8%*	*36.2%*
European average	8.4%	10%	12%	*20.0%*	*42.9%*

Finally, two additional data should be mentioned: the presence of independent directors on the board and the frequency of meetings of the governing bodies.

The first data shows that the presence of independent directors on the boards of European companies was 43% in 2010, a significant decrease when compared to the 54% in 2006. This trend seems to be anomalous considering that in the context of an international market crisis one would expect an increase in the number of independent directors to strengthen governance control over the actions of executive directors. Also to be considered, as indicated by some contributions in literature (Erkens *et al.*, 2012), albeit limited to financial firms, is that the presence of independent directors determines a greater ability to acquire venture capital, which is essential in ensuring the adequacy of capital and to reduce the risk of insolvency during times of crisis.

The data in question could be interpreted by recalling those studies according to which in times of crisis, and therefore following a period of poor performance, the number of insider directors temporarily increases in preparation for the replacement/succession of the CEO (Hermalin and Weisbach, 1988). The trend reverses once a new CEO has been appointed, entailing other executive directors exiting and replacing these with new and often independent directors. However, it is somewhat evident that the study in question, although providing a possible explanation as evidenced by the data examined, reflects the peculiarity of having been tested in a market (the U.S.) that significantly differs from that in which European companies operate.

Alternatively, the reduction of independent directors could be seen as the consequence of an increasing degree of uncertainty inherent in companies in crisis that induces independent directors to abandon their appointment, also to safeguard their reputation and reduce the risk of any liability related to the potential failure of the company (Arthaud-Day *et al.*, 2006; Fahlenbrach *et al.*, 2010; Finklestein *et al.*, 2009; Withers *et al*., 2012).

Also to be noted is that the percentage of independent directors varies considerably in the different national contexts examined: it assumes high values in the Netherlands (75%), Switzerland (62%) and the United Kingdom (61%), and is significantly more limited in Germany (21%), Portugal (30%), Belgium (32%) and Spain (36%) (data for 2010).

Table 5. Percentage of independent directors on the board

Country	2006	2008	2010	Δ 2008-2010	Δ 2006-2010
Germany	28%	30%	21%	*-30%*	*-25%*
Portugal	35%	22%	30%	*36.4%*	*-14.3%*
Belgium	41%	40%	32%	*-20%*	*-22%*
Spain	40%	30%	33%	*10%*	*-17.5%*
Austria	23%	28%	36%	*28.6%*	*56.5%*
France	51%	42%	40%	*-4.8%*	*-21.6%*
Sweden	42%	45%	40%	*-11.1%*	*-4.8%*
Italy	52%	45%	48%	*6.7%*	*-7.7%*
United Kingdom	91%	86%	61%	*-29.1%*	*-33%*
Switzerland	75%	63%	62%	*-1.6%*	*-17.3%*
Netherlands	85%	79%	75%	*-5.1%*	*-11.8%*
European average	54%	45%	43%	*-4.4%*	*-20.4%*

The often-recalled increasing level of uncertainty due to the crisis also allows explaining the general increase in the number of directors' meetings in the period examined. At the European level, an increase of 8% of meetings is shown in the 2006-2010 period; this increase is even more evident when comparing the 2006 figures with those of 2008, when the crisis manifested with greater intensity, imposing the frequent convening of governing bodies to take decisions to effectively deal with the changing international economic and financial situation. The evidence provided confirms Jensen's (1993) postulation, namely, an increase in the number of meetings of the board of directors is a reaction to negative results. In the same vein, also to be considered is the effect of an increase in the number of meetings that, according to some authors, exerts positive effects in terms of improved performance in the years following the increase in the frequency of meetings (Vafeas, 1999).

Except for the German context, where the number of meetings was nonetheless extremely low in the three years under observation (always below the threshold of 6 meetings per year), in other countries the data is essentially in line with the European average (9.40), ranging from the minimum value recorded in Belgium (8.0) to the highest value found in Italy (11.30) (data for 2010).

Table 6. Frequency of board meetings (average number of meetings per year)

Country	2006	2008	2010	Δ 2008-2010	Δ 2006-2010
Germany	4.4	5.8	5.9	*1.7%*	*34.1%*
Belgium	8.9	8.6	8.0	*-7.0%*	*-10.1%*
Netherlands	8.1	9.3	8.3	*-10.8%*	*2.5%*
Switzerland	7.3	8.2	8.4	*2.4%*	*15.1%*
Portugal	8.7	10.6	8.9	*-16.0%*	*2.3%*
France	7.4	8.1	9.0	*11.1%*	*21.6%*
United Kingdom	8.7	9.6	9.4	*-2.1%*	*8.0%*
Sweden	9.4	10.9	10.3	*-5.5%*	*9.6%*
Spain	10.9	11.4	10.9	*-4.4%*	*0.0%*
Italy	12	12.1	11.3	*-6.6%*	*-5.8%*
European average	8.7	9.60	9.40	*-2.1%*	*8.0%*

3. Literature review

Interlocking directorate is a widespread and extremely varied phenomenon in the international economic reality: its complexity is the subject of constant interest in literature examining the different sociological, organizational, managerial and legal profiles.

This implies that any attempt at classifying the numerous scientific papers is considerably difficult when taking into account the different objectives and the specific aspects under study.

The systematic analysis of the literature, conducted as part of this research, suggests that the authoritative contributions in literature can be usefully classified according to the following analysis objectives:

A. Examine the motivations and environmental factors that foster the creation of interpersonal networks, together with the analysis – also in evolutionary and comparative terms – of the structure of networks in different international contexts.
B. Analyse the consequences on corporate behaviour of sharing one or more directors, the functioning of the governance system and corporate performance.
C. Assess the personal impact of interlocking on directors with multiple appointments (increase of remuneration, acquisition of new skills, growing reputation, etc.).
D. Investigate possible causal links between intense personal ties between companies in a given sector and the possible limitation (or alteration) of competition in the relevant markets.

In the first line of research (point A), some studies focus on the critical analysis of the reasons (so-called models) that justify the creation and dissemination of interlocks between large firms (Fennema and Schijf, 1979; Koening *et al*., 1979; Zajac, 1988; Mizruchi, 1996).

In this context, particularly significant are some works that systematically examine the models and theories advanced by literature to explain the development and evolution of the personal nature of relationships between legally distinct firms.

In particular, Koening *et al*.'s (1979) contribution argues that the spread of networks based on common directors alternatively expresses one of the following circumstances:

a) management control power (*management control model*) that is able to guide the votes of shareholders at the time of the appointment or replacement of members of the board of directors (Dahl *et al.*, 1959; Cheit, 1964; Dively, 1972; Holden *et al.*, 1941)
b) the need to build mutual cooperation relations between firms (*reciprocity model*) by sharing directors (Dooley, 1969; Allen, 1974)
c) the volition of financial institutions to exercise control over debtor firms (*finance control model*) (Aaronovitch, 1961; Perlo, 1957)
d) the presence of an elite group of influential people (*class hegemony model*) who share common objectives and through their simultaneous presence in large firms can ensure the maximization of personal profit and more stable control power (Domhoff, 1967; Mills, 1956; Zeitlin, 1974).

In a later work, Mizruchi (1996) describes six separate models that justify the formation of personal ties:

a) the collusion model, according to which the diffusion of interlocks has origin in the desire of firms to create useful ties to exchange information, coordinate decisions within an industry and limit competition (Pennings, 1980; Burt, 1983)
b) the cooptation and monitoring model, according to which interlocking directorate is an instrument adopted by firms to secure the resources needed to reduce environmental uncertainty or monitor the behaviour of companies entrusted with their resources (consider the bank-firm relationship) (Dooley, 1969; Pfeffer, 1972; Allen, 1974; Pfeffer and Salancik, 1978; Schoorman *et al.*, 1981)
c) the legitimacy model, which considers the sharing of directors as a result of firms seeking to legitimize their value to investors through the creation of a series of personal ties with other entities (DiMaggio and Powell, 1983)
d) the career advancement model, whereby the creation of the interlocking directorate derives not so much from companies seeking to create ties with other entities, but from directors seeking an increasing number of more important appointments, and firms seeking directors with more experience, irrespective of the entities they are linked to (Stokman *et al.*, 1988; Zajac, 1988; Useem, 1979; Mace, 1971)
e) the social cohesion model, according to which interlocks are the result of ties between members of the richer and more influential social classes that tend to perpetuate their power through the mutual exchange of appointments (Mills, 1956; Mace, 1971; Domhoff, 1967; Zeitlin, 1974).

The aforementioned research stream also includes many studies that examine the structure of interlocking networks by measuring the density of ties, the number and the centrality of the different parties involved, their evolution over time and the different network characteristics according to the geographic context under observation.

The contributions in this area focus in some cases on a single country (or industry sector) and refer to a specific date (Everard and Henry, 2002; Comet and Pizarro, 2011; Gambini *et al.*, 2012), while others, although focused within a limited geographical context, examine the evolution over time of firm networks (Heemskerk, 2007). Finally, additional studies propose analyses comparing the interlocking directorate networks in different countries (Windolf and Beyer, 1996; Santella *et al.*, 2008; van Veen and Kratzer, 2011) or examine the evolution of the network of personal ties between companies operating in distinct nations (international network) (Carroll *et al*., 2010; Heemskerk, 2013).

The second stream (point B) includes studies, referring to the aforementioned theoretical models (particularly that of cooptation and monitoring), that aim to measure the effects of interlocking on decision-making, on the effectiveness of governance mechanisms and on value creation. In relation to the latter point, the extreme variety of empirical results is noteworthy and based thereon the literature has affirmed that interlocking positively (Phan *et al*., 2003; Elouaer Mrizak, 2009; Silva *et al.*, 2006; Di Pietra *et al*., 2008; Li *et al.*, 2013) or negatively (Non and Franses, 2007; Croci and Grassi, 2010; Drago *et al.*, 2011) affects firm performance and business value. Remaining on the theme of performance, the study of Khanna and Thomas (2009) demonstrates a possible synchrony of results between companies linked by interlocking directorate.

Another part of literature instead focuses on particular circumstances that indirectly affect firm performance and business value.

First, we recall the studies that indicate a weakening of control mechanisms due to the excessive number of multiple appointments undertaken by interlocked directors who, with limited time and resources, often fail to effectively fulfil their duties of control over the actions of executive directors (Beasley, 1996; Fich and Shivdasani, 2006). Falling into this category are also studies that demonstrate that interlocks are negatively related to persistence and balance sheet value relevance (Arena, 2012).

In addition, according to some authors, interlocking directorate also has repercussions on the management of extraordinary (or non-recurring) operations. According to Stuart and Yim (2010), for example, listed companies with interlocked directors are more likely to be acquired by private equity firms. However, other authors have pointed out that the attitudes of firms facing a takeover attempt are varyingly affected by the intensity and type of ties that exist between the acquiring firm and the target entity (D'Aveni and Kesner, 1993).

Beyond the firm perspective, the interlocking directorate phenomenon is also shown to have significant effects in the personal sphere of shared directors (studies included in point C).

According to Fich and White (2005), for example, the reciprocal sharing of CEOs among different enterprises is an instrument that primarily promotes the pursuit of the private interests of those involved, rather than as a governance mechanism for the benefit of the firms. With this in mind, the empirical evidence reported by Hallock (1997) is unsurprising, according to which the sharing of directors determines a significant increase in the remuneration of interlocked directors.

It is quite evident that the benefits enjoyed by directors who participate in interpersonal networks between companies are not exclusively limited to the economic aspect. Some authors have thus focused on the relative stability of the interlocking directorate network, attempting to investigate the factors that enable some directors to permanently occupy several different positions on the boards of large firms. In this sphere, we recall the aforementioned studies according to which, on one hand, this implies a gradual reduction of the density of the interlocking network in individual European contexts with a simultaneous dissolution of the director elite shared at national level (Heemskerk, 2007); on the other hand, implying the rapid spread of interpersonal ties between companies operating in different European countries, which enables identifying a new elite of more influential and internationally active directors (Carroll *et al.*, 2010; van Veen and Elbertsen, 2008; Heemskerk, 2013).

Finally, the proposed classification model includes studies that have sought to examine the theme of sharing directors in terms of the proper functioning of markets (point D perspective). Indeed, the primary source of interest on the interlocking theme historically originates in the legislative measures taken in the United States (first and foremost the Clayton Act) to limit the phenomenon of common directors among competitor firms and to discourage the adoption of collusive behaviours. This line of research, although of primary importance, has recorded limited results in terms of empirical evidence due to the extreme difficulty of proving (in statistical terms) the causal link between interlocking and market concentration.

The studies of Pennings (1980) and Burt (1983), while empirically demonstrating a relationship between the degree of market concentration and the presence of interlocking directors, were unable to verify the existence of a causal link between the two observed phenomena. In subsequent years, literature proposed some insights (Santella *et al.*, 2008; Windolf and Beyer, 1996) that through the analysis of network characteristics (density, multiple ties between companies, etc.) outlined two main interlocking directorate models. On one side, those of a cooperative nature (present, for example, in Germany, Italy and France), which due to their structure induce hypothesizing agreements and collusion between firms; on the other hand, those of a competitive nature (observable in the British context) where the limited presence of interlocks between firms and the characteristics of the associated entities appear to respond better to the paradigm, based on resource dependence theory, which qualifies personal ties as a means of acquiring and sharing resources essential to the survival and development of the enterprises involved.

4. Theoretical framework and explanation of the research aims

According to the literature review proposed in the previous section, the present research is ideally

positioning within the framework of studies that aim to examine the interlocking network structure from an evolutionary perspective in a given geographical context.

Compared to the studies carried out in recent years, our study has some noteworthy distinctions.

We previously mentioned that some authors have in the recent past proposed a comparative analysis of the structure of networks in Italy, Germany and the UK, although capturing their essential characteristics in only a single period that coincides with the beginning of 2008 (Santella *et al.*, 2008). Other studies, while offering more complex and in-depth analyses of the evolution of the national network in the period 1998-2006, do not allow verifying whether the recent international crisis of 2008 has somehow changed the structure of the interlocking directorate network in the context of Italian listed companies. The results of the analysis conducted by Santella *et al.* (2008) describe a relatively dense interlocking network among Italian listed companies (especially in the blue chip segment), dominated in large part by an elite of directors relating, in many cases, to a small number of family controlled groups (industrial or financial).

With this in mind, our study intends to verify, from an evolutionary perspective, whether the 2006-2010 period saw significant changes in the density of ties within the overall network structure and to measure the centrality of the most influential companies in the sample examined. Hence, building on co-optation and control theory (Mizruchi, 1996), we intend to specifically examine whether the need to address the 2008 international crisis and the consequent desire to reduce environmental uncertainty in subsequent years (Schoorman *et al.*, 1981) contributed to a significant increase in the density of ties and a possible change in the degree of centrality of some enterprises, with respect to those generally observed, to create new alliances and consequently share distinctive competencies and resources (Dooley, 1969; Pfeffer, 1972; Allen, 1974; Pfeffer and Salancik, 1978).

5. The evolution of the network based on sharing directors between large Italian listed companies in 2006-2010

5.1. The data and the methodology adopted

To construct the database used in this research, reference was made to listed companies in the FTSE MIB segment of the Italian Stock Exchange in the years 2006, 2008 and 2010. From the original sample – composed of forty companies for each year of observation – we excluded two entities under foreign law: STMicroelectrics and Tenaris[20].

The choice of the overall time period examined (2006-2010) is closely linked to the purpose of our study, namely, to investigate whether the sudden spread of the systemic crisis that has recently affected the world's leading economies (including Italy) has had a significant impact on the structure of personal ties between major Italian listed companies.

The further methodological choice to perform the analysis on a biennial (2006, 2008 and 2010) rather than annual basis, is aimed at facilitating the next phase of discussing and interpreting the results obtained, enabling focusing on three distinct periods each characterized by different economic and market conditions (i.e., the apparent stability of the economy in 2006, the emergence of the financial crisis in 2008, the consolidation of the conditions of instability and uncertainty in 2010).

The study of interpersonal ties among firms in the sample was conducted by examining the composition of their governing bodies – the board of directors when adopting a traditional or monistic governance model and the management board when adopting a two-tier model – as resulting on 31 December of each year (2006, 2008 and 2010) in the summary documents published periodically by Consob (Italian Securities and Exchange Commission).

The in-depth analyses foreseen in this research were implemented through identifying changes in key indicators used in literature in the Social Network Analysis framework (Wellman and Berkowitz, 1988; Wasserman and Faust, 1994; Freeman, 2004; Carrington *et al.*, 2005; Scott, 2013). We thus examined, also in evolutionary terms, the level of cohesion of the network (density, geodesic distance), the degree of centrality of the network as a whole and from the perspective of firms that are more involved in personal network relations (Freeman's degree, closeness, betweenness). In addition to the calculation of the key synthetic network indicators, we also graphically represent the network in order to highlight, in a more immediate and direct way, the main changes that occurred in the period under investigation[21].

[20] The list of companies that constitute the survey sample of this research is given in Appendix A.

[21] The Ucinet software was used to calculate the key synthetic network indicators (Borgatti *et al.*, 2002); the graphic representation of the network was implemented with the correlated Netdraw visualization software.

