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The international telecommunications sector: a financial investigation of post privatisation performance

Al-Shafi, Nasser Mubarak Shafi

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University of Plymouth

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The International Telecommunications Sector: A Financial Investigation of Post-Privatisation Performance

By

Nasser Mubarak Shafi Al-Shafi

A thesis submitted to the University of Plymouth Business School in partial fulfilment for the degree of

DOCTOR OF PHILOSOPHY

IN FINANCE

The University of Plymouth Business School

February 2003
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Nasser Mubarak Al-Shafi

Abstract

The focus of this thesis is an investigation of the post-privatisation performance of the international telecoms sector. Firstly, the general hypothesis (1) of this thesis has been pursued, which states that the privatised telecoms companies perform differently from their non-privatised (private) counterparts. Several tests were applied; namely, ANOVA, and multiple regression analysis. The principal finding was that there was no significant difference in performance.

Secondly, the next hypothesis (2) states that the financial performance of each company is positively related to that of the other two selected companies. For this purpose, multiple regression tests were performed to investigate any inter-relationships between BT, AT&T and NTT. It was found that the performance of each was affected by the other companies.

Thirdly, the next hypothesis (3) states that, in a global market, company performance is related more closely to the sector than to each respective stock market. It was found that performance was affected more significantly by their respective stock markets than by competitor global players.

Fourthly, the next hypothesis (4) states that, in terms of competitive advantage, NTT exhibits through time a superior position compared with BT and AT&T on account of its monopoly position. It was found that monopoly was not an issue.

Fifthly, the next hypothesis (5) states that, of the three global players, AT&T is more adversely affected in its competitive advantage on account of its having a weaker monopoly position. It was found that AT&T had a competitive advantage from 1990 to 1993. BT took the lead until 2000, then NTT forged ahead after the Japanese market started to become more liberalised in terms of competition. Original tests were performed regarding the changing degree of competitive advantage of these three companies. This required an evaluation of the relationship between competitive advantage and price-earnings inverses, capital asset pricing model derived rates of return and dividend-based rates of return. A random walk with drift model was also applied, in order to evaluate forecasted trends.

Finally, BT’s short-term debt-financing problems were examined. To overcome these difficulties, BT raised funds via a rights issue, selling off Yell and other profitable assets and de-merged their mobile company. It was found that the strategic risk probability of a failed rights issue was quite small.
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<tr>
<td>$\beta$</td>
<td>Beta</td>
</tr>
<tr>
<td>3G</td>
<td>Third Generation Mobile</td>
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<tr>
<td>ANOVA</td>
<td>One Way Analysis of Variance</td>
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<tr>
<td>APT</td>
<td>Arbitrage Pricing Model</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>American Telegraph and Telephone- Public Telecommunications Operator (USA)</td>
</tr>
<tr>
<td>B/M ratio</td>
<td>Book to Market Ratio</td>
</tr>
<tr>
<td>BA</td>
<td>British Airways</td>
</tr>
<tr>
<td>BAA</td>
<td>British Airport Authority</td>
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<tr>
<td>Batelco</td>
<td>Bahrain Telecommunications Company</td>
</tr>
<tr>
<td>BT</td>
<td>British Telecommunications Company</td>
</tr>
<tr>
<td>Capex</td>
<td>Capital Expenditure</td>
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<tr>
<td>CAPM</td>
<td>Capital Asset Price Model</td>
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<tr>
<td>Cesky</td>
<td>Czech Republic Telecom</td>
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<tr>
<td>DDM</td>
<td>Dividend Discount Model</td>
</tr>
<tr>
<td>DSM</td>
<td>Doha Stock Market</td>
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<tr>
<td>DTI</td>
<td>Department of Trade and Industry</td>
</tr>
<tr>
<td>DW</td>
<td>Durbin-Watson Statistic Test</td>
</tr>
<tr>
<td>DY</td>
<td>Dividend Yield</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Earnings Before Interest, Tax and Amortisation</td>
</tr>
<tr>
<td>EPS</td>
<td>Earnings Per Share</td>
</tr>
<tr>
<td>EU</td>
<td>European Unit</td>
</tr>
<tr>
<td>FTSE</td>
<td>Financial Times Index</td>
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<td>FT</td>
<td>Financial Times Newspaper</td>
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<td>GCC</td>
<td>Gulf Corporation Council</td>
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GDP Gross Domestic Product
GNP Gross National Product
GSM General System Mobile
IPO Initial Public Offerings.
IASC International Accounting Standards Committee
IRR Internal Rate of Return
LN (MV) Market Value
LN (Return) Log of the Return Index
LN Natural Logarithm of a Number
LP Labour Productivity
MBO Management Buyouts.
ME Market Equity
MMC Monopolies and Mergers Commission
MTBV Market to Book Value
NIKKEI Nihon-Keizai Shimbun Inc index (Japan)
NTT Nippon Telegraph and Telephone (Japan)
OECD Organisation for Economic Co-operation and Development
OFCOM Office of Communications (New regulator for communications in UK)
OFFER Office of Electricity (regulator)
OFGAS Office of Gas Supply
OFTEL Office of Telecommunications (regulator)
OHE-HLC Greece Telecom
P/E Ratio Price-Earnings Ratio
P/Non Privatised and Non-Privatised Group
PE Price Earnings Ratio
PER Price Earnings Ratio
PRI-X Price Index Formula
<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>PSBR</td>
<td>Public Spending Borrowing Requirements</td>
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<td>Q-TEL</td>
<td>Qatar Telecommunication Company</td>
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<tr>
<td>RI</td>
<td>Return Index</td>
</tr>
<tr>
<td>ROCE</td>
<td>Return On Capital Employed</td>
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<td>S&amp;P 500</td>
<td>Standards and Poor’s 500 Index</td>
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<tr>
<td>SD</td>
<td>Standard Deviation</td>
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<td>SOEs</td>
<td>State-Owned Enterprises</td>
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<td>TDC</td>
<td>Telecom Denmark</td>
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<td>Telstra</td>
<td>Telecom Australia</td>
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<tr>
<td>TFP</td>
<td>Total Factor Productivity</td>
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<tr>
<td>Thai</td>
<td>Thailand Telecom</td>
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<tr>
<td>UNCTAD</td>
<td>United Nations Conference for Trade and Development</td>
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<tr>
<td>WACC</td>
<td>Weighted Average Cost of Capital</td>
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<td>WTO</td>
<td>World Trade Organisation</td>
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</table>
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Finally, thank God for his help.
AUTHOR'S DECLARATION

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award.

The study was financed with the financial support from the State of Qatar- Ministry of Education, Qatar.

The following activities were undertaken in connection with the programme of study:

➢ Participated indirectly with the privatisation of Qatar Telecom company in November 1998-Qatar.

➢ Attendance of some financial and economic seminars.

➢ Supervised some undergraduate and postgraduate dissertations and final projects in his own free time.

➢ The author has a weekly column in the Business section, The Peninsula Newspaper-English Newspaper-Qatar, the articles are published as follow:


- Article has been published at Gulf Business Magazine


- Articles have been published in the Financial Management (CIMA)-UK:


- A draft paper is being prepared:

- Further papers are proposed:

Signed-------------------------
Date ------------ --1- =ý
Introduction
Thesis Outline

Introduction

Privatisation is a complex phenomenon, because it covers a variety of organisational transformations occurring in diverse and under-researched contexts in terms of analysis, development and empirical work. It is also a multidisciplinary phenomenon, studied by financial analysts, organisational experts, management consultants, economists, political scientists, public administration specialists, and lawyers. In addition, privatisation has brought about a major restructuring in the economic, social and political arenas in many different countries. Privatisation has increased the role of the private sector through state deregulation, economic liberalisation and institution building, which improves the functioning of private firms and markets (see Ramamurti, 2000).

The United States liberalised the long distance telecommunications markets in the 1960s. The United Kingdom and Japan followed suit in the 1980s, but neither fully liberalised and permitted effective competition. The other countries of the European Union (EU) undertook partial liberalisation (of both local and long-distance service) in the late 1990s. As a result, the industry remains largely a privatised monopoly, but elsewhere the global industry is characterised as largely state-run.

The shift to competition in all these countries was prompted in part by changes in technologies, but more fundamentally by the realisation that users, and the economy in general, would benefit greatly from a broader range of services, of higher quality and at lower prices, in a competitive environment (Michel et al., 2001).
Most of the dramatic changes in telecoms policies have occurred in the past two decades, mainly because of the swift changes in the technologies. Many state-owned companies have followed the lead of British Telecom to privatised their state-owned telecoms companies, further motivated by the rules of the WTO (World Trade Organisation) and European Commission.

This thesis sets out to examine two issues relating to the privatisation of telecoms companies. The first issue: is how to compare and contrast the financial performance of the fully, the partially privatised and private companies in telecoms. The second issue: is how to compare the financial performance of three major companies in the telecoms sector, which are chosen to represent the three categories, namely BT (fully privatised), NTT (partially privatised) and AT&T (private).

The general hypothesis 1 states that the privatised telecoms companies perform differently from their non-privatised (private) counterparts, given the present contestability.

In pursuit of this hypothesis, the first issue is addressed by the financial testing of a large group of international telecoms companies in order to identify to what extent their financial performance differed according to their being privatised or not. The second issue is addressed by an in-depth analysis, examining three aspects of performance, namely: (a) the degree of interrelationship between the companies; (b) their local stock market performance over a set period; and (c) the degree of competitive advantage.

The thesis approaches the question of privatisation differently from that already chosen by most researchers (see chapter 3); the comparisons with pre- and post-privatisation and privatisation versus state-ownership have deliberately avoided in this thesis. Instead, the choice for study is a comparison of those companies, which were privatised fully or
partially, with those companies, which were always in the private sector. **Note: that when the thesis uses the term non-privatised, it means private.**

While it is understood that many theorists have made claims to the effect that there is economic efficiency and managerial effectiveness to be gained from the privatisation process, the evidence from past research has not been based on a thorough examination of financial results (see table 3.1). The purely financial data produced by such companies has been inadequately interpreted for support of the claims. This thesis sets out to address this deficiency.

This thesis is divided into three parts. First part is the theoretical part, which contains three chapters. The first chapter deals with the literature review of the privatisation issue. The second chapter will discuss the importance of ownership and the regulator’s role in the market. The third chapter will cover the methodologies-related literature in this thesis.

The second part is divided into three chapters. Chapter Four will deal with global analysis of the telecoms companies. Chapter Five will focus on the biggest three telecoms (BT, NTT, and AT&T) worldwide. Chapter Six is a continuation of chapter five employing a new method of measuring competitive advantage.

The third part is a reflection chapter in which it looks at the financial performance of the three companies in terms of their recent performance and some of the issues arising from the current post-boom period in the sector. The question of what effects there are if any, regarding the BT’s rights issue in May 2001 has been further examined. It has been intended draw down some contemporary articles in the news media, which relate to comparisons with France Telecom to show that BT was particularly fortuitous in the timing of the rights issue. The scope of influence of the regulatory system now being
developed through OfCom and its effect on the contestability in the telecoms sector has been pointed out in this thesis. The final chapter is the conclusion and deals with an overview of the thesis.

Chapter One

This chapter will provide a historical overview of the privatisation issue by expressing many researchers’ views and definitions. Some objectives and aims of privatisation will be presented with reasons for privatising BT.

The privatisation methods will be dealt with and some examples of each one of the methods will be provided in Appendix 4. A graph that shows the privatisation process will be included with some narrative of the process in Appendix 4.

Chapter Two

Chapter Two will discuss the importance of ownership in a comparative manner between private and state enterprises. A regulator’s roles will be explained with some illustrations of the regulation powers.

Chapter Three

Chapter Three will deal with the methodologies of this thesis. The previous studies on British Telecom are provided to identify the approach of this research. ANOVA tests and multiple regression analysis are the main tools in examining chapter 4. Multiple regressions and time series analyses will be used in chapters 5 and 6.
Chapter Four

Chapter Four will examine telecoms companies globally. The numbers of companies vary depending on the time of privatisation. Both ANOVA and multiple regression tests will be used to measure the financial performance of these companies. A study period of 7 years (1995-2001) will be conducted to address the hypothesis 1 that the privatised telecoms companies perform differently from their non-privatised (private) counterparts, given the present contestability.

Chapter Five

The three telecoms companies representing the range in the study are presented in this chapter for analysis. These companies are: BT as the one of the leaders in telecoms in Europe; NTT is the leader in Japan and most of the Asian telecoms industry, and last, but not least is AT&T, which is one of the leaders in telecoms in the north and south American market.

Multiple regression tests will be performed to test whether or not the performance of each of the three telecoms companies is related to each other or not. A further test against the stock market index in each country is performed. These tests are in part fulfilment of the general hypothesis 1:

\[ H2: \text{The financial performance of each company is positively related to that of the other companies. The rationale is that, in the telecoms market, companies would be affected by similar technological factors. This can be represented by } \beta_2, \beta_3 > 0 \text{ where the financial performance of company } j \text{ at time } t \text{ is given by } f_{jt}. \text{ So, for the first company:} \]

\[ f_{1,t} = \alpha + \beta_2 f_{2,t} + \beta_3 f_{3,t} \]

(Equation 5.1)
**H3:** In a global market, company performance is related more closely to the sector (i.e. other respective companies) than each respective stock market. This can be represented by:

\[ f_{1,t} = \alpha + \beta_2 f_{2,t} + \beta_3 f_{3,t} + \gamma F_{1,t} \]  

*Equation 5.2*

Where \( F_{1,t} \) represents the performance of the stock market index of the chosen company 1, and the \( \gamma \) coefficient is less significant than \( \beta_2 \) and \( \beta_3 \).

A random walk with drift model is used as a forecasting tool to measure the performance of each one of these companies for one year ahead. The forecasting period starts April 2002 to March 2003.

Finally the return analysis will indicate which of the companies has the better performance overalls. The down-side risk measurement will be included to indicate which one of these three companies offers a safer investment.

**Chapter Six**

In order to examine the competitive advantage and risk associates with each of the companies in the thesis, a new test derived from Pointon’s theoretical model for competitive advantage has been employed. Different risk premium estimates are used in the competitive advantage model. This is in part fulfilment of hypothesis 1:

**H4:** In terms of competitive advantage, NTT exhibits through time a superior position compared with BT and AT&T on account of its monopoly position.

**H5:** Of the three global players, AT&T is more adversely affected, in its competitive advantage position, by the other two companies.
Chapter Seven

Chapter Seven is a reflection chapter, which deals with some of the many side issues and events, which occurred in the telecoms market over the past few years. The first part will be an evaluation of the strategic risk associated with BT’s rights issue.

The second part makes an evaluation and interpretation of the model chosen for the analysis in chapter 6.

The third part reviews the news reportage of the telecoms industry worldwide during the most recent period before the thesis was completed. It addresses in particular some consideration of the strategies employed by some of the major players. France Telecom’s rights issue and potential state intervention and re-nationalisation are discussed because this is a topical issue. The continuing and possible expanding role for regulation completes the chapter.

Chapter Eight

Chapter Eight summarises the conclusions and the findings in this thesis. In particular, it will indicate that, contrary to the expectations at the beginning of the study, privatised companies perform equally well as their equivalent non-privatised companies. As to global players in the market, the competitive advantage analysis predicted AT&T’s relative demise before it was highlighted in the financial press relating to the period of July 10th 2002. The random walk with drift application suggests that NTT will strengthen its relative global position according to the forecast in chapter 6. BT’s fortuitous outcomes can be seen as largely a product of timing rather than prescient strategies, because they were able to raise funds via rights issue just prior to the collapse in the stock of the telecoms market.
Outline of the thesis chapters

Introduction

Chapter One: Literature Review

Chapter Two: The Importance of Ownership and Regulation

Chapter Three: The Methodology Review

Chapter Four: Global Financial Study of the telecoms Market

Chapter Five: The main players in the telecoms market

Chapter Six: Analysing the Dynamics of Competitive Advantage in Telecoms

Chapter Seven: Reflections

Chapter Eight: Conclusion
Chapter One: Literature Review
Chapter One: Literature review

1.1 Historical overview of the privatisation process

It is instructive to start by noting Smith’s (1776) observation on privatisation. In the Wealth of Nations, Smith favoured the privatisation of crown lands on efficiency grounds. He believed that:

“In every great monarchy of Europe the sale of crown lands would produce a very large sum of money, which, if applied to the payment of public debt, would deliver from mortgage much greater revenues than any which those lands have ever afforded the crown” (Nelsen, 1996:17).

When a state-owned enterprise is transferred from the state-owned into the private sector environment, many changes occur during this transfer. These changes include management strategy and style, operational and financial changes and ownership change. Because of the importance of the financial performance changes, this thesis will use the financial data for developing the epistemology for measuring the performance of privatised companies versus their non-privatised counterparts.

Privatisation has been a key element in the ascendance of the new market orthodoxy since the 1970s, and has been at the forefront of economic policy debates in all parts of the world. The international wave of privatisation began in the United Kingdom and thereafter rapidly spread to other industrial countries (see Cook & Kirkpatrick, 1995:1; for a fuller disclosure of worldwide privatisation, see appendix 1).

Most people associate the modern privatisation programmes to the Conservative government led by Margaret Thatcher that came to power in 1979. However, the government that launched a privatisation programme for economic reform was that of Konrad Adenauer in the Federal Republic of Germany. In 1961, the German government sold off the majority stake in Volkswagen in a public share offering in favour of small
investors. Four years later, the West German government launched an even larger offering for shares in VEBA. However, the small investors were hurt badly after the stock declined, so the government took the responsibility to bail them out afterwards (see Megginson, Nash, and Randenborgh, 1994:406-407)

According to Megginson, Nash, Netter and Poulsen (2001:1) in the late 1970s, the Thatcher government utilised the term privatisation to mean the sale of state-owned enterprises (SOEs) to private investors. Since then, the growth of the privatisation programme all over the world has been phenomenal. This change of ownership has reduced the position of the state in many world economies.

British Telecommunications (BT) was one of the first companies to be privatised through the public share offerings method. BT was successfully privatised and the UK government generated huge proceeds from the sale. BT was the first utility company in the UK and the world to be exposed to a regulator (see Lawless, 1991; Walters, 1989, and appendix 2 for list of the privatisation companies in the UK).

According to World Bank reports, more than 12,000 companies have been privatised since the 1980s, and the privatisation programme is moving fast in many countries. Letwin (1999) estimates that $800 billion of assets were privatised internationally during the 1980s and 1990s, with more than $50 billion privatised in western Europe in 1998 alone.

Roche (1996:5), president of the research firm “Independent Strategy” and a columnist in Euromoney, predicts that $6 trillion of privatisation assets will be sold over the next 20 years, including $3 trillion in eastern Europe and China combined. He says: “The pace in the past five years has been slow in comparison to what is about to come.”
According to the FT (2002:29) of Sept. 26th, the China telecom will list 16.8bn shares or about 20 per cent of the company in its initial public offerings next month. Bankers expect the company to be valued at $3bn-$4bn, which would make the IPO the largest in Hong Kong this year.

Roche (1996:26) has stated that “In the last two years, the privatisation sales of assets reached $53 billion in Europe, over $5 billion in the Americas and nearly $9 billion in Asia. In eastern Europe privatisation helped push the transition from communism to capitalism. As output from the non-state sector soared to 55% of GDP, assets with an estimated economic value of $200 billion were returned to the citizens.”

He adds (p. 26) that “Worldwide, in most countries where state owned enterprises (SOEs) had played a significant role, selling them off added between 0.5% and 3% to equity market capitalisation, on average amounting to 0.7% of GDP” (Roche, 1996). (see appendix 1 for more details of country breakdown of global amounts raised from privatisation from 1990 to 1998).

While the Thatcher government may not have been the first to launch a large privatisation programme, it is without doubt the most important historically. Thatcher is credited for being the one who changed the policy’s name from “denationalisation” to the more appealing “privatisation”. It is important to note that the concept of privatisation in its present form is considered one of the modern concepts in the economic literature. No one knows exactly when people started to use the word privatisation, however, it is believed that the term appeared for the first time in western dictionaries in 1983 (Al-Samadi, 1993).
Privatisation is known by different names around the world. For example, apart from the use of “de-nationalization” in the UK., it is termed as “dis-incorporation” in Mexico, “prioritisation” in Australia, “asset sales programme” in New Zealand, “transformation” in Thailand, “people isolation” in Sri Lanka, and “dis-investment” in Pakistan (Gupta, 1996:98).

Privatisation has certainly been a major event in the economic and financial history of the last twenty years, and its impact on equity markets has been particularly dramatic. The cumulative value of proceeds raised through privatisation programme by governments’ exceeded $1 trillion sometime during the second half of 1999, and the value of such revenue raised each year is now roughly $140 billion (Gibbon, 2000).

Boutchkova and Megginson (2000:69) provide a rough yet significant measure, i.e: the total market value of privatised companies (SIPs) to date is nearly 10 per cent of the world’s total market capitalisation, accounting for over one-fifth of the non-US total. However, SIPs also play a significant role in the even more dramatic increase in global stock market trading volume, from $1.23 trillion in 1983 to $37.5 trillion in 1999.

According to Miller (1994:125) the worldwide interest in the privatisation has increased recently for several reasons. These include:

(1) The collapse of communism in the former Soviet Union and its eastern European allies and the emerging governments’ determination to transform state owned enterprises into private sector entities;

(2) The desire of a growing number of political leaders and their constituents to reduce the size and scope of local and national government;

(3) The problem of how governments can continue to provide adequate public services given the reluctance of many citizens to fund regular tax increases;
The commitment of some governments to increase state-owned enterprises’ efficiency, productivity, and responsiveness to customer needs; and

the desire of many nations to promote free market principles and to establish an enterprise culture.

Privatisation is claimed by governments to enhance individual freedom, encourage and improve efficiency, make industry more responsive to the demands of the customer, decrease the public debt and weaken the power of the trade unions by forcing management to face the realities of the market place. It is said to create a shareholder democracy by giving a large number of small shareholders a stake in the economy (Veljanovski, 1987 and 1989).

Whilst the privatisation of government-owned enterprises (GOEs hereinafter) may have almost reached an end in the UK, where this (now global) phenomenon may be said to have started in the early 1980s, it is nevertheless continuing strongly elsewhere: in the EU; in the transitional economies of east/central Europe and CIS; in China, India, Africa, Middle East and Latin America (Economist, 1998).

In 1995 the global volume of government sales of state assets reached a record figure of US$73 billion (Economist, 1996). From 1980 to 1995 more than $85 billion of privatisations were handled through a public share offerings method (Euromoney, 1996).

Some experts argue that the current annual world volume of privatisation is, however, small compared to what is yet to come (see appendix 1), particularly as regards Central Europe, the former USSR, and China (Roche, 1996; Burton and ul-Haq, 2001).
British Telecommunications was the first large utilities company to be privatised in the UK and worldwide in 1984, and it came after the privatisation of British Petroleum in 1979 and Cable and Wireless in 1981 (see El-Naggar, 1989; Waverman and Esen, 1997; Hills, 1986; and Thornton, 1998, see appendix 2).

According to Eckel, Eckel and Singal (1997:275-276) when a firm is privatised, several factors change simultaneously. First, the ownership changes from the government to private hands. Second, the firm’s objective changes to profit maximisation. Third, changes in regulation designed to enhance competition in product markets are likely to take place.

There is general agreement on factors that change after privatisation, but there are other factors that change. Most likely, the privatised company starts to think globally through having alliances and subsidiaries in different countries. The whole strategy of the company changes internally and externally to compete with others for market survival or dominance.

1.2 Definitions relating to privatisation

It was claimed by Beesley and Littlechild (1983:1) and Peacock (1984:3) that privatisation is generally meant as the formation of a “Companies Act” company and the subsequent sale of at least 50 per cent of the shares to private shareholders. However, there is an underlying idea by policy makers that such a transformation will improve the industry performance by increasing the role of market forces.

BT was transformed to private status and more than 50 per cent of its shareholdings were sold to private shareholders in 1984 (see Thornton, 1998; and Fraser, 1988). See BT privatisation timetable in appendix 3.
On the other hand, Pirie (1988:3), Posner (1984), and Dunleavy (1986:13) claim that privatisation means transferring the production of goods and services from the state-owned sector to the private sector, in order to make a public gain from asset sales (see Walle, 1989:601; Hemming and Mansoor, 1988:31; and Rees, 1986:19). Certainly the sale of BT did indeed, net gains for the UK treasury, as was the case in most privatisations.

A more euphoric description is offered by Ahmed (1993) and the Adam Smith Institute (1985:3):

"An approach which recognises that the regulation, which the market imposes on economic activity is superior to any regulation, which men can devise and operate by law. This focuses on the issue that the market measures, and responds to the choices and preferences of people more accurately than the political process. A programme performed by the private economy can be done more efficiently, more cheaply, and with greater satisfaction to its beneficiaries than its counterpart can achieve in public sector" (see Veljanovaski, 1987:2). Drawn upon Adam Smith himself in the wealth of nation, he observed "private ownership improves productivity and efficiency" (Veljanovaski, 1989:35).

Young (1986:236), Donnison (1984:45), and Ascher (1987:4) suggest that privatisation is a set of policies, which aim to limit the role of the state-owned sector, and increase the role of private sector, while improving the performance of the remaining state-owned sector.

This is as yet to be demonstrated, but perhaps the assumption is that the state-owned sector should only do what the private sector cannot, such as social rationing-provisions of public goods (Starr, 1989:6; and Butcher, 1995:108).

Some have defined privatisation simply as the sale of government assets, either through the sale of some or all of a government shareholding in a company or through the sale of specific assets (see Dodgson and Topham, 1988; Bos, 1998:51, 1988 and 1993).
There were a number of common definitions for the term privatisation as stated by Heald, 1984:37; Kay and Thompson, 1986:118; Bishop and Kay, 1989; Abu Shair, 1997:1; Clementi, 1985:124; Savas, 1991:1-3; Prager, 1992:311-13; Glade, 1983; Domberger and Piggott, 1986:146, where most of them agreed on more than one of the following privatisation definition elements as:

1. The privatisation of financing of the state enterprises, which entails the utilisation of private funds to relieve the enterprises from temporary budgetary constraints;
2. The privatisation of production;
3. Denationalisation is the selling of shares of state-owned enterprises to private investors; and
4. the liberalisation interim of relaxing or removing statutory constraints on competition, prices etc (see Yacob and Mengistu, 1988).

In 1983 the Thatcherite Financial Secretary to the Treasury, John Moore, declared that:

“Privatisation is a key element in the government’s economic strategy. It will lead to a fundamental shift in the balance between the public and private sectors. It is already bringing about a profound change in attitude within state industries. It opens up exciting possibilities for the consumer: better pay, conditions and employment opportunities for the employees; and new freedom for the managers of the industries concerned” (Moore, 1983:78).

Privatisation can be narrowly defined as “the sale of state-owned sector assets and exclude issues such as contracting out, debureaucratization and the promotion of competition by market forces” (Bos, 1991).

Other researchers believe that privatisation is the goal of SOE (State-Owned Enterprises) reform and this concept of reforming SOE has been used as a synonym for privatisation (see Galal, 1991; Shirley, 1990; Shirley and Nellis, 1991).
Zahariadis (1995:4), Andrews and Dowling (1998:601), Ogden and Watson (1999:526) agree on defining privatisation ‘as the transfer of the central government’s ownership rights in commercial entities to private investors’, they chose this definition because firstly, it is a form that includes a fairly tight set of presumptions in contrast to the diversity of other forms. Secondly, it is the more widely practiced, most ambitious, and most visible form of privatisation. Thirdly, it avoids the problems of issue equivalent or which is best (Roche, 1996:26; and Estrin, 1994:3).

According to Ramamurti (2000:526) privatisation has narrow and broad definitions. The narrow definition is any measure that transfers some or all of the ownership and/or control over SOEs to the private sector. This definition treats privatisation as a continuous variable, with many possible intermediate forms of state-owned-private partnership (see Ramamurti, 1997).

His broad definition of privatisation is any measure that increases the role of the private sector in the economy: e.g., through deregulation, which permits private entry into markets previously reserved for SOEs; economic liberalisation, which exposes them to greater competition (e.g., through lower tariffs or fewer restrictions on foreign investment); or institution building, which improves the functioning of private firms and markets.

Definitions from other sources are also worth reproducing because of the increased or simplified dimensions they provide. There has not been any definition of privatisation by the UK government itself. However, John Moore’s speeches, Financial Secretary to the UK Treasury, during (1983, 1984, and 1985) used the words, ‘returning state owned companies to the private sector’, ‘contracting out services to the private sector’, ‘liberalisation’ (meaning opening to competition) and ‘deregulation’ (Wiltshire, 1987:16).
Despite this, at the time of BT privatisation, the UK Conservative manifesto in 1979 did not have any definition for privatisation and neither was there a policy for seriously debating proposals to sell off BT (see Zahariadis, 1995).

Most of the privatisation's definitions depend on how these writers or researchers look at privatisation. It might also depend on the circumstances, the information and data available. Overall, different definitions of privatisation make it easy and flexible for many to express it in a way where it matches their political and economic views.

The writer believes that privatisation as a process involves the transfer of ownership of the state-owned to private enterprises. This transfer involves the assets of the company, and can take many forms such as a public share offerings, assets’ sale, vouchers, service contracts, or a management buyout. Moreover, privatisation is a policy for restructuring political and economic themes, and a way to develop the capital market and increase the participation of domestic and foreign investors.

Furthermore, the writer believes that privatisation can be seen as a mechanism that can change the whole system, improve the efficiency and the performance of an enterprise. That does not mean privatisation is a perfect strategy. The perfection of this process depends on a governments’ serious commitment to complete the programme, judicious regulation and the capacity of private management to realise the potential of the assets through improved financial performance (see appendix 4 for some of the privatisation issues). This study reveals to some extent that degree of financial improvement and competitive advantage of the three representative telecoms companies.
1.3 Privatisation Objectives

In the case of BT, the official case for privatisation had a number of specific objectives. They have changed over time and so has the emphasis on them. The basic aims were claimed to be: the promotion of competition and increased efficiency. Other derived objectives included: the promotion of wider share ownership by both employees and the public, increased competitiveness, enhanced technical innovation, and providing a stakeholder relationship between employees and management. In July 1982, a White Paper on the 'Future of Telecommunications in Britain' was issued and the new Secretary of State, Patrick Jenkin, in a statement to the House of Commons on Monday 19 July 1982 (Department of Trade and Industry, 1982), stated the objectives for privatising BT:

"It is the government's aim to promote consumer choice. Where ever possible, we want industrial and commercial decisions to be determined by the market and not by the state. We believe that consumer choice and the disciplines of the market lead to more stable prices, improved efficiency and a higher quality services. As a nationalised industry British Telecom does not have access to financial markets. Its borrowing is controlled by government and counts against the public sector borrowing requirements. Monopoly power has allowed British Telecom to raise prices to finance investment without doing all that could be done to increase efficiency" (see Newman, 1986:6).

According to Vickers and Yarrow (1988:205), it is easily noticeable from the White Paper that the UK government privatised BT from the desire to promote consumer choice, market forces and allowing BT to access capital markets without increasing the public sector borrowing requirements.

The UK telecommunications sector was falling behind all other European countries, and the UK government sought to increase the efficiency of the telecommunications industry, to allow for better investment and to increase consumer choice. Table (1.1) gives some details of deficiencies in telecommunications in the UK (see Molyneux and Thompson, 1987).
Table 1.1 A comparison of telecommunications systems in three countries

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<tr>
<td>Density of penetration</td>
<td>34.1</td>
<td>50.7</td>
<td>23.6</td>
<td>54.1</td>
<td>30.2</td>
<td>51.0</td>
</tr>
<tr>
<td>Telecommunications investment as percentage of GDP</td>
<td>10.7</td>
<td>6.5</td>
<td>5.2</td>
<td>7.0</td>
<td>7.6</td>
<td>7.4</td>
</tr>
<tr>
<td>Employees per 100,000 main lines</td>
<td>201.6</td>
<td>128.8</td>
<td>142.5</td>
<td>84.0</td>
<td>156.2</td>
<td>89.7</td>
</tr>
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Observing table (1.1), it appears from the change in the density of penetration that there has been much greater growth in telecoms usage in France and Germany over the same period. In the second category, investment as a percentage of GDP, the level of investment has fallen from 10.7 to 6.5, whereas in France it has risen from 5.2 to 7.0 and in Germany it has remained high at 7.6 and 7.4. This may be explained as a cyclical shift in that the large scale investment in the UK of 10.7 might have been because of a need for technical improvement when the company was still a public utility.

Hence, the level of investment in 1982 of 6.5, 7.0 and 7.4 respectively would appear to show a similar level across the three countries. What is noticeable about the third category is the dramatic drop experienced in Britain of the numbers employed of 36 per cent, France 41 per cent and Germany 44 per cent. In the case of the other two, France and Germany were providing their services with much lower numbers employed to begin with in 1974 than in the UK and yet still managed a subsequent reduction greater than that achieved by the British company pre-privatisation.
Steel and Heald (1982), Hatch (1987:60), and Moore (1992:119-120) were able to identify four main privatisation objectives: enhancing freedom; improving efficiency; reducing the public spending borrowing requirements (PSBR); and tackling the problem of state-owned sector pay (see Heald, 1985; Grimstone, 1988:106; Vickers and Yarrow, 1988:157; Goodman and Loveman, 1991:26; Letwin, 1988:26; Stevens, 1992:3-4; Grosfeld, 1991; Lieberman, 1994; Kikeri, Nellis and Shirley, 1992 for further details).

According to Hyman (1988:120-121) the principle objectives of privatisation can be summarised as:

(1) A perception that the efficiency of the industry could be improved by transition to the private sector. This can be done through better motivation of management and employees, the force of competition and the ability of management to run the business free from government interference;

(2) A means of raising funds for the Exchequer. The British Telecom (BT) flotation raised £2.6 billion net of the pension liabilities kept by the government; and

(3) the desire to widen share ownership. The BT flotation emphasised the objective of widening share ownership.

When BT was transferred to a private enterprise, it was meant to increase its financial performance overall, and open up a new competitive telecoms market in UK.

King (1987:21) argued that 'privatisation positively affects employee attitudes and motivation when the employees' became shareholders in the company. It increased the involvement of staff in owning shares elsewhere as well as in their own companies, thus helping to establish more securely, a capitalist economy. British Airways was seen as a good example, where more than 9.4 per cent of the shares at flotation were owned by employees (Baldwin, 1990; Vickers and Yarrow, 1988).
According to Bennett (1997:7), Shelton (1999:6), Burton and ul-Haq (2001:3-4), Russell (2000:30), Boutchkova and Megginson (2000:3), the privatisation objectives can be roughly categorised as follows:

(a) Political goals such as reducing the size of the state-owned sector, restoring or strengthening the private sector (as in all transitional economies), spreading share ownership more widely (popular capitalism), and making productive enterprises more responsive and accountable to those for whom they produce;

(b) Efficiency goals such as increasing productivity and microeconomic efficiency, and the development of capital market institutions, which intermediate between savers and investors;

(c) Fiscal stabilisation goals such as maximising proceeds of sales, reducing the future drain of subventions and capital contributions from government revenue, increasing tax revenues from higher profits and reducing the public debt; and

(d) resource mobilisation goals as promoting foreign investment in the country, releasing limited state resources for investment in other sectors such as education and health.

The UK privatisation programme has had many objectives, which have changed over time. The UK government's early concern was to limit the power and influence of the state-owned sector trades unions, to reduce the role of government, to promote a wider spread of share-ownership amongst the population at large and to realise the proceeds from the sale of state assets for the government’s finances (see Bishop and Thompson, 1993 and 1994).

Finally, perhaps a most important factor has been a concern to improve the efficiency of the public enterprise sector. In 1983, the UK Treasury Minister, Moore (1983:93), concluded that: ‘our main objective is to promote competition and improve efficiency’. At times the UK government has claimed that privatisation aims to prevent politicians
meddling in the affairs of business enterprises, and also to distinguish between the economic and social objectives of these enterprises to that extent privatisation is claimed to produce transparency of decision-making (see Wiltshire, 1987:22).

Apart from the official case, a large number of writers have identified many other objectives of privatisation. A considerable array of harsher critics claim that the government has been out to smash the power of trade unions, reduce the state-owned sector borrowing requirement (not just for its own sake, but also because these statistics have become a key indicator of government macro-economic performance), and generate revenue; some say to finance tax cuts before the next general election (see Armstrong, Cowan and Vickers, 1994 for details).

Internationally, governments have privatised state-owned enterprises to achieve several objectives such as raising revenue for the state; raising investment capital for the industry or for the company being privatised; reducing the government’s role in the economy; promoting wider share ownership; increasing efficiency; introducing greater competition; and exposing firms to market discipline.

