RISK GOVERNANCE & CONTROL:
FINANCIAL MARKETS & INSTITUTIONS

Postal Address:

Postal Box 36
Sumy 40014
Ukraine

Tel: +380-542-698125
Fax: +380-542-698125
e-mail: alex_kostyuk@virtusinterpress.org
www.virtusinterpress.org

Journal *Risk governance & control: financial markets & institutions* is published four times a year, in September-November, December-February, March-May and June-August, by Publishing House "Virtus Interpress", Kirova Str. 146/1, office 20, Sumy, 40021, Ukraine.

Information for subscribers: New orders requests should be addressed to the Editor by e-mail. See the section "Subscription details".

Back issues: Single issues are available from the Editor. Details, including prices, are available upon request.

Advertising: For details, please, contact the Editor of the journal.

Risk governance & control:
financial markets & institutions

ISSN 2077-429X (printed version)
2077-4303 (online version)

EDITORIAL

Dear readers!

The recent issue of the journal is devoted to several risk governance issues.

Sheilla Nyasha, NM Odhiambo highlight the origin of the stock market in Brazil, and trace the reforms that have been undertaken to develop the stock market. It also highlights the growth of the Brazilian stock market, as well as the challenges currently facing the market.

W J (Wessel) Pienaar deals with aspects of efficiency within the five modes of freight transport, with special reference to the operating cost and fuel consumption rates between South Africa's largest industrial cities and seaports. In particular, the paper deals with (a) the opportunities that exist for the achievement of efficiency in freight transport; (b) the subgroups of economies that can enhance efficiency attainment in the freight transport industry; (c) prevailing cost structures, operating cost and fuel consumption rates within the five modes of freight transport; and (d) the salient economic features of the freight transport market. The research approach and methodology combine (a) a literature survey; (b) empiric research, (c) an analysis of the cost structures of freight transport operators from different modes of transport; and (d) interviews conducted with specialists in the freight transport industry.

J.H. Havenga, J. van Eeden, W.J. Pienaar present the following information South Africa's most important border posts (based on traffic flows); a product profile for imports and exports through these border posts; the modal split (road and rail); the annual logistics costs incurred on the corridors feeding the border posts, as well as the additional costs incurred due to border delays. The research has proved that the streamlining of border-post operations that take a total supply chain view (i.e. of both border operations and those that could be moved from the border) is beneficial.

WS Nel, BW Bruwer, NJ le Roux investigate the relative valuation performance of various value drivers when valuing the equity of South African companies listed on the JSE Securities Exchange for the period 2001-2010. The empirical results revealed, among other findings, that earnings-based value drivers offered the highest degree of valuation accuracy, while cash flow- and sales-based value drivers offered the lowest degree of valuation accuracy. Dividend- and asset-based value drivers offered average results. An interesting phenomenon was that, contrary to popular belief, cash flow-based value drivers only offered marginal improvements in valuation accuracy *viz-à-viz* sales-based value drivers; and not consistently so.

Dinh Tran Ngoc Huy estimates the impacts of external financing on market risk for the listed firms in the Viet nam non-banking financial services industry, esp. after the financial crisis 2007-2009. This paper provides some outcomes that could provide companies and government more evidence in establishing their policies in governance.

Fernando Scarpati, Wilson Ng draw on an ex-ante perspective of investment decision-making in suggesting how a number of drivers and factors of PE phenomena may produce "abnormal returns", and that each of those drivers and factors should therefore be considered in accurately assessing the required risk premium and expected abnormal returns of PE investments.

We hope that you will enjoy reading the journal and in future we will receive new papers, outlining the most important issues in the field of risk governance and best practices of corporate governance!

RISK GOVERNANCE & CONTROL: Financial markets and institutions

VOLUME 3, ISSUE 3, 2013

CONTENTS

THE BRAZILIAN STOCK MARKET DEVELOPMENT: A CRITICAL ANALYSIS OF PROGRESS AND PROSPECTS DURING THE PAST 50 YEARS

Sheilla Nyasha*, NM Odhiambo**

Abstract

This paper highlights the origin of the stock market in Brazil, and traces the reforms that have been undertaken to develop the stock market. It also highlights the growth of the Brazilian stock market, as well as the challenges currently facing the market. The country has one big stock market, known as the BM&FBOVESPA, which is one of the world's largest stock markets. Over the years, a number of stock market reforms have been implemented in Brazil. Among these reforms have been the restructuring of the financial market, the replacement of the traditional trading systems by full electronic trading systems, the enactment of new laws governing the stock market, as well as the revision of the existing laws. In addition, the formation of a regulatory body known as Securities and Exchange Commission (CVM) in 1976 also assisted in the creation of an environment conducive for the growth and development of the stock market. Since the implementation of these reforms, the Brazilian stock market has developed significantly in terms of market capitalisation, the total value of stocks traded, and the turnover ratio.

Keywords: Brazil; BM&FBOVESPA; Stock Market; Reforms

**Corresponding Author, Department of Economics, University of South Africa, P.O Box 392, UNISA, 0003, Pretoria, South Africa*
Email: smagombeyi@yahoo.com
***Department of Economics, University of South Africa, P.O Box 392, UNISA, 0003, Pretoria, South Africa*
Email: odhianm@unisa.ac.za, nmbaya99@yahoo.com

1 Introduction

Stock-market development is an important component of financial sector development, as it supplements the role of the banking system in economic development. Stock markets assist in liquidity provision, a reduction in transactions costs, price discovery and risk transfer. They reduce information costs through the generation and dissemination of information on firms – thereby leading to efficient markets, in which prices incorporate all the available information (Garcia and Liu, 1999; Yartey and Adjasi2007).

Generally, stock markets provide market liquidity that enables the implementation of long-term projects with long-term payoffs, thereby promoting a country's economic growth. Moreover, efficient stock markets not only make resources available to investors, but they also facilitate the inflow of foreign financial resources into the domestic economy (Yartey and Adjasi, 2007). The role of the stock market in the development of an economy cannot, therefore, be overemphasised.

The Brazilian stock market is no exception – it lubricates the Brazilian economy in more ways than one. These include the mobilisation of domestic savings to bring about the reallocation of financial resources from dormant to active agents, as well as the enhancement of the inflow of international capital.

Despite the importance of the stock market in the economic growth process of Brazil, this area has not yet been fully explored. The documentation on Brazil's stock market is very scant. This paper, therefore, aims to fill this gap, and to put the Brazilian stock market in the spotlight, by highlighting its origin and growth – since the establishment of the first Brazilian stock exchange, the Rio de Janeiro Stock Exchange, in the 19th century – and the developmental challenges it has faced.

Long-term capital is deemed crucial for economic development, as evidenced by the positive relationship between long-term capital and economic growth (Demirguc and Levine, 1996). In recognition of this, the Brazilian Law No. 4.728, dated 14 April 1965 was passed, culminating in the first Capital Market Act, which brought order in the Brazilian stock market (Ministry of Finance, Brazil, 2012). The reforms undertaken by Brazil as part of the revitalisation process stretched over a century. They include, amongst others, the formation of a regulatory body called the Securities and Exchange Commission (CVM) in 1976, to assist in the creation of an environment conducive for the growth and

development of the country's stock market, as well as the gradual replacement of the traditional trading systems by full electronic trading systems.

The Brazilian stock market responded largely positively to the various stock market initiatives implemented over the years. Thus, Brazil achieved substantial progress in stock market development. The menu of available financial instruments expanded, the market infrastructure was reformed and strengthened, and a diversified investor base was built. Despite this notable progress, challenges still remain. These include the still-prevalent short-term indexation, still-low liquidity in the secondary market, and the small number of listings.

The rest of this paper is organised as follows: Section 2 covers the origin of the stock market in Brazil. Section 3 outlines the reforms implemented to revitalise the stock market; while Section 4 tracks the growth of the Brazilian stock market, in response to the reforms. Section 5 highlights the challenges facing stock-market development in Brazil. This is followed by the 6th and concluding section.

2 The Origin of the Brazilian Stock Market

The Brazilian stock market has enjoyed years of development, especially during the 1990s and the late 2000s. The history of the stock market in Brazil dates back to as early as 1817, when the first Brazilian stock exchange was inaugurated. Today, Brazil has several stock exchanges, which gradually emerged over the years; and which have also gradually acquired one another and/or merged over the years to form one big stock exchange: the BM&FBovespa.

3.1 The Rio de Janeiro Stock Exchange/Bolsa de Valores do Rio de Janeiro (BVRJ)

The Rio de Janeiro Stock Exchange/Bolsa de Valores de Rio de Janeiro (BVRJ) was inaugurated in 1820. It was Brazil's second largest exchange after the Bovespa stock exchange in São Paulo, and the oldest of Brazilian stock exchanges in activity. It was from its inception through the early 1970s, the most important Brazilian Exchange. Following the 1971 markets crash's effects, little by little, the BVRJ started losing ground to the Bovespa.

After the national stock markets crash in 1989, this stock exchange lost its definitive rank as the main stock exchange of the country and of Latin America, to the São Paulo stock exchange – Bovespa. It was eventually sold on 11 April 2002 to the Brazilian Mercantile and Futures Exchange/Bolsa de Valores, Mercadorias (BM&F).

3.2 The São Paulo Stock Exchange/Bolsa de Valores de São Paulo (Bovespa)

On August 23, 1890, the São Paulo Stock Exchange/Bolsa de Valores de São Paulo (Bovespa), was founded. It has had a long history of service to the stock market and the Brazilian economy. Until the mid-1960s, Bovespa and the other Brazilian stock markets were state-owned companies, tied with the Secretary of Finances of the states to which they belonged, and the brokers were appointed by the government. After the reforms of the national financial system and the stock market implemented in 1965/1966, Brazilian stock markets assumed a more institutional role. In 2007, the Exchange demutualized and became a for-profit company (Ministry of Finance, Brazil, 2012).

Through self-regulation, Bovespa operated under the supervision of the Securities and Exchange Commission of Brazil/Commissão de Valores Mobiliários (CVM), analogous to the American Securities and Exchange Commission. Since the 1960s, it has constantly evolved with the help of technology, such as the introduction of computer-based systems, mobile phones and the internet. In 1972, Bovespa was the first Brazilian stock market to implement an automated system for the dissemination of information online and in real-time, through an ample network of computer terminals (Ministry of Finance, Brazil, 2012).

In 1997, a new system of electronic trading, known as the Mega Bolsa, was implemented successfully. The Mega Bolsa extended the potential volume for the processing of information; and this has allowed the Exchange to increase its overall volume of activities.

In 2000, Bovespa created three new listing segments: the Novo Mercado (New Market), Level 2 and Level 1 of Corporate Governance Standards, allowing companies to accede voluntarily to more-demanding disclosure, governance and compliance obligations. The new listing segments largely languished until 2004, when a growing number of newly public companies began to list on the Novo Mercado and other segments as part of a capital-raising effort. The stock market index of Novo Mercado listed companies (the IGC) has consistently outperformed the broader Bovespa index since its launch.

The recent success of the Brazilian equity capital markets is attributed to a significant extent to the credibility engendered by the Novo Mercado regulations. On May 8, 2008, the São Paulo Stock Exchange (Bovespa) and the Brazilian Mercantile and Futures Exchange (BM&F) merged, creating the world's third-largest stock exchange, the BM&FBOVESPA, located in São Paulo, Brazil.

3.3 The São Paulo Commodities Exchange (BMSP)

On October 26, 1917, exporters, businessmen, and commodity producers founded the São Paulo Commodities Exchange (BMSP). This was the first Brazilian institution to offer forward trading. With the passage of time, BMSP established a rich tradition in the trade of agricultural commodities, especially coffee, live cattle, and cotton.

3.4 Mercantile and Futures Exchange (BM&F)

In July of 1985, the Mercantile and Futures Exchange (BM&F) was founded. Trading sessions commenced on January 31, 1986; and within a short period of time it attained a position of respect amongst the world's major futures exchanges by offering derivatives on varied financial assets.

On May 9, 1991, the BMSP and the BM&F decided to unite their operations. This act brought together the tradition of the former and the dynamism of the latter, thereby creating what is now called the Brazilian Mercantile and Futures Exchange, which maintained BM&F as its title (BM&FBovespa, 2012).

On June 30, 1997, another operational agreement took place, with the Brazilian Futures Exchange (BBF) of Rio de Janeiro, which was founded in 1983. The purpose of this agreement was to strengthen the domestic commodity market, and to consolidate the BM&F as the major derivatives trading centre in Mercosur.

On 22 April 2002, the BM&F Foreign Exchange Clearing house initiated its activities. Three days later, on 25 April, BM&F acquired the rights to manage and operate a clearinghouse for government bonds, fixed-income securities and other securities issued by financial institutions from the Brazilian Clearing and Depository Corporation (CBLC). On the same day, it also acquired all of the Rio de Janeiro Stock Exchange (BVRJ) equity memberships, along with the rights to manage and operate the electronic system known as SISBEX.

On 12 November 2002, BM&F negotiated an agreement with the Brazilian Federation of Banks (FEBRABAN), and with the Central clearing of Clearing and Settlement S.A., in a move to cease all of the latter's activities related to registration, clearing and settlement of trades involving public and private fixed-income securities, consequentially centralising all of these activities at BM&F. The culmination of these events took place on 14 May 2004, when the BM&F Securities Clearing house was inaugurated, and began its activities.

With these initiatives, BM&F broadened its capacity to become the major clearing house in Latin America, providing an integrated set of assets, securities and derivatives clearing services, while at the same time offering economies of scale, competitive costs, and operating security. Moreover, the three BM&F Clearing houses are ISO 9001 certified: The Derivatives Clearinghouse since October 1996; the Foreign Exchange Clearinghouse since June 2002; and the Securities Clearinghouse since March 2005.

On 29 August 2002, BM&F launched the Brazilian Commodities Exchange, which united the commodity exchanges from the states of Goiás, Mato Grosso do Sul, Minas Gerais, Paraná and Rio Grande do Sul, and from the city of Uberlândia, thereby transforming these exchanges into regional operating centres. BM&F renders clearing and settlement services to this new exchange. The result was the creation of an integrated domestic market for agricultural commodities with modern price-discovery mechanisms and an organised marketing structure. The Brazilian Commodities Exchange opened for trading on 22 October, 2002.

In 2004, another regional operation centre was created in the state of Ceará; and a field office linked to the Paraná operation centre was opened in Florianópolis (state of Santa Catarina).

The BM&F established the BM&F Settlement Bank, which went into operation on 30 November 2004 (BM&FBovespa, 2012).

3.5 BM&FBOVESPA

On May 8, 2008, the BM&F and the Bovespa merged, creating the then world's third largest stock exchange, the BM&FBOVESPA, which is Brazil's most sophisticated stock exchange. The BM&FBOVESPA, as of December 31, 2011 had a market capitalisation of US $1.22 Trillion, making it in the 8th largest stock exchange in the world (BM&FBovespa, 2012).

The benchmark indicator of BM&FBOVESPA is the Índex Bovespa (IBOVESPA). As of April 30, 2008, there were 381 companies listed on Bovespa. The number had, however, increased to 594 by mid-2012 (BM&FBOVESPA, 2012). There are currently 533 listed companies at BM&FBOVESPA. Although it is a Brazilian company/exchange, BM&FBOVESPA has offices in New York, Shanghai and London. It is the most important Brazilian institution to intermediate equity market transactions, and the only securities, commodities and futures exchange in Brazil.

BM&FBOVESPA further acts as a driver for the Brazilian capital markets. Currently, BM&FBOVESPA is a fully electronic exchange (BM&FBovespa, 2012). BM&FBOVESPA is Latin America's leader in the securities and derivatives segments. Its mission is to operate in the macro-economic dynamics of market growth, and to make the Exchange and Brazil a socially responsible international financial hub for trading excellence in stocks, derivatives, commodities, bonds, OTC and structured transactions (BM&FBovespa, 2012).

As a result of an early 2008 stock swap, Chicago Mercantile Exchange (CME) Group owns a 5% stake in BM&FBovespa, and in turn, BM&FBovespa owns a 5% stake in CME Group. The agreement has also created an order-routing trading system between both exchanges (BM&FBovespa, 2012).

The stock market in Brazil is monitored and regulated by the Securities and Exchange Commission (CVM), a Federal agency that is part of the Ministry of Finance. Among its principal responsibilities is the monitoring of organised over-the-counter markets (assets traded outside the Stock Exchange), publicly traded companies, stock exchange and futures markets, in addition to fund and equity administrators.

The Commission also regulates the issue of shares on the BM&FBovespa, the Brazilian Stock Exchange. The CVM has the duty of protecting the interests of investors and ensuring the dissemination of information concerning securities that are traded and the companies that issue them (Securities and Exchange Commission (CVM) 2012).

3 Stock Market Reforms in Brazil

Before 1960, Brazilians invested mainly in real assets, avoiding investments on public or private bonds. To an economic environment of growing inflation – mainly from the end of the 1950's – a legislation that imposed limits of 12% per year to which maximum interest rate charges were added, was passed. This was called the Usura Act, which used to limit the development of an active capital market (Ministry of Finance, Brazil, 2012). With the enactment of a new government to power in 1964, national building became a priority; and a programme aimed at great national economy reforms began. Amongst these reforms was the restructuring of the financial market, that came with the enactment of new laws and the revision of existing laws governing the stock market (Ministry of Finance, Brazil, 2012).

Among the laws that brought greatest importance for the stock market were: i) Law No. 4.537/64. This instituted the monetary adjustment through the creation of the Brazilian Readjustable National Treasury Bond; ii) Law No. 4.595/64, named the Banking Reform Act, which reformulated the entire national financial intermediation system and created the National Monetary Council and the Central Bank; and iii) Law No. 4.728, dated 14 April 1965, the first Capital Market Act, which disciplined the capital market and established measures for its development (Ministry of Finance, Brazil, 2012).

The introduction of the above mentioned legislation resulted in many alterations in the stock market, such as: the reform of the legislation governing the transactions in the stock market; the transformation of public fund brokers into Legal Entity Brokerage Firms; forcing the practice to become professionalised; and the creation of Investment Banks, of which the main task was to develop the investment fund industry (Ministry of Finance, Brazil, 2012).

With the specific goal to regulate and inspect the securities market, the Stock Market Exchanges, the financial intermediaries and the public-held companies – functions that are nowadays carried out by the CVM – a directive board in the Central Bank was created: the Capital Market Board of Directors. At the same time, some incentives for investment in the stock market were introduced, including the Funds 157 of 1967, created by Decree Law No. 157. The Funds 157 was an option given to taxpayers to use part of their income tax owed at the time of the Income Tax Filing, to purchase shares of public-held companies' share funds.

According to the Brazil Ministry of Finance (2012), the injection of Decree Law 157 as a long-term instrument was a logical method, in order to lift refinancing pressures off management and allow concentration on production.

With the great volume of resources taken to the stock market in the late 1960s, mainly due to tax incentives created by the Federal Government, there was a rapid demand growth for stocks on the investors' side, without accounting for a simultaneous increase of new stock issuance by the companies. That chained a "boom" in the Rio de Janeiro Stock Exchange between December 1970 and July 1971. There was a strong speculative tide; and the stock values continued to rise (Ministry of Finance, Brazil, 2012).

After stock values reached their highest point in July 1971, a process of cashing in the profits by more experienced and knowledgeable investors, who started to sell their investments began. Although the speculative tide, known as the "boom of 1971," did not last long, its consequences yielded many years of a depressed market for some stock offerings – from extremely fragile companies without any commitment to their stockholders during that time. These companies generated large losses; and they left the stock market's reputation tarnished for a long time (Ministry of Finance, Brazil, 2012).

In 1975, the stock market witnessed a recovery of the quotations, beginning in 1975, due to the new investment of resources; which included the technical reserves of the insurance companies, the resources from the social contribution fund, additional to the Fund 157, and the creation of the Investment Companies Decree Law No. 1401, to collect external resources, and to invest in the stock market.

As time passed, many other incentives were adopted, aimed at incentivising market growth. Such incentives included: tax exemption of the gains obtained in the stock markets; and the possibility of income-tax deduction of part of the amounts invested in the public subscription of stocks. These amounts were derived from capital increases and the financial programmes at interests subsidised by the BNDES, the

Brazilian Development Bank, to the subscribers of stocks publicly allocated.

In 1976, during the stagnation condition and stock-market recovery attempts, two new legal rules – still in effect today – were issued. Law No. 6.404/76 was issued. This was known as the New Corporations Act, which aimed at modernising the rules that guided the corporations that were, until then, regulated by an old Decree-Law from 1940. Also issued within the same year was the Law No. 6.385/76, the second Capital Market law that, among other innovations, created the Securities and Exchange Commission (CVM) and introduced into the market a governmental institution, exclusively destined to regulate and develop the capital market, to inspect the Stock Exchanges and the public-held companies (CVM, 2012).

In spite of all those incentives, the stock market did not present the expected growth, even though, in some lapses, it had experienced an increase in the number of companies going public (BM&FBovespa, 2012). From the mid-1990s, with the acceleration of the opening-up of the Brazilian economy, the volume of foreign investors operating in the Brazilian market increased. Furthermore, some Brazilian companies began to access the foreign markets through the listing of their stocks on foreign stock-market exchanges, mainly the New York Stock Exchange, in order to capitalise through the issuing of securities abroad (Ministry of Finance, Brazil, 2012).

As time passed, the Brazilian stock market started to lose space to other markets, due to the lack of protection for the minor stockholder, and due to uncertainties as regards the financial investments. The lack of transparency in management and the absence of adequate instruments for the supervision of the companies influenced the perception of risk, and, consequently, increased the companies' capital cost.

In order to put a stop to this negative development, some institutional and governmental initiatives were implemented in the last few years, aimed at ensuring improvements in the corporate governance practices of Brazilian companies. This led to the approval of Law No. 10.303/01 and the creation of the New Market, as well as the 1 and 2 Corporate Governance Levels by the then São Paulo Stock Exchange (Bovespa) (Ministry of Finance, Brazil, 2012).

Towards the end of the1990s, it was evident that the Brazilian stock market was facing a tremendous crisis. The number of companies listed in Bovespa had dropped from 550 in 1996 to 440 in 2001. The volume exchanged after reaching US$191 billion in 1997 retreated to US$101 billion in 2000, and to US$65 billion in 2001 (Ministry of Finance, Brazil, 2012). Furthermore, many companies were going private, and only a few were going public.

However, as of 2003, there was a reheating of the market, increasing three times the average daily business deal volume recorded by BOVESPA prior thereto. Furthermore, the average volume exchanged in BOVESPA increased in practice three times from 2004 within this same period (Ministry of Finance, Brazil, 2012). In 2010, BM&FBOVESPA released a document that consolidated the trading rules.

Technological innovation was part of the Brazilian stock-market reform process. Since the 1960s, the stock market has constantly evolved with the help of technology, such as the introduction of computer-based systems, mobile phones and the internet. In 1972, an automated system for the dissemination of information online and in real-time, through an ample network of computer terminals, was implemented. At the end of the 1970s, a telephone trading system was introduced in Brazil.

In 1997, a new system of electronic trading, known as the Mega Bolsa, was implemented successfully. The Mega Bolsa extends the potential volume for the processing of information; and it allows the Exchange to increase its overall volume of activities. Currently, BM&FBOVESPA is a fully electronic exchange (BM&FBovespa, 2012).

4 Stock Market Growth in Brazil

After a "lost decade" of debt crisis, stagflation, and sharply decreasing growth rates in the 1980s, Brazil initiated a modernisation strategy in the 1990s that, inspired by the Washington consensus, replaced import-substitution subsidies with international competition, and inaugurated a comprehensive privatisation process. The reduction in the barriers to foreign capital enabled a major influx of foreign investment into the country, and the São Paulo Stock Exchange saw a record increase in its market capitalisation compared to that of previous periods (Gilson et al., 2010).

The ratio of stock market capitalisation to GDP in Brazil jumped from an average of 8% in the 1980s to an average of 26.3% between 1993 and 1998, while the ratio of trading volume to GDP increased from 2.7% to 15.6% in the same period. By the early 1990s São Paulo's Stock Exchange had become the only active stock exchange in Brazil, as a scandal involving default by a major speculator in the options market in the late 1980s had led to the demise of the Rio de Janeiro Stock Exchange (Gilson et al., 2010).

Although the market capitalisation was rising, there was a steady decline in the number of publicly listed firms and in the liquidity of local markets. As a result, the trading volume on the Bovespa fell from more than $191 billion in 1997 to $101 billion in 2000 and to $65 billion in 2001 (BM&FBovespa, 2012). By December 1997, a single company, the telecom firm, accounted for almost 60% of Brazil's market-trading volume. This was, in large part, a direct consequence of a government-sponsored reform to the Corporations Law in 1997, the Federal Law 9,457/1997 (Gilson et al., 2010).

This new law removed even the limited statutory protection then available to minority shareholders upon control sales, such as statutory appraisal rights at book value, and the weakened mandatory bid rule. This was done in order to allow the federal government to maximise its privatisation proceeds (Gilson et al., 2010).

The expectation of minority expropriation depressed share prices, which in turn, deterred further offerings. Brazilian companies that still sought equity investments at reasonable valuations did so by circumventing local markets and listing almost exclusively on the New York Stock Exchange (NYSE), thereby piggybacking on more protective NYSE listing requirements, and on the application to foreign issuers of elements of U.S. securities laws that accompanied NYSE listing. However, a NYSE listing provided an alternative to only a limited range of firms; such a listing was too expensive for small Brazilian issuers, which then lacked not only equity financing, but also long-term debt financing options in the private sector (Gilson et al., 2010).

There have been impressive improvements in the performance of the Brazilian stock market. As of July 2007, around BRL23 billion (roughly USD12 billion) of initial public offers (IPOs) were launched to the market in 12 months. In 2004, seven companies performed IPOs amounting to BRL4.5 billion; while for 2005, eight companies performed IPOs amounting BRL5.4 billion. In 2006, a sharp rise was observed in the number of companies accessing the equities market – when around BRL30 billion was tapped using this type of instrument. This represented an overall record in terms of capital raised in BOVESPA since the early 1990s. This activity ranked the Brazilian Stock Exchange as second in terms of capital-raised activity among emerging markets (National Treasury, Brazil, 2007).

Total trading value increased by 66% in 2006, compared to 2005, reaching BRL599 billion, the highest ever registered as at that date. The new market raised the daily average to BRL2.4 billion, 51% higher than the BRL1.6 billion registered in 2005; and it stood at BRL4 billion in June 2007. The number of trades increased 39%, levelling off at 21.5 million in 2006, against 15.5 million in 2005 (National Treasury, Brazil, 2007).

The number of listed companies in the Brazil stock market has been on the increase, although marginally. In 2006, there were 394 listed companied at Bovespa. The number increased to 419 in 2007; and to 594 in 2012 (BM&FBovespa, 2012).

The growth of the stock market in Brazil can also be explained by using the stock-market capitalisation of listed companies, the total value of stocks traded, and the turnover ratio of stocks traded. The stock market size of Brazil, as measured by stock-market capitalisation, was stagnant in the late 1980s – with a sharp decline in 1990 – and it started improving in 1993, reaching 34.6% of GDP in 1994, before it deteriorated to 19% in the following year.

The year 2007 registered a peak in market capitalisation of 100.3% of GDP – the highest thus far in the history of Brazil's stock market. After the year 2007, the stock market suffered a heavy blow, as the market capitalisation fell below the 2003 level. This was due to the global financial crisis that started in 2008. Despite the economic meltdown, the Brazilian stock market showed a quick recovery by registering a market capitalisation of more than 70% of GDP in 2009, from 35.7% in 2008.

In terms of market liquidity, as measured by total value traded/GDP and turnover ratio, Brazil had a less-liquid market during the late 1980s. However, as with stock-market capitalisation, the total value of stocks traded and the turnover ratio fluctuated upwards, forming a zigzag trend from 1988 to 1997. Thereafter, the two declined, only to pick up momentum in 2002, and reach a peak in 2007 – thereby creating a deep and wide trough between 1997 and 2007 – before resuming its yo-yo pattern (World Bank, 2012).