Table 7. Distribution of multiple directorship in Italian listed company network

N. of directorship held by 1 person	2006	%	2008	%	2010	%
1	402	86.83%	371	86.28%	359	85.48%
2	48	10.37%	44	10.23%	53	12.62%
3	7	1.51%	11	2.56%	6	1.43%
4	5	1.08%	4	0.93%	2	0.48%
5	1	0.22%	-	-	-	-
N. of directors	**463**		**430**		**420**	
N. of directorship	**544**		**508**		**491**	

From the operational point of view, the network of ties between companies was analyzed by first creating the so-called affiliation matrix composed of *n* columns (events) representing the firms in the sample (38 firms) and *m* rows (actors) corresponding to the respective directors in office at the end of each year observed[22].

Table 7 shows that the number of directors present in the 38 companies examined decreased from 463 (FY 2006) to 420 units (FY 2010); a significant number of these directors held multiple positions in the companies observed, up to a maximum five positions in 2006 (1 case), four positions in 2008 (4 cases) and 2010 (2 cases).

The matrix (*m x n*) resulting from the intersection of these two perspectives (affiliation matrix) was subsequently re-elaborated to generate the symmetric matrix $n \times n$, which summarizes the presence of common directors between the observed firms (adjacency matrix). All indicators subject to comment in the next section thus refer to the aforementioned adjacency matrix (*n x n*) of the 38 listed Italian companies that make up our research sample[23].

5.2. Results and discussion

Table 8 illustrates the key data describing the network of personal ties between large Italian listed companies (FTSE MIB) and presents an immediate view of the evolutionary trends of the interlocking directorate at the national level between 2006 and 2010.

First to be noted is that the first component of the network (i.e., the larger subgroup) increased in size from 30 units in 2006 to 34 units of 2010; conversely, in the same period, the number of ties significantly reduced from 73 to 61 (- 16.4%).

The reduction of the number of ties between companies is reflected in the network density, which particularly decreased in the period 2008-2010, shifting from the value of 0.1038 to 0.0868 (- about 20%). The increase of companies in the first component and the reduced number of interlocks in relation to 2010 renders the network structure less dense than in 2006, resulting in an increase of the geodesic distance between enterprises: compared to an average distance of 2.4 nodes in 2006 and 2008, the corresponding value in 2010 is 2.8 nodes[24].

The companies examined are in many cases linked by sharing several directors, with the result that the number of common directors among the entities varies from one to five. The years 2006 and 2010 show, for example, cases of companies linked by five common directors: in 2006, this is observable in the context of ties between Alleanza Assicurazioni and Banca Intesa, while in 2010, the greatest sharing of directors is between Exor and FIAT. Finally, in 2008, the most intense ties, with four directors in common, are observable in the relationship between Mediaset and Mondadori (Table 9).

We hereafter focus on the measures of network centrality (Freeman, 1979), both as a whole and with reference to individual companies, to describe the evolution of the network and the different roles played by firms in the period examined.

[22] The combination of *m* columns and *n* rows originated three separate affiliation matrices (2006, 2008 and 2010) for a total of 49,932 items.

[23] The adjacency matrix initially obtained from the re-elaboration of the affiliation matrix was dichotomized as suggested by literature for the calculation of specific indicators (Prell, 2012). Thus, in some cases, regardless of the number of shared directors between firms (one, or more than one) the correlated value in the matrix examined was given an equal unitary value (presence or absence of the tie).

[24] In terms of reticular cohesion indicators, the density corresponds to the ratio between the number of ties actually existing in the network and the number of all ties potentially achievable. The geodesic distance instead represents the shortest distance (in terms of paths) between a pair of nodes: in this research, we examine the average geodesic distances between all nodes of the first component, taking into account that an increase in this indicator (greater distance between firms) corresponds to a decrease in the density of the reticular structure.

Table 8. Descriptive statistics of the network of Italian listed companies

	2006	2008	2010
Number of companies observed	38	38	38
First Component	30	32	34
Components (minimum 2 linked nodes)	3	1	1
Isolated	4	6	4
Number of ties	73	76	61
Density	0.1038	0.1081	0.0868
Geodesic Distance (average distance)	2.4	2.4	2.8

Table 9. Distribution of interlocks (based on number of directors in common)

N. of directors in common	2006	%	2008	%	2010	%
1	51	69.9%	58	76.3%	49	80.3%
2	11	15.1%	12	15.8%	5	8.2%
3	9	12.3%	5	6.6%	5	8.2%
4	1	1.4%	1	1.3%	1	1.6%
5	1	1.4%	-	-	1	1.6%

Table 10. Centrality measures of the network of Italian listed companies

	2006	2008	2010
Degree of centralization (Freeman's degree)	28.98%	28.53%	25.08%
Centralization closeness (main component)	41.60%	39.51%	35.40%

Table 10 shows a moderately high degree of hierarchy in the network (based on the value of Freeman's degree) throughout the period of observation, which means that, within the network, some companies have a more active role due to the higher number of direct ties with other firms. Examining the development of the centrality indicators from a dynamic perspective, we observe a reduction in the degree of hierarchy in the network: both the Freeman's degree of the whole sample observed and the average closeness indicator in relation to the first component decreased by more than 10% in the period 2008-2010[25]. These changes, although significant, indicate that in the years following the crisis, the network had a less centralized structure.

Turning to the measures of centrality of individual companies in the sample[26], we note that the

[25] The centrality indicators of the entire network (in some cases, referring to the first component) summarize the average degree of centrality assumed by each actor with respect to the remaining companies in the network and thus provide information on the network hierarchy. With this in mind, these indicators range between 0 and 1 (where not expressed as a percentage) and take values close to zero when a consistent degree of centrality exist among companies; to the contrary, when one or several companies focus the majority of their ties to a greater extent when compared to other companies, the observed indicator tends to converge towards the unitary value (Wasserman and Faust, 1994).

[26] With reference to the key centrality indicators measured in this research and referring to individual companies in the sample, the following should be clarified.
The *Freeman's degree* is the simplest and most immediate measure of centrality: it corresponds to the number of nodes (companies) with which another node is directly linked. The higher the number of direct ties, the more advantageous the company's position can be considered, while its role within the network can be considered the most central and active. Other centrality indicators (based, however, on indirect ties between companies) are closeness and betweenness. *Closeness* is the summary indicator of the proximity of a node with respect to all the others and in numerical terms corresponds to the inverse of the sum of the entire geodetic distance between a node and all the others (Sabidussi, 1966). *Betweenness* instead measures the number of paths that pass through a given node: in this perspective, a company assumes a central role as an intermediary between other nodes to the extent that it contributes to fostering indirect ties between non-adjacent firms. In this way, the firm acts as an intermediary between other businesses, able to control the exchange of information within the network (Freeman, 1977).

most relevant nodes (represented by Pirelli, Mediobanca and Autostrade/Atlantia) maintained their top position in the network during the entire period observed. Nevertheless, in accordance with that previously mentioned in reference to the network as a whole, the number of direct ties between the more centralized firms (expressed by Freeman's degree) significantly decreased especially in the period 2008-2010. Interesting to note in this context, by way of example, is that that while in 2008 the number of companies linked with at least ten other companies is equal to four (Pirelli, Mediobanca, Atlantia and Telecom Italy), in 2010, this is only found in two cases (Pirelli and Mediobanca). More generally, the number of nodes (companies) that have at least five direct ties decreased between 2006 and 2010 from 14 to 11 cases.

The reduction in the total number of direct ties within the network has a positive effect on the intermediating role played by some companies that on closer inspection acquire, in the observed period, a more important position within the network as measured in terms of *betweenness*. In essence, with fewer direct ties within the network, increasing importance is assumed by those companies that also play the role of intermediaries (so-called gatekeepers) between other businesses that are not directly linked, channelling the exchange of information and resources.

In this context, comparing for each year the list of companies with higher centrality indicators (expressed in terms of *Freeman's degree* and *betweenness*), we observe that their composition, although similar, differs with respect to certain companies. This in essence implies that some companies, despite having a lower number of direct ties than others (*Freeman's degree*), take on greater strategic importance within the network since as a gatekeepers they link - albeit indirectly - other companies that are not adjacent.

In a dynamic perspective, beyond the previously mentioned reduction in the number of direct ties (*degree*) and the correlated increase in the degree of importance of intermediation of some firms (*betweenness*), a general reduction was also observed (between 2006 and 2010) in the proximity (*closeness*) between companies. This reflects on the form and structure of the network, which as already mentioned is less dense and more extensive in 2010 than in 2006.

In further investigating the role and positioning of the companies examined, we observe that the majority of these have direct ties with other companies that play a strategic role within the network. This further amplifies the network cohesion effects and the centralization of coordination power in relation to a small group of firms and leads to the formation of numerous cliques[27] of significant size (more than four units).

Again we note, in a dynamic perspective, that the crisis of 2008 appears to have reduced the number of cliques in the timeframe examined: those equal to four units were halved between 2008 and 2010 (from 10 to 5), those with five units were present only in 2006 (2 cases) and in 2008 (3 cases). Of all companies with direct ties with other companies of higher centrality, the hegemonic role of Pirelli is noteworthy, which is present in all larger cliques in each year (those with five for 2006 and 2008, those with four for 2010).

In general terms, it can reasonably be argued that centrality summarizes the ability of firms to take an active role in the network, resulting from power of control over the flow of information and resources that are exchanged between directly related or mediated companies.

[27] The term clique refers to the subset of highly cohesive nodes within which each node has direct ties with the other members of the clique; it follows that within cliques the geodetic distances between all nodes are always equal to 1.
Herewith follows the composition of larger cliques identified in the years of observation:
year 2006 (2 cliques of five units): 1) Autogrill, Autostrade, Mediobanca, Pirelli, Telecom Italia; 2) Alleanza Assicurazione, Banca Intesa, Generali Assicurazioni, Mediobanca, Pirelli
year 2008 (3 cliques of five units): 1) Atlantia, Autogrill, Mediobanca, Pirelli, Telecom Italia; 2) Alleanza Assicurazioni, Generali Assicurazioni, Mediobanca, Pirelli, Telecom Italia; 3) Alleanza Assicurazioni, Generali Assicurazioni, Intesa San Paolo, Pirelli, Telecom Italia
year 2010 (5 cliques of four units): 1) Italcementi, Mediaset, Mediobanca, Pirelli; 2) Atlantia, Italcementi, Mediobanca, Pirelli; 3) Italcementi, Mediobanca, Pirelli, Unicredit; 4) Atlantia, Autogrill, Mediobanca, Pirelli; 5) Italcementi, Mediaset, Parmalat, Pirelli.

Table 11. Centrality measures (*Freeman's degree*) of Italian listed companies (companies with a Freeman's degree above 5)

Company	2006	Company	2008	Company	2010
Pirelli	14	Pirelli	14	Pirelli	12
Mediobanca	13	Mediobanca	12	Mediobanca	11
Autostrade	9	Atlantia	11	Atlantia	8
Autogrill	8	Telecom Italia	10	Luxottica	8
Telecom Italia	8	Generali	9	Italcementi	8
Capitalia	6	Italcementi	8	Generali	7
Italcementi	6	Mediaset	7	Autogrill	6
Mediaset	6	Luxottica	7	Mediaset	6
Generali	5	Alleanza	7	Parmalat	6
Banc. Pop. Un.	5	Autogrill	7	Fiat	5
Alleanza	5	Parmalat	6	Eni	5
Fiat	5	Fiat	5		
Parmalat	5	Eni	5		
Luxottica	5	Intesa	5		
		Unicredit	5		

Table 12. Centrality measures (normalized betweenness) of Italian listed companies (top ten centralized companies)

Company	2006	Company	2008	Company	2010
Pirelli	17.596	Pirelli	16.109	Pirelli	21.078
Mediobanca	13.438	Atlantia	14.079	Mediobanca	16.532
Autogrill	10.849	Generali	12.504	Generali	15.234
Autostrade	8.159	Mediobanca	11.579	Luxottica	15.018
Telecom	5.089	Luxottica	7.256	Parmalat	12.947
Fiat	4.871	Italcementi	6.009	Fiat	11.299
Fondiaria-Sai	4.334	Telecom	5.094	Atlantia	11.162
Unicredito	4.327	Autogrill	4.773	Telecom	8.213
L'Espresso	4.204	Unicredit	4.580	Italcementi	7.596
Parmalat	3.442	M.P.S.	4.505	Tod's	6.269

Table 13. Centrality measures (normalized closeness) of Italian listed companies (top ten centralized companies)

Company	2006	Company	2008	Company	2010
Pirelli	63.043	Pirelli	62.000	Pirelli	54.098
Mediobanca	61.702	Mediobanca	59.615	Mediobanca	52.381
Autostrada	54.717	Telecom	56.364	Generali	47.826
Telecom	53.704	Atlantia	55.357	Parmalat	47.143
Autogrill	52.727	Generali	52.542	Italcementi	46.479
Italcementi	49.153	Italcementi	50.820	Atlantia	46.479
Parmalat	49.153	Autogrill	50.000	Luxottica	44.595
Mediaset	47.541	Luxottica	48.438	Autogrill	44.000
Capitalia	45.313	Alleanza	48.438	Mediaset	42.857
Fondiaria-Sai	44.615	Parmalat	48.438	Eni	42.308

Table 14. Cliques in the Italian listed company network

Minimum set size	2006	2008	2010
4	7	10	5
5	2	3	0

The graphic representation of the network, obtained using the Netdraw software, allows visually perceiving the evolution of the network structure that, as already mentioned, is progressively less dense and more extensive in its meshes.

Beyond the positioning of individual companies, amongst which the central role of Pirelli is also graphically evident, it is interesting to note the increasing number of cut-off points (represented with triangles) that increased by less than 5 units (6 to 11)

from 2006 to 2010. This refers to those particular nodes whose eventual removal would result in the exclusion of one or more firms from the first component and, for this reason, are particularly significant in the network. The increase in cut-off points could be explained by the reduction in the total number of ties between the firms observed (recalling that direct ties decreased from 73 in 2006 to 61 in 2010). In this context, each tie takes on increasing importance and its absence is likely to interrupt the chain of indirect ties in the network.

In graphic terms, the reduction of direct ties is also reflected in the structure of the network, which as mentioned, in the comparison between 2006 and 2010, is more extensive and less dense towards the centre.

Figure 1. Interlocking directorship network among Italian listed companies in the FTSE MIB (year 2006)

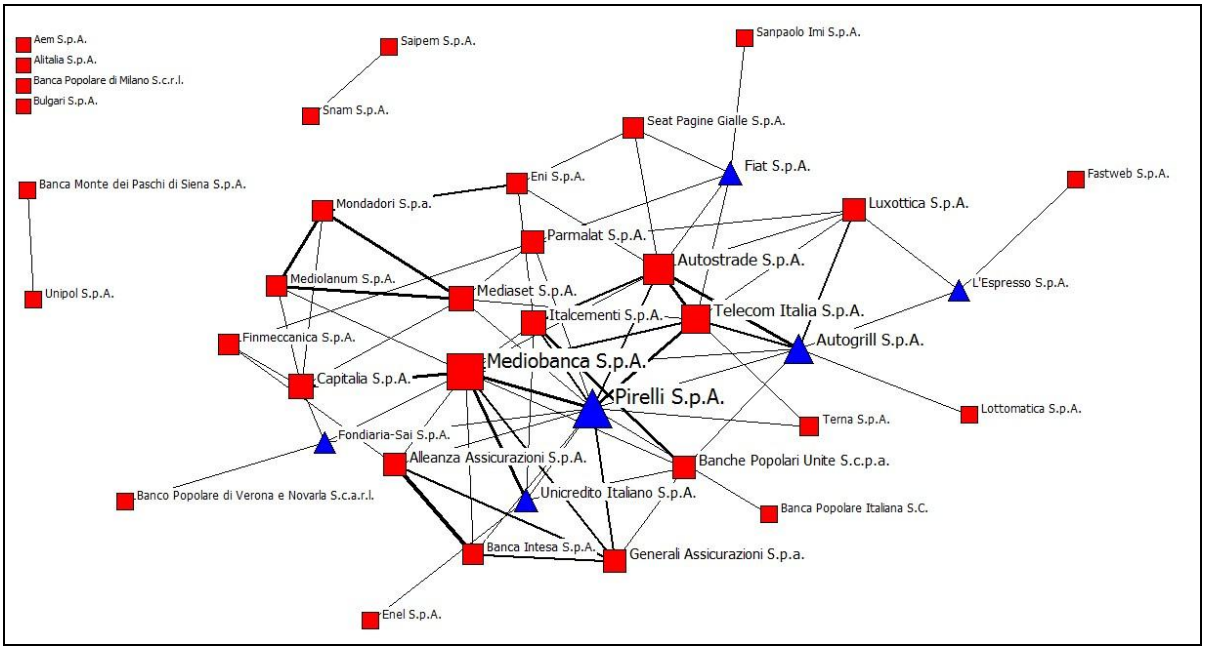


Figure 2. Interlocking directorship network among Italian listed companies in the FTSE MIB (year 2008)