Privatisation objectives may differ from one country to another depending on the local circumstances. In December 1992, Russia privatised the Bolshevik Biscuit Company in Moscow, which was sold at auction as a part of the Russian government’s programme to transfer state-owned enterprises to private ownership. The main objective was to convert Russia from a command economy to a mostly private economy, this was a minor, but important beginning to the process (see Blasi, Kroumova and Kruse, 1997:1; and Lane, 1995 for details of Russian privatisation).
1.4 Specific objectives of the BT privatisation

The objectives of the privatisation of BT were succinctly stated by Cecil Parkinson, the Secretary of State for Industry, to Parliament in 1984:

"Develop the UK telecommunications industry as quickly as possible to the widest possible benefit to UK customers and manufacturers... to extend share ownership and to create within the new shareholding constituency a category of shareholder employees with a vested interest in the strength and vitality of BT's business... reward achievement through the mechanism of incentives so that reward would be intimately related to performance (and) to provide BT with a source of investment finance largely free from treasury control" (Pitt, 1990:68).


"Privatisation of British Telecom gives the government an opportunity to offer Britain's 19 million telephone subscribers a stake in the business."

According to Newman (1986:41) there were three predominant and interrelated objectives for the privatisation of British Telecom. Firstly, a successful sale of 51 per cent would allow the treasury to report that it was keeping to its public expenditure plans and containing the public sector borrowing requirement. Secondly, there were the wider share ownership objectives, based on ideological commitment and partly on fiscal necessity. Thirdly, it was recognised that if this issue to be successful, it needed to appeal to as wide an audience as possible, not merely from the domestic market, but from investors abroad.

Harper (1997:223) states that the privatisation of BT was a political act and it will stand or fall on its political merits as the years go by. A new Secretary of State, Partick Jenkin, in a statement to the House of Commons on Monday 19th July 1982, announced that the UK government intended to privatise British Telecom. He stated:

"It is the government's aim to promote consumer choice. Wherever possible, we want industrial and commercial decisions to be determined by the market and not by the state. We believe that consumer choice and the disciplines of the market lead to more more stable prices, improved efficiency and a higher quality of service" (Newman, 1986:5).
Norman Tebbit, Secretary of State for Trade and Industry, made a statement on the privatisation of BT in 1983. He stated:

"The transfer of BT from the public to private sector was an essential step towards ensuring effective and fair competition" (The Times, Dec. 16th 1983:4e)

Butcher J, Under Secretary for Department of Industry, made the following statement in front of OECD Conference in Paris in 1983:

"Our intention is to convert British Telecommunication from a PTT in the traditional mould into a dynamic private company; fully responsive to market demands, free from government restraints and able to raise investment capital on a commercial basis and on a scale, which will allow it to make full use of the coming opportunities" (Ergas and Okayama, 1984:38).

The Times in 1980 had quoted Sir George Jefferson, BT’s Chairman

"We recognise the need to control public expenditures, but unless we can find ways of matching finance to the real need, the ability of commerce and industry in the United Kingdom to be competitive will be seriously impaired by lack of a good telecom network" (p. 15).

According to Zahariadis (1995:85) after the BT’s Chairman’s statement, there were two options available to the treasury in order to solve the financing difficulty for BT’s investment: either recapitalisation, which was favoured by the Department of Trade and Industry and BT’s management, or privatisation, which was the most likely favourable choice for the treasury. The unwillingness of the UK government to fund BT may have been main reason to privatise after all!
1.5 Pursuit of privatisation internationally

Privatisation has become more attractive, with increasing evidence that many state-owned enterprises were loss-makers rather than revenue generators. There were studies conducted by the World Bank to indicate that by the beginning of the 1980s, SOEs in developing countries accounted for one-quarter to one-half of all outstanding domestic debt and for a substantial portion of foreign borrowing (Shirley, 1983).

Governments in both western industrialised nations and developing countries have seen privatisation as a means of generating needed revenues and of reducing their budget deficits. In 1979, the borrowings and losses of SOEs in the United Kingdom, for example, were nearly US$6 billion. However, from 1981 to 1991, the Government was able to raise more than US$80 billion from the privatisation of 46 large firms and several dozen smaller ones. By 1990, the companies that were privatised by the UK government had contributed to tax revenues more than £2.5 billion (Moore, 1992).

Many developed and developing countries are rushing to sell most of their state-owned enterprises to generate revenues and to attract more foreign investment. The World Bank (1992:11) reported that former SOEs in developing countries grew faster and more effectively contained their costs after transfer to private ownership (OECD, 2001:43).

Generally, most countries might have many mutual objectives, but there are slight and unnoticeable different objectives behind pursuing privatisation.

Objectives of privatisation differ from one country to another, but the United Nations Conference for Trade and Development in 1995 grouped the objectives of privatisation in 13 categories (see UNCTAD, 1995). However, most of the points are normative suggestion rather than an evaluation of what has occurred and have been addressed by the other
writers previously mentioned in this chapter. A full listing of UNCTAD objectives is supplied in appendix 5.

1.6 Factors that determine the choice of privatisation methods

1.6.1 Market conditions

The degree of development of the privatising country’s capital market will affect the decision to sell a SOE in the capital markets. If the capital market is primitive, it may be difficult to find buyers (Magginson, Nash, Netter and Poulsen, 2001:4). The more the lack of liquidity in the capital market, the greater is the uncertainty regarding the SOE’s intrinsic value. In less developed markets, pricing the asset and hence share value will be problematic (Dewenter and Malatesta, 1997 and 1998).

Subrahmanyam and Titman (1999) and Perotti and Oijen (1998) state that government sales can jumpstart stock market development and trigger gains in economic growth and efficiency. Therefore, the level of development of the domestic capital market can affect the choice of privatisation technique (see McLindon, 1996).

Governments will look at factors, such as the liquidity of the capital market, the level of income equality, the budget deficit, and the level of spending as a percent of GDP. Countries with a well-developed capital market use different methods, such as asset sales to generate money, whereas countries with an undeveloped capital market tend mostly to issue shares to the public, in order to increase the volume and the capitalisation in their stock markets for future privatisation (Beck, Demirguc-Kunt and Levine, 1999).
Governments consider the level of equality and inequality of income as an indicator measure for their decisions. If there is an equality in the level of income, then governments might consider offering shares to the public through the public share offerings method. In the meantime, if there is an inequality in the level of income, the governments might choose asset sales or employ other methods (Biais and Perotti, 2001).

In the case of budget deficits and high level of spending (GDP), governments tend to use methods that would maximise sales revenue and achieve their economic and political objectives, such as an asset sales. However, with low budget deficits and low spending levels, they tend to have initial public share offerings to enable a wider range of citizens to obtain shares (Megginson, Nash, Netter and Poulsen, 2001).

When the UK government decided to privatise BT in 1984, they were not sure if the market is big enough to absorb the BT’s issue, so they had to spend considerable sums, especially in the advertising segment, to make the issue attractive to investors. Being mindful of the fact that the BT privatisation was the first to be launched with a big issue on the stock market (see Newman, 1986).
1.6.2 Political and legal aspects

The legal and political environment encompasses the government’s ability to commit to policy, the protection of property rights and the desire to promote and develop its national stock market (Perotti, 1995).

Developing or establishing strict and regulatory protection for debt and equity investors is a prerequisite to establishing the proper institutional setting required for financial investment to flourish (North 1994; La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998 and 1999); Bortolotti, Fantini, Siniscalco and Vitalini, 1997).

Governments with a strong property rights’ protection tend to use asset sales as the selling method, but with a lack of investors’ protection rights they might use initial public share offerings. Countries’ political structures identify the type of divestment to use (Bortolotti, Fantini, and Siniscalco, 2001). Russia uses the voucher, whereas in Germany, they intend to use restitution following the reunification period (see appendix 4 for examples of privatisation methods worldwide, and further expansion of these points are shown in table 1.7).

1.6.3 Factors affecting the individual firm

Firm specific factors such as the size of the firm, its profitability and industry also impact upon the privatisation decision. Small to medium sized firms might be privatised through a buyout management or an assets’ sale, whereas large firms would be privatised through public share offerings. Post-divestment performance of the SOEs may also influence the government’s choice of privatisation technique (Meggins, Nash, Netter, and Poulsen, 2001).
Dewenter and Malatesta (1997), Alexandrowicz (1994) Magginson, Nash, and Van Randenborgh (1994) argue that the public’s perception of the newly-privatised firm’s performance is crucial to the success or failure of the privatisation programme. Most importantly, the early privatisations must be financial success stories, in order to build credibility for the government and encourage investors to participate in subsequent privatisation (Megginson, Nash, Netter and Poulsen, 2001:10).

A good example was the UK government’s efforts to privatise BT successfully, in order to make it possible to generate more proceeds for future privatisation, if BT proved a success (Newman, 1986).

It was noted by Manzetti (1994) that governments are sometimes hesitant to privatise firms of “strategic” importance. Industries such as defence, transportation, and energy could be of such strategic significance that foreign ownership would be unacceptable. The government’s protection of private property rights (from itself and from other parties) and the long-term viability of contractual commitments will have an important impact on privatisation policy in general and the method chosen to privatise assets in particular (Magginson, Nash, Netter and Poulsen, 2001).
### 1.7 Privatisation methods:

#### Table 1.2: Privatisation methods

<table>
<thead>
<tr>
<th>Methods</th>
<th>Purpose</th>
<th>Typical uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restitution and reprivatisation</td>
<td>Return confiscated or nationalised property to former private owners or private compensation for all or part of its value.</td>
<td>Means of returning to private owners small residential, industrial, commercial or agricultural properties for which ownership claims can be substantiated.</td>
</tr>
<tr>
<td>Auction</td>
<td>Government-organised sale to allow private investors and individuals to bid for state property or assets.</td>
<td>Means of transferring to private ownership small commercial, nationalised property that cannot be reprivatised through restitution; means of selling rehabilitated or improved property.</td>
</tr>
<tr>
<td>Direct sales</td>
<td>Transfer of state property to private ownership through direct sale to a private investor.</td>
<td>Means of transferring to private ownership profitable or potentially profitable state enterprises, and plant and equipment of liquidated SOEs.</td>
</tr>
<tr>
<td>Stock offerings</td>
<td>Public sale of shares in SOEs through a Stock Exchange or private offers to investment groups.</td>
<td>Means of making ownership in restructured SOEs, joint-stock companies, and holding companies available to both small-and large-scale investors.</td>
</tr>
<tr>
<td>Liquidation</td>
<td>Legal abolition of a state corporation so that plant, equipment or other assets can be sold.</td>
<td>Means of disposing of the assets of unprofitable and uncompetitive state enterprises that cannot be restructured or sale through other means.</td>
</tr>
<tr>
<td>Employee or management buyouts</td>
<td>Sale of all or part of a state enterprise to its workers, managers or a combination of both.</td>
<td>Means of obtaining worker or manager participation in SOE restructuring; means of giving employees a stake in privatised SOEs.</td>
</tr>
<tr>
<td>Public distribution of shares</td>
<td>Use of lotteries, coupon sales, or free distribution of vouchers to citizens who can use them to obtain shares in SOEs that are to be privatised.</td>
<td>Means of promoting widespread public ownership in private companies; means of promoting public support for privatisation.</td>
</tr>
<tr>
<td>Marketization or demonopolization</td>
<td>Requirements that SOEs compete with private sector to provide goods and services and become responsible for their profits and losses.</td>
<td>Means of improving the efficiency of state enterprises and agencies that the government does not want to privatisate.</td>
</tr>
<tr>
<td>Public service contracting</td>
<td>Government agreements with private companies to provide services, manage facilities or operate enterprises for a specified period of time; concession agreements with private sector contractors. There are three types of public service contacting; (a) service contacts; (b) management contacts; and (c) lease contracts.</td>
<td>Means of increasing the participation of the private sector in extending services and infrastructure, making public service delivery more efficient, and using private sector management experience in public service provision.</td>
</tr>
<tr>
<td>(A) service Contract</td>
<td>A private firm is engaged by a government agency to provide a specific service for a specified period of time.</td>
<td>The government maintains ownership and policy control of the enterprise. Type of service contracts such as, mental health facilities; solid waste collection; road repair; bus operations, etc.</td>
</tr>
<tr>
<td>(B) management contract</td>
<td>A contractor takes responsibility for operating and maintaining a facility or programme, with freedom to make day-to-day management decisions.</td>
<td>The government maintains ownership and policy control of the enterprise. These kinds of contracts can be seen in managing municipal or public hospitals; and correctional facilities; and some public utilities.</td>
</tr>
<tr>
<td>(C) Lease contracts</td>
<td>An enterprise leases a facility providing public service from a public authority and assumes responsibility for operation, maintenance and replacement of non-fixed capital assets.</td>
<td>The government maintains ownership and policy control of the enterprise. This kind of contract can be seen in managing freight and passenger services; and municipal operations.</td>
</tr>
<tr>
<td>Public-private partnerships</td>
<td>Joint ventures between government and private companies in providing services and infrastructure. Some type of these partnerships; (a) joint ventures; (b) build-operate-transfer agreements; and (c) joint investment.</td>
<td>Means of increasing private sector participation in providing infrastructure and quasi-commercial public services; means of eliciting financial participation of private companies in infrastructure provision.</td>
</tr>
<tr>
<td>(A) Joint ventures</td>
<td>A joint work between public and private firms to provide services and infrastructure.</td>
<td>Private companies use their financial, managerial and technical capabilities, whereas the government only funds the projects. Joint ventures can be seen in Gas and Oil facilities; telecommunications activities; and to increase foreign’s capital and technology in the country.</td>
</tr>
<tr>
<td>(B) BOT and BOO</td>
<td>Private companies obtain the right from the government to build infrastructure such as telecommunications systems, highways, utilities and all works that deal with infrastructures.</td>
<td>The project is operated under a concession from the government, which lasts for a period of 15 to 30 years to allow the company to recover its costs, repay debt and make a return on investment. At the end of the concession, the project facilities are either transferred to the government or purchased by the operating company.</td>
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</tr>
<tr>
<td>(C) Joint investment</td>
<td>Less formal co-operation agreements between the government and the private sector to meet the growing demands for public and services and infrastructures.</td>
<td>Private companies use their financial, managerial and technical capabilities, whereas the government only funds the projects.</td>
</tr>
<tr>
<td>Transferring services to private and non-governmental organisations</td>
<td>Government divestment of services; allowing private sector to provide services; using private and non-governmental organisations to extend or provide higher levels of service.</td>
<td>Means of extending access to social and community services, low-cost housing, and other services that governments cannot or will not provide on their own.</td>
</tr>
</tbody>
</table>


### 1.7.1 Comments

The writer has found the public share offerings to be a worldwide method, which many governments use, such as Japan, Great Britain, France, Italy, and Germany. These five countries together have raised almost $285 billion through 120 public share offers of the common stock of state-owned enterprises (Megginsin, 2000). British telecommunications has raised more than £12 billion alone from privatising BT through the stock market (see Fraser, 1988).
1.8 Review

Some of the privatisation issues have been looked at and the concept has been explained through the eyes of other researchers. It is noticeable from the literature that there is a little discussion of the issue relating to the privatisation of public monopolies, which remain virtual monopolies after privatisation. The hypothesis is set to address this matter. Discussion of other issues relating to privatisation can be seen at appendix 4.

The next chapter (2) will discuss the issue of ownership transfer from the state-owned to private and how this issue can have an effect on the success of the privatisation programme. The regulation issue, which addresses the condition when virtual monopoly still exists after privatisation, will be considered in this chapter and further discussion can be seen in chapter 7 (reflections chapter). The regulation regime will illustrate the main role of the regulator in the telecoms markets, which definition remains a less contestable market than other sectors of the economy.
Chapter Two: The importance of Ownership and Regulation
Chapter Two: The importance of ownership and regulation

2.1 Does ownership matter?

This is a key element in the pursuit of the thesis that ownership does matter when a firm transfers from the state-owned sector to the private sector. This chapter introduces an important caveat when we measure the performance of privatised companies and compare them with the private companies, insofar that their economic performance may be shadowed by lingering attitudes remaining from their previous status as state-owned enterprises. At this moment in time, many of the privatised companies have a short history of being in the private sector and others have been only semi-privatised because of the large shareholding held by the states. In order to compare economic performance between these various ownership structures, an awareness of their antecedents and their current progress towards a wholly private managerial focus, is essential.

While observing this problem, the contention of this thesis is, to measure the performance solely through the analysis and interpretation of the financial data and make no claims to having further capacity for another objective measures of managerial capability (entrepreneurial strategies). The thesis is purposefully narrowed to measure performance solely by the objective means of measuring financial performance as a simple outcome determinant. The writer chooses not to be distracted by pursuing the normative approach, which examines managerial style, leadership competence or organisational structure of the telecoms companies in the study.

The transfer from state to private ownership will lead to a change in the incentive structure facing its decision-makers (see Kocenda and Svejnar, 2002). This shift basically will have two effects from the perspective of agency theory (Yarrow, 1989; and Chappell, 1986).
First, there will be a change in the objectives of the firm: to the shareholders' objectives in the private firm (profit maximisation and dividend growth), and to the voting public objectives in the case of the state-owned firm to meet the targets of customer provision set by the state (See Alchian, 1965; Jensen and Meckling, 1976; and Fama, 1980 for more details).

Second, are the performance requirements of management. The managers of privately-owned enterprises will be concerned with meeting the requirements of the capital markets and will have to deal with the possible threat of a take-over and also possible bankruptcy if the company fails to ensure revenues (see Aoki, 1983; and Leech, 1987).

By contrast, the managers of state-owned enterprises seek to satisfy ministerial objectives (see Field, 1995), and market forces have much less influence, although they might well have to manage within the constraints of the public purse (see Foster, 1992; Blankart, 1983; and Road, 1997).

This is a continuous perception in the mind of many researchers that public service management exhibits a "civil service mentality" in both workers and management in state-owned enterprises and such behaviour can remain a persistent shadow in many newly privatised companies, especially so, when the privatisation is only partial through regulators or shareholders.

A large number of the privatised companies are protected by a golden share from takeover, which creates a false position in the market place, where in normal circumstances firms are exposed to the feature of takeovers (see Pirie, 1988:63; Wiltshire, 1987:41-42; Martin and Parker, 1997:22; Economist, 1994:96; Shearer, 2002:11-12; and Hofheinz, 2001:9A). In 1996, the proposed collaboration between BT and MCI was largely prevented by the
existing of goldern share, which would have inhibited any merger between the companies. Therefore, it limited their market potential (Financial Times, Nov. 16th 1996:20, Financial Times, Nov 16th 1996:10; Financial Times, Dec. 4th 1996:30; and Financial Times, July 15th 1997:16). However, in the 1997 published accounts, the golden share was not shown to be a barrier to the acquisition (BT annual report, 1997).

In private ownership, there is a fairly direct link between agents (managers) and principals (shareholders), but the state monitoring hierarchy is more complex, involving two major levels of delegation: first to the ministers, and then to the managers (monitored by ministers). The most fundamental weaknesses of the latter stems from the interactions between voters and politicians (Millward, 1982; Boardman, and Vining, 1989; and Rees, 1985).

The state control hierarchy is highly vulnerable to goal displacement in democracies as political opponents will most likely change policies when in power. It is this problem that most likely accounts for some of the observed relative inefficiency of the state enterprises operating in competitive product markets (Yarrow, 1989).

Common ownership has been a poor means of bringing control over some companies. In state enterprises, the planning horizon might not exceed the length of the franchise of the political system (5 years in most cases). With privatisation, the sale of shares allow a real stake in the industry by the public in general and institutional shareholders, which can facilitate much longer-run planning by management, but with a discipline for short-run market objective.
However, they can be exposed to the volatility of share price movements, which for the first-time buyer of shares can prove disturbing and cause a frenzy of selling or buying. Brokers may be inundated with requests for information about the company requiring regular information about how the company is performing, and small first-time buyers will even attend the Annual General Meeting to question the management on policy and performance issues.

The survey of evidence in the UK Stock Exchange-Treasury (1986) suggests that about 9.4 million people (23 per cent of the adult population) now own shares, compared with two million (5 per cent) in 1983, before the large stock market flotation of public utilities. Privatisation has given many individuals as well as the employees of the companies, the right to purchase shares in the company of their choice, and as a result create wider shareownership among the public at large. Such schemes have an effect on the ownership structure of the company and the mentality of the public towards state-owned enterprises, since much of the public provision is satisfied from the private sector subsequent to the privatisation. There will be a focus on share value as well as in customer satisfaction, which may at times appear contradictory.

It is estimated that the BT privatisation has promoted share ownership. The number of shareholders has increased to more than 20 million over the last decade. BT itself added more than 9 million shareholders including their employees before most of these shares were sold to financial institutions (see Martin and Parker, 1997; Pitt, 1990; Vickers and Yarrow, 1988).
A good example of employees' ownership is Amersham International. Their employees were able to subscribe to shares priced at £1.42 (the issue price), and exercise this option in either April 1987 or April 1989. In the British gas sale, for example, 93 per cent of employees own shares in the company (see Estrin, Grout and Wadhwani, 1987; and Grout, 1987).

The convergence of interest hypothesis predicts that a firm's value increases as managerial equity ownership rises. Jensen and Meckling (1976) analysed how a firm's value is affected by the distribution of ownership between inside shareholders who can consume perquisites, and outside shareholders who cannot. According to Earle (1998) there is a positive impact of private ownership, relative to state ownership, on labor productivity, and most of this is due to the positive effects of managerial and other employees ownership.

Within this framework, increased managerial ownership of equity alleviates agency difficulties by reducing incentives to consume perquisites and expropriate shareholders' wealth. This reduces the potential for misallocation of resources, enhancing the firm's value (see Alchian and Demsetz, 1972; and Kay, 1987).

Similarly, Demsetz (1968) argues that non-management insiders with large shareholdings are effective monitors of a firm's activities, suggesting that increased ownership concentration enhances a firm's value (see Alchian and Demsetz, 1972).

However, Fama and Jensen (1983), DeAngelo and DeAngelo (1985) argue that increased insider ownership-concentration permits managerial consumption of perquisites and the entrenchment of incumbent management by reducing the probability of bidding by outside agents, thus reducing the firm's value. Several empirical studies have estimated cross-
sectional regressions to assess the relationship between ownership structure and corporate value, but have reached conflicting conclusions.

The theory of property rights argues that a transfer of ownership from state-owned to private will enhance the efficiency of the firm because of the better incentive system and control mechanism associated with private ownership. These are said to derive from the benefits associated with residual claimants. State assets are not owned; there are no clear rights for residual claimants; and the exchange of rights does not exist (see Forsyth and Hocking, 1980; Furubotu and Pejovich, 1972).

The major difference between state and private ownership is the transferability of property rights. The rights of the shareholder in state-owned ownership do not include in the right of saleability or exchange of the right, because the right is purely ‘nominal’ (Alchain, 1965; Millward and Parker, 1983). If there are shareholders of a state-owned firm who are not happy with the performance of the firm, they cannot sell their shares. This causes less pressure from the top, or from above, on the management of a state-owned enterprise.

In contrast, contestability of ownership is a device for managers of a private firm. If there are poor returns to the shareholders, the value of the firm’s shares are likely to fall on the stock market. This gives the shareholders a signal to sell their shares and put pressure on the management to increase and improve their efforts.

Many theorists have discussed the difference between state ownership and private ownership. Most of these theories have the same belief that competition in the market is the only single most important factor in enhancing efficiency and reducing agency costs. Thus, it is not the ownership that determines the success or the failure of privatisation; it is the market structure (see Vickers and Yarrow, 1988: 7-44, for details of these theories).
There is no doubt that ownership plays an important role in the success or failure of the firm, but one must be aware that there are many factors, which could be of essential importance as well as ownership. The market needs a competitive environment to work better. It was said: “it is not enough to argue that improvements in internal efficiency can be obtained by changing the external economic environment without transferring ownership” (see Beesley and Littlechild, 1989; and Littlechild, 2000) and it seems to be a valuable truth.

Logically, it is difficult to compare the performance of state-owned firms with private firms because these organisations pursue different objectives within restraints imposed by regulators and monopoly agencies.

Private firms seem to be, in the main, interested in maximising profit, whereas state-owned firms’ objectives are complex, unclear, inconsistent and unstable. According to Barberies, Boycko, Shleifer, and Tsukanova (1996) the changes in ownership and management styles are likely to lead to a value-maximising restructuring. The complexion of aims within state-owned firms does not make them perform poorly in many countries. Other factors come into play, but the objective of state-owned firms to make profits may be an inappropriate criterion, with which to appraise the whole economic performance of state-owned firms (see Pryke, 1982 for more comparative analysis of public and private enterprises).
Changing the ownership structure of a company will have an impact on the company itself. This impact could affect the overall performance of the company. Competition is a very important factor in changing the management perspectives as a whole. Ownership transfer without a competitive and unregulated market seldom works. The process of privatisation can be a force for encouraging competition in the market-place where none existed before.

Ownership transferred to private hands will change the image and the strategy of company management from state control to more commercial imperatives. The new management will adopt a new style and strategy in order to improve the performance of its business and increase the financial performance.

Martin and Parker (1997: 178 and p. 198) provide a summary of the main changes of the privatised firm in the UK and explain the stereotypical view of the change process from nationalised industry to private sector producer.

The improvement in the financial performance of the privatised enterprise will indicate whether or not the privatisation programme is successful. Other elements can contribute to the success of this privatisation programme such as improved services, better quality, more competitive prices and an increased range of products. All these elements together can be measured to some extent by the successful financial performance of the privatised enterprise.

In this thesis, spurious claims have been avoided to be able to measure the performance of state-owned enterprises with that of the private or the privatised companies. Instead the focus is entirely limited to a comparison between recently privatised, fully or partially, with that of private companies. In chapters 4, 5 and 6, the analysis shown, demonstrates in analytical terms the outcomes of the performance irrespective of the extent to which that
there has been any management cultural change brought about through privatisation and hence, ownership structure. Nevertheless, it must be implied that some changes have taken place, since the outcomes of the analysis will show that the general hypothesis will be rejected (see chapter 4).

2.2 Regulation and competition

Regulation may be defined as the various rules set by the governments or their agencies that seek to control the operations of firms (Griffiths and Wall, 2000:525). There has been a shift in policy, which has resulted in the privatisation of large state enterprises with significant monopoly power.

The British Telecommunications privatisation in November 1984 fostered a requirement for new regulatory institutions. The existence of a natural monopolistic distribution network in telecom, gas, electricity and water, led the government to develop new, semi-autonomous and industry-specific regulatory bodies to oversee the activities of the newly-privatised companies (Bishop and Thompson, 1992).

The regulatory worldwide objectives were given as stated in chapter 1 as: (1) to meet social objectives; (2) to develop competition; and (3) to prevent monopolistic pricing behaviour.

The main instrument of regulatory policy in the UK was an operating licence with which the former state enterprise was required to comply. Social objectives were imposed through certain conditions in the licence. These conditions were forced by the government to be provided without any reduction in the services. A good example from British Telecommunications was the requirement to retain the public phone booths—even when they were not on profitable sites.
Monopolistic pricing was capped by the regulator (or at least the price of those of its products where it is able to exercise market power), and this condition was enforced in the licence. This ceiling is set by reference to a formula which permits the company to increase its prices no more than a specified amount below the increase in the consumer price index (the so-called PRI-X formula). The value of X in the formula is reset at prespecified intervals, typically every five years (Littlechild, 1983; Vicker and Yarrow, 1988).

The most difficult task for this regulatory policy is promoting competition policy. There is often scope for competition in some activities. Privatised monopolies have a significant degree of market power. Potential entrants face a powerful incumbent and recognition of this means that the licence conditions usually contain provisions, which are more specific than the provisions of competition policy, which apply to ordinary private sector companies. These companies are hybrid private enterprises, in that they have not existed before (specifically regulated private monopolies).

Thus licenses usually require the utilities not to use price discrimination; cross-subsidy between specified activities is often explicitly prohibited; and separate profit and loss accounts are sometimes required for individual projects (Bishop and Thompson, 1992).

The regulatory offices monitor and enforce compliance with the licences and seek to alter licences in circumstances where the initial provisions turn out not to be appropriate (Beesley and Littlechild, 1989). The implementation of these regulatory regimes would depend heavily on the regulators’ enforcement.
The large industries with natural monopoly in the UK such as British Telecommunications, British Gas, British Airports Authority and the water industries are operated under licences containing many obligations and constraints. Independent regulatory authorities such as OFTEL (Office of Telecommunications); OFGAS (Office of Gas Supply); and OFFER (Office of Electricity) are each headed by a director-general, and monitor and enforce compliance with licence conditions (Beesley and Littlechild, 1997).

The duties of regulators include protecting the interests of producers, of consumers of various kinds, and of employees and third parties (e.g., governmental concern). Beesley and Littlechild (1997) have identified the role of the actions of the privatisation regulator: (1) to ensure that all reasonable demands are met, and that producers are able to finance the provision of these services; (2) to protect the interests of consumers with respect to prices and quality of service; and (3) to enable or promote competition in the industry.

The industries often see this simply as a price cap.

The regulators’ essential task is to assess the relationship between their actions (which will include regulatory changes as well as determining disputes and constraining prices) and the probability that entry will actually occur. They will need to consider the scale and the time path of entry and its impact on all the parties involved as well as on other potential parties (Beesley and Littlechild, 1997).

The effectiveness of the regulator depends upon the scope for new entry and on the information available to the regulator. The regulators need to acquire adequate information concerning the scope for cost reductions and the extent and effects of new entry. The generation and dissemination of information are therefore at the heart of regulatory effectiveness (Kirzner, 1973).
The regulator remains in the background for these companies when considering the degree of competitive advantage, their monopoly position in their markets, and their financial performance compared with each other. Chapters 4, 5 and 6 constantly infer the inhibiting present of the regulator in that the data analysed arises from the current performance of the companies all three of which are bounded by the regulator in each of their market.

2.3 Overall comment

As this study sets out to assess the financial performance of BT and other privatised monopolies in telecommunications, the role and actions of the regulators, now globally used throughout this sector, and factors such as EU competition policy, will have implications for the financial outcomes we are measuring. In essence, the existence of a regulator focused on one company, has the effect of state interference in the objectives of management maybe distorted in favour of the regulator and the remit of his office.

The approach to be used in the study will be to measure the performance of the companies by using conventional financial measures and to introduce further sophistication by the introduction of new tools and further adaptations of financial models. This is in order to ascertain to what extent these privatised utilities have retained their competitive advantage.

After analysing the ownership transfer and the regulation regime in the telecoms markets, it has been emphasised why ownership was an important element in the privatisation process, and it was pointed out the main reason for implementing the watchdog regime such as price control and controlling the anti-competition behaviour in the telecoms sector. The next chapter (3) is the methodology chapter, where it will cover most of the literature review on the financial tests that will be used. Chapter 3 will consider previous studies of BT, identify which areas have or have not been covered, and indicate the financial tests that will be used in the methodology chapter.
Chapter Three: The Methodology Review
Chapter Three: The methodology review

3.1 Introduction

One of the main features of this thesis is to measure the financial performance of a privatised monopoly enterprise.

As a group, other privatised telecoms companies will be examined worldwide to find out if there is any significant difference among privatised and non-privatised firms. This chapter also provides an explanation of some of the methodologies that will be used throughout the whole thesis. Popular analytical methods such as ANOVA and multiple regression, using data taken from the conventional financial ratios and other financial statement items will be employed.

3.2 Previous studies on BT

Table (3.1) presents the most important studies of BT that have been undertaken by other researchers, academics and professionals. The previous studies cover a wide range of areas such as regulation, ownership transfer, management, and some general discussion on financial performance.

This research has been undertaken from 1980 to 2002 to discover whether there had been any thorough financial studies or tests on BT. The results of the research revealed no formal financial tests had been examined and only total factor productivity (TFP) and labour productivity (LP) had been covered. They were the only two productivity measures that generally examined BT’s financial performance and other privatised companies in different sectors without providing any detailed analysis (see table 3.1).
D’Souza, Bortolotti, Fantini and Megginson (2001) produced the only study that examined the profitability, efficiency, employment in pre and post-privatisation in telecoms companies globally (see table 3.1).

There was a study partly on BT that covered the cross section of the financial ratios of some privatised companies without using the statistical analytical tools (Hartley, Parker and Martin, 1991, see table 3.1).

This thesis is constructed such that it avoids replication of the financial tests that have been examined by others. The conventional and new tests in this thesis make it original and more thought provoking, but that does not mean that the previous financial tests are not useful or valuable.

There is a test that covered both pre- and post-privatisation period of telecoms companies globally (see D’Souza, Bortolotti, Fantini and Megginson, 2001). The lack of information on the pre-privatisation period of the sample companies, had prevented a close examination of the pre-privatisation period. Further, the concept of pre and post-privatisation performance covered many companies in different sectors in different countries and did not focus clearly on telecoms as such or avoid the problems of the differing cultural and national regimes (La Porta and Lopez-De-Silance, 1999; Lopez-de-Silances, 1997; Megginson, Nash, and Randenborgh, 1994; Boubakri and Cosset, 1998; D’Souza and Megginson, 1999; and Harper, 2001).

Other researchers have focused on comparing the performance of state firms with either private (Boardman and Vining, 1989) or privatised alternatives (Pohl, Anderson, Claessens and Djankov, 1997; Roman, Gray, Hessel and Andrzej, 1999; and Omran, 2002). Table (3.1) shows these studies in more detail:
### Table: 3.1: The main BT studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Main performance measure(s) used</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith, Barnard Smith (1986)</td>
<td>Management development scheme</td>
<td><em>(a)</em> a pattern of commitment and involvement has been established <em>(b)</em> solving the soft edge of management</td>
</tr>
<tr>
<td>Gist and Meadowcroft (1986)</td>
<td>Regulatory regime</td>
<td>Certain policy provisions needed to have effective regulation policy and constrains BT from anti-competitive behaviour.</td>
</tr>
<tr>
<td>Molyneux and Thompson (1987)</td>
<td>Total factor productivity and labour productivity</td>
<td>Buoyant labour productivity growth but a poorer performance in terms of total factor productivity.</td>
</tr>
<tr>
<td>Foreman-Peck and Manning (1986)</td>
<td>Natural monopoly</td>
<td>If BT has natural monopoly then, <em>(a)</em> performance will deteriorate in long term, or <em>(b)</em> industry will return to a monopolistic organisation after a number of years.</td>
</tr>
<tr>
<td>Foreman-Peck and Manning (1988)</td>
<td>Productivity</td>
<td>BT was not clearly performing better than the state-owned telecom monopolies in continental Europe.</td>
</tr>
<tr>
<td>Foreman-Peck (1989)</td>
<td>Total factor productivity</td>
<td>No substantial improvement in the growth rate of BT since privatisation.</td>
</tr>
<tr>
<td>Hartley, Parker and Martin (1991)</td>
<td>Employment, productivity and financial ratios</td>
<td>Results were sensitive to the performance measure used. In general the performance improved, but this result was not guaranteed.</td>
</tr>
<tr>
<td>Dutch (1991)</td>
<td>Ownership and performance</td>
<td>Performance was not related to ownership.</td>
</tr>
<tr>
<td>Hunt and Lynk (1991)</td>
<td>Productivity</td>
<td>Productivity has increased in USA and Japan after liberalisation but not the case for BT.</td>
</tr>
<tr>
<td>Lynk (1991)</td>
<td>Utilises the correspondence between cointegration and error correction mechanisms</td>
<td>Since post-privatisation output data for BT in several service areas is unavailable testing this has proved problematical.</td>
</tr>
<tr>
<td>Trauth &amp; Pitt (1992)</td>
<td>Competition effects</td>
<td>There are some forces that pushed for further competition such as societal, economic and technological.</td>
</tr>
<tr>
<td>Source</td>
<td>Research Topic</td>
<td>Summary</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Kwoka (1993)</td>
<td>Total factor productivity</td>
<td>The productivity of BT has increased to 25% in recent years.</td>
</tr>
<tr>
<td>Schneider, Dang-Nguyen and Werle (1994)</td>
<td>Performance through profit margins, labour and total factor productivity</td>
<td>Increase in total factor productivity for BT and privatisation of BT has an impact on economic performance in telecommunications.</td>
</tr>
<tr>
<td>Parker (1994)</td>
<td>Performance indicators such as labour, quality of service, R &amp;D and labour productivity</td>
<td>Gains have been achieved by BT in terms of service, overall prices, profitability and labour productivity since privatisation.</td>
</tr>
<tr>
<td>Muller (1994)</td>
<td>Telecommunications Regulation</td>
<td>Establishing proper regulatory institutions is an important precondition for successfully restructuring telecommunications sector.</td>
</tr>
<tr>
<td>Curwen (1995)</td>
<td>Telecommunications policy in EU</td>
<td>The European Commission has a problem in controlling the monopolistic operators.</td>
</tr>
<tr>
<td>Dnes and Seaton (1995)</td>
<td>Daily stock market return</td>
<td>No sign of evidence of overall capture of the regulatory regime by BT.</td>
</tr>
<tr>
<td>Parker (1997)</td>
<td>Total factor productivity and labour productivity</td>
<td>Increase in labour productivity of BT, but lacklustre total factor productivity in BT immediately after privatisation.</td>
</tr>
<tr>
<td>D'Souza, Bortolotti, Fantini and Megginson (2001)</td>
<td>Use pre vs. post privatisation methodology</td>
<td>Increase in profitability, output, efficiency, capital expenditures, number of access lines in service and average salary per employee, decrease in leverage, and employment.</td>
</tr>
</tbody>
</table>
Robinson (2000)  Modelling the conditional variance using daily data on share returns  It was found that the conditional variance of BT share returns decreased after the publication of White Paper in March 1991.