Despite the depth and sophistication of Brazilian financial markets, Brazil's stock market could still explore its possibilities. Its trading had been once quite highly concentrated in the stocks of just a few companies, even though this trend has been reversed lately, reflecting the fact that family groups (or, in the case of recently privatised firms, small consortia of controlling shareholders), continue to control even the most publicly traded private enterprises (National Treasury, Brazil, 2007).

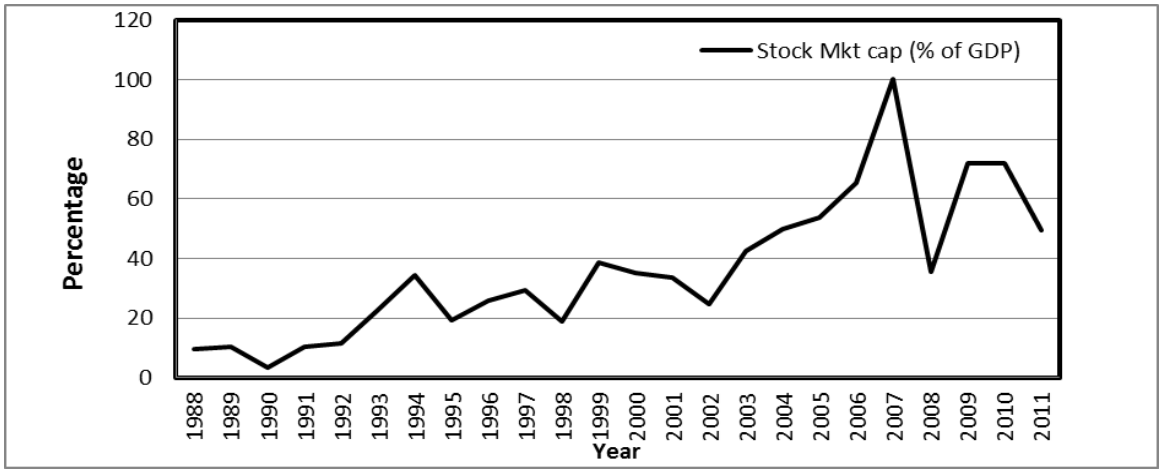
Figures 1 - 3 track the Brazilian stock market growth during the period 1988-2011.

5 Some Challenges Facing the Stock Market Development in Brazil

During the last decade, Brazil has achieved substantial progress in its stock market development. The menu of available financial instruments has been expanded; the market infrastructure has been reformed and strengthened; and a diversified investor base has been built. This was a high-priority agenda for the authorities, and the reforms were introduced in close co-operation with the market participants.

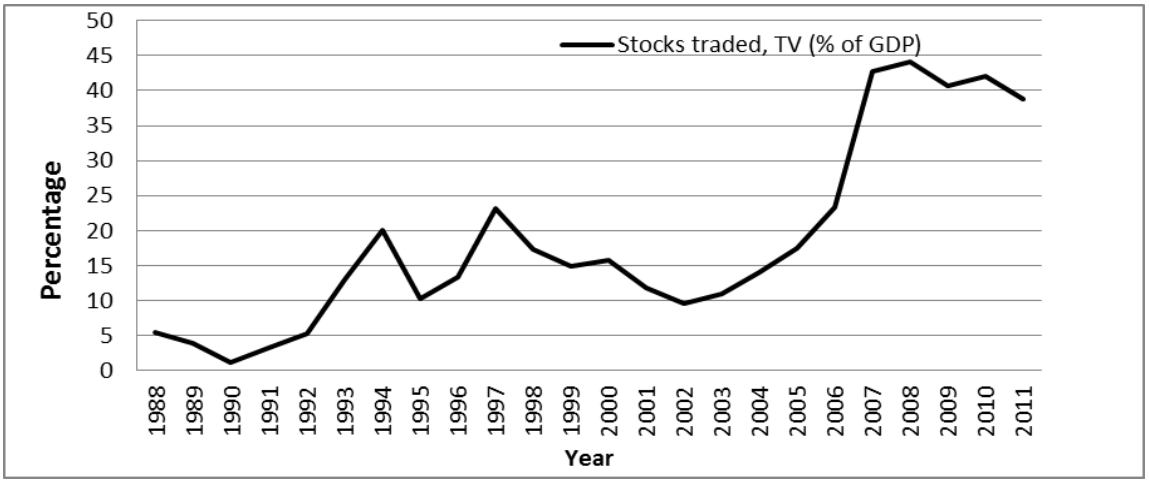
Nonetheless, challenges remain; and the continued development process will need careful management (Park, 2012). Despite the country's great potential – the large size of the economy, its sound fiscal management, and the large mutual fund industry – Brazil's stock market is still facing a number of challenges. These include: the still-prevalent short-term indexation, still-low liquidity in the secondary market, and managing the role of Brazil's National Development Bank (BNDES), (Park, 2012).

Figure 1. Trends in Stock Market Capitalisation in Brazil (1988-2011)



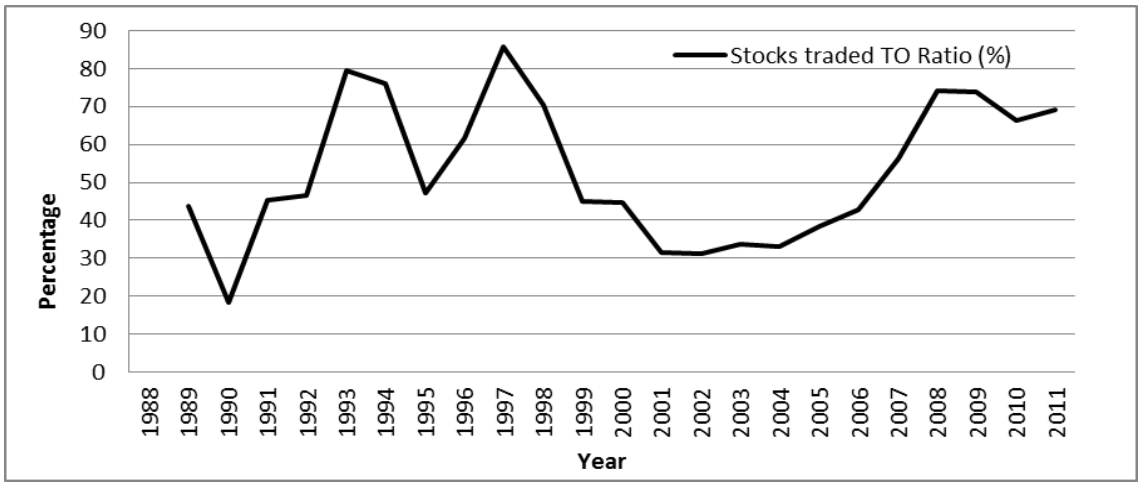
Source: World Bank Development Indicators (2012)

Figure 2. Trends in Total Value of Stocks Traded in Brazil (1988-2011)



Source: World Bank Development Indicators (2012)

Figure 3. Trends in Turnover Ratio of Stocks Traded in Brazil (1988-2011)



Source: World Bank Development Indicators (2012)

Brazil's stock market remains focused on short-term instruments; and this poses a developmental challenge. Most financial contracts among residents are indexed to the overnight interest rate, although

there has been a gradual trend towards increasing duration in recent years. This largely short-term structure reflects long-standing fundamental factors, including a legacy of past high inflation, which is typically associated with a more short–term focus for investing. Thus, high levels of short-term interest rates, and the degree of indexation of debt holders contribute to a low secondary market turnover ratio, constraining the overall market development (IMF, 2012).

Although Brazil's equity market has grown rapidly in terms of both market capitalisation and transaction volumes, it still has a small number of listings. Following a record 76 offerings (IPO and follow-on) in 2007, the number of offerings in the past three years has stabilised at lower levels, in part reflecting the weak global financial conditions (IMF, 2012). The growth in market capitalisation and the number of listed companies has slowed down in recent years. Cross-country comparisons show that the number of listed companies is still lower than those of Brazil's peers in Asia. Indeed, the share of the top 10 companies in market capitalisation has remained over 50% in recent years, showing a limited diversification of the issuer base, in line with the experience in several other emerging markets (IMF, 2012).

Another challenge facing the stock market in Brazil is the high number of foreign investors, as significant players in the equity market. Foreigners are majority investors, especially, in the public-offering market. Most non-resident investors are domiciled in the U.S. and Europe, introducing an important link between the offering market and conditions overseas. In August and September 2011, for example, there was no share issuance – several public offerings were cancelled or postponed due to investors' concerns on contagion risks from the Euro zone (IMF, 2012).

Although BNDES has traditionally had an important role in the Brazilian financial system, its role needs to be managed, according to the IMF (2012). BNDES has typically been a major source of long-term financing for industry and infrastructure. During the crisis, it played an important counter-cyclical role, as private bank credit fell off sharply in 2009 – during the height of the Lehman-related global tensions. However, the size of BNDES' balance sheet has doubled – from 7.5% of GDP in 2007 to over 15% of GDP in 2011.

The challenge is that BNDES has traditionally provided significant financing to large strategic companies in Brazil, notwithstanding the fact that these companies also have recourse to alternate sources of financing. Recently, its resource distribution has shifted at the margin towards its more-traditional development-banking operations. According to the IMF (2012), looking further ahead, BNDES could gradually shift towards promoting the development of long-term stock/capital markets, by playing a role in standardisation and market making (e.g., co-financing of infrastructural projects with the private sectors) in the long-term financing market (IMF, 2012).

6 Conclusion

This paper has discussed the origin of the Brazilian stock market, the reforms undertaken to develop the market, the growth of the stock market, as well as the challenges facing the Brazilian stock market development. Brazil had several stock exchanges, which gradually emerged over the years; and which have now gradually acquired one another and/or merged over the years to form one big stock exchange: the BM&FBovespa. This is one of the world's largest stock exchanges. In order to boost the performance and significance of the Brazilian stock market, a number of reforms targeting the stock market have been implemented over the years. Amongst these reforms was the restructuring of the financial market that came with the enactment of new laws and the revision of existing laws governing the stock market. The Capital Market laws, among other innovations, created the Securities and Exchange Commission (CVM), tasked with the monitoring and regulation of the stock market in Brazil. Technological innovation was part of the Brazilian stock market-reform process as well. Following the reforms, the Brazilian stock market has developed significantly in terms of market capitalisation, the total value of stocks traded, and the turnover ratio. Even the number of listed companied in the Brazil stock market has been on the increase. Thus, Brazil has achieved substantial progress in stock market development. The menu of available financial instruments has been expanded, the market infrastructure has been reformed and strengthened, and a diversified investor base has been built. Despite the country's great potential – the large size of the economy, the sound fiscal management, and the large mutual-fund industry – Brazil's stock market still faces a number of challenges, when compared with the stock markets in developed economies, such as the USA, UK, Japan, etc. Some of these include: i) the short-term indexation when compared to those of the developed economies; ii) a relatively low liquidity in the secondary market; and iii) a small number of listings when compared with those of developed economies.

References

1. BM&FBovespa, 2012. Various Issues. [Online] Available from <http://www.bmfbovespa.com.br/en-us/home.aspx?idioma=en-us> [Accessed 16 October 2012].
2. Gilson, R.; Hansmann, H. and Pargendler, M. 2010. Regulatory Dualism as a Development Strategy: Corporate Reform in Brazil, the U.S., and the EU. European Corporate Governance Institute (ECGI) Working Paper Series in Law, Working Paper N°.149/2010.
3. International Monetary Fund, 2012. Brazil: Selected Issues Paper. IMF Country Report No. 12/192.

4. Ministry of Finance, Brazil, 2012. History of the Capital Market. Investment Portal. [Online] Available from <http://www.portaldoinvestidor.gov.br/Investor/Investor/TheBrazilianSecuritiesMarket/HistoryoftheCapitalMarket/tabid/223/Default.aspx> [Accessed 11 October 2012].
5. National Treasury, Brazil, 2007. Debt Report: Brazilian Capital Market Boom. [Online] Available from <http://www.tesouro.fazenda.gov.br/english/public_debt/downloads/Brazilian_Capital_Markets_Boom.pdf> [Accessed 15 October 2012].
6. Park, J. 2012. Brazil's Capital Market: Current Status and Issues for Further Development. IMF Working Paper WP/12/224.
7. Securities and Exchange Commission of Brazil, 2012. Various Issues. [Online] Available from <http://www.cvm.gov.br/ingl/indexing.asp> [Accessed 16 October 2012].
8. World Bank. 2011. Brazil - Country Partnership Strategy (CPS) for the period FY2012-2015. Washington D.C.
9. World Bank, 2012. World Bank Development Indicators. [Online] Available from <http://data.worldbank.org/topic/financial-sector> [Accessed 05 October 2012].
10. Yartey, C.A. and Adjasi, CK. 2007. Stock Market Development in Sub-Saharan Africa: Critical Issues and Challenges. IMF Working Paper 07/209.International Monetary Fund, Washington DC.

COMPARATIVE ECONOMIC EFFICIENCY, OPERATING COSTS AND FUEL CONSUMPTION RATES OF FREIGHT TRANSPORT MODES BETWEEN THE LARGEST INDUSTRIAL CITIES AND SEAPORTS IN SOUTH AFRICA

W J (Wessel) Pienaar*

Abstract

The paper deals with aspects of efficiency within the five modes of freight transport, with special reference to the operating cost and fuel consumption rates between South Africa's largest industrial cities and seaports. In particular, the paper deals with (a) the opportunities that exist for the achievement of efficiency in freight transport; (b) the subgroups of economies that can enhance efficiency attainment in the freight transport industry; (c) prevailing cost structures, operating cost and fuel consumption rates within the five modes of freight transport; and (d) the salient economic features of the freight transport market. The research approach and methodology combine (a) a literature survey; (b) empiric research, (c) an analysis of the cost structures of freight transport operators from different modes of transport; and (d) interviews conducted with specialists in the freight transport industry.

Keywords: Economies of Density; Economies of Distance; Economies of Scale; Economies of Scope; Efficiency; Freight Transport; Fuel Consumption; Modes of Freight Transport; Transport Operating Cost

**Department of Logistics, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa*
Tel: 27 21 808 2251
Fax: 27 21 808 3406
Email: wpienaar@sun.ac.za

1 Introduction

The goal of the research was to compile an overview of the most salient aspects of efficiency achievement that can give guidance in freight transport policy formulation in South Africa. The research approach and methodology combine (a) a literature survey; (b) an analysis of the cost structures of freight transport operators from different modes of transport; (c) previous empiric work conducted by the author; and (d) 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, with special reference to the operating cost and fuel consumption rates between South Africa's largest industrial cities and seaports. The conclusions and a summary of the project findings are contained in Section 5.

2 Background and overview

The factors contributing to internal scale economies in freight transport are, firstly, the spreading of fixed cost commitments over extended output capacity; secondly, certain inputs that can be obtained cheaper as output rises; and thirdly, the employment of more productive indivisible inputs and technology that enjoy increasing returns to scale.

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 firm, fleet or plant size, especially in the case of ships and pipelines. Ships, notably bulk carriers and container vessels, 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.

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 due to a growth in output capacity, opportunities arise to also obtain the benefits of increasing returns to scale. 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. Economies of scale in freight transport are often enhanced by the attainment of one or more of three subgroups of economies, namely those of density, scope and distance. These are discussed in the following paragraphs.

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 given market area. 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.)

Economies of scope are achieved when the cost of producing two or more products together, in either a joint or 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 will 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 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.

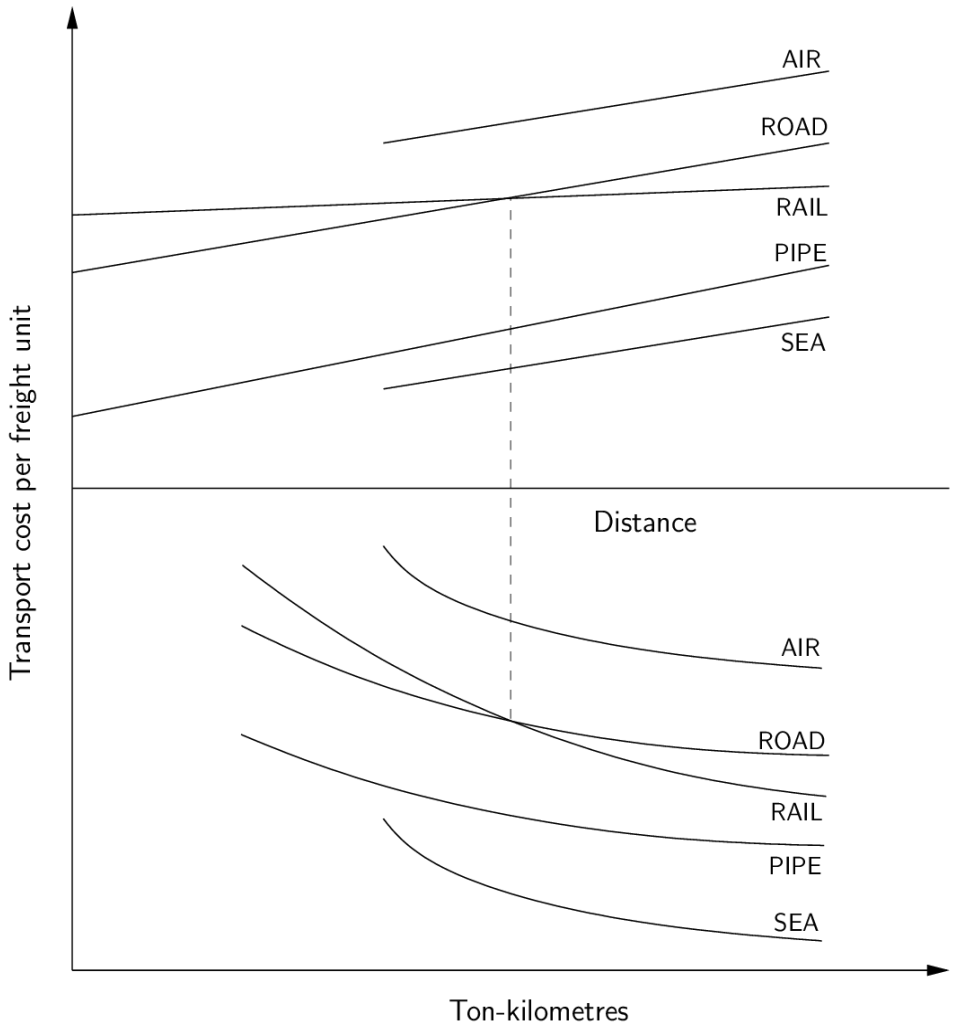
Economies of distance (also known as long-haul economies) are attained when the total transport cost per ton-kilometre decreases as the trip distance increases. Economies of distance arise when there are trip-specific fixed costs that are not affected by the distance of the journey, and also by cost 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 the costs. 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.

3 Comparative modal cost levels, cost structures and fuel consumption

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, 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. 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. The total unit cost to carry freight by sea on voyages longer than 300 km is the lowest of all modes of transport. (Air freight flights and sea voyages shorter than 300 km seldom occur in South Africa – hence the reason why the 'air' and 'sea' curves in Figure 1 commence from positions to the right of the y-axis.) Over equal distances, the unit cost in ton-kilometres to carry freight on voyages longer than 300 km 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. 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 (Pienaar 2013). 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 (EAPC 2009).

Figure 1. Comparative cost of the five modes of transport to carry freight



3.1 Air transport cost structure

The cost structure of air transport is characterised by fairly balanced proportions of fixed and variable costs (ICAO 1999). With freight-only services, the fixed costs normally exceed the variable costs to some extent. 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 (Cowie 2010).

3.2 Road transport cost structure

The fixed costs of operators with non-specialised fleets who carry (full) 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 (Cowie 2010). 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 of economies of scale in road transport is not strong (Button 2010).

Of all forms of transport, road transport has the smallest proportion of fixed to total costs, making this market sector highly competitive, and thus less prone to monopolistic or oligopolistic behaviour.

As can be deduced from Table 1, for 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 (RFA 2012).

Table 1. Typical cost structures of different sizes of road freight vehicles based in the Western Cape province in South Africa 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	R28 640	R46 430	R65 980	R102 060	R122 570	R134 900
Interest	R9 110	R15 260	R23 480	R39 120	R39 000	R59 040
Insurance	R15 180	R25 430	R39 130	R65 200	R75 450	R90 110
Licence	R492	R1 302	R4 467	R9 732	R14 439	R19 524
Crew	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	R57 180	R114 370	R166 350	R213 130	R559 910	R655 220
Lubricants	R1 430	R2 860	R4 160	R5 330	R14 000	R16 380
Maintenance	R31 130	R63 640	R98 070	R148 060	R183 700	R233 550
Tyres	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

3.3 Rail transport cost structure

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) (Cowie 2010). Approximately 75 per cent of rail transport costs are fixed over the short term (Havenga and Pienaar 2012).

3.4 Pipeline transport cost structure

Pipelines provide their own right of way. Since the pipe component, the pumps, 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. Because the fixed costs of pipeline transport are proportionately much higher than the variable costs, and continuous pumping may be done with no need for any return flow and no materials handling taking place, 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 (Department of Logistics, US 2008; Pienaar 2009).

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 one) (Nersa 2007). 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.

3.5 Sea transport cost structure

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; however, these obligations only arise when a port is visited (Stopfort 2009).

3.6 Air transport fuel consumption

The freight aircraft model used most by South African Airways (SAA) domestically is the Boeing 737-200(F) with a carrying capacity of 20 tons (i.e. 20 000 kg). Its fuel consumption between the three busiest domestic airports is given in Table 2.

Table 2. Freight aircraft fuel consumption between the busiest airports in South Africa

Route	Total consumption (ℓ)	Consumption/ton (ℓ)
Johannesburg – Cape Town	6 662	333
Johannesburg – Durban	3 400	170
Durban – Cape Town	6 593	330

Source: Africon 2008

3.7 Road transport fuel consumption

As can be deduced from Table 1, the diesel fuel needed to transport one ton of freight by road through the use of a combination road truck with a carrying capacity of 32 tons between the largest three cities in South Africa is as follows:

Johannesburg – Cape Town : 36,76ℓ
Cape Town – Durban : 42,38ℓ
Durban – Johannesburg : 15,78ℓ

3.8 Rail transport fuel consumption

Most rail freight haulage in South Africa is conducted with electric traction, followed by diesel traction. The estimate for Transnet Freight Rail's (South Africa's national freight rail operator) present diesel consumption is 1,86ℓ/100 ton-kilometre for net freight movement (18,6 mℓ/ton-kilometre). This is an average countrywide diesel consumption rate for all types of freight, excluding the mass of rolling stock. The average utilisation of rail (train) payload capacity in South Africa is approximately 45 per cent. The diesel fuel consumption to carry one ton of freight (including the mass of containers but excluding rolling stock) between the three largest cities in South Africa is shown in Table 3.

Table 3. Diesel fuel consumption to carry one ton of freight by rail transport between the three largest cities in South Africa

Route	Route distance (km)	Diesel consumption (ℓ/ton)
Johannesburg – Cape Town	1 496	27,8
Johannesburg – Durban	727	13,5
Durban – Cape Town	1 951	36,3

Source: Africon 2008

3.9 Sea transport fuel consumption

Average fuel consumption in tons for container vessels between South Africa's three busiest container ports is detailed in Table 4 (Africon 2008):

Table 4. Average fuel consumption in tons for container vessels between South Africa's three busiest sea ports*

Container vessel	CPT – PE (422 nautical miles)***	PE – Durban (391 nautical miles)	CPT – Durban (800 nautical miles)
5 000 TEU**	49,7	46,0	94,2
2 000 TEU	26,4	24,4	50,0
1 000 TEU	18,5	17,2	35,1

*Fuel cost can be taken as approximately 52 per cent of vessel operating cost.

**TEU: 'Twenty foot, Equivalent, Unit' (a 20ft (6 m) standard sea container).

***Average sailing speed of the three sizes of container vessels used in South African coastal shipping: 5 000 TEU vessel – 23 knots; 2 000 TEU vessel – 19 knots; 1 000 – 16 knots. One knot equals one nautical mile per hour. A nautical mile equals 1 842 kilometres at the equator.

Average fuel consumption in kilograms per container between South Africa's three busiest sea ports is shown in Table 5 (Africon 2008).

Table 5. Average fuel consumption in kilograms* per container** between South Africa's three busiest sea ports

Container vessel	CPT – PE	PE – Durban	CPT - Durban
5 000 TEU	9,9	9,2	18,8
2 000 TEU	13,2	12,2	25,0
1 000 TEU	18,5	17,2	35,1

*One kg of marine fuel is equal to approximately 1,12ℓ.

**In South Africa, the average mass of a TEU container including its content is approximately 13,24 tons (13 240 kg).

According to the records of South African coastal container shipping providers the cost of fuel consumption on average amounts to 52 per cent of variable voyage costs.

4 Economies achievable in freight transport

4.1 Air transport

4.1.1 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 (Wei and Hansen 2003). 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 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 (Holloway 2008). 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.

4.1.3 Economies of infrastructure extension

An obstacle to effective 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 (Cowie 2010). 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.

4.1.4 Economies of distance

On condition that intermediate landing is not necessary and that the crew does not need to be changed, 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 (for example wheel fittings, tyres);
- charges for traffic control and navigation close to airports;
- landing charges;
- terminal services (such as cleaning; power connection; charges for cargo handling, loading and unloading, parking); and
- additional fuel consumption immediately after take-off.

These five points become less significant as flight lengths increase. For example, a Boeing 737-200(F) consumes between 1 200ℓ and 1 300ℓ of fuel to reach its cruising altitude, after which it cruises at 4,24 ℓ/km, hence an economy of distance (Africon 2008).

Air and sea transport enjoy similar economies of distance – after rail transport, the second highest level. Air freight flights shorter than 500 km seldom occur in South Africa; however, in exceptional cases commercial freight consignments are carried on passenger flights as short as 300 km, for example between the airports of Port Elizabeth and East London – hence the reason why the 'air' curves in Figure 1 commence from positions to the right of the y-axis.

4.2 Road transport

4.2.1 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 (Cowie 2010). 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 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 (RFA 2012). The costs of dispatching and load documentation tend to remain the same regardless of load or shipment size that vehicles of different sizes can carry. These relationships account for the trend towards long-haul road vehicles whose length, width, height and gross vehicle 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.

4.2.3 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.

4.2.4 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.

4.3 Rail transport

4.3.1 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 Economies of vehicle size

The width of rail wagons is limited by the gauge of the railway line. Efficiency requires that the same gauge be used throughout the system. The height of wagons is limited 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 (Button 2010).

4.3.3 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 (Button 2010. 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'.

4.3.4 Economies of distance

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

When analysing rail transport, one should distinguish between unit costs (for example the cost per ton-kilometre) decreasing due to economies of density and 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-kilometres) 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

4.4.1 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. Increasing the diameter of a pipe will therefore 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. 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 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 (Gwilliam 1970).

4.5 Sea transport

4.5.1 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 operators of 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 Economies of vehicle size

Shipping benefits through economies of scale are associated with operating larger ships (Talley et al., 1986). 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) (Stopfort 2009). 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.

4.5.3 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 (Heaver 1975). 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 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.

4.5.4 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) (Stopfort 2009). 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. Sea freight voyages shorter than 500 km seldom occur in South Africa; however, in exceptional cases commercial freight consignments are carried on combination-vessel

voyages as short as 300 km – for example between the ports of Port Elizabeth and East London, and between Cape Town and Mossel Bay – hence the reason why the 'sea' curves in Figure 1 commence from positions to the right of the y-axis.

5 Concluding summary

5.1 General

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 (i.e. more productive technology). 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, scope and distance.

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 might 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 their strictest form – that of being dependent on size of the firm (i.e. number of vehicles in the firm's fleet) – are considerably important, they cannot be divorced from the attainment of one or more of three subgroups of economies: economies of density, scope and distance.