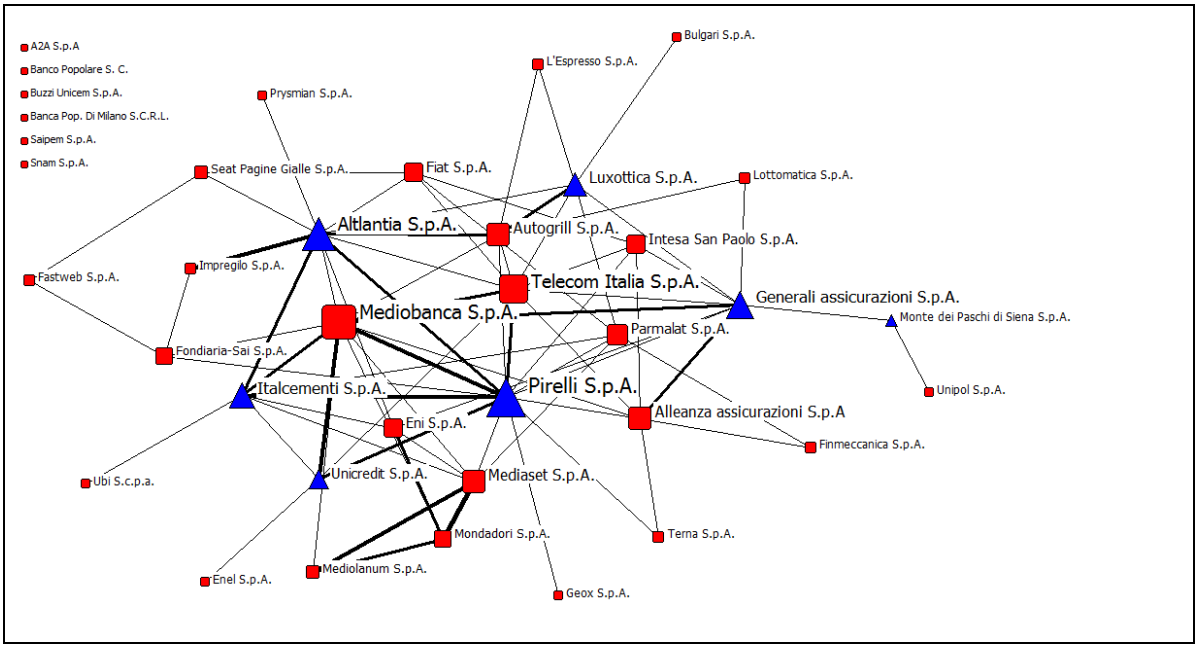
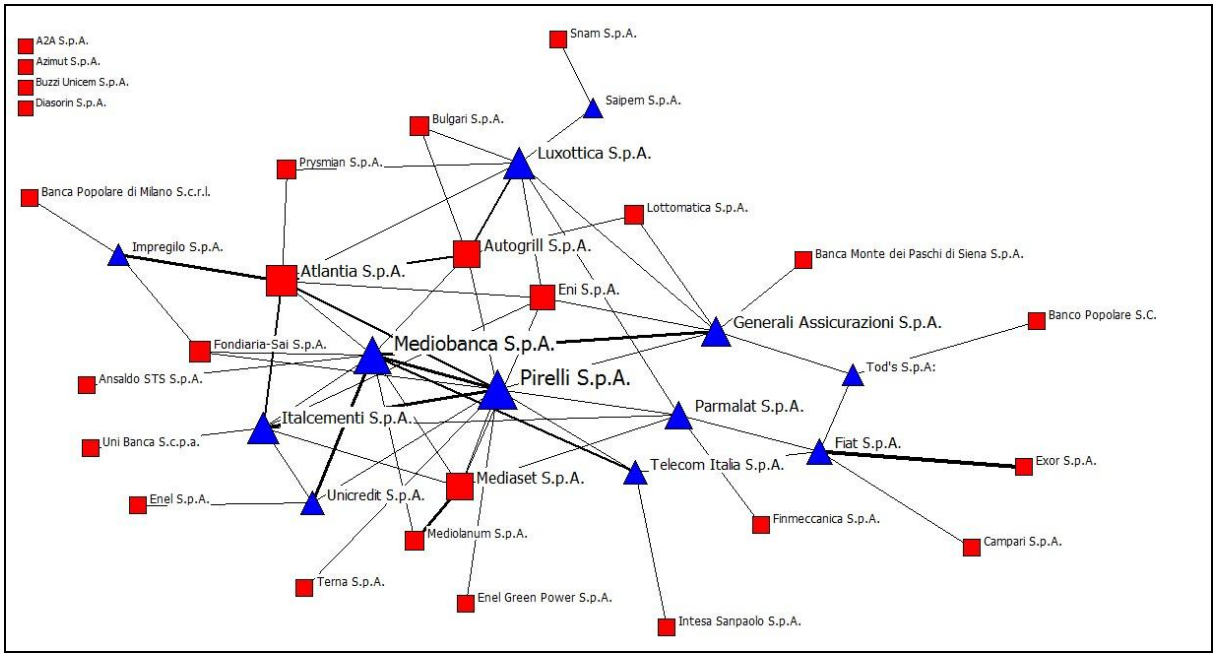


Figure 3. Interlocking directorship network among Italian listed companies in the FTSE MIB (year 2010)



6. Conclusions

The analyses reported in the previous sections lead us to develop some brief concluding remarks.

First, there is no doubt that during the observation period of this study, significant changes took place in the personal ties amongst large companies listed on the regulated Italian market. Indeed, all summary indicators examined show considerable changes, especially in the period 2008-2010.

A first analysis of the results obtained, which deserve to be further explored and validated through expanding the data collected, would seem to refute the hypothesis that the sharing of directors between large companies could find wider dissemination concurrently with the periods of general crisis on a national and international level. Therefore, the results obtained contradict, from a certain perspective, some previous studies that consider interlocking directorate as the effect of strategies adopted by companies to reduce environmental uncertainty (Schoorman *et al.*, 1981). According to this perspective, one would have expected that in a period of crisis the response of firms would be to intensify their relations with other entities.

It should be added, however, that several recent studies, while confirming the gradual reduction of the phenomenon of sharing directors in national contexts, report a significant increase in interlocking directorate at the international level (Heemskerk, 2013). It would thus be interesting to ascertain as a further future development of this research whether the reduction of personal ties, in the context of companies under Italian law, has been partially offset by the creation of new ties with foreign firms. This would be unsurprising, especially in light of the aforementioned studies that consider international networks as an instrument adopted by firms to acquire new distinct competencies and resources that are needed to initiate the revitalization and recovery of economic activities.

Contrary to what one might have expected, in this research we observe that in the period 2008-2010 – i.e., in the period immediately following the spread of the crisis in the context of the real economy and in international finance – the personal ties between the main listed companies on the regulated Italian market have significantly decreased. In a dynamic perspective, the interlocking directorate network between the firms under observation has evolved in terms of the lower density of ties, the greater distance between firms and the lower degree of hierarchy in the network.

Personal ties, although present to a significant extent between Italian listed companies – to the degree of enabling identifying cliques characterized by a high degree of centrality and stability – significantly decreased, especially in the period 2008-2010. This evidence, which warrants further study using a larger sample of companies and extending the time period of observation, provides new scenarios to investigate the effects of the crisis on relationships between companies.

A possible interpretation of the observed trends could be found in the need for some companies to renew, at least partially, the composition of their governance bodies to signal discontinuity to the market and manage the international economic crisis with renewed strategies. In this perspective, it is conceivable that a change in top management has caused (perhaps only temporarily) the rupturing of some of the personal interrelations built over the years

by the companies under study. In short, the crisis to some extent seems to be a destabilizing factor of interlocking ties: the turnover of directors that generally follows the emergence of a crisis and the need to reconsider some alliances could be relevant factors that limit – at least temporarily – the phenomenon in question. If this were the case, future research could also usefully examine whether the new crisis condition, now ongoing since 2008, has over the years enabled the gradual formation of new ties between major Italian listed companies.

These conclusions lead to resuming a key issue previously identified in other studies (Heemskerk, 2013). Remaining to be assessed is whether the evolution of the interlocking network (in this case, its reduction in national contexts) is the result of a choice adopted by companies or whether, to the contrary, the changes of the network of personal ties between companies remains largely the result of a complex process of co-optation between a few directors who represent an elite within the business system. The relative high degree of network density and the presence of redundant ties between associated companies, although reducing as a result of the crisis, suggest that the significant drive towards the creation of a personal network between companies is attributable to the volition of these directors to enhance their status and their ability to indirectly govern national and international economic levers.

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Appendix A –Sample composition (FTSE MIB – Borsa Italiana)

Year 2006 (31/12/2006)	Aem S.p.A., Alitalia S.p.A., Alleanza Assicurazioni S.p.A., Autogrill S.p.A., Autostrade S.p.A., Banca Intesa S.p.A., Banca Monte dei Paschi di Siena S.p.A., Banca Popolare di Milano S.c.r.l., Banca Popolare Italiana S.C., Banche Popolari Unite S.c.p.a., Banco Popolare di Verona e Novarla S.c.a.r.l., Bulgari S.p.A., Capitalia S.p.A., Enel S.p.A., Eni S.p.A., Fastweb S.p.A., Fiat S.p.A., Finmeccanica S.p.A., Fondiaria-Sai S.p.A., Generali Assicurazioni S.p.a., Italcementi S.p.A., L'Espresso S.p.A., Lottomatica S.p.A., Luxottica S.p.A., Mediaset S.p.A., Mediobanca S.p.A., Mediolanum S.p.A., Mondadori S.p.a., Parmalat S.p.A., Pirelli S.p.A., Saipem S.p.A., Sanpaolo Imi S.p.A., Seat Pagine Gialle S.p.A., Snam S.p.A., Telecom Italia S.p.A., Terna S.p.A., Unicredito Italiano S.p.A., Unipol S.p.A.
Year 2008 (31/12/2008)	A2A S.p.A., Alleanza Assicurazioni S.p.A., Atlantia S.p.A., Autogrill S.p.A., Banco Popolare S. C., Bulgari S.p.A., Buzzi Unicem S.p.A., Enel S.p.A., Eni S.p.A., Fastweb S.p.A., Fiat S.p.A., Finmeccanica S.p.A., Fondiaria-Sai S.p.A., Generali Assicurazioni S.p.A., Geox S.p.A., Impregilo S.p.A., Intesa San Paolo S.p.A., Italcementi S.p.A., L'Espresso S.p.A., Lottomatica S.p.A., Luxottica S.p.A., Mediaset S.p.A., Mediobanca S.p.A., Mediolanum S.p.A., Mondadori S.p.A., Monte dei Paschi di Siena S.p.A., Parmalat S.p.A., Pirelli S.p.A., Banca Pop. Di Milano S.C.R.L., Prysmian S.p.A., Saipem S.p.A., Seat Pagine Gialle S.p.A., Snam S.p.A., Telecom Italia S.p.A., Terna S.p.A., Ubi S.c.p.a., Unicredit S.p.A., Unipol S.p.A.
Year 2010 (31/12/2010)	A2A S.p.A., Ansaldo STS S.p.A., Atlantia S.p.A., Autogrill S.p.A., Azimut S.p.A., Banco Popolare S.C., Banca Monte dei Paschi di Siena S.p.A., Banca Popolare di Milano S.c.r.l., Bulgari S.p.A., Buzzi Unicem S.p.A., Campari S.p.A., Diasorin S.p.A., Enel S.p.A., Enel Green Power S.p.A., Eni S.p.A., Exor S.p.A., Fiat S.p.A., Finmeccanica S.p.A., Fondiaria-Sai S.p.A., Generali Assicurazioni S.p.A., Impregilo S.p.A., Intesa Sanpaolo S.p.A., Italcementi S.p.A., Lottomatica S.p.A., Luxottica S.p.A., Mediaset S.p.A., Mediobanca S.p.A., Mediolanum S.p.A., Parmalat S.p.A., Pirelli S.p.A., Prysmian S.p.A., Saipem S.p.A., Snam S.p.A., Telecom Italia S.p.A., Terna S.p.A., Tod's S.p.A., Uni Banca S.c.p.a., Unicredit S.p.A.

REVOLUTIONISING AGRICULTURAL FINANCE IN AFRICA: OPPORTUNITIES AND CHALLENGES

Busani Moyo*

Abstract

Africa needs business models that are capable of bringing affordable, life-changing products and services in order to reduce or even eliminate poverty. These business models through appropriate and responsible funding must, as a matter of necessity, create jobs and lead directly to economic growth in Sub-Saharan Africa (SSA). This study therefore provides a detailed analysis of the different types of major agricultural financial initiatives in Africa relating them to the problems faced by small farmers in the region. We also look at innovative finance schemes that are also making inroads in the continent like patient capital, agriculture pull mechanisms, value chain financing as well as Sovereign wealth funds. We argue that these innovative schemes can make a difference in helping innovative business models that address poverty see the light of day. Thus policies that protects farmers from natural risks like drought and floods, encourage the proliferation of donors, philanthropic organizations as well as the creation of strong linkages and cooperation among all those involved in agricultural value chains are important for the development of Africa's agriculture.

Keywords: Agriculture, Finance, Innovation, Africa

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1. INTRODUCTION

The Sub Saharan Africa (SSA) continent has a total population of about 860 million people with about 65% of this population living in the rural areas and thus heavily reliant on the agriculture sector for livelihood[28]. The African continent is also endowed with about 12% of the world's arable land, 80% of it uncultivated and only 7% irrigated (Mullin, 2010). The contribution of the agriculture sector to national income (GDP) in SSA was above 15% between 2000 and 2007 and then fell to about 10.7% in 2010. Agriculture in Africa has not performed as well as expected during the past few decades. Agricultural growth rates in the region have increased modestly from about 2.6 percent a year during the period 1980 to 1999 to 3.2 percent a year between 2000 and 2010, a figure slightly higher than the annual 3% growth in population for the same period (WDI, 2012). However agriculture value added per capita for the same period averaged US$118 per year much lower than the world average of US$252, US$282 for Latin America and the Caribbean, US$403 for Europe and Central Asia as well as US$276 for East Asia and Pacific[29]. These statistics basically illustrate the need to develop the continent's agricultural sector so as to improve its contribution to growth, employment creation[30], food security and poverty reduction.

Moreover, with over 60% of the population in Sub-Saharan Africa dependent on the sector and 70% of these dependent on food production through farming and livestock rearing, growth in the sector has the best chance for producing poverty reducing effects and thus any strategy for sustained growth and poverty reduction must centre on the rapid growth of the agriculture sector (Odhiambo, 2007)[31]. One factor that has affected the growth and productivity of the

[28] At least 70 percent of the African workforce is engaged in agriculture also (WDI, 2012; Fan et al, 2009).

[29] These statistics are from the World Bank's World Development Indicators 2012.

[30] The agricultural sector employs about 65% of the total labour force (IFPRI, 2012).

[31] Odhiambo W (2007): Financing African Agriculture; Issues and Challenges Dept Of Agriculture and Industry-AfDB.

agricultural sector in Africa is its heavy reliance on traditional methods of production. Ox drawn ploughs, limited use of inputs like fertilizers, improved seeds and irrigation as well as poor agriculture extension services are some of the factors that have affected the productivity of African agriculture. Thus the adoption of modern agricultural techniques will greatly improve food security problems facing the continent and turn it from being a net food importer to a food exporter. According to United Nations Economic Commission for Africa (UNECA, 2009) strategies for transforming African agriculture have to address such challenges as low investment and productivity, poor infrastructure, lack of funding for agricultural research, inadequate use of yield-enhancing technologies, weak linkages between agriculture and other sectors, unfavourable policy and regulatory environments, and climate change. Roth et al (2011) also argue that access to finance[32] is also key to unleashing Africa's agricultural potential and for promoting the growth of the sector. Whilst it is true that food security is one of the key challenges facing the African continent, however, to get land planted and help their countries become self-sustaining, farmers need financing. The Kampala principles agreed upon at the Making Finance Work for Africa (MFW4A) Conference in Uganda in 2011 also reiterated the fact that financial inclusion is important to achieving MDGs and for Africa's agricultural development. The conference recognized that while agricultural finance is a part of the overall financial system of a country, the financial services needs of agriculture sectors in Africa are pressing, and demand special attention.

The main aim of this study therefore is to provide a critical overview of the major players in the financing of Africa's agricultural sector and also analyze the objectives of these financiers vis a vis the challenges faced by the small holder farmers who are the backbone of the sector. The study will also look at the role played by the new innovative financing schemes like Agricultural Pull mechanisms, Index based insurance, Sovereign Wealth Funds, Value chain financing and patient capital in addressing the financing challenges faced by different types of farmers in Africa. The question that we want to answer is; are these innovative schemes the appropriate alternative to the financing problems of the sector, and what are their strengths and weaknesses?

Apart from the concerns raised at the Making Finance Work for Africa (MFW4A) Conference in Uganda, there are generally quite a number of financial players in the agricultural sector in Africa but the problems bedeviling the sector appear far from being over. One wonders whether these agriculture financial initiatives are a response to the needs of the vulnerable poor farmers or they are merely servicing the interests of funders. There is also need to assess the extent of overlap in some of these funding initiatives so that mainstreaming can be done and benefits are spread across a broader spectrum of beneficiaries in the continent's agriculture sector.