Burton and Ul-Haq (2001)  Use a 4 dimensional matrix to examine the management strategy of the privatised companies. Their 4 dimensions are: (1) change in macroenvironment; (2) competitive environment; (3) management processes; and (4) the firm's relation to 4 dimensions.  There is a link between external changes facing the firm and changes in the internal strategic management processes of the subject firm.

Thoralf, Parker and Saal (2001)  Profit margin, labour productivity and total factor productivity.  BT profit margins rose after privatisation but began to fall in the early 1990s. Poor labour productivity growth following privatisation in 1984, decline in TFP after privatisation but improves after liberalisation in 1991.

Some of the studies are not related to the theme of this thesis, but they must be included to show the level of previous research coverage of BT. Overall, these studies give a guideline to indicate what has been done and what the areas of BT are that have yet to be covered.

Molyneux and Thompson (1987) examined nine corporations including BT's performance. They tested the labour productivity and total factor productivity as performance measures. They examined three periods to analyse the productivity performance for these corporations and they measured the trends in productivity from 1960-75, 1968-78 and 1978-85. The following extracts show in detail the productivity performance of BT.

Table 3.2: BT productivity measures 1960-75

<table>
<thead>
<tr>
<th>1960-75</th>
<th>Output per head %</th>
<th>Total factor productivity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Telecommunications</td>
<td>7.7*</td>
<td>6.4*</td>
</tr>
</tbody>
</table>

Table 3.3: BT productivity measure 1968-78

<table>
<thead>
<tr>
<th></th>
<th>1968-78</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output per head %</td>
<td>Total factor productivity %</td>
</tr>
<tr>
<td></td>
<td>1968-73</td>
<td>1973-78</td>
</tr>
<tr>
<td>British Telecommunications</td>
<td>7.7*</td>
<td>8.6*</td>
</tr>
</tbody>
</table>


Table 3.4: BT productivity measure 1978-85

<table>
<thead>
<tr>
<th></th>
<th>1978-85</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output per head %</td>
<td>Total factor productivity %</td>
</tr>
<tr>
<td>British Telecommunications</td>
<td>5.8*</td>
<td>0.5</td>
</tr>
</tbody>
</table>


*Indicates that the trend growth is higher than the average for manufacturing industry.

They concluded that BT had performed well above the manufacturing industry level and they claimed that both total factor productivity and labour productivity of BT had increased in these three periods (Molyneux and Thompson, 1987).

The Foreman and Manning (1988) agreed with Kay and Thompson (1986) that the poor performance of BT was related to a number of reasons. First, is the manner in which BT was placed with the private investor. Second, BT was too large to be vulnerable to competition and third, BT should have been broken into a number of independent firms, as was the American Bell Company. They argued that smaller European telecoms companies in Norway and Denmark performed better than BT in general in both TFP and LP measures.

In the Hartley, Parker and Martin (1991) agreed with the Molyneux and Thompson (1987) results that both TFP and LP revealed an improvement in the performance of British Telecom (BT), and this improvement was attributed to the change in the organisational status.
The Bishop and Thompson (1992) covered a longer period to the late 1980s and both labour productivity (LP) and total factor productivity growth (TFP) were used for their performance measurements at BA, BAA, and BT, the electricity supply industry, gas, posts, rail and steel between 1970-80 and 1980-90. They concluded that in the case of BT, labour productivity had improved, but with a slight decline in the results of TFP growth (see table 3.5 for more details).

Table 3.5: UK public enterprises: productivity growth from 1970 to 1990

<table>
<thead>
<tr>
<th>Enterprises</th>
<th>Annual average rates of growth</th>
<th>Labour productivity %</th>
<th>Total factor productivity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Airways</td>
<td></td>
<td>8.1</td>
<td>6.0</td>
</tr>
<tr>
<td>BAA</td>
<td></td>
<td>.6</td>
<td>2.7</td>
</tr>
<tr>
<td>British Telecom</td>
<td></td>
<td>4.3</td>
<td>7.2</td>
</tr>
<tr>
<td>British Coal</td>
<td></td>
<td>(2.4)</td>
<td>8.1</td>
</tr>
<tr>
<td>Electricity Supply</td>
<td></td>
<td>3.7</td>
<td>2.5</td>
</tr>
<tr>
<td>British Gas</td>
<td></td>
<td>4.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Post Office</td>
<td></td>
<td>(0.1)</td>
<td>3.4</td>
</tr>
<tr>
<td>British Rail</td>
<td></td>
<td>(2.0)</td>
<td>3.2</td>
</tr>
<tr>
<td>British Steel</td>
<td></td>
<td>(1.7)</td>
<td>13.7</td>
</tr>
</tbody>
</table>


Kwoka (1993) studied: “The effects of divestiture, privatisation, and competition on productivity in US and UK telecommunications.” This study sought to determine the incremental impact of telecommunications policy on productivity of the leading firms in the US and UK industries. He concluded that, BT’s TFP had increased by 25% compared with the 17% productivity increase in the AT&T.
The Parker (1997) supported Bishop and Thompson (1992) that the LP increased whereas the TFP showed a lacklustre performance for BT. He pointed out that this lacklustre TFP performance of BT was in the years immediately after privatisation, but with performance, especially labour productivity, rising quickly in response to increased competition after 1990.1

D’Souze, Bortolotti, Fantini and Megginson (2001) examined the pre- versus post-privatisation financial and operating performance of firms from 26 national telecommunications industries in 21 countries that were fully or partially privatised through public share offerings between November 1984 and October 1997. They found that profitability, output, efficiency, capital expenditures, number of access lines in service (a proxy for quality of goods sold) and average salary per employee all increased significantly, leverage decreased significantly, but employment decreased insignificantly in the BT case. They attributed profitability gains due to greater output and productivity, rather than to output price increases, and the efficiency gains resulting from better incentives and cost control, rather than from wholesale firing of employees.


Their results show that there is considerable variation in both profitability and productivity of telecommunications operators across Europe, compared with the USA and Japan (these two countries were introduced into the study as international benchmarks). The study, however, provided scant evidence that privatisation has had a reliable and favourable

1 Molyneux & Thompson (1987) report buoyant labour productivity growth in state-owned UK telecommunications between 1978 and 1985, but a poorer performance in terms of TFP. Europe Economics (1998) report labour productivity growth figures for BT since 1980s that are higher but not dissimilar in trend to our results.
impact on economic performance in telecommunications in the absence of market liberalisation. BT had recorded a steady growth in TFP, but the improved performance lagged privatisation and was more closely timed to the introduction of full competition in UK telecommunications from the early 1990s.

In order for this study to progress from the earlier contributions, it is necessary to employ, more thoroughly, conventional financial techniques and to adopt where possible new measures for analysing the financial performance of a privatised monopoly utility such as BT.

ANOVA and multiple regression tests are very appropriate and useful tools to implement meaningful comparisons and to analyse determinant factors, and they provide the thesis with a range of additional results, allowing for a variety of variables to be tested.

3.3 ANOVA Test

The ANOVA test is used to examine the seven variables of this study, and discover which variable is the most significant for distinguishing between the privatised and non-privatised groups.

One way analysis of variance (ANOVA) has been of interest to many academic and student researchers to analyse a set of samples to see if there is any significant difference among these samples.

Sirotnik (1971:36) applied the ANOVA test of the mean in relation to paired comparison (correlated) t-tests and 1 way ANOVA. He found that the variability of means between groups in the ANOVA had not been used in previous tests (see Winter, 1962; Lindquist, 1956; Edwards, 1968; Myers, 1967; Kirk, 1968; Hyas, 1963; and Kempthorne, 1952). He
concluded that the one way ANOVA test produces good results for a limited set of samples.

Levy (1980) applied nonparametric applications of Shaffer’s extension of Dunnett’s procedures. He uses the Kruskal-Wallis procedure, Friedman procedure, and Cochran procedure in the one way ANOVA test.

Atrill, Omran and Pointon (2002) examined: “Shareholders versus stakeholders: corporate mission statements and investor return.” They used the ANOVA test to see whether or not there was a significant difference between the mean return of the shareholder and stakeholder sample. They concluded that there is no significant difference in shareholder returns between stakeholder-oriented and shareholder-oriented companies on the basis of the test outcomes.

Girden (1992) applied ANOVA to “repeated measures” and Maxwell and Riccardo (1999) extended the analysis of variance in more detail and demonstrated how anyone can calculate every procedure of the AVOVA test in more mathematical ways rather than relying on the ANOVA computer programme.

Other researchers have contributed to the analysis of variance in depth and they suggest some other techniques to use (see Bolk, 1979; Bolk and Kirk, 1977; Bray and Maxwell, 1985; Dodd and Schultz, 1973; Hertzog and Rovine, 1985; O’Brien and Kaiser, 1985; Rouanet and Lepine, 1970; Rosenthal and Rosnow, 1991; Siegel and Castellan, 1998).

ANOVA seems to be a reliable and well tested measure for this study and it has been adopted in chapters 4 and 7. Relevant tests are demonstrated in chapter 4 (section 4.3).
3.4 Multiple regression

Multiple regression is a technique used to describe a relationship between two or more variables in statistical terms, expressing predictions in values of the dependent variable as a linear function of several independent variables. Multiple regression tests have been used widely to compare the performance of certain variables (see Francis, 1988: 118). A few examples of many are:

Blay and Geiger (2001) studied the market expectations for first-time going-concern recipients. They used multiple regression tests to compare market differentiation of subsequently bankrupt and viable companies.

Another example is Landis and Dunlap (2000), where they examined how the ordering of variables and to what extent they were criterion specific, which would have an impact the presence of a significant interactive relationship in moderated multiple regression. VanDerhei (1987) also studied the effect of voluntary termination of overfunded pension plans on shareholders wealth. He examined abnormal returns using multiple regression of the common stock of firms with excess assets in their defined benefit pension plans. Again focused on specific criterion for making a choice of variables.

The multiple regression test is used in chapters 4, 5 and 6 of this thesis also apply specific criterion in that the model is based upon chapter 4 (section 4.3) and the following section.
3.5 An evaluation of the study variables

As with Miles and Timmermann’s study in (1996) this thesis has used variations in expected returns. This thesis has not used the pricing of equities, but the beta, book to market value, size, standard deviation and capital gearing instead of dividend yield, PER, leverage and share liquidity used by them. Their study period was 1979-91. They used the beta, book to market, size, dividend yield, PER, leverage, and share liquidity, as variables. They found out that there is no relationship in univariate or multivariate analysis using beta as a variable. However, this thesis has shown that there is a relationship and the beta variable identifies this. The MTBV (market-to-book value) according to them, has a significant relationship, and this thesis found that the MTBV was not significant. They found that there is no linear relationship to size, but the smallest of companies have a substantially higher return, in this thesis, size proved not to be significant. They used a debt/market capitalisation for gearing (leverage) and they found that this was not statistically significant, and this thesis agrees with this result. They concluded that the variables belonging to the book to market value, and to a lesser extent size and liquidity, were the only variables that appear to contain information about variation in expected returns (p. 379). Later it will be discovered that beta is a significant variable in the ANOVA test and the standard deviation is a significant indicator in the multiple regression test (see chapter 4).

Chan and Chui (1996) made an empirical re-examination of the cross-section of expected returns from UK evidence, the study period was 1973-1990, and they used beta, book to market, size, dividend yield, PER, leverage, share liquidity as their variables. They found that the beta value according to them, had no relationship in the univariate analysis; and was negative in the multivariate analysis, unlike this thesis. The MTBV had a significant positive relationship, whereas size was not significant, which is similar to the findings in the thesis. They used total assets/market capitalisation and total assets/book value as
measures for leverage, and they found that total assets/market capitalisation had a significant positive relationship, unlike the thesis, whereas total assets/book value was not significant. They concluded that in contrast to Fama and French (1992), when the book-to-market variable is broken down into market leverage and book leverage, the market leverage was more significant than the book leverage, and captures the whole effect of the book-to-market variable (p. 1446). Some of the variables were not chosen in the thesis.

Strong and Xu (1997) studied the cross-section of UK expected returns. The study period was 1971-1992. They examined beta, book to market, size, dividend yield, PER, leverage, and share liquidity as variables. They found that beta has a positive relationship in univariate analysis; none in multivariate analysis. The MTBV has a significant positive relationship. The small size companies according to them, produced higher returns, but they stated that this is not significant when book-to-market or leverage variables are included. They used the total assets/market capitalisation and total assets/book value as a measure for gearing, and found that there is a significant positive relationship. Overall, they concluded that no combination of variables can explain more than 8% of the variation of returns. According to the thesis, beta was the only significant variable in the ANOVA test.

Clare, Priestley and Thomas (1998) used beta, book to market, size, dividend yield, PER, leverage, share liquidity, their study period was 1970-1993, and they found an economically and statistically significant role for beta. The MTBV had a positive relationship, but was not statistically significant. The size had a negative relationship, but was not statistically significant. They used book value of debt/market value of equity as a measure for leverage, and found that there was a positive relationship, but statistically insignificant. They concluded that there was a significant and powerful role for beta in
explaining expected returns but no role for the Fama and French (1992) variables (p. 1225). Their study agrees with the results from the analysis of this thesis.

Lakonishok and Vermaelen (1990) studied: “The anomalous price behaviour around repurchase tender offers.” They examined size, and found that the smaller the firms, the larger the period return, a result also observed by Vermaelen (1981), whose results showed 24.31 per cent for the smallest firms versus 8.3 per cent for the largest firms with longer periods of return.

Amihud and Lev (1981) studied: “Risk reduction as a management motive for conglomerate mergers.” They also examined capital market measures of firm risk, and found out that smaller banks were always exposed to higher risks.

Mandelker and Rhee (1984) studied: “The impact of degrees of both the operating and financial leverage on systematic risk of common stock.” They argued that operating leverage acts in an analogous fashion to financial leverage in increasing the firm risk.

Lev (1974) studied the association between operating leverage and risk, and he found that highly leverage firms tend to exhibit greater stock return variance.

A study by Dufresne, Goldstein and Spenser (2001:2185) found that the change in leverage and the firm equity return are statistically significant, but the economic significance is, however, rather weak, and the sensitivity to changes in leverage also tends to increase as leverage does, but that the results were more apparent in a multi-variance regression framework.
Many current researchers demonstrate that abnormal return performance and possible market imperfection are stronger for smaller firms (Fama, 1998). However, this can be due to a delayed response mechanism, which corrects itself in the medium-term (see Bernard and Thomas, 1989).

Fama and French (1992:427) studied the cross-sectional return of expected stock, and they commented that there were two easily measured variables, size and book to market equity. They combined these effects to capture the cross-sectional variation in average stock returns, as well as the effect of market β (beta), and leverage. They concluded that there is no reliable relationship between beta and the average returns. But beta was found to be significant in this thesis.

Furthermore, they indicated that both the size and book-to-market equity provide a simple and powerful characterisation of the cross-section of average stock returns for the 1963-1990 period (p. 429). Fama and French (1993) examined five common risk factors in the returns on stocks and bonds. They concluded that size and book-to-market equity are important factors in determining and affecting return on the stock market (see Fama and French, 1988; Fama and MacBeth, 1973).

Banz (1981) studied the relationship between return and the market value of common stocks, and he found that the most prominent was the size effect. He discovered that market equity, ME (a stock’s price times shares outstanding), adds to the explanation of the cross-section of average returns and found that the average returns on small (Low ME) stocks are too high given their β estimates, and average returns on large stocks are too low. However, size did not appear to have a significant relevance in this thesis.
Kothari and Shanken (1997) studied the book-to-market, dividend yield, and expected market returns using a time series analysis. They made a comparison between the forecasting ability of B/M ratios and dividend yield. They stated that book-to-market (B/M) ratios and dividend yields were useful indicators over the period 1962-91 and sub-period 1941-91 during time series variation in expected real stock return. The thesis disagrees with the results of this study.

Berk and Berk (1995) studied the critique of size-related anomalies. They argued that the size-related regularities in asset prices should not be regarded as anomalies in the stock market return. There is a relationship between market value and expected return and this book-to-market equity ratio is a better predictor of return than market value. The thesis disagrees in that MTBV was a better predictor of performance for telecoms.

3.6 The importance of the standard deviation variable

In the study, the standard deviation has proved to be a very significant measure for comparing the privatised and non-privatised groups and justifies this approach. The standard deviation approach has been revived largely as a consequence of contemporary usage (Yoram, Levy and Markowitz, 1984) and given its prominence as a variance element in Markowitz 1959 and 1991 (second edition).

Of course the variance, and hence the standard deviation is used in mean-variance analysis (Brennan and Subrahmanyam, 1998; White, 1997; Miller and Leiblein, 1991; Wu, 1995; Coffee, 1995; and Nielsen, 1992). There is, however, an implied condition that the data set is normalised or a sufficiently large sample size is taken to permit a normal distribution in order to use the standard deviation for this purpose.
Because of the importance of information on share price movements, it has been decided to use the random walk model to forecast the future financial performance of the three telecoms companies (BT, AT&T and NTT) and this can be seen in chapters 5 and 6.

A random walk with drift model is an artificial approach rather than relying upon data prepared by professional forecasters, which would most likely to subjected to short-termism and would reflect the distortion of the market collapse in 2000 and 2001 when the telecoms bubble burst.

The price of shares move in a random fashion— one day’s price change cannot be predicted by looking at graphs of any of the previous day’s price change. The random walk model occurs because the share price at any time reflects all available information as it randomly arises (Dixit and Pindyck, 1994). Successive price changes will be independent and prices follow a random walk because the next piece of news (by definition) will be independent of the last piece of news (see Arnold, 2002:608).

According to Keane (1983:11) the random walk model is still a special case of the fair game model, and more specifically concerned with the sequence of price changes over time. The fair game model expresses efficiency in terms of the opportunities for speculators to earn excess returns. He adds (p. 34) that the tests of form of efficiency have their origins in what has come to be known as the random walk theory.

The name random walk theory derives from a series of markets studies carried out by researchers, mainly in the 1950s and 1960s, which indicated that the sequence of share price movements over time far from forming prophetic patterns, are quite consistent with being a series of cumulative random numbers.
For example, an early study by Kendall (1953) was presented as a paper to examine the security and commodity price movements over time, but he failed to identify any of the regular price cycles (see also Roberts, 1959; and Alexander, 1961).

The random walk emphasises the importance of information on the share price movements. The assumption behind this model can be explained by Fama (1970) when he produced a three-level grading system to define the extent to which markets were efficient. Fama’s market efficient system agrees with the random walk model, reflecting the importance of information on the share price movements.

Fama (1970) produced three types of investment approaches, which were supposedly designed to produce abnormal returns. The first form is weak-form efficiency, where share prices fully reflect all information contained in past price movements. The second form is semi-strong form efficiency, where share prices fully reflect all the relevant publicly available information (including earnings and dividends announcements, rights issues, technological breakthroughs, resignations of directors and so on).

The third form is strong-form efficiency, where all relevant information, including that which is privately held, is reflected in the share price (insider dealing). (For further detail of the efficiency market theory see Copper, 1974; Firth, 1977a and 1977b; DeBondt and Thaler, 1985; Dissanaike, 1997; Hong and Stein, 1999; Sullivan, Timmermann and White, 1999; and Shleifer, 2000).
In weakly efficient markets, current prices respond instantaneously and without bias to new information, which implies the absence of price regularities with any prophetic significance (Fama, 1970). Markets that are weakly efficient may be described by the process:

\[ P_t - P_{t-1} = x_i \]  \hspace{1cm} (Equation 3.1)

where \( P_t \) is the market price in period \( t \), and \( P_{t-1} \) is the price in period \( t-1 \). The random error term \( x_i \) is sometimes referred to as “white noise,” where \( E(x_i) = 0, E(x_i x_{i-1}) = 0 \).

Equation 3.1 is known as a “random walk” model. It says that the best estimate of the current price of a security is the price that prevailed in the previous period. A variation of this process is:

\[ P_t - P_{t-1} = \zeta + x_i \] \hspace{1cm} (Equation 3.2)

where \( \zeta \) is a constant parameter. This model is known as a “random walk with drift” (Webster and Szenberg, 1995:11).

### 3.8 The importance of dividends and dividend policy

Dividends play a central role in traditional models of stock valuation. Dividends constitute the primary cash payment to stockholders- the greater the expected future stream of dividends, the greater the value of the stockholder’s share (Carlson, 2001).

Asquith and Mullins (1986); Richardson, Sefcik and Thompson (1986); Healey and Palepu (1988) express that dividend policy is used by managers to convey private information to outsiders, and that prices adjust to this information.

The stability of a firm’s dividend policy may provide information to investors about its true value, and this attribute may be particularly useful in attempting to differentiate high value firms from their lower-value counterparts, which currently have high payout levels (Gwilym, Morgan and Thomas, 2000:262).
Modigliani and Miller (1961) argue that dividend policy is irrelevant to valuation. They claimed that the value of the company is not affected by whether it pays the dividends and raises funds through an equity issue, or uses only the retained earnings without any dividends being paid. They argue as long as a company maintains its investment plans it can pay whatever it likes in dividends at the end of the year, without affecting the underlying value of the company.

According to Barker (2001:31) Modigliani and Miller’s conclusion (1961) suggested that there is no reason to expect some sort of direct relationship between current dividends and future dividends, implying that (even though the Dividend Discount Model remains valid) current dividend-based valuation is without foundation. He adds (p.32) that the most fundamental problem of all, however, is that dividend-based valuation models do not address the determinants of dividend growth, and he argues that on account of erratic growth they do not help in explaining the relationship between current dividends and future dividends.

Penman (1992) has termed the ‘dividend conundrum’, whereby ‘price is based upon future dividends, but observed dividends do not tell us anything about price’.

3.9 Dividend Yield forecasting method

The dividend and earnings yields forecast is a standing tradition among academics and researchers. Fama and French (1988) find that dividend yields forecast future returns and that the forecasting power of individual yields increases with the return horizon.

Kothari and Shanken (1992) regress stock returns on current and future changes in dividends, and find that a high percentage of return variance can be explained by future changes in dividends.

There were some other studies that document the forecasting power of dividend yields. Black and Scholes (1974) examine the cross-sectional relationship between the dividend-price ratio and average returns. Several other studies find that stock returns are predictable (DeBondt and Thaler, (1985, 1987); Lehmann, 1990; and Fama, 1991).

According to Wu and Wang (2000:100) the dividend yields predict future returns because of their ability to forecast the mean-reverting component of returns and the permanent component of future earnings growth, and the yields contain information about future returns and growth.

Both Fama and French (1993, 1996); Naranjo, Nimalendran, and Ryngaert (1998) find that stocks with higher dividend yields earn higher risk-adjusted returns.

### 3.10 Forecasted earnings yield approach

Fama and French (1992) show that stocks with high earnings yield earn higher returns. Lakonishok, Shleifer, and Vishny (1994) find those stocks with low prices relative to earnings, dividends, cash flows, book assets and sales growth tend to have higher returns. Fama and French (1988); and Lamont (1998) find that earnings yield convey information similar to dividend yields.
Many studies have directly addressed the issue of forecast rationality in the forecast earnings (Ali, Klein and Rosenfeld, 1992).

The body of literature examining analyst’s earnings forecasts is large, and many studies have directly addressed the issue of forecasting rationality. Recent studies are by Pesando, 1975; Mullineaux, (1978, 1980); Brown and Maital, 1981; Figlewski and Wachtel, 1981; Keane and Runkle, 1990; and some others. Ackert and Hunter (1995) examine the rational expectations and security analyst’s earnings forecasts, and they rejected analyst-forecast rationality.

Beaver et al. (1980, 1987), and Collins et al. (1987) show that past stock returns reveal information about future earnings. If analysts’ forecasts are efficient, this information should be reflected in their estimates (Ali, Klein and Rosenfeld, 1992).

Stickel (1990) uses the change in the mean consensus forecast of other analysts since the date of the analyst’s current outstanding forecast to predict the individual analyst earnings forecast. He finds that updated forecasts are less biased and more accurate predictors of future forecasts than the analyst’s current forecast.

Earnings represent an important variable in stock valuation and selection. Earnings are assumed to move with cash flows and their forecast is considered, therefore, important for predicting future returns (Givoly, 1985).
Many researchers have begun to focus on analysts’ earnings forecasts as a proxy for unobservable market expectations. Givoly and Lakonishok (1979) and Elton, Gruber and Gultekin (1981) show that stock price movements are correlated with revisions in analysts’ forecasts of earnings.

Fried and Givoly (1982) compare the association between stock price movements and the prediction errors of analysts’ forecasts and time-series models and find out that investors behave in a way, which is more consistent with analysts’ forecasts being the surrogate for market expectations of earnings (see Gonedes, Dopuch and Penman, 1976).

3.11 An evaluation of both dividends and earnings yields

Shiller (1984); Fama and French (1988) estimate regressions of returns on either the lagged dividend yield or the lagged earnings yield, and find that both have explanatory power, but that the dividend yield has greater explanatory power.

Both Fama and French (1988); Wu and Wang (2000) find that the forecasting power of dividend yields increases with the time horizon, and the forecasting power of dividend and earnings yields persists over a longer horizon.

Dividend yields forecast future dividend growth (see Campell and Shiller 1988), dividend yields are significantly associated with future stock returns, and earnings yields provide information similar to that conveyed by dividends yields (Wu and Wang, 2000:100).

Bernartzi, Michaely and Thaler (1997) assume that dividend changes are positively associated with recent earnings changes, but not good predictors of future earnings growth.
3.12 Common measures of the market performance

3.12.1 P/E ratio

The PE ratio is a ratio of the share price to its earnings per share, and it is a useful measure of the market’s assessment of the firm’s growth opportunities (Kumar and Kumi, 2001:25).

The calculation of the PE ratio varies, some analysts calculate it differently, such as by the use of current price or future price, and current earnings or future earnings (Pratt, 2001).

But Penman (1996) demonstrates that PE ratio is related to both current and expected profitability.

According to Pointon (2002b:3), though the price earnings ratio is a popular parameter for providing an initial estimate of the cost of equity; nevertheless, the current price-earnings inverse typically understates the true cost of equity (p. 7). Just as the year-ahead dividend to the current price is used in a dividend model, a year-ahead earnings figure may be applied to a current price in an earnings model. With a growth in earnings, the current price-earnings inverse is typically an underestimate of the cost of equity.

The PE inverse was used as a predictor to calculate the equity cost of capital under the competitive advantage model (Pointon, 2001).
The capital asset pricing model (CAPM) by Sharpe (1964) is the most popular method in estimating the required rate of return on equity capital (Graham and Campbell, 2001; Al-Ali and Arkwright, 2000). CAPM is an explanation of how financial assets are priced in capital markets, and it demonstrates that the expected return (and hence the price) of an asset is directly and linearly related to its risk, and the higher the risk of an asset, the higher the return that the asset must offer investors in order to induce them to buy and hold it rather than some other security (Davies al et., 1999:13).

CAPM recognises that the marginal risk of an asset is what matters to investors and that they are not concerned with the total risk of an asset (because the unsystematic component of the total risk can be diversified away), and the beta of a security is a measure of this marginal risk, assuming that investors hold a well diversified portfolio (Davies al et., 1999:31).

According to Besley and Brigham (2000:200) the CAPM model is used to determine the required asset return, which is based on the proposition that any asset's return should be equal to the risk-free rate of return plus a risk premium that reflects the asset’s non-diversifiable risk.

David et al. (1999:231) state that CAPM is an equation that the expected rate of return on a project is a function of: (1) the risk free rate; (2) the investment’s systematic risk; and (3) the expected risk premium for the market portfolio of all risky securities.
Zavi and Merton (1998:299-300) argue that CAPM is a theory about equilibrium prices in the markets for risky assets and it is important for two reasons. First, CAPM provides a theoretical justification for widespread practice of passive investing known as indexing. Indexing means holding a diversified portfolio in which securities are held in the same relative proportions as in a broad market index such as the Standard and Poor’s 500 or the Morgan Stanley index of international stocks.

Second, CAPM provides a way of estimating expected rates of return for use in a variety of financial applications. For example, risk-adjusted expected rates of return are needed as inputs to discounted cash flow valuation models for stocks and in computing net present value when making capital budgeting decisions. For a further depth explanation of the CAPM, see Rosenberg (1981).

However, evidence by Fama and French (1992) indicates that over the period 1963 to 1990, differences in beta do not explain differences in the performance (rates of returns) of stocks. They found that CAPM is not particularly effective at forecasting a stock’s rate of return, and they concluded that beta is a “dead measure.”

Other studies have defended the CAPM model and found that betas were significant. Chan and Lakonishok (1992) evaluate the entire period from 1926 to 1991 and found that for the period ended in 1982, higher betas were indeed associated with higher returns.

Kothari, Shankin and Sloan (1995) re-examined the issue as to whether beta explains variation in average return over the post 1940 period as well as the longer post 1926 period. They found that beta has a relationship with returns.
Roll and Ross (1992) argue that using an index, such as the S&P 500 index or the New York Stock Exchange index, the betas and the rate of returns should be positively related.

Pointon (2002a) defends the use of a beta measure in pointing out that whether the beta is high or low is of less consequence and what is more important is the relative value of the risk premium.

Only one alternative theory has been offered as a substitute or as a possible complement for the CAPM. This relatively newer theory, the arbitrage pricing model (APT), considers multiple economic factors when explaining required rates of return, rather than looking at systematic risk or general market returns as a single determinant of an investor’s required rate of return, but does not meet the requirement of this thesis, because CAPM is part of the competitive advantage model that has been chosen and is used in chapter 6 (section 6.6.2) (see Bower et al., 1986; Ross et al., 1996; Elton and Gruber, 1987, for more details of APT).

3.13 An innovative approach to the use of ratio analysis

3.13.1 Competitive advantage model

The competitive advantage model looks at the future as a healthy and strong sign for the evaluation of the performance of a firm. If a firm has a competitive advantage, it means this firm retains the sustainable growth and opportunities for further future growth. The competitive advantage can be seen clearly in companies with a strong brand name, protected patents and market leader position such as Microsoft (Financial Times, 1998:17; and Economist, 1999).
Some others have examined key attributes of organisational effectiveness such as corporate reputation (such as quality of management as well as their products and services), the ability to develop talented people, and to innovate (Al-Najjar and Riahi-Belkaoui, 2001). The explanation of Porter’s work can be seen in chapter 6 (section 6.1).

Others have seen the competitive advantage as a way of having economies of scale, and barriers to entry, such as the choices in the telecoms sector (Pointon, 2002b).

Shapiro and Balbirer (2000) suggest that technology-based companies can enjoy some privileged position, which indicates a competitive advantage as in the case with the choices in the telecoms sector.

According to Pointon and Boston (1999) when the competitors follow the technology, they can take away the competitive advantage from the corporate innovators.

The competitive advantage can be seen clearly in the main telecoms companies, where most of them, if not all, hold a high market share and private or public monopoly of networking and services. A good example is BT, whereas of today, more than 50 per cent of the market share in the UK is owned by BT. BT has a private monopoly of the networking and the rule of regulator (OFTEL) is trying to shrink this monopoly through putting a cap on the price charges and to regulate its behaviour.

Because of the importance of competitive advantage, in calculating the equity cost of capital a competitive advantage model will be used in chapter 6 for the three important telecoms companies (BT, AT&T and NTT)
This competitive advantage model was used for the first time by Pointon, and the importance of this model and its formula is explained by Pointon (2001 and 2002b). This model is critically examined in chapter 6 (section 6.6.1).

3.13.2 Cost of capital

Modigliani and Miller (1958) and Solomon (1963) suggest a definition for the true cost of capital that has gained general acceptance. They define it as the discount rate that equates the capitalised value of a firm’s expected future cash flows to the firm’s value.

While the cost of capital is simple in concept, it is quite complex in practice. It depends on the rates of return demanded by shareholders and bondholders, the tax system confronting the corporation, and a variety of auxiliary aspects of firm behaviour. Any attempt to estimate the cost of capital must rely on a variety of assumptions about corporate financing and investment practices. However, data for firms in different nations are rarely comparable, requiring further assumptions and approximations (Poterba, 1990:20).

Brealey and Myers (1991) suggest that the cost of capital is the expected return that is foregone by investing in a (capital investment) project rather than in comparable financial securities. The emphasis of this definition is that the cost of capital is an expected return, which investors expect to receive from their investment.

The cost of capital relates to the returns on new investments and their risk, and not to past investments and funding sources. It depends on the use of funds and not on their sources, and relates to the particular project being considered (Davies al et., 1999:2). There are various techniques for calculating the overall cost of capital, and the most popular one in the literature is the weighted average cost of capital (WACC). It is important to estimate
the cost of equity, cost of debt and the relative proportions of debt to equity in order to calculate the WACC.

There are several aspects that need to be considered when examining the cost of capital of a firm. First, is to adjust the costs for changes in risk. Second, is to recognise that costs will depend, in part at least, on the proportion of debt to equity, and changes in the proportion of debt to equity will have an impact on the relative costs of debt and equity and hence, on the cost of capital.

The focus in this thesis is to pursue the study through an analysis of financial performance because it gives consistency for measuring performance between companies with different management styles, culture and forms of regulation.

3.14 Concluding comments

The main methodologies that will be used in this thesis have been covered and listed, and various financial tests to be undertaken have been examined. However, the financial studies of BT did not use the statistical methods and models used in this thesis. This thesis sets out to examine three issues relating to the privatisation of telecoms companies. The first issue: is how to compare and contrast the financial performance of the fully, the partially privatised and private companies in telecoms. The second issue: is how to compare the financial performance of three major companies in the telecoms sector, which are chosen to represent the three categories, namely BT (fully privatised), NTT (partially privatised) and AT&T (private).
The next chapter (4) is a global telecoms financial examination of privatised and non-privatised groups. Seven variables will be used to test the financial performance of both privatised and non-privatised groups in order to find if there are any significant financial differences between these groups. This is in fulfilment of the first issue, which is how to compare and contrast the financial performance of the fully, the partially privatised and private companies in telecoms.

The seven variables chosen are: return index, standard deviation of returns, gearing, MTBV, market value (MV), beta and a dummy variable (Privatised/non-privatised). Most of these variables have been chosen by previous researchers in several industrial cross-sectional evaluations. The standard deviation has been included in this thesis largely as a consequence of studies conducted by Atrill, Omran and Pointon (2002). A further discussion on the choice of variables can be found in the following chapter 4 (section 4.3). ANOVA and multiple regressions tests will be the main two tests to be used in chapter 4.
Chapter Four: Global Financial study
Of the Telecoms Market
Chapter Four: Global financial study of the telecoms market

4.1 Introduction

Recently many state-owned telecoms companies have been privatised to promote a better service and quality of products. This process has also enabled them to enter the global market and compete with different companies in different countries. The investigation in this chapter therefore uses all the privatised companies in the global market, excluding those privatised after 1999 (due to the short time-scale of data). See table 4.32 for the privatised companies’ sample for the study.

However, hardly any of the companies in the sample are fully privatised. It needs to be mentioned that BT has been privatised much longer than the other companies. BT is fully privatised and expanded globally, whereas the others are still very much in the early stages of the global development to compete with each other for the survival in the global telecoms market. A separate investigation will be made for BT and two other global players, in chapters 5 and 6, which are more suited to a comparison with BT, because of their similar size, and similar range of operations.

The nature of the investigation is to examine whether the privatised group of telecoms companies perform significantly differently from the group of private-based companies.

Hypothesis 1

The general hypothesis 1 states that the privatised telecoms companies perform differently from their non-privatised (private) counterparts, given the present contestability.
4.2 ANOVA and Multiple regression tests

Little past research has concentrated on pre- and post-privatisation for telecoms globally with the exception of D'Souza, Bortolotti, Fantini and Megginson, 2001, who found, performance improved post-privatisation. However, their attention was directed at accounting ratios and employment productivity rather than at a full multiple regression analysis of share price performance. An analysis of share price performance is more market base and would concentrate on providing an external viewpoint rather than mainly focusing on internal drivers of performance. Other studies have examined pre- and post-privatisation performance, but have not focused on telecoms (La Porta and Lopez-De-Silance, 1999; Lopez-de-Silances, 1997; Megginson, Nash, and Randenborgh, 1994; Boubakri and Cosset, 1998; D'Souza and Megginson, 1999; and Harper, 2001).