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 'fleet size' refers to train length) and 'network size' (where 'network size' refers to route kilometres).

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.

With sea transport, as in the case of air transport, economies of scale are possible with large individual vessels and not necessarily with large fleet operations. Economies of scale in transport often refer to vehicle size rather than firm, fleet or plant size, especially in the case of ships, notably bulk carriers and container vessels, which often operate as separate business entities. Single-ship operators or those operating a few ships – for example operators of 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.

Table 6 provides a comparative summary of the most salient economic features of the five modes of freight transport.

5.2 South African conditions

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, 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.

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. The total unit cost to carry freight by sea on voyages longer than 300 km is the lowest of all modes of transport. Over equal distances the unit cost in ton-kilometres 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. 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. Of all the modes of transport that use liquid fuel for propulsion, rail freight over long hauls is the most cost- and fuel-efficient mode of land transport. From seaport to seaport, coastal shipping is the most cost and fuel efficient. Between Cape Town and Durban, rail transport consumes 36,3ℓ of fuel to transport one ton of freight, and large (5 000 TEU), medium-sized (2 000 TEU) and small (1 000 TEU) container vessels consume approximately 1,6ℓ, 2,1ℓ and 3.0ℓ respectively to transport the same weight . The latter fuel consumption rates with container vessels are taken at 100 per cent utilisation. If sea transport utilisation of payload capacity were to decline to the same level as that of rail transport (i.e. 45 per cent) fuel consumption of sea transport to carry one ton of freight between Cape Town and Durban with large, medium-sized and small container vessels would rise to only 3,53 ℓ/ton, 4.70 ℓ/ton and 6.59ℓ/ton respectively.

Table 6. Comparison of salient economic features of freight transport modes

Economic characteristics	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)

References

1. Africon. (2008) *Study on the macro-economic impact of fuel costs in transport.* Contract report produced for the National Department of Transport. Pretoria.
2. Button, K.J. (2010) *Transport Economies*, 3rd edition. Cheltenham, UK: Edward Elgar.
3. Cowie, J. (2010) *The Economics of Transport: A Theoretical and Applied Perspective*. London: Routledge.Department of Logistics, Stellenbosch University. (1998) *Report to Petronet on the development of a defensible pricing mechanism.* Contract report produced for Petronet. Stellenbosch.
4. Eilat Askelon Pipeline Co. Ltd. (EAPC). (2009). Pipelines. Available: http://www.eapc.co.il/print/english/pipelines.html [Accessed 2009, 4 May].
5. Gwilliam, K.M. (1970) *Transport and public policy*, 2nd edition. London: George Allen & Unwin.
6. Havenga, J.H. and Pienaar, W.J. (2012) 'The creation and application of a national freight flow model for South Africa', *Journal of the South African Institution of Civil Engineering*, 54(1) 2–13.
7. Heaver, T.D. (1975) *The routing of Canadian container traffic through Vancouver and Seattle*. Vancouver: WESTMAK.
8. Holloway, S. (2008) *Straight and level: Practical airline economics*, 3rd edition. Aldershot, UK: Ashgate.
9. International Civil Aviation Organization (ICAO). (1999) *Digest of statistics.* Montreal: ICAO.
10. National Energy Regulator of South Africa (Nersa). (2007) 'Licence condition relating to tariffs of a petroleum pipeline system including storage facilities'. 29 March. Available: http://www.dme.gov.za (Accessed 2008, 2 June).
11. Pienaar, W.J. (2009) 'Economic aspects of pipeline transport: A South African perspective', *South African Journal of Science and Technology*, 28(2) 119–140.
12. Pienaar, W.J. (2013) 'Opportunities for the

achievement of economies of scale in freight transport', *Corporate Ownership & Control*, 11(1) 161–174.
13. Road Freight Association. (2012) *Vehicle cost schedule*, 45th edition. Pretoria, South Africa.
14. Stopford, M. (2009) *Maritime economics*, 3rd edition. London: Routledge.
15. Talley, W.K., Agarwal, V.B. and Breakfield, J.W. (1986) 'Economies of density of ocean tanker ships', *Journal of Transport Economics and Policy*, 20(1) 91–99.
16. Wei, W. and Hansen, M. (2003) 'Cost economics of aircraft size', *Journal of Transport Economics and Policy*, 37(2) 279–296.

SUPPLY CHAIN COST IMPROVEMENT OPPORTUNITIES THROUGH STREAMLINING CROSS-BORDER OPERATIONS

J.H. Havenga, J. van Eeden**, W.J. Pienaar****

Abstract

The Cross-Border Road Transport Agency (CBRTA) in South Africa aims to encourage and facilitate trade between South Africa and its neighbouring countries. The CBRTA sponsored a study by Stellenbosch University (SU) to determine the logistics cost impact of cross-border delays between South Africa and its major neighbouring trading partners, and prioritise opportunities for improvement. SU is the proprietor of both a comprehensive freight demand model and a logistics cost model for South Africa, which enable extractions and extensions of freight flows and related costs for specific purposes. Through the application of these models, the following information is identified and presented in this paper: South Africa's most important border posts (based on traffic flows); a product profile for imports and exports through these border posts; the modal split (road and rail); the annual logistics costs incurred on the corridors feeding the border posts, as well as the additional costs incurred due to border delays.
The research has proved that the streamlining of border-post operations that take a total supply chain view (i.e. of both border operations and those that could be moved from the border) is beneficial.

Keywords: Cross-border Operations; Road Freight Transport; Supply Chain Cost; South Africa

**Stellenbosch University, Department of Logistics, Private Bag X1, Matieland 7602, South Africa*
Tel: 27 21 808 3981
Fax: 27 21 808 3406
Email: janh@sun.ac.za
***Stellenbosch University, Department of Logistics, Private Bag X1, Matieland 7602, South Africa*
Tel: 27 21 808 3970
Fax: 27 21 808 3406
Email: jveeden@sun.ac.za
****Stellenbosch University, Department of Logistics, Private Bag X1, Matieland 7602, South Africa*
Tel: 27 21 808 2251
Fax: 27 21 808 3406
Email: wpienaar@sun.ac.za

1 Introduction

In the European Union, intraregional trade accounts for almost 80% of total trade, while in Africa it accounts for only 12% (Lazenby, 2012). The low intraregional trade is partly attributable to delays, high congestion and inefficient service delivery at border posts which, in the case of South Africa's cross-border trade, translate into waiting times of 33 to 45 hours, and estimated annual transaction costs of US$29m to US$35m (Neethling, 2012). According to Teravaninthorn (2010), cargo dwell time may account for up to two-thirds of the total transport time to landlocked countries in sub-Saharan Africa, with border delays accounting for up to a third of the total transport time from Durban (South Africa's largest port) to Lusaka (in Zambia). Border delays could also lead to increased requirements for safety stock to offset the unreliability of deliveries, add to transport cost due to stationary transport equipment at the border controls, and increased stock holding costs due to pipeline inventory stuck in the border control system.

The Cross-Border Road Transport Agency (CBRTA) in South Africa aims to encourage and facilitate trade between South Africa and its neighbouring countries. The CBRTA sponsored a study by Stellenbosch University (SU) to determine the logistics cost impact of cross-border delays between South Africa and its major neighbouring trading partners, and prioritise opportunities for improvement. SU is the proprietor of both a comprehensive freight demand model and a logistics cost model for South Africa, which enable extractions and extensions of freight flows and related costs for specific purposes. Through the application of these

models, the following information is identified and presented in this paper:

- South Africa's most important border posts (based on traffic flows);
- A product profile for imports and exports through these border posts;
- The modal split (road and rail);
- The annual logistics costs incurred on the corridors feeding the border posts, as well as the additional costs incurred due to border delays.

2 Literature Review

In an analysis of World Bank statistics of the mean time required to export from 18 economic communities around the world, Djankov, Freund and Pham (2010) demonstrate that the South African Development Community (SADC) is at the 13th position with 36 days, compared to the shortest export time of 10 days from the CER (Australia and New Zealand), and 13 days from the European Union, with only the former Soviet Union countries (the CIS) and the four other African economic communities performing worse. The problems are magnified for landlocked African countries, whose exporters need to comply with different requirements at each border. The authors demonstrate that these trade delays hamper exports more than foreign tariffs do.

The duration of trade delays is influenced by three distinct components: bureaucratic requirements (bank and export documentation), transit time (packing and arranging transportation, inland transportation, additional clearance and waiting time at borders), and port handling and customs clearance. In sub-Saharan Africa, bureaucratic delays are the longest, taking 19 days on average, followed by customs and ports delays (nine days on average), and transit delays (seven days on average) (Freund and Rocha, 2010). The authors, however, highlight that, in the African context, transit delays have the most economically and statistically significant effect on exports. A one-day reduction in inland travel time leads to a 7% increase in exports, or translates into a 1.5% decrease in all importing-country tariffs. In contrast, improvements in bureaucratic requirements or port handling and customs clearance times have a far smaller impact on trade. The key reason put forward for this is uncertainty – delays that cannot be pre-empted (such as the length of border-crossing holdups) impact negatively on the demand for exports.

The physical nodes (ports and border posts) in trade supply chains are responsible for a considerable percentage of delays because of the way they fulfil their role as the administrative focal points to enforce the administration associated with the flow of freight across borders.

The Chirundu border post between Zimbabwe and Zambia is an example of the positive impact of reducing cross-border delays. In 2009 it took 39 hours on average for a truck to transit northbound through the border post, and 14 hours southbound (Curtis, 2009). The introduction of a one-stop border post (OSBP) in 2010, with concomitant infrastructure upgrades (for example a double-lane bridge and state-of-the-art scanner) has led to a reduction in transit times of 36% over the past two years, enabling truck flow to increase by 65% (*FESARTA*, 2013). That is a growth from an average of 1 800 to 2 000 trucks per month in 2009 to 12 000 to 14 000 a month in 2012, increasing revenues for the Zambian government by 30% (Tran, 2012).

The intention is to replicate this success at border crossings between South Africa and its major neighbouring trading partners. According to Curtis (2009), Beit Bridge (the border between South Africa and Zimbabwe) is the busiest border crossing in east- and southern Africa. In 2009, delays at the Beit Bridge border were 33.5 hours for northbound and 12.2 hours for southbound traffic. The long wait is mainly due to traffic having to pass through two identical controls on either side of the border. TradeMark SA (2010) postulates that the most effective way to reduce costs in the trade supply chain is to reduce waiting times at borders through an OSBP, addressing:

- Physical facilities – a common control zone (CCZ) with a fenced perimeter, as well as common facilities such as scanners, weighbridges and inspection bays;
- Operations improvement and training of personnel in order to streamline cross-border movement through simplified aligned processes and knowledgeable personnel; and
- Extraterritorial legal jurisdiction for border-control officers, which would move non-critical activities away from the border post and thus reduce time spent there.

In addition, the World Customs Organization (WCO) (2009) points out that intelligence is vital in the enforcement of customs regulations, and allows customs to execute targeted and selective controls to avoid disrupting legitimate trade based on a global network for gathering data and information, called the Customs Enforcement Network (CEN). All SADC countries belong to the WCO.

Curtis (2007) estimated that the potential savings in transport costs by reducing the standing time at Beit Bridge by 18 hours would be equal to ZAR128 million. This excluded other costs such as inventory cost, insurance and other cost elements. Fitzmaurice (2009) is even more ambitious, inferring that an OSBP at Beit Bridge that could transit a vehicle in three hours would save US$29 million northbound and US$35 million southbound. These savings related to reduced transport- and time-related costs; more predictable transport times; and improved logistical efficiency and trade competitiveness of the countries involved.

3 Research approach

Two SU proprietary models were used for the results presented in this paper:

- The freight demand model (FDM) is based on gravity modelling, and provides a bottom-up measure of freight flows between all magisterial districts (including borders) in South Africa, for all commodities, on all modes. It provides granular origin-destination data, as well as commodity data.
- The logistics cost model (LCM) measures all costs on all modes together with ancillary logistics expenditures such as warehousing, management and administration as well as inventory carrying costs. (A small portion of the LCM is published in South Africa's annual State of Logistics Survey.)

3.1 Determining freight flows

The FDM for South Africa is driven by an exhaustive geographically disaggregated sectoral supply–demand model of the economy, culminating in a gravity model to determine freight flows. The modelling of supply (production and imports) and demand (intermediate demand, final demand, exports and inventory investments) on a geographical basis per commodity is based on the input-output table (I-O table) of the economy. By its nature, the I-O table gives detailed information on the intermediate and final demand components of each commodity in the economy.

The geographical units are 356 magisterial districts (MDs), the smallest area for which some economic data is available. The estimation of flows per commodity is based on a gravity modelling approach using the volumetric magisterial district supply and demand data from the I-O process. Gravity models are the most widely used approaches internationally to distribute freight flows between origins and destinations. Gravity-based approaches are grounded on the premise that freight flows between origins and destinations are determined by supply and demand, and a measure of transport resistance. The amount of interaction – freight flows – between two areas is presumed to be directly related to the attraction of the areas, and inversely to the transport resistance measure between the two. For the purposes of this research, the transport resistance measure used was a distance decay function. While the I-O model provides data for the 356 MDs in South Africa, the gravity model expands this to 372 regions by distinguishing the eight border posts between South Africa and neighbouring countries, South Africa's seven ocean ports, and the largest freight airport (in Gauteng).

The input data for the flow modelling is created by subtracting the origin and destination data of known flows (rail, pipeline, conveyor and coastal shipping) from the supply (origin) and demand (destination) values. The balance of flows is modelled as origins and destinations. The decay factor is added for each commodity. The FDM then estimates road freight flows in South Africa (summarised into 64 commodity groups) between the 372 regions in tons and ton-kilometres, with 30-year forecasts and for three growth scenarios, and results in more than one million records of freight-flow data between defined origin and destination pairs. Known rail flows are utilised to conduct detailed modal analysis.

The availability of this data allows for the identification of South Africa's major border posts based on freight flow volumes, as well as the commodities transported through the borders. Once all flows have been identified, logistics costs are calculated. (Refer to Havenga (2007) for further details.)

3.2 Determining logistics costs

The LCM employs both a bottom-up and top-down approach for the computation of logistics costs by relating the total supply of a specific commodity to the costs of performing logistical functions with respect to that commodity. The logistics cost elements measured are transport; storage and port handling costs; management and administration costs; and inventory carrying costs. The total transport cost is measured by calculating the cost of transport by road (both distribution and line haul), rail, air, coastal shipping and pipeline.

Total road transport costs are calculated using the road freight flow outputs from the FDM. The approach involves the summation of all the different cost elements of road transport within a typology on a specific route (overhead costs are left out of the equation since these are calculated as separate cost elements in the model). These different cost elements of road transport in the model are determined by the vehicle type, which in turn is determined by the commodity type, typology and route of travel. The commodity's 'preferred' vehicle type will change with changes in each of these variables. Once the vehicle type and volume are known, the cost elements can be assigned. The model also extends to secondary road traffic (i.e. local distribution from the final warehouse to the retailer).

Actual rail transport costs are received from the national rail transport operator (Transnet Freight Rail) per commodity per origin-destination station, and therefore rail transport costs do not have to be modelled.

Storage and handling rates are used to calculate the warehousing costs for the entire country. Storage costs take the static storage delay in inventory into account and use the change in inventory costs from the previous year (per sector of the economy) to adjust the static delay. A separate handling charge (for picking and stuffing) is calculated per distinct commodity, based on industry tariffs and applied to all tons stored.

The inventory carrying cost is calculated by researching the rand value of inventory levels for

different industries in the economy, and then multiplying that value by the weighted average prime rate for the year.

The cost of management and administration is calculated by taking the average number of employees in the logistics sector (excluding truck drivers), multiplied by their average annual earnings, and adding management costs of truck drivers (this is for in-house transport, which is calculated at average salary contribution to cost, applied to truck driver cost).

3.3 Additional logistics costs due to cross-border delays

In calculating the transport costs, a specific vehicle type is allocated to each commodity on each route of travel (such as long-distance corridor or short-distance rural movements). A more detailed understanding of this process is necessary in order to clarify the process followed to add cross-border-related transport cost. Each vehicle allocated to these specific freight movements have specific aspects used in determining costs. These are:

- the annual estimated kilometres travelled;
- the average payload;
- the percentage of the time the vehicle travels without cargo;
- the licence fees in the province allocated;
- the replacement value to determine depreciation;
- the value to determine carrying cost and insurance;
- wages for the driver;
- business overheads;
- toll fees required on the route of travel;
- maintenance and repair costs of the vehicle;
- costs of tyre usage; and
- fuel costs.

Of these costs, the licence fees, depreciation costs, capital carrying cost, insurance and wages will be incurred even for a vehicle standing at the border posts. Owing to standing time, more vehicles will be required to move the same volume of freight, and reduced utilisation is achieved, and thus fixed costs will increase the transport cost overall. These standing costs differ for each commodity and each vehicle type. The calculated costs for the various commodity groups are indicated in Table 1.

Table 1. Standing costs per commodity group per day (FDM)

Commodity groups	Road fixed delay cost per ton (ZAR)
Chemicals	115
Construction & steel	88
Consumer	143
Equipment	135
Fuels & beverages	159
Minerals	165
Other	100
Paper & wood	98
Perishables	128
Tobacco & grains	112

These standing costs were calculated based on the fixed cost per day for each vehicle type used per commodity group, considering factors such as the average payload, annual kilometres travelled, and the percentage of time the vehicle travelled without cargo.

Additional inventory carrying cost is the additional cost of having freight standing at the border. This is determined by the average value of the cargo per commodity group and the opportunity cost of holding inventory. On a company-to-company basis, the opportunity cost of holding inventory can be represented by the hurdle rate, and will therefore differ slightly between companies. In the case of macro-economic calculations, the prime rate is used as a conservative proxy for holding inventory in the country.

Additional buffer stock cost is added to compensate for the unreliability due to the unknown length of border delays. This unpredictability causes inventory levels to rise on both sides of the shipment flows.

The critical assumption required in determining the effect of border procedures on border-related flows, therefore, are the current delay at the border and the targeted delay that can be achieved based on systemic improvements of the process.

In 2011, interviews and focus groups were performed with 29 cross-border freight owners and 25 logistics service providers (LSPs). The assumptions of the current delay times per border used in the above calculations are indicated in Table 2 for the original

researched delay, and the expected reduced delay at the border for suggested improvements.

Table 2. Delay time assumptions per border

	Lebombo	Beit Bridge
Original researched delay at border	1.2 days	2 days
Expected reduced delay at border	0.5 days	0.5 days

The high-level estimate by the focus groups was that these measures would yield a net reduction of 0.5 days for both the Beit Bridge and Lebombo corridors.

4 Results

According to the 2009 data, 21% of South Africa's regional imports and 16% of regional exports were routed via Beit Bridge (the Zimbabwean border), while 71% of the imports and 59% of the related exports were routed via Lebombo (the Mozambican border). Imports and exports via the Namibian and Botswana border posts constitute the remainder of the regional trade to and from South Africa. For the purposes of this paper, the remainder of the discussion will focus on the two major border crossings.

Table 3 lists the cross-border commodity flows for South Africa's major border posts in 2009. Construction material dominates the traffic across the Mozambican border, comprising largely low-value commodities such as cement and lime imports to South Africa. Agricultural products and wood are the next most important imports to South Africa. The exports from South Africa are dominated by minerals (coal and chrome ore) and steel. Tobacco and grains, minerals (imports), tobacco and grains, and consumer goods (exports) are the major freight categories crossing the Beit Bridge border.

Table 3. Freight flow for South Africa-Lebombo and South Africa-Beit Bridge border posts (2009) (sorted according to imports)

LEBOMBO ('000 tons)				**BEIT BRIDGE ('000 tons)**		
Commodity group	**Imports**	**Exports**		**Commodity group**	**Imports**	**Exports**
Construction & steel	3 108	169		Minerals	781	47
Tobacco & grains	1 408	127		Tobacco & grains	688	202
Consumer	328	101		Consumer	87	201
Paper & wood	293	10		Construction & steel	70	10
Other	186	970		Paper & wood	29	1
Minerals	159	1 354		Other	21	207
Fuels & beverages	156	57		Perishables	16	28
Equipment	32	2		Equipment	5	33
Perishables	6	230		Fuels & beverages	2	95
Chemicals	1	21		Chemicals	1	5
Total	**5 678**	**3 041**		**Total**	**1 701**	**829**

Table 4 represents the annual logistics costs (2009) for the two border posts under discussion. The modelled costs for the Beit Bridge and Lebombo corridors under the current cross-border delay assumptions add up to ZAR1 039 million additional cross-border cost, which is also reflected in Table 4.

More than 50% of the total cost relates to transportation. Line haul makes up the bulk of transportation cost (76%) and distribution represents 24%. The remaining cost is almost equally distributed among inventory carrying, warehousing, and management and administrative costs. Road fixed costs are the largest of the three added costs at the border. This emphasises the fact that the time delay at borders results in considerable added costs, which could signify a great advantage if minimised.

Table 4. Modelled costs for Beit Bridge and Lebombo corridors – total logistics costs and additional cross-border costs under current cross-border delay assumptions

Cost element	LEBOMBO			BEIT BRIDGE			Grand total
	Import	Export	Total	Impor	Export	Total	
Total transport cost – all modes	1 496	867	2362	814	389	1203	3 566
Total externality costs – all modes	417	77	494	169	60	229	723
Storage and ports	577	191	768	145	76	221	989
Management, admin & profit cost	473	228	701	178	87	265	966
Inventory carrying cost	467	343	810	159	185	344	1 154
Cross-border: Additional buffer stock cost	25	8	33	12	5	18	51
Cross-border: ICC in transit border	42	25	67	18	19	37	104
Cross-border: Road fixed delay cost	488	63	552	234	99	333	884
Total cost	**3 984**	**1 803**	**5 788**	**1 730**	**920**	**2 650**	**8 438**

Adjusting the supply chain metrics in line with the potential reduction in border delays, the 'could be' supply chain costing was calculated. The assumptions used for this calculation are based on the perceptions voiced during interviews and focus groups with 29 cross-border freight owners and 25 LSPs. Tabulated results for the two corridors in the 'could be' state are summarised Table 5, adding up to ZAR368 million, and yielding a reduction in the pre- and post-intervention cost of ZAR671 million, which represents the net gain per annum of the proposed improvements.

Table 5. 'Could be' supply chain costs for Beit Bridge and Lebombo corridors due to reduced cross-border delays

Cost element	LEBOMBO	BEIT BRIDGE	Total ZAR
Cross-border: Additional buffer stock cost	14	4	18
Cross-border: ICC in transit border	28	9	37
Cross-border: Road fixed delay cost	230	83	313

The savings due to a 12-hour reduction are significantly more than the ZAR128 million Curtis (2007) postulated as possible with an 18-hour reduction in border delays. The higher value could be ascribed to the total supply chain view that this research has taken by including the impact of the border-post delay on the cost of origin-to-destination transport cost.

During the focus group discussions, a number of border-post interventions were proposed. The key interventions to bring about a reduction in border delays are: integrated information systems and processes; scanners and weighbridges in key areas (scanning all freight at origin and pre-border); creating one-stop border posts; optimising border-post infrastructure; and streamlining processes across agencies. These interventions were estimated by the focus group participants to have an initial capital cost of ZAR750 million and an additional annual running cost of ZAR100 million. However, the savings to southern African trade partners would see a macro-view payback period of approximately two years for such an investment. This is a high-level estimate, and further detailed studies are required to improve the accuracy of estimates for intervention cost and savings.

5 Conclusion and recommendations

The research has proved that the streamlining of border-post operations that take a total supply chain view (i.e. of both border operations and those that could be moved from the border) is beneficial. In order to achieve this objective, all supply chain costs from origin to destination have to be considered and compared to the investment cost of creating a trans-frontier (ICT) investment view that extends beyond the physical border post.

This includes much more than modifying the physical infrastructure at the border, and includes ICT investments, and different procedures and legal frameworks. This conclusion is in line with Chirundu's OSBP findings (TradeMark SA, 2010). The savings that can be realised on a macro-economic level, however, seem to be much higher than those found by Curtis (2007), and the researchers conclude that this is because of the wider supply chain view that was taken.

A strong political will need to exist and be established in order to create the legal frameworks to make this work, but more than this, the culture change must receive attention. Streamlining processes across several agencies is not an easy task to aspire to, but this has to be addressed and resolved.

A complete solution will also require support from both the public and the private sector, and interconnectivity between these sectors on both sides of the border. Without wide collaboration and dedicated focus from senior management in both sectors, such an endeavour would not be possible.

References

1. Curtis, B. (2007) 'Beit Bridge action plan: Monitoring arrangement that improves the efficiency of transport services', *FESARTA*, June 2007.
2. Curtis, B. (2009) 'The Chirundu border post, detailed monitoring of transit times', Sub-Saharan African Transport Policy Programme, September 2009.Djankov, S., Freund, C. and Pham, Cong S. (2010) 'Trading on time', World Bank Policy Research Working Paper 3909, July 2010.
3. Fitzmaurice, M. (2009) 'Situational analysis at Beit Bridge border post (Zimbabwe focus): Final report November 2009', Transport Logistics Consultants, TradeMark SA, November 2009.
4. Freund, C. and Rocha, N. (2010) 'What constrains Africa's exports', World Bank Development Research Group, Trade and Integration Team, Working Paper 5184, January 2010.
5. Havenga, J.H. (2007) 'The creation and application of a freight flow model for South Africa', PhD dissertation, Stellenbosch University.
6. Lazenby, H. (2012) 'SA aims for one-stop borders as delays exact economic toll', *Engineering News*, 27 March 2012. http://www.engineeringnews.co.za/article/sa-aims-for-one-stop-borders-as-delays-exact-economic-toll-2012-03-27 [Accessed: 12 June 2013].
7. Neethling, T. (2012) 'Overhauling the running of SA's borders', *Business Day*, 19 October 2012. http://www.bdlive.co.za/business/transport/2012/10/19/overhauling-the-running-of-sas-borders [Accessed: 12 June 2013].
8. Teravaninthorn, S. (2010) 'Transport for Africa growth and integration', Africa Transport Unit African Transport Unit, for SSATP Annual Meeting, Kampala, World Bank, 18 October 2010.
9. TradeMark Southern Africa (2010) 'Chirundu one stop border post: Progress report and lessons learned'. November 2010. http://www.trademarksa.org/sites/default/files/publications/Chirundu_OSBP_November2010.pdf [Accessed: 12 June 2013].
10. Tran, M. (2012) 'Zambia and Zimbabwe's single-stop solution to boosting intra-African trade'. *The Guardian*, 29 May 2012. http://www.guardian.co.uk/global-development/2012/may/29/zambia-zimbabwe-intra-african-trade [Accessed: 12 June 2013].
11. World Customs Organisation (2009) 'CEN: Sharing information for a more effective network', Global Customs Enforcement System.

THE VALUATION PERFORMANCE OF EQUITY-BASED MULTIPLES IN SOUTH AFRICAN CONTEXT

WS Nel*, BW Bruwer**, NJ le Roux*

Abstract

Despite the popularity of multiples among analysts in practice, the emerging market literature offers little empirical guidance for the use thereof. This paper investigates the relative valuation performance of various value drivers when valuing the equity of South African companies listed on the JSE Securities Exchange for the period 2001-2010. The empirical results revealed, among other findings, that earnings-based value drivers offered the highest degree of valuation accuracy, while cash flow- and sales-based value drivers offered the lowest degree of valuation accuracy. Dividend- and asset-based value drivers offered average results. An interesting phenomenon was that, contrary to popular belief, cash flow-based value drivers only offered marginal improvements in valuation accuracy *viz-à-viz* sales-based value drivers; and not consistently so.