This paper is organized as follows; section 2 looks at the challenges faced by farmers in Africa's agricultural sector followed by section 3 which looks at the major domestic and international organizations providing funding to the sector. The last sections 4 and 5 cover the new innovative financing schemes as well as conclusions and policy recommendations respectively.

2. AGRICULTURE AND FINANCING CHALLENGES IN AFRICA

In Africa, small farms dominate agriculture in many developing countries, and the transformation from traditional to modern agriculture is based on the efficiency of small farms and their transformation from subsistence to market-oriented production. The agriculture related challenges faced by many of these farmers basically range from lack of improved crop varieties, total reliance on rain fed agriculture, severely depleted soils, lack of irrigation and crop storage, low use of inputs like fertilizers, limited access to markets and credit as well as weak or poor management of farmer organizations (AGRA, 2013). Thus the use of farm inputs like fertilizers which enhances productivity is very low in Africa and is around 10 kilograms per hectare far much lower than the global average of 100 kg/ha and because of this, yields in most countries are far much lower than their potential (AGRA, 2013). In many places limited on farm storage leads to post harvest crop losses of up to 30% whilst limited access to credit precludes investment in small scale farms or agricultural businesses. Africa's soils are the most degraded in the world and steps must be taken on a large scale to increase fertility and encourage the use of better agronomic practices. The IFPRI (2012) report state that nearly 60 percent of the total land area in the region is marginally suitable for cultivation with soils characterized by limited organic matter and poor water-retention capacity. Added to this is the problem of low and poorly distributed rainfall patterns which is a major barrier to agricultural development in large areas of SSA. Much of Africa is too dry for the new high-yielding crop varieties that have produced well in Asia. Average rainfall in the dry semi-arid areas of SSA is less than 700 millimeters per year, and when the rain does come, the rainy season is very short.

Inefficient land tenure systems, weak extension services to train farmers, poor road infrastructure and

[32] Agricultural finance refers to financial services ranging from short-, medium- and long-term loans, to leasing, to crop and livestock insurance, covering the entire agricultural value chain - input supply, production and distribution, wholesaling, processing and marketing (Making Finance work for Africa report).

lack of or weak farmer organizations have also characterized the agricultural sector in Africa. Weak farmer organizations mean limited negotiating power of farmers and that famers can only access markets through middle men who garner a large chunk of the value of the produce sold. The development of famer organizations in SSA will enable the pooling of resources and partnerships can be forged with these farmer organizations for the supply of inputs, dissemination of technologies as well as linkages to markets. These organizations can help instill commercialization ideas in farmers, establish business clusters, strengthen the position of farmers along the value chain, assist them in increasing their profitability as well as lobby for their interests. The most important thing in Africa is to transform peasant farming into a viable commercial process. This is because farming at any scale should be a business, and smallholders and producers must be treated as entrepreneurs and that businesses need clear linkages along the value chain, from production to processing, marketing and ultimately to consumption. When all these linkages are in place, wonderful things will begin to happen (Nwanze, 2011).

Therefore support to African agriculture should be directed at addressing some of these challenges faced by farmers and governments. Availability of finance is crucial in this regard. However, private sector financing of agricultural activities in Africa has been difficult because of so many problems. Arunachalam (2011) cited a number of constraints to agricultural financing and these are high transaction costs for both (borrower) producers and lenders; high risks faced by both parties especially covariance risk for agriculture; lack of reliable production/financial data regarding rural households engaged in agriculture and finally the problem of financial products that are ill suited to the cash flows and livelihoods of the borrowers.

Most rural households have little or no income or collateral and therefore find it difficult to access funding from institutions. Accessing funding from banks involves costs and this can be a huge setback for rural farmers and ultimately impacts negatively on their yields. Hess *et al* (2001) pointed out that households and companies in rural areas have low asset base and hence little access to developed insurance and credit markets. The other problem is that in Africa and other places in the world economies depend on weather conditions for their yields. Inevitably, this means that the economies face a host of risks among them drought, floods and windstorms. These adverse conditions affect households and agribusinesses operating in the same area and at the same time and hence result in private financial institutions being reluctant to lend to these individuals. Another problem is that financial institutions are ready to extend funding to well established farmers and agribusinesses whose production capacities are known including their financial status. In most rural areas there is little information regarding the number of smallholder farmers, the types of crops they are engaged in as well as their financial statuses. This information asymmetry means banks and other financial intermediaries cannot risk their funds in activities without known statistics. Lastly some financial products do not match the cash flows of smallholder farmers and this can be a serious drawback on accessing funds. This is normally a result of financial markets that are not sophisticated enough (something common in Africa) to give a wide range of financial products to carter for various types of borrowers.

3. EXTERNAL FINANCING OF AFRICAN AGRICULTURE

Although external financial resources are important for economic and social development in Africa, especially agriculture, this assistance has been declining since the 1980s (Odhiambo, 2007). The inflows of aid flowing into Africa or Sub Saharan Africa in particular have been increasing though marginally between 2006 and 2010 (see table 1, below). Another interesting feature is that from 1973 to 2009 the Agriculture Orientation Index (AOI)[33] for Sub-Saharan Africa has been lower than that of the developing world as a whole, implying that ODA allocated to agriculture represented less of a share of total ODA than agriculture represents in the total economy (Lowder and Carisma, 2011).

[33] AOI equals the agricultural share of ODA divided by the agricultural share of GDP. An AOI less than one indicates that ODA allocated to agriculture represents less of a share of total ODA than agriculture represents in the total economy.

Table 1. ODA to Agriculture by all Donors (Gross Disbursements) in USD Millions

Region	2006	2007	2008	2009	2010
Africa	1279.183	1632.931	1875.141	2412.938	2648.613
Africa, South of Sahara	1148.452	1497.195	1682.709	2196.949	2330.861
South & Central Asia	473.275	476.811	840.881	1197.489	1338.500
South America	263.553	394.984	405.112	426.770	346.249
Asia	1101.526	1173.004	1540.028	1859.782	2228.842

Source: OECD CRS dataset, 2012

According to Odhiambo (2007) a number of other agencies active in African agriculture such as the European Commission (EC), DFID[34], Japanese International Cooperation Agency (JICA)[35] and US Agency for International Development (USAID)[36] have also prioritized agriculture as part of the poverty reduction efforts as evidenced by their recent policy strategies. OECD-DAC statistics, (2012) show that in 2010, members of the Development Assistance Committee (DAC) contributed about 6.9% of total aid to agriculture, forestry and fishing, whilst European Union institutions as well as the World Bank International Development Association (IDA) came in with 10.3% (see Figure 1 below). Total multilateral aid to agriculture in 2010 amounted to 8.1% of total aid.

The launch in July 2009 of the L'Aquila Food Security Initiative (AFSI) with total bilateral aid commitments of USD 20 billion over three years is expected to significantly boost Official Development Assistance (ODA) destined for the agricultural sector (Bickel and Klein,2010)[37]. According to the Muskoka G8 Interim Report (2010), as of April 30, 2010, the AFSI has disbursed USD 6.5 billion and remain committed to allocate the full amount of individual commitments by 2012. There are about 24 African countries that are currently benefiting from the AFSI (see table 7 appendix). The projects funded by donor countries under the L'Aquila Food Security Initiative are so diverse and most of them are related to the challenges faced by many African countries in the agricultural sector highlighted in section 2 above. They range from supporting climate change adaptation, setting up of Index based livestock insurance (to protect small farmers' livestock against drought in Kenya and Somalia), improving agriculture productivity through the use of improved seeds, drought tolerant crops, irrigation development, use of fertilizers, capacity building at various levels (line ministries and farmers associations), the provision of extension services as well as improvement of transport infrastructure. Other programs include the promotion of commodity chains, supporting micro and rural financing and facilitating the use of contract farming or out-grower schemes. Although the nature of programs implemented by donors under the L'Aquila initiative in these African countries speak to challenges the countries are facing, the concentration of donors and the implementation of programs is however not consistent. Some countries appear to attract more funding and hence more projects compared to other countries. For example there are six countries actively involved in Kenyan Agriculture and five in Ethiopia compared to an average of two in other remaining countries. The pattern is still the same even when comparing the amount of funding flowing into these countries. The ideal approach probably would be to identify common fundamental agriculture problems in African countries and then implore donors to tackle such challenges first so that development of the sector is not severely skewed in favour of some countries. For more on the projects funded under the L'Aquila initiative, see table 7 appendix.

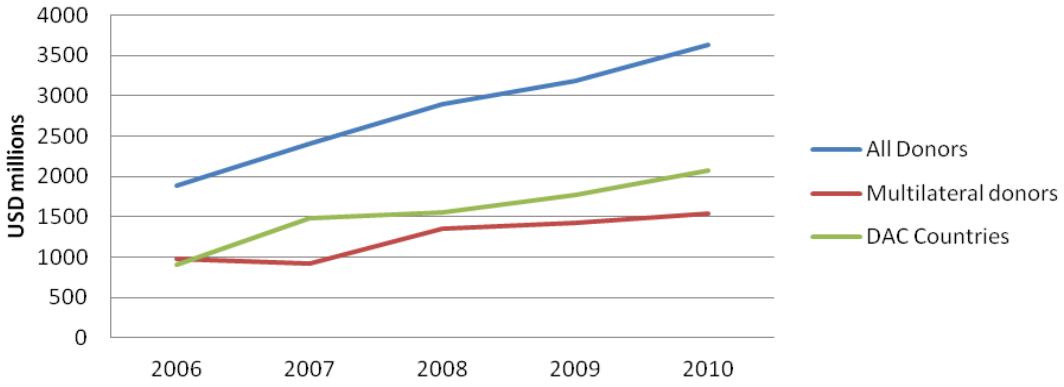
[34] Two interesting initiatives by DfID are the North South Transport Corridor and the 'best bets' approach to agriculture. The "best bets" approach for agriculture will see funding going to "the innovations with the greatest potential to lift poor people out of poverty, and to getting these into widespread use." These include tackling new pests which attack crops (will cost 20 million pounds), breeding drought resistant maize for Africa (will cost 60 million pounds) and improving the vitamin content of staple crops (will cost 80 million pounds) [Eliminating World Poverty: Building our Common Future white paper, 2009]

[35] JICA is building a new development model to encourage increased agricultural production in Africa, both to help prevent another global food crisis and to deter a land grab by foreign enterprises across the continent, according to Senior Vice President Kenzo Oshima (JICA Press Release 17 March 2010)

[36] As East Africa struggles with skyrocketing food prices and the region's worst drought in 60 years, the U.S. Agency for International Development, together with six partners, announced a first-of-its-kind effort to invest $25 million in small and medium sized enterprises. The African Agricultural Capital Fund (AACF) which will deliver much needed growth capital to boost the productivity and profitability of Africa's undercapitalized agriculture sector (USAID Press Release September 2011)

[37] Rethinking rural and Agricultural Finance-the African Case (2010)

Figure 1. ODA to Agriculture in Africa



Source: OECD statistics, Creditor Reporting System, 2012

The pledges made through L'Aquila Food Security Initiative also led to the establishment of the Global Agriculture and Food Security Program (GAFSP), a multilateral financing mechanism, held in the World Bank, to assist in the implementation of the pledges made at the L'Aquila Summit. The GAFSP has a public and private sector window of financing. The private sector window managed by IFC provides long and short term loans, credit guarantees, and equity to support private sector activities to improve agricultural development and food security. The public sector window on the other hand is intended to mobilize and consolidate grant funding that is additional to current programs and support strategic country-led or regional programs that result from sector-wide country or regional consultations and planning exercises, such as the Comprehensive African Agriculture Development Program (CAADP) in Africa. By February 2013, the funds received from donors amounted to about US$ 783 million through the public sector window and US$153 million through the private sector window representing 69% of the total pledges. There are about 11 African countries in which GAFSP is currently active and eight of these countries also benefit from the L'Aquila Food Security Initiative (IFC, 2012)[38]. Most of the projects under GAFSP are to support water and land management as well as market access in these selected countries and the degree of projects overlap is not huge (see table 8 appendix for more).

Other major external sources to finance agriculture in Africa include Kofi Annan's Alliance for a Green Revolution in Africa (AGRA).[39] AGRA seeks to promote smallholder farmers by providing them with high yielding seeds, improving the quality of degraded soils, providing them with better access to markets, transport and financing as well as strengthening the capacity of farmers organizations. These are basically the same activities that the L'Aquila Initiative is also involved in its selected African countries. AGRA works in 13 countries in Africa and five of these are also covered by GAFSP. According to AGRA, the selected countries have land areas of significant size with relatively good soil, reliable rainfall, basic infrastructure is already in place, and there are active smallholder farmers in addition to the fact that these are countries that have shown a commitment to agricultural development. All countries under AGRA are also part of the L'Aquila Initiative and it also appears that there are five African countries that are benefiting from the three programs: GAFSP, AGRA and the L'Aquila Initiative (AFSI).

4. DOMESTIC FINANCING OF AGRICULTURE IN AFRICA

Recognizing the importance of agriculture to the economies of its member states and the many challenges faced in reducing poverty and enhancing food security on the continent, the African Union (AU), together with the New Partnership for Africa's Development (NEPAD), created an agricultural initiative called the Comprehensive Africa Agriculture Development Program (CAADP) in 2003. The main goal of CAADP is to help African countries reach a higher path of economic growth through agriculture-led development that eliminates hunger, reduces poverty, food insecurity and enables expansion of exports (NEPAD 2005a). Through this program African governments committed themselves to allocating 10% of their national budgets to agriculture sector within a 5 year period as well as increase agricultural productivity by 6% annually through 2015. According to FAO (2012), government expenditure on agriculture is positively and highly correlated with capital formation and also has a significant positive impact on productivity, rural

[38] The countries currently benefiting from GAFSP are Burundi, Ethiopia, The Gambia, Liberia, Malawi, Niger, Rwanda, Senegal, Sierra Leone, Tanzania and Togo. For projects funded under these countries see table 11

[39] AGRA works in 13 countries in Africa namely Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Tanzania, Uganda and Zambia.

household income, rural household consumption and rural poverty reduction. Research has shown that increasing public spending on agriculture by 10 percent leads to a 0.34 percent increase in a country's agricultural total factor productivity (FAO, 2012). Fan et al (2009) also argue that for each unit of local currency spent on the agricultural sector, on average ten local currency units are returned in terms of increased agricultural productivity or income across several African countries.

Despite these potential benefits from agricultural spending, only a handful of countries in Sub-Saharan Africa have made significant progress towards achieving the CAADP goals. The CAADP (2009) policy brief states that the number of countries spending more than 10% increased from 11% in 2003 to 22% in 2006 and that the 2007 AU/NEPAD survey found that 50% of the countries spent less than 5% of their national expenditure on agriculture development, reflecting a decrease from 57% in 2003. The recent CAADP (2010) report state that so far eight African countries have exceeded the 10% target and ten countries have met the 6% target and another 19 have achieved productivity growth of between 3% and 6%.

The IFPRI Statistics of Public Expenditure for Economic Development (SPEED)[40] database which provides more current information on public spending on agriculture in selected countries show that generally the amount allocated to the agricultural sector has been low in Africa (see table 2 below).

These trends in government spending for countries in Sub-Saharan Africa indicate that government budgets have afforded less priority to agriculture than have governments of other regions. At country level, no country has consistently allocated at least 10% of its national budget to agriculture. After the 2003 Maputo Declaration, it appears that Zambia and Ethiopia are the only countries in this sample that have been trying to meet the CAADP 10% goal (see table 2 above). Table 3 statistics show that Sub Saharan Africa also spends about 0.81% of GDP on agriculture higher than other regions like Europe & Central Asia (0.61%), Latin America &Caribbean (0.31%) and South Asia (0.71%). Based on selected SSA countries, the share of agriculture expenditure as a proportion of total expenditure was on average 4.3% far much lower than what was agreed under the Maputo Declaration in 2003. In countries of Sub-Saharan Africa the share was about 3% – 6% between 2003 and 2007; it increased substantially from 2004 to 2005 and decreased slightly from 2005 to 2007. Education and Defense are the sectors that continue to receive a relatively large share of the government budget (see table 4 below). The Maputo declaration also established the Regional Strategic Analysis and Knowledge Support System (ReSAKSS) which compiles data on government spending on agriculture for African countries; it is used as the most official source of information for monitoring the Maputo Declaration. According to Benin *et al*, (2010) ReSAKSS coordinator, only 10 out of 45 of the African countries covered by the dataset attained the 10% target agreed upon by African ministers through the Maputo Declaration. Benin also further argue that amongst the countries that have not attained the target, over the 3 most recent years, 12 countries exhibit an increase in the share of government spending on agriculture, 15 show a decrease and neither clear increase nor decrease was evident in other eight countries.