The study takes the discussion into the realm of examining the telecoms companies after privatisation and contrasts them with companies who were always in the private sector.

ANOVA tests are used to determine the individual contribution of each chosen critical factor in the determination of the share price. By contrast, the multiple regression tests examine the contribution of the combination of critical factors simultaneously; although they also deal with individual contributions, but within the context of a model that encapsulates other variables also.

The application of these two tests are standard statistical tools that have been applied in many other contexts. They are appropriate in the analysis of the impact of one (in ANOVA tests) or more (in the multiple regression tests) independent continuous dependent variables (see chapter 3, sections 3.3 and 3.4). Financial data readily fits such requirements. The multiple regression methodology does allow the use of a dummy
variable. This has proved to be very useful, since two different groups: privatised and private companies have been examined.

An alternative approach could have been a panel data analysis. Panel data refers to the pooling of observations on a cross-section of households, countries, firms, etc. over several time periods (Baltagi, 1995: 1). There are several benefits from using panel data. These are: (1) controlling for individual heterogeneity; (2) panel data give more informative data, more variability, less collinearity among the variables, more degree of freedom and more efficiency; (3) panel data are better able to study the dynamics of adjustment; (4) panel data are better able to identify and measure effects that are simply not detectable in pure cross-sections or pure time-series data; (5) panel data models allow us to construct and test more complicated behavioral models than purely cross-section or time-series data; and (6) panel data are usually gathered on micro units, like individuals, firms and households (Hsiao, 1985, 1986; Klevmarken, 1989; Solon, 1989). For the limitations of panel data (see Baltagi, 1995; Duncan and Hills, 1985; Hausman and Wise, 1979; Ridder, 1990, 1992).

However, the intention in this thesis is to measure year by year performance, so that sudden shifts in structural relationships through changes in technologies can be identified, and so the techniques chosen for the analysis are therefore well suited to the requirements of the study.

4.3 Methodology and Identification of key variables

The ANOVA test is used to examine six variables against the LN (return index) as the dependent variable, to find out if there is any significant difference between these variables for the privatised and non-privatised groups. For further information about ANOVA tests, see chapter 3 (section 3.3).
One-way analysis of variance for key variables is also used. This test is to compare the mean values of our variables for the privatised and non-privatised companies.

The **F-test** in the ANOVA table will test whether there are any significant differences among the means. If there are, the multiple range tests will tell which means are significantly different from which others.

**Cochran's C Test** examines the null hypothesis that the standard deviations of the variables within each of privatised and non-privatised groups of dummy variables are the same. If this is rejected, then the ANOVA result is ignored in favour of the Kruskal-Wallis test. The reason is that the ANOVA test of means pre-supposes a constant variance between the groups. If this is violated, a median test would be preferred instead.

**The Kruskal-Wallis Test** examines the null hypothesis that the medians of the six hypothesised independent variables for the two groups (privatised and non-privatised) are the same.

Additionally, multiple regression tests have been run in order to reflect possible interactive effects between explanatory variables, that otherwise might confound the results. In these tests, in order to provide a meaningful comparison between the performance of privatised and non-privatised firms, it was considered important to control for several key explanatory variables, that are likely to affect performance, they were:
• Operating risk, as measured by the standard deviation of the monthly returns index of each company for each separate year (see Atrill, Omran and Pointon, 2002). Some other studies have used the standard deviation as a variable when examining their dataset (Thomas, 2003; Zhang and Tianyou, 2002; Batten, Craig and Warren, 2002; and Salman, 2002).

• Gearing, as measured by debt to equity, since a higher proportion of debt increases the financial risk of the firm and so should increase the rate of return required by shareholders (Modigliani and Miller, 1958; Fama and French, 1992; Chan and Chai, 1996; Miles and Timmermann, 1996; Strong and Xu, 1997). However, some findings suggest that gearing in the UK is negatively related to the level of profitability and the market to book ratio (Rajan and Zingales, 1995).

• MTBV (Market-to-book-value) of the equity, since other studies have suggested that higher MTBVs reflect better growth opportunities, which should have an impact on realised returns (see Fama and French, 1988 and 1992; Clare, Priestley and Thomas, 1998; Strong and Xu, 1997). Furthermore, expected returns are systematically higher for firms with high book-market ratios (Fama and MacBeth, 1973). Rosenberg, Reid and Lanstein (1985) suggest that firms with high ratios of book value to the market value of common equity stocks have higher average returns than firms with low book-to-market ratios.

• Market value of the equity, since firms with smaller capitalisations have been found to generate superior returns (see Fama and French, 1998), although Ashton and Tippett (2000) suggest a measurement miss-specification. Some other findings suggest that the market value is the financial determinant of performance (Adams and Hardwick, 1998;
Moore, 2001). Ballester, Joshua and Nishi (2002) find that the market value is related to the industry's activities.

- Beta, being the ratio of (i) the covariance of the rate of return on a share with the overall stock market rate of return and (ii) the variance of the rate of return on the overall stock market portfolio (Sharpe, 1964). Although beta is a popular measure of risk, it has nevertheless been strongly criticized on the basis of other empirical findings (Fama and MacBeth, 1973; Fama and French, 1992 and 1993). Other studies have suggested that small firms tend to have higher betas than larger firms (Miles and Timmermann, 1995:372).

In efficient parsimonious financial modelling, many variables are typically not utilised, and they necessarily imply the loss of degrees of freedom (Maddala, 1977). This affects the statistical power of the model. Also, if there are too many variables, each displaying at least some influence, there are many more interaction effects between the variables (Koop, 2000). In the extreme case, a model with many variables may provide an excellent fit, but reveal little of the more important critical factors.

The approach is to follow a positivistic paradigm that begins with an identification of potentially critical factors that other empirical studies have found to influence share prices. A phenomenological approach was not followed, which could have begun with variables identified from interviews with key executives staff of privatised companies, for example, because this would have resulted in a loss of objectivity. The reader may note that potential variables/factors have been reviewed already in chapter 3 (section 3.5). Some other variables could have been chosen, perhaps: liquidity, return on sales, interest cover, or sales to capital employed; but these are not normally found in stock price studies.
In the regressions that follow the identification of privatised and non-privatised companies is achieved through the use of a dummy variable. The critical result is whether this dummy variable significantly contributes to the combination of factors, affecting the performance of all companies, in the multiple regressions. In the analysis that follows, the dummy is referred to as ‘P/Non’, representing privatised and non-privatised companies.

### 4.4 Data-set

A data set has been built using balance sheet data for a seven-year period. The information on the privatised companies and non-privatised companies has been extracted, primarily via the Datastream database for the reason of data availability. Some other sources are used, such as annual reports, Internet and secondary sources. Naturally by using the telecoms market for this study, it is recognised that there are limitations enforced by the fact that the privatisation process is fairly recent and there are few private companies with which to compare. Most of the companies in the 27 companies series have only recently been privatised, so this has led to a constrained 7 year period for this analysis (see tables 4.33-4.39 at the end of this chapter for the study variables).

### 4.5 Problems associated with using financial models

The privatisation timing was a chosen variable for this comparison of privatised and non-privatised groups to find if there was any difference between the time of privatisation and the dummy variable (P/Non). It has been found that there is no difference between the time of privatisation and performance. It has therefore been decided that the dummy variable for privatised and non-privatised groups is to be used instead of using the privatisation time as a measure against the non-privatised group.
4.6 Testing the model

In order to make the test more sophisticated, international telecommunications companies with different markets and economies are used, from Europe, Asia, America, Latin America, Canada and Australia.

The financial performance of these companies across the globe is interesting, firstly, as to whether or not the privatised and non-privatised groups are similar or different, and secondly, regarding which variable is the most influential determinant of the financial performance among these companies.

A data sample is taken in several countries: 18 companies in 1995 (11 privatised, 7 non-privatised); 20 companies in 1996 (13 privatised, 7 non-privatised); 24 companies in 1997 (16 privatised, 8 non-privatised); 25 companies in 1998 (17 companies privatised, 8 non-privatised); 26 companies in 1999 (18 privatised, 8 non-privatised); 27 companies in 2000 (18 privatised, 9 non-privatised); and 27 companies in 2001 (18 privatised, 9 non-privatised). See table 4.32 for the privatised companies’ sample. Note that both 1995 and 1996 samples are small.

There is a problem with two variables due to the lack of information. These variables were beta and capital gearing. The main problem was the lack of information about capital gearing in some years. An annual average from the data available across the time period was chosen for the companies where the individual years were not available. A monthly historical beta is used for some of the companies.

The large telecoms companies such as the American, Canadian, Latin American and some Asian companies had full annual betas. The reason why some of these other companies did not have annual betas, might be due to the fact that some information on these companies were incomplete for such a purpose.

There were also problems with the data on capital gearing in some years. The calculation for 2001 was based on using all the period spread (1995-2000), and calculating the average in order to produce a result for 2001.

The only telecom company for which the 2001 capital gearing calculation was necessary was Greece Telecom (OHE-HLC).

Capital gearing was also a difficult variable to collect where there were gaps for this item in the following countries: Argentina 1995 (1996+1997)/2, 1996 (1997+1998)/2, 1999 (1998+2000)/2, 2001 (1999+2000)/2; BCE-Canada 1999 (95+96+97+98)/4; Chile 1999 (1998+2000)/2; New Zealand 2000 (98+99+2001+2002)/4; Peru 1998 (97+99)/2, 2001 (1999+2000)/2; Sprint 1998 (95+96+97)/3, 1999 (98+2000)/2; and Tele Denmark 1995 (1996+1997)/2. Two and three years average have been applied, because of the difficulties associated with gaps in data collection from published sources (certain missing years).
The standard deviation is important, because it is a statistical measure of the dispersion around the expected value. It even provides a common yardstick to use when comparing the dispersions of possible outcomes for a number of projects (see Arnold, 1998:202).

The standard deviation has been calculated to find the yearly standard deviation for a whole sample set of privatised and non-privatised groups. The first of January is the starting day and 31st of the same month is the second raw data day. Thereafter, the end of each month is used. After the raw data has been entered, the 31st of January figure has been divided by the 1st of January figure to get the results of the first month. The figure for each month has been divided by the previous month’s figure to get the results.

To avoid scale-distortions, the LN has been used throughout with almost every variable. It was used with the market to book value (MTBV) ratio, for 2000 and 2001, note that there were a few negative numbers in those years (-68.0) for Japan. A constant was added to each sample for 2000 and 2001 to deal with a negative figure in MTBV.

N.B. The (£) exchange rate against all the currencies has been used in yearly bases in the LN of market value variable.

4.7 Results

The general hypothesis 1 states that the privatised telecoms companies perform differently from their non-privatised (private) counterparts, given the present contestability. The results of the ANOVA test are presented in the following tables, which show how each one of these six variables is significant or not, and which of the variables is the most significant. For example, if the mean of the capital gearing is stated to be significant, then the researcher is 95% confident that the mean capital gearing of the privatised group is different from the mean capital gearing of the non-privatised group.
4.7.1 LN (Return)

Table 4.1: The result of the log of the return

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<tr>
<td>Mean</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Median</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Sig.</td>
</tr>
</tbody>
</table>

There is no statistically significant difference in the mean and the median in the LN of the return index at the 95% confidence level, but the standard deviation of return index is statistically significant at the 95% confidence level in 1995, 1996, 1997 and 2001.

In 1995 and 1996, the non-privatised group exhibited a wider dispersion of LN (Returns), but a smaller dispersion in 2001 (see table 4.40).

However, where the standard deviations of privatised and non-privatised companies are statistically significantly different, the assumption of a constant variance, underpinning the mean test in the ANOVA table, is violated.

This suggests that more weight should be attached to the median test instead. The results clearly show that the medians of the two groups are not different, so it indicates that the performance of privatised and non-privatised groups is similar.
4.7.2 Standard deviation (risk)

Table 4.2: The standard deviation result

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Median</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>Not</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Not</td>
<td>Not</td>
</tr>
</tbody>
</table>

The mean and median of the risk are not statistically significant at the 95% confidence level.

The standard deviation of the standard deviations is statistically significant in 1996, 1997, 1998 and 1999 with a smaller variation in risk for privatised group. But this violates an underlying assumption of ANOVA test, which suggests a preference for the medians, but the medians are not significant (see table 4.41).

In turn, this implies that there is no significant difference in risk between the privatised and non-privatised groups.

The standard deviation result is about the same as in the standard deviation of the LN (return index), where both the mean and the median are not statistically significantly different, but the standard deviation is significant for both of them, which in turn has violated the ANOVA rule.
4.7.3 Capital gearing

Table 4.3: The result of the capital gearing variable

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Sig.</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Median</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Sig.</td>
<td>Not</td>
</tr>
</tbody>
</table>

Capital gearing shows no statistically significant difference at the 95% confidence level for the mean and median except for the mean in 1995 when the non-privatised group were more highly geared. The standard deviation is significantly different at the 95% confidence level in 1995, 1996 and 2000 when the privatised group exhibited a wider dispersion in capital gearing (see table 4.42).

The capital gearing outcomes have shown the same insignificant statistical result in the mean and the median as before the previous result for LN of the return index and the standard deviation variables, and hence SD has violated the ANOVA test rule.

Capital gearing is not significant and previous studies agreed with the results (Miles and Timmermann, 1996; Clare, Priestley and Thomas, 1998).

Other studies found that capital gearing was significant, but they used a different approach multiple regression (Dufresne, Goldstein and Spenser, 2001; Fama and French, 1992; Strong and Xu, 1997).

It can be said that capital gearing shows no significant difference at the 95% confidence level for both privatised and non-privatised groups, even though the capital gearing for the non-privatised group was higher at the beginning of the study period. Nevertheless, the privatised group’s gearing had increased steadily after then, which makes both privatised and non-privatised groups the same.
4.7.4 LN (MV)

Table 4.4: The log of the market value result

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Median</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>Sig.</td>
<td>Not</td>
<td>Sig.</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
</tbody>
</table>

Both the mean and the median are not statistically significant at the 95% confidence level.

The standard deviation of market value is statistically significant at the 95% confidence level in 1995 and 1997. In these two years, the privatised group exhibited a wider dispersion of LN (MV) (see table 4.43).

The following studies found that market value (LN MV) was not significant: Chan and Chui, 1996; Miles and Timmermann, 1996. Others found that market value was significant (Banz, 1981).

The case for market value (LN MV) had the same result as the same for the previous variables, where both the median and the mean were not significant, but the market value standard deviation was only significant in two of the years, which makes the result different from previous years, where there were more than two years that show a significant difference in standard deviation.

The market value is not statistically significantly different in privatised and non-privatised firms, which implies there are some privatised groups also with a large market value.
4.7.5 MTBV

Table 4.5: The result of the MTBV variable

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Median</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Not</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
</tr>
</tbody>
</table>

The MTBV's mean and the median are not statistically significant at the 95% confidence level.

The standard deviation of MTBV is largely statistically significant for all the years except 1998. In the remaining years, except 2000, the privatised group had a lower dispersion in MTBV (see table 4.44). The violation of the ANOVA test has indicated that the mean MTBV is to be ignored. However, it has just been stated that the medians are not significantly different.

It is thought that MTBV would be significantly different among the privatised and non-privatised groups, because previous studies have shown that MTBV is a significant variable (see methodology in chapter 3, section 3.5, Miles and Timmermann, 1996; Chan and Chui, 1996; strong and Xu, 1997; Kothari and Shanken, 1997; Berk and Berk, 1995), but our study has shown that MTBV is not statistically significant different at the 95% confidence level.

The results, however, agree with a previous study that MTBV is not significant (see Clare, Priestly and Thomas, 1998).

It can be argued from MTBV is not significant, for it indicates that there is no statistically significant difference between the privatised and non-privatised groups.
4.7.6 Beta

Table 4.6: Beta variable result

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Not</td>
</tr>
<tr>
<td>Median</td>
<td>Not</td>
<td>Not</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Not</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>Not</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Sig.</td>
<td>Not</td>
<td>Not</td>
<td>Sig.</td>
</tr>
</tbody>
</table>

Beta seems a very important variable. This shows a statistically significant outcome in some years for the mean, median and the standard deviation. In the mean, the beta is statistically significant at the 95% confidence level in 1998, 1999 and 2000. In 1998, the mean beta for each group were substantially reduced. In fact, the beta for the privatised group became negative, indicating that the share prices moved in a different direction from the overall stock market movement (see table 4.45). However, the constant variance assumption of the ANOVA-mean test is violated in several years (1996,1997, 1998 and 2001).

In 1998, the significant mean is therefore questionable. In this instance, the median test should carry more weight. In fact, the median is indeed statistically significant in 1997, 1998, 1999 and 2000.

According to Clare, Priestley and Thomas, 1998; Chan and Lakonishok, 1992; Kothari, Shankin and Sloan, 1995; Roll and Ross, 1992 (refer to the methodology in chapter 3, section 3.5), beta was a significant variable at the 95% confidence level, whereas in some studies such as Chan and Chui, 1996; Miles and Timmermann, 1996; Fama and French, 1992 (refer to the methodology in chapter 3), they found that beta was not a significant variable.
The study has shown that beta is the only variable that is strongly statistically significantly different in its median (or mean) in several years, at the 95% confidence level when comparing the privatised and non-privatised groups.

4.7.7 Conclusion

The systematic (beta) risk differed between the two groups. Thus, the role of beta in this study has been confirmed, due to the statistically significant difference between the privatised and non-privatised groups, the study confirming the results of some, but not all, previous studies where the beta was significant (see the methodology in chapter 3 section 3.5). It needs to be noted, however, that the betas are based on each company's own stock market rather than on a global index. Some of the markets may be quite small and their indices may not be based on a large dataset.

4.8 Applying the correlation matrix

The correlation matrix shows estimated correlations between the coefficients in the fitted model. These correlations can be used to detect the presence of serious multicollinearity amongst the predictor variables. The correlations have been detected using all the variables except the LN (return index) and the constants. Each year has been presented to show the correlation matrix between them and to identify whether there is any multicollinearity problem. The variables are: standard deviation; capital gearing; market value; MTBV; beta; and dummy variable (P/Non).
4.8.1 Correlation matrix for coefficient estimates (1995)

Table 4.7: Correlation matrix result of 1995

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>Gearing</th>
<th>LN(MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gearing</td>
<td>0.1916</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN (MV)</td>
<td>0.4138</td>
<td>0.5179</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTBV</td>
<td>-0.3710</td>
<td>0.4143</td>
<td>0.1564</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>-0.4366</td>
<td>-0.0412</td>
<td>-0.0420</td>
<td>0.1564</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>P/Non</td>
<td>0.1389</td>
<td>0.6464</td>
<td>0.5129</td>
<td>0.1649</td>
<td>-0.1121</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

The correlation matrix for coefficient estimates for 1995 shows that there are four correlations with absolute values greater than 0.50 (0.50 is a cut off rate recommended by Statgraphics package). The multicollinearity problems are between (gearing, LN (MV)), (MTBV, beta), (P/non, LN (MV)) and (gearing, P/non).

The capital gearing and the market value (LN-MV) have been taken out in the first instance, because both these variables have a correlation problem with the dummy variable, so it has been decided to leave (P/non), which is the dummy variable (Privatised and non-privatised).

(MTBV) is used for the second case, and beta is taken out.

4.8.2 Correlation matrix for coefficient estimates (1996)

Table 4.8: Correlation matrix result of 1996

<table>
<thead>
<tr>
<th></th>
<th>1996</th>
<th>S.D.</th>
<th>Gearing</th>
<th>LN(MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gearing</td>
<td>-0.1307</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN(MV)</td>
<td>-1.758</td>
<td>-0.4407</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTBV</td>
<td>0.1025</td>
<td>-0.0979</td>
<td>-0.1614</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>0.0850</td>
<td>0.1044</td>
<td>-0.2532</td>
<td>-0.9282</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| P/Non  | 0.2077 | 0.4182 | 0.4673 | 0.0234 | -0.0117 | 1.0000 |}

The correlation matrix for coefficient estimates for 1996 show the presence of serious multicollinearity in one case, which indicates there is one correlation with an absolute value greater than 0.5. The multicollinearity problem is between the MTBV and beta.
However, MTBV has caused another correlation with an absolute value greater than 0.5, when it was chosen for the first time and we run the test, it was found that the MTBV had a problem with another variable, and a correlation matrix has been provided to present the problem as expressed in the following table (4.9):

**Table 4.9: The second correlation matrix of 1996**

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>Gearing</th>
<th>LN(MV)</th>
<th>MTBV</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gearing</td>
<td>-0.1408</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN(MV)</td>
<td>0.1600</td>
<td>0.4305</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTBV</td>
<td>-0.0637</td>
<td>0.5266</td>
<td>0.2047</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>P/Non</td>
<td>0.2074</td>
<td>0.4193</td>
<td>0.4800</td>
<td>0.0920</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

After having the problem with MTBV, it has been decided to take it out and use the beta instead. After testing using the beta it indicates no correlations with absolute values greater than 0.5.

**4.8.3 Correlation matrix for coefficient estimates (1997)**

**Table 4.10: Correlation matrix of 1997**

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>Gearing</th>
<th>LN(MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.D.</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gearing</td>
<td>-0.1355</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN(MV)</td>
<td>.1488</td>
<td>-.0060</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTBV</td>
<td>-0.1438</td>
<td>.0137</td>
<td>-0.2885</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>.1897</td>
<td>.1789</td>
<td>-.0768</td>
<td>-.1116</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>P/Non</td>
<td>.1125</td>
<td>.0595</td>
<td>.3912</td>
<td>-.2702</td>
<td>.3050</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

The estimated correlation coefficient of the correlation matrix in 1997, shows there is no serious multicollinearity in this year, so there are no correlations with absolute values greater than 0.5.
4.8.4 Correlation matrix for coefficient estimates (1998)

Table 4.11: Correlation matrix of 1998

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>Gearing</th>
<th>LN(MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gearing</td>
<td>-.4628</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN (MV)</td>
<td>.2885</td>
<td>-.0178</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTBV</td>
<td>.3352</td>
<td>-.2893</td>
<td>-.0878</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>-.2368</td>
<td>.3667</td>
<td>-.3852</td>
<td>.0851</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>P/Non</td>
<td>.0775</td>
<td>.1183</td>
<td>.3556</td>
<td>-.2454</td>
<td>-.0639</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

In the 1998 correlation matrix, there is no serious multicollinearity in this year, since there are no correlations with absolute values greater than 0.5.

4.8.5 Correlation matrix for coefficient estimates (1999)

Table 4.12: Correlation matrix of 1999

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>Gearing</th>
<th>LN(MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gearing</td>
<td>-.5476</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN(MV)</td>
<td>.1328</td>
<td>.1126</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTBV</td>
<td>.4926</td>
<td>-.4304</td>
<td>-.1558</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>.4114</td>
<td>-.1395</td>
<td>-.0866</td>
<td>.2422</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>P/Non</td>
<td>-.1639</td>
<td>.1525</td>
<td>.3512</td>
<td>-.3312</td>
<td>-.6015</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

When estimating the coefficient for correlation matrix to find any presence of serious multicollinearity in 1999, it has been found that there are 2 serious multicollinearity problems, as in this case, there are 2 correlations with absolute value greater than 0.5. The multicollinearity problems are between (S.D. and gearing) and (beta and P/non). It has been decided to use standard deviation from the first case, and P/non variable from the second case.
4.8.6 Correlation matrix for coefficient estimates (2000)

In the estimation of coefficients of the correlation matrix in 2000, there is no serious multicollinearity problem, as there are no correlations with absolute values greater than 0.5.

4.8.7 Correlation matrix for coefficient estimates (2001)

The correlation matrix in 2001 indicates that there is no serious multicollinearity problem, as there are no correlations with absolute values greater than 0.5.

4.8.8 Observation

It can be observed, from the correlation matrices for coefficient estimates of the 7 year period, that there are only 3 years out of 7 that have a multicollinearity problem. These years are 1995, 1996 and 1999. It is obvious that the 1997, 1998, 2000 and 2001, for the privatised and non-privatised groups, do not have any multicollinearity problems.
4.9 Introducing the multiple regression test

4.9.1 Multiple regression (coefficient)

The multiple regression test will use LN (return index) as the dependent variable and all the other variables as the independents. The multiple regression test will explain which variable is the most significant and may be the financial performance indicator for privatised and non-privatised groups. (see section 4.2).

The variables with serious multicollinearity problems have been dealt with by taking them out and running the multiple regression with the remaining ones. The years 1995, 1996 and 1999, are the ones with multicollinearity problems. Each year is discussed individually in the next section.

4.9.1.1 Key words appropriate to the test

The **R-squared statistic** indicates by how much the combined independent variables in the model, as fitted, explain the variability of the LN of the return index.

The **adjusted R-squared statistic** is more suitable for comparing with different numbers of independent variables.

Six variables are chosen as the independent variables. The LN (return index) has been used as the dependent variable. See table (4.46) for the multiple regression coefficient table of the 7 years period.
4.9.1.2 1995 results

There are only three variables in 1995 after taking out the variables with a correlation problem, and the remaining variables are (standard deviation, MTBV and dummy variable).

- The estimated coefficient for the standard deviation is $-7.92211$, which, since it is negative, indicates that the low risk firms have performed better than the high risk firms. Some of these low risk firms are privatised firms, because they are new to the market and they have not been exposed to market risk as much as the non-privatised group.

- The MTBV coefficient is $0.0135923$ and positive, which indicates that where book values undertake market values more strongly, returns are lower.

- Since the dummy variable coefficient is $-0.0207268$, i.e. negative, it implies that the non-privatised group outperformed the privatised group in 1995.

- The R-squared in 1995 is 27.93 percent, which indicates that only 27.9% is captured by the variables (standard deviation, MTBV and the dummy variable) it explains that only 27.9% of variation in performance is explained by these variables, and 72% of performance is explained by other factors outside this model.

- This model is not a very good model, since the ANOVA P-value is 0.1918. this tells us that the dependent and the combined independent variables have not a statistically significant relationship between them at the 90% or higher confidence level.
• The standard deviation is individually strong at the 15% level of significance (85% confidence level).

• In 1995, the MTBV is the strongest variable among the independent variables.

4.9.1.3 1996 results

There are five variables (standard deviation, capital gearing, LN (market value), beta and the dummy variable).

• The standard deviation has a negative coefficient (−57.6589), which indicates that low risk firms have out-performed high-risk firms, i.e. they have generated higher returns and maintained a safer investment.

• The gearing coefficient is positive (0.000553308), which explains that more highly geared firms perform better in terms of the log-returns to shareholders. The geared relationship is consistent with the Modigliani and Miller (1958) theory of capital structure that shareholders are compensated for financial risk.

• The market value coefficient is negative (−0.0641857), which indicates that the smaller firms perform better than the larger firms.

• With a negative estimated coefficient for the beta (−0.0453167) as an independent variable, the low systematic risk firm performs better than riskier firm.

• The dummy variable has (0.101938) coefficient, which, being positive, indicates that the privatised group has outperformed the non-privatised group in 1996, but not in the 1995 year.
• The R-squared is very strong in 1996 at 75.45%, which explains that this model is a good model, and it shows that the variables are related to each other with a variation in performance of 75.45% compared with 24.55% of variation from other variables outside the selected model.

• Since the AVOVA P-value is 0.0007, which is less than 0.01, there is a statistically significant relationship between the five independent variables and the dependent variable at the 99% confidence level.

• The standard deviation is very strong with an ANOVA P-value of less than 0.01 that makes the standard deviation a critical variable at the 99% confidence level.

4.9.1.4 1997 results

In 1997, all the variables are used because there is no serious multicollinearity problem as there are no correlations with absolute values more than 0.5.

• The standard deviation shows that the low risk firms outperform the high-risk firms, since the coefficient for the standard deviation is negative (-22.6909).

• The capital gearing indicates that more highly geared firms produce superior returns to shareholders. Although the coefficient is not significant, this is consistent with the Modigliani-Miller (1958) propositions.

• The market value again shows that larger firms perform worse than smaller firms. Market value has a negative coefficient (-0.0249172) in 1997. The result is consistent with Fama and French (1992), although it is not statistically significant.
• For 1997, though not statistically significant, the greater the undervaluation of the accounting book value compared with the market value, the worse the performance as revealed by a negative coefficient (−0.026147).

• The beta in 1997 is (−0.194479), which indicates that for 1997 firms with greater systematic risk performed worse, although again it was not statistically significant.

• The 1997 results show that the privatised group outperformed the non-privatised as was the case in 1996, but not in 1995. The coefficient was positive (0.192985) in 1997. Nevertheless, it is not statistically significant.

• The model is fitted in 1997 as in 1996 with a R-squared of 66.26%, which indicates that more than 66% of shareholders log-returns are related to the joint performance of these independent variables that are tested in 1997. Only 33% of returns are related to outside variables or factors.

• The 1997 model is good overall, since the ANOVA P-value is 0.0024, which is less than 0.01. So, there is a statistically significant relationship between the six variables and the dependent variable at the 99% confidence level.

• The standard deviation is a strong determinant factor with a significant probability less than 0.01, indicating more than a 99% confidence level.
4.9.1.5 1998 results

In 1998, none of variables are related to each other, nor is there a strong candidate variable to be more efficient than the others. Hence, a part from a brief comment on privatisation, the individual variables are not discussed.

- In 1998, the non-privatised group has performed better than the privatised group because the coefficient for the dummy variable is negative. Nevertheless, at the 90% confidence level it is not significant.

- The model is not good with R-squared of 20%, which shows that more than 80% of variation in performance is related to other factors, i.e. variables outside the model, and only 20% is related to the variation in performance of these variables in the study. The R-squared (adjusted) is 0.0%, which implies that this model is not good at all in 1998.

- Since the ANOVA P-value is 0.6116, which is greater than 0.10, there is not a statistically significant relationship between the dependent variable and the combined independent variables at the 90% or higher confidence level.

- The 1998 model is not a good model and there is no variable that is significant.

4.9.1.6 1999 results

- There are four variables in 1999, yet even at a 20% significance probability only one is significant, namely the standard deviation. Its coefficient is positive, which implies the high risk firms have performed better than low risk firms.
• The privatised group has performed better than the non-privatised group with a positive dummy variable coefficient of (0.128618). Nevertheless, it is not significant at the 90% confidence level. The other variables are not significant at this level either.

• The model is not good in 1999 with R-squared of 21.85% and an R-squared (adjusted) of only 6.97%, which shows more than 78% of performance variation belongs to other factors and variables outside the study, and only 21.85% is related to the performance of the four variables.

• Since the ANOVA P-value is 0.2474, which is greater than 0.10, there is not a statistically significant relationship between the four variables and the dependent variable at the 90% or higher confidence level.

4.9.1.7 2000 results

• All the variables are used in year 2000. This is a negative (−19.2323) standard deviation coefficient, which implies that high-risk firms perform worse than low-risk firms, even though the high risk firms are expose to more risk. Nevertheless, it is not significant at the 10% significant level (although it is at 15%).

• The capital gearing result shows that low geared firms perform better than high firms with a negative coefficient (−0.005595). Again it is significant at 15%, but not at 10%.

• The other variables are not significant, even at 15%.

• The non-privatised group outperformed the privatised group according to the coefficient result of the dummy variable in 2000 (−0.0655034), although it is not significant, even at 15%.
• The R-squared is somehow healthier and better than the previous years in 1995, 1998 and 1999, but not as good model as in 1996 and 1997 years.

• The R-squared is 34.85% indicates that more than 65% of the variation in performance is explained by outside variables and factors away from the study variables in the model. With only a 34.85% variation in performance, this model indeed is not a good model.

• Since the ANOVA P-value is 0.1538, which is greater than 0.10, there is not a statistically significant relationship overall at the 90% or higher confidence level.

4.9.1.8 2001 results

• There is no serious multicollinearity in 2001 and all the variables are used in the model. With a negative standard deviation coefficient (−7.71458) the high-risk firms have performed worse than the low-risk firms. The standard deviation is significant at that the 90% confidence level.

• The non-privatised group has outperformed the privatised group with dummy variable coefficient of −0.0159998, although this is not significant at the 90% confidence level. The remaining variables are not significant at this level either.

• The model is not good in 2001 with a slight decrease in R-squared from 2000 of 33.6142%, and 65% of the variation in performance from outside factors and variables.

• Since the ANOVA P-value (0.1758) is greater than 0.10, there is not a statistically significant relationship overall at the 90% or higher confidence level.
4.9.1.9 Conclusion

Despite the relationship among the variables in the multiple regression, there are only two years in 1996 and 1997 that show there is a statistically significant relationship among the variables, but in 1996, MTBV is taken out because of the multicollinearity problem, whereas in 1997, all the variables were used in the test. Perhaps some problems with the international stock markets in 1997 may have caused the model to be sensitive in that year.

The multiple regressions have shown that there is no particular difference among the privatised and non-privatised groups.

However, the standard deviation has been shown to be a strong indicator variable to be used as the financial performance determinant for both the privatised and non-privatised groups.

4.9.2 Multiple regressions (reduced version) for each year

4.9.2.1 Introduction

The multiple regression (reduced version) comprises an inclusion of the privatisation dummy and every variable that was significant at 20% in any of the previous models of section (4.8). The significance probabilities of this new version are given in table (4.15):
Table 4.15: Multiple regression reduced version 1995-2001

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S. D.</td>
<td>0.1166</td>
<td>0.0001</td>
<td>0.0000</td>
<td>0.4298</td>
<td>0.1966</td>
<td>0.1327</td>
<td>0.0748</td>
</tr>
<tr>
<td>MTBV</td>
<td>0.0882</td>
<td>--------</td>
<td>0.9610</td>
<td>0.6486</td>
<td>0.2622</td>
<td>0.8870</td>
<td>0.4029</td>
</tr>
<tr>
<td>Gearing</td>
<td>0.7424</td>
<td>0.8855</td>
<td>0.7304</td>
<td>0.1756</td>
<td>--------</td>
<td>0.1412</td>
<td>0.7155</td>
</tr>
<tr>
<td>LN MV</td>
<td>--------</td>
<td>0.0269</td>
<td>0.4449</td>
<td>0.8975</td>
<td>0.6819</td>
<td>0.9170</td>
<td>0.2480</td>
</tr>
<tr>
<td>P/non</td>
<td>0.9982</td>
<td>0.4817</td>
<td>0.2725</td>
<td>0.3816</td>
<td>0.5074</td>
<td>0.7545</td>
<td>0.9120</td>
</tr>
</tbody>
</table>

From the multiple regressions table (4.15) it seems clear that the standard deviation is the most suitable variable that can be used to determine the financial performance among the privatised and non-privatised groups. The multiple regression table (4.15) shows that the standard deviations are strong in 6 years out of the 7 years study period.

Since market-to-book-value, gearing and size (LN-MV) also play a role in some years, some further regression tests have been applied to finalise, which variable could be the best one to be the financial performance determinant.

4.9.2.2 1995 results

Three regression tests have been used to identify the best candidate variable for 1995. In the first test, three variables (S.D., MTBV, and dummy variable (P/non)) are examined including the LN (return index) as the dependent variable for all cases. In the second test, both the standard deviation and the dummy variable are tested. In the third test, the MTBV and the dummy variable are examined.
4.9.2.2.1 First test

Table 4.16: First test result of 1995

<table>
<thead>
<tr>
<th>Year</th>
<th>S.D.</th>
<th>MTBV</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>0.1069</td>
<td>0.0647</td>
<td>0.8425</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The MTBV is slightly better than the standard deviation with a significant probability of 0.0647 over 0.1069.

4.9.2.2.2 Second test

Table 4.17: Second test result of 1995

<table>
<thead>
<tr>
<th>Year</th>
<th>S.D.</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>0.3125</td>
<td>0.9688</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Both the standard deviation and the dummy variable probabilities are high, which indicates they are not strong determinants of performance of the dependent variable.

4.9.2.2.3 Third test

Table 4.18: Third test result of 1995

<table>
<thead>
<tr>
<th>Year</th>
<th>MTBV</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>0.1690</td>
<td>0.6241</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The MTBV is still high when it is tested with the dummy variable.

4.9.2.2.4 Overview

The test shows the MTBV is better than the standard deviation, but since there is not much difference between them, it has been decided to record both the results in the final table (4.31) to show how each one of them is comparable with each other, yet it can be concluded that both the MTBV and the standard deviation affect performance more than the dummy variable (privatised and non-privatised), because the dummy variable has the highest P-value in all three tests.
4.9.2.3 1996 results

The standard deviation has been chosen, as the best one with a P-value of 0.00, which indicates that the standard deviation in 1996 is statistically significant at the 99% confidence level. The market value (LN-MV) in 1996 also shows a strong confidence level of more than 97%.