Keywords: Emerging Markets; Multiples; Value Drivers; JSE; Earnings; Cash Flow; Sales; Dividends; Assets

**Corresponding author. School of Accounting, University of Stellenbosch, Private Bag X1, Matieland, 7602, South Africa*
Tel:+27 (21) 808 3430, +27 83 410 1945
Fax: +27 (21) 886 4176
Email: snel@sun.ac.za
***School of Accounting*
University of Stellenbosch
****Department of Statistics and Actuarial Science*
University of Stellenbosch

1 Introduction

International research on corporate valuation practice focuses on the relatively deeply traded and liquid, developed markets in the United States of America (USA) and Europe, while shedding little light on emerging markets. However, emerging markets are projected to grow at 3.24 times the pace of developed markets (G-7 countries) over the period 2013-2017 (IMF, 2012). Developing countries also account for large parts of the world population, land mass and natural resources. Although investment inflows into emerging markets are significant, failure to agree on valuations remains the key hurdle obscuring cross-border transactions into emerging markets. Improved valuation practices could, therefore, significantly affect the welfare of investors. Consequently, this paper aims to expand the limited empirical evidence that is available on valuation practice in emerging markets.

The specific area within the field of corporate valuation practice that this paper focuses on is multiples, which are also referred to as relative valuations since they value assets, relative to the value of similar assets in the market (Damodaran, 2002). The popularity of multiples in practice is well established by research (PwC, 2012; Minjina, 2008; Roosenboom, 2007; Damodaran, 2006b; Asquith, Mikhail and Au, 2005; Bhojraj and Lee, 2002). The traditional multiples approach comprises a numerator, the market price variable, relative to the denominator, the value driver. The focus in this paper is on the latter, i.e. the choice of value driver. The valuation performance of four categories of value drivers, namely earnings, cash flow, assets and revenue is pitted against each other. A total of 16 multiples are constructed and their efficacy is investigated in the equity valuation of companies listed on the JSE Securities Exchange (JSE) for the period 2001-2010.

First, the modelled valuations of each of the four value driver categories are compared to the market in order to establish each category's valuation performance. Secondly, the relative valuation performance of all four value driver categories is compared and quantified. Thirdly, biplots, based on principal component analysis (PCA), are employed to investigate the consistency of these rankings over time.

In Section 2 the literature review is discussed, followed by the data selection process in Section 3 and a discussion of the research methodology in Section 4. Empirical research findings are presented in Section 5, followed by concluding remarks in the final section.

2 Literature review

Analysts generally follow the following four steps when employing multiples to perform equity valuations (Damodaran, 2009, 2006a; Schreiner and Spremann, 2007): Firstly, they identify two value relevant measures, i.e. the market price variable and a matching value driver. Secondly, they select a set of comparable companies, known as a peer group. Thirdly, they estimate a peer group multiple. Lastly, they apply the estimated peer group multiple to the target company's value driver to determine the equity value of the target company.

The aim with this paper is to establish the efficacy of value drivers in step one in estimating the equity value of companies listed on the JSE. Although various value drivers can be extracted from the financial statements when constructing multiples, earnings, cash flow, assets and revenue are used most frequently in international literature (Liu, Nissim and Thomas, 2002a). Of these four, earnings and cash flow are most commonly used (Liu, Nissim and Thomas, 2007). The general perception, that cash flow may offer superior explanatory power *vis-á-vis* earnings, stems, in part, from the fact that cash flow is less susceptible, although not immune, to accounting manipulations (Mulford and Comiskey, 2002; Fink, 2002; Securities and Exchange Commission, 2002). However, analysts typically favour earnings-based multiples (Rappaport and Mauboussin, 2001).

Although limited empirical studies exist on multiples in emerging markets, various researchers have conducted empirical research on value drivers in developed markets. Most researchers came to the conclusion that earnings-based multiples are superior to their counterparts. Liu, Nissim and Thomas (2002b) found earnings to be the best value driver in valuing equity. Liu et al. (2002b) focused on price multiples and investigated which value drivers performed the best amongst earnings, cash flow, dividends and revenue, to approximate stock prices in ten countries, including South Africa, between 1987 and 2001. However, Liu et al. (2002b) neglected to investigate assets and limited the study to only four variables, which may have rendered their approach biased. It was found that multiples based on earnings generally performed the best valuations, while those based on cash flow and dividends produced average results. Multiples based on revenue performed the worst.

In a study of the valuation accuracy of the price earnings (P/E) ratio and the price to book value of equity (P/BVE) ratio as benchmarks between 1973 and 1992, Cheng and McNamara (2000) found similar results, i.e. earnings was the most important value driver. Herrmann and Richter (2003) and Abukari, Jog and McConomy (2000) drew similar conclusions.

In a research survey conducted in South Africa, Nel (2010) found that academia's order of preference when using multiples, in terms of value drivers, is (1) earnings-based multiples, (2) cash flow-based multiples, (3) asset-based multiples, and (4) revenue-based multiples. Although these preferences are fairly well aligned with international research findings (Herrmann and Richter, 2003; Liu et al., 2002a, 2002b; Abukari et al., 2000; Cheng and McNamara, 2000), Liu et al. (2002b) offers the only quantitative empirical evidence to substantiate these preferences.

Despite the popularity of multiples in the marketplace and among academia, multiple-based research tends to focus on a limited number of company years and investigates a limited number of multiples, e.g. the P/E multiple or earnings before interest, tax, depreciation and amortisation (EBITDA) (Liu et al., 2002a, Alford, 1992). In the majority of the current literature, studies tend to select a single value driver as representative of whole value driver categories, which suggests a biased approach. This paper aims to address the lack of empirical evidence in this regard by extending the previous selection of variables from four to 16, thereby including various multiples in each value driver category, and by including assets as a value driver category.

3 Data selection

The following variables were extracted from the McGregor BFA database: Market capitalisation (MCap), Shares in issue, Gross profit (GP), Earnings before interest, tax, depreciation and amortisation (EBITDA), Earnings before interest and tax (EBIT), Profit after tax (PAT), Profit before tax (PBT), Headline earnings (HE), Total assets (TA), Invested capital (IC), Book value of equity (BVE), Turnover (R), Cash as operations, Increase/decrease in working capital, Net retained cash (NCIfOA), Cash generated (NCIfIA), Ordinary dividend (OD), Taxation paid, Fixed assets acquired, Net interest paid/received, Secondary tax on companies, Capital profits/losses on financial assets, Normal taxation included in extraordinary items, Total profit of an extraordinary nature and Sector.

The data that were extracted from the McGregor BFA database were screened based on three criteria: 1) All multiples are positive, i.e. multiples with negative values were discarded, 2) The companies have at least three years of positive company year multiples, and 3) Each sector has at least four observations that meet criteria 1) and 2) above. Although many companies' sector classifications have changed over the past ten years, for the purposes of this study, companies were allocated to the sectors where they resided as at 31 December 2010.

The first condition eliminates unrealistic multiples that cannot be used. The second condition ensures that selected companies have a reasonable history as a going concern and the third ensures that the number of companies within each sector is not prohibitively small, preventing the situation where there are too few observations to warrant a realistic mean calculation. Observations located outside of the 1st and 99th percentiles were removed from the pooled observations, since the initial analysis indicated the

prevalence of a number of outliers, which may have distorted the research results (Nel, Bruwer and Le Roux, 2013a; 2013b). The final population of observations represents approximately 71% of the total number of listed companies on the JSE as at 31 December 2010 and approximately 91% of the market capitalisation of the companies listed on the JSE at the same date, which serves as a fair representation for the conclusions drawn.

The number of observations (N) contained in each value driver category was different, depending on how well their multiples satisfied criteria 1) to 3). Consequently, each value driver category contains different sample sizes, ranging from 2 263 to 12 747 observations, with a total population of 31 467 observations for the period 2001-2010. These observations were used to calculate 16 multiples, i.e. multiples where market price (P) was used as the market price variable. Although various potential combinations of P and value drivers exist, the focus for the purpose of this paper, was on the most popular multiples within each of the four most popular value driver categories, namely earnings, cash flow, assets and revenue (PwC, 2012; Nel, 2010; Nel, 2009a; Liu et al., 2002a; Liu et al., 2002b; Cheng and McNamara, 2000). The multiples, i.e. the ratio of P to the respective value drivers, that were used in each value driver category are summarised in Table 1.

Table 1. Framework of multiples

	Value drivers			
	Earnings	**Book value**	**Revenue**	**Cash flow**
P	GP	TA	R	CgbO
	EBITDA	IC		NCIfOA
	EBIT	BVE		NCIfIA
	PAT			OD
	PBT			FCFE
	HE			FCFF

P - Market price
GP - Gross profit
EBITDA - Earnings before interest, tax, depreciation and amortisation
EBIT - Earnings before interest and tax
PAT - Profit after tax
PBT - Profit before tax
HE - Headline earnings
TA - Total assets
IC - Invested capital
BVE - Book value of equity
R - Revenue
CgbO - Cash generated by operations
NCIfOA - Net cash inflow from operating activities
NCIfIA - Net cash inflow from investment activities
OD - Ordinary cash dividend
FCFE - Free cash flow to equity
FCFF - Free cash flow to the firm

4 Research methodology

Traditional multiples-based valuation theory assumes that the actual equity value (V_{it}^{e}) of a company (i) at a given point in time (t) is equal to the product of a multiple (λ_{t}^{e}) and a specific value driver (α_{it}) at that specific point in time, so that

$$V_{it}^{e} = \lambda_{t}^{e} \cdot \alpha_{it} \quad (1)$$

The objective is to quantify the ability of equation (1) to approximate actual share prices on the JSE. After extracting and screening the data from the McGregor BFA database, an out-of-sample peer group multiple ($\hat{\lambda}^{e}_{ct}$) is estimated for each company by calculating the harmonic mean of all the other remaining companies in the same sector. Although there is a lack of academic consensus regarding which averaging procedure constitutes best practice (Dittman and Maug, 2008), most researchers regard the harmonic mean as a viable and unbiased estimator (Bhojraj and Lee, 2002; Liu et al., 2002b; Beatty, Riffe and Thompson, 1999). The application of an industry-specific approach to multiples is well established by research (Nel et al., 2013b; Nel, 2009a; Nel, 2009b; Goedhart, Koller and Wessels, 2005; Liu et al., 2002a; Fernández, 2001; Barker, 1999). The McGregor BFA sector-level industry classification is applied, since previous research established that it was the optimal industry classification when conducting a cross-section analysis (Nel et al., 2013b)[1].

[1] The McGregor BFA industry classifications are industry, supersector, sector and subsector

The peer group estimate of each company ($\hat{\lambda}^e_{ct}$) is then multiplied by the target company's actual value driver (α_{it}) to calculate an equity value prediction ($\hat{V}^e_{it}$):

$$\hat{V}^e_{it} = \hat{\lambda}^e_{ct} \cdot \alpha_{it} \quad (2)$$

Subtracting equation (2) from equation (1) produces (3) for the calculation of the error margin (valuation error):

$$\hat{V}^e_{it} - V^e_{it} \quad (3)$$

Since companies with higher values tend to have higher valuation errors, (3) is not independent of value. It is anticipated that expressing (3) proportionally to V^e_{it} will improve the efficacy of the peer group multiple estimate (Beatty et al., 1999). The standardised form of (3), ε_{it}, is therefore expressed proportionally to V^e_{it}, where[2]

$$\varepsilon_{it} = \left| \frac{\hat{V}^e_{it} - V^e_{it}}{V^e_{it}} \right| \quad (4)$$

Valuation errors were calculated for each company year and subsequently aggregated. Absolute valuation errors were used since the netting of positive and negative valuation errors may have resulted in artificially low valuation errors. The most accurate value driver category is the one with the lowest median valuation error. Consequently, the average median valuation errors of the four value driver categories were compared to establish which value driver category offered the greatest explanatory power.

Inter-value driver category improvements was subsequently calculated, indicating the extent to which the valuation accuracy of the multiples improved by switching between value driver categories. First, the four value driver categories were ranked according to their median valuation errors in order to determine the optimal value driver category. Second, the potential percentage improvement (IMP) in valuation accuracy was calculated based on substituting each of the three sub-optimal value driver categories with the optimal one. Third, the incremental IMP in valuation accuracy was calculated by adopting a step-wise substitution approach, i.e. by starting with the least accurate value driver category and continuously substituting it with the next most accurate value driver category.

The initial analysis was based on pooled valuation errors that covered the entire period between 2001 and 2010. It is equally important to consider whether the performance of the value driver categories holds over time. However, the multi-dimensional nature of the data obscures a comprehensive grasp of the relative valuation performance of the four value driver categories for each observation year. Consequently, two-dimensional biplots, which are based on PCA, were constructed from the data in order to assess the behaviour of the observations over the period 2001-2010. A one-dimensional biplot was also constructed, offering a linear display of the optimal ranking between the value driver categories over this period.

5 Empirical results

The valuation performance of the four value driver categories was compared in order to ascertain which value driver category performed the most accurate equity valuations. Four pools of valuation errors were estimated, based on the sector industry classification.

5.1 Pooled valuation errors

In Figure 1, the median valuation errors are grouped per value driver category and then averaged. As is evident from Figure 1, the earnings-based value driver category performed the most accurate valuations, followed by the assets-, cash flow- and revenue-based value driver categories. In terms of valuation accuracy, earnings offers good results, assets offer average results and cash flow and revenue offer poor results.

The superiority of the earnings-based value driver category becomes even more apparent when one considers the magnitude of the performance gap between the earnings-based value driver category and the other three value driver categories. The IMP in terms of valuation accuracy, when switching from the second most accurate value driver category, namely assets, to the earnings-based value driver category, is 24.21%. The corresponding IMPs for the other two value driver categories, relative to earnings, are 28.54% (cash flow-to-earnings) and 29.49% (revenue-to-earnings), respectively. A step-wise analysis of the incremental performance improvement in valuation accuracy, when moving from the worst to the best performing value driver category, is illustrated in Figure 2. The results indicate that a switch from revenue, the least accurate value driver category, to any other value driver category will improve the valuation accuracy of multiples. The most significant improvement in valuation accuracy occurs when the switch is made to earnings.

[2]Functions for the calculation of ε_{it} and the statistical analysis thereof were developed in the R-package, an open source programming language that lends itself to statistical analysis and graphics (R Development Core Team, 2012).

Figure 1. The valuation accuracy of the four value driver categories

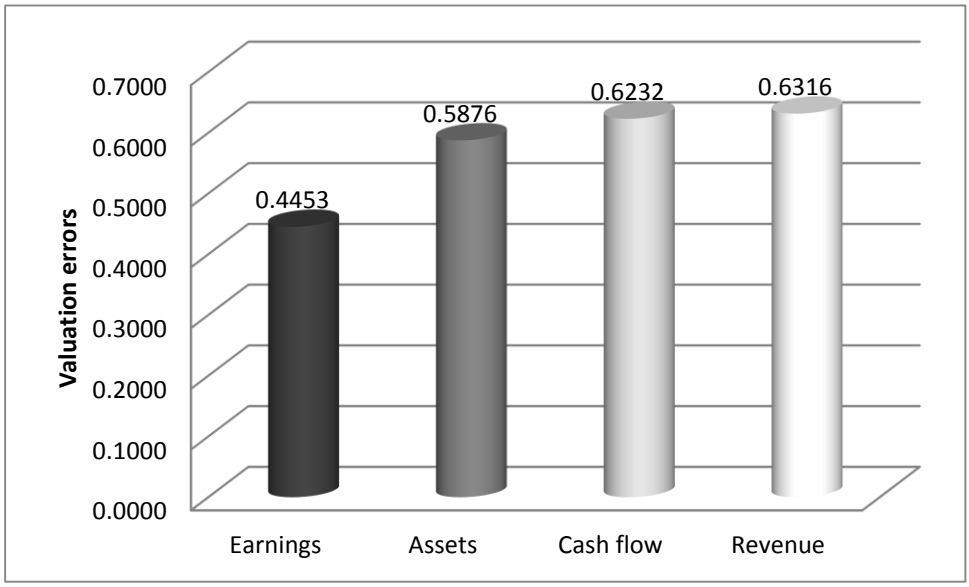
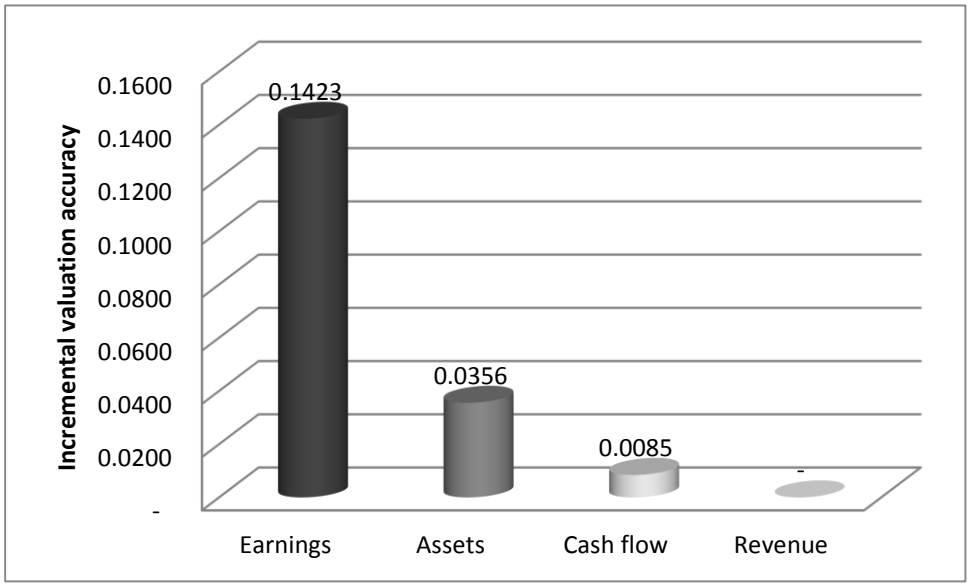


Figure 2. Incremental inter-value driver category improvements in valuation accuracy



The incremental improvements illustrated in Figure 2, expressed in percentage terms, are 1.34% (revenue-to-cash flow), 5.70% (cash flow-to-assets) and 24.21% (assets-to-earnings). These results concur with, and contradict, empirical evidence from developed markets. The superior performance of earnings and the inferior performance of revenue are well established in the developed market literature (Herrmann and Richter, 2003; Liu et al., 2002a, 2002b; Abukari et al., 2000; Cheng and McNamara, 2000). However, evidence from the developed market literature also suggests that assets and cash flow produce average results in terms of valuation accuracy (Herrmann and Richter, 2003; Liu et al., 2002a, 2002b; Abukari et al., 2000; Cheng and McNamara, 2000). As is evident from Figure 2, cash flow produce poor results, i.e. the valuation performance of cash flow is closer to revenue than to assets, offering a marginal IMP in valuation accuracy over revenue of just 1.34%, which contradicts the evidence from the developed market literature. This discrepancy becomes even more apparent when one considers that, for the purpose of this study, OD is included as a cash flow-based value driver, while comparative studies in developed capital markets isolate it as a separate value driver. If similar logic is applied in this study, i.e. if OD is stripped from cash flow, revenue would have outperformed cash flow, rendering cash flow the least accurate value driver category. Isolating OD from the cash flow value driver category results in a cash flow-to-revenue IMP of 1.40% (not included in the analysis). Although this may seem insignificant, one needs to take cognisance of the fact that this contradicts evidence from the developed market

literature, all of which indicates that revenue performs the least accurate equity valuations.

This discrepancy is important, since there is a common misconception among analysts that cash flow-based multiples offer a good, if not greater degree of valuation accuracy compared to earnings-based multiples (Liu *et al*., 2007). The perception regarding the credibility of cash flow as a value driver also surfaced from surveyed findings by Nel (2010), where the evidence suggested that cash flow offer superior explanatory power compared to assets and revenue. The evidence, however, contradicts the common belief regarding the explanatory power of cash flow-based multiples *vis-á-vis* the other value drivers, particularly earnings-based multiples, which highlights the misconception of analysts who opt for cash flow-based multiples.

5.2 The multi-dimensional nature of the data and the reduction in dimensionality

The observations discussed thus far were based on pooled valuation errors for the entire period 2001-2010. However, these observations do not reflect the consistency of the results over this period. Table 2 contains an analysis of the pooled valuation errors and the annual valuation performance of the four value driver categories over time, which affords one the opportunity to assess the consistency of the results.

Table 2. Pooled and annual median valuation errors

		Value driver categories			
		Earnings	**Assets**	**Cash flow**	**Revenue**
Pooled		0.4453	0.5876	0.6232	0.6316
Annual	**2010**	0.4635	0.5807	0.6121	0.5751
	2009	0.4522	0.5308	0.6480	0.6412
	2008	0.4026	0.5516	0.5798	0.6388
	2007	0.4226	0.5704	0.6410	0.6013
	2006	0.4397	0.6116	0.6099	0.6762
	2005	0.4167	0.6083	0.6284	0.6192
	2004	0.4581	0.5993	0.6233	0.6103
	2003	0.5100	0.6388	0.6010	0.6690
	2002	0.4750	0.5994	0.6298	0.6278
	2001	0.4655	0.6497	0.7029	0.7074

The multi-dimensional nature of the data contained in Table 2 complicates a careful analysis of the general trend of the data and obscures the visibility of the consistency of the data over time. Since the data occupies multi-dimensional space, i.e. it encapsulates multiple coordinate axes, the use of a conventional two-dimensional scatter plot is inappropriate (Gower, Lubbe and Le Roux, 2011).

However, the use of biplots accommodates higher-dimensional data by approximating it in lower, usually two-, dimensional space, enabling the visualisation of multi-dimensional data. The interpretations of biplots and conventional two-dimensional scatterplots are similar, except that biplots can accommodate more than two variables in the form of calibrated axes. However, these axes cannot intersect perpendicularly in two dimensions. If the loss of information resulting from this approximation is negligible, much can be learned about the multivariate nature of the data. To this end, the valuation accuracy of the four value driver categories for the period 2001-2010, as measured annually by the median absolute valuation errors, is illustrated as a biplot in Figure 3.

The PCA-based biplot in Figure 3 approximates the data in the best possible two-dimensional space. Although biplots provide a useful and versatile method to visualise multi-dimensional data, the reduction of the multi-dimensional nature of the data, as illustrated in Figure 3, can only be achieved with a certain loss of data accuracy (Greenacre, 2007). The data points displayed on the biplot are therefore approximations of the actual data points. Both the approximations and the actual data points are contained in Table 3.

Figure 3. PCA biplot reflecting the consistency of the relative valuation performance of the four value driver categories over the period 2001-2010[3]

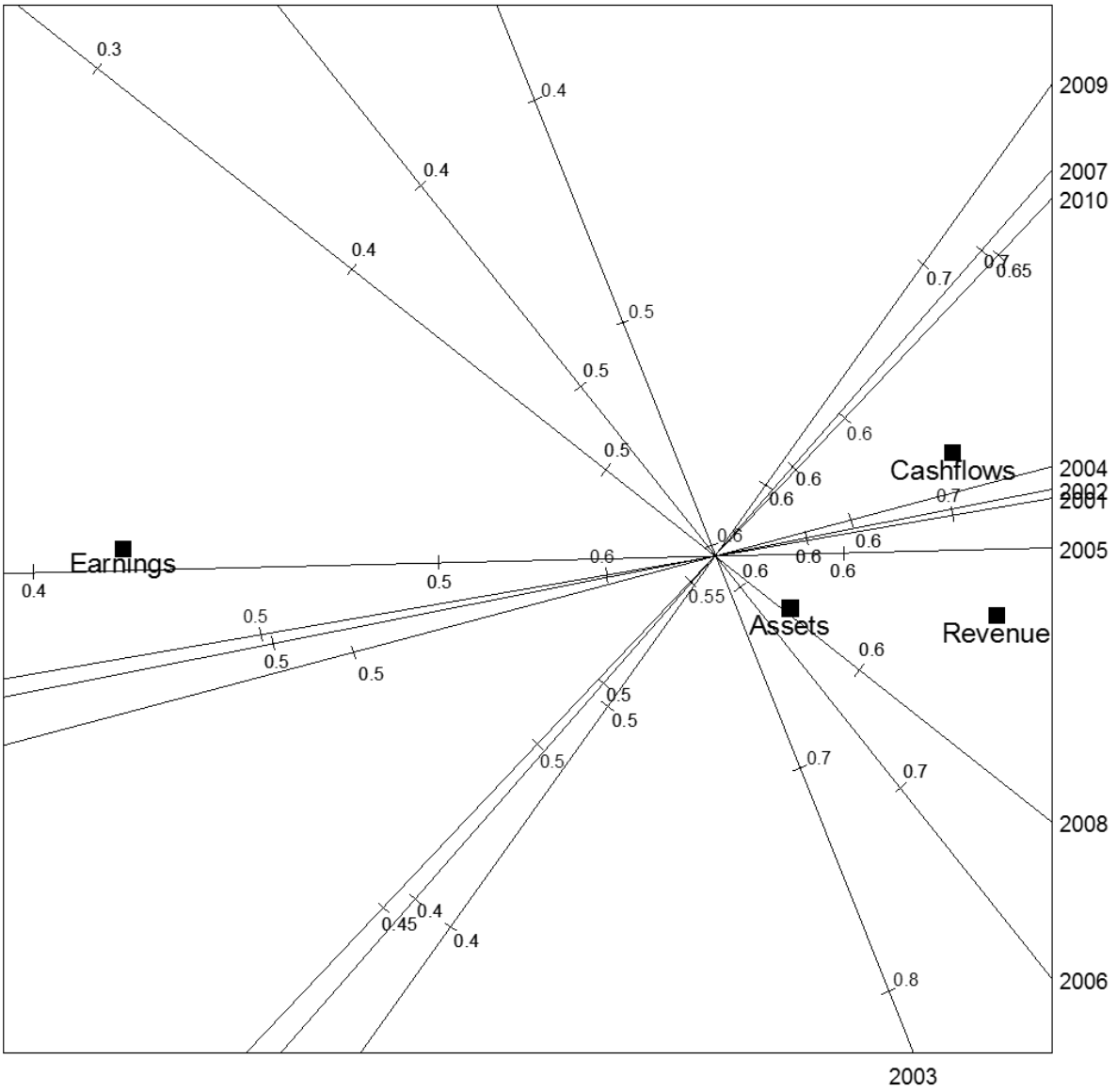


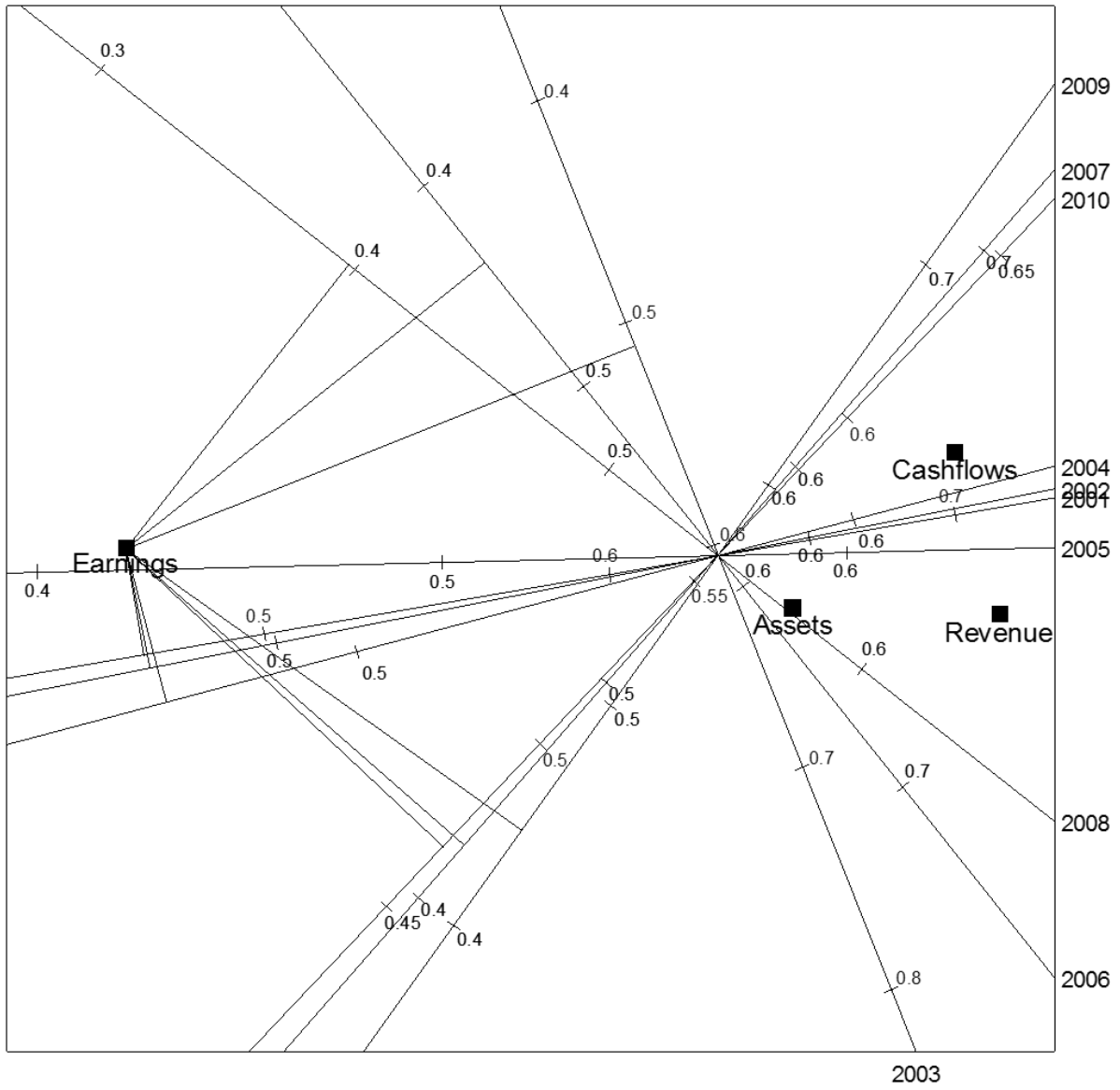
Table 3. Actual valuation errors and their predictions over the period 2001-2010

Year	Value driver categories							
	Earnings		Assets		Cash flow		Revenue	
	Actual	Predict	Actual	Predict	Actual	Predict	Actual	Predict
2010	0.4635	0.4683	0.5807	0.5608	0.6121	0.6110	0.5751	0.5913
2009	0.4522	0.4432	0.5308	0.5684	0.6480	0.6500	0.6412	0.6101
2008	0.4026	0.3979	0.5516	0.5712	0.5798	0.5809	0.6388	0.6228
2007	0.4226	0.4245	0.5704	0.5623	0.6410	0.6406	0.6013	0.6079
2006	0.4397	0.4381	0.6116	0.6183	0.6099	0.6103	0.6762	0.6707
2005	0.4167	0.4220	0.6083	0.5862	0.6284	0.6272	0.6192	0.6372
2004	0.4581	0.4617	0.5993	0.5841	0.6233	0.6225	0.6103	0.6226
2003	0.5100	0.5106	0.6388	0.6364	0.6010	0.6009	0.6690	0.6710
2002	0.4750	0.4762	0.5994	0.5946	0.6298	0.6295	0.6278	0.6317
2001	0.4655	0.4655	0.6497	0.6497	0.7029	0.7029	0.7074	0.7074

[3]The R code for constructing the PCA biplots utilises the UBbipl package, which is available at the following link http://dl.dropbox.com/u/17860902/UBbipl_1.0.zip

The comparison between the actual and predicted data points over all four value driver categories in Table 3 indicates that the loss in data accuracy is negligible. The predictions contained in Table 3 can be read from the PCA biplot displayed in Figure 4. The relevant data points of the earnings value driver category, for example, are illustrated by the perpendicular readings. Although not shown here, similar readings can be traced to Table 3 for assets, cash flow and revenue. Note that an exact reading (to the fourth decimal) from the biplot is not possible, but can be achieved algebraically.