The Agricultural Orientation Index (AOI) of government spending for Sub-Saharan Africa also decreased dramatically over the time period 1980 to 2007. The Agricultural Orientation Index (AOI) for government spending is calculated as the agricultural share of government spending divided by the agricultural share of GDP. An AOI less than one indicates that government spending on agriculture represents smaller share of total government spending than agriculture represents in the total economy. The decline indicates that relatively smaller and smaller amounts of funds have been channeled to the sector. This lack of emphasis on agriculture in African countries seems inconsistent with the recognition of the importance of government spending on agriculture by African Heads of State as evidenced by their joint signing of the Maputo Declaration in 2003.

[40] It is important to note that totals do not refer to global totals, but rather totals for all countries for which data is available. The SPEED database covers 67 countries, 13 of these are High income Non-OECD countries and 54 are classified as low or middle income countries. Among the low and middle income countries, 19 are in Africa with Sub-Saharan Africa having 12 and the rest are spread across Asia, Europe and Latin America. In the years 2000 and 2007 the total population of the countries included in the database represented 50% of Africa's population.

Table 2. Share of Agriculture Expenditure (% of Total Expenditure) in selected African Countries

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Botswana	6.0	8.9	5.0	4.9	4.3	4.2	4.2	4.4	3.9	3.1	3.8	2.9	2.7
Ethiopia	9.7	10.5	8.1	8.1	11.5	6.6	4.0	7.4	5.0	5.0	15.9	16.8	14.4
Ghana	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.7	0.6	0.5	0.5	0.4	0.4
Kenya	7.0	5.5	5.0	5.4	5.7	5.5	4.8	5.0	4.6	4.2	3.9	2.8	3.4
Lesotho	12.4	10.9	10.0	5.1	4.5	3.7	4.9	3.8	4.2	4.0	3.8	2.8	3.2
Malawi	8.8	6.0	5.9	6.9	8.9	4.9	5.6	7.0	4.8	4.7	4.4	4.3	4.1
Mauritius	5.9	5.8	4.7	5.1	5.8	4.8	4.6	4.0	3.5	4.0	3.9	3.0	2.7
Nigeria	2.6	3.2	3.0	2.2	3.4	2.0	6.4	3.8	1.3	1.0	5.0	1.8	2.0
Swaziland	5.2	5.7	5.9	5.3	6.2	6.6	5.0	4.9	3.8	4.6	5.5	3.3	4.4
Uganda	1.9	1.3	1.0	0.8	1.2	6.3	4.0	4.2	4.2	2.4	3.1	3.4	4.0
Zambia	2.8	2.7	4.1	4.4	4.7	6.5	13.6	13.8	12.0	11.5	8.3	12.3	8.3
Zimbabwe	4.2	2.4	2.6	2.9	3.0	2.8	4.3	10.5	-	-	-	-	-

Source: IFPRI –SPEED Database

Table 3. Share of Agriculture expenditure (% of GDP)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
East Asia & Pacific	1.16	1.21	1.12	1.30	1.16	1.13	1.15	1.18	1.16	1.30	1.13	1.26	1.20
Europe &Central Asia	0.48	0.50	0.71	0.60	0.58	0.60	0.58	0.56	0.61	0.66	0.68	0.71	0.70
Latin America &Caribbean	0.25	0.35	0.46	0.54	0.35	0.36	0.28	0.26	0.22	0.22	0.22	0.22	0.24
Middle East North Africa	1.04	1.01	1.11	1.00	0,81	0.84	1.07	1.06	0.81	0.75	0.92	0.80	0.66
South Asia	0.73	0.73	0.76	0.77	0.80	0.79	0.70	0.61	0.57	0.69	0.70	0.84	0.80
Sub Saharan Africa	0.83	0.76	0.71	0.76	0.94	0.81	1.13	0.95	0.60	0.51	1.00	0.79	0.74
ALL	0.75	0.80	0.84	0.89	0.80	0.79	0.80	0.80	0.76	0.83	0.80	0.86	0.82

Source: IFPRI –SPEED Database

Table 4. Sub Saharan Africa's Sectoral share of Expenditure (% of Total Expenditure)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Agriculture	5.0	5.2	4.3	3.8	4.9	4.0	5.1	4.6	3.1	2.9	5.5	4.5	4.2
Education	15.3	16.9	16.0	14.7	16.7	15.4	13.3	14.6	14.6	15.0	14.7	15.9	16.1
Health	5.0	5.1	5.2	5.4	5.8	4.6	5.9	6.4	6.0	6.4	6.8	6.4	6.7
Defence	6.4	6.6	6.4	7.7	9.8	11.4	8.8	9.4	7.2	7.1	7.1	6.5	5.8
Social Protection	2.9	2.5	2.9	3.1	3.1	2.9	4.8	4.6	4.4	4.9	4.0	4.2	4.4
Trans & Comm	4.6	5.5	5.3	4.9	5.3	3.4	5.2	5.5	4.6	2.8	2.7	2.7	3.2
Other	60.7	58.2	60.0	60.3	54.5	58.2	57.0	54.9	60.1	60.8	59.2	59.8	59.5

Source: IFPRI –SPEED Database

5. INNOVATIVE FINANCE MECHANISMS FOR AGRICULTURE

Agricultural Pull Mechanism (AGPM) Initiatives

In 1798 Thomas Robert Malthus predicted a grim outlook regarding the ability of the world to feed its people. He envisaged a situation where food resources would increase arithmetically and human population increasing geometrically meaning that in the long run humans would run short of food. This was, however, a narrow-minded view of the world as he never factored in the possibility of new and innovative ways of producing food. Though Malthus statement was not entirely correct his views are not to be ignored totally.

Elliott (2010) asserted that meeting the goals of feeding billions of people in the future in the face of climate change, water scarcity and land problems, declining crop yields require giant leaps in agricultural innovations. FAO (2010) report estimates that a total of about $83 billion per year is required in order to meet the food needs of people by 2050.

More food can be produced if economies can find ways to do things differently and efficiently. Doing the latter, however, requires reversing the current situation, where agricultural research and development (R&D) by the private sector is virtually nonexistent in developing countries particularly in Africa because of market failures that make it difficult for them to recoup up-front costs in developing new products (Elliot, 2010). There are a number of innovative ways that have been identified in the agriculture finance literature that can be used to encourage private sector participation as well as improve funding to the sector. These include inter-alia Agriculture Pull mechanism, Index Based Insurance, Patient Capital and Value Chain financing.

Agriculture Pull mechanisms are results-based incentives designed to overcome market failures and encourage innovation and engagement. This means, therefore, that pull mechanisms reward successful innovations *ex post*. This differs from traditional 'push mechanisms' that fund innovations *ex ante* (FAO, 2012). Pull mechanisms are best suited to projects that need to bring new products to the market that are dynamic and will also ensure quality and timeous production of agricultural products to satisfy market demands. Overreliance on traditional R&D is not to be trusted as there are principal-agent problems and in some cases interference from government officials. The expectations of funders of R&D may differ from those of the agent and information asymmetry between these economic agents means their incentives may be misaligned (Kremer and Zwane, 2004). Thus *Ex ante* research grants are not wise as incomplete information regarding performance of researcher leads to sub-optimal use of resources. There is need to complement the traditional "push mechanisms" with innovative, demand- based, pull mechanisms that pay ex post for agricultural innovations. The pull mechanism is useful in situations where the donors and researchers do not have the same information regarding expertise, timeous production of results etc. According to Elliot (2010) a number of agricultural innovations (push mechanisms) that worked well in experiments were not embraced by farmers in the field. Theile van de Fliert, and Campilan (2001) discuss a case in which technology to reduce pest-induced losses from sweet potato weevil in Uganda was met with little enthusiasm because farmers, in this case, were more interested in improved root quality. Another case is that of an improved variety of sweet potatoes that farmers in Uganda declined to adopt because the color of the plant was redder than the traditional variety. Thus creating incentives for scientists to develop products that farmers will want to adopt through push programs is challenging. Therefore by putting the onus on inventors to ensure that the final product meets the needs of the consumers, this can partially address asymmetric information problem between researchers and consumers faced by funders. According to Kremer and Zwane (2004), pull mechanisms create strong incentives for researchers to carefully select research projects, and to focus efforts on developing viable products rather than on other ancillary goals. Policy makers and funders need not themselves select the research approach that should be pursued, but only the necessary characteristics of the final product. Project selection is in the hands of those with the most information. A pull program may be most effective if donors pre-specify a desired technology and commit to paying a reward that is tied to adoption levels in the event that this technology is developed. Tying rewards to adoption may be a more effective means of inducing the development of technologies that are responsive to small farmers' needs and tastes than recommending that scientists solicit farmers' opinions about needed technologies (Kremer and Zwane 2004). However, despite these benefits of pull mechanisms, the challenge is that some small farmers or agribusinesses in Africa may not have resources to fund these innovations from their own private resources. Governments and even donors may still need to come in and inject start up capital that farmers can use to carry their pull mechanisms innovations (pushed pull mechanism).

Index Based Insurance (IBI)

Index Based Insurance (IBI) is another innovative way to ensure that risks associated with poor harvests are mitigated in order to avoid diminishing the spirit of farmers to produce in the future. IBI is the creation of insurance that is linked to certain agricultural risks such as drought. This type of insurance is different from traditional crop insurance that has been a global failure because of being plagued by moral hazard, adverse selection, and high monitoring and administrative cost (World Bank, 2005). Empirical evidence of the success of IBI is in Morocco. The Moroccan Agricultural Index Based program was basically a rainfall insurance program for certain crops and this indemnifies producers if rainfall levels fall below a specified threshold. The only challenge to these kinds of schemes is the complexity involved in drawing such contracts. The idea behind such contracts is that there is sufficient correlation between weather and yield so that the farmer can hedge his production risk by getting a contract that would pay him/her if rainfall levels fall below a selected strike. Another related insurance index was developed by the International Livestock Research Institute (ILRI) in collaboration with various partners and is called Index Based Livestock Insurance (IBLI). Its aim is to

protect livestock keepers from drought related asset losses particularly those in the drought prone arid and semi-arid lands. For pastoralists whose livelihoods rely solely or partly on livestock, the resulting high livestock mortality rate has devastating effects on asset levels, rendering them among the most vulnerable populations. Index-based insurance products represent a promising and exciting innovation that could allow the benefits of insurance to protect the climate-related risks that vulnerable rural smallholder farmers and livestock keepers face. Because index insurance is based on the realization of an outcome that cannot be influenced by insurers or policy holders (such as the amount and distribution of rainfall over a season), it has a relatively simple and transparent structure. This makes such products easier to administer and consequently more cost-effective to develop and trade. This type of insurance scheme has been tried successfully in African countries like Kenya and Somalia and Ethiopia and can be replicated in many other countries where livestock protection is important for livelihood purposes.

Value Chain Financing (VCF)

Value Chain Finance has become a buzzword today especially in the agricultural sector. Small to medium-sized farmers have little chances of accessing formal finance due to sub-optimal infrastructure, wide client dispersion and lack of guarantees. Other challenges faced by small-holder farmers in rural settings are that there is weak or no government intervention and that weak support services for producers dampens the enthusiasm of formal banks and other institutions to fund agricultural activities. Value Chain Financing refers to the existence of a financial relationship between two or more actors within the value chain (Neven, 2008). As such there are two types of value chain finance and these are direct value chain finance and indirect value chain finance.

A Value Chain Finance is a bottom-up approach to the growth and development of a community as it seeks to assist those at the grassroots level (farmers) to be able to produce without facing production-bottlenecks. Looking at direct value chain finance, a firm or farmer gets funding from another actor in the chain while in indirect value chain financing a farmer/firm gets funding from external sources outside the chain. According to the findings of the Inter-American Development Bank (2010) participation in a well-structured and dynamic supply chain seems to improve the chances of obtaining finance either from larger more liquid agents in the same chain or indirectly from external formal lenders.

A successful VCF scheme is found in Ethiopia and it is a Fruits Value Chain. The approach in Ethiopia is the Demand Driven Value Chain Development (DDVCD). The strategy is to maximise market opportunities for upstream actors (farmers) to better align them with market requirements. Downstream actors that comprise processors, exporters and general buyers are also strengthened in the chain. The area of intervention by an Ethiopian firm promoting VCF was introduced after having identified the constraints in production of horticultural products faced by small scale farmers. The firm intervened by providing farm management knowledge, market linkages and information about market reactions. The result was a substantial increase in marketed volumes as well as net margins for all players in the chain. According to LEDNA (2012) the farmers as well as downstream players continued to make good margins well after the disengagement of the organisation that initiated the VCF.

Patient Capital

Past experience has shown that markets alone cannot solve the problems of poverty; nor are charity and aid enough to tackle the challenges faced by over two-thirds of the world's population living in poverty. Patient capital is another type of funding that seeks to bridge the gap between the efficiency and scale of market-based approaches and the social impact of pure philanthropy. According to Friedman (2007), patient capital is long-term capital made available by the international community on concessional terms and is used to part-fund capital costs of irrigation and related agriculture supporting infrastructure. This is a kind of investment in which the investor has no expectation of turning a quick profit and must be willing to forgo an immediate return but anticipates more substantial returns down the road. It helps overcome the barriers to entry into commercial agriculture. It provides one-off support leaving a sustainable agribusiness sector that requires no further patient capital. Patient capital can be in form of equity, debt, loan guarantees or other financial instruments and needs to be long term and is suitable where a firm or company to be financed is in the early stages of existence. It is also suitable for funding of enterprises providing low-income consumers with access to healthcare, water, housing, alternative energy or agricultural inputs to small-holder farmers. The purpose of patient capital is to jump-start the creation of firms that improve the ability of the poor people to live with dignity (Novogratz, 2011). For example increasing access to affordable irrigation will bring about major improvements in crop yields and farmers' incomes. Returns on early-stage investment in agricultural irrigation will improve and therefore greater investment in agriculture is stimulated. Once commercial investment has been kick-started, agribusinesses along the whole length of the value chain are stimulated. Patient capital is by far the most cost-effective way of providing major benefits for smallholder farmers and the rural communities in which they live.

An example of a Patient Capital is the Acumen Fund. Acumen Fund sees patient capital as a debt or

equity investment in an early-stage enterprise providing low-income consumers with access to water, agricultural inputs, healthcare, housing and alternative energy. As an example a typical commitment of patient capital (*by Acumen)* for an enterprise range from $300,000 to $2,500,000 in equity or debt with payback or exit in roughly seven to ten years. The patient capital by Acumen is accompanied by a wide range of management support services nurturing the company to maturity.

In 2004 Acumen Fund invested $600,000 in Water Health International (WHI), a company that dedicated itself to bring safe drinking water to rural Indians, something long thought nearly impossible. Success came through in one year with more projects of the same nature in the area with the technical assistance of Acumen in which ten more systems were now in place and this water facility by WHI attracted interest of additional investors. Three years after Acumen's initial investment, WHI had raised $11 million in private capital and this made it possible to start negotiating with banks about financing an additional 20 systems.

Over the years WHI has developed over 275 systems that impact the lives of over 350,000 people in India. WHI now has over $30 million as a result of leveraging a powerful business model, focused leadership, and the strong support of patient capital, to create an innovative new approach to tackling India's water challenges.

Another example of patient capital in Africa is the Chiansi Irrigation project in Zambia which was set up and funded by a private firm. The model was that of facilitating large-scale development of irrigation assets that would benefit both small and large-scale producers. In addition to water provision there was also the existence of commercial and grant system as well as seed and fertilizer markets in the selected arable land. The harvests by small scale producers were for their own consumption while the produce by large-scale commercial farmers was targeted for exports at regional and international markets. The Chiansi project achieved a double-barreled objective of economic growth as well as poverty reduction among smallholder farmers and their families.

Sovereign Wealth Funds (SWFs

Sovereign Wealth Funds (SWFs)[41] are a good example of private financing schemes that are making investments in the agriculture sector in the developing world and acquiring land in the context of improving "food security" is certainly one of the more conspicuous reasons cited by these SWFs. According to McNellis (2009) Congo, Ethiopia, Madagascar, Mozambique, Sudan and Tanzania are the principal partners of these land deals in Africa. Countries that have been active in these land deals are Saudi Arabia, China, the United Arab Emirates and South Korea. The widely common investments in land may create tensions in farming communities, as experienced in Madagascar and Central America where the privatisation of previously customary lands led to a rapid land concentration, and was immediately followed by decades of conflict and civil war which greatly undermined the development of the region (Songwe and Deininger 2009). In Madagascar, for example, only 15 percent of the plots are titled. About 49 percent of the farmers are not conversant with land titling procedures (Ny Tantsaha 2008). Another example is that of pastoral land areas in Sudan, Tanzania, and Kenya, where seasonal grazing areas for pastoral populations are likely to be lost to foreign investors, putting their livestock and crop activities at risk. This process is helped by the weak tenure system in numerous African countries, where producers do not hold land titles. Under these circumstances, the rural population has no clear legal recourse in case of expropriation. African governments need to design appropriate legislations and mechanisms to benefit from foreign investment in agricultural land, while preserving the livelihoods and interests of the local population (Castel and Kamara, 2009). FAO has recognized the importance of foreign investment as a source of agriculture finance and so, together with member governments and several other international organizations, have established the Principles for Responsible Investment in Agriculture (FAO, 2011). These principles are important in protecting local communities from unscrupulous investors.