Three tests were run. The first test utilises the standard deviation with the LN (MV) and the dummy variable. The second test takes the standard deviation with the dummy variable and the third test is to run the LN (MV) with just the dummy variable.

4.9.2.3.1 First test

Table 4.19: First test result of 1996

<table>
<thead>
<tr>
<th>1996</th>
<th>S.D.</th>
<th>LN (MV)</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value</td>
<td>0.0001</td>
<td>0.0143</td>
<td>0.7163</td>
</tr>
</tbody>
</table>

The first test of the standard deviation and the market value (LN-MV) shows a stronger relationship between the performance and the standard deviation, and between performance and market value, more than between performance and the dummy variable.

Nevertheless, the ANOVA P-value (0.003) shows a strong statistically significant relationship between the dependent and (combined) independent variables at the 99% confidence level.
4.9.2.3.2 The second test

Table 4.20: Second test result of 1996

<table>
<thead>
<tr>
<th>Year</th>
<th>S.D.</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>0.0006</td>
<td>0.9845</td>
</tr>
</tbody>
</table>

The standard deviation is very statistically significant with more than a 99% confidence level, but the dummy variable again has a high P-value, which indicates that the performance (the dependent variable) is not related to the dummy variable.

According to the ANOVA P-value (0.0016), there is, nevertheless, a statistically significant relationship overall at the 99% confidence level.

4.9.2.3.3 Third test

Table 4.21: Third test result of 1996

<table>
<thead>
<tr>
<th>Year</th>
<th>LN (MV)</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>0.3646</td>
<td>0.3783</td>
</tr>
</tbody>
</table>

The 1996 third test between the performance and the market value and the (P/Non) dummy variable show that neither the market value nor the dummy variable is individually significant.

The ANOVA P-value (0.4296) is greater than 0.10, which indicates there is not a statistically significant relationship between the variables overall at the 90% or higher confidence level.

4.9.2.3.4 Overview

The standard deviation proved to be the most significant variable in 1996 financial year.
4.9.2.4 1997 results

The standard deviation is significant at the 99% confidence level when included with the MTBV, gearing, size (LN-MV) and the dummy (P/Non), but a further test is needed to regress the performance against the standard deviation and the dummy variable to show if it is still really significant.

4.9.2.4.1 Test of 1997

Table 4.22: The test result of 1997

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>0.0000</td>
<td>.2875</td>
</tr>
</tbody>
</table>

The test shows that the standard deviation is again strongly significant at the 99% confidence level, yet the dummy variable probability is not high. The privatised group does not perform differently from the non-privatised group.

The ANOVA P-value (0.0001) shows a strong statistically significant relationship overall at the 99% confidence level. This is clearly driven by the effect of the standard deviation on performance rather than by the privatisation categorisation, because the dummy variable P-value is higher than the standard deviation P-value.

4.9.2.4.2 Overview

Table (4.22) indicated that the standard deviation is the most significant variable among all other tested independent variables as of 1997.
4.9.2.5 1998 results

The capital gearing is the variable that has the lowest P-value among all other variables. Nevertheless, the capital gearing has a P-value of 0.1756, which is not too low, compared with the standard deviation in previous years, but it is the lowest among all the tested variables in 1998. A test has been performed to regress performance against capital gearing and the dummy variable.

4.9.2.5.1 Test of 1998

Table 4.23: 1998 test result

<table>
<thead>
<tr>
<th></th>
<th>Capital Gearing</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>0.3438</td>
<td>0.3250</td>
</tr>
</tbody>
</table>

The test shows that the capital gearing and the dummy variable are not individually related to performance.

The ANOVA P-value (0.1381) is greater than 0.10, so there is not a statistically significant relationship between the variables overall at the 90% confidence level.

4.9.2.5.2 Overview

Table 4.23 showed that none of the tested variables is significant, even though the capital gearing had the lowest P-value, but after running the test, the result indicated that none of the variables is significant.
4.9.2.6 1999 results

The standard deviation has the lowest P-value among four variables, including the dummy, which suggests it might be the better one to be used as the financial performance determinant for the 1999. Because the MTBV has a moderately low P-value of (0.2622), which is not much different from the P-value of the standard deviation (0.1966). Three tests are run to check whether or not the standard deviation or the MTBV is the best variable for 1999. The LN (MV) is ignored because of its high P-value.

4.9.2.6.1 First test

Table 4.24: First test result of 1999

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>MTBV</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-value</td>
<td>0.1361</td>
<td>0.2327</td>
<td>0.3732</td>
</tr>
</tbody>
</table>

It can be noted that the standard deviation is the one with the lowest P-value, which identifies it as the better variable.

The ANOVA P-value (0.1473) shows, however, no significant relationship between performance and the combined variables at the 90% or higher confidence level.

4.9.2.6.2 Second test

Table 4.25: Second test result of 1999

<table>
<thead>
<tr>
<th></th>
<th>S.D.</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-value</td>
<td>0.0513</td>
<td>0.5094</td>
</tr>
</tbody>
</table>

The second test indicates that the standard deviation is very strong at the 95% confidence level, unlike the dummy variable.

The ANOVA P-value (0.1381), however, explains that there is not a statistically significant relationship between the variables at the 90% or higher confidence level.
4.9.2.6.3 Third test

Table 4.26: Third test result of 1999

<table>
<thead>
<tr>
<th></th>
<th>MTBV</th>
<th>P/Non</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value</td>
<td>0.0852</td>
<td>0.4671</td>
</tr>
</tbody>
</table>

The third test indicates that the MTBV is significant at the 91% confidence level, but not the dummy variable. The privatised group does not affect performance differently from the non-privatised group, even allowing for the MTBV variations, because the P-value for the dummy variable is high.

The ANOVA P-value (0.2115) is not statistically significant, however, at the 90% or higher confidence level.

4.9.2.6.4 Overview

The results indicated that the standard deviation was a significant variable, having compared the MTBV to discover which one was more significant than the other.

4.9.2.7 2000 results

Because the P-values of the standard deviation and the capital gearing are almost the same, three tests were performed to distinguish between the three variables (the standard deviation, the capital gearing and the dummy variable).
4.9.2.7.1 First test

Table 4.27: 2000 first test result

<table>
<thead>
<tr>
<th>2000</th>
<th>S.D.</th>
<th>Capital gearing</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value</td>
<td>.1078</td>
<td>.0882</td>
<td>.8961</td>
</tr>
</tbody>
</table>

The first test in 2000 shows a moderate relationship between performance and both the standard deviation and the capital gearing, but not the dummy variable. Once again privatisation (P/Non) is not an issue affecting performance, because again the dummy variable has a high P-value.

The ANOVA P-value (0.0277) shows there is a statistically significant relationship between the variables overall at the 95% confidence level. So, performance is determined by the combined factors (although not individually affected by the privatisation dummy).

4.9.2.7.2 Second test

Table 4.28: Second test result of 2000

<table>
<thead>
<tr>
<th>2000</th>
<th>S.D.</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value</td>
<td>.0137</td>
<td>.7338</td>
</tr>
</tbody>
</table>

The standard deviation is strongly significant at the 99% confidence level, but the dependent variable is not individually related to the dummy variable. Privatisation is not an issue affecting performance (noting the high P-value).

The ANOVA P-value (0.0444) reveals a statistically significant relationship between the variables overall at the 95% confidence level.
4.9.2.7.3 Third test

Table 4.29: Third test result of 2000

<table>
<thead>
<tr>
<th>2000</th>
<th>Capital gearing</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value</td>
<td>0.0114</td>
<td>0.5294</td>
</tr>
</tbody>
</table>

The third test in 2000 indicated a strong significance at the 99% confidence level for capital gearing. The dummy variable is lower when combined with the capital gearing than with the standard deviation.

There is a statistically significant relationship between the combined independent variables and performance at the 95% confidence level according to ANOVA P-value (0.0374).

4.9.2.7.4 Overview

It appears that the capital gearing and the standard deviation P-values are almost the same, in terms of P-values, for capital gearing (.0114) compared with (.0137) for standard deviation. Both of them appear in the final table (4.31).

4.9.2.8 2001 results

The standard deviation is the lowest P-value variable of five (including the dummy), and a test is performed to see if any change might occur to the standard deviation after the test.

A test is taken to examine the standard deviation impact of one independent variable, plus the dummy variable.
4.9.2.8.1 The test of 2001

Table 4.30: 2001 test result

<table>
<thead>
<tr>
<th>2001</th>
<th>S.D.</th>
<th>P/non</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-value</td>
<td>0.0102</td>
<td>0.7575</td>
</tr>
</tbody>
</table>

The 2001 test of the standard deviation indicates that it is a strongly significant variable to be used in 2001 with a 99% confidence level. The privatisation dummy (P/Non) is not significant, because it has a high P-value.

The ANOVA P-value (0.0283) explains a statistically significant relationship between the combined independent variables and the dependent performance variable at the 95% confidence level. This is driven by the standard deviation and not by the privatisation dummy.

4.10 Final comments

The results of the previous reduced tests have revealed that the standard deviation is the best variable as financial performance determinant when a distinction is made by the use of a dummy variable to indicate privatised and non-privatised groups. See table (4.31):

Table 4.31: Chosen variable

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D.</td>
<td>.1069</td>
<td>.0001</td>
<td>.0000</td>
<td>------</td>
<td>.0513</td>
<td>.0137</td>
<td>.0102</td>
</tr>
<tr>
<td>MTBV</td>
<td>.0674</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Gearing</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>.3438</td>
<td>------</td>
<td>.0114</td>
<td>------</td>
</tr>
<tr>
<td>P/non</td>
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<td>0.7163</td>
<td>0.2807</td>
<td>0.3250</td>
<td>0.5094</td>
<td>0.5294</td>
<td>0.7575</td>
</tr>
</tbody>
</table>

Note: figures reveal significance probabilities of explanatory variables in multiple regressions
Table (4.31) shows that the standard deviation is a strong candidate that might be used as financial performance determinant and it is the best variable in the multiple regression tests. It shows it is the only variable that has a low P-value throughout the years, except for 1998, where all the variables had a high P-value.

Table (4.31) shows that the standard deviation is also strongly significant at the 99.99% confidence level in 1996 and 1997. It is strongly significant at more than 98% in 2000 and 2001. In 1995, the standard deviation is significant at the 89% confidence level, but in 1998 none of the variables were significant.

From table (4.31) the MTBV is significant at the 93% confidence level in 1995 and the capital gearing is significant at the 98% confidence level in 2000.

The standard deviation is the most important variable that predicts the financial performance, when there is a dummy for privatised and non-privatised groups. The results have supported the argument and many tests have been run to finalise the conclusion.

The multiple regression test indicated that the standard deviation is statistically significant at the 95% confidence level in the majority of years. It is to be observed that the standard deviation is not normally used as a variable outside the usual portfolio analysis (Kroll, Levy and Markowitz 1984; Markowitz 1991; and others (see chapter 3)). It can be used as a financial performance determinant when including a dummy for the differences between privatised and non-privatised groups.
It can be observed that the beta, in the one way ANOVA test, was a significant variable, but it is not significant when used in the multiple regression test, because of the greater range of variables included in this test. So, risk structure may differ between the two groups, yet performance is not substantially affected. However, risk might change between these two groups, because the privatised group is newly entered the market.

4.11 Overall conclusion

The general hypothesis 1 states that the privatised telecoms companies perform differently from their non-privatised (private) counterparts, given the present contestability. The most important part of the analysis as far as this thesis is concerned, however, is that the multiple regression tests show that there is no statistically significant difference between performance and the privatisation dummy, to reflect any distinction between the privatised and non-privatised groups. Therefore, our hypothesis is rejected.

The results in chapter 4 indicated that in the regressions there were not any statistically significant financial performance differences between the privatised and non-privatised groups. However, ignoring this distinction and looking at the sector as a whole, betas of the individual firms were shown to be statistically significantly different in the single ANOVA test. The role of the betas suggests some importance attached to the national stock markets, which will be investigated further in chapter 5 (section 5.9). However, the standard deviation was a significant explanatory variable in the multiple regressions test as far as the combined group was concerned.
The next chapter (5) will examine three of the most influential players in the telecommunications market (BT, AT&T and NTT). These companies meet the requirement for comparison: one being fully privatised (BT), one being partially privatised (NTT), and one being a wholly private company (AT&T).

A longer period of 16 years will be used: from the beginning of 1987 to the end of 2002. The multiple regression tests have been applied to establish where BT stands compared with the other two telecoms companies. The multiple regression test exclusively examines whether or not these three companies are related to each other (Hypothesis 2) or related more to their stock market indices (Hypothesis 3). The reason for examining this condition is in part fulfilment of the first hypothesis that private and privatised telecoms companies are not different from each other. Also, each telecoms sector, which has been chosen to examine, would be a representative sector of its stock market. A second part of this test will regress each company’s performance against the others to find out which company of the three performs better within that data-set.

Additionally, the model used for multiple regression will give a value for the downside-risk, and this can be used to give some indication of the risk exposure of the three companies. A further analysis will be done to forecast performance for these three companies using a random walk model with drift, and the reasons for using the random walk model with drift have been explained in chapter 3.

The second part of this thesis, namely, the links between performance and the degree of interrelationship between the companies and their local stock market performance over a set period, is examined in the following chapter 5. Chapter 6 will continue this analysis with an examination of their competitive advantage.
Table 4.32: The privatised companies sample

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Company Name</th>
<th>Privatisation Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Argentina</td>
<td>Telefonica De Argentina</td>
<td>Dec 1991</td>
</tr>
<tr>
<td>2</td>
<td>Australia</td>
<td>Telstra</td>
<td>Nov 1997</td>
</tr>
<tr>
<td>3</td>
<td>Canada</td>
<td>BCE</td>
<td>1987</td>
</tr>
<tr>
<td>4</td>
<td>Chile</td>
<td>Telefonos de Chile</td>
<td>Sept 1990</td>
</tr>
<tr>
<td>5</td>
<td>Denmark</td>
<td>TeleDanmark</td>
<td>May 1994</td>
</tr>
<tr>
<td>6</td>
<td>France</td>
<td>France Telecom</td>
<td>Oct-1997</td>
</tr>
<tr>
<td>7</td>
<td>Germany</td>
<td>Deutsche Telecom</td>
<td>Nov-1996</td>
</tr>
<tr>
<td>8</td>
<td>Greece</td>
<td>Hellenic Telecommunication (OTE)</td>
<td>March 1996</td>
</tr>
<tr>
<td>9</td>
<td>Indonesia</td>
<td>PT Telekom</td>
<td>Nov-1995</td>
</tr>
<tr>
<td>10</td>
<td>Italy</td>
<td>Telecom Italia</td>
<td>Oct 1997</td>
</tr>
<tr>
<td>11</td>
<td>Malaysia</td>
<td>Telekom Malaysia</td>
<td>Oct 1990</td>
</tr>
<tr>
<td>12</td>
<td>Mexico</td>
<td>Telefonos de Mexico</td>
<td>May 1991</td>
</tr>
<tr>
<td>13</td>
<td>Netherlands</td>
<td>Koninklijke PTT Nederlands N. V.</td>
<td>June 1994</td>
</tr>
<tr>
<td>14</td>
<td>New Zealand</td>
<td>Telecom Corporation of New Zealand</td>
<td>July 1991</td>
</tr>
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<td>15</td>
<td>Peru</td>
<td>Telefonica del Peru</td>
<td>July 1991</td>
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<td>16</td>
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<td>Portugal Telecom</td>
<td>June 1995</td>
</tr>
<tr>
<td>17</td>
<td>Singapore</td>
<td>Singapore Telecommunications Ltd</td>
<td>Oct 1993</td>
</tr>
<tr>
<td>18</td>
<td>Spain</td>
<td>Telefonica de Spain</td>
<td>June 1987</td>
</tr>
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</table>
### Overall table of the whole 7 years set (1995-2001)

**Table 4.33: 1995 Financial Year**

<table>
<thead>
<tr>
<th>Company</th>
<th>RI (01/01)</th>
<th>RI (31/12)</th>
<th>LN (Return)</th>
<th>S.D.</th>
<th>Cap.gearing</th>
<th>LN(MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>Privatisation Ages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore Telecom</td>
<td>67.7</td>
<td>77.4</td>
<td>0.133900601</td>
<td>0.00083049</td>
<td>5.62</td>
<td>9.82</td>
<td>7.88</td>
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<td>216.9</td>
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<td>8.890</td>
<td>1.23</td>
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<td>0.040686392</td>
<td>0.00145945</td>
<td>25.08</td>
<td>8.43</td>
<td>1.79</td>
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<td>1</td>
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<tr>
<td>TDC Denmark</td>
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<td>122.9</td>
<td>0.040686392</td>
<td>0.00145945</td>
<td>25.08</td>
<td>8.43</td>
<td>1.79</td>
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<td>1</td>
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<tr>
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* 0= private-based company
<table>
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<th>Company</th>
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<th>RI (31/12)</th>
<th>LN (Return)</th>
<th>S.D.</th>
<th>Cap.gearing</th>
<th>LN (MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>Privatisation Ages</th>
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## Table 4.35: 1997 Financial Year

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<th>LN (Return)</th>
<th>S.D.</th>
<th>Cap.gearing</th>
<th>LN (MV)</th>
<th>MTBV</th>
<th>Beta</th>
<th>Privatisation ages</th>
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### ANOVA Results 1995-2001

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Table 4.46: Multiple regressions Coefficient

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<td>.128618</td>
<td>-.0655034</td>
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Statistical Remarks

| R-squared % | 27.9315 | 75.4501 | 66.2598 | 20.1733 | 21.8535 | 34.8534 | 33.6142 |
| R-squared (adjusted) % | 12.4882 | 66.6822 | 54.3514 | 0.0 | 6.96839 | 15.3094 | 13.6985 |
| F-ratio     | 1.81     | 8.61     | 5.56     | .76      | 1.47     | 1.78     | 1.69     |
| ANOVA: P-value | .1918   | .0007    | .0024    | .6116    | .2474    | .1538    | 0.1758   |

***** P-value < 0.01
**** P-value <.05
*** P-value <.10
** P-value <.15
* P-value <.20
Chapter Five: The Main Players
In The Telecoms Market
Chapter Five: Three main players in the telecoms market

5.1 Introduction

This chapter investigates the inter-relationships and the stock market relationships between the three telecoms companies. The main aim is to test hypotheses 2 and 3 for three of the biggest telecoms companies: British Telecom (BT), AT&T and Japan NTT. However, in order to examine these three companies, a few questions need to be answered (see appendix 6 for the three companies' history):

1. Are they statistically normal? Which normality test will be performed? **This is examined in section (5.4).** The importance of the test is to determine whether certain types of statistical analysis are appropriate.

2. Are there any auto-correlations in performance for each company? **This is examined in section (5.5).** This test is to identify if there is any time series problem associated with the dependent variable.

3. What are the downside risks for the three companies? **This is examined in section (5.6).** This test is assess the risk level associate with stock price declines.

4. What can be inferred from a test against the forecasted figures for all of the three, measuring their performance against each other? **This is determined in section (5.7).** This test simply evaluates relative performance.
5. Are financial performances of these companies related to each other or not? **This is determined in section (5.8).** This test is important in order to examine hypothesis 2 in this thesis.

6. Are these companies related more to each other or more to their individual stock market indices? **This is determined in section (5.9).** This test is important to examine hypothesis 3, which relates to the industry versus market effects.

7. Where does BT stand in comparison with the other two companies? **This is examined in section (5.10).** In this instance, BT is used as a benchmark.

---

**5.2 Industry effects**

Because the study is investigating companies in the same industry, but in different national stock markets, this requires to briefly consider issues relating to country and industry effects.

Lessard (1974, 1976) suggested that country factors are the dominant drivers in security-price returns. Solnik (1974) demonstrated that diversification across countries provides greater risk reduction than diversification across industries.

Grinold et al (1989) decomposed global stock returns with a seven-factor model that included country, currency, and industry. They found that, although both country and industry effects were significant, country effects were clearly more important. Heston and Rouwenhorst (1994) refined the Grinold et al. model to three influential factors: global, country, and sector. For 12 European countries, they found that sectors accounted for less than 1 per cent of stock return volatility. Beckers et al. (1996) expanded this model to look at various combinations of global, country, industry, and sector (grouped industries) effects. They were unable to find statistically significant evidence of increasing global...
integration. They did, however, find strong and statistically significant evidence of increasing integration within the European Union.

One of the most surprising empirical characteristics in international equity markets is the low correlations between country portfolio returns. For example, between 1970 and 1998, the average correlation between the MSCI index returns of Japan and United States was 0.25 and the correlation between the United Kingdom and the United States was 0.50. These correlations are low because the country indices correspond to portfolios that are well diversified in terms of the number of securities that they contain (Rouwenhorst, 1999:57).

Griffin and Karolyi (1998) extended the Heston-Rouwenhorst (1994) model to study index returns from 25 countries. For the two-year period ending April 1995, they found that little stock return variation could be explained by industrial composition. However, Baca et al. (2000:34) studied the rise of sector effects in major equity markets and found evidence that country effects no longer dominate sector effects in explaining variations in the stock returns of the world’s seven major equity markets.

Heston and Rouwenhorst (1994, 1995), Griffin and Karolyi (1998), and Rouwenhorst (1999) show that country effects, on average, dominated industry effects during the 1975-1998 period. Cavaglia, Brightman, and Aked (2000), Kerneis and Williams (2000), and Hopkins and Willer (2001), however, point out that industry effects have grown so markedly in importance that they have sublimated country effects in the variation of international stock returns (L’Her el al, 2002:70).

According to Rouwenhorst (1999:61) the country effects have been more variable than industry effects: the standard deviation of the country effects of 8 of the 12 countries is higher than that of the most volatile industry effect (energy).
Brooks and Del Negro (2002) construct a new data-set that covers virtually the entire global stock market and find for this more comprehensive data-set, that industry effects have grown so dramatically in recent years that they have gone from less than half to almost twice as important, as country effects, since the mid-1990s. According to the Federal Reserve Bank of Atlanta (2002:2) there may be significant differences across regions, in the degree to which capital markets are becoming integrated within regions, a perspective that is lost in a purely global analysis. In hypothesis 3, which follows shortly, the country effects is proxied by the stock market.

5.3 The two hypotheses

In part fulfilment of hypothesis 1:

H2: The financial performance of each company is positively related to that of the other companies. The rationale is that, in the telecoms market, companies would be affected by similar technological factors. This can be represented by $\beta_2, \beta_3 > 0$ where the financial performance of company $j$ at time $t$ is given by $f_{jt}$. So, for the first company:

$$f_{1,t} = \alpha + \beta_2 f_{2,t} + \beta_3 f_{3,t} \quad \text{(Equation 5.1)}$$

H3: In a global market, company performance is related more closely to the sector (i.e. other respective companies) than each respective stock market. This can be represented by:

$$f_{1,t} = \alpha + \beta_2 f_{2,t} + \beta_3 f_{3,t} + \gamma F_{1,t} \quad \text{(Equation 5.2)}$$

where $F_{1,t}$ represents the performance of the stock market index of the chosen company 1, and the $\gamma$ coefficient is less significant than $\beta_2$ and $\beta_3$, i.e its significance probability is larger.
The answers for each one of these questions is generated from the financial tests. The LN (return index) is used all through the tests because the sample set is very large and distortions have to be eliminated. The sample period begins 01/03/1987 and runs to 01/03/2002, i.e. for 180 months.

5.4 Are these companies statistically normal or not?

5.4.1 Single variance test

The normality analysis is to test a single sample of data to determine whether or not it is likely to be a sample taken from a normally distributed populations. A single variance test has been run to identify some key points for each one of these companies to have a basis for further analysis. This test is designed to summarise a single sample of data, and examines the normality situation for the samples. If they were not normally distributed, the test applied will be less relevant as a means of comparing each of the companies. Three tests will be run later for each company to give figures for interpretation. Each company is presented in turn to show its statistical figures and results:

5.4.2 BT summary analysis of log of returns

The summary statistics are helpful when one needs to determine if other statistical analyses might be appropriate to use with the data, or when one needs to determine if one should transform the data. Each company will be presented with the summary statistics to find out more about each of them:
Table 5.1: BT summary analysis of log of returns

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<td>Stnd. Kurtosis</td>
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Table (5.1) shows summary statistics for BT. It includes measures of central tendency, measure of variability, and measures of shape. The standardised skewness and standardised kurtosis are used to determine whether the sample comes from a normal distribution and the values of these statistics test if they lie outside the range of -2 to +2, it indicates significant departures from normality, which would tend to invalidate any statistical test regarding the standard deviation.

In the BT case, the standardised skewness value (-1.89) is within the range expected for data from a normal distribution, whereas the standardised kurtosis value (2.76) is not within the range expected for data from a normal distribution, but near enough (see figure 5.1 at the end of this chapter).

Hypothesis tests for BT are used to examine the centre of the population from which the sample of BT comes. The sample mean return for BT is 0.00667953 and the sample median return is 0.0154033.

Three tests for each one of the examined telecoms companies will be performed to investigate if there are any differences in the log of returns of the sample-data for each one of the companies.
5.4.2.1 The first test

The first test is a t-test (which is to assess the statistical significance of the differences between the two sample mean returns for a single dependent variable) of the null hypothesis that the mean of BT's return equals 0.0 versus the alternative hypothesis that the mean of BT's return is not equal to 0.0. Since the P-value for this test (.275862) is greater than (or equal to) 0.05, so the null hypothesis cannot be rejected at the 95.0% confidence level.

5.4.2.2 The second test

The second test is a sign test (which is to assess the statistical significance of the differences between the two sample median returns for a single dependent variable) of the null hypothesis. That the median of BT's return equals 0.0 versus the alternative hypothesis that the median of BT's return is not equal to 0.0, and it is based on counting the number of values above (102) and below (77) of the hypothesised median. Since the P-value for this test (0.0728377) is greater than (or equal to) 0.05, so the null hypothesis cannot be rejected at the 95% confidence level.

5.4.2.3 The third test

The third test is a signed rank test ((which is to assess the statistical significance of the differences between the two sample median returns for a single dependent variable, it is a more powerful alternative to the Sign test (see Statgraphics Plus 5, section 14-21, 2000), but does assume that the population probability distribution is symmetric)), of the null hypothesis. That the median of BT's return equals 0.0 versus the alternative hypothesis that the median of BT's return is not equal to 0.0, and this is based on comparing the average ranks of values above (89.799) and below (92.5909) of the hypothesised median. Since the...
P-value for this test (.147481) is greater than (or equal to) 0.05, so the null hypothesis cannot be rejected at the 95% confidence level.

5.4.2.4 The results

Both the sign test and signed rank test are less sensitive to the presence of outliers, but are somewhat less powerful than the t-test if all data comes from a single normal distribution. BT has passed all the three tests and therefore, there are no significant differences in BT’s return sample.

The result shows that BT is not normally distributed although it was close even to be normally distributed, but it fails the standard kurtosis test (see figure 5.1).

5.4.3 NTT summary analysis of log of returns

The results of the statistical figures show the situation with NTT:

Table 5.2: NTT summary analysis of log of returns

<table>
<thead>
<tr>
<th>ANALYSIS SUMMARY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>180</td>
</tr>
<tr>
<td>Average</td>
<td>-.00847566</td>
</tr>
<tr>
<td>Variance</td>
<td>.00840765</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>.0916932</td>
</tr>
<tr>
<td>Minimum</td>
<td>-.223558</td>
</tr>
<tr>
<td>Maximum</td>
<td>.441172</td>
</tr>
<tr>
<td>Range</td>
<td>.66473</td>
</tr>
<tr>
<td>Std. Skewness</td>
<td>6.57396</td>
</tr>
<tr>
<td>Std. Kurtosis</td>
<td>10.0053</td>
</tr>
</tbody>
</table>

In the NTT case, the standardised skewness value (6.57) is not within the range expected for data from a normal distribution, and the standardised kurtosis value (10.0) is not within the range expected for data from a normal distribution (see figure 5.2 at the end of this chapter).
Table (5.2) indicates that NTT is not normally distributed because it invalidates any statistical test regarding the standard deviation and it fails both standard skewness and standard kurtosis test.

The sample mean return for NTT is -0.00847566 and the sample median return is -0.0176835. Regarding central tendency test, three tests are examined.

### 5.4.3.1 The first test

Since the P-value for this test (.216545) is greater than (or equal to) 0.05, so the null hypothesis cannot be rejected at the 95.0% confidence level.

### 5.4.3.2 The second test

The values above (74) and below (104) of the hypothesised median are found. Since the P-value for this test (0.0297318) is less than 0.05, so the null hypothesis is rejected at the 95.0% confidence level.

### 5.4.3.3 The third test

This is based on comparing the average ranks of values above (88.1554) and below (93.8798) of the hypothesised median. Since the P-value for this test (.0208165) is less than to 0.05, so the null hypothesis is rejected at the 95% confidence level.
5.4.3.4 The results

NTT is not normally distributed according to the standard skewness and standard kurtosis results (see figure 5.2). NTT failed to pass the three tests (the first test was accepted, but the last two were rejected), because of the presence of outliers such as erratic results in this data-set. Ignoring these results, it is possible to accept near normality.

5.4.4 AT&T summary analysis of log of returns

Table 5.3: AT&T summary analysis of log of returns

<table>
<thead>
<tr>
<th>ANALYSIS SUMMARY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>180</td>
</tr>
<tr>
<td>Average</td>
<td>0.00629954</td>
</tr>
<tr>
<td>Variance</td>
<td>0.00762761</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.0873362</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.333153</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.349209</td>
</tr>
<tr>
<td>Range</td>
<td>0.682362</td>
</tr>
<tr>
<td>Std. Skewness</td>
<td>-1.24261</td>
</tr>
<tr>
<td>Std. Kurtosis</td>
<td>6.1707</td>
</tr>
</tbody>
</table>

In the AT&T case, the standardised skewness value (-1.24261) is within the range expected for data from a normal distribution, but the standardised kurtosis value (6.1707) is not within the range expected for data from a normal distribution (see figure 5.3 at the end of this chapter), and so the performance measure for AT&T is not normally distributed.

The sample mean return for AT&T is 0.00629954 and the sample median return is 0.00925244.

5.4.4.1 The first test

Since the P-value for this test (0.334489) is greater than (or equal to) 0.05, so the null hypothesis cannot be rejected at the 95.0% confidence level.
5.4.4.2 The second test

Counting the number of values above (98) and below (82) of the hypothesised median. Since the P-value for this test (0.263551) is greater than (or equal to) 0.05, so the null hypothesis cannot be rejected at the 95.0% confidence level.

5.4.4.3 The third test

Comparing the average ranks of values above (93.102) and below (87.3902) of the hypothesised median. Since the P-value for this test (.16218) is greater than (or equal to) 0.05, so the null hypothesis cannot be rejected at the 95% confidence level.

5.4.4.4 The results

According to the summary analysis of AT&T’s log of returns in table (5.3), the company is not normally distributed (see figure 5.3), but AT&T passed all the three tests.

5.4.5 Conclusion

The results show that none of the three companies is normally distributed even though their normal distribution plots visually suggest so. They failed to pass both standard kurtosis test in all cases and standard skewness test additionally in the case of NTT. However, an assumption has been made for the benefit of further analysis that the three companies can be considered to lie within a reasonable range of normal distribution.
5.5 Are there any auto-correlations in performance for each company?

5.5.1 Introduction

The basic idea of correlation is to report the strength of the association between the two variables. Auto-correlation often happens when data are collected successively over a period of time. In a time series, the value of a variable at a particular moment in time can be affected by the ‘level’ of the data. For example, a highly-valued variable at the previous point in time may infer a highly-valued variable at the next point in time. To include previous values in a multiple regression can help deal with the impact of the previous value on the current level as well as the impact of other explanatory variables.

Without including auto-correlation, a spurious relationship through time may otherwise be found between the dependent variable and the other explanatory variables. So the auto-correlation is a common tool used by researchers to understand the properties of a time series. In this test, the intention is to examine if there is any auto-correlation for each of the three companies. Before moving to a multiple regression, a simple regression test is used to identify if there is any relationship between a company’s LN (return index) and its lagged value. This is to show if there is any auto-correlation with the previous month’s value for each one of them.
5.5.2 AT&T

Table 5.4: AT&T simple regression test result

<table>
<thead>
<tr>
<th>AT&amp;T</th>
<th>Estimate</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.00607144</td>
<td>0.92863</td>
<td>0.3543</td>
<td></td>
</tr>
<tr>
<td>Slope</td>
<td>0.0386364</td>
<td>0.515062</td>
<td>0.6071</td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td></td>
<td></td>
<td>0.0385768</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td>0.148817</td>
<td></td>
</tr>
<tr>
<td>R-squared (adjusted)%</td>
<td></td>
<td></td>
<td>-0.412145</td>
<td></td>
</tr>
<tr>
<td>P-value (ANOVA)</td>
<td></td>
<td></td>
<td>0.6071</td>
<td></td>
</tr>
<tr>
<td>F-ratio (ANOVA)</td>
<td></td>
<td></td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson statistic (1.98316)</td>
<td></td>
<td></td>
<td>P=0.4686</td>
<td></td>
</tr>
</tbody>
</table>

5.5.2.1 The results

The output shows the results of fitting a linear model to describe the relationship between LN (return index) and the lagged of LN (return index).

Since the P-value (0.6071) in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between the LN (return index) and LN (return index) lagged at the 90.0% or higher confidence level.

The R-squared statistic indicates that the model as fitted explains 0.148817% of the variability of LN (return index). The correlation coefficient equals to (0.0385768), indicating virtually no relationship between the variables.

The Durbin-Watson (DW) statistic tests the residuals to determine if there is any significant correlation based on the order in which they occur in our data file. Since the P-value (.4686) is greater than 0.05, there is no indication of serial autocorrelation in the residuals.
5.5.2.2 Overview

The AT&T LN (return index) is not auto-correlated using a one-month lag.

5.5.3 BT

Table 5.5: BT simple regression test result

<table>
<thead>
<tr>
<th>BT</th>
<th>Estimate</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.00661497</td>
<td>1.07592</td>
<td>.2834</td>
<td></td>
</tr>
<tr>
<td>Slope</td>
<td>0.00972655</td>
<td>0.129777</td>
<td>0.8969</td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td></td>
<td></td>
<td></td>
<td>0.0972673</td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>0.00946092</td>
</tr>
<tr>
<td>R-squared (adjusted)%</td>
<td></td>
<td></td>
<td></td>
<td>-0.552284</td>
</tr>
<tr>
<td>P-value (ANOVA)</td>
<td></td>
<td></td>
<td></td>
<td>0.8969</td>
</tr>
<tr>
<td>F-ratio (ANOVA)</td>
<td></td>
<td></td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>Durbin-Watson statistic (1.98316)</td>
<td></td>
<td></td>
<td></td>
<td>P=0.4552</td>
</tr>
</tbody>
</table>

5.5.3.1 The results

According to the P-value in the ANOVA table (0.8969), which is greater than or equal to 0.10, there is not a statistically significant relationship between BT’s LN (return index) and BT’s LN (return index) lagged at the 90% or higher confidence level.

The R-squared statistic indicates that the model as fitted explains 0.00946092% of the variability in BT’s LN (return index), which is virtually nothing! This is a favourable result since, if identical results hold for the other companies, a lack of autocorrelation will allow a sensible time series analysis (to follow) between the companies.
The correlation coefficient describes the strength of the relationship between the two set of interval-scaled or ratio-scaled variables, and in this case the correlation coefficient for BT is 0.00972673, indicating effectively no relationship between the LN (return index) and BT’s LN (return index) lagged. This is not used as an input in next chapter, because mainly the random walk with drift model is used for forecasting purpose in chapters 5 and 6.

Since the P-value (0.4552) in the Durbin-Watson test is greater than 0.05, there is no indication of serial autocorrelation in the residuals.

5.5.4 NTT

Table 5.6: NTT simple regression test result

<table>
<thead>
<tr>
<th>NTT</th>
<th>Estimate</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.00846067</td>
<td>-1.2275</td>
<td>0.2213</td>
<td></td>
</tr>
<tr>
<td>Slope</td>
<td>0.00155887</td>
<td>0.0204774</td>
<td>0.9837</td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td></td>
<td></td>
<td></td>
<td>0.00153484</td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>0.000235574</td>
</tr>
<tr>
<td>R-squared (adjusted)%</td>
<td></td>
<td></td>
<td></td>
<td>-0.561561</td>
</tr>
<tr>
<td>P-value (ANOVA)</td>
<td></td>
<td></td>
<td></td>
<td>0.9837</td>
</tr>
<tr>
<td>F-ratio (ANOVA)</td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>Durbin-Watson statistic (1.98316)</td>
<td></td>
<td></td>
<td>P=0.3947</td>
<td></td>
</tr>
</tbody>
</table>

5.5.4.1 The results

The P-value (0.9837) in the ANOVA table is greater than or equal to 0.10, which indicates that there is not a statistically significant relationship between NTT’s LN (return index) and NTT’s LN (return index) lagged at the 90% or higher confidence level.