Figure 4. PCA biplot readings for earnings



When using biplots, it is important to ascertain the magnitude of the loss in data accuracy in order to determine whether it is acceptable. The PCA biplot output obtained from the R-package, the code that was applied in this study, produces PCA quality of display and predictivity readings, which affords one the opportunity to assess the loss of data accuracy (Gower et al., 2011). In this analysis, the lower dimensionality was achieved with a PCA quality reading of 97.86% and annual predictivity readings as contained in Table 4, confirming a negligible loss of data accuracy. The greatest loss in accuracy occurs in 2009, but at 90.8% it remains a very accurate reading.

Table 4. Predictivity readings over the period 2001-2010

Years	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
Predictivity	0.946	0.908	0.978	0.996	0.997	0.973	0.978	0.999	0.998	1.000

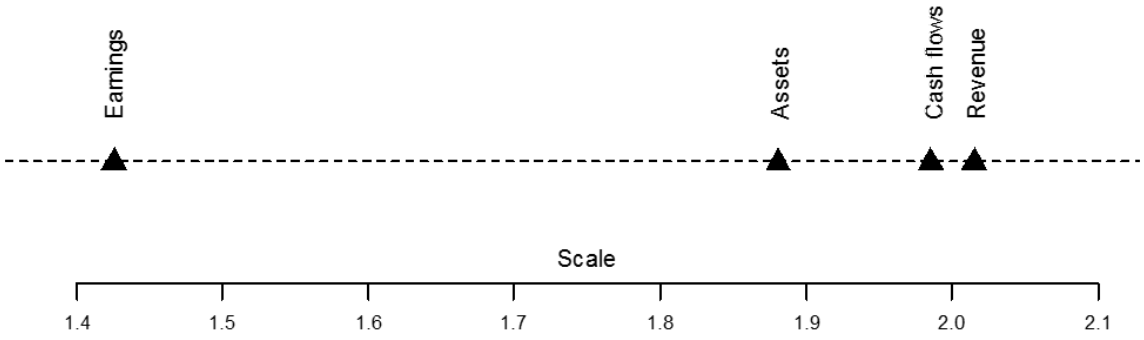
5.3 Consistency of the results

The use of biplots proved particularly useful in this study as it afforded one the opportunity to visualise the consistency of the relative valuation performance of the four value driver categories over time. In the biplot in Figure 3, each of the ten years over the period 2001-2010 is represented by a separate calibrated axis. The mean of the four value driver categories for each of the ten years is located at the point of intersection (origin) of the ten axes. Note that the valuation performance of the four value driver categories is depicted relative to each other and relative to the origin, i.e. the mean for each of the ten years. The value driver categories with the smaller valuation errors, i.e. a greater degree of valuation accuracy, are located to the left of the origin, while the less accurate value drivers are located to the right of the origin. As is evident from Figure 3, the superiority of earnings holds for each of the ten years.

Although, at first glance, the order in valuation performance confirms the observation in Figure 1, a closer examination reveals that, besides earnings, the relative valuation performance of the other three value driver categories did not remain constant on an annual basis over the period 2001-2010. As is evident from Figure 3, earnings is the only value driver category that consistently delivers a superior valuation performance *vis-á-vis* the other three value driver categories, i.e. for each of the ten years observed, earnings produced the most accurate equity valuations. Earnings is also the only value driver category that consistently delivered below average valuation errors, as is evident from its location to the left of the origin for each of the ten years observed. Figure 3 also illustrates the magnitude of the superior explanatory power of earnings, which is depicted by the distance of the earnings value driver category's location from the origin and the other three value driver categories.

From the PCA biplot one can deduce one-dimensional optimal scaling values for the four value driver categories, which is illustrated in Figure 5. The one-dimensional optimal scaling values, as depicted in Figure 5, confirmed the superior valuation performance of earnings, which is located to the far left of the linear spectrum with a scaled value of 1.4260. As with the biplot, the distance between earnings and the other three value driver categories reflects the magnitude of its superior explanatory power *vis-á-vis* the other three value driver categories over the period 2001-2010. The use of PCA effectively reduces the dimensionality of the data cluster, thereby affording one the opportunity to more easily visualise the relative valuation performance of the four value driver categories.

Figure 5. Optimal one-dimensional scaling of the relative valuation performance of the four value driver categories over the period 2001-2010



As is evident from Figure 3, assets predominantly produced the second most accurate results over the ten years, generally tending towards the mean of the four value driver categories. However, assets is located a significant distance to the right of earnings in Figure 3 and Figure 5, which suggests that its valuation performance is considerably less accurate than that of earnings. The latter is reflected in its scaled value of 1.8807.

Contrary to popular belief, cash flow produced far less accurate valuation results than earnings, which is evident from the significant distance between the locations of the two value drive categories in Figure 3. Cash flow was the least-, or next to least, accurate value driver for most of the years in the period 2001-2010. Cash flow is located to the right of the origin in Figure 3, reflecting its poor valuation performance, i.e. it produced valuation errors higher than the mean for each of the ten years, except for 2003. It obtained a scaled value of 1.9857, as depicted in Figure 5, reflecting the significance of the disparity between cash flow and earnings.

As the evidence suggests, in terms of the consistency of their valuation performance, cash flow and revenue offer similar results, with cash flow offering an insignificant increase in valuation performance over revenue. From Figure 3 one can deduce that revenue was primarily the least accurate value driver for the period 2001-2010. Revenue is situated to the right of the origin in Figure 3, reflecting its consistent inability to produce valuation errors below the mean. Revenue produced the least accurate

valuation results over the period 2001-2010, with a scaled value of 2.0154.

6 Conclusion

The first contribution of this paper is that it offers an emerging market perspective on the explanatory power of four value driver categories, namely earnings, assets, cash flow and revenue. The empirical evidence suggests that earnings offer the greatest degree of valuation accuracy *vis-á-vis* assets, cash flow and revenue. In terms of valuation accuracy, the latter three value driver categories offer distant alternatives to earnings. Compared to earnings, assets offered moderate results, while cash flow and revenue offered poor results. Except for cash flow, these findings concur with empirical evidence from the developed market literature.

However, while the developed market literature suggests that cash flow produce average results, the findings in this study indicate that cash flow offers poor results. The evidence also suggests that, when a more narrowly defined cash flow-based value driver category is selected, revenue may, in fact, offer a greater degree of valuation accuracy compared to cash flow, which also contradicts evidence from the developed market literature.

The study employed PCA-based biplots to investigate the consistency of the relative valuation performance of the four value driver categories over time. Given the multi-dimensionality of the data contained in this study, biplots seem to be a promising tool for analysing and visualising multi-dimensional data of this nature. The consistency of the results, i.e. the ability of the respective value drivers to maintain their valuation performance on an annual basis throughout the period 2001-2010, confirmed the initial findings. Earnings is the only value driver that consistently offers superior results over this period. Assets maintained a reasonable amount of consistency over this period, while cash flow and revenue offered the least consistent results.

The research results present strong evidence in support of the use of earnings as superior value driver when employing multiples to perform equity valuations, which concur with empirical evidence from developed capital markets. The evidence therefore justifies analysts' preference for earnings-based multiples.

However, the evidence rejects the general perception that cash flow-based multiples offer relatively accurate valuations compared to earnings-based multiples. The opportunity benefit of switching from the cash flow- to earnings-based value drivers could provide an increase in valuation accuracy of up to 28.54%, which is significant. Consequently, the evidence suggests that analysts who use cash flow-based multiples in practice should consider switching to earnings-based multiples.

The second contribution of this paper is that it quantifies the magnitude of the potential improvement in valuation accuracy when substituting a less accurate value driver with a more accurate one. Based on the median valuation errors, the potential improvement in valuation accuracy lies between 1.34% and 29.49%. It is therefore evident that analysts can, by switching value drivers, significantly improve the valuation accuracy of their multiples models.

There are limitations to the study: Firstly, with the initial screening of the data, observations outside the 1st and 99th percentiles were omitted. The reasoning is two-fold. One, excluding extreme observations will prevent the severe distortion of the research results and two, rational analysts will most certainly exclude these extreme observations when estimating peer group multiples in practice. Secondly, value driver categories were analysed and not the individual value drivers. There will be individual value drivers within each of the value driver categories that will, for example, outperform other value driver categories. However, this is a topic for future research. Thirdly, the focus of this paper was specifically on the valuation performance of trailing multiples, whose value drivers are historical in nature. Although a more comprehensive approach may also incorporate forward multiples, this is severely hamstrung by a lack of depth in the South African market, particularly at the level that the authors would envisage testing them.

References

1. Abukari, K., Jog, V. and McConomy, B.J. (2000), "The role and the relative importance of financial statements in equity valuation", working paper, Wilfred Laurier University, Ontario, 6 November.
2. Alford, A. (1992), "The effect of the set of comparable companies on the accuracy of the price-earnings valuation method", *Journal of Accounting Research*, Vol. 30 No. 1, pp. 94-108.
3. Asquith, P., Mikhail, M.B. and Au, A.S. (2005), "Information content of equity analyst reports", *Journal of Financial Economics*, Vol. 75 No. 2, pp. 245-282.
4. Barker, R.G. (1999), "Survey and market-based evidence of sector-dependence in analysts' preferences between the dividend yield and price-earnings ratio valuation models", *Journal of Business Finance and Accounting*, Vol. 26 No. 3 & 4, pp. 393-418.
5. Beatty, R.P., Riffe, S.M. and Thompson, R. (1999), "The method of comparables and tax court valuations of private companies – An empirical investigation", *Accounting Horizons*, Vol. 13 No. 3, pp. 177-199.
6. Bhojraj, S. and Lee, M.C. (2002), "Who is my peer? A valuation-based approach to the selection of comparable companies", *Journal of Accounting Research*, Vol. 40 No. 2, pp. 407-439.
7. Cheng, C.S.A. and McNamara, R. (2000), "The valuation accuracy of the price-earnings and price-book benchmark valuation methods", *Review of Quantitative Finance and Accounting*, Vol. 15 No. 4, pp. 349-370.
8. Damodaran, A. (2009), *The dark side of valuations*, 2nd edition, Pearson Education, Inc., New Jersey.
9. Damodaran, A. (2006a), *Damodaran on valuation: Security analysis for investment and corporate*

finance, 2nd edition, John Wiley & Sons, Inc., New Jersey.
10. Damodaran, A. (2006b), *Valuation approaches and metrics: A survey of the theory and evidence*, 2nd edition, Now Publishers, Inc., Hanover.
11. Damodaran, A. (2002), *Investment valuation: Tools and techniques for determining the value of any asset*, 2nd edition, John Wiley & Sons, Inc., New York.
12. Dittmann, I. and Maug, E. (2008), "Biases and error measures: How to compare valuation methods", working paper, Erasmus University, Rotterdam, 28 April.
13. Fernández, P. (2001), "Valuation using multiples. How do analysts reach their conclusions?", working paper, IESE Business School, Madrid, 4 June.
14. Fink, R. (2002), "Tuning into cash flow", *CFO Magazine*, December, pp. 44-49.
15. Goedhart, M., Koller, T. and Wessels, D. (2005), "The right role for multiples in valuation", *McKinsey on Finance*, Vol. 15, pp. 7-11.
16. Gower, J., Lubbe, S. and Le Roux, N. (2011), *Understanding Biplots*, John Wiley & Sons, Ltd., Chichester.
17. Greenacre, M. (2007), *Correspondence Analysis in Practice*, 2nd edition, Chapman and Hall/CRC, London.
18. Herrmann, V. and Richter, F. (2003), "Pricing with performance-controlled multiples", *Schmalenbach Business Review*, Vol. 55 No. 3, pp. 194-219.
19. International Monetary Fund (IMF) (2012), "World Economic Outlook Database", World Economic and Financial Surveys, IMF, Washington, October.
20. Liu, J., Nissim, D. and Thomas, J. (2007), "Is cash flow king in valuations?", *Financial Analysts Journal*, Vol. 63 No. 2, pp. 1-13.
21. Liu, J., Nissim, D. and Thomas, J. (2002a), "Equity valuation using multiples", *Journal of Accounting Research*, Vol. 40 No. 1, pp. 135-172.
22. Liu, J., Nissim, D. and Thomas, J. (2002b), "International equity valuation using multiples", working paper, University of California at Los Angeles (Anderson Graduate School of Management), Los Angeles, September.
23. Minjina, D.I. (2008), "Multiples and their use for equity valuation on European capital markets", *Theoretical and Applied Economics*, Vol. 11 No. 11, pp. 22-28.
24. Mulford, C.W. and Comiskey, E.E. (2002), "*The financial numbers game: Detecting creative accounting practices",* 1st edition, John Wiley & Sons, Inc., New York.
25. Nel, W.S., Bruwer, B.W. and Le Roux, N.J. (2013a), "Equity- and entity-based multiples
26. in emerging markets: Evidence from the JSE Securities Exchange", *Journal of Applied Business Research*, Vol. 13 No. 3: 829-852.
27. Nel, W.S., Bruwer, B.W. and Le Roux, N.J. (2013b), "The impact of industry classification on the valuation accuracy of multiples in the South African capital market", *International Business and Economics Research Journal*, Vol. 12 No. 1, pp. 79-102.
28. Nel, W.S. (2010), "A South African perspective on the multiples of choice in the valuation of ordinary shareholders' equity: From theory to practice", *African Journal of Business Management*, Vol. 4 No. 6, pp. 930-941.
29. Nel, W.S. (2009a), "The use of multiples in the South African equity market: Is the popularity of the price earnings ratio justifiable from a sector perspective?", *Meditari Accountancy Research*, Vol. 17 No. 2, pp. 101-115.
30. Nel, W.S. (2009b), "Methods of choice in the valuation of ordinary shareholders' equity", *Meditari Accountancy Research*, Vol. 17 No. 2, pp. 117-135.
31. Pretorius, D., Venter, E., Von Well, R. and Wingard, C. (2010), *GAAP handbook: Financial Accounting and reporting practice*, Volume 1, LexisNexis, Durban.
32. PricewaterhouseCoopers (PwC) (2012), *An African perspective: Valuation Methodology Survey*, 6th edition, PwC Corporate Finance, Johannesburg.
33. R Development Core Team (2012), "R: A language and environment for Statistical computing", R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.Rproject.org/
34. Rappaport, A. and Mauboussin, M. J. (2001), "The trouble with earnings and price/earnings
35. multiples", *available at:* http://www.expectationsinvesting.com/pdf/earnings.pdf. (accessed 30 April 2013).
36. Roosenboom, P. (2007), "How do underwriters value initial public offerings? An empirical analysis of the French IPO market", *Contemporary Accounting Research*, Vol. 24 No. 4, pp. 1217-1243.
37. Schreiner, A. and Spremann, K. (2007), "Multiples and their valuation accuracy in European equity markets", working paper, University of Saint Gallen, Frankfurt, 13 August.
38. Securities and Exchange Commission (SEC) (2002), "*Joint meeting of SEC Regulations Committee with SEC staff",* Washington, pp. 1-7.

Appendix A. Acronyms

Acronym/Abbreviation	Description
BFA	Bureau of Financial Analysis
BVE	Book value of equity
CgbO	Cash generated by operations
ε	Error term
EBIT	Earnings before interest and tax
EBITDA	Earnings before interest, tax, depreciation and amortisation
FCFE	Free cash flow to equity
FCFF	Free cash flow to the firm
GP	Gross profit
HE	Headline earnings
i	Company *i*
IC	Invested capital
IMP	Potential percentage improvement
JSE	JSE Securities Exchange
MCap	Market capitalisation
N	Number of observations
NCIfIA	Net cash inflow from investing activities
NCIfOA	Net cash inflow from operating activities
OD	Ordinary cash dividend
P	Market price
PAT	Profit after tax
PBT	Profit before tax
PCA	Principal component analysis
PwC	PricewaterhouseCoopers
R	Revenue
t	Time period *t*
TA	Total assets
USA	United States of America
λ_t^e	Equity multiple
$\hat{\lambda}^e{}_{ct}$	Estimated peer group equity multiple at time period *t*
α_{it}	Actual value driver
V_{it}^e	Actual value of equity of company *i* at time period *t*
$\hat{V}_{it}^e$	Estimated value of equity of company *i* at time period *t*

Appendix B. Classification of variables

All data were extracted from the McGregor BFA database. The classifications were largely derived from the descriptions as presented in the McGregor BFA user manuals.

B.1 Market price variable

1. Market capitalisation (MCap) represents the market value of an entity's issued ordinary share capital. MCap is calculated by multiplying the market price per share as at the entity's financial year end with the issued volume of shares at the same date.

B.2 Earnings-based multiples

2. Gross profit (GP) represents and is calculated as the difference between revenue or revenue and the cost of revenue.
3. Earnings before interest, taxation, depreciation and amortisation (EBITDA) represents an entity's earnings before interest, taxation, depreciation and amortisation. It is calculated by taking EBIT and adding back depreciation and amortisation.
4. Earnings before interest and tax (EBIT) represents an entity's earnings before interest and taxation. It is calculated by taking income before taxation and adding back interest.
5. Profit before tax (PBT) represents an entity's net profit, including realised profits and all losses of an extraordinary nature, after interest, but before taxation. It is calculated by taking profit before interest and taxation and deducting interest.
6. Profit after tax (PAT) represents an entity's net profit, including realised profits and all losses of an extraordinary nature, after interest and taxation. It is calculated by taking PBT and deducting taxation.
7. Headline earnings (HE) represents an entity's earnings generated by normal operational activities. It is calculated by taking PAT and adding back profits/losses associated with non-core operational activities, such as the sale of fixed assets or the termination of discontinued operations.

B.3 Book value-based multiples

8. Total assets (TA) represents the total of all the tangible assets employed by the entity. It is calculated by adding total fixed assets, total long-term investments and total current assets.
9. Invested capital (IC) represents the total cash investment by fund providers. It is calculated by deducting cash and cash equivalents from TA.
10. Book value of equity (BVE) represents the equity of the ordinary shareholders. It is calculated by adding ordinary share capital and reserves; and deducting the cost of control of subsidiaries and intangible assets.

B.4 Revenue-based multiple

11. Turnover (R) represents the gross revenue or revenue of the entity.

B.5 Cash flow-based multiples

12. Cash generated by operations (CgbO) represents pre-tax cash flows net of working capital requirements. It is calculated by taking operating profits, adding back non-cash items and deducting changes in working capital.
13. Net cash inflow from operating activities (NCIfOA) represents post-tax operational cash flows. It is calculated by taking CgbO and deducting net interest, net dividends and taxation.
14. Net cash inflow from investment activities (NCIfIA) represents post-tax operational cash flows net of fixed capital requirements. It is calculated by taking NCIfOA and deducting acquisitions of fixed capital items net of capital gains tax.
15. Ordinary dividend (OD) represents the amount of dividends paid to ordinary shareholders as per the cash flow statement.
16. Free cash flow to the firm (FCFF) represents post-tax cash flows that are available to be distributed to all the fund providers of an entity, net of capital requirements to grow or maintain the business. It is calculated by taking NCIfIA and adding back non-operational items, such as net interest and net dividends.
17. Free cash flow to equity (FCFE) represents post-tax cash flows that are available to be distributed to all the equity fund providers of an entity, net of capital requirements to grow or maintain the business. It is calculated by taking FCFF and adding/deducting debt capital movements and interest paid.

THE RISK LEVEL OF VIET NAM NON-BANKING INVESTMENT AND FINANCIAL SERVICES INDUSTRY UNDER FINANCIAL LEVERAGE DURING AND AFTER THE GLOBAL CRISIS 2007-2011

Dinh Tran Ngoc Huy*

Abstract

This paper estimates the impacts of external financing on market risk for the listed firms in the Viet nam non-banking financial services industry, esp. after the financial crisis 2007-2009.
First, by using quantitative and analytical methods to estimate asset and equity beta of total 10 listed companies in Viet Nam non-banking financial services industry with a proper traditional model, we found out that the beta values, in general, for many institutions are acceptable.
Second, under 3 different scenarios of changing leverage (in 2011 financial reports, 30% up and 20% down), we recognized that the risk level, measured by equity and asset beta mean, decreases when leverage increases to 30% and vice versa.
Third, by changing leverage in 3 scenarios, we recognized the dispersion of risk level increases (measured by equity beta var) if the leverage decreases down to 20%.
Finally, this paper provides some outcomes that could provide companies and government more evidence in establishing their policies in governance**.

Keywords: Equity Beta; Financial Structure; Financial Crisis; Risk; External Financing; Investment and Financial Service Industry

JEL classification: G010, G100, G390

**Banking University, HCMC – GSIM, International University of Japan, Japan*
Email: dtnhuy2010@gmail.com
***My sincere thanks are for the editorial office and Lecturers/Doctors at Banking University and International University of Japan. Through the qualitative analysis, please kindly email me if any error found*

1 Introduction

Financial system development has positively related to the economic growth, throughout many recent years, and Viet Nam non-banking investment and financial servies industry is considered as one of active economic sectors.

This paper is organized as follow. The research issues and literature review will be covered in next sessions 2 and 3, for a short summary. Then, methodology and conceptual theories are introduced in session 4 and 5. Session 6 describes the data in empirical analysis. Session 7 presents empirical results and findings. Next, session 8 covers the analytical results. Then, session 9 presents analysis of risk. Lastly, session 10 will conclude with some policy suggestions. This paper also supports readers with references, exhibits and relevant web sources.

2 Research Issues

We mention some issues on the estimating of impacts of external financing on beta for listed non-banking investment and financial servies companies in Viet Nam stock exchange as following:

Issue 1: Whether the risk level of non-banking investment and financial servies firms under the different changing scenarios of leverage increase or decrease so much.

Issue 2: Whether the dispersed distribution of beta values become large in the different changing scenarios of leverage estimated in the non-banking investment and financial servies industry.

3 Literature review

Scott (1976) indicated that the value of tax benefit is a major factor in capital structure. Black (1976) proposes the leverage effect to explain the negative correlation between equity returns and return volatilities. Mishkin (1983) analysis suggests that the negative relation between excess leverage and future returns can be explained by the market's failure to react promptly to the information in excess leverage about the firm's probability of distress and future asset growth. Levine (1991) said liquid markets can enable

investment in long-term investment projects while at the same time allowing investors to have access to their savings at short-term notice. King and Levine (1993) stated financial institutions and markets allow cross-sectional diversification across projects, allowing risky innovative activity. Grgor and Steven (1996) found out that high leverage, not poor firm performance or poor industry performance, is the primary cause of financial distress for many firms who have positive positive operating income at the time of distress.

Next, Peter and Liuren (2007) mentions equity volatility increases proportionally with the level of financial leverage, the variation of which is dictated by managerial decisions on a company's capital structure based on economic conditions. And for a company with a fixed amount of debt, its financial leverage increases when the market price of its stock declines. Then, Chava and Purnanandam (2009) mentioned leverage is positively correlated with financial distress and distress intensity is negatively related to future returns.

Reinhart and Rogoff (2009) pointed the history of finance is full of boom-and-bust cycles, bank failures, and systemic bank and currency crises. Adrian and Shin (2010) stated a company can also proactively vary its financial leverage based on variations on market conditions.

Then, Harry and Rene (2013) pointed that because debt-equity neutrality assigns zero way to the social value of liquidity, it is an inappropriately equity-biased baseline for assessing whether the high leverage ratios of real-world banks are excessive or socially destructive.

Finally, financial leverage can be considered as one among many factors that affect business risk of consumer good firms.

4 Conceptual theories

4.1 The impact of financial leverage on the economy

A sound and effective financial system has positive effect on the development and growth of the economy. Financial institutions not only help businesses to reduce agency problems but also enable them to enhance liquidity capacity and long-term capital. And financial innovation also reduces the cost of diversification. So, finance and growth has interrelated.

In a specific industry such as non-banking financial service industry, on the one hand, using leverage with a decrease or increase in certain periods could affect tax obligations, revenues, profit after tax and technology innovation and compensation and jobs of the industry. Hence, financial leverage could positively affect firms' growth and investment opportunities.

During and after financial crises such as the 2007-2009 crisis, there raises concerns about the role of financial leverage of many countries, in both developed and developing markets. On the one hand, lending programs and packages might support the business sectors. On the other hand, it might create more risks for the business and economy.