[41] These are state-owned investment fund composed of financial assets such as stocks, bonds, property, precious metals or other financial instruments. Sovereign wealth funds invest globally. Most SWFs are funded by foreign exchange assets.

6. CONCLUSION AND POLICY RECOMENDATIONS

Africa needs business models that are capable of bringing affordable, life-changing products and services in order to reduce or even eliminate poverty. These business models through appropriate and responsible funding must, as a matter of necessity, create jobs and lead directly to economic growth in Sub-Saharan Africa (SSA). Patient capital can make the difference in helping innovative business models that address poverty see the light of day.

Best Practice Business models that benefit the marginalized people must be encouraged through appropriate legislative and policy frameworks. Innovative funding of agricultural activities where formal financing is lacking cannot be overemphasized. Economies should encourage the creation of strong linkages and cooperation among all those involved in agricultural activities from producers, marketers and consumers so that producers, large and small, are assured of a ready market for their products and services. Such value

chains act as insurance for smallholder farmers that cannot access formal funding. The success of VCF also depends on the willingness by governments to support efforts of value chains. To this end, governments should commit themselves to work with participating firms in a chain and provide the necessary support in form of guarantees or otherwise.

Yield insurance programs should be considered as one of the effective ways to minimize risks in agriculture. To this end, policies should be put in places that promote insurance products that are unique to certain agricultural yields. Index Based Insurance is the best way forward in this regard. Many farmers in rural areas face drought, flood and other types of risks and this exacerbates poverty in such areas. A policy that protects such vulnerable farmers can go a long way to alleviate poverty and uplift the spirit of rural farmers to better improve their production in an atmosphere free of anxiety.

Patient capital is a kind of funding to rural farmers which give them enough room to establish themselves before loan repayments can commence. Some projects take a while before positive net inflows can be realised and a scheme in which the lender is willing to agree to a deferment of loan-repayment is beneficial to poor communities. Patient capital also creates jobs and affordable commodity prices as a result of below-market interest rates for the loans. A policy that promotes such funding is more than welcome in many parts of the world and in particular, Africa. To this end a legislative directive that encourages the proliferation of donors, venture-like structures, philanthropic organisations and other types of patient capital investors should be in place. Donors should be those organisations without other ulterior 'neo-colonialism' motives but are coming as agents of change to better lives of many Africans as pointed out by Hallam (2009). Another issue of importance is that authorities should encourage speedy infrastructural development in form of roads, communication infrastructure as well as energy provision so as to cut down operating costs which hamper many from financing agricultural activities.

Africa is a land that has different agro-ecological conditions from other parts of the world and so requires its inhabitants to embrace innovation in order to achieve agricultural milestones. The recommendations should include the implementation of both "push" and "pull" mechanisms. There is need to understand the market needs and then *ex post* fund those innovations designed to satisfy the market both in quantity and quality. Drought has become a constant companion of most parts of the world and more so in Africa; this realization demands that we seek to develop drought-resistant crops which are less water-stressed and also strong in resisting diseases and pests.

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APPENDIX

Table 5. Agriculture Expenditure constant 2005 International dollars PP (US Billions)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
East Asia & Pacific	47	53	52	62	59	63	68	75	80	97	91	112	117
Europe &Central Asia	12	12	18	16	16	18	18	18	21	24	27	30	32
Latin America &Caribbean	6	9	13	16	10	11	9	8	7	8	9	9	11
Middle East North Africa	12	12	14	13	11	12	15	16	13	13	16	15	13
South Asia	12	13	14	15	17	17	16	15	15	19	21	28	29
Sub Saharan Africa	2	2	2	2	3	3	4	4	2	2	5	4	4
ALL	91	102	114	124	115	124	130	135	138	163	169	197	205

Source: IFPRI –SPEED Database

Table 6. Sub Saharan Africa's Sectoral share of Expenditure (% of GDP)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Agriculture	0.8	0.8	0.7	0.8	0.9	0.8	1.1	0.9	0.6	0.5	1.0	0.8	0.7
Education	2.5	2.5	2.6	2.9	3.2	3.2	3.0	3.0	2.8	2.7	2.7	2.8	2.8
Health	0.8	0.8	0.9	1.1	1.1	1.0	1.3	1.3	1.2	1.1	1.2	1.1	1.2
Defence	1.1	1.0	1.1	1.5	1.9	2.3	2.0	2.0	1.4	1.3	1.3	1.2	1.0
Social Protection	0.5	0.4	0.5	0.6	0.6	0.6	1.1	1.0	0.8	0.9	0.7	0.7	0.8
Trans & Comm	0.8	0.8	0.9	1.0	1.0	0.7	1.2	1.1	0.9	0.5	0.5	0.5	0.6
Other	10.1	8.5	9.9	12.0	10.4	11.9	12.7	11.4	11.6	10.8	10.8	10.7	10.4
Total	16.6	14.7	16.5	19.9	19.1	20.5	22.3	20.8	19.3	17.7	18.2	17.8	17.5

Source: IFPRI –SPEED Database

Table 7. Funded projects under the L'Aquila Food Security Initiative (AFSI)

African Country	Funding	Nature of Projects	Time frame	Funding Country
Kenya	Committed AU$24.75m $159.9m $121.5m $118.52m $28m E66.4m	• AusAID support hunger safety program by handing cash transfers to chronologically food insecure • Also support climate change adaptation initiative • Index based livestock insurance is a public-private program enabling Kenyan pastoralist to insure their main assts livestock against drought • Capacity Building for small holder farmers and development of irrigation schemes • Improve agriculture productivity(horticulture, dairy, maize in high rainfall areas, drought tolerant crops livestock in arid regions) • Development of private sector and agric value chains • Policy advice and sector contribution • Irrigation development, strengthen farmer organizations, seed supply, water harvesting, animal health, pasture reseeding • Agric and livestock extension, land reforms, financial services, marketing and value chains, CSO projects and environment • Increase productivity and efficiency of food systems to enhance food security targeting food insecure households		Australia Japan USA Germany Sweden EU
Somalia	AU$2.9m	• Enhance livelihoods and reduce vulnerability of pastoral populations, increase earnings from livestock • It also appears that there is a demand for Index Based Insurance. During a brief campaign there was a huge uptake of the IBLI		Australia
South Sudan and Somalia	AU$20m	• Building resilience through social protection mechanisms and climate change adaptation to reduce risk of food insecurity		Australia
Zimbabwe	AU$12.9m $39.5 million	• Promote livelihoods of the poorest and most vulnerable populations • Provide crops and livestock inputs • Increase the role of private sector through contract farming, strengthen markets, value chain, improving financial services for the poor • Reducing poverty through improved livelihoods, ensuring clean water, food security and hygiene • Provide agric inputs, promotion of conservation agriculture, formation and support to internal lending and savings clubs, cash transfers, safe water points, latrines, hand washing facilities • Improve access to financial and business development services for small and medium sized enterprises working in agric by providing production support, logistics sales and marketing. Capacity development and distribution • Financial and technical support to agric business with innovative and inclusive business models • Enabling environment for business and microfinance program so as to increase micro credit to women		Australia UK
Ghana	$53.6m $119.9m $78.7m	• Agriculture contract farming in the rubber area • Development of out-grower schemes • Support to micro and rural finance and district development • Value chain focus on key crops including rice, maize soya and marine fisheries • Contribute to the food and agric sector development Policy through refinancing policy for agric investment and technical assistance		France USA

	$116.8m	• Contribute to improved food security through improving the availability of food • Improve nutritional practices and more productive agric practices amongst small holder focusing on women		Canada
Senegal	$19.4m $560m $4.05m $5.8m $21.7m	• Irrigation infrastructure rehabilitation, creation of 5000ha for rice and other crops • Capacity building for different actors of rice value chain • Support to commercialization, processing and marketing of rice • Agriculture productivity by improving irrigation systems • Rehabilitate main conveyances and drainage canals • Secure land rights of farmers • Rehabilitate two national roads • Improve access to domestic and international markets • Agric diversification of production, food production (rice) water use, warehousing training, infrastructure, livestock • Community development projects through micro finance and technical assistance activities • Support to the national program of investment in agric, rural infrastructure, irrigation schemes , capacity development, increasing horticulture and fruit production • Strengthen production capacity of rural entrepreneurs through technical and material support, enhance linkages of producers to markets, extend microfinance services to more rural farmers and entrepreneurs		France USA Spain Italy Canada
Cameroon	$286m $126.7m	• Extension services and vocational training • Farmers association and line ministries capacity building • Micro finance in rural areas and agronomic research • Support program for sustainable management of natural resources and basket fund • Decentralization and local development assistance program • Health/AIDS program in the framework of a swap reproductive health project		France Germany
Uganda	$155.6m $100.3m $114.8m	• Capacity building for rice promotion • Irrigation development and improvement of transport infrastructure • Comprehensive value chain approach focusing on maize, beans and coffee • Expand production and sale of these crops to local and international markets • Improve private sector competitiveness • Build and enabling policy environment • Strengthen local and scientific capacity • Conduct biotechnology research • Integrate agric and nutrition programs • Food and nutrition security • Rural financing sector program, renewable energy and energy efficiency, water and sanitation, development of financial sector		Japan USA Gemany
Mozambique	$75.58m $48.9m $11 million $10.9m $37.98m	• Improving research capacity for Nacala Corridor agriculture development • Improving transport infrastructure • Improve agric productivity (oilseeds pulses, cashews and fruits) • Through the Community land use fund – secure land rights of rural people and other natural resources, facilitate equitable use of these resources for poverty reduction and growth • Through the Beira Agric Growth Corridor – reduce poverty by promoting profitable agric in the Beira corridor, guarantee social and gender equality, use BAGC to transform agric productivity with major benefits for small holder famers and local communities • Promote income generating activities of farmers, support agric production and marketing through capacity building, improve sustainable management of natural resources • Increase fishermen income by increasing fish production and marketing, strengthen fishermen associations • Improve institutional capacity in the fisheries sector and develop fishing techniques and the marine park • Strengthen capacity, extension services, implement food production action plans, improve commercialization and market access, support vulnerable populations to achieve food security and improve incomes.		Japan USA UK Italy Canada
Tanzania	$121.9m $139.1m	• Capacity development for planning and implementation of agriculture development and transport infrastructure improvement		Japan

	$61m	• Improve agriculture production and processing (rice , maize horticulture) • Expand market access and promote sustainable resources management • Expand capacity building and support services, foster enabling policy environment • Water sector development programs • Rural development programs and buffer zones management in the Serengeti • Support to renewable energy		USA
Ethiopia	$121.8m $62.5m $125.8m E71.8m $75m	• Spur agriculture growth (maize, wheat, honey, coffee value chains) • Link the vulnerable to markets • Build institutional capacity • Sustainable land management including the rehabilitation of degraded areas • Support to agric development small scale irrigation • Improvement of framework conditions\ • Using the Productive Safety Nets program- provide food and cash transfers to food insecure rural people • Improve access to credit and technical services to help them build up livelihood assets and graduate from program • Strengthen agric services and systems for improved agric productivity making agric extension at woreda level more responsive to local farmer needs • Achieve food security of chronic and transitory food insecure households • Recovery of livelihoods in drought affected areas and building resiliency • Finance the productive safety nets program, rural capacity building project, agric growth program, improving productivity and market access, managing environmental resources (increased availability of agric inputs, extension services, credit, land and water management and marketing opportunities, irrigation, institutional capacity building policy development market and value chain development improved productivity)		USA Germany UK EU Canada
Liberia	$60.3m	• Improve agriculture productivity (rice cassava, vegetables, goats)		USA
Malawi	$40.1m $22milion	• Promotion of improved nutritional behavior • Investments in high potential value chains to develop markets and improve nutritional options • engagement of government to improve the policy environment • Farm input subsidy program- to improve agric productivity and food security and to achieve poverty reduction through affordable fertilizer and seeds to poor households		USA UK
Mali	$64m Funding by Germany to be finalized because of war $36.99m	• strengthen rice, millet, sorghum and livestock value chains • address high levels of nutritional deficiency • improve the enabling environment for agric trade and investment • build capacity among farmers, the private sector, civil society and public institutions • promote productive and sustainable agriculture • drinking water supply and sanitation • decentralization • reproductive health and education programs • improve sustainable agric productivity and food security		USA Germany Canada
Rwanda	$71m $22.8 m	• promoting value chains through the core investment areas of sustainable market linkages and infrastructure • link agric to nutrition and support gender equality to improve food security • invest in traditional high value exports, coffee and pyrethrum • Through the Rwanda Agric Service Delivery Grant – help government to implement the intensification and development of sustainable production systems • Support to professionalization of producers through cooperatives and farmers organizations • Promotion of commodity chains and development of agribusiness value chains, institutional capacity building across whole agric sector • Ministry of Agric to expand extension services to farmer communities, increase agric productivity		USA UK

Zambia	$43.2m	• Improve agriculture productivity (oilseeds, legumes, maize, horticulture) • FTF nutritional investments targeted at women • FTF program to promote innovation in agric technology such as drought tolerant maize, bio-fortification of maize, oranges, fleshed sweet potatoes and management of aflatoxins		USA
Benin	$137.8m	• Environmental fund to support West African savannahs foundation • Support decentralization and municipal development • Strengthen agric programs		Germany
Burkina Faso	$56.11m	• Small scale irrigation, value chains and policy advice for implementation of CAADP		
Ivory Coast	$17.03m	• Rural economic development including poultry, pig industry, rice horticulture, plantains, cocoa, rubber, palm oils or value chains • Linking vulnerable to markets • Capacity development for cooperatives and other institutions		Germany
DRC	$97.5m $5.6m	• Post conflict support • HIV and health systems • Protection and management of natural resources including water and waste water • Strengthen certified horticulture seed production centre in Kinshasa • Increase agric production and farmer income, provide technical assistance to technicians, members of the farmers association and rural leaders and other farmers		Germany Italy
Niger	$57.7m E113m	• Rural development, reproductive farming resource management, climate change agriculture irrigation, productivity promotion, capacity building, sector political support, regional planning, community development • Promotion of food security projects, provision of funding for grain purchase, monitoring and evaluation support, technical advice and rural infrastructure • Road infrastructure, improving capacity of production, management and maintenance of the roads by strengthening the different structures involved • Ensure food security by promoting sustainable agric development • Create good conditions for producers associations • Improve quality and coverage of rural financial services		Germany EU
Togo	$11.14m	• Programs to be defined		Germany
Nigeria	$3.7 m	• Improve livelihoods by facilitating growth and pro poor outcomes in agric markets • Fertilizer interventions (bottom of pyramid approach)..reached over 1 million famers using Notore. This improves declining agric yields and hence food security • GEMS program to create greater value chains in the meat and leather value chains to improve incomes of poor people in this sector		UK
South Sudan All Sudan	$10 m $19.44m	• Using the South Sudan Multi Donor Trust Fund to coordinate the reconstruction and development needs of Southern Sudan and covers infrastructure, health, water and sanitation, Agric and rural development to increase productivity of agric and forestry small holder farmers • South Sudan Recovery Fund to help transition from relief to recovery support livelihoods projects like agro pastorals skills, improved water and sanitation, capacity building, infrastructure etc • Economically sustainable rural communities • Increase agric production • Ensure market access • Improve livelihoods, support to targeted government NGOs		UK Canada
Chad	E26.8m	• Improve food security, good governance and management of biodiversity and natural resources • Prevent food insecurity during lean seasons. Reinforce resilience of targeted populations and reinforce livelihood link to farming and agriculture		EU

Source: L'Aquila Food Security Initiative (AFSI) website: http://www.feedthefuture.gov/resource/laquila-food-security-initiative-final-report-2012.