The R-squared statistic indicates that the model as fitted explains 0.000235574% of the variability in NTT’s LN (return index), which is virtually zero.
The correlation coefficient is 0.00153484, indicating effectively no relationship between the NTT’s LN (return index) and its return index lagged.

There is no indication of serial autocorrelation in the residuals, because the Durbin-Watson's P-value is 0.3947, which is greater than 0.05.

5.5.5 Conclusion

The results show no autocorrelation between the LN (return index) and its lagged one for all the three companies.

5.6 Measuring downside risk

5.6.1 Introduction

The down-risk has been used for the first time by Markowitz (1952) who provided a quantitative framework for measuring portfolio risk and return. Markowitz developed his complex structure of equations after he was struck by the notion that “you should be interested in risk as well as return.” (Bernstein, 1993:41). Later, a second article on portfolio theory by Roy (1952) was published to develop the practical method for determining the best risk-return trade-off.

Markowitz (1959) recognised the importance of this idea. Investors are interested in minimising downside risk for two reasons: (1) only downside risk or safety first is relevant to an investor; and (2) securities' distributions may not be normal. Therefore, a downside risk measure would help investors make proper decisions when faced with non-normal security return distributions. So, according to Markowitz, if the distributions are normal, both downside risk measures and the variance provides the correct answer. If the distributions are not normal, only the downside risk measure provides the correct answer.
Downside risk generally means risk defined only over a restricted part of the distribution of returns, most generally those returns lying below a pre-specified target, or where risk significantly decreases for large positive returns (Pedersen, 2001:258).

The downside risk is important for the comparison reason for the three telecoms companies. It will give an indication to the investors about the risk level in each one of the three examined telecoms companies. However, more extreme negative values suggest an exposure to greater risk. The analysis here indicates which company of the three is more riskier than the others? Three companies are AT&T, NTT and BT.

Table 5.7: Downside risk result

<table>
<thead>
<tr>
<th>Percentiles</th>
<th>Lower 5%</th>
<th>Lower 10%</th>
<th>Lower 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>-0.129536</td>
<td>-0.0855632</td>
<td>-0.0451487</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-0.133913</td>
<td>-0.102759</td>
<td>-0.0344812</td>
</tr>
<tr>
<td>NTT</td>
<td>-0.136504</td>
<td>-0.11206</td>
<td>-0.0674496</td>
</tr>
</tbody>
</table>

BT has lower downside risk as indicated by the lower 5% of LN (returns), which are better for BT and worse for AT&T and NTT, and it is better for AT&T than for NTT.

BT has lower downside risk given by the lower 10% of LN (returns), which are better for BT and worse for AT&T and NTT, and it is even better for AT&T than for NTT.

AT&T has lower downside risk with a slight decrease from BT at the lower 25% of LN (returns), which are worse for NTT.
5.6.2 Overall conclusion

The downside risk shows that BT has lower downside risk at the 5 and 10 percentile; and AT&T at the 25 percentile. NTT ranks the worst one with highest downside risk among the three companies. The writer concludes that BT proves to be generally a safer investment than the other two companies, and NTT the worst. The focus here is on risk not on the risk-return relationship. For the latter purpose, the coefficient of variation could have been used (see section 5.7.2 for different approach).

5.7 Forecasting 12 months ahead (4/02-3/03)

5.7.1 Introduction

A simple regression test has been used to compare the forecasted monthly LN (return index) values from 1/4/2002 to 1/3/2003 for the three companies BT, NTT and AT&T. The Random walk with drift model is used to forecast the LN (return index) for the three companies. The reason for this technique is to give a set of figures for comparison based upon a random walk with drift model rather than making guesses or relying upon a specialists in the forecasting field all of which will be market biased.

For BT 12 values range from 0.131564 to 0.139143, AT&T’s from -0.0979803 to -0.0882323 and NTT’s range from 0.114236 to 0.119505. Table (5.8) shows the forecasted LN (return index) for the three companies:
Table 5.8: Forecasted 12 months figures for the three companies

<table>
<thead>
<tr>
<th>Date</th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/04/2002</td>
<td>0.131564</td>
<td>-0.0882323</td>
<td>0.119505</td>
</tr>
<tr>
<td>01/05/2002</td>
<td>0.132253</td>
<td>-0.0891185</td>
<td>0.119026</td>
</tr>
<tr>
<td>01/06/2002</td>
<td>0.132942</td>
<td>-0.0900047</td>
<td>0.118547</td>
</tr>
<tr>
<td>01/07/2002</td>
<td>0.133631</td>
<td>-0.0908909</td>
<td>0.118068</td>
</tr>
<tr>
<td>01/08/2002</td>
<td>0.134320</td>
<td>-0.0917770</td>
<td>0.117589</td>
</tr>
<tr>
<td>01/09/2002</td>
<td>0.135009</td>
<td>-0.0926632</td>
<td>0.117110</td>
</tr>
<tr>
<td>01/10/2002</td>
<td>0.135698</td>
<td>-0.0935494</td>
<td>0.116631</td>
</tr>
<tr>
<td>01/11/2002</td>
<td>0.136387</td>
<td>-0.0944356</td>
<td>0.116152</td>
</tr>
<tr>
<td>01/12/2002</td>
<td>0.137076</td>
<td>-0.0953217</td>
<td>0.115673</td>
</tr>
<tr>
<td>01/01/2003</td>
<td>0.137765</td>
<td>-0.0962079</td>
<td>0.115194</td>
</tr>
<tr>
<td>01/02/2003</td>
<td>0.138454</td>
<td>-0.0970941</td>
<td>0.114715</td>
</tr>
<tr>
<td>01/03/2003</td>
<td>0.139143</td>
<td>-0.0979803</td>
<td>0.114236</td>
</tr>
</tbody>
</table>

5.7.2 The results of the simple comparison test

Table (5.9) below shows the statistical figures for the simple comparison test:

Table 5.9: Simple comparison test result of the three companies

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.135353</td>
<td>-0.0931063</td>
<td>0.116871</td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.00248422</td>
<td>0.00319516</td>
<td>0.00172706</td>
<td></td>
</tr>
<tr>
<td>ANOVA Table</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-Ratio</td>
<td></td>
<td></td>
<td></td>
<td>29941.13</td>
</tr>
<tr>
<td>P-Value</td>
<td></td>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
<tr>
<td>Cochran’s test</td>
<td></td>
<td></td>
<td></td>
<td>0.157828</td>
</tr>
<tr>
<td>Kruskall-Wallis</td>
<td></td>
<td></td>
<td></td>
<td>0.0000000173417</td>
</tr>
</tbody>
</table>

The forecasted data shows that BT is outperforming the other companies, although the returns for NTT are not too different. By contrast, AT&T is performing worse than the other two companies in terms of both mean return and risk.

Since the P-value of the ANOVA is 0.0000, which is less than 0.05, there is a statistically significant difference between the means of the BT, AT&T and NTT variables at the 95.0% confidence level.
The Cochran's C Test P-value is 0.157828, which is greater than (or equal to) 0.05, and so there is not a statistically significant difference amongst the standard deviations at the 95.0% confidence level.

Since the Kruskall-Wallis Test P-value is 0.000000173417, which is less than 0.05, there is a statistically significant difference amongst the medians at the 95.0% confidence level.

5.8 Are they nevertheless related to each other?

5.8.1 Introduction

Hypothesis 2 states that the financial performance of each company is positively related to that of the other companies. The rationale is that, in the telecoms market, companies would be affected by similar technological factors. Two tests are performed here. In the first test, each of the telecoms companies' performance is examined as a dependent variable regressed against the other two telecoms companies' performances with an inclusion of an auto-regressive term, i.e. a lagged value of the dependent variable, to accommodate possible auto-correlation as explained in section 5.5.1. In the second test, the same technique is applied without an auto-regressive term.

A further examination has been done to whether the performance of the companies chosen was likely to be a function of the telecoms sector generally using as they do, a common technology, similar customer base, product range and market environment at that time.
Applying the formula

\[ Y_t = \alpha + \beta_1 x_t + \beta_2 w_t + \gamma y_{t-1} \]  \hspace{1cm} \text{(Equation 5.3)}

where:

- \( Y_t \) = is the dependent variable of a company
- \( \beta_1 x_t \) = is the first independent variable company component to be tested
- \( \beta_2 w_t \) = is the second independent variable company component
- \( \gamma y_{t-1} \) = is lagged value of the dependent variable company component

Multiple regression analysis has been used to compare the three companies with each other and to see if they are related to each other or not. Two tests of multiple regression have been used, one with a lag and the other without a lag using the LN (return index). With the financial data, an efficient stock market would suggest that the share prices is autocorrelated with its previous value. For example, a current price of £6.50 suggests this is the best estimate of the next day price. To introduce greater lags, it is less meaningful in terms of economic rationale (Fama, 1970).

5.8.2 Companies with lags

5.8.2.1 BT

Using this formula

\[ Y_t^{BT} = \alpha + \beta_1 x_t^{AT&T} + \beta_2 w_t^{NTT} + \gamma y_{t-1}^{BT} \]  \hspace{1cm} \text{(Equation 5.4)}

In the first test, BT is the dependent variable and AT&T, NTT and BT lagged are independent variables. Table (5.10) will show the results:
Since the P-value in the ANOVA table is 0.0000, there is a statistically significant relationship between the variables at the 99% confidence level. Since the P-value of the Durbin-Watson statistic is 0.2807, which is greater than 0.05, there is no indication of serial autocorrelation in the residuals.

From the individual P-values in table (5.10), the P-value for BT lagged is 0.6386, which is greater than 0.10, which indicates that BT lagged is not statistically significant at the 90% or higher confidence level, which is an indication of no need to use BT lagged.

### 5.8.2.1.1 Conclusion

The conclusion from the test is that these companies have a statistically significant relationship to each other at the 99% confidence level. It is worth noting and using the tests for lags for both NTT and AT&T to prove (in the next section) the theory that there is no need to use the lagged values in the formula (see equation 5.3, 5.4).

The overall P-value can be broken down into its constituent components for the respective variables:
Table 5.11: Breakdown of ANOVA P-values result

<table>
<thead>
<tr>
<th>Source</th>
<th>F-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT&amp;T</td>
<td>27.86</td>
<td>0.0000</td>
</tr>
<tr>
<td>NTT</td>
<td>7.20</td>
<td>0.0080</td>
</tr>
<tr>
<td>BT lagged</td>
<td>0.22</td>
<td>0.6386</td>
</tr>
</tbody>
</table>

Table (5.11) shows that both AT&T and NTT are individually statistically significant at the 99% confidence level, whereas the BT lagged is not.

The multicollinearity is a correlation among the independent variables, which would lead to incorrect conclusion as to which independent variables are statistically significant, so the multicollinearity problem has been checked using the correlation matrix for coefficient estimation, for which in this case, there are no correlations with absolute values greater than 0.5. Table (5.12) shows the result:

Table 5.12: Correlation matrix using BT as dependent variable

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>AT&amp;T</th>
<th>NTT</th>
<th>BT lagged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.0000</td>
<td>-0.0953</td>
<td>0.1224</td>
<td>-0.0886</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-0.0953</td>
<td>1.0000</td>
<td>-0.2514</td>
<td>-0.0315</td>
</tr>
<tr>
<td>NTT</td>
<td>0.1224</td>
<td>-0.2514</td>
<td>1.0000</td>
<td>-0.1074</td>
</tr>
<tr>
<td>BT lagged</td>
<td>-0.0886</td>
<td>-0.0315</td>
<td>-0.1074</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

5.8.2.2 AT&T

Using this formula

\[ Y_{t}^{AT&T} = \alpha + \beta_1 x_{t}^{BT} + \beta_2 w_{t}^{NTT} + \gamma Y_{t-1}^{AT&T} \]  

(Equation 5.5)
Table 5.13: Multiple regression test result using AT&T as dependent variable

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>T statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.00531689</td>
<td>0.873339</td>
<td>0.3837</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>0.334008</td>
<td>4.33353</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.165414</td>
<td>2.39972</td>
<td>0.0175</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T lagged</td>
<td>0.0260222</td>
<td>0.371446</td>
<td>0.7108</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>15.9385</td>
</tr>
<tr>
<td>R-squared (adjusted)</td>
<td></td>
<td></td>
<td></td>
<td>14.5057</td>
</tr>
<tr>
<td>ANOVA –F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>11.12</td>
</tr>
<tr>
<td>ANOVA- P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td></td>
<td></td>
<td></td>
<td>(P=0.4421)</td>
</tr>
</tbody>
</table>

The P-value in the ANOVA table is 0.0000, which indicates that there is a statistically significant relationship overall at the 99% confidence level. Since the P-value of the Durbin-Watson statistic is 0.4421, which is greater than 0.05, there is no indication of serial autocorrelation in the residuals.

5.8.2.2.1 Conclusion

The individual insignificance of the lagged variable is again demonstrated, on this occasion regarding AT&T, because AT&T’s lagged variable has the highest P-value (0.7108).

Further ANOVA decomposition reveals:

Table 5.14: Breakdown of ANOVA P-values

<table>
<thead>
<tr>
<th>Source</th>
<th>F-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>27.61</td>
<td>0.0000</td>
</tr>
<tr>
<td>NTT</td>
<td>5.63</td>
<td>0.0188</td>
</tr>
<tr>
<td>AT&amp;T lagged</td>
<td>0.14</td>
<td>0.7108</td>
</tr>
</tbody>
</table>

Table (5.14) shows that both BT and NTT are individually statistically significant at the 99% confidence level, whereas AT&T lagged is not.
Multicollinearity has been checked using the correlation matrix for coefficient estimation, which in this case reveals no correlations with absolute values greater than 0.5. Table (5.15) shows the full results:

Table 5.15: Correlation matrix result using AT&T as dependent variable

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>BT</th>
<th>NTT</th>
<th>AT&amp;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.0000</td>
<td>-0.1033</td>
<td>0.1114</td>
<td>-0.0456</td>
</tr>
<tr>
<td>BT</td>
<td>-0.1033</td>
<td>1.0000</td>
<td>-0.2827</td>
<td>-0.1229</td>
</tr>
<tr>
<td>NTT</td>
<td>0.1114</td>
<td>-0.2827</td>
<td>1.0000</td>
<td>0.1243</td>
</tr>
<tr>
<td>AT&amp;T lagged</td>
<td>-0.0456</td>
<td>-0.1229</td>
<td>0.1243</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

5.8.2.3 NTT

Using this formula

\[ Y_t^{\text{NTT}} = \alpha + \beta_1 x_t^{\text{BT}} + \beta_2 W_t^{\text{AT&T}} + \gamma Y_{t-1}^{\text{NTT}} \]  

(Equation 5.6)

Table 5.16: Multiple regression result using NTT as a dependent variable

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>T statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.0111339</td>
<td>-1.68844</td>
<td>0.0931</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>0.229651</td>
<td>2.67853</td>
<td>0.0081</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.191257</td>
<td>2.37391</td>
<td>0.0187</td>
<td></td>
</tr>
<tr>
<td>NTT lagged</td>
<td>0.00837623</td>
<td>0.115342</td>
<td>0.9083</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>10.2478</td>
</tr>
<tr>
<td>R-squared (adjusted)</td>
<td></td>
<td></td>
<td></td>
<td>8.71791</td>
</tr>
<tr>
<td>ANOVA – F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>6.70</td>
</tr>
<tr>
<td>ANOVA- P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0003</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td></td>
<td></td>
<td></td>
<td>(P=0.3939)</td>
</tr>
</tbody>
</table>

Since the P-value in the ANOVA table is 0.0003, there is a statistically significant relationship overall at the 99% confidence level. The P-value of the Durbin-Watson statistic is 0.3939, which is greater than 0.05, so there is no indication of serial autocorrelation in the residuals.
5.8.2.3.1 Conclusion

As before the lagged variable has the highest P-value, and indicates that the term is greater than or equal to 0.10, which is not statistically significant at the 99% confidence level.

Further ANOVA decomposition indicates:

Table 5.17: Breakdown of ANOVA P-values result

<table>
<thead>
<tr>
<th>Source</th>
<th>F-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>14.46</td>
<td>0.0002</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>5.62</td>
<td>0.0188</td>
</tr>
<tr>
<td>NTT lagged</td>
<td>0.01</td>
<td>0.9083</td>
</tr>
</tbody>
</table>

Table (5.17) shows that both BT and AT&T are individually statistically significant at the 99% confidence level, whereas NTT lagged is not.

Multicollinearity has been checked using the correlation matrix for coefficient estimation, which in this case shows that there are no correlations with absolute values greater than 0.5. Table (5.18) shows the results:

Table 5.18: Correlation matrix result using NTT as a dependent variable

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT lagged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.0000</td>
<td>-0.0614</td>
<td>-0.0401</td>
<td>0.1042</td>
</tr>
<tr>
<td>BT</td>
<td>-0.0614</td>
<td>1.0000</td>
<td>-0.3638</td>
<td>-0.0240</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-0.0401</td>
<td>-0.3638</td>
<td>1.0000</td>
<td>0.0497</td>
</tr>
<tr>
<td>NTT lagged</td>
<td>0.1042</td>
<td>-0.0240</td>
<td>0.0497</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

5.8.2.4 Overall conclusion

Lagged values for BT, AT&T and NTT do not have any statistically significant relationship and have the highest P-values. For this reason, the writer believes it is worth taking them out and running the test again against the three companies to see if there are related to each other or not. In the next section (5.8.3), the unlagged tests will prove that
the three companies are individually statistically significantly related to the dependent variable at the 99% confidence level.

5.8.3 The independent variables for companies without using lags

5.8.3.1 BT

Using the formula without the lag

\[ Y_t^{BT} = \alpha + \beta_1 x_t^{AT&T} + \beta_2 w_t^{NTT} \]  

(Equation 5.7)

The BT is the dependent variable, whereas AT&T and NTT are independent variables.

Table (5.19) shows the results:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>T statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.00626931</td>
<td>1.10683</td>
<td>0.2699</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.294918</td>
<td>4.42344</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.170798</td>
<td>2.68958</td>
<td>0.0078</td>
<td></td>
</tr>
<tr>
<td>R-Squared %</td>
<td></td>
<td></td>
<td></td>
<td>16.5942</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>15.6518</td>
</tr>
<tr>
<td>ANOVA F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>17.61</td>
</tr>
<tr>
<td>AVONA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td></td>
<td></td>
<td>(P=0.1774)</td>
<td></td>
</tr>
</tbody>
</table>

Given the ANOVA P-value is 0.0000, which is less than 0.01, there is a statistically significant relationship overall at the 99% confidence level. Since the P-value for the Durbin-Watson statistic is 0.1774, which is greater than 0.05, there is no indication of serial autocorrelation in the residuals.

NTT has the highest P-value of 0.0078, which is less than 0.01, so the highest order term is statistically significant at the 99% confidence level.
Further ANOVA decomposition for variables can be seen in the following table (5.20):

**Table 5.20: Breakdown of ANOVA P-values result**

<table>
<thead>
<tr>
<th>Source</th>
<th>F-Ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT&amp;T</td>
<td>27.98</td>
<td>0.0000</td>
</tr>
<tr>
<td>NTT</td>
<td>7.23</td>
<td>0.0078</td>
</tr>
</tbody>
</table>

Table (5.20) shows how NTT and AT&T are individually statistically significant at the 99% confidence level.

There is no multicollinearity problem among these variables, which can be seen through table (5.21) of the correlation matrix for coefficient estimates:

**Table 5.21: Correlation matrix result using BT as a dependent variable**

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.0000</td>
<td>-0.0985</td>
<td>0.1140</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-0.0985</td>
<td>1.0000</td>
<td>-0.2564</td>
</tr>
<tr>
<td>NTT</td>
<td>0.1140</td>
<td>-0.2564</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

There are no correlations with absolute values greater than 0.5, which indicates no presence of serious multicollinearity.

### 5.8.3.2 AT&T

Using the formula without the lag

\[ Y_t^{AT&T} = \alpha + \beta_1 x_t^{BT} + \beta_2 w_t^{NTT} \]  
*(Equation 5.8)*

The AT&T is the dependent variable, whereas BT and NTT are independent variables. Table (5.22) shows the results:
Table 5.22: Multiple regression using AT&T as a dependent variable

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>T statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.00542004</td>
<td>0.893388</td>
<td>0.3729</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.162233</td>
<td>2.37775</td>
<td>0.0185</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>0.337527</td>
<td>4.42344</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>R-Squared %</td>
<td></td>
<td></td>
<td>15.8726</td>
<td></td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td>14.9221</td>
<td></td>
</tr>
<tr>
<td>ANOVA F-ratio</td>
<td></td>
<td></td>
<td>16.70</td>
<td></td>
</tr>
<tr>
<td>AVONA P-value</td>
<td></td>
<td></td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td></td>
<td></td>
<td>(P=0.3173)</td>
<td></td>
</tr>
</tbody>
</table>

Since the ANOVA P-value is 0.0000, which is less than 0.01, there is a statistically significant relationship between the variables at the 99% confidence level. The P-value for the Durbin-Watson statistic is 0.3173, which is greater than 0.05, which indicates that there is no indication of serial autocorrelation in the residuals.

Since the highest P-value for the independent variables for NTT is 0.0185, which is less than 0.05, the outcome is statistically significant at the 95% confidence level.

Further ANOVA decomposition for variables can be seen in the following table (5.23):

Table 5.23: Breakdown of ANOVA P-values result

<table>
<thead>
<tr>
<th>Source</th>
<th>F-Ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTT</td>
<td>13.83</td>
<td>0.0003</td>
</tr>
<tr>
<td>BT</td>
<td>19.57</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Table (5.23) shows how NTT and BT are individually statistically significant at the 99% confidence level.

There is no multicollinearity problem among these variables and it can be seen through the correlation matrix for coefficient estimates table (5.24):
Table 5.24: Correlation matrix result using AT&T as a dependent variable

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>NTT</th>
<th>BT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.0000</td>
<td>0.1181</td>
<td>-0.1099</td>
</tr>
<tr>
<td>NTT</td>
<td>0.1181</td>
<td>1.0000</td>
<td>-0.2715</td>
</tr>
<tr>
<td>BT</td>
<td>-0.1099</td>
<td>-0.2715</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

There are no correlations with absolute values greater than 0.5, which indicates no presence of serious multicollinearity.

5.8.3.3 NTT

Using the formula without lag

\[ Y_t^{NTT} = \alpha + \beta_1 x_t^{BT} + \beta_2 w_t^{AT&T} + \gamma y_{t-1}^{NTT} \]  

(Equation 5.9)

The NTT is the dependent variable, whereas AT&T and BT are independent variables.

Table (5.25) shows the results:

Table 5.25: Multiple regression using NTT as a dependent variable

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>T statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.0112131</td>
<td>-1.71455</td>
<td>0.0882</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>0.229888</td>
<td>2.68958</td>
<td>0.0078</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.190794</td>
<td>2.37775</td>
<td>0.0185</td>
<td></td>
</tr>
<tr>
<td>R-Squared %</td>
<td></td>
<td></td>
<td></td>
<td>10.241</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>9.22677</td>
</tr>
<tr>
<td>ANOVA F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>10.10</td>
</tr>
<tr>
<td>AVONA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0001</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td></td>
<td></td>
<td></td>
<td>(P=0.3532)</td>
</tr>
</tbody>
</table>

Because the ANOVA P-value is 0.0001, which is less than 0.01, there is a statistically significant relationship overall at the 99% confidence level, and the P-value for the Durbin-Watson statistic is 0.3532, which is greater than 0.05, which indicates that there is no indication of serial autocorrelation in the residuals.

The the highest P-value (0.0185) belongs to AT&T, which is less than 0.05, so the outcome is statistically significant at the 95% confidence level.
Further ANOVA results for variables can be seen in the following table (5.26):

Table 5.26: Breakdown of ANOVA P-values result

<table>
<thead>
<tr>
<th>Source</th>
<th>F-Ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>14.54</td>
<td>0.0002</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>5.65</td>
<td>0.0185</td>
</tr>
</tbody>
</table>

Table (5.26) shows how BT and AT&T are each statistically significant at the 99% confidence level.

There is no multicollinearity problem among these variables and it can be observed through the correlation matrix for coefficient estimates table (5.27):

Table 5.27: Correlation matrix result using NTT as a dependent variable

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>BT</th>
<th>AT&amp;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.0000</td>
<td>-0.0592</td>
<td>-0.0456</td>
</tr>
<tr>
<td>BT</td>
<td>-0.0592</td>
<td>1.0000</td>
<td>-0.3631</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-0.0456</td>
<td>-0.3631</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

There are no correlations with absolute values greater than 0.5, which indicates no presence of serious multicollinearity according to the result of table (5.27).

5.8.4 Overall conclusion

Hypothesis 2 states that the financial performance of each company is positively related to that of the other companies. The rationale is that, in the telecoms market, companies would be affected by similar technological factors. In this section, the three separate analyses have demonstrated that at the 95% confidence level each company’s performance is significantly positively related to the combined performance of the other two companies. So, hypothesis 2 is supported.
5.9 Are they related to their own indices or not?

The investigation here, under hypothesis 3 ((which states that in a global market, company performance is related more closely to the sector (i.e. other respective companies) than each respective stock market)) if these telecoms companies are more related to their stock market index or to each other. However, each one of the examined telecoms companies have a different market structure, but the intention is to find out if they are more related to their stock market indices than to each other.

The FTSE all share is used for BT, S&P 500 is used for AT&T, and Nikkei is used for NTT. The multiple regression test is performed for each company with each other and with its own stock market index in order to identify whether each companies performance is closely related to its own stock market index.

\[ Y_t = \alpha + \beta_1 x_t + \beta_2 w_t + \gamma y \quad (\text{Equation 5.10}) \]

where:

- \( Y_t \) = is the dependent variable of a company
- \( x_t \) = is the first company variable to be tested
- \( w_t \) = is the second company variable
- \( y \) = is the dependent variable’s stock market index

\( \alpha, \beta_1, \beta_2 \text{ and } \gamma \text{ are estimated coefficients} \)
5.9.1 Introduction

In this sub-section, BT is presented as a dependent variable, whereas AT&T, NTT and FTSE All share run as independent variables and similarly in subsequent sections for NTT and AT&T.

5.9.2 The first test

\[ Y_t^{BT} = \alpha + \beta_1 x_t^{AT&T} + \beta_2 w_t^{NTT} + \gamma y^{FTSE \ \text{ALL \ SHARE}} \]  

(Equation 5.11)

where:

- \( Y_t^{BT} \) is the BT performance as a dependent variable
- \( \beta_1 x_t^{AT&T} \) is the AT&T component
- \( \beta_2 w_t^{NTT} \) is the NTT (Japan) component
- \( \gamma y^{FTSE \ \text{ALL \ SHARE}} \) is FTSE All Share index (for BT) component

In the first test, BT is dependent and NTT, AT&T and FTSE all share are independent variables. It appears from the first test and table (5.28) that BT is more related to its own FTSE all share index than to NTT and AT&T.

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>T Statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT&amp;T</td>
<td>0.189118</td>
<td>3.16641</td>
<td>0.0018</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.095457</td>
<td>1.6986</td>
<td>0.0912</td>
<td></td>
</tr>
<tr>
<td>FTSE All share</td>
<td>0.779724</td>
<td>7.57166</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>37.0873</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>36.0149</td>
</tr>
<tr>
<td>F-Ratio</td>
<td></td>
<td></td>
<td></td>
<td>34.58</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
<tr>
<td>Durbin- Watson statistic</td>
<td></td>
<td></td>
<td>(P=0.2334)</td>
<td></td>
</tr>
</tbody>
</table>

Since the P-value of the Durbin-Watson statistic is 0.2334, which is greater than 0.05, there is no indication of serial autocorrelation in the residuals.
Since the P-value in the ANOVA table (0.0000) is less than 0.01, there is a statistically significant relationship between the dependent variable and the combined independent variables at the 99% confidence level.

### 5.9.3 The second test

Taking this formula for AT&T

\[ Y_{t}^{AT\&T} = \alpha + \beta_1 x_{t}^{BT} + \beta_2 w_{t}^{NTT} + \gamma y^{S\&P\ 500} \]  

(Equation 5.12)

In the second test, AT&T is dependent and NTT, BT and S&P 500 share index are independent variables. It indicates that AT&T is more related to its own S&P 500-share index than to NTT and BT according to the table (5.29) result. The statistical figures show the results:

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>T Statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTT</td>
<td>0.105531</td>
<td>1.61714</td>
<td>0.1076</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>0.164224</td>
<td>2.04989</td>
<td>0.0419</td>
<td></td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>0.733528</td>
<td>4.88064</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>25.9015</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>24.6384</td>
</tr>
<tr>
<td>F-Ratio</td>
<td></td>
<td></td>
<td></td>
<td>20.51</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
<tr>
<td>Durbin- Watson statistic</td>
<td></td>
<td></td>
<td></td>
<td>(P=0.3480)</td>
</tr>
</tbody>
</table>

There is no indication of serial autocorrelation in the residuals, because the P-value of the Durbin-Watson is 0.3480, which is greater than 0.05.

Given the P-value in the ANOVA table of 0.0000, which is less than 0.01, there is a statistically significant relationship overall at the 99% confidence level.
5.9.4 The third test

Taking this formula for NTT

\[ Y_t^{NTT} = \alpha + \beta_1 x_t^{BT} + \beta_2 w_t^{AT&T} + \gamma y^{NIKKEI} \]  
\[ \text{(Equation 5.13)} \]

In the third test, NTT is dependent and AT&T, BT and Nikkie Exchange share index are independent variables. It appears from the third test’s result that NTT is more related to its own stock market index than to AT&T and BT. The statistical figures show the results:

Table 5.30: Third test result of multiple regression using NTT as a dependent variable

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>T Statistic</th>
<th>P-value</th>
<th>Overall results</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>0.0654153</td>
<td>0.960453</td>
<td>0.3381</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.118463</td>
<td>1.88975</td>
<td>0.0604</td>
<td></td>
</tr>
<tr>
<td>Nikkei</td>
<td>0.926095</td>
<td>10.8323</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>46.1457</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>45.2277</td>
</tr>
<tr>
<td>F-Ratio</td>
<td></td>
<td></td>
<td></td>
<td>50.27</td>
</tr>
<tr>
<td>P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0000</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td></td>
<td></td>
<td></td>
<td>(P=0.1723)</td>
</tr>
</tbody>
</table>

The P-value of the Durbin-Watson statistic is 0.1723, which is greater than 0.05, which indicates that there is no indication of serial autocorrelation in the residuals.

On account of the P-value in the ANOVA table of only 0.0000, which is less than 0.01, there is a statistically significant relationship overall at the 99% confidence level.
5.9.5 Overall conclusion

Hypothesis 3 states that in a global market, company performance is related more closely to the sector (i.e. other respective companies) than to each respective stock market. In concluding whether or not our three telecoms companies are related to their own stock market indices, the writer observes that these companies are more strongly related to their own stock market indices than to each other. The hypothesis is rejected.

5.10 Which one performs better?

5.10.1 Introduction

In order to investigate the financial performance of the examined telecoms companies to find, which one of the companies performs better than the others, a summary statistics are needed to be provided in order to show the whole picture.

Table 5.31: Summary statistics of the three companies

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Average</th>
<th>Variance</th>
<th>Standard Deviation</th>
<th>Std. Skewness</th>
<th>Std. Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>180</td>
<td>0.00667953</td>
<td>0.00672237</td>
<td>0.08199</td>
<td>-1.88492</td>
<td>2.75964</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>180</td>
<td>0.00629954</td>
<td>0.00762761</td>
<td>0.0873362</td>
<td>-1.24261</td>
<td>6.1707</td>
</tr>
<tr>
<td>NTT</td>
<td>180</td>
<td>-0.00847566</td>
<td>0.00840765</td>
<td>0.0916932</td>
<td>6.57396</td>
<td>10.4054</td>
</tr>
</tbody>
</table>

Table (5.31) shows that BT has a better average level of performance than AT&T and NTT and with a smaller a standard deviation. In a Markowitz (1959) sense it is mean-variance efficient. On the normality issue, BT is more closely normally distributed than the other two because the standard kurtosis is 0.76 above the critical value of 2, whereas for AT&T it is larger at almost 4.0 above the 2, and NTT’s more than 8.0 above the 2 threshold.
5.10.2 Observation

Table (5.31) shows that BT performs better than both AT&T and NTT with a close link between AT&T and BT. This might suggest that both of these markets are almost alike. The earlier test for downside risk showed that BT is generally better than the other two companies.

5.10.3 Conclusion

It has been demonstrated that BT has outperformed both AT&T and NTT, but with only a slight margin over AT&T.

5.11 Overall conclusion and comment on previous chapters

The previous chapters 4 and 5 examined the financial performance of telecoms companies in privatised and non-privatised groups. Chapter 4 examined telecoms companies in a global sense where the most important privatised telecoms companies in Asia, Europe, Canada and Australia, and non-privatised telecoms companies from USA, Canada and Japan were tested. The results showed no statistically significant differences in performance between privatised and non-privatised groups, although there were significantly different betas in the ANOVA test.

In the multiple regression tests, in which the standard deviation in performance (and not beta) proved to be a critical factor affecting overall performance, there were no significant differences between privatised and non-privatised groups.
Chapter 5 examined three of the most important telecoms companies in the telecoms industries worldwide. The results showed that these three telecoms companies are related to each other in their financial performance over the same period and react the same way to external events. Thus, hypothesis 2 was confirmed. Despite this, and more importantly, the results also show that the extent to which these telecoms companies are related to each other is less than the impact of local market conditions upon individual company performance. Hypothesis 3 was rejected. In the industry effects section 5.2, the stock market indices are more related to the macroeconomic conditions within the national market rather than reflecting the performance of the industries individually. Capital flows within the economy from savings into investments are subject to investor sentiment, which arises from the overall optimism or pessimism about share values. The results of the study on the industry effects agree with previous research (see Solnik, 1974; Grinold at al, 1989; Heston and Rouwenhost, 1994 and 1995; Griffin and Karolyi, 1998). Although, some studies suggest a stronger role for the industry effects (Baca et al, 2000). This does not appear to apply to the telecoms sector. Therefore, any game play polices that may be enacted in order to gain advantage viz-a-viz their competitors are not as influential as local financial markets.

In the next chapter (6), the competitive advantage model will be empirically used, which was introduced by Pointon (2002b). The assumptions in this model will be derived from the original formula of this concept, which will be supplied. AlShafi’s method is a new method derived from Pointon’s formula, by which it will examine the financial performance of the three telecoms companies (BT, AT&T and NTT).
A further examination of the degree to which these three telecoms companies have competitive advantage over each other will be tested. Additionally, from the stakeholders’ perspective, the WACC will be tested using the dividend growth model and the year-ahead earnings model instead of using the CAPM. This analysis is in fulfilment of the second issue in the thesis: part (c) the degree of competitive advantage.
Figure 5.1: BT’s Normal Distribution Plot

Normal Probability Plot

Log of Returns
Figure 5.2: NTT's Normal Distribution Plot
Figure 5.3: AT&T’s Normal Distribution Plot

Normal Probability Plot

Log of Returns

percentage

0.1 1 5 20 50 80 95 99 99.9

-0.34 -0.14 0.06 0.26 0.46
Chapter Six: Analysing the Dynamics of Competitive Advantage in Telecoms
Chapter Six: Analysing the dynamics of competitive advantage in telecoms

6.1 Introduction

For decades, telecoms services have been provided by a secure monopolist, i.e. a state enterprise in most of the world, and a private regulated corporation ((AT&T) and the Bell Corporation in the United States). The absence of competition was motivated by the existence of large fixed costs (land lines) in all parts of the network, whose duplication was either prohibitively expensive or socially undesirable; the telecoms industry was deemed to be a “natural monopoly” (Laffont and Tirole, 2000:3). So, the competition in telecoms provides a conceptual apparatus for thinking through the key issues facing the new competitive environment.

Over the last ten years in the economics literature, the concept of competence (economic capability) has emerged as a central concept for competitive strategy. Several rich theoretical streams have contributed an extensive array of frameworks, definitions and papers using this concept. The practical importance of the competitive advantage concept is a firm’s endurance through difficult times, a valuable characteristic, and the most frustrating challenge for competitors that do not acquire such a prized asset. The source of these advantages lie in a firm’s competences, which exist within the firm and are important at the product/market interface where firms typically compete (Bogner and Thomas, 1999:275).