5 Methodology

In order to calculate systemic risk results and leverage impacts, in this study, we use the live data during the crisis period 2007-2011 from the stock exchange market in Viet Nam (HOSE and HNX and UPCOM).

In this research, analytical research method is used, philosophical method is used and specially, leverage scenario analysis method is used. Analytical data is from the situation of listed non-banking investment and financial servies firms in VN stock exchange and curent tax rate is 25%.

Finally, we use the results to suggest policy for both these enterprises, relevant organizations and government.

6 General Data Analysis

The research sample has total 10 listed firms in the non-banking investment and financial servies market with the live data from the stock exchange.

Firstly, we estimate equity beta values of these firms and use financial leverage to estimate asset beta values of them. Secondly, we change the leverage from what reported in F.S 2011 to increasing 30% and reducing 20% to see the sensitivity of beta values. We found out that in 3 cases, asset beta mean values are estimated at 0,574, 0,422 and 0,675 which are negatively correlated with the leverage. Also in 3 scenarios, we find out equity beta mean values (1,050, 1,038 and 1,058) are also negatively correlated with the leverage and with the smaller gap. Leverage degree changes definitely has certain effects on asset and equity beta values.

7 Empirical Research Findings and Discussion

In the below section, data used are from total 10 listed non-banking investment and financial servies companies on VN stock exchange (HOSE and HNX mainly). In the scenario 1, current financial leverage degree is kept as in the 2011 financial statements which is used to calculate market risk (beta). Then, two (2) FL scenarios are changed up to 30% and down to 20%, compared to the current FL degree.

Market risk (beta) under the impact of tax rate, includes: 1) equity beta; and 2) asset beta.

7.1 Scenario 1: current financial leverage (FL) as in financial reports 2011

In this case, all beta values of 10 listed firms on VN non-banking investment and financial servies market as following:

Table 1. Market risk of listed companies on VN non-banking investment and financial servies market

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage (F.S reports)
1	AGR	1,370	0,313		77,2%
2	APG	0,648	0,630	CLS as comparable	2,8%
3	APS	0,895	0,382		57,4%
4	AVS	0,546	0,425	CLS as comparable	22,1%
5	BSI	1,125	0,873	AGR as comparable	22,4%
6	BVS	2,159	1,592		26,3%
7	CLS	0,662	0,331		50,0%
8	CTS	0,812	0,546		32,8%
9	PVF	1,365	0,119		91,3%
10	VNR	0,922	0,525		43,0%
				Average	42,52%

7.2 Scenario 2: financial leverage increases up to 30%

If leverage increases up to 30%, all beta values of total 10 listed firms on VN non-banking investment and financial servies market as below:

Table 2. Market risks of listed non-banking investment and financial servies firms (case 2)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage (30% up)
1	AGR	1,370	-0,004		100,3%
2	APG	0,644	0,621	CLS as comparable	3,6%
3	APS	0,895	0,228		74,6%
4	AVS	0,508	0,363	CLS as comparable	28,7%
5	BSI	1,046	0,741	AGR as comparable	29,2%
6	BVS	2,159	1,422		34,1%
7	CLS	0,662	0,231		65,0%
8	CTS	0,812	0,466		42,6%
9	PVF	1,365	-0,255		118,7%
10	VNR	0,922	0,406		55,9%
				Average	55,3%

7.3 Scenario 3: leverage decreases down to 20%

If leverage decreases down to 20%, all beta values of total 10 listed firms on the non-banking investment and financial servies market in VN as following:

Table 3. Market risk of listed non-banking investment and financial servies firms (case 3)

Order No.	Company stock code	Equity beta	Asset beta (assume debt beta = 0)	Note	Financial leverage (20% down)
1	AGR	1,370	0,524		61,7%
2	APG	0,651	0,636	CLS as comparable	2,2%
3	APS	0,895	0,484		45,9%
4	AVS	0,570	0,469	CLS as comparable	17,7%
5	BSI	1,177	0,965	AGR as comparable	18,0%
6	BVS	2,159	1,705		21,0%
7	CLS	0,662	0,397		40,0%
8	CTS	0,812	0,599		26,2%
9	PVF	1,365	0,368		73,0%
10	VNR	0,922	0,604		34,4%
				Average	34,0%

All three above tables and data show that values of equity and asset beta in the case of increasing leverage up to 30% or decreasing leverage degree down to 20% have certain fluctuation.

8 Comparing statistical results in 3 scenarios of changing leverage

Table 4. Statistical results (FL in case 1)

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	2,159	1,592	0,5669
MIN	0,546	0,119	0,4268
MEAN	1,050	0,574	0,4767
VAR	0,2332	0,1694	0,0638
Note: Sample size : 10			

Table 5. Statistical results (FL in case 2)

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	2,159	1,422	0,7370
MIN	0,508	-0,255	0,7629
MEAN	1,038	0,422	0,6164
VAR	0,2372	0,2067	0,0305
Note: Sample size : 10			

Table 6. Statistical results (FL in case 3)

Statistic results	Equity beta	Asset beta (assume debt beta = 0)	Difference
MAX	2,159	1,705	0,4535
MIN	0,570	0,368	0,2019
MEAN	1,058	0,675	0,3827
VAR	0,2314	0,1589	0,0725
Note: Sample size : 10			

Based on the above results, we find out:

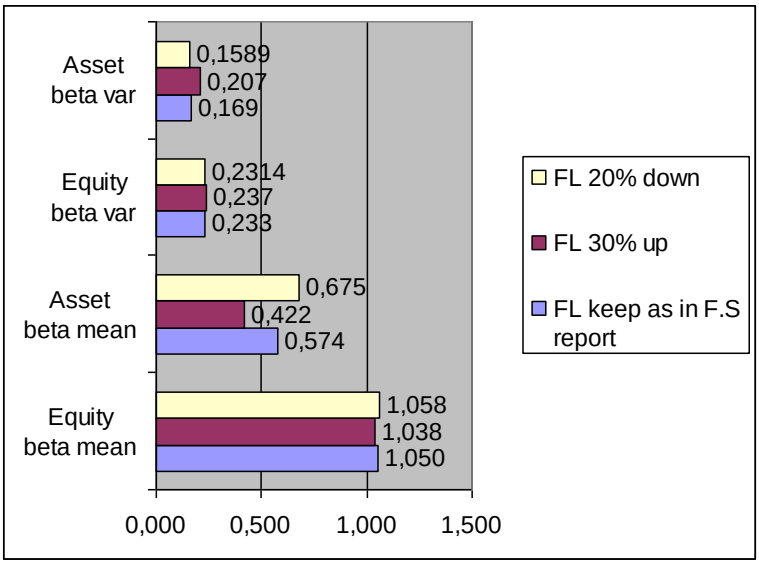
Equity beta mean values in all 3 scenarios are little high (< 1,1) and asset beta mean values are low (< 0,7) although max equity beta values in some cases might be higher than (>) 1. In the case of reported leverage in 2011, equity beta value fluctuates in an acceptable range from 0,546 (min) up to 2,159 (max) and asset beta fluctuates from 0,119 (min) up to 1,592 (max). If leverage increases to 30%, equity beta moves in a range from 0,508 (min) up to 2,159 (max unchanged) and asset beta moves from -0,255 (min) up to 1,422 (max). Hence, we note that there is a

decrease in equity beta min value if leverage increases. When leverage decreases down to 20%, equity beta value still fluctuates in a range from 0,570 to 2,159 (max unchanged) and asset beta changes from 0,368 (min) up to 1,705 (max). So, there is a small increase in equity beta min value when leverage decreases in scenario 3.

Beside, Table A.4 informs us that in the case 30% leverage up, average equity beta value of 10 listed firms decreases down to 0,012 while average asset beta value of these 10 firms decreases little more up to 0,152. Then, when leverage reduces to 20%, average equity beta value of 10 listed firms goes up to 0,008 and average asset beta value of 10 firms up to 0,102.

The below Figure 1 shows us : when leverage degree decreases down to 20%, average equity and asset beta values increase slightly (1,058 and 0,675) compared to those at the initial rate in reports (1,050 and 0,574). Then, when leverage degree increases up to 30%, average equity beta decreases little more and average asset beta value also decreases more (to 1,038 and 0,422). However, the fluctuation of equity and asset beta value (0,231 and 0,159) in the case of 20% leverage down is lower than (>) the results in the rest 2 leverage cases.

Figure 1. Comparing statistical results of three (3) scenarios of changing FL



9 Risk analysis

In short, the using of financial leverage could have both negatively or positively impacts on the financial results or return on equity of a company. The more debt the firm uses, the more risk it takes. And FL is a factor that causes financial crises in many economies and firms. Using leverage too much indicates the firm met financial distress. In special perios such as financial crisis stages, firms become more careful with capital structure and financial leverage degree.

On the other hand, in the case of increasing leverage, the company will expect to get more returns. The financial leverage becomes worthwhile if the cost of additional financial leverage is lower than the additional earnings before taxes and interests (EBIT). FL has become a positive factor linking finance and growth in many companies. Beside, leverage choice could also become a determinant of firms' capital structure and financial risk.

10 Conclusion and Policy suggestion

In summary, the government has to consider the impacts on the mobility of capital in the markets when it changes the macro policies. Beside, it continues to increase the effectiveness of building the legal system and regulation supporting the plan of developing consumer good market. The Ministry of Finance continue to increase the effectiveness of fiscal policies and tax policies which are needed to combine with other macro policies at the same time. The State Bank of Viet Nam continues to increase the effectiveness of capital providing channels for non-banking financial service companies as we could note that in this study when leverage is going to increase up to 30%, the risk level decreases much (although the asset beta var increases), compared to the case it is going to decrease down to 20%.

Furthermore, the entire efforts among many different government bodies need to be coordinated.

Finally, this paper suggests implications for further research and policy suggestion for the Viet Nam government and relevant organizations, economists and investors from current market conditions.

References

1. *ADB and Viet Nam Fact Sheet*, 2010
2. Ajinkya, Bijal., and Kumar, Mahesh., (2012), Taxation aspects of Mergers and Acquisitions, *Asia-Pacific Tax Bulletin*
3. Ang, A., Chen, J., (2007), CAPM Over the Long Run: 1926-2001, *Journal of Empirical Finance*
4. Baker, Kent H., Singleton, Clay J., and Veit, Theodore E., (2011), Survey Research in Corporate Finance: Bridging The Gap Between Theory and Practice, *Oxford University Press*
5. Barber, Joel R., and Copper, Mark L., (2012), Principal Component Analysis of Yield Curve Movements, *Journal of Economic and Finance*
6. Eugene, Fama F., and French, Kenneth R., (2004), The Capital Asset Pricing Model: Theory and Evidence, *Journal of Economic Perspectives*
7. Flifel, Kaouther., (2012), Financial Markets between Efficiency and Persistence : Empirical Evidence on Daily Data, *Asian Journal of Finance and Accounting*
8. Grullon, Gustavo., Lyandres, Evgeny., and Zhdanov, Alexei., (2012), Real Options, Volatility and Stock Returns, *Journal of Finance*
9. Hai, Nguyen Minh., Hien, Phan Tat., and Linh, Dang Huyen., (2013), Phân tích tác động của phá giá tiền tệ đến tăng trưởng kinh tế VN thời kỳ 2000-2012, *Journal of Economic Development*
10. Huy, Dinh T.N., (2012), Estimating Beta of Viet Nam listed construction companies groups during the crisis, *Journal of Integration and Development*
11. Kale, Jayant R., Meneghetti, Costanza., and Sharur, Husayn., (2013), Contracting With Non-Financial Stakeholders and Corporate Capital Structure: The Case of Product Warantties, *Journal of Financial and Quantitative Analysis*
12. Ling, Amy., (2013), Tax Issues Relating to Intangibles, *Asia-Pacific Tax Bulletin*
13. Lu, Wenling., and Whidbee, David A., (2013), Bank Structure and Failure,*Journal of Financial Econoic Policy*
14. Maria, Ana POPA (2012)., The Impact of Social Factors on Economic Growth: Empirical Evidence for Romania and European Union Countries, *Romanian Journal of Fiscal Policy*
15. Neumann, Michael., and Skiadopoulos, George., (2013), Predictable Dynamics in Higher Order Risk-Neutral Moments : Evidence From The S&P 500 Options, *Journal of Financial and Quantitative Analysis*
16. Varotto, Simone., (2011), Liquidity Risk, Credit Risk, Market Risk and Bank Capital, *International Journal of Managerial Finance*
17. www.hsx.vn/hsx/
18. www.mof.gov.vn
19. www.mofa.gov.vn/vi/
20. www.saigontimes.com.vn
21. www.tuoitre.com.vn
22. www.vneconomy.com.vn

Appendix A

Table A.1. Interest rates in banking industry during crisis

Year	Borrowing Interest rates	Deposit Rates	Note
2011	18%-22%	13%-14%	
2010	19%-20%	13%-14%	Approximately
2009	9%-12%	9%-10%	(2007: required reserves ratio at SBV is changed from 5% to 10%)
2008	19%-21%	15%-16,5%	
2007	12%-15%	9%-11%	(2009: special supporting interest rate is 4%)

Source: Viet Nam commercial banks

Table A.2. Basic interest rate changes in Viet Nam

Year	Basic rate	Note
2011	9%	
2010	8%	
2009	7%	
2008	8,75%-14%	Approximately, fluctuated
2007	8,25%	
2006	8,25%	
2005	7,8%	
2004	7,5%	
2003	7,5%	
2002	7,44%	
2001	7,2%-8,7%	Approximately, fluctuated
2000	9%	

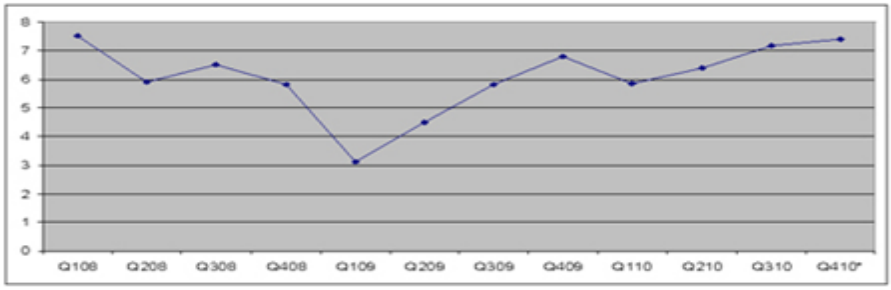
Source: State Bank of Viet Nam and Viet Nam economy

Table A.3. Inflation, GDP growth and macroeconomics factors

Year	Inflation	GDP	USD/VND rate
2011	18%	5,89%	20.670
2010	11,75% (Estimated at Dec 2010)	6,5% (expected)	19.495
2009	6,88%	5,2%	17.000
2008	22%	6,23%	17.700
2007	12,63%	8,44%	16.132
2006	6,6%	8,17%	
2005	8,4%		
Note		approximately	

Source: Viet Nam commercial banks and economic statistical bureau

Figure A.1. GDP growth Việt Nam 2006-2010



Source: Bureau Statistic

Table A.4. Increase/decrease risk level of listed non-banking investment and financial servies firms under changing scenarios of leverage : in 2011 F.S reports, 30% up, 20% down in the period 2007 - 2011

Order No.	Company stock code	FL keep as in F.S report		FL 30% up		FL 20% down	
		Equity beta	Asset beta	Increase /Decrease (equity beta)	Increase /Decrease (asset beta)	Increase /Decrease (equity beta)	Increase /Decrease (asset beta)
1	AGR	1,370	0,313	0,000	-0,317	0,000	0,211
2	APG	0,648	0,630	-0,004	-0,009	0,003	0,006
3	APS	0,895	0,382	0,000	-0,154	0,000	0,103
4	AVS	0,546	0,425	-0,037	-0,063	0,024	0,044
5	BSI	1,125	0,873	-0,079	-0,132	0,051	0,092
6	BVS	2,159	1,592	0,000	-0,170	0,000	0,113
7	CLS	0,662	0,331	0,000	-0,099	0,000	0,066
8	CTS	0,812	0,546	0,000	-0,080	0,000	0,053
9	PVF	1,365	0,119	0,000	-0,374	0,000	0,249
10	VNR	0,922	0,525	0,000	-0,119	0,000	0,079
			Average	-0,012	-0,152	0,008	0,102

Figure A.2. VNI Index and other stock market index during crisis 2006-2010

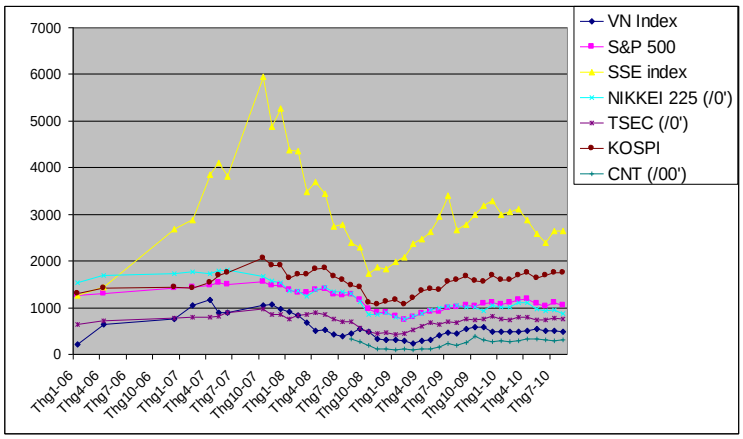
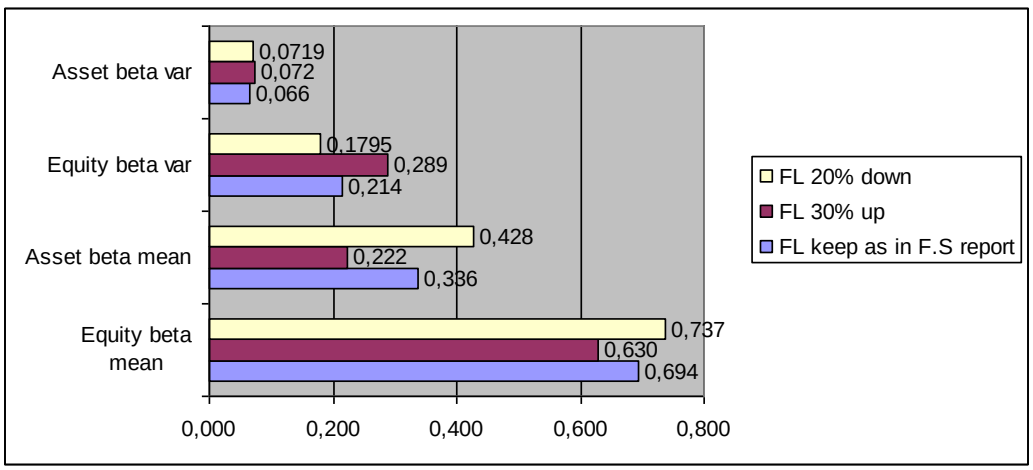


Figure A.3. Comparing statistical results of three (3) scenarios of changing FL of 121 listed firms in the consumer good industry



CHASING THE DEAL WITH THE MONEY: MEASURING THE REQUIRED RISK PREMIUM AND EXPECTED ABNORMAL RETURNS OF PRIVATE EQUITY FUNDS TO MAXIMIZE THEIR INTERNAL RATE OF RETURN

Fernando Scarpati*, Wilson Ng**

Abstract

A number of scholars of private equity ("PE") have attempted to assess the ex-post returns, or performance, of PEs by adopting an ex-post perspective of asset pricing. In doing so a set of phenomena has been recognized that is thought to be specific to the PE sector, such as "money-chasing deal phenomenon" (Gompers and Lerner, 2000) and "performance persistence" (Lerner and Schoar, 2005). However, based on their continuing use of an ex-post perspective, few scholars have paid attention to the possible extent to which these and other PE phenomena may affect expected returns from PE investments. To address this problem this article draws on an ex-ante perspective of investment decision-making in suggesting how a number of drivers and factors of PE phenomena may produce "abnormal returns", and that each of those drivers and factors should therefore be considered in accurately assessing the required risk premium and expected abnormal returns of PE investments. In making these contributions we examined a private equity investment of a regional PE in Italy and administered a telephone questionnaire to 40 PEs in Italy and the UK and found principally that while size is the most important driver in producing abnormal returns illiquidity alone cannot explain the expected returns of PE investments (*cf*. Franzoni et al., 2012). Based on our findings we developed a predictive model of PE decision-making that draws on an ex-ante perspective of asset pricing and takes into account PE phenomena and abnormal returns. This model extends the work of Franzoni et al. (2012), Jegadeesh et al. (2009), and Korteweg and Sorensen (2010) who did not consider the possible influence of PE phenomena in decision-making and will also help PE managers in making better-informed decisions.

Keywords: Risk Premium; Abnormal Returns; Private Equity Funds; Internal Rate of Return

**Bradford (Yorkshire), Roehampton (London), MIP (Milan) business schools*
Email: fascarpati@gmail.com
***Advisory board member of a publicly-quoted risk capital provider, Belgium*
Email: WilsonIng@aol.com

1 Introduction

It has been suggested that General Partners (GPs) of PE funds do not normally take an ex-ante perspective of risk and abnormal returns where intuition and experience are the main drivers of their investment decisions (Gompers and Lerner, 1997). Additionally, Limited Partners (LPs) and GPs typically extrapolate past performance to assess future expectations (Lerner and Schoar, 2005). The PE literature has offered little support for an ex-ante perspective of investment decisions, and most papers are ex-post studies that have focused on calculating past returns as a basis for making prospective decisions.

Yet scholars should recognize the importance of an ex-ante perspective in studying PEs in order to *"reduce the dangerous temptation to merely extrapolate past excess returns in shaping expectations for the risk premium"* (Arnott and Bernstein, 2002, p. 82). In this paper therefore we have sought to address the question of whether and in what way(s) an ex-ante perspective may improve investment decisions and thereby contribute to the literature on evaluating investment decisions in PEs.

Ex-post studies have assumed the existence of a set of phenomena unique to the PE sector that might influence performance, such as performance persistence (Kaplan and Schoar, 2005), money chasing deal phenomenon (Gompers and Lerner 1999, 2000), and investment speed effect (Phalippou and Gottschalg, 2009). The existence of such phenomena, which we call "PE phenomena" in this paper, weakens the accuracy of the Efficient Market Hypothesis and Capital Asset Pricing Models because PE phenomena can significantly affect performance (see, for example, Gompers and Lerner, 1999).

Yet the few risk-premium predicting models that exist (Franzoni et al., 2012; Jegadeesh et al., 2009;

Korteweg and Sorensen, 2010) suggest that illiquidity is the only additional factor to include in assessing risk premium and required investment returns. These models also do not consider how PE phenomena may produce abnormal returns and instead continue to rely on the efficient market hypothesis: *"The unconditional liquidity risk premium is about 3% annually, the total risk premium is about 18%, and the alpha (gross of fees) is not statistically different from zero"* (Franzoni et al., 2012, p. 2341). The trouble with this view is that the perceived risk and expected return drivers of PE investments refer not to the ex-post realized returns that PE investors actually achieve but to the required return that PEs expect to gain from their target investment. Here, one of the principal contributions of this paper is to suggest a number of relatively unexplored concepts, drivers and behaviors that may be observed with an ex-ante approach. Furthermore, we suggest how PE scholars and managers may compute the risk perceptions and return expectations of new investment deals by considering a range of specialized PE phenomena, including but not limited to risk and internal cost factors.

In making our contributions we explored a case of the process in which a small regional private equity fund ("REF") in Italy valued and made an investment. The core findings of this case were then examined in a telephone questionnaire of 40 PEs. Based on our observations in our case and questionnaire we suggest how PE phenomena may play an important role in valuing target investments. A more comprehensive model of PE decision-making is then developed that contributes to and complements the investment formulae of Franzoni et al. (2012), Jegadeesh et al. (2009), and Korteweg and Sorensen (2010) by drawing on an ex-ante perspective of investment decision-making that takes into account a number of specific PE phenomena as well as abnormal returns.

Our article proceeds as follows. First we discuss key gaps in the literature on investment decision-making in PEs that gives rise to our research question. We then describe our research methodology to address this question and explain how we analysed our data and produced a number of findings that form the platform for our contributions. In the following *Discussion* we introduce our model and suggest through worked examples how it extends the work of Franzoni et al. (2012), Jegadeesh et al. (2009), and Korteweg and Sorensen (2010) by demonstrating that certain PE phenomena may significantly influence investment decision-making. The paper concludes by articulating core issues arising from our research and possible directions for research.

2 Literature Review

The existing literature on evaluating risk-premium in PE can be divided into two sets of studies (Table 1 below). The first set of studies examines the return expectations and risk perceptions of PEs that adopt an ex-ante perspective. The second set explores realized returns and risks from an ex-post perspective. Additionally, these studies may be divided along two different perspectives:

- The first perspective draws from a statistical database. Authors assess Internal Rate of Return ("IRR") and infer phenomena using statistical analysis, while
- The second perspective focuses on collecting data from surveys and cases.

Table 1. Literature on Risk-Premium in PE Investments

	EX-ANTE Return Expectations / Risk Perceptions	**EX-POST Realized Returns and Risks**
Data collected from statistical databases		Peng (2001); Quigley & Woodward (2003); Emery (2003); Jones & Rhodes-Kropf (2004); Ljungqvist & Richardson (2003); Kaplan & Schoar (2005); Anson (2007); Jegadeesh et al. (2009); Kojima & Murphy (2011); Franzoni et al. (2012); Phalippou & Gottschlag (2009); Cochrane (2005); Mehra and Prescott (1985); Villalonga (2004); Lerner & Schoar (2004); Cumming & Dai (2008); Cumming (2006); Gompers et al. (2005, 2006, 2008); Kaserer & Diller (2004, 2005 , 2009); Korteweg & Sorensen (2009); Graham et al. (2002); Lopez de Silani & Gottschlag (2009); Woodward (2004); Harris et al., (2013) and many others.
Data collected by Surveys and Case Studies.	Manigart et al. (2002) Scarpati & Ng (2013)	Gompers & Lerner (1997)

Table 1 suggests that almost all studies of investment decision-making in PEs have assessed ex-post realized returns and are principally concerned with past performance and not with understanding return expectations and risk perceptions. Typically in ex-post studies PE phenomena have been considered only to the extent that their statistical effects have

been audited (see, for example, Kaplan and Schoar, 2005, and Lerner and Schoar, 2004).

Based on the literature the most important PE phenomena seem to be:

- "Money-chasing deal phenomenon": Gompers and Lerner (1999, 2000) argued that there are a limited number of favourable investments in the PE sector and that these investments are to be matched with a fluctuating capital supply,

- "Performance Persistence: GPs whose funds outperform the industry are likely to also outperform the industry in the next fund they manage, and vice versa, as fund size and flows are positively correlated with past performance (Kaplan and Schoar, 2005),

- "Speed Effect": Poorly performing funds seem to invest more slowly (Phalippou and Gottschalg, 2009),

- Big PEs versus Small PEs: Big PEs have higher gross threshold internal rates of return ("T.IRR") than small PEs as large funds tend to outperform small funds (Phalippou and Gottschalg, 2009) and may also produce economies of scale in fees whereby GPs of large funds can offer lower percentages of fees, and

- "Economies of Scope": PE performance suffers when the value-adding capacity of a management team needs to be shared across a large number of investments, and scale increases may imply diseconomies of scope whereby PEs investing in many types of firms may lose specialization and scope (Lopez-de-Silanes and Phalippou, 2008).

Most ex-post authors in Table 1 seem to be concerned with measuring investment performance without questioning the risk-return trade-off or without accurately measuring the risk-premium of deals. For instance, authors make assumptions about the value of beta: Jones and Rhodes-Kropf (2004), Kaplan and Schoar (2005), and Ljungqvist and Richardson (2003) assume betas of circa 1. On the other hand, Phalippou and Zollo (2005) compare investment performance to the S&P 500 without assessing risk-to-return trade-offs.