Table 8. Projects funded by Global Agriculture and Food Security Program

African Country	Funding	Nature of Projects	Funded by
Burundi	$30 million	• $30 million to improve water management and irrigation in drought-prone areas with investments in infrastructure and agricultural intensification through improved technologies, productive assets, and the establishment of farmer field schools	GASFP
Ethiopia	$51.5 million	• Funds meant to boost incomes of rural people and increase food security by developing the untapped potential of high-potential areas. • GAFSP co-finances the Agriculture Growth Program (AGP) which aims to increase agricultural productivity and market access for key crop and livestock products in targeted woredas with increased participation of women and youth. The AGP particularly focuses on developing the untapped potential of relatively well-endowed areas.	GASFP
The Gambia	$28 million	• Target three highly food-insecure regions via an integrated area development program that includes land and water management, horticultural gardens, aquaculture farming, and small ruminant and poultry farming. • GAFSP resources will focus on scaling up and expanding proven initiatives and best practices to boost household food security and nutritional levels, increase levels of sustainable production and productivity through improved land and water management technologies, and strengthen smallholder agricultural competitiveness.	GASFP
Liberia	$46 million	• Fund to enhance the income of smallholder farmers, particularly women and youth, through sustainable land expansion and land improvement, increased market access, and strengthening institutional capacities. GAFSP financing in Liberia will support the implementation of sustainable medium and long-term investments in agriculture guided by the Liberia Agriculture Sector Investment Program (LASIP).	GASFP
Malawi	$39.6 million	• The promotion of irrigated rice and horticulture production as well as crop diversification and value chain development for selected commodities. The primary objective of this project is to reduce poverty and ensure sustainable food security for Malawians at both household and national levels by increasing food production and developing high potential value chains. Main activities will support: sustainable land and water management to enhance agriculture under irrigated agriculture in selected districts, crop diversification, and value chain development	GASFP
Niger	$33 million	• Projects contribute to poverty alleviation by boosting rural production and enhancing food security in particularly vulnerable areas. GAFSP financing will create surface water harnessing facilities, structures, and irrigation works as well as implementing counter erosion measures in watersheds upstream of the structures. GAFSP activities support construction and rehabilitation of water-spreading bunds, mini dams, and irrigation areas which will help to increase the arable land area by more than 17,000 hectares	GASFP
Rwanda	$50 million	• To increase productivity and commercialization of hillside agriculture through research and extension, water and land management, agricultural value chains, and expanded access to finance.	GASFP
Senegal	$40 million	• To promote livestock and crop production in vulnerable zones, including investments focused on provision of water management systems, rural roads, and animal vaccination centers. the project will focus on livestock water points, rural roads, rural animal vaccination centers, and financing for model ruminant and poultry operations	GASFP

Sierra Leone	$50 million	• GAFSP is financing two components of the Smallholder Commercialization Program (SCP) Investment Plan, Sierra Leone's National Agricultural Investment Program (NAIP) under the CAADP process. The specific objective of the support is to promote smallholder agricultural commercialization through production intensification, diversification, value addition, and marketing, as well as developing small-scale irrigation infrastructures to boost rice production, a major staple in the country	GASFP
Tanzania	$22.9 million	• To support the rehabilitation of irrigation schemes and an input voucher scheme for rice input packages in the project zones. GAFSP funding will contribute to sector growth with a particular focus on enhancing rice production in the TARIPA-SAGCOT area in Tanzania Mainland, and in Mtwango, Kibokwa, and Ole in Zanzibar Islands	GASFP
Togo	$39 million	to support agricultural productivity growth through adoption of technology, increased value addition, and promotion of agricultural diversification. GAFSP financing will support two programs: Project to Support Agricultural Development in Togo (PADAT) and Project to Support the Agricultural Sector (PASA). GAFSP support will help in increasing productivity of small farms through adoption of new technologies, promotion of value addition, and marketing of the targeted agricultural produce. It will also support agricultural diversification through promotion of strategic food and export crops as well as freshwater fish farming	GASFP

Source: GAFSP website: http://www.gafspfund.org/.

Table 9. Green Revolution in Africa (AGRA)

African Country	Funding	Nature of Projects
Burkina Faso	AGRA	• The Alliance for a Green Revolution in Africa (AGRA) supports government initiatives such as the Agricultural Sector Investment Program outlined in the Government's Green Revolution Guide. It calls for diversification and intensification of production, and strengthening linkages between production and the market-two goals that AGRA is well-suited to address.
Ethiopia	AGRA	• Develops and disseminates improved, higher yielding, farmer-preferred wheat varieties with tolerance of wheat stem rust for smallholder farmers in marginal areas using Ethiopia Institute for Agric Research • To enhance uptake and utilization of improved seed through increased production and efficient dissemination to overcome hunger and poverty in small scale farmers in Ethiopia
Ghana	AGRA	• Helps smallholder farmers of staple crops raise their incomes through linking them to commercial buyers and producers, thereby expanding their access to markets • To improve smallholder agricultural productivity and food security in Africa by developing and strengthening regional human and institutional capacity to develop innovative and adaptable integrated soil fertility management technologies. • In March 2009, Standard Bank and AGRA signed an agreement under which Standard Bank will offer $100 million in loans to smallholder farmers and small agricultural business-$25 million. This is done through Ghana's millennium development authority
Kenya	AGRA	• AGRA and the International Fund for Agricultural Development (IFAD) provided $2.5 million each as a loan guarantee for the Equity Bank's $50 million program. The program will make small low-interest loans available to 2.5 million farmers and 15,000 agri-businesses. • Mobilizes and trains smallholder farmers to form strong business groups that will enable them to access reliable and diversified markets for cereals resulting in reduced transaction costs and increased farmer incomes. • Links smallholder farmers to more efficient input and output markets through improved market information to raise farmers' incomes • To improve smallholder agricultural productivity and food security in Africa through strengthening the human and instituitional capacity required to develop appropriate integrated soil fertility management technologies.
Malawi	AGRA	• To sustain self sufficiency in maize production, lower seed cost and improve food security among smallholder farmers in Malawi through development of high yielding, disease and pest resistant maize varieties of the mid-altitude areas of Malawi

		• Promotes and distributes improved seed varieties for use by poor small-scale farmers in Malawi • To produce well trained human resources equipped with practical skills in integrated soil fertility management practices that can contribute to improving smallholder agricultural productivity and food security.
Mali	AGRA	• Enhances productivity and incomes of poor, smallholder farm households in the Segou and Koulikoro regions of Mali through providing increased access to agricultural inputs and technologies • Develop high yielding seed varieties • Links fertilizer micro-dosing with input-output markets to boost smallholder farmers' livelihoods in the dry lands of Mali and two other countries •
Mozambique	AGRA	• Develops improved rice varieties that combine high yield, good grain quality, resistance to rice yellow mottle virus and bacterial blight, and tolerance for grain shattering and lodging for smallholder farmers • To improve food security and increase incomes of small holder farmers in Zambezia and Nampula provinces of Mozambique through promotion of Integrated Soil Fertility Management. • In March 2009, Standard Bank and AGRA signed an agreement under which Standard Bank will offer $100 million in loans to smallholder farmers and small agricultural business-$25 million using the Millennium Challenge Account in Mozambique •
Niger	AGRA	• Boosts the productivity and incomes of smallholder farmers in Niger through accelerated development and diffusion of drought-tolerant improved seed varieties. • Promotes wide-scale dissemination and adoption of fertilizer micro-dosing and inventory credit system for increased production incomes of smallholder farmers in Niger
Nigeria	AGRA	• Strengthens existing agro-dealer network and creates a new cadre of agro-dealers with the means and incentives to supply seeds and related technologies for increased productivity, household incomes and welfare of resource-poor farmers in four disadvantaged zones of Nigeria. • To increase small holder farmers 'productivity and incomes through the development and dissemination of virus resistant seeds • Soil health improvement programs
Rwanda	AGRA	• To improve food security of smallholder farmers in Rwanda through development of new, improved sweet potato varieties through farmer participation processing high yield, high beta-carotene content, high dry matter content, pest and disease resistance and adapted to different agro-ecologies of the low, mid and high altitude provinces • Produces and disseminates improved seed to poor farmers • To increase agricultural productivity and smallholder farmer incomes through improved soil health by demonstrating and promoting the wide scale use of agricultural lime in Rwanda. •
Tanzania	AGRA	• Develops a national strategy to streamline an agro dealer distribution system that will cost-effectively and sustainably make available improved inputs to smallholder farmers in rural Tanzania, thereby increasing their productivity and incomes • Ensures production of improved crop varieties adapted to smallholder farmer conditions in Tanzania • Soil health improvement program • In March 2009, Standard Bank and AGRA signed an agreement under which Standard Bank will offer $100 million in loans to smallholder farmers and small agricultural business-$25 million through the Kilimo trust • AGRA and the Financial Sector Deepening Trust (FSDT) in 2008 provided $1.1 million for a loan guarantee fund securing a $5 million line of credit from the National Microfinance Bank (NMB) aimed at farmers, agro-dealers and other agricultural businesses. NMB agreed to lend to agro-dealers at rates of 18%, compared to the typical rate of 46% charged by microfinance institutions. •
Uganda	AGRA	• Strengthens supply and demand for improved seed and other agricultural inputs among smallholder farmers through the development of an agro-input dealers' association with strong linkages to private sector importers, input suppliers, and smallholder farmers • Ensure production of improved crop varieties adapted to poor farmer conditions through advanced training • Participate in the soil health program • In March 2009, Standard Bank and AGRA signed an agreement under which Standard Bank will offer $100 million in loans to smallholder farmers and small agricultural business-$25 million through the Kilimo Trust

		• Provides support to small- and medium-sized companies that purchase raw materials from smallholder farmers
Zambia	AGRA	• Provides 91,000 smallholder farm households in remote rural Zambia with an increased range of agricultural inputs and technologies at reduced prices by extending a network of agro dealers through community agents and service providers • Increases on-farm productivity and reduces rural poverty by making available to resource-poor farmers improved maize varieties that are resistant to drought and tolerate low nitrogen • To improve soil health, food security and incomes of small holder farmers through integration of legumes in maize based cropping systems in Zambia •

Source: AGRA website: http://www.agra.org/where-we-work/.

AN EXPLORATORY REVIEW OF FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN FOUR SSA COUNTRIES

Edmore Mahembe*, Nicholas M. Odhiambo*

Abstract

This paper highlights the status of foreign direct investment (FDI) and economic growth in four middle-income sub-Saharan Africa countries, namely: Angola, Mauritius, Namibia and Seychelles. The study examines the individual countries' policies and strategies that were aimed at boosting FDI and economic growth. The study finds that the FDI inflows were fairly low during the period the 1980s and the 1990s. This is mainly because during this period, the policies of these countries, like many other sub-Saharan African countries, hinged mainly on import substitution, socialism and centralized economic systems. However, following the implementation of policies, such as privatisation, liberalisation, structural-adjustments, etc, in the 1990s and 2000s, the FDI inflows into these countries increased significantly, especially from developed countries. The biggest recipient of FDI inflows among the four studied countries, however, was Angola – where the FDI inflows increased from US$ 2145.5 mill in 2001 to US$ 16581.0 million in 2008.

Keywords: Foreign Direct Investment, Economic Growth, Angola, Mauritius, Namibia, Seychelles

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1. Introduction

Foreign direct investment (FDI) is defined by the IMF (1993) as international investment by an entity resident in one economy – in the business of an enterprise resident in another economy – that is made with the objective of obtaining a lasting interest. In the neoclassical or exogenous growth model, it is argued that FDI promotes economic growth by increasing the volume of investment and/or its efficiency (Li and Liu, 2005). In the endogenous growth model, FDI increases economic growth by generating technological spill-overs from the industrialised nations to the host country (De Mello, 1997 and 1999). Recent empirical studies have shown that FDI can affect the host country's economic growth, via increase in the stock of capital, bringing know-how and technology, boosting the prevailing stock of knowledge in the host economy through formal or informal labour training, skill acquisition and diffusion, and the introduction of new business management methods and organisational arrangement (OECD, 2002 and Li & Liu, 2005).

However, regardless of the important role of FDI in economic development, and the increase in FDI inflows into sub-Saharan African countries in particular, there is a significant absence of literature on the policies and strategies implemented to attract FDI, and to boost economic growth. Most studies focus on the impact of FDI on economic growth, causality, or on the FDI-growth nexus (Juma, 2012); but they do not examine the policies, strategies and challenges faced by individual countries in attracting FDI.

This paper evaluates the status of foreign direct investment (FDI) and economic growth in four middle-income sub-Saharan African countries, namely Angola, Mauritius, Namibia, and Seychelles. This study highlights the policies, initiatives and strategies that have been implemented by these countries to boost FDI inflows and economic growth. The paper also highlights the trends and dynamics of FDI inflows and economic growth in the four studied countries during the period 1980-2012.

2. A Review of Foreign Direct Investment and Economic Growth in sub-Saharan African Countries: Experiences from Angola, Mauritius, Namibia and Seychelles

2.1 Angola

Angola is Africa's second largest oil producer, after Nigeria, with an installed capacity of over 1.9 million bpd (ADB, 2012a). In 2011, the mining sector, dominated by oil, accounted for about 47% of the total GDP, while diamonds accounted for about 1% of

the GDP. Angola discovered huge oil deposits in 2006; and it became a member of the Organisation of the Petroleum Exporting Countries (OPEC) in the same year. The country is currently the largest oil producer in Sub-Saharan Africa, and the second-largest economy in the SADC region, after South Africa.

According to the World Bankrankings (World Bank, 2012), the country graduated from a lower-income country (LIC) to a middle-income country (MIC)[42] in 2004 (Glennie, 2011:4). The country is one of the few with a relatively high GDP per capita (US$6,000). As shown in the GDP trend analysis in Figure 1 the country is among the three fastest-growing economies in the world.

Policies to attract FDI and to boost economic growth in Angola

According to the African Development Bank (ADB), the Country-Strategy Paper for Angola (ADB, 2011a), as well as the Angolan government's broad economic and development strategy, are aimed at stimulating and accelerating economic growth and competitiveness through diversification and poverty-reduction. The country is currently implementing the National Reconstruction Programme, which saw capital expenditure reaching 11.6% of GDP, and budget spending in social areas increased to 31.5% of GDP in 2011 (ADB, 2011a).

The African Economic Outlook Report (ADB, 2012b) identified Angola as one of several African countries that are making concerted efforts to further diversify their economies. Angola has adopted programmes to support its manufacturing sector. The ADB (2012b) noted that the government is excessively dependent on oil revenues, as shown by the fact that oil constituted 97% of all exports, and accounted for around 80% of fiscal revenues. This makes the country's economy susceptible to external shocks. For example, Angola's GDP growth rate fell from a high of 22.6% in 2007 to a low of 2.4% in 2009, due to the world economic crisis in 2009, which curbed oil demand and generated a terms-of-trade shock (ADB, 2011a). However, the ADB (2011a) appraised the country's "home-grown" macro-economic stability plan for bringing inflation down from more than 70 per cent to 13 per cent; built-up reserves to US$18billion; contain external debt at around 13 per cent of GDP; and allowing for the effective pegging of the kwanza to the dollar.

In an effort to improve its regulatory and legal framework, so as to facilitate and protect foreign investments, the Government of Angola established the National Private Investment Agency (ANIP) in July 2003. The ANIP is responsible for assisting and facilitating new investment in Angola (ANIP, 2013). In the same year, the country replaced the 1994 Foreign Investment Law with the Law on Private Investment (Law 11/03) (FAO, 2011:1). The new law sets out the broad parameters, benefits and obligations for foreign investors in Angola; and it acknowledges that investment plays a vital role in the country's economic development.

In order to deepen its implementation of FDI attraction initiatives, the country amended its investment laws by introducing a new investment regime applicable to national and foreign investors that invest in developing areas, special economic zones or free trade zones. The New Private Investment Law, which was gazetted in May 2011, offers investors several incentives in a wide range of industries. The sectors include agriculture, manufacturing, rail, road, port and airport infrastructure, telecommunications, energy, health, education and tourism (Government of Angola, 2011).

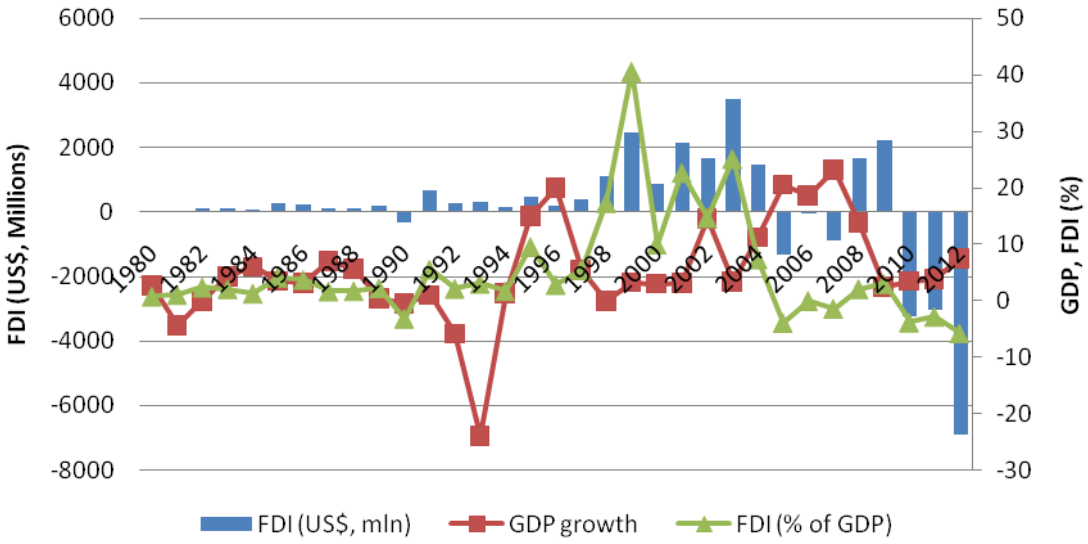
Though it might be too early to assess the impact of the new laws on FDI, the country received positive and significant FDI inflows consecutively from 1998 to 2004; but it is currently experiencing net FDI outflows. The ADB (2011a) argues that the new legislation represents a fundamental shift in attracting FDI, from a more open regime to a stricter one. It includes new and more rigid regulation of fiscal incentives, subsidies and profit repatriation, and in particular, for new projects below US$10 million.

The new laws further require that projects above the US$10 million threshold be decided directly by the government's cabinet; and these laws include new controls on profit repatriation. The ADB (2011a) concludes that the new legislation is broadly perceived by the global investment market as being restrictive to FDI in the country.