Meaningfully, the contestability (competition in the market) market is a market that enjoys competitors and the companies in that market feel free to compete with each other. The state-owned telecoms companies have a monopoly situation even after the privatisation process. Although the governments are aware of the problems that might be caused by the
lack of competition, they are more concerned about the success of the process and the proceeds of the privatisation, which takes these companies ‘off their backs.’ Many economists have emphasised the importance of the level of competition (Schotter, 2001; Taylor, 1995; Pindyck and Rubinfeld, 2001).

There is a considerable amount of literature in current economic texts, which relates to the contestability of markets. Von Neumann teamed up with Oskar Morgenstern and named their subject “the theory of games” to draw an analogy between games such as chess, poker, backgammon and others, with that of business decisions and the handling of uncertainty, risk and competition (Emett, 1997; Fred, 1997; Anderson, Sweeney and Williams, 1998).

Competition is at the core of the success or failure of firms. According to Porter (1985:1) competition determines the appropriateness of a firm’s activities that can contribute to its performance, such as innovations, a cohesive culture, or good implementation of strategy. Competitive strategy is the search for a favourable competitive position in an industry, the fundamental arena in which competition occurs. Competitive advantage aims to establish a profitable and sustainable position against the forces that determine industry competition.

In 1983, John Moore- the UK Financial Secretary, concluded that:

"The long-term success of the privatisation programme will stand or fall by the extent to which it maximises competition" (Moore, 1983).

However, competition is a common market structure that has very desirable properties, so it is useful to compare other market structures to competition. Economists say that a market is competitive if each firm in the market is a price taker: a firm that cannot significantly affect the market price for its output or the prices at which it buys its inputs (Perloff, 2001:224).
For Beesley and Littlechild (1983) competition is seen as the most important mechanism for maximising consumer benefits, and limiting monopoly power. In essence it is rivalry and freedom to enter the market.

Littlechild (1983) stated that:

"Competition is indisputably the most effective means—perhaps ultimately the only effective means of protecting the consumer against monopoly power."

Competence in corporate performance plays an importance in creating sustainable competitive advantage (Leonard-Barton, 1992; Prahalad and Hamel, 1990; Teece, Pisano and Schuen, 1997).

Porter’s contribution to the competitive advantage arises from his seminal works on the concept of national advantage (1990), in which there is a cross study of nations identifying their comparative advantages. His second work on competitive advantage identifies the five key characteristics, which demonstrates organisation and market strengths needed for superior performance (Porter, 1985, 1990 and 1998). He indicates that the value chain is the basic tool for understanding and knowing the competitive advantage. The value chain disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and the existing and potential sources of differentiation. A further discussion of the competitive advantage can be seen in section 6.6.

Porter’s (1985:26) competitive advantage describes the way a firm can choose and implement a generic strategy to achieve and sustain competitive advantage. It addresses the interplay between the types of competitive advantage-cost and differentiation-and the scope of a firm’s activities.
While the approach in the literature seems to be drawn from the internal management perspective, in this thesis, competitive advantage will be inferred from external market data (see chapters 3 and 6). It is for this reason that another model of competitive advantage will be employed later in this chapter, which focuses more on stock market returns.

Technological change is one of the principal drivers of competition. It plays a major role in industry structural change, as well as in creating new industries. It is also a great equaliser, eroding the competitive advantage of even well-entrenched firms and propelling others to the forefront. The rate of technological change will be embodied in the analysis that follows, affecting the time period of superior rate of return.

Because of the importance of the competition concept in the telecoms competitive sector, it has been decided to examine the competition situation for the three companies, for which each one of them has a different market structure in the competition policy procedure. BT was privatised in 1984 and the telecoms market in UK was liberalised in the 1991 after the duopoly review. BT situation in the UK market can be classified as an oligopoly. NTT is a monopolistic company in the Japanese telecoms market and the Japanese government still retains more than 50 per cent of the company as of today. AT&T is a company that has a near perfect competition and has been private always.

However, it was found the competition category for each one of the examined companies interesting and useful for the study of the telecoms market in measuring the competitive advantage in these three companies. A company who holds a monopoly privilege would automatically hold a competitive advantage over the others. So, the three examined companies have different competition levels, even though both BT and NTT are almost alike because they are privatised companies and they came from a state-owned environment. It is important to examine whether or not the privatised companies would
have a competitive advantage over the private-based one and that is because of the possible monopoly situation.

This chapter will introduce a new method called the competitive advantage model approach, which has been introduced recently by Pointon (2001, 2002b), and the importance of this method is to examine the strength and the sustainable growth of a company. More precisely, the new method will indicate, in years (N), how many years a company can earn superior returns and sustain its future growth within an environment of technological uncertainty. A new formula (Pointon, 2001) has been used in applying the competitive advantage model, and a new approach has been introduced following from Pointon’s formula to examine the competitive advantage model for BT, AT&T and NTT. To operationalise Pointon’s formula, a new method will be introduced called Al Shafi’s method, and this new method might not be suitable for other industries or different companies in different sectors.

The introductory part of this chapter explains what the reader will expect from this chapter, and what techniques will be used in the rest of this chapter. More importantly, it will highlight some methods that have been used in measuring the cost of equity and the cost of debt. The new approach will be presented for the first time in this thesis.

Table (6.1) is presented in detail to show the calculation of each method of the cost of equity and the cost of debt, and it will show how and where some of these figures are generated. Each method will have a narrative and formulas.

The three telecoms companies will be examined, BT, AT&T and NTT. This chapter is the continuation of the analysis of financial performance from the previous chapter and more precisely chapter five, where these three companies were examined.
6.2 The hypotheses

In part fulfilment of hypothesis 1:

**H4:** In terms of competitive advantage, NTT exhibits through time a superior position compared with BT and AT&T on account of its monopoly position.

**H5:** Of the three global players, AT&T is more adversely affected, in its competitive advantage position, by the other two companies on account of its having a weaker monopoly position.

6.3 Estimating the cost of equity

Table (6.1) presents the important factors in calculating the cost of equity. Each one of these factors will be discussed to show how it can be calculated.

**Table 6.1: Critical Factors**

<table>
<thead>
<tr>
<th>Dividend Yield %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasted DY Growth</td>
</tr>
<tr>
<td>Dividend Yield + Growth</td>
</tr>
<tr>
<td>Earnings Yield (1/PE)</td>
</tr>
<tr>
<td>Competitive market model of earnings</td>
</tr>
<tr>
<td>Actual earnings (EPS)</td>
</tr>
<tr>
<td>Forecasted earnings (EPS)</td>
</tr>
<tr>
<td>Share price</td>
</tr>
<tr>
<td>Year ahead earnings Yield</td>
</tr>
<tr>
<td>Risk free rate</td>
</tr>
<tr>
<td>Risk premium</td>
</tr>
<tr>
<td>Beta</td>
</tr>
<tr>
<td>CAPM</td>
</tr>
<tr>
<td>Competitive advantage model</td>
</tr>
</tbody>
</table>
The cost of equity capital is the rate of return, which investors require from their investments in equity capital. It is an important variable in company valuation, in actuarial pension calculations, in capital budgeting, in performance target setting and in rate of return regulations (O’Hanlon and Steele, 2000:1051).

6.3.1 Dividend yield %

Dividend yield is the expected dividend divided by the current market price of a share of stock (see, for example, Mills and Robertson, 1999:141). The calculation of the dividend yield, using the year-ahead dividend and the current price, is:

\[
\text{Dividend yield} = \frac{D_1}{P_0} \quad \text{(Equation 6.1)}
\]

where:

- \( D_1 \) = Dividend per share in one year’s time
- \( P_0 \) = current market price of share

The dividend yield for the firm can be considered as a factor in calculating the cost of equity. Some financial analysts use the dividend yield to examine the cost of equity of a firm (Barker 1999b). McLaney et al (1998) selected around 200 companies from the London stock market, and found that more than 27.5 per cent of company executives use the dividend model, with or without a growth factor to estimate the cost of equity. By comparison, Al-Ali and Arkwright (2000) sampled the largest UK companies by turnover, and they found that 21 per cent used a dividend valuation model (DVM).
6.3.2 Forecasted DY growth

The forecasted dividend growth relates to the growth in dividend next year. The next year growth is estimated by forecasting from the previous years. If one knows the actual dividends for a number of years, then the next year’s forecast can be estimated. Different techniques can be used to calculate the forecasted growth, but a specific method has been applied in this thesis.

The method used here is based on time-series applying a random walk with drift model to forecast the dividend yield growth (see, for example, Dixit and Pindyck, 1994). The study period starts from 1985 to 1989 in order to forecast 1990, and then the actual dividend yield for 1990 has been added to the period to forecast the 1991 dividend yield, and so on.

6.3.3 Dividend growth (g)

If the firm does not have any growth prospects, the dividend yield will be one way of estimating the cost of equity, but if a firm generates some growth, it would be better to estimate the dividend yield plus the dividend growth. The growth rate is the expected rate of change in dividends per share (Besley and Brigham, 2000:301).

However, if the dividend yield has been used individually without anticipating the growth, it might underestimate the cost of equity if a firm intends or expects to pay higher dividends in the future (Pointon, 2002b:24).

The expected rate of return on a common stock that an individual stockholders expects to receive is equal to the expected dividend yield plus the growth factor, g, and so the formula for the cost of equity, $K_e$, is:
\[ K_e = \frac{d_1}{p_0} + g \]  

(Equation 6.2)

This implicitly assumes perfect capital markets and sustainable growth, in which case the capital gains yield is identical to the dividend growth rate. The model is known as the Gordon growth model (Gordon, 1962; Gordon and Shapiro, 1956), although it was also derived by Williams (1938)).

### 6.3.4 Earnings yield

The formula for the price-earning ratio is:

\[ PE = \frac{P_0}{e_0} \]  

(Equation 6.3)

where:

- \( P_0 \) = the market price of share
- \( e_0 \) = current earnings per share

This is the original formula for PE, but to be consistent with a cost of equity formulation in calculating the earnings yield, the formula must be:

\[ \text{Earnings ahead yield} = \frac{1}{(P_0: e_0)} \]  

(Equation 6.4)

According to Barker (1999a), both the price-earnings ratio (PE) and the dividend yield model are two popular approaches to share valuation.

Barker (1999a) presents evidence from questionnaire and interviews with analysts, that the price-earnings ratio is used for valuation purposes in services, and industrial and consumer goods sectors, whereas the dividend yield is applied in the financial and utilities sectors.
The price-earnings ratio is a popular parameter for providing an initial estimate of the cost of equity. A price-earnings of 10 would suggest that the earnings per share are one-tenth of share price.

6.3.5 Competitive market model of earnings

In this section, an indirect competitive market model of earnings is used in the discussion leading to the competitive advantage model. The key assumption in the model is that the firm earns the required rate of return on equity with a zero net present value on retentions. The reason for this is that if there were perfect competition in products and services, the rate of return generated would be the competitively determined equity cost of capital.

Hence, the firm can expect to earn its cost of capital in the sense of a perfectly competitive market for its goods and services. The formula to calculate the competitive market model for the cost of capital is (see Pointon, 2002b:10):

\[ K_e = \frac{k_v}{1 - bk_v} \]  \hspace{1cm} (Equation 6.5)

where:

\( k_v = \) PE inverse

\( b = \) the retention ratio, and it can calculated as \( = \frac{(PAT-Div)}{PAT} \)

where; \( PAT = \) profit after tax

\( Div = \) total in value £ of payable dividends

\( d_1 = e_1 (1-b) \)

The proof of the formula proceeds as follows:

\[ K_e = \frac{e_1 (1-b)}{P_0} + bk_e \]  \hspace{1cm} (Equation 6.6)

\[ K_e (1-b) = \frac{e_1 (1-b)}{P_0} \]

\[ K_e = \frac{e_1}{P_0} = \frac{e_0 (1+bk_e)}{P_0} \]

\[ K_e P_0 = e_0 + e_0 bk_e \]

\[ K_e (P_0 - e_0 b) = e_0 \]
\[ K_e = \left( \frac{e_0}{P_0} \right) / \left[ 1 - b_{e_0}/P_0 \right] \]

\[ K_e = k_v / (1 - b_k_v) \]

6.3.6 Actual earnings (EPS)

The formula of EPS:

\[ \text{EPS} = \frac{e}{n} \]  

(Equation 6.7)

\( e = \text{profit attributed to shareholders} \)

\( n = \text{number of shares} \)

Shapiro and Balbirer (2000) argue that firms with good investment opportunities retain more earnings. Lamont (1998) found that, in exploring dividend payout ratios from 1947-1994, both earnings and dividends contain information content concerning expected returns.

By contrast, earnings are more important than dividends, in multinational share price determination, depending upon the investment opportunity set of the firm, as measured by a factor score of the earnings to price ratio, the market to book value of assets and the market to book value of equity (Riahi-Belkaoui and Picur, 2001).

6.3.7 Forecasted earnings

Forecasted earnings are needed for the year-ahead earnings yield method. The random walk with drift method has been implemented to calculate the forecasted earnings (Dixit and Pindyck, 1994). The same calculation method for forecasted dividend yield has been applied to calculate the forecasted earnings. The reason for using only 1 year's of earnings, is that the model requires only \( e_1 \).
6.3.8 Year ahead earnings Yield

The year-ahead earnings yield will indicate the forecasted earnings for the next year, scaled by the current share price. The forecasted earnings will be divided by the share price. The formula of the forecasted earnings yield is:

\[
\text{Year-ahead earnings yield} = \frac{e_t}{p_o}
\]

(Equation 6.8)

\[
e_t = \text{forecasted earnings per share}
\]

\[
p_o = \text{the market price of the share}
\]

Claus and Thomas (1997) use an earnings forecast to calculate the equity risk premium (see the methodology chapter 3 for more details).

The year-ahead earnings will be used as a component when calculating the competitive-advantage cost of capital and this model will be the key aspect of this chapter. The competitive advantage approach will be discussed later.

6.3.9 Risk free rate

Investors in shares require a return, which provides for two elements. First they need a return equal to the risk free rate (usually taken to be that on government securities). Second, there is the risk premium (to be discussed later), which for the individual company rises with the degree of systematic risk. The risk-free rate gives a return sufficient to compensate for both impatience to consume and inflation (Arnold, 1998:708).
The risk free rate is a part of the calculation of the capital asset pricing model (CAPM), and the risk free rate differs in an international dimension.

The government’s 10 year bond yield is used as a surrogate for the risk free rate. For instance, for the UK the 10 year rates for gilts have been used to calculate the risk free rate.

6.3.10 Risk premium

The single most important contemporary issue in finance is the perhaps equity risk premium. The risk premium is the expected reward for bearing the risk of investing in equities, rather than in low-risk investments in such as bills or bonds and is usually estimated from historical data (Dimson, Marsh and Staunton, 2000:1).

Risk premium is measured in one of two ways. It is the overall market portfolio equity rate of return over the surrogate risk free rate. The first way uses treasury bills (short term, default-free, fixed income government securities) as the risk-free or safe benchmark. The second way measures the risk premium relative to long-term government bonds (see Dimson, Marsh, and Staunton, 2000:8).

The risk premium is probably the most important factor in calculating the CAPM equity cost of capital. Internationally, every country has a different risk premium, which, indeed, needs some refining if the right risk premium to be used properly.

Many studies have showed different risk premium estimates. Claus and Thomas (1997), using earnings forecasts and a growth model within a residual income-based valuation framework, suggested that the equity risk premium in UK, US and other developed markets is in the region of 3% (for the abnormal earnings model).
Jenkinson (1994), using the dividend growth model, estimates that the UK equity risk premium is 4%. The UK competition authorities appear to have adopted an assumed equity premium in the range 3.5% to 5% (MMC, 1996, 1997a, 1997b, and 1999).

Other studies have estimated the UK risk premium to range from 4% to 5% (Omran and Pointon, 2002). Buckley (1999) estimates the UK risk premium to be 3% to 5%, whereas other studies in the US have similar results as in the UK (McKinsey et al. 2000). The risk premium ranges from 4.5% to 5.0%, whereas other US studies have a higher risk premium than the UK estimate (Ibbotson, 1998). It is estimated that the equity risk premium of 8.2% to 8.5% in the US. As mentioned earlier, the calculation of risk the premium is a part of the CAPM calculation (see equation 6.9).

6.3.11 Beta (β)

According to Jenkinson (1999:115) the beta is the estimate of the (undiversifiable) risk of the particular equity used by Sharpe (1964).

Besley and Brigham (2000:201) explain that the beta factor measures the stock volatility relative to an average stock (or the market).

According to Davies et al. (1999:16) the beta of the firm’s equity summarises how, on average, the market perceives the firm will react to changes in growth and other broad economic movements, and it is a measure of how the firm’s equity is expected to react to movements in the average level of the market, and a beta of zero indicates that the firm has no market-related element of risk.
A larger beta implies that on average the share is more sensitive than the market. In general terms, a beta of 1 indicates that the share generally moves with the overall market by the same proportion.

For example, if a market increases or improves by 8%, then a share with beta 1.2 would expect to improve by \((1.2 \times 8\%) = 9.6\%\), which is higher than the market level. Interestingly, if the beta is low, for instance 0.85, and the market improves by 4%, then the share would be likely to rise to \((0.85 \times 4\%) = 3.4\%\), lower than the market level. It highlights how beta is an important factor in determining the share movement and performance.

Beta is a very important factor in the calculation of CAPM, and the beta level will reflect the increase and decrease of the CAPM rate, but Pointon (2002a) argues that the beta level does not affect the CAPM rate as much as the risk premium rate does. The formula for beta in CAPM is calculated by multiplying beta by the risk premium and adding the result to the risk free rate to get CAPM (see equation 6.9).

6.3.12 CAPM

The Capital Asset Pricing Model (CAPM), for which Sharpe (1964) received a Nobel prize in 1990, is used to determine the price of risky assets such as equities. Both the riskless rate of return and the equity risk premium are exogenous parameters, and because of this, in common with other models, CAPM is essentially static in nature and considers investors arranging their portfolio such that they are mean variance efficient at a single point in time (Jenkinson, 1999:115). CAPM provides a relevant equity cost of capital measure if investors hold a very widely diversified portfolio. The CAPM is used because it is well known model.
CAPM has influenced the calculation of the cost of capital for a firm, or to express it another way, the required rate of return on projects. By providing a target figure of the return required by shareholders, the CAPM has enabled management to vary the discount rate by which project cash flows were discounted, depending on the perceived level of systematic risk defined by beta (Arnold, 1998:285).

The CAPM calculation is part of the competitive advantage model of this chapter. CAPM is one of the three factors that will be used to calculate the cost of equity in the calculation of competitive advantage and in the cost of capital calculation as well.

The formula of CAPM is:

\[ r_e = r_f + (r_m - r_f) \beta \]  

(Equation 6.9)

where:

- \( r_e \) denotes expected equity returns
- \( r_f \) is the riskless rate of return (risk free rate)
- \( r_m \) is the expected return on the market portfolio
- \( \beta \) is the systematic risk measure.

Even taking account of the shortcomings of the CAPM as a static model (see Campbell and Cochrane, 1999), it still remains a standard tool for estimating the cost of capital, see the methodology chapter 3 for more details of CAPM.

6.4 Estimating the cost of debt

The cost of debt capital is the current market rate of return for a risk class of debt. According to Mills and Robertson (1999:377) the cost of debt is the rate of return that debt-holders require to hold debt. The cost of debt has two elements in calculating the debt:
6.4.1 Cost of debt before tax

The yield to maturity rate for the debt must be calculated, often by drawing on the principles of discounted cash flow analysis and particularly the internal rate of return (IRR). The maturity of this debt depends on the type of debt and currencies relating to this debt.

Multinational companies such as telecoms companies would have a very wide range of borrowings and different maturity dates. Meanwhile, the corporate bonds yield is used extensively in calculating the debt yield.

The after tax cost of debt \( k_{at} \) is simply the interest rate on debt after tax.

The formula for debt after tax is estimated by

\[
K_d (1-T_c) \quad \text{(Equation 6.10)}
\]

where: \( k_d = \) is the maturity yield of the loans (use of corporate bond yield); or the bondholders’ required rate of return.

\( T_c = \) the marginal tax rate

\( (1-T_c) = 1 \) minus the marginal corporate tax.

The after tax cost of debt is used because the value of the firm’s equity and debt depend on the after tax cash flows. The bond value is calculated as:

\[
\text{Bond value} = \sum_{t=1}^{N} \frac{\text{INT}}{(1+k_d)} + \frac{M}{(1+k_d)^N} \quad \text{(Equation 6.11)}
\]

where:

\( \text{INT} = \) is the sterling (say) coupon interest paid per period

\( M = \) is the face value repaid at maturity

\( N = \) is the number of interest payments remaining until maturity
6.4.2 Marginal tax rate

The marginal corporate tax rate is the rate that is applied to the company's last earned slice income.

The calculation of the marginal tax effect is \( (1 - T_c) \) \( \text{(see equation 6.10)} \)

where:

\[ T_c = \text{is the marginal tax rate.} \]

After the estimation of both the cost of equity and the cost of debt components of the cost of capital, the calculation of cost of capital will be presented in the next section.

6.5 Weighted Average of Cost of Capital (WACC)

The weighted average of cost of capital (WACC) procedure has three steps. These three steps are explained in an early discussion. A figure 6.1 of the three steps are displayed below:

**Figure 6.1: WACC steps**

The estimation of both the first step and second step are presented already, and the third step is the value of debt and the value of equity according to the overall value of the firm.
The weighted average cost of capital (WACC) is the expected return on a portfolio of all
the company's securities and is used in capital budgeting decisions to find the net present
value of projects that would not change the business risk of the firm (Brealey and Myers,
2000:484).

The formula to calculate the weighted average cost of capital is:

\[ k_o = K_e \left( \frac{S}{S+D} \right) + i \left( \frac{D}{S+D} \right) \]  

(Equation 6.12)

where:

- \( k_o = \) WACC
- \( k_e = \) the cost of equity.
- \( S = \) the equity value in £
- \( S+D = \) the equity value in £ plus the debt value in £
- \( i = \) the cost of debt

Different approaches will be used to calculate WACC. The CAPM, the dividend growth
model and the PE inverse method will be used to calculate the cost of equity component of
the WACC. The corporate bonds yield will be used to calculate the cost of debt. Before
multiplying the result by one minus the marginal tax rate to arrive at the after-tax cost of
debt.

The calculation of WACC for the three companies will be provided in a table (see tables
6.28-6.30 at the end of this chapter) and some illustration of the calculation will be
presented in a later discussion. The next section will be entirely devoted to a discussion of
the competitive advantage model, which is the main key theme of this chapter.
6.6 Competitive advantage model

6.6.1 Introduction

Some competitive advantage can be seen clearly in the main telecoms companies, where most of them, if not all, hold a high market share and a private or public monopoly of networking and services. A good example is BT, where today, more than 50 per cent of the market share is held by them in the UK. BT has a private monopoly of the networking and the rule of regulator (OFTEL) is trying to shrink this monopoly through putting a cap on the prices charged and to regulate its behaviour.

Because of the importance of competitive advantage, it is important for the calculation of the equity cost of capital to reflect competitive advantage. Such a model will be used all through this chapter and applied to three important telecoms companies, namely BT, AT&T and NTT.

The competitive advantage model has been used for the first time, and the importance of this model and its formula has been introduced by Pointon (2002b). The assumptions behind Pointon’s model (2001, 2002b) are:

I. There is a constant retention ratio, \( b = (E-D)/E \).  

(Equation 6.13)

Assumption 1 is identical to the retention assumption in the famous Gordon Growth Model (1962). When the period of competitive advantage comes to an end, as explained in assumption 5, it makes no difference to the cost of equity what level the retention ratio takes. The reason for this is that the factor \((1-b)\) cancels out in the derivation as given in the preceding section on the competitive market model of earnings (section 6.3.5). Clearly, until the period of competitive advantage ends, the value of the retention ratio parameter is important. In later simulations, a period of competitive advantage for a given retention
ratio has been predicted. However, each prediction uses a different retention ratio according to the empirical observation. The consequential periods of competitive advantage are given in chart form (see chart 6.1).

II. During the period of competitive advantage the trend in the rate of return on the equity-financed portion of reinvested funds is equal to a constant rate $r$.
Assumption 2 refers to a position of the competitive advantage in which the company earns a rate of return superior to the cost of equity. Once again this is another identical assumption to the Gordon Growth Model (1962). However, the difference between the models in this regard is that in the competitive advantage model, the period, during which a super-normal rate of return is earned, is finite. This may be a proper choice for a quasi-monopoly.

III. During the period of competitive advantage, the earnings follow a geometric Brownian motion with a growth trend $br$ and instantaneous variance $\sigma^2$.
Assumption 3 is the assumption of a geometric Brownian Motion (after Robert Brown a botanist around 1910), which follows the principle that increments in the share price are log-normally distributed. This means that the log of the share price follows a normal distribution. This same assumption is also inherent in the famous Black-Scholes option-pricing model (1972). If we exclude any growth trend, then the implication is that share price increments are unpredictable. There is some evidence, however, that the extreme values of log share price increments have ‘fatter tails’ than those suggested by a strictly normal distributions (Harris and Kucukozen, 2001). Nevertheless, the approximation may be reasonable at least for comparative purposes.
IV. Competitive advantage remains for an exponentially distributed period of time, of mean $N$, which implies a Poisson jump representing the rate of competitive change with mean $\lambda = 1/N$.

Poisson jumps have been used in other financial contexts. For example, in tax risk (Pointon, 1998), technological change (Boston and Pointon, 1999), take-overs (Pointon, 1997), and other examples are given in (Dixit and Pindyck, 1994). It is well known that the period until a Poisson jump occurs follows an exponential distribution (see, for example, Wagner, 1969). The Poisson jump represents a random switch from a position of competitive advantage to one of perfect competition. It could be argued such a switch does not occur so precisely, although in a highly technological environment it may be a reasonable approximation.

V. When the competitive change occurs, the mean rate of return on the equity financed portion of reinvested funds switches from $r$ to the true cost of equity, $k_e$.

As argued under assumption 2, a position of competitive advantage implies a superior rate of return on retentions, denoted $r$, which would exceed a normalised rate of return equal to the cost of equity capital, $k_e$. In a truly competitive environment, the firm should not expect to earn on its retentions an amount in excess of the cost of equity, otherwise it would expect to generate positive net present values. By contrast a zero net present value is consistent with perfect competition. A parallel argument would suggest that under CAPM, for example, prices are such that excess returns are eliminated.

The lambda ($\lambda$) in the model below expresses the rate of technological change as it affects the competitive advantage position. Basically, this factor is the 'unknown' parameter that is solved by the model.
Pointon's model (his Appendix A) shows that:

\[ K_e = \frac{\lambda k_3}{k_e} + k_1 - \lambda \]  \hspace{1cm} (Equation 6.14)

In which case

\[ N = \frac{1}{\lambda} = \frac{(k_e - k_3)}{(k_1 - k_e)} / k_e \]  \hspace{1cm} (Equation 6.15)

where: \( N \) = the period of competitive advantage \((1/\lambda)\); and where

\( \lambda dt \) is a random probability of a switch in competition during time \( dt \).

\( k_e \) = true cost of equity

\( k_1 \) = upper estimate (Dividend-growth based)

\( k_3 \) = lower estimate (PE inverse)

Pointon’s model (2001) uses the dividend-growth model as an upper estimate, and the PE inverse as the lower estimate. However, Pointon (2001) does not consider CAPM. Now, the \( K_e \) is the true cost of equity consisting of three factors, which can be estimated from:

\[ K_e = \frac{k_1 + k_3 + k_{CAPM}}{3} \]  \hspace{1cm} (Equation 6.16)

Which is a simple average of the three individually determined estimates.

### 6.6.2 Adaptation of the competitive advantage model

However, for the three telecoms companies, it is the CAPM, which produces an upper estimate. But, if the growth rate in the dividend model were sufficiently high to make the cost of equity consistent with the CAPM rate, then that growth rate is likely to be unsustainable. So, \( k_1 \) can be reinterpreted as the cost of equity based on the year-ahead dividend yield plus the rate of capital growth implied by CAPM rather than dividend growth.
The main reason for adopting the CAPM data in the model, was that the dividend data suggested by Pointon’s model proved to be somewhat eclectic. The NTT’s dividend distribution was well below any scale for comparison with other telecoms companies, reflecting the Japanese market which has, over the past ten years, been seriously distorted by the general economic performance of the Nikkei registered companies. The CAPM data gives a better reflection of the relative efficiencies between the major telecoms competitors without undue reliance on dividend expectations, which differs considerably between countries.

In theory, the two models, CAPM and the dividend growth model, should give the same results. If the CAPM-derived cost of equity is realised on the stock market, then the capital gains yield, G, would be given by the overall return less the dividend yield component of that overall return:

\[ G = \left[ r_t + (r_m - r_f) \beta \right] - \frac{d_t}{p} \]  

(Equation 6.17)

Where \( \frac{d_t}{p} \) is the dividend to price ratio, i.e. dividend yield. If the price is correctly evaluated by the market, then the capital gains yield should equal the dividend growth rate:

\[ G = K_e - \frac{d_t}{p} \]  

(Equation 6.18)

\[ K_e = \frac{d_t}{p} + G \]  

(Equation 6.19)

\[ = \frac{d_t}{p} + g, \text{ if correctly priced, as argued by Pointon (2002b:35), where} \]

\[ G = \text{the capital gains yield} \]
\[ g = \text{the dividend growth rate} \]
\[ d_t = \text{dividend per share on the end of year one} \]
\[ P = \text{current share price} \]
\[ K_e = \text{cost of equity} \]
\[ r_f = \text{risk-free rate} \]
\[ r_m = \text{mean rate of return on efficient market portfolio} \]
\[ \beta = \text{beta coefficient} \]
However, a secondary reason for substituting CAPM for the dividend model is a survey by McLaney et al (1998) of nearly 200 UK companies, which revealed that firms that use CAPM state that their overall cost of capital is higher than that of firms that use a dividend model instead. This suggests that it is the CAPM model that would produce the higher cost of capital estimate rather than the dividend growth model in the original formula.

Hence, Al-Shafi’s method (2002) takes:

\[ N = \left( \frac{K_e - K_{\text{earnings}}}{K_{\text{CAPM}} - K_e} \right) / K_e \]  

(Equation 6.20)

where:

- \( K_e \) = the average of three factors;
- \( K_{\text{earnings}} \) = the year-ahead earnings-based cost of equity;
- \( K_{\text{CAPM}} \) = the rate using the CAPM.

Al-Shafi’s method has been derived from Pointon’s formula, and because of the telecoms industry situation, Al Shafi’s method has been constructed in a way that would suit the calculation of the competitive advantage model. Al Shafi’s method might not be suitable to other industries with a different structure from the telecoms industry.

Each of the three telecoms companies’ competitive advantage from applying the model will be calculated and the results of this calculation will be presented in a table (see tables 6.28-6.30 at the end of this chapter). A multiple regression test will be used to record some results of this test through using the figures of the competitive advantage model of each company, and a graph will be displayed and some comments will be provided.

Since the risk premium has been estimated differently according to previous studies, where some of these studies estimated the risk premium ranging from 3.5% to 5% (MMC, 1996); and Claus and Thomas (1997) estimated the risk premium of 3% for UK, USA and other
developed markets; and where Omran and Pointon (2002) agreed with O’ Hanlon and Steele (2000) that risk premium ranged from 4% to 5% in the UK, it has been decided to accommodate most of the studies and measure the CAPM using the range of 3% to 6% risk premium.

The results of each of the risk premium will be recorded and the competitive advantage model will be tested against all the range of risk premia. Various statistical tests will be used for each case and the results will be recorded in tabular and graphical form (for the calculation of competitive advantage, see tables 6.28-6.30).

6.6.2.1 Testing Al-Shaft’s model

6.6.2.1.1 Risk premium applied to the competitive advantage model

Hypothesis 4 states that in terms of competitive advantage, NTT exhibits through time a superior position compared with BT and AT&T on account of its monopoly position.

6.6.2.1.1.1 Competitive advantage of 4% risk premium

Table (see tables 6.28-6.30) of results is provided for each company on the basis of a 4% risk premium, and a graph of this comparison in terms of the implied period of competitive advantage is worth displaying in order to show the competitive advantage of each company over the others.
The competitive advantage chart (6.1) shows a historical story of the three telecoms companies. The chart indicates an early superior period of competitive advantage for AT&T over BT and NTT.

In 1991; 1993; 1995; and 1997 the competitive advantage is broadly similar for 3 companies. In 1996, there is divergence in relative competitive advantage. From 1990 to 1993, AT&T has superior competitive advantage; whereas from 1994 to 2000 BT has superior competitive advantage over AT&T and NTT. In 2001, there is a wide divergence in competitive advantage, where NTT > BT > AT&T.

Since 1996, AT&T has the lowest competitive advantage. BT has the highest competitive advantage, but in 2001 NTT took the lead from BT.

Now, can the passage of time, during which competition between BT, AT&T and NTT has existed, be predicted from the combined results from the individual periods of competitive advantage for each company?

For this reason (and somewhat unusually) time is treated as the dependent variable and the periods of competitive advantage of BT, AT&T and NTT as independent variables. If the answer is yes, then it will be instructive to consider future estimates of competitive advantage.
6.6.2.1.1.2 Durbin-Watson (DW) statistic test

First, let us test for serial autocorrelation, which could otherwise be causing a trend through time. The Durbin-Watson statistic tests the residuals to determine if there is any significant correlation based on the order in which they occur in our data file.

Using the risk premium of 4% in the estimates of the period of competitive advantage, the figures indicate that the Durbin-Watson’s P-value is 0.3000, which is greater than 0.05, so there is no indication of serial autocorrelation in the residuals.

The trend through time (measured by the chosen year) was regressed against the period of competitive advantage for each company. The R-squared result shows that 69% of the proportion of variation through time explained by the combined degree of competition (and the R-squared (adjusted) was 58.58). There is a statistically significant relationship between the variables at the 95% confidence level, because the ANOVA’s P-Value is 0.0176, which is less than 0.05.

6.6.2.1.1.3 Correlation matrix

The correlation matrix indicates if there is any correlation between the variables for the period of competitive advantage of the three companies.

**Table 6.2: Correlation matrix of 4% risk premium**

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.2460</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-0.1567</td>
<td>-0.1860</td>
<td>1.0000</td>
</tr>
</tbody>
</table>
There is no indication of the presence of a serious multicollinearity problem using the 4% risk premium, because there are no correlations with absolute values greater than 0.50.

6.6.2.1.4 Forecasted competitive advantage model (4% risk premium)

The random walk with drift method has been used to forecast the competitive advantage from 2002 to 2005 for the three companies.

Chart 6.2: Forecasted competitive advantage model of 4% risk premium

The forecasted competitive advantage model shows that both BT and NTT are increasing and have superior competitive advantage over AT&T. The forecasted figures indicate that AT&T will have a negative competitive advantage. NTT has superior competitive advantage over BT (NTT > BT > AT&T).

6.6.2.1.2 Competitive advantage model (5% risk premium)

Next, 5% has been used for the risk premium to calculate the time period of competitive advantage, and the results of this test are provided in a table for each one of the three telecoms companies. The chart (6.3) of the competitive advantage model is:
6.6.2.1.2.1 Comparison of the three companies

Chart 6.3: Competitive advantage of 5% risk premium

The competitive advantage model shows that in 1991; 1993; and 1995, the three telecoms companies have a broadly similar competitive advantage.

After 1995, there is a divergence in relative competitive advantage. From 1995 to 1999, BT has superior competitive advantage years since BT > NTT > AT&T.

From 1990 to 1993, AT&T has a better competitive advantage over BT and NTT. In 2000, there is a wide divergence in competitive advantage, where NTT has superior competitive advantage years over BT and AT&T. In 2001, NTT > BT > AT&T, indicating that AT&T since 1996 has the lowest competitive advantage.

6.6.2.1.2.2 Durbin-Watson statistic test

Since the P-value of the Durbin-Watson statistic is 0.1637, which is greater than 0.05, there is no indication of serial autocorrelation in the residuals.

The ANOVA’s P-value is 0.0116, which is less than 0.05, and so there is a statistically significant relationship between the variables at the 95% confidence level.
The R-Squared is 72.9887% and the R-squared (adjusted) is 62.8595%, which indicates a significant model with only 27% being explained by outside forces.

6.6.2.1.2.3 Correlation matrix

Table 6.3: Correlation matrix of 5% risk premium

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.6220</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.3390</td>
<td>0.6435</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

There are 2 correlations with absolute values than 0.5. The serious multicollinearity is present in BT versus AT&T and the second case is AT&T versus NTT. The deeply shaded areas show the problems.