Other authors such as Cochrane (2005) and Phalippou and Zollo (2005) use models such as SLM-CAPM or the three-factor model of Fama and French (1993), such as Jagadesh et al. (2009), Korteweg and Sorensen (2010), and Franzoni et al. (2012) that were developed for organized markets and do not consider PE phenomena.

Risk-premium and beta are sometimes based on intuition. For instance, Gompers and Lerner (1997) found that their (single) case of an investee firm earned positive-adjusted returns of 8% per year, and they considered that this performance was sufficient to cover any additional premium arising from the firm's lack of marketability. They did not assess the required risk premium.

Franzoni et al. (2012) seem to be among a limited number of studies that appear to have offered a complete predictive model. However, their work has important limitations. First, they were not able to relate risk-premium to PE phenomena beyond illiquidity risk. Second, they based their study on past information in terms of ex-post realized returns in calculating future expected returns and the risk premium of these returns. Third, Franzoni et al. (2012) were not able to account for the opportunity cost incurred by LPs where capital committed is not invested. Fourth, factors of different nature, for example, risk, PE internal costs, and PE drivers were not distinguished from one another. Fifth, Franzoni et al. (2012) sought to eliminate "abnormal returns" and yet research suggests that we should expect abnormal returns in PE markets that are typically inefficient (Bajaj et al., 2001; Margulis et al., 2005; Mercer, 2003; Pratt, 2002). Sixth, Franzoni et al. found only an average of their database for the liquidity (illiquid minus liquid) risk factor, or IML, of 4.5% and illiquidity beta of 0.67, and they did not present a list of different levels of IML and illiquidity beta.

Here we believe that an ex-ante perspective involving case studies of the processes of decision-making in PE investments is needed to complement past research in order to:

- Learn GPs' risk perceptions and return expectations,

- Be able to measure risk-premium and expected abnormal returns taking into account PE phenomena,

- Learn how GPs assess and mitigate risk during the valuation process, and

- Provide academics and GPs with a rational tool to assess risk premium and abnormal returns that avoids any need to extrapolate from realized returns.

3 Research Methods

3.1 Context

In our research we conducted and analyzed a qualitative case study of decision-making in a PE investment within a quantitative assessment of risk premium and abnormal returns. This approach was based on a number of criteria and operationalized as follows:

- An investment 'deal' was explored in which a regional PE ("REF") invested in a small, international family business, Carpiland (CL). CL was chosen because it seemed to represent an interesting case of a potentially high yielding investment made by a local PE who assessed the investment from an ex-post perspective. Furthermore, the first author had access to a considerable amount of data on CL.

- Then, in order to explore the possible existence of intrinsic drivers in this investment data from the study were compared and contrasted with data from other PEs. For instance, as we wanted to explore if the size of our case firm was a determining factor in producing abnormal returns we adopted a statistical approach in examining cross-sectional data from our questionnaire (Appendix B).

- For our comparative exercise we chose 40 PEs of all sizes, 20 in UK and 20 in Italy. The questionnaire was conducted by telephone and was repeated twice by two researchers to diminish bias (the co-researcher was the first author's assistant, Veronica Pinero). The interviewee was a different manager in both cases.

- With our data in hand we ran Pearson's correlations to try and locate patterns in the data. Since our main concern was to analyze correlations among size and other variables we believed that we would reach saturation point with data on 40 PEs. This approach was based on Manigart et al. (2002) who also conducted a survey, in their case of 200 PEs in five countries, or 40 PEs per country. The questions posed by Manigart et al. (2002) seemed simple, requiring only a "yes" or "no" answer. Furthermore, Manigart et al. (2002) ran a quantitative analysis, and we also adopted this approach. However, due to a paucity of qualitative data Manigart et al. (2002) inferred causations behind their answers without probing why and how questions.

We took up this challenge of developing Manigart et al. (2002)'s approach by exploring more deeply why CL and other investments were made, but within a similar quantitative paradigm as Manigart et al. (2002) to address our quantitative research question. To do so we divided our sample of 40 PEs in size groups according to the level of abnormal return generated. For instance, we found that a PE with a capital in excess of €2 billion can generate circa 6% of positive alpha. In the same way we found that the breakeven point (alpha equals zero) can be found in PEs of a capital size of between €300 million and €400 million. PEs smaller than €100 million in size may generate up to 6% negative abnormal returns.

Italian and British PEs were chosen to reduce potential bias generated by culture, while we sought PEs in Italy and the UK as we were familiar with these markets. Our questionnaire and statistical analysis are attached, respectively, in Appendix A and Appendix B.

3.2 Data Collection

3.2.1 Case: Carpiland

CL is a family business specializing in natural agriculture that has operated in Parma Italy since the end of the 18th century. In 2000 CL began producing and bottling organic tomato puree and introduced a wide range of pasta sauces. The firm's turnover increased exponentially from €500,000 in 2004 to €3.3 million in 2008. However, despite this turnover CL's financial position had deteriorated and the firm was in financial distress in July 2008.

CL's owner saw only one possible exit to this problem- a capital increase. The subsequent capital raising exercise seemed to offer an attractive investment for a small private equity fund because of CL's long established business and market networks although the owner was reluctant to part control of his company. The first author then put the owner in touch with REF.

3.2.2 The Private Equity Funder: Regional Equity Fund

REF was established in 2006 with a total issued capital of Euro 20 million. Its main activity is to acquire small privately held firms and add value by reinforcing capital structure and their managerial competences, which is partly provided by the Fund. The following tables set out key data on REF:

Table 2. key data on REF

Type of PEF	Size	CAP (commitment) MM	N of companies	N of executives	Fund raised Year	PEF ex-life (L)	Speed - Years (1)	Carried Interest
REF1	Small	20	1	2	2007	15	6	8%

Type of PEF	PEF internal Fees	Net Consolidated IRR (LPs expectations & GPs target		Fees Method	Min-Max Invest
		IRR	Multiple		
REF1	2%	10,0%		over cap invested and consultancy	€ 1 Mln - 5 Mln

Where:
CAP= The capital committed.
N of Companies= The number of investments held by a PE in REF.
N of executives= The number of executives working in a PE.
PE ex-life (L)= The expected life.
Speed-Years: The expected investment speed. How many years a PE will invest its entire capital.
Carried Interests= The minimum IRR (Hurdle IRR) net of fees established by contract between LP and GPs by which GPs may keep 20% of any capital gain.
Internal Fees= Fees are calculated over the capital committed at the beginning and over capital invested at the end of a contractual period (each PE has its own contract and method).
IRR (LPs' expectations)= The net Internal Rate of Return that LPs expect to gain.

REF had a list of other investments for private transactions with entry multiples of between 7 and 9. Most of these firms were similar in size but were financially healthier. REF therefore believed it had to offer a discount for CL, which after negotiation with CL's owner was reduced from c. 40%[4] (5 times price earnings ratio) to c. 35%.

Taking the average EBITDA for 2008 and 2009, the PE valued CL at c. €800,000. As its owner insisted on keeping a majority shareholding stake REF bought a minority stake of between 42% and 48% in the firm, with an aggregate value that equated to the required capital increase of €500,000 in the form of a €400,000 loan and the balance in cash**.**

There were many contractual covenants to protect REF's interest, including its exit. However, the owner's main concern was for a share buy-back clause. In response REF waited before converting its loan into equity, whereby its investment risk was reduced from 25% to 20%.

3.3 Data Analysis

3.3.1 Expected IRR (E.IRR), Threshold IRR (T.IRR) and Hurdle IRR (H.IRR)

In our data analysis we sought to address the question of whether the premium included in the E.IRR for the CL deal was enough to offset the risk of the deal. This E.IRR was estimated for each year with values of between 47% in 2009 and 59% in 2012. To answer this question, we first sought to understand a few concepts related to the study of this case, namely, T.IRR, H.IRR, and the LPs' net E.IRR. The first concept (T.IRR) concerns the measurement of the minimum IRR necessary to offset the risk of investments in terms of the value and determinants of the equity premium required by PEs when approaching their target investments. The second concept (H.IRR) concerns the minimum IRR that has to be achieved by GPs at the end of the PE's life in order to receive part of the capital gain as a bonus. The third concept (E.IRR) concerns LPs' expectations of their earnings. All these indicators are based on an ex-ante perspective of investment performance (*cf.* Franzoni et al., 2012; *cf.* Jegadeesh et al., 2009).

In CL the value of the H.IRR was 8%, net of fees, carried interests, and other costs. However, the value of the T.IRR, gross of fees, carried interests and other costs, was estimated for each deal. How did REF estimate such an important value given that they did not appear to have any models or formulae to assess the risk of deals? The first author raised this question with REF.

REF's investment managers responded by suggesting that at least for the CL investment they drew on their perception, experience, and pressure from LPs for a minimum T.IRR and higher net E.IRR. As REF saw significant investment risk in CL due its small size and financial distress they set a high minimum T.IRR of 25% (the normal range of T.IRR is between 18% and 25%). The PE then compared this 25% with the investee' firm's E.IRR. Given that the E.IRR of between 47% and 59% estimated by CL's business plan was superior to the minimum T.IRR of 25% REF accepted the investment in CL.

Overall, the studies we have reviewed seemed to consider IRR as a unique concept (ex-post IRR / performance / realized returns) without identifying T.IRR, H.IRR or the difference between E.IRR and ex-post IRR. We believe that this approach is partly due to researchers adopting an ex-post IRR perspective, where the E.IRR or T.IRR that measures ex-ante perceived risks is no longer considered to be important, possibly for three main reasons:

- First, the typically difficult access to PEs directly may have left researchers to obtain data from public ex-post databases,
- Second, researchers seem to have observed historical data and then sought to derive prospective conclusions based on them, and
- Third, the fact that most studies were conducted in publicly organized markets with a large amount of ex-post data may have influenced authors to draw on ex-post information to predict future premiums.

3.4 PE Phenomena in the Data

By contrast, by adopting an ex-ante perspective to draw on PE phenomena we observed that REF's investment in CL seemed to reveal a number of patterns and particular phenomena that do not recall traditional finance theory. Given the space limitation of this article we present and discuss here a number of PE phenomena that we observed with the potential on the basis of our case to make a significant impact on expected returns, but we also observed a number of other PE phenomena among those that we set out in another article (Scarpati & Ng, 2013), but whose impact seemed less clear:

The "Money-chasing deal phenomenon": Our statistical analysis in Appendix B suggests a high correlation between size and the EBITDA entry discount. One of the main aspects of REF's investment in CL was the low valuation compared with other, comparable transactions: A 5.5 times multiple of EBITDA with a discount of 35%. This high discount seemed to be based on the following drivers:

- CL's circumstances of financial distress, and
- REF's investment in CL in a situation where REF had no competition as the owner did not look for competing funders.

[4] The real reason for such a discount- as we will show in our Discussion section- was not only the risk involved in the deal but the need to offset diseconomies of scale. Small funds such as REF believe that they need to buy at deep discounts in order to perform.

In our sample questionnaire (Appendix A) most PEs suggested that GPs typically sought to "buy cheap" to obtain higher E.IRRs, and therefore that GPs should seek investments where competition was as low as possible and where the number of potential investments is a key factor.

Performance persistence: The high correlation between size and E.IRR implies that larger PEs have access to better deals (Appendix B). In addition, the questionnaire in Appendix A suggests that the T.IRR of REF is lower than that of larger PEs and this may be because PEs do not look entirely at the risk involved in a deal but at their LPs' expectations. This was the opinion of most GPs we questioned.

Fees-effect and economies of scale: The high correlation between fees and size seems to confirm this phenomenon (Appendix B). The annual management fee of 2% is high compared with other large PEs (Appendix A). This implies diseconomies of scale and the T.IRR should be higher to offset this level of fees.

Investment speed-effect: In Appendix B we show a high correlation between the speed of investment and its T.IRR: The larger the T.IRR, the lower the speed. At the time of this investment in November 2008 REF had over one year of its life remaining, and of its €20 million capital under commitment only €0.8 million had been invested. There were no investments other than CL under consideration and REF's senior executives felt pressured by their LPs to make more investments. After three years the fund's IRR was c. 20% compared with its internally agreed T.IRR of 25% and E.IRR of 47%. GPs recognized that they might have been too optimistic in their investment objectives. In addition, REF's T.IRR was correlated with its net T.IRR, which suggests that its LPs' expectations were considered when estimating the fund's T.IRR as the higher the LPs' expectations based on past performance, then the higher the T.IRR (Phalippou and Gottschalg, 2009). This also suggests that investment premium may be driven by expectations and not by risk.

PE non-pecuniary drivers: The owner's objectives in the case may not only be to maximize returns but to preserve the family's wealth, its prestige and history. This view seems to have influenced his negotiations, the value of the deal, and its T.IRR.

Big versus small PEs: We were able to confirm the presence of this phenomenon with the high correlation shown in Appendix B.

4 Discussion

Based on our findings, to address our research question we introduce and discuss a new model that seeks to extend and complement the work of Franzoni et al. (2012). Principally we shall demonstrate how we extend their model of decision-making in PE investments by adopting an ex-ante perspective of investment decision-making to account for a number of drivers that may significantly influence risk and produce abnormal returns but which have not usually been considered in the literature.

4.1 Regional Equity Fund's Calculation of T.IRR

While REF's managers suggest that they draw on intuition and experience to assess T.IRR, the basis of estimating the value of T.IRR is in fact the value of the net IRR expected by LPs. In our questionnaire LPs said that they expected net IRR to be 10%:

$$\text{T.IRR} = \text{net LPs T.IRR} + \text{Fees} + \text{Carried Interests} + \text{Other costs (1)} + \text{deal premium} \quad (1)$$

(1) Other Costs: Mainly consultants' fees. REF does not consider the opportunity cost of capital committed and yet not invested although LPs have pressed them to do so.

Yet based on this formula REF's managers computed the T.IRR of CL as follows:

$$\text{T.IRR} = 10\% + 2.5\% + 2\% + 1.5\% + 19\% = 25\%$$

Here it is interesting to observe that although the targeted net IRR is 10%, REF seems to have considered an investment risk premium of 19%. According to REF this premium was based on the following criteria:

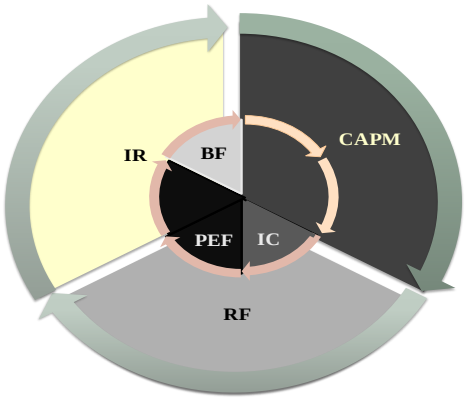
- Setting a protection margin,
- Taking into account the perceived risk of the deal, and
- Setting a minimum, achievable IRR based on past experience.

Instead of a systematic analysis of the factors and drivers of potential investments these criteria that were based on intuition and experience seemed to lie at the heart of REF's decision to invest in CL.

4.2 The Ex-Ante Model Explained

By contrast, we believe that all returns including "abnormal returns" in privately held firms may be systematically assessed. In fact, we believe that abnormal returns should be a consequence of the PE phenomena that Franzoni et al. (2012) do not consider in their model. Based on our case our model begins to identify a number of the drivers affecting risk premium and expected abnormal returns and to classify them accordingly.

Figure 1. General Classification of all Drivers



Source: Scarpati & Ng (2013)

Figure 1 divides all our drivers outlined in this paper into three main groups:

First: Factors that are governed by TFT. Being risk factors, they are "CAPM".

Second: Factors that don't belong to TFT but include rational and non-risk factors (RF).

Third: Factors that are not rational but behavioral. These are also non-risk factors (IR).

Figure 1 has a further classification:

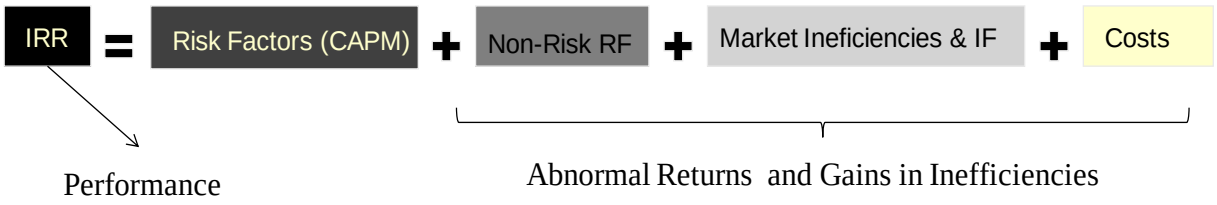
PE (Factors), which refer to the PE phenomena already seen.

Internal Costs (IC) are factors that also include PEs' internal costs such as fees, carried interests, opportunity costs, etc. These are non-risk factors but are rational.

Behavioural drivers include for instance, intuition in assessing risk-premium and an owner's sentimental attachment to his family-owned firm, as in CL.

Let us now present the following, preliminary formula of our model based on our findings in this case that seeks to identify factors according to their nature:

Figure 2. Preliminary formula of our model



Additionally, an external and highly influential factor outside the above formula may be that most PE phenomena generating abnormal returns have size as perhaps *the* core driver, namely, the size of the sponsoring PEs. This view is supported by recent research suggesting that bigger funds perform better, for example, due to experience, professionalism, and economies of scale (Harris et al., 2013; Kaplan and Schoar, 2005; Phalippou and Gottschalg, 2008; Phalippou and Zollo, 2005; Willis, 2009). For example, Harris et al. (2013) found that PEs below €250 million in capital destroy value, although this is time-dependent given changes in the PE market.

Having suggested that that the core driver for most PE phenomena might be the size of the sponsoring PE, we may now calculate the Big minus Small price-to-earnings factor of our sampled PEs (Big minus Small PE= the T.IRR for big funds minus the T.IRR for small funds) based on our close correlation in our analysis of PE size and performance (please see Appendix B). This factor is 13.8%[5]. However, in order to contribute to the model of Franzoni et al. (2012) we need to assess if this figure should be considered as positive or negative alpha. The answer to this question has to do with the size and in particular with the entry discount rate of investments.

In our assessment PEs that are not able to buy at market prices would already be destroying value at the start of a transaction. They do not have the skills, the size, the economies of scale and the access to good deals to create value, and thus have to buy cheaper than the market (this issue was mentioned by all small

[5] We apply the same methodology used by most authors who seek to modify CAPM. For instance, Franzoni et al. (2012) calculate liquidity minus illiquidity to assess the risk-premium of IML. Fama and French (1993) also calculate "Small minus Big" caps to assess risk-premium for the size factor.

PEs questioned and may be observed in both our Appendices). We could argue that such discounts are due to the risk involved in the deals that are chosen by smaller PEs. However, this is not quite true since such risks are not considered in the T.IRR. Instead, they have lower T.IRR, which in general might generate expected negative alphas. As a REF manager suggested: "*We have to buy cheaper than most big PEs to offset our diseconomies of scale. We need to find deals in which no competition is present and where the entrepreneur needs to sell*".

4.3 Applying our Ex-Ante Model to CL

In applying our model to analyze REF's investment in CL let us begin by setting out and applying the model of Franzoni *et al*. (2012) in analyzing the CL investment and then suggest how we may extend the model and offer a more comprehensive and accurate valuation of the investment. First, Franzoni et al. (2012) estimated risk premium and the cost of capital for PEs using the three-factor investment decision model of Fama and French (1993) and added a new factor: The Pastor and Stambaugh (2003) liquidity factor. The four-factor formula including the Liquidity Factor of Franzoni et al. (2012) is as follows:

$$E(R) = Rf + \beta * Rm + (\beta s * Rs) + (\beta v * Rv) + (\beta\ liq * R\ liq) \quad (2)$$

Where the new factor added is the liquidity: (β liq * R liq).

In the above formula the average result for PEs reported in Franzoni et al. (2012) was a liquidity premium of 4.5% annually, with an annual market risk premium of 7.5%. The HML and SMB average premiums were 4.9% and 2.9% annually, respectively. Furthermore, the illiquidity average beta was 0.67. In sum, the four-factor model produces a very high risk-premium and cost of capital of c. 24% compared with the three-factor model.

In our case, CL's Risk Factors were these:

*E(R) = Rf + β * Rm + (βs * Rs) + (βv * Rv) + (β liq * R liq)*
Where Rf = 4%,
Rm = 5%
βfood = 0.7 → βleveraged = 1.3 (using Hamada equation)
SMB = 3%
βsize = 1.4
HML = 5%
βgrowth = 0.8

(These data on CL considered its sector, size, and growth factors.)
And Liq = 4.5%
βliq = 1
Therefore, E(R) = 23.4%

Internal Cost Factors

Fees = 2.0% per year.
Expected life of the PE =15 years.
REF obtains fees as follows: First 2 years over capital committed, 7 years over capital invested, and nothing for the last two years.
First three years = 2% x euro 20MM x 2 years = Euro 400,000.
Second 6 years = 2% x euro 20MM x 10 years / 3 years = Euro 600,000. This equation is divided by three years as GPs do not expect to have all their capital invested after 10 years.
Total Expected Fees (estimation) = Euro 1,000,000
Total Expected Fees over Capital Committed = 5%

Carried Interest:
Minimum IRR = T.IRR= 22%
Hurdle Rate = 8%
Expected capital Gain = 22% - 8% = 14%
Total Carried Interest = 20% over capital gain = 20% x 14% = 2.8%

Opportunity Costs:
Expected Investment Speed (EIS) = 6 years
LPs return while capital is not invested = 2%
Expected life of the fund = 15 years
LPs return expectations = 10%
Total Opportunity Costs (OC) = (10% - 2%) = 8%
Yearly Expected OC = $= \frac{8\% \times (6/2)}{15} = 1.6\%$[6]

Total Internal Costs = 5% + 2.8% + 1.6% = 9.4%.

Therefore the T.IRR of REF (minimum return to offset systematic risks and costs) should be around 33%, which is considerably higher than their actual, maximum T.IRR of 25%

The above calculations seem to confirm what many authors have said about small funds destroying value (see, for example, Kaplan and Schoar, 2005; Phalippou and Gottschalg, 2008; Phalippou, 2012). However, our contributions in this paper begin at this point as we assess the PE phenomena in our data and the expected abnormal return that our case may generate.

Appendix A suggests that below a capital committed of approximately €350 million the entry discounts become negative and therefore we assume that those PEs generate negative alphas driven by the

[6] In this equation we have divided EIS by two as GPs do not expect to invest all their capital after 6 years in a day! On the contrary, investment is often an extremely slow process that typically considers that at the midpoint of a PE's life only half of the capital has been invested. All costs are then divided by the life of the PE to obtain the annual internal cost.

PE phenomena. The following table shows the alphas for each group of PEs in terms of size:

Table 3. The alphas for each group of PEs in terms of size

	PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10	PE11	PE12	PE13	PE14
CC	4000	3500	3000	2700	2400	2200	1700	1300	1000	800	700	650	500	400
Alpha	6%	8%	7%	6%	6%	6%	3%	3%	3%	3%	3%	0%	1%	0%
Ave Alpha	**6,6%**					**3,5%**						**0,3%**		
	PE15	PE16	PE17	PE18	PE19	PE20	PE21	PE22	PE23	PE24	PE25	PE26	PE27	PE28
CC	350	300	260	250	230	200	190	160	150	140	140	130	120	100
Alpha	-1%	-2%	0%	2%	-1%	-2%	-1%	-2%	-1%	-2%	-1%	0%	-5%	-2%
Ave Alpha	**-0,7%**						**-1,8%**							

	PE29	PE30	PE31	PE32	PE33	PE34	PE35	PE36	PE37	PE38	PE39 / REF	PE40
CC	90	80	70	60	55	50	40	35	30	25	20	10
Alpha	-2%	-7%	-7%	-2%	-7%	-4%	-7%	-9%	-7%	-7%	-4%	-9%
Ave Alpha	**-6%**											

In the above tables the total abnormal returns of investments is circa 12%, from -6% to 6%, with the coefficient (μ) from -0.5 to 0.5. These results may be expressed in the following formula:

$$E(R) = Rf + \beta * Rm + (\beta s * Rs) + (\beta v * Rv) + (\beta\ liq * R\ liq) + \alpha\ (Jensen's\ alpha)$$
$$E(R) = Rf + \beta * Rm + (\beta s * Rs) + (\beta v * Rv) + (\beta\ liq * R\ liq) + (\mu\ abnormal * R\ abnormal) \quad (3)$$

Where R =12%; μ goes between -0.5 and 0.5; in REF μ is -0.3 and μ * R abnormal is -4%.

Our case produced an alpha of -4% although the average of its group is -6%. We previously assessed the T.IRR of our REF as approximately 33%, but we can now calculate E.IRR by just adding the expected alpha for this PE.

The nature of PEs' returns as well as their expectations (E.IRR) also includes abnormal returns:

$$E.IRR = Risk\text{-}Adjusted\ Return + Abnormal\ Return$$
$$E.IRR = Gross\ T.IRR + Jensen's\ alpha \quad (4)$$
$$E.IRR = Gross\ T.IRR + \sigma$$

Where σ represents those factors, some of which are PE phenomena and others of which are behavioral determinants, that drive abnormal returns (Jensen's alpha).

In CL therefore: E.IRR = 33% - 4% = 29%.

We interpret the meaning of this last formula and values in our case as follows:

First, CL will have to increase its T.IRR to 33% to be able to offset both internal costs and risks. Second, as the size and PE phenomena might generate an abnormal return of -4% CL should look for business plans with an E.IRR of at least 37% to achieve the 33% T.IRR. REF in line with many other funds of €350 million and below may have to address negative PE phenomena (Phalippou, 2012; Phalippou and Gottschalg, 2008). In our sampled PEs, including REF, the E.IRRs of their business plans were much higher than 37%, but a number of as GPs suggested that these plans were probably too optimistic and resulted from pressure from LPs. The problem is that GPs and LPs may not be aware of these issues and might believe that they are still creating value and positive alphas despite discounted entry prices[7].

Based on differences among our sampled PEs let us suggest how PEs with different characteristics may strategically position themselves in terms of the phenomena and drivers shown in our model. For instance, in the following figure three PEs, including REF, are strategically positioned based on their size and growth.

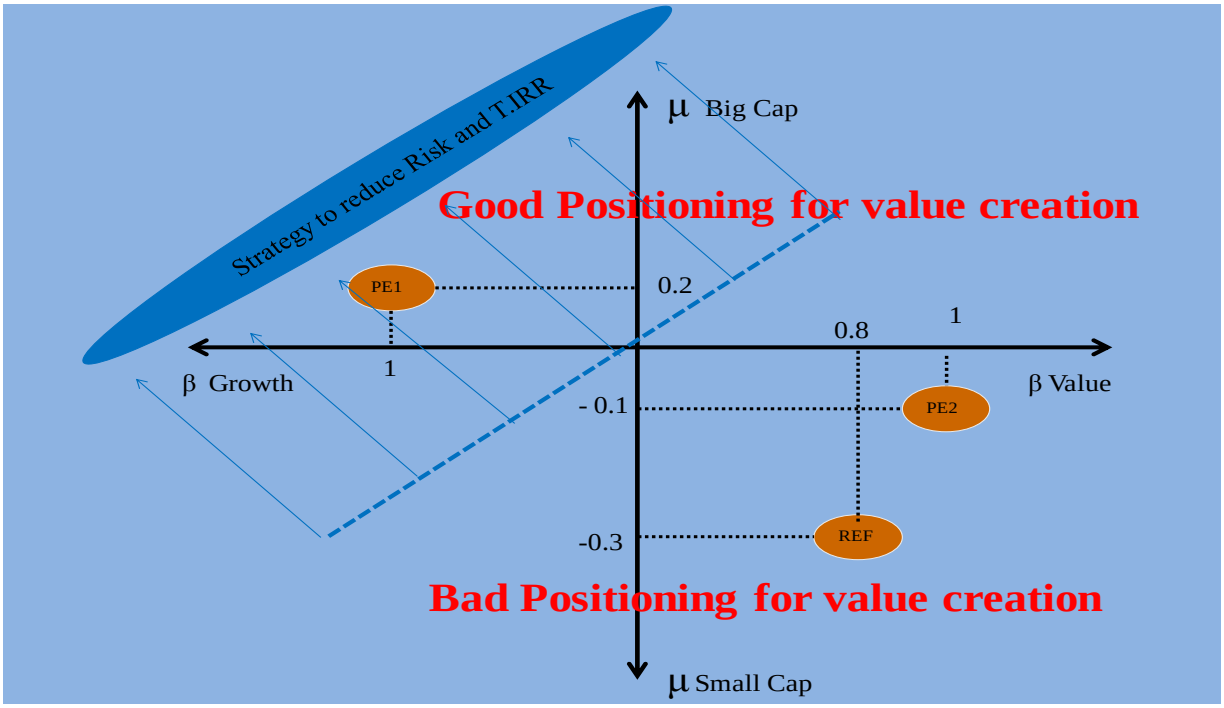
This figure suggests that PEs positioned over the x-axis may generate positive abnormal returns and that funds implementing strategies towards the blue arrows are likely to reduce risk. The following investment strategies may therefore mitigate the impact of abnormal returns:

- "PE1" is a PE in a "good" position, with positive expectations of abnormal returns, and it expects to generate c. 2% positive abnormal returns due to the influence of PE phenomena. Its investment strategy focuses mainly on rapid-growth firms, which reduces risk and therefore the T.IRR.
- "PE2" is a medium-to-small fund that generates insignificant abnormal returns. It also has a riskier portfolio (old and mature firms), and it seeks an investment strategy to reduce risk and offset abnormal returns in order to reach the blue line. To do so PE2 should alter its strategy by increasing its fundraising activity to augment its size and develop its investment portfolio, specifically to invest more expansion capital in high growth, later stage ventures, while lowering its leverage.