Figure 1 shows the trends of real GDP and FDI in Angola during the period 1980-2012.

[42]As of April 2011, the range for LIC was US$995 or less gross national income (GNI) per capita, while that for MIC ranged from US$996-12,195 American dollars.

Figure 1. Angola GDP and FDI Inflows (1980-2012)



Source: Compilation from UNCTAD and WDI's Databases

2.2 Mauritius

Mauritius had an estimated GDP of US$10,809 million in 2011, and the World Bank (2012) classified it as an upper-middle income country with its gross national income (GNI) *per capita* at US$8,230 (World Bank, 2013a). Madhoo and Nath (2004) showed that the country accelerated its economic growth through the policy of a developing export-oriented manufacturing sector after 1982, constantly reforming its sugar industry and progressively diversifying into tourism and offshore services.

Policies to attract FDI and boost economic growth in Mauritius

In a study explaining the economic growth performance of Mauritius, Madhoo and Nath (2004) categorised the economic-development trajectory of the country into phases; these are briefly described below:

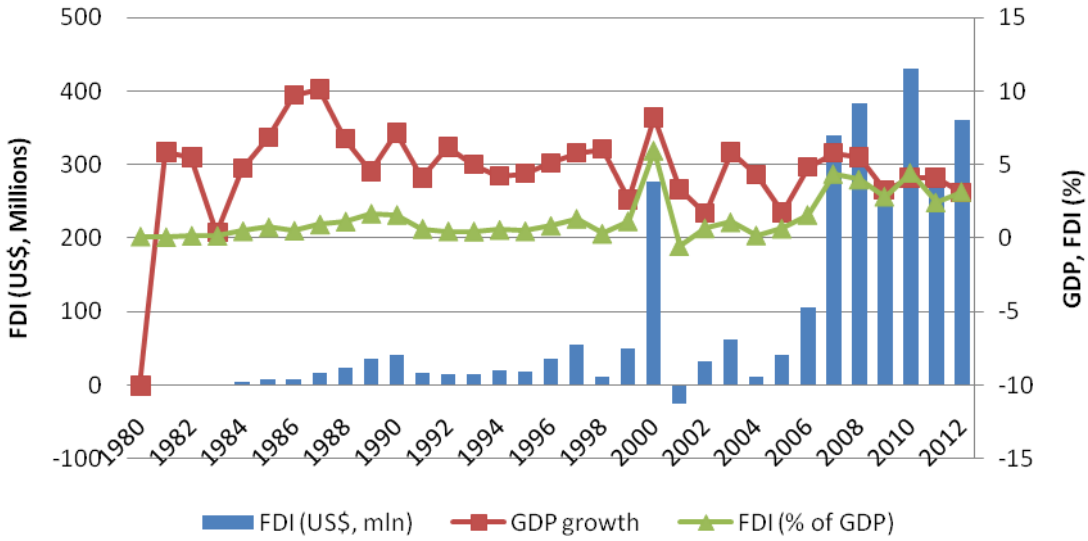
Table 1. Phases of the Economic-Development Trajectory in Mauritius

Economic policy	Period	Policy Actions and Result
Import Substitution Strategy and Structural Transformation	1960-1977	– Adoption of a new industrial policy in 1963, which had a number of fiscal benefits for import substitution manufacturers. – The government gave a greater role to the private sector and foreign investors in the development of the economy through the establishment of the Mauritius Export Processing Zone (MEPZ). – The economy underwent a transition period from dependence on traditional agriculture to the manufacturing sector. – Slow growth or economic stagnation, with average real growth rate of 0.7%. – The result was almost a total collapse of the economy.
Economic Structural Adjustment Programme	1978-83	– Adopting the IMF-recommended ESAP in 1979. – The main policy measures put into operation were fiscal stabilisation, exchange-rate deregulation, liberalisation of labour markets and trade liberalisation. – The unfavourable economic situation overturned.
FDI-Export-Led Growth	1984-88	– The expansion of export-led industries. – The number of EPZ enterprises rocketed to 591, FDI increased and the economy expanded.
Diversification and Consolidation	1989-2002	– Transformation of the economy from a mono-crop (sugar) economy to a diversified one consisting of the manufacturing and services sectors. – Opening of the Stock Exchange of Mauritius (SEM), – Establishment of a free port in 1992, as a part of the country's strategy to develop as a regional trade centre. – Establishment of the EPZ.

Source: Own illustration from Madhoo and Nath (2004)

In its review of the investment policy in Mauritius, the UNCTAD (2001) noted that FDI had played a small but essential role in the country. The report credits the government for enacting the EPZ Act (the first in Africa), which helped attract Asian investors to locate textile and garment-manufacturing operations in Mauritius, and its ability to benefit from the preferential access to the European and United States markets. Figure 2 shows the trends in FDI and economic growth in Mauritius during the period 1980-2012.

Figure 2. GDP and FDI Trends in Mauritius (1980-2012)



Source: Compilation from UNCTAD and WDI's databases

2.3 Namibia

Namibia is an upper-middle income country that has experienced significant successes since it gained independence from South Africa in 1990 emanating from sound economic management and good governance (World Bank, 2013b). Its GDP *per capita* (current prices) increased from US$1,661 in 1990 to US$5,383 in 2011. The country's economy is strongly connected to that of South Africa through trade, investment, and common monetary policies. The Namibian dollar is pegged to the South African rand, making economic trends (including inflation) to closely follow those in South Africa.

Policies to attract FDI and boost economic growth in Namibia

The country's economic policies and strategic goals are driven by the Namibian Vision 2030, which states that by the year 2030, Namibia should become a "prosperous and industrialised" nation (Government of Namibia, 2004:15). Industrialisation is to be achieved through growing the manufacturing sector; and this is to be achieved through the diversification of the export base into the exporting of processed goods (as compared to raw materials), as well as through the import substitution of manufactured goods (Rosendahl, 2010:18). Below is a brief discussion of some of the major policies and strategies that have been enacted, in order to boast economic growth and to attract FDI into Namibia.

The White Paper on Industrial Development, which was adopted by the government in 1992, had increased value-addition in manufacturing as its main objective (Government of Namibia, 1998:2)[43]. The White Paper called for increased productivity; import substitution; increased diversification through increased economic growth and inter-industrial linkages; employment generation, especially for disadvantaged groups; and the improved geographical distribution of industries (Government of Namibia, 1998:2).

The country's major macro-economic policies follow a five-year planning cycle, according to the government National Development Plans (NDPs). The first NDP (NDP1) was adopted in 1995 (Government of Namibia, 2004:15). It focused on boosting and sustaining economic growth, creating employment, reducing inequalities in income distribution, and reducing poverty. The NDP1 was succeeded by the NDP2 in 2001, which continued with the NDP1 goals, but with the special goal of increasing the share of manufacturing in the economy.

The NDP2 set the goal of growing the share of employment in the manufacturing sector from 6.4% in

[43] The original version of the White Paper is not available at the Ministry, so the study could only access a review of the White Paper.

2000 to 20% in 2006 (Government of the Republic of Namibia, 2012). The NDP3, which came into being in 2008, emphasised the importance of improving growth rates against worsening unemployment and underemployment. It projected a GDP growth rate of 5% per annum; however the actual rate was only 3%. The Government of Namibia (2012) attributed the below-par performance of the economy over the NDP3 period to "the global financial and economic crisis, which led to a global recession in 2009". The current and Fourth National Development Plan (NDP4) has three major goals: faster and more sustainable economic growth, the creation of employment opportunities, and enhanced income equality (Government of Namibia, 2012).

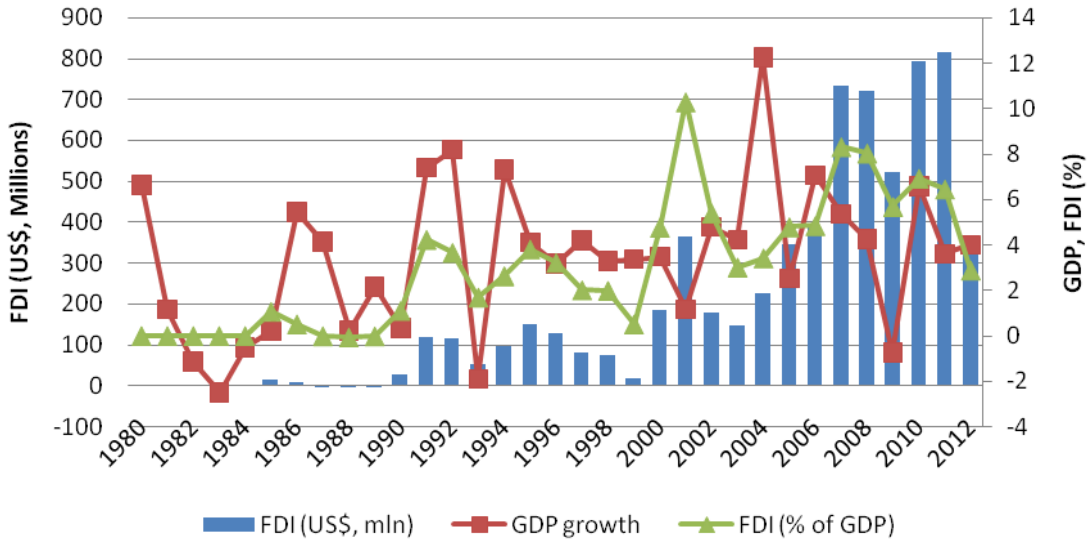
Successive NDPs have acknowledged the importance of FDI in the economy of Namibia. NDP3 admitted that FDI had played a significant part in augmenting investments in the country (Government of Namibia, 2008); and NDP4 states that the Government has been pursuing macro-economic stability, including fiscal discipline, in order to create an attractive environment for domestic and FDI that would create the much-needed growth and employment opportunities (Government of Namibia, 2012).

Some specific initiatives aimed at attracting FDI are briefly described herein. Firstly, the Government of Namibia promulgated the Foreign Investment Act in 1990, which established the Namibian Investment Centre (NIC). The NIC is responsible for the promotion and facilitation of foreign investment in the country. Secondly, the government established an Export Processing Zone (EPZ) through the Export Processing Zone Act of 1995. Through the two Acts, and other supporting initiatives, the government has ushered in a general open-door policy on FDI, which is characterised by a non-discriminatory treatment of foreign investors, and the promotion of the manufacturing sector, in line with its Vision 2030 (Rosendahl, 2010:22).

Furthermore, the country offers a broad range-of-incentives regime, especially for firms in the manufacturing sector: both domestic and foreign. These incentives also include substantial tax, and non-tax, incentives for registered manufacturers, exporters of manufactured goods and for the EPZ enterprises (Rosendahl, 2010:22).

Figure 3 shows the trends of FDI and GDP in Namibia during the period 1980-2012.

Figure 3. GDP and FDI Trends in Namibia (1980-2011)



Source: Compilation from UNCTAD and WDI's databases

2.4 Seychelles

Seychelles is a Small Island Developing State (SIDS), and is one of the smallest and most indebted countries in the developing world, with a total public debt stock-to-GDP ratio of around 140% in 2008 (World Bank, 2009). The country's total GDP stood at US$1.06 billion in 2011. The World Bank (2012a) classified Seychelles as an upper-middle class country; its GDP *per capita* rose by more than four times – from a mere US$2,288 in 1980 to US$12,321 in 2011. As a SIDS, the country's economy faces constraints characteristic of a small island state, such as lack of economic diversification, susceptibility to external shocks, distance from markets, and risks of environmental degradation, and weather-related disasters (World Bank, 2013e).

Policies to attract FDI and boost economic growth in Seychelles

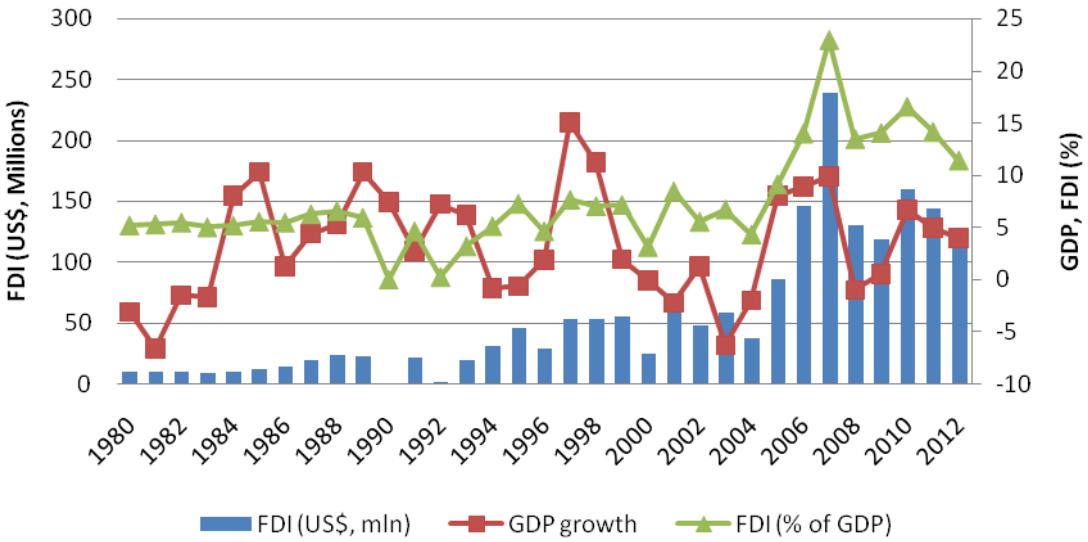
The Government of Seychelles currently has an ambitious plan to double its GDP by the year 2017 (Government of Seychelles, 2007). The ADB (2011b) noted that before the country's current reform programme the economy used to be managed by the state-led development strategy that was modelled on self-sufficiency and direct intervention in manufacturing, distribution, trade and other economic activities through state-owned enterprises (SOEs). These earlier policies were characterised by persistent expansionary fiscal and monetary policies, and incompatible trade and exchange rate policies, which led to severe macroeconomic imbalances. In fact, the economy became so unstable that, by 2008 the country failed to honour its foreign debt obligations.

The Government of Seychelles has also been implementing Macroeconomic Reform Programmes (MERPs). The first MERP was adopted in 2002, and was intended to assist in restructuring the country's economy, and exploring ways to promote growth and raise the standard of living for the citizenry. The first MERP also recognised the significance of the private sector in growing the economy and creating employment for the youth. Through the MERP of 2002, the Government privatised many of its assets (Government of Seychelles, 2010).

The second MERP was initially implemented in 2008. This was initiated with the support of major development partners (including the ADB, WB, IMF and the European Union). The reforms undertaken since 2008 include exchange rate and monetary policy deregulation, tax reform, the elimination of subsidies, and the enactment of legislations, such as the Public Debt Management Act. The ADB (2011b) applauds these reforms and attributed them to a major economic turnaround. By September 2011, Seychelles' total public debt ratio to GDP declined to 84%, from 128% in 2008.

UNCTAD (2010) argues that SIDSs are by nature attractive destinations for FDI in tourism, as well as eco-tourism. Seychelles has been taking advantage of its SIDS status by pursuing a niche strategy, and by highlighting tourism services – with a combination of quality and exclusivity, based on their small size-offering – which is not always available in mass-market package destinations. Apart from attracting tourism-related FDI, the country has also been marketing the exclusive economic zone (EEZ), with the aim of directing FDI to offshore oil exploration and other sectors, in a bid to diversify the economy. Figure 4 shows the trends of FDI and GDP during the period 1980-2012.

Figure 4. GDP and FDI Trends in Seychelles (1980-2012)



Source: Compilation from UNCTAD and WDI's databases

3. Conclusion

In this paper, the policies and strategies aimed at boosting economic growth and attracting FDI have been analysed in the four middle-income sub-Saharan African countries. These include Angola, Mauritius, Namibia, and Seychelles. The paper has also highlighted the trends in FDI inflows and economic growth in individual countries during the period 1980-2012. The analysis of this study shows that the FDI inflows into these countries were fairly low during the 1980s and early 1990s. This is mainly because during this period, the policies of these countries, like many other sub-Saharan African countries, hinged 'mainly on import substitution, socialism and centralised economic systems. However, the FDI inflows into

these countries started to increase in the late 1990s, as governments embarked on privatisation, liberalisation and economic structural-adjustment programmes. These reforms saw the warming up of countries to multinational corporations (MNCs), and the setting up of investment promotion and facilitation agencies. Some of the policies that have been implemented in these countries include, amongst others: i) Deregularisation of the economy; ii) relaxation of exchange controls; iii) adoption of 'market-friendly' policies, such as privatisation and trade liberalisation; iv) allowing foreign investors to repatriate profits and dividends; and v) guaranteeing lawful protection of foreign investments; vi) political stability; and vii) multilateral and bilateral trade and investment agreements. Moreover, in recent years, some of these countries have introduced special economic zones that offer further incentives to investors in 'strategic industries', such as manufacturing, tourism and oil exploration. The biggest recipient of FDI inflows among the four countries during the studied period, however, was Angola – where the FDI inflows increased from US$ 2145.5 mill in 2001 to US$ 16581.0 mill in 2008.

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