[7] There is a driver that might run contrary to our model: Economies of scope (Lopez-de-Silanes and Phalippou, 2008). This phenomenon may negatively affect the performance of bigger size. However, a more recent study (Humphery-Jenner, 2012) found that big funds lose scope only when the size of investee firms is small. Humphery-Jenner (2012) concluded that big funds should buy big firms. Consequently, since we are in an ex-ante perspective of investment strategy, we may assume that big PEs will normally buy big firms. In our sample, the bigger the PE, then the bigger the firms in its portfolio.

Compared with PE1 and PE2, REF is a very small fund with high abnormal return expectations. It invests in high-risk firms such as CL that are in financial distress. Based on the above figure, an alternative, more valuable strategy for REF might instead be to reduce risk by focusing on low-risk investments, concentrate on expansion capital, and buy at lower prices, for example, based on high entry EBITDA discount rates.

Figure 3. Strategic Position of PEs with Information on Ex-ante PE Phenomena



5. Conclusions

By analyzing REF's decision to invest in CL we have introduced and explained a number of concepts and drivers that were previously neglected in assessing risk and returns in PE investments. In our questionnaire to 40 PEs we found high correlations among size, T.IRR and other variables that seem to support the existence of specialized PE phenomena generating abnormal returns. We have also shown that PE size is among the most important drivers of PE phenomena, which supports the findings of many other authors, such as Kaplan and Schoar, 2005, and Phalippou and Gottschalg, 2008 but have done so in a context in which size is one of several identified PE phenomena, all of which may impact on investment returns in PE firms.

Here we have contributed to the work of Franzoni et al. (2012), Jegadeesh et al. (2012), and Korteweg and Sorenson (2010) by extending their model to account for a number of PE phenomena, and importantly to do so by adopting an ex-ante approach in assessing risk and return in a "live" example of a PE investment. In this assessment we have probed deeply into the required risk-premium and abnormal returns that may be expected of PE investments, and have explored T.IRR, H.IRR, E.IRR and their relationships in determining risk and possible returns of PE investments. We have then shown from an ex-ante perspective the operationalization of a number of specifically PE phenomena and have demonstrated that PE investments can generate positive or negative alphas, in contrast to Franzoni et al. (2012) who without considering the possible impact of PE phenomena suggested that PE investments should only generate positive alphas. Based on this impact it turns out that firm size is one of the most important drivers in generating either positive or negative alphas from abnormal returns.

In developing our findings we built on the work of Franzoni et al. (2012), Jegadeesh et al. (2009), and Korteweg and Sorensen (2010) by setting out a model that specifically considered the nature and effects of PE phenomena and abnormal returns. Here we have suggested how the work of these scholars may be usefully expanded to include a range of drivers and factors that are specific to the PE sector and which may provide the basis for a more accurately predictive model for the investment decisions of PEs. In doing so we have also provided rare, empirical evidence of PE decision making and shown through worked examples how investment decisions may be more informed by applying our predictive model. In this model we emphasized the importance of an ex-ante perspective in avoiding the tendency to extrapolate from past returns in computing the risk premium of PE investments. Additionally, in making these scholarly contributions we have argued in favour of observing

specific factors, some of which are PE phenomena and others of which are behavioral determinants, that drive both the required risk premium and expected abnormal returns.

Our second contribution is directed at PE managers. The key benefit of our model for those fund managers is that it allows them to balance their portfolios with greater or lesser exposure to each of the specified risk factors, and accordingly they may target more precisely different levels of expected return. Based on our findings in a single study we cannot and do not deny the role of intuition and experience in assessing deals, but we believe that our rational model may provide a useful tool to generate value for PEs by identifying a number of specific drivers and factors that may significantly increase or decrease risk in investment deals and by setting out a preliminary model for operationalizing each driver and factor in deal analysis. Specifically, GPs should include and assess *all* PE phenomena in order to more accurately evaluate the required risk premium, T.IRR, and expected abnormal returns of their investments.

Future research may deepen and broaden our ex-ante perspective with a larger number of more varied cases of different sizes and risk profiles. Knowledge from these cases should then feed into the development of a more sophisticated and refined ex-ante model. For example, in this paper we have measured firm size as the only driving factor, while future research may consider quantifying various factors we have identified, such as money-chasing deal phenomenon and performance persistence, that are driven by firm size.

References

1. Anson, M. "Performance Measurement in Private Equity: Another Look." The Journal of Private Equity, Summer 2007, pp. 7-22.
2. Arnott, R.D., and P. Bernstein. "What Risk Premium is 'Normal'?" Financial Analysts Journal, Vol. 58, No. 2 (2002), pp. 64-85.
3. Bajaj, M., Denis, D.J., Ferris, S.P., and A. Sarin. "Firm value and marketability discounts" Journal of Corporation Law, 27(1), (2001) pp. 89-116.
4. Cochrane, J.H. "The Risk and Return of Venture Capital." Journal of Financial Economics, Vol. 75, No. 1 (2005), pp. 3-52.
5. Cumming, D.J. "The Determinants of Venture Capital Port-folio Size: Empirical Evidence." Journal of Business, 79 (2006), pp. 1083-1126.
6. Cumming, D.J., and N. Dai. "Limited Attention: Fund Size and Valuation." EFA 2008 Athens Meetings Paper, 2008. Available at SSRN: http://ssrn.com/abstract=1099465
7. Emery, K. "Private Equity Risk and Reward: Assessing the Stale Pricing Problem." The Journal of Private Equity, Spring 2003, pp. 43-50.
8. Fama, E.F., and K. French. "Common Risk Factors in the Returns on Bonds and Stocks." Journal of Financial Economics, Vol. 33, No. 1 (1993), pp. 3-56.
9. Franzoni, F., E. Nowak, and L. Phalippou. "Private Equity Performance and Liquidity Risk." The Journal of Finance, 67 (2012), pp. 2341-2373.
10. Gompers, P.A., and J. Lerner. "Risk and Reward in Private Equity Investments: The Challenge of Performance Assessment." The Journal of Private Equity, 1 (1997), pp. 5-12.
11. ——. "An Analysis of Compensation in the U.S. Venture Capital Partnership". Journal of Financial Economics, 51, (1999), pp. 3-44.
12. ——. "Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuations." Journal of Financial Economics, 55 (2000), pp. 281-325.
13. Gompers, P.A., A. Kovner, J. Lerner, and D. Scharfstein. "Venture Capital Investment Cycles: The Impact of Public Markets." NBER Working Paper No. 11385, 2005.
14. ——. "Specialization and Success: Evidence from Venture Capital." Journal of Economics and Management Strategy, forthcoming.
15. ——. "Venture Capital Investment Cycles: The Impact of Public Markets." Journal of Financial Economics, Vol. 87, No. 1 (2008), pp. 1-23.
16. Graham, J.R., and Lemmon, M.L., Wolf, J.G. Does Corporate Diversification Destroy Value? The Journal of Finance, Vol. 57, No. 2 (2002), pp. 695-720.
17. Harris R.S., T. Jenkinson, and S.N. Kaplan. "Private Equity Performance: What Do We Know?" NBER Working Paper 17874 (2012), http://www.nber.org.papers/w17874
18. Humphery-Jenner, M. "Private Equity Fund Size, Investment Size, and Value Creation". Review of Finance, Vol. 16, No. 3 (2012), pp.67-93.
19. Jegadeesh N., R. Kraussl, and J. Pollet. "Risk and Expected Returns of Private Equity Investments: Evidence Based on Market Prices." NBER Working Paper No. 15335, September 2009. Available at: http://ssrn.com/abstract=1364776.
20. Jones, C.M., and M. Rhodes-Kropf. "The Price of Diversifiable Risk in Venture Capital and Private Equity." Working paper, Columbia Business School, 2004.
21. Kaplan, S.N., and A. Schoar. "Private Equity Performance: Returns, Persistence, and Capital Flows." Journal of Finance, No. 60 (2005), pp. 1791-1823.
22. Kaserer, C., and C. Diller. "Beyond IRR Once More." Private Equity International, July/August 2004.
23. ——. "Private Equity Funds: Return Characteristics, Return Drivers and Consequences for Investors." Journal of Financial Transformation, Vol. 15, No. 12 (2005), pp. 107-117.
24. ——. "What Drives Private Equity Returns? Fund Inflows, Skilled GPs and/or Risk?" European Financial Management Journal, 2009.
25. Kojima, J.C., and D.J. Murphy. "Hitting the Curve Ball: Risk Management in Private Equity." The Journal of Private Equity, Vol. 14, No. 2 (Spring 2011), pp. 18-42.
26. Korteweg, A.G., and M. Sorensen. "Risk and Return Characteristics of Venture Capital-Backed Entrepreneurial Companies." Review of Financial Studies, 2010.
27. Lerner, J., and A. Schoar. "The Illiquidity Puzzle: Theory and Evidence from Private Equity." The Journal of Financial Economics, Vol. 72, No. 1 (2004), pp. 3-40.

28. Ljungqvist, A., and M. Richardson. "The Cash Flow, Return and Risk Characteristics of Private Equity." NBER Working Paper No. 9454, 2003.
29. Lopez-de-Silanes F., and L. Phalippou. (2008). Private Equity Investments: Performance and Diseconomies of Scale. Preliminary working paper available at: http://www.papers.ssrn.com/sol3/papers.cfm?abstract_id=1344298.
30. Manigart, S., K. De Waele, M. Wright, K. Robbie, P. Desbrieres, H.J. Sapienza, and A. Beekman. "Determinants of Required Return in Venture Capital Investment: A Five-Country Study." Journal of Business Venturing, Vol. 17, No. 4 (2002), pp. 291-312.
31. Margulis, M.S., Krasner, J., and M.J. Melancon. "Size-adjusting beta", Valuation Strategies, 8(4), (2005), pp. 4-9.
32. Mehra, R., and E. Prescott. "The Equity Premium: A Puzzle." Journal of Monetary Economics, 15 (1985), pp. 145-161.
33. Mercer, Z. C. "A primer on the quantitative marketability discount model", The CPA Journal, 73(7), (2003), pp. 66.
34. Peng, L. "Building a Venture Capital Index." Yale Working Paper No. 00- 51, August 2001.
35. Phalippou L. "A comment on recent evidence on private equity performance", Working Paper, Said Business School, University of Oxford, Oxford. (2012). Electronic copy available at: http://www.papers.ssrn.com/sol3/papers.cfm?abstract_id=1969101.
36. Phalippou, L., and O. Gottschalg. "The Performance of Private Equity Funds." The Review of Financial Studies, Vol. 22, No. 4 (2009), pp. 1747-1776.
37. Phalippou, L., and M.G. Zollo. "Performance of Private Equity Funds: Another Puzzle?" INSEAD Working Paper, 2005.
38. Pratt, S.P. "How to use transaction databases for M&A". The Journal of Corporate Accounting & Finance, 13(3), (2002), pp. 71-80.
39. Quigley, J.M., and S.E. Woodward. "An Index for Venture Capital." University of California at Berkeley, Working Paper No. E03-333, (2003).
40. Scarpati, F., and Ng, W. "What really Drives Risk Premium and Abnormal Returns in Private Equity Funds? A New Perspective". The Journal of Private Equity, Vol.16, No. 4, Fall 2013, pp. 8-20.
41. Villalonga, B. "Diversification Discount or Premium? New Evidence from the Business Information Tracking Series." The Journal of Finance, Vol. 59, No. 2 (2004), pp. 479-506. Woodward, S.E. "M
42. Willis, A. "In Private Equity, bigger is better". Tuesday's Globe and Mail, (2005). Electronic copy available at: http://www.theglobeandmail.com/globe-investor/investment-ideas/in-private-equity-bigger-is-better/article737871/
43. Woodward S. (2004). Measuring Risk and Performance for Private Equity Sand Hill Econometrics Electronic copy available at: http://www.sandhillecon.com/pdf/MeasuringRiskPerformance.pdf.

Appendix A. PE Questionnaire based on an Ex-Ante Perspective of Investment Decision-making

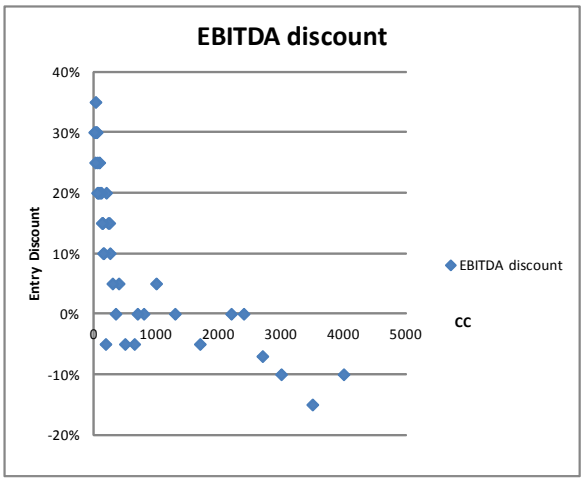
1) What is the capital committed of your PE?
2) Which modification do you apply to the market EBITDA multiples (from other similar private transactions) to value your target company? Do you pay more than the market or less? Which percentage do you normally apply (negative or positive) to market multiples?
3) Could you tell us what is your general threshold IRR to approve a deal? We mean the minimum IRR to offset LPs expectations, risks and all internal costs. In other words, what is your minimum target that is based on risk perceived in the deal?
4) What, in your opinion, are your LPs expectations in terms of net final performance?
5) At the beginning of your PE what were your expectations of investment fees?
6) What is the IRR you normally obtain for your approved business plans and deals (Expected IRR from closed deals)?
7) What typically are the percentage/s of fees you receive?
8) To assess the risk premium and threshold IRR of your target company, how far does your PE draw on a rational model (for instance: CAPM, or some version of this?) or does your PE prefers to trust managers and team skills, experience, know-how and intuition?

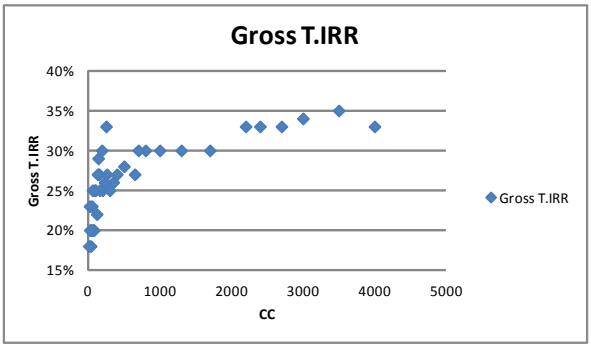
Table A.1. Answers

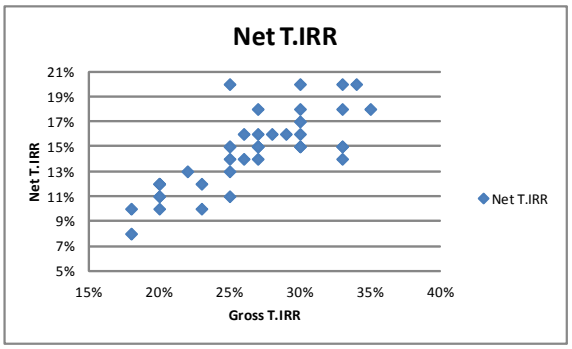
	CC	EBITDA discount	Gross T.IRR	Net T.IRR	expected Speed	E.IRR	Fees	Risk Assessement
PE1	4000	-10%	33%	20%	3	35%	1,20%	Experience
PE2	3500	-15%	35%	18%	3	35%	1,00%	Experience
PE3	3000	-10%	34%	20%	3	35%	1,25%	Rational Formula
PE4	2700	-7%	33%	15%	4	33%	1,25%	Mix
PE5	2400	0%	33%	18%	3	33%	1,50%	Mix
PE6	2200	0%	33%	15%	3	35%	1,30%	Rational Formula
PE7	1700	-5%	30%	17%	3	35%	1,20%	Experience
PE8	1300	0%	30%	18%	4	33%	1,50%	Experience
PE9	1000	5%	30%	15%	4	32%	1,70%	Experience
PE10	800	0%	30%	16%	3	33%	1,35%	Mix
PE11	700	0%	30%	15%	3	33%	1,50%	Rational Formula
PE12	650	-5%	27%	15%	4	30%	1,60%	Experience
PE13	500	-5%	28%	16%	5	30%	1,70%	Experience
PE14	400	5%	27%	16%	5	29%	1,70%	Experience
PE15	350	0%	26%	16%	5	30%	1,50%	Experience
PE16	300	5%	25%	13%	4	27%	1,50%	Experience
PE17	260	10%	27%	15%	4	28%	1,50%	Experience
PE18	250	15%	29%	14%	5	30%	1,30%	Experience
PE19	230	15%	26%	14%	3	27%	1,80%	Experience
PE20	200	20%	25%	15%	4	25%	2,00%	Experience
PE21	190	-5%	26%	20%	3	30%	1,90%	Experience
PE22	160	10%	25%	20%	5	25%	1,70%	Mix
PE23	150	10%	26%	18%	5	25%	1,50%	Experience
PE24	140	15%	25%	15%	6	30%	1,90%	Experience
PE25	140	15%	26%	16%	5	30%	2,00%	Experience
PE26	130	15%	27%	14%	5	30%	1,70%	Experience
PE27	120	20%	22%	13%	4	24%	1,70%	Experience
PE28	100	20%	25%	15%	4	27%	1,80%	Experience
PE29	90	25%	25%	14%	4	30%	2,00%	Experience
PE30	80	20%	20%	12%	5	25%	2,00%	Experience
PE31	70	20%	20%	12%	4	25%	2,00%	Mix
PE32	60	25%	25%	11%	5	27%	2,20%	Experience
PE33	55	20%	20%	11%	5	25%	2,20%	Experience
PE34	50	30%	23%	12%	4	28%	2,10%	Experience
PE35	40	30%	20%	11%	4	20%	2,00%	Experience
PE36	35	30%	18%	8%	5	20%	2,30%	Experience
PE37	30	35%	20%	10%	5	20%	1,90%	Experience
PE38	25	25%	20%	12%	5	23%	2,00%	Experience
PE39 / REF	20	30%	23%	10%	6	25%	2,00%	Experience
PE40	10	30%	18%	10%	5	23%	2,40%	Experience

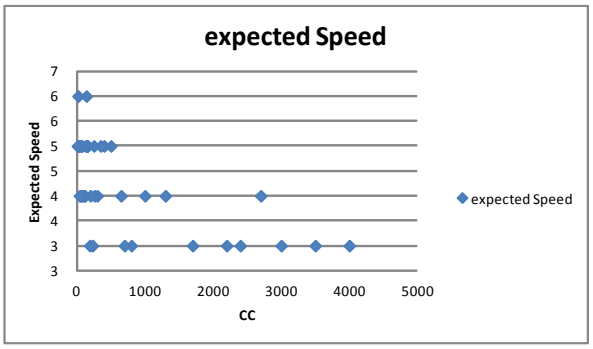
Appendix B. Statistical Analysis with an Ex-Ante Perspective

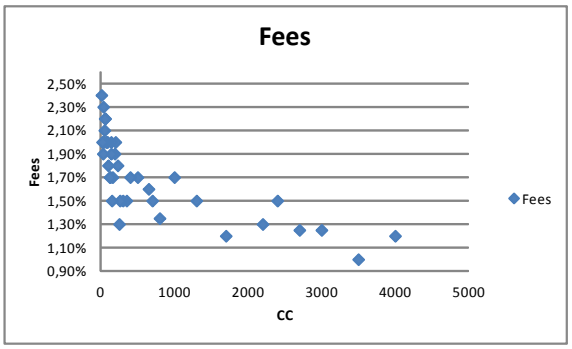
Correlation CC vs. Entry Discount	-0,74
Correlation CC vs. T.IRR	0,74
Correlation gross T.IRR vs. net T.IRR	0,78
Corralation CC vs. Speed	-0,61
Correlation CC vs. Fees	-0,74
Correlation CC vs. E.IRR	0,56
Average T.IRR biggest five	33,6%
Average T.IRR Smallest five	19,8%
BMSP (big minus small Pes)	13,8%
Total Average T.IRR	26,5%
Minimum CC for PE that can buy at market values	551
Average of those PE that cannot buy at market values	103

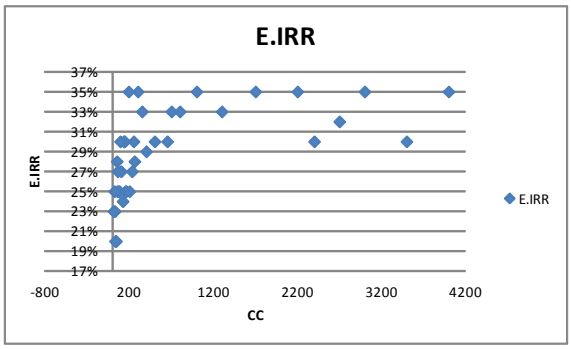












SUBSCRIPTION FORM
TO "CORPORATE OWNERSHIP & CONTROL", "CORPORATE BOARD: ROLE, DUTIES & COMPOSITION", "RISK GOVERNANCE & CONTROL: FINANCIAL MARKETS & INSTITUTIONS", "JOURNAL OF GOVERNANCE AND REGULATION"

Copy this form and follow guidelines to fill it up. I would like to buy (underline what you choose):

For individual subscribers:

1. Journal of Corporate Ownership & Control:
   1.1. Printed version of the journal - US$260 / €220.
   1.2. Electronic version - US$185 / €150.
2. Corporate Board: role, duties & composition:
   2.1. Printed version of the journal - US$240 / €190.
   2.2. Electronic version - US$180 / €145.
3. Risk Governance & Control journal: financial markets & institutions:
   3.1. Printed version of the journal - US$240 / €190.
   3.2. Electronic version - US$180 / €145.
4. Journal of Governance and Regulation:
   3.1. Printed version of the journal - US$240 / €190.
   3.2. Electronic version - US$180 / €145.

For institutional subscribers:

1. Journal of Corporate Ownership & Control:
   1.1. Printed version of the journal and electronic subscription - US$1240 / €890.
   1.2. Printed version of the journal - US$1080 / €790.
   1.3. Electronic version - US$730 / €650.
2. Corporate Board: role, duties & composition:
   2.1. Printed version of the journal and electronic subscription - US$820 / €760.
   2.2. Printed version of the journal - US$960 / €720.
   2.3. Electronic version - US$650 / €590.
3. Risk Governance & Control journal: financial markets & institutions:
   3.1. Printed version of the journal and electronic subscription - US$920 / €790.
   3.2. Printed version of the journal - US$860 / €620.
   3.3. Electronic version - US$550 / €490.
3. Journal of Governance and Regulation:
   3.1. Printed version of the journal and electronic subscription - US$920 / €790.
   3.2. Printed version of the journal - US$860 / €620.
   3.3. Electronic version - US$550 / €490.

Underline one of the payment methods you prefer, and write amount to pay (if you prefer, you can pay by one cheque/bank transfer to subscribe to both journals):
1. I enclose a cheque for US$ / €_____;
2. Send me an invoice for US$ / €_____ (indicate currency correctly).
Write your contact details here:

Name_____
Position_____
Institution_____
Address_____
E-mail_____Tel_____Fax_____

Please, send this form (with a cheque if you prefer to pay by cheque) at:

Dr. Alexander Kostyuk
Publishing house "Virtus Interpress"
Postal Box 36
Sumy
40014
Ukraine
Ask for invoice by fax at +380-542-698125 (if you want to pay by bank transfer).
Enter our web-site to download the subscription form at www.virtusinterpress.org.
If you prefer, you can subscribe through our global subscription agents – SWETS INFORMATION SERVICES of EBSCO.

LIBRARY RECOMMENDATION FORM PLEASE FORWARD THIS FORM TO YOUR INSTITUTION FOR ORDER CONSIDERATION

To: Subject Librarian_____
From: _____
Title:_____
Department: _____
Email:_____

I would like the library to order the titles selected below:

- **Corporate Governance: An International Outlook - *ISBN 978-966-96872-2-7*** (390 pages, year of publishing - 2011, authors: Dr. Alexander Kostyuk, Professor at Ukrainian Academy of Banking (Ukraine), Dr. Carsten Gerner-Beuerle, Professor at London School of Economics (The UK), Dr. Rodolfo Apreda, Professor at Universidad del CEMA (Argentina) - price - EURO 56
Number of copies -_____
- **Anti-Crisis Paradigms of Corporate Governance in Banks: a new institutional outlook - *ISBN978-966-96872-0-9*** (482 pages, year of publishing - 2010, authors - Alexander N. Kostyuk, Fumiko Takeda, Kaoru Hosono, ***introduced by Oliver Williamson, a Nobel Prize Winner 2009*** - price - EURO 68
Number of copies -_____
- **Corporate Governance: *a textbook - ISBN978-966-96872-0-3*** (400 pages, year of publishing 2007, authors - Alexander N. Kostyuk, Udo C. Braendle, Rodolfo Apreda) - price - EURO 58
Number of copies -_____
- **Corporate Governance in a Transition Economy: *a monograph - ISBN966-96566-0-5*** (155 pages, year of publishing - 2005, author - Alexander N. Kostyuk) - price - EURO 38
Number of copies -_____
- **Corporate Board Practices: *a monograph - ISBN966-96566-1-3*** (156 pages, year of publishing - 2006, author - Alexander N. Kostyuk) - price - EURO 38
Number of copies -_____
- **Euroasian Perspectives Of The Banking Systems Development - *ISBN 978-966-96872-2-7*** (170 pages, year of publishing - 2011, authors: Dr. Oleksandr Kostyuk, Dr. Michelle Lin, Dr. Ghassan Omet - price - EURO 24
Number of copies -_____

I want to order all books in the list. Total price - EURO 255.

I recommend this book(s) for the following reasons:
- I need to refer to this information frequently in the course of my work.
- This book(s) is directly related to my field and is an important source of information for my research.
- It is critical that students have access to this information to best facilitate their course work and academic pursuits.
- This is an obligatory course book
- Additional reasons:
Signature: _____ Date :_____

Information on these books may be obtained from the Publisher's Website:
http://www.virtusinterpress.org
Please send all orders and inquiries to:
Publishing company "Virtus Interpress"
Postal Box 36
40014
Sumy, Ukraine
E-mail: alex_kostyuk@virtusinterpress.org, alex_kostyuk@mail.ru