As to AT&T, it was decided to take it out and run the test again to see if there is any serious multicollinearity problem among BT and NTT.

The ANOVA’s P-value is now 0.0016, which is less than 0.01, and so there is a statistically significant relationship between BT and NTT at the 99% confidence level. The Durbin-Watson’s P-value is 0.2964, indicating no serial autocorrelation in the residuals.

6.6.2.1.2.4 The forecasted competitive advantage model (5%)

The random walk with drift method has been used to forecast the competitive advantage in all the estimation of risk premium ranges.
The forecasted competitive advantage shows the same results as the forecasted competitive model of 4% risk premium. AT&T’s position is going down, whereas BT and NTT’s are going up.

6.6.2.1.3 Conclusion

Both the 5% and 4% estimates indicate that BT has a superior competitive advantage over NTT and AT&T. BT was doing better and had a superior performance over NTT and AT&T in previous years. However, the forecasted year 2000 and after 2001, showed that NTT was, and should be, performing better than BT and AT&T. This is largely because NTT was just starting to spread globally and the competition in the Japanese market started later than the UK. A further factor was that the USA’s market liberalisation and competition hampered the performance of AT&T.
6.6.2.1.4 The competitive advantage model (6%)

6.6.2.1.4.1 Comparison of the three telecom companies

Chart 6.5: Competitive advantage model of 6% risk premium

The competitive advantage model chart (6.5) indicates a broadly similar competitive advantage model for the three companies in 1991; 1993 and 1995.

In 1994, there is a divergence in relative competitive advantage. From 1994 to 1999, BT has superior competitive advantage over AT&T and NTT.

AT&T has better competitive advantage in 1990 to 1993. In 2000 and 2001, NTT has superior competitive advantage over both BT and AT&T.

AT&T has the lowest competitive advantage since 1996.

NTT has the lead over both BT and AT&T in 2000 and 2001 and indeed the forecast competitive situation reveals a similar performance in which NTT > BT > AT&T.
6.6.2.1.4.2 Durbin-Watson statistic test

Since the Durbin-Watson’s P-value is 0.2358, there is no indication of any serial autocorrelation in the residuals.

The R-squared is 71.6917% and the R-squared (adjusted) is 61.0761%, and since the ANOVA’s P-value is 0.0139, which is less than 0.05, there is a statistically significant result at the 95% confidence level.

6.6.2.1.4.3 Correlation matrix

**Table 6.4: Correlation matrix of 6% risk premium**

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.7434</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.3912</td>
<td>0.6258</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

The deeply shaded areas show that there are two serious multicollinearity problems, when applying the 6% estimated risk premium exhibiting the same pattern as the 5% scenario.

The problems are between BT versus AT&T and in the second case between AT&T and NTT. It has been decided to take AT&T out and leave both BT and NTT and run the test again to make sure that there is no more presence of a multicollinearity problem.

The second test now indicates that BT and NTT have a statistically significant relationship between them at the 99% confidence level (according to 0.0076 of the ANOVA’s P-value). There is no indication of any serial autocorrelation in the residuals.
The random walk with drift method has been used to forecast the period of competitive advantage using a 6% risk premium. The results show that both BT and NTT are improving their competitive advantage according to the forecasted period from 2001 to 2005.

The forecasted figures indicate the same results as for a risk premium of 5% and 4% that AT&T is experiencing a lower and even a negative competitive advantage. NTT has superior competitive advantage over both BT and NTT especially from 2000 to 2005, and this implies that NTT has a better sustainable growth more than BT and AT&T. In turn, BT does have some sustainable growth for the coming years, but lower than for NTT.

**6.6.2.1.5 Extending the analysis**

After estimating the competitive advantage period using a 4%, 5% and 6% risk premium, it was decided to run a new test using 3% to accommodate all the previous studies. Especially taking account of Claus and Thomas (1997) who estimated the risk premium to be 3% for UK and USA and other developed countries, such as Japan.
6.6.2.1.5.1 Competitive advantage model (3%)

6.6.2.1.5.1.1 Comparison of the three telecom companies

Chart 6.7: Realised competitive advantage of 3% risk premium

The 1991 and 1995 figures reveal a broadly similar competitive advantage for BT, AT&T and NTT. In 1994, there is a shift in relative competitive advantage among the three companies.

AT&T has a superior competitive advantage from 1990 to 1993. From 1994 to 1999, BT had the leading competitive advantage over AT&T and NTT.

From 2000 to 2001, NTT has improved its competitive advantage and took the lead from BT.

From 1996 to 1998, there is a wide divergence in competitive advantage, whereby BT has the lead: BT > NTT > AT&T.

6.6.2.1.5.1.2 Durbin-Watson statistic test

There is no indication of serial autocorrelation in the individual residuals for BT, AT&T and NTT because the Durbin-Watson’s P-value is 0.2763, which is greater than 0.05.
There is a statistically significant relationship between the passage of time during which competition has existed and the combined results for the competitive advantage periods for BT, AT&T and NTT at the 95% confidence level, because ANOVA’s P-value 0.0247 is less than 0.05. The R-squared is 67.1182 and the R-squared (adjusted) is 54.7875.

### 6.6.2.1.5.1.3 Correlation matrix

**Table 6.5: Correlation matrix of 3% risk premium**

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.4746</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.2630</td>
<td>0.6159</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

The deeply shaded area indicates a serious multicollinearity problem between AT&T and NTT with an absolute value greater than 0.50. Therefore, a second test will be run for both AT&T and NTT against BT individually to find out where the real problem lies.

### 6.6.2.1.5.1.3.1 The first test

The first test is between BT and NTT:

There is no sign of a serious multicollinearity problem between BT and NTT. According to ANOVA’s P-value of 0.0083, since the P-value is less than 0.01, there is a statistically significant relationship between the passage of time during which competition has existed and the combined results for BT and NTT at the 99% confidence level. The Durbin-Watson’s P-value of (0.3014) indicates no serial autocorrelation in the residuals.
The second test is between BT and AT&T:

According to the correlation matrix, there is no significant presence of a serious multicollinearity problem between BT and AT&T. Interestingly, there is no statistically significant relationship in the revised model at the 90% or higher confidence level. However, the Durbin-Watson test indicates that there is a possible serial autocorrelation in the residuals.

Forecasted competitive advantage model (3%)

Chart 6.8: Forecasted competitive advantage of 3% risk premium

The forecasted competitive advantage model for the 3% risk premium shows that both BT and NTT are improving their competitive advantage, whereas AT&T is having a problem evidence by a decrease in its competitive advantage.

The forecasted competitive advantage model for all the estimated risk premia indicates that BT and NTT are increasing their competitive advantage, whereas for AT&T it is decreasing over the forecasted years.
6.6.2.1.6 Dominant firm

In section 6.6.2.1.1, the dominant firm in terms of competitive advantage has been identified. This indicates, which telecoms company has an advantage over the others. Table (6.6) shows each estimated risk premium, and therefore which company is dominant at that time.

**Table 6.6: Competitive advantage model of the dominant firm**

<table>
<thead>
<tr>
<th>Years</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>1991</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>1992</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>1993</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>1994</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
</tr>
<tr>
<td>1995</td>
<td>BT</td>
<td>AT&amp;T</td>
<td>BT</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>1996</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
</tr>
<tr>
<td>1997</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
</tr>
<tr>
<td>1998</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
</tr>
<tr>
<td>1999</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
<td>BT</td>
</tr>
<tr>
<td>2000</td>
<td>NTT</td>
<td>NTT</td>
<td>NTT</td>
<td>NTT</td>
</tr>
<tr>
<td>2001</td>
<td>NTT</td>
<td>NTT</td>
<td>NTT</td>
<td>NTT</td>
</tr>
</tbody>
</table>

The darker shaded areas, indicating the firm with the highest competitive advantage, show that BT is superior to AT&T and NTT with almost 50 per cent dominance for all the estimated risk premia. The second company is AT&T with more than 33 per cent dominance and NTT has the 17 per cent remainder of the whole 100 per cent share.

**6.6.2.1.6.1 Conclusion**

Hypothesis 4 states that in terms of competitive advantage, NTT exhibits through time a superior position compared with BT and AT&T on account of its monopoly position. The conclusion that is derived from the competitive advantage approach is that BT is the dominant firm of the three. This conclusion agrees with the previous chapter 5, where BT performed better than both AT&T and NTT, and also had a lower investment risk ratio, which allowed it to be a more safe investment than AT&T and NTT.
The hypothesis is rejected for the most of the study periods until 2000, but is supported for the forecasted periods (2002-2005).

6.6.2.1.7 Weighted Average Cost of Capital (WACC)

To take more of a stakeholder perspective rather than a shareholder approach, then returns to both shareholders and debtholders are considered in this subsection. The perspective will be in the form of the weighted average cost of capital. In assessing the shareholder returns, dividend- or earnings-based models would reflect the performance of the firm. However, the CAPM reflects the risk. In this section performance is measured by the average of the dividend- and earnings-based equity cost of capital estimates. To adjust for gearing a WACC approach is adopted using this averaging process.

Chart 6.9: WACC result of the three companies

The WACC graph indicates a ‘superior performance’ for BT over AT&T and NTT. BT’s stakeholder performance decreases after 1998, but still outperforms both AT&T (but not in 2000) and NTT. In 2000, AT&T had higher WACC than BT, but BT recovers in 2001, and had the lead over AT&T. NTT has consistent WACC over the years. BT has outperformed both AT&T and NTT from this stakeholder perspective.
6.6.2.1.8 Competitive advantage model using multiple regression analysis

Hypothesis 5 states that of the three global players, AT&T is more adversely affected in its competitive position by the other two companies on account of its having a weaker monopoly position. In the multiple regression tests, the competitive advantage estimates (in years) are used. Each one of the companies, in turn, becomes the reference point for the dependent variable, whilst the other two company figures are independent variables.

6.6.2.1.8.1 Competitive advantage model (3%)

6.6.2.1.8.1.1 BT

BT = a + b_1AT&T + b_2NTT

(Equation 6.21)

BT = the dependent variable in the multiple regression test

where;

both AT&T and NTT are independent variables.

Table 6.7: BT competitive advantage model of 3% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T- statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>137.014</td>
<td>2.15861</td>
<td>0.0592</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-2.23868</td>
<td>-1.61769</td>
<td>0.1402</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-1.23042</td>
<td>-0.81793</td>
<td>0.4345</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>22.665</td>
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<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>5.47947</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>1.32</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.3146</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P= 0.0224</td>
</tr>
</tbody>
</table>

Most of the key words that are mentioned in the table are already discussed and explained in chapter 4 (section 4.3). AT&T’s estimated coefficient is −2.23868 and NTT is −1.23042, which indicates that BT’s competitive advantage is negatively associated with of AT&T and NTT.
The R-squared is 22.665%, which implies that only 22.665% of the variation in BT’s position is captured by both AT&T and NTT, and the rest of 77% from outside forces. The R-squared is low for this model.

This is not a good model because the P-value of the ANOVA test is 0.3146, which indicates no statistically significant relationship overall in this model. The Durbin-Watson P-value is 0.0224, which is an indication of serious serial autocorrelation.

Additionally, there is a serious multicollinearity problem between AT&T and NTT, since there is an absolute correlation value greater than 0.50 (not shown).

This model is not good when an account is taken of the performance of AT&T and NTT against each other.

6.6.2.1.8.1.2 AT&T

\[ \text{AT&T} = a + b_1 \text{NTT} + b_2 \text{BT} \]  
(Equation 6.22)

Table 6.8: AT&T competitive advantage of 3% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>42.4812</td>
<td>4.92735</td>
<td>0.0008</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-0.610832</td>
<td>-2.34554</td>
<td>0.0436</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>-0.100625</td>
<td>-1.61769</td>
<td>0.1402</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>48.4364</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>36.9779</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>4.23</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0508</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P= 0.1492</td>
</tr>
</tbody>
</table>

This model fits better than the previous model, because the R-squared is higher.
The estimated constant is lowered for AT&T, whereas the estimated constant for BT was 137.014.

The ANOVA P-value is 0.0508, which indicates a relationship between AT&T and the other two combined at the 94% or lower confidence level.

There is no serial autocorrelation in this model according to the Durbin-Watson statistic test because the P-value for this is greater than 0.05.

Also, there is no serious multicollinearity problem between NTT and BT (not shown).

### 6.6.2.1.8.1.3 NTT

**NTT = a + b_1BT + b_2AT&T**  
(Equation 6.23)

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>42.3349</td>
<td>4.72369</td>
<td>0.0011</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>-0.0562337</td>
<td>-0.81793</td>
<td>0.4345</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-0.621084</td>
<td>-2.34554</td>
<td>0.0436</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
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<td></td>
<td></td>
<td>38.0485</td>
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<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>24.2815</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>2.76</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.1159</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P = 0.2610</td>
</tr>
</tbody>
</table>

The R-squared of 38.0485% is low, and only 38% of the variation in NTT's competitive advantage is captured by the variation in competition from BT and AT&T.

The ANOVA P-value is 0.1159, indicating that there is no relationship between NTT against the other two companies at the 90% or lower confidence level.
There is no indication of serial autocorrelation according to the Durbin-Watson test, and no presence of any serious multicollinearity problem (not shown).

6.6.2.1.8.1.4 Conclusion

The conclusion is that the competitive advantage models for BT\(^{(a)}\), AT&T\(^{(b)}\) and NTT\(^{(c)}\), respectively, for the 3% risk premium show a significant result for model (b), i.e. a significant relationship between the competitive advantage for AT&T being negatively associated with BT and NTT combined.

6.6.2.1.8.2 Competitive advantage model (4%)

6.6.2.1.8.2.1 BT

\[
BT = a + b_1AT&T + b_2NTT \quad \text{(Equation 6.24)}
\]

Table 6.10: BT competitive advantage model of 4% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>39.8779</td>
<td>4.79556</td>
<td>0.0010</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-1.4431</td>
<td>-2.801</td>
<td>0.0207</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.229157</td>
<td>1.3707</td>
<td>0.2037</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>48.8991</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>37.5434</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>4.31</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>0.0487</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P= 0.4666</td>
</tr>
</tbody>
</table>

The ANOVA P-value is less than 5%, therefore the null hypothesis, that the estimated coefficient are all zero, is rejected at the 95% confidence level. Looking to the individual P-values, the multiple regression indicates a significant result at the 95% confidence level between BT and AT&T (P-value = 0.0207).

The R-squared is moderate and it demonstrates that only 48.899% of variation in competitive advantage is captured by regressing BT against AT&T and NTT.
There is no indication of serial autocorrelation according to the Durbin-Watson test. Furthermore, the correlation coefficient regarding AT&T and NTT, is less than 0.50, which indicates no serious multicollinearity problem (not shown).

6.6.2.1.8.2.2 AT&T

\[ AT&T = a + b_1 \text{NTT} + b_2 \text{BT} \]  

(Equation 6.25)

Table 6.11: AT&T competitive advantage model of 4% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>20.0233</td>
<td>6.19944</td>
<td>0.0002</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>0.105507</td>
<td>1.3273</td>
<td>0.2171</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>-0.322733</td>
<td>-2.801</td>
<td>0.0207</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>48.343</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>36.8637</td>
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<tr>
<td>F-ratio</td>
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<td></td>
<td></td>
<td>4.21</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0512</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P= 0.0757</td>
</tr>
</tbody>
</table>

According to the ANOVA P-value of (0.0512), there is a statistically significant relationship between AT&T’s competitive advantage and those of other two companies, BT and NTT, at the 90% or higher confidence level.

According to the individual P-values of the model, there is a significant relationship between AT&T and BT, at the 95% level of confidence.

The R-squared is moderate and indicates 48.343% of AT&T’s variability in competitive advantage is captured by NTT and BT.

There is no serial autocorrelation and no serious multicollinearity between BT and NTT (not shown).
6.6.2.1.8.2.3 NTT

NTT = a + b₁BT + b₂AT&T \hspace{1cm} (Equation 6.26)

Table 6.12: NTT competitive advantage model of 4% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
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<td>-1.00311</td>
<td>0.3420</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>0.753653</td>
<td>1.3707</td>
<td>0.2037</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>1.55157</td>
<td>1.3273</td>
<td>0.2171</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>20.0105</td>
</tr>
<tr>
<td>R-squared (adj.)%</td>
<td></td>
<td></td>
<td></td>
<td>2.23509</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.3661</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P= 0.0179</td>
</tr>
</tbody>
</table>

According to the ANOVA P-value, there is no statistically significant relationship between NTT and the other two companies combined at the 90% or higher confidence level. Also, according to the individual P-value, there is no relationship between NTT’s competitive advantage and either BT’s and AT&T’s.

Furthermore, the R-squared is low, and it indicates the relationship between the independent and dependent variables is relatively weak.

There is some serial autocorrelation according to the result of the Durbin-Watson statistic test. Also, there is a serious multicollinearity problem between BT and AT&T (not shown).

6.6.2.1.8.2.4 Conclusion

The conclusion for competitive advantage modelling, using a risk premium of 4%, points to a problem for both BT and AT&T, where there is serial autocorrelation and a multicollinearity problem.
6.6.2.1.8.3 Competitive advantage model (5%)

6.6.2.1.8.3.1 BT

\[
BT = a + b_1 AT&T + b_2 NTT
\]

(Equation 6.27)

Table 6.13: BT competitive advantage model of 5% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>39.3911</td>
<td>3.71043</td>
<td>0.0048</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-1.17119</td>
<td>-2.57968</td>
<td>0.0297</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-0.312857</td>
<td>-1.08108</td>
<td>0.3078</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>43.6163</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>31.0865</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>3.48</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0759</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P= 0.0154</td>
</tr>
</tbody>
</table>

According to the ANOVA P-value, there is a statistically significant relationship between BT’s competitive advantage and those for NTT and AT&T combined at the 90% or higher confidence level.

According to the individual P-value of the fitted model, there is a relationship between BT and AT&T at the 95% or higher confidence level.

The R-squared is moderate and it shows there is more than 43% of BT’s variation in competitive advantage captured by the variations in competitive advantage of AT&T and NTT.

However, there is serial autocorrelation, and also a serious multicollinearity problem between AT&T and NTT (not shown).
6.6.2.1.8.3.2 AT&T

\[ AT&T = a + b_1NTT + b_2BT \]  
(Equation 6.28)

Table 6.14: AT&T competitive advantage model of 5% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>25.8686</td>
<td>6.91238</td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-0.330581</td>
<td>-2.52198</td>
<td>0.0327</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>-0.362961</td>
<td>-2.57968</td>
<td>0.0297</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>62.6733</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>54.3785</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>7.56</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>.0119</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P = 0.2741</td>
</tr>
</tbody>
</table>

The overall P-value shows that BT and NTT together have a statistically significant relationship with AT&T at the 95% or higher confidence level.

The fitted model indicates that there is a relationship between AT&T and BT at the 95% confidence level, and a relationship between AT&T and NTT also at the 95% confidence level.

According to the Durbin-Watson statistic test, there is no indication of serial autocorrelation. Furthermore, the correlation matrix for BT and NTT shows no sign of any serious multicollinearity problem (not shown).
6.6.2.1.8.3.3 NTT

\[
NTT = a + b_1BT + b_2AT&T
\]

(Equation 6.29)

Table 6.15: NTT competitive advantage of 5% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>42.5531</td>
<td>3.68157</td>
<td>0.0051</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>-0.367372</td>
<td>-1.08108</td>
<td>0.3078</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-1.25258</td>
<td>-2.52198</td>
<td>0.0327</td>
<td></td>
</tr>
</tbody>
</table>

R-squared % 42.5357
R-squared (adjusted) % 29.7659
F-ratio 3.33
ANOVA P-value .0827
Durbin-Watson P= 0.3188

There is a statistically significant relationship, from regressing NTT against BT and AT&T, at the 90% or higher confidence level according to the result of ANOVA P-value.

The fitted model presents some relationship between NTT and AT&T at more than a 95% confidence level (P-value = 0.0327).

In this case, there is no particular indication of serial autocorrelation, although there is some correlation between BT and AT&T, which presents a serious multicollinearity problem between them (not shown).

6.6.2.1.8.3.4 Conclusion

For the models (a), (b) and (c) the final result for the competitive advantage model using a risk premium of 5%, indicates that the BT model (a) exhibits serial autocorrelation and that there are serious multicollinearity problems between AT&T and NTT and between AT&T and BT.
6.6.2.1.8.4 Competitive advantage model (6%)

6.6.2.1.8.4.1 BT

\[ BT = a + b_1 AT&T + b_2 NTT \]  
\hspace{1cm} \text{(Equation 6.30)}

Table 6.16: BT competitive advantage model of 6% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate</th>
<th>T-statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>33.1094</td>
<td>4.67526</td>
<td>0.0012</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-1.13393</td>
<td>-3.334473</td>
<td>0.0087</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-0.275421</td>
<td>-1.27534</td>
<td>0.2341</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>56.1703</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>46.4304</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>5.77</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0244</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P= 0.0166</td>
</tr>
</tbody>
</table>

There is a statistically significant relationship between BT, AT&T and NTT combined at the 95% confidence level according to the ANOVA P-value.

Individually, there is a relationship between BT and AT&T at the 99% confidence level according to the P-value of the model.

R-squared is more than half and it indicates more than 56% of the variation in BT’s competitive advantage is explained by the movement of competition in the market, whereas 44% is from other factors.

According to the Durbin-Watson test, there is some serial autocorrelation. Also, there is a serious multicollinearity problem according to the correlation matrix result (not shown).
6.6.2.1.8.4.2 AT&T

\[ \text{AT&T} = a + b_1 \text{NTT} + b_2 \text{BT} \]  
(Equation 6.31)

Table 6.17: AT&T competitive advantage model of 6% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T- statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>24.0079</td>
<td>7.64103</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-0.288854</td>
<td>-2.40718</td>
<td>0.0394</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>-0.487412</td>
<td>-3.33473</td>
<td>0.0087</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td>68.5184</td>
<td></td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td>61.5224</td>
<td></td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td>9.79</td>
<td></td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td>0.0055</td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td>P= 0.1528</td>
<td></td>
</tr>
</tbody>
</table>

According to the AVOVA P-value, there is a statistically significant relationship between AT&T and the combined competitive advantage of BT and NTT at the 99% confidence level.

Specifically, there is a relationship between AT&T and BT at the 99% confidence level. AT&T has a relationship with NTT at the 95% confidence level.

There is no sign of serial autocorrelation according to the Durbin-Watson statistic test. Also, there is no correlation with absolute values greater than 0.5 between the independent variables, BT and NTT (not shown).
6.6.2.1.8.4.3 NTT

$$NTT = a + b_1 BT + b_2 AT&T$$  \hspace{1cm} (Equation 6.32)

Table 6.18: NTT competitive advantage model of 6% risk premium

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate Coefficient</th>
<th>T- statistics</th>
<th>P-value</th>
<th>Overall result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>42.0293</td>
<td>3.42378</td>
<td>0.0076</td>
<td></td>
</tr>
<tr>
<td>BT</td>
<td>-0.555733</td>
<td>-1.27534</td>
<td>0.2341</td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>-1.35593</td>
<td>-2.40718</td>
<td>0.0394</td>
<td></td>
</tr>
<tr>
<td>R-squared %</td>
<td></td>
<td></td>
<td></td>
<td>40.3921</td>
</tr>
<tr>
<td>R-squared (adjusted) %</td>
<td></td>
<td></td>
<td></td>
<td>27.1459</td>
</tr>
<tr>
<td>F-ratio</td>
<td></td>
<td></td>
<td></td>
<td>3.05</td>
</tr>
<tr>
<td>ANOVA P-value</td>
<td></td>
<td></td>
<td></td>
<td>0.0975</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>P = 0.2925</td>
</tr>
</tbody>
</table>

The ANOVA P-value indicates a statistically significant relationship between NTT’s competitive advantage and that of BT and AT&T only at the 90% confidence level.

According to the individual P-value of the fitted model, there is a relationship between NTT and AT&T at the 95% confidence level.

The R-squared is relatively low and implies that 40% of NTT’s degree of competition is explained by the BT and AT&T variables.

There is no indication of serial autocorrelation according to the Durbin-Watson P-value. But there is a particular correlation (not shown) between BT and AT&T with an absolute value greater than 0.5, which presents a serious multicollinearity problem.

6.6.2.1.8.4.4 Conclusion

According to the competitive advantage model of the 6% risk premium, AT&T had a serial autocorrelation and multicollinearity problem with both BT and NTT.
6.6.2.1.8.5 Final qualitative observations of the various multiple regressions

Table 6.19: Comparison result of 3% risk premium

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>No relationship</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>No relationship</td>
<td>Relationship</td>
<td>-</td>
</tr>
</tbody>
</table>

There is no significant relationship between BT and NTT. BT and AT&T have no such relationship either. AT&T and NTT do have a significant relationship and there were no serial autocorrelation or multicollinearity problems for the AT&T and NTT models using the 3% risk premium.

Table 6.20: Comparison result of 4% risk premium

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>Relationship</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>No relationship</td>
<td>No relationship</td>
<td>-</td>
</tr>
</tbody>
</table>

The competitive advantage model of 4% shows a significant relationship between BT and AT&T at the 95% confidence level, and there was no serial autocorrelation and no multicollinearity problem for the BT and AT&T models. BT and NTT have no significant relationship at the 95% confidence level. Also, there is no relationship between AT&T and NTT at the 95% confidence level.

Table 6.21: Comparison result of 5% risk premium

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>Relationship</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>No relationship</td>
<td>Relationship</td>
<td>-</td>
</tr>
</tbody>
</table>

BT and AT&T have a relationship at the 90% confidence level, but when BT is a dependent variable, there is a serious multicollinearity problem between the other two companies. There is no significant relationship between BT and NTT. Both AT&T and
NTT have a significant relationship at the 95% confidence level, although there is some autocorrelation in the residuals for the NTT model and a multicollinearity problem with that model between the other two companies.

Table 6.22: Comparison result of 6% risk premium

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>Relationship</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>No relationship</td>
<td>Relationship</td>
<td>-</td>
</tr>
</tbody>
</table>

There is no significant relationship between BT and NTT. However, BT and AT&T have a relationship at the 99% confidence level, although the BT model exhibits serial autocorrelation and multicollinearity between the other two companies. Moreover, a significant relationship between AT&T and NTT exists at the 95% confidence level and neither of these two models suffer from autocorrelation, although there is a multicollinearity problem in the NTT model.

6.6.2.1.8.6 Overall conclusion

Hypothesis 5 states that of the three global players, AT&T is more adversely affected in its competitive position by the other two companies on account of its having a weaker monopoly position. Overall, considering the assumed risk premia of 3, 4, 5 and 6 per cent:

1) Using either AT&T or BT as the dependent variable, the multiple regression analyses indicate a strong significant relationship between AT&T and BT at the 4, 5 and 6 per cent risk premia.

2) Correspondingly, there is a relationship between AT&T and NTT at the 3, 5 and 6 per cent risk premia.
3) BT and NTT have no relationship whether using the 3, 4, 5 or 6 per cent risk premium.

4) The conclusion indicates that no matter the risk premium, NTT is independent of BT in terms of competitive advantage, whereas AT&T is negatively related to both BT (and vice versa) and NTT (and vice versa) at three out of the four risk premium levels (see figure 6.2). Hypothesis 5 is supported.

Figure 6.2: Relationships (all negative) between periods of competitive advantage in multiple regressions

From the figure (6.2), it has been noted that, from the analysis of competitive advantage, the relationships that exist between BT and AT&T, and between AT&T and NTT are particularly strong. This can be explained by the fact that AT&T, which was originally part of the Bell company in the USA, had established strong trading relationships in both Britain and Japan before the privatisation process in telecoms. AT&T has established a market position in both countries often as a supplier of technology and also as a competitor in that they had invested in local firms or quoted themselves on these markets. There is no apparent linkage between BT and NTT, since they were both originally state-owned
companies with little foreign investment prior to privatisation and for many years afterwards. Therefore, the competitive advantage factors cannot be identified, which have enabled us to make a direct comparison between the two companies. To this day there is little linkage or cross investments between BT and NTT, despite the fact that, in the cable business, BT had invested for a brief period in the Japanese market.

6.6.2.2 Applying a new estimation of risk premium

Omran and Pointon (2002), in their manuscript: “A simulation analysis of the risk premium in G7 countries”, find that the estimation of the risk premium for UK is 4.4%, USA 5.4% and Japan 3.3%. Regarding this estimation, a multiple regression test has been run to see if there is any new result from the previous risk premium estimations.

6.6.2.2.1 Competitive advantage model

Chart 6.10: The new estimation competitive advantage model

The competitive advantage chart (6.10) shows a large competitive advantage from 1995 to 2001. AT&T is superior to BT and NTT from 1990 to 1994. From 1995 to 1999, BT took the lead from AT&T. In 2000 and 2001, NTT was the leader. The overall picture is the same as demonstrated earlier.
6.6.2.2.2 Durbin-Watson statistic test

According to the Durbin-Watson statistic test, there is no serial autocorrelation among the residuals between BT, AT&T and NTT (not shown).

6.6.2.2.3 Correlation coefficient

Table 6.23: Correlation matrix of new estimation of competitive advantage

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.6315</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-0.1810</td>
<td>0.5670</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

The correlation matrix shows that AT&T has a positive number against both BT and NTT. It indicates that AT&T is affected by external forces of competition and not by other competitors (BT, NTT).

AT&T enjoys a very competitive market in the USA, and many competitors are competing against AT&T. The other reason could be related to the fact that AT&T has been private since its establishment and it has not been subjected to any intervention from the government. Both BT and NTT were state-owned companies, and later they were privatised.

NTT has a negative coefficient against BT, which implies that BT gains at NTT’s expenses and vice versa, in theory.

NTT has a positive sign against AT&T, which indicates that AT&T does not lose out to Japan.
NTT is moving strongly against BT and has taken the lead from BT both in 2000 and 2001. In terms of shareholders returns, all these three companies have enjoyed competitive advantage except for a few years, where BT lost competitive advantage in 1992, and AT&T in 1996. This was confirmed in previous models.

However, two correlation coefficients exceed 0.5 and so there is a multicollinearity problem.

### 6.6.2.3 Change in competitive advantage

#### 6.6.2.3.1 Introduction

The intention here is firstly, to examine the dynamics of competitive advantage and secondly, to eliminate multicollinearity problem. Essentially the regressions are of the form:

\[ \Delta y_t = \alpha + \beta_1 \Delta x_{1t} + \beta_2 \Delta x_{2t} + \epsilon_t \]  

(Equation 6.33)

Each one of the competitive advantage percentages will be tested to examine both the Durbin-Watson statistic test for any autocorrelation and the correlation matrix for the R² to find the correlation coefficients between BT, AT&T and NTT.

#### 6.6.2.3.2 Change in competitive advantage (3%)

**Table 6.24: Correlation matrix of change in competitive advantage of 3% risk**

<table>
<thead>
<tr>
<th></th>
<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>.4805</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>NTT</td>
<td>-.1837</td>
<td>.2410</td>
<td>1.0000</td>
</tr>
</tbody>
</table>
According to the Durbin-Watson test, there is no indication of any serial autocorrelation between the variables, because the Durbin-Watson P-value (not shown) is greater than 0.05.

The correlation matrix shows a negative figure, which indicates that any favourable changes in BT or NTT adversely affects the other.

\[
\text{The correlation between (BT, NTT) = } R^2 = (-0.1837)^2 = 0.0338
\]

< 4% (approx.) of variation in BT’s reduction in competitive advantage explains gains in NTT’s competitive advantage. However, there is a negative association between the degrees of competitive advantage of the two companies, if the risk premium is correctly assessed at 3 per cent. Nevertheless, the degree of association is relatively small.

\[
\text{The correlation between (BT, AT&T) = } R^2 = (0.4805)^2 = 0.231
\]

< 24% of variation in BT’s change in competitive advantage explains AT&T’s change in competitive advantage. Here the association is positive, so they are not direct competitors.

\[
\text{Correlation between (AT&T, NTT) = } R^2 = (0.2410)^2 = 0.0581
\]

< 6% of variation in AT&T’s change in competitive advantage explains NTT’s change in competitive advantage. Again the association is positive.

### 6.6.2.3.3 Change in competitive advantage (4%)

<table>
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<tr>
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<th>BT</th>
<th>AT&amp;T</th>
<th>NTT</th>
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</thead>
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<td>BT</td>
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<td></td>
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<tr>
<td>AT&amp;T</td>
<td>0.7102</td>
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<tr>
<td>NTT</td>
<td>-0.1527</td>
<td>-0.1055</td>
<td>1.0000</td>
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</tbody>
</table>
6.6.2.3.3.1 Observation

There are no serial autocorrelation issues among BT, AT&T and NTT, because their values (not shown) are greater than 0.05.

There are some negative numbers representing cross-correlations between BT and NTT and AT&T and NTT.

\[(BT, NTT) = R^2 = (-0.1527)^2 = 0.0233\]

< 3% of variation in BT’s decline in competitive advantage (discussed earlier) explains the gain in NTT’s competitive advantage.

\[(BT, AT&T) = R^2 = (0.7102)^2 = 0.5044\]

< 51% of variation in BT’s change in competitive advantage explains AT&T change in competitive advantage.

\[(AT&T, NTT) = R^2 = (-0.1055)^2 = 0.011\]

< 2% of variation in AT&T’s decline in competitive advantage (noted earlier) explains a gain for NTT’s competitive advantage.

6.6.2.3.4 Conclusion

Overall, assuming the 3 and 4 per cent premium to be correct, NTT is able to gain at the joint expense of BT and AT&T (only 4 percent in AT&T case). The dominant firm section, and even the forecasts projected, suggest that NTT from 2000 onwards is outperformed BT and AT&T.
6.6.2.3.5 Change in competitive advantage (5%)

Table 6.26: Correlation Matrix of change in competitive advantage of 5% risk

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<td>AT&amp;T</td>
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<tr>
<td>NTT</td>
<td>0.0339</td>
<td>0.2899</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

6.6.2.3.5.1 Observation

The Durbin-Watson statistic test (not shown) indicates that there is no serial autocorrelation between BT, AT&T and NTT.

Observation shows no negative numbers in the change in competitive advantage using the 5% risk premium, which therefore signifies that changes in one company do not adversely affect the others.

The correlation between BT and NTT (BT, NTT) is small

\[(BT, NTT) = R^2 = (0.0339)^2 = 0.00115\]

< 1% of variation in BT’s change in competitive advantage explains NTT’s change in competitive advantage.

\[(BT, AT&T) = R^2 = (0.4999)^2 = 0.25\]

25% of variation in BT’s change in competitive advantage explains AT&T’s change in competitive advantage.

\[(AT&T, NTT) = R^2 = (0.2899)^2 = 0.084\]

< 9% of variation in AT&T’s change in competitive advantage explains NTT’s change in competitive advantage.
6.6.2.3.5.2 Conclusion: Not rivals

Using the 5 per cent premium, the overall conclusion is that the companies are not rivals: they can each grow in competitive strength.

6.6.2.3.6 Change in competitive advantage (6%)

Table 6.27: Correlation Matrix of change in competitive advantage of 6% risk

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<th>NTT</th>
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<tbody>
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<tr>
<td>AT&amp;T</td>
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<td>NTT</td>
<td>0.0688</td>
<td>0.2096</td>
<td>1.0000</td>
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</table>

6.6.2.3.6.1 Observation

According to the Durbin-Watson statistic test, there is no indication of any serial autocorrelation between BT, AT&T and NTT (not shown).

The main observation from the correlation matrix is that none of the coefficients is negative. Therefore, changes in one company’s competitive advantage is not adversely affecting the others.

Correlation between (BT, NTT) is small at less than 7% at (0.0688).

\[
(BT, NTT) = R^2 = (0.0688)^2 = 0.00473
\]

<1% of variation in BT’s change in competitive advantage explains NTT’s change in competitive advantage.

\[
(BT, AT&T) = R^2 = (0.6749)^2 = 0.4555
\]

Approximately 46% of variation in BT’s change in competitive advantage explains AT&T’s change in competitive advantage.
(AT&T, NTT) = R^2 = (0.2096)^2 = 0.044

<5% of variation in AT&T’s change in competitive advantage explains NTT’s change in competitive advantage.

6.6.2.3.6.2 Conclusion: Not rivals

The conclusion from analysing the 6 per cent model is the same as for the 5 per cent model: they can each grow in competitive strength.

6.6.2.3.7 Overall conclusion

However, the reason why a 4 per cent risk premium estimate provides the most sensible explanation is because the correlation coefficients can be negative, revealing a degree of the competitive change, which is consistent with the results of the dominant firm analysis. It showed that for most of the overall period, BT was the dominant firm. Later in 2001 and onwards (according to the projected forecasts) NTT has taken the lead and that is mainly because the competition in the Japanese market is not yet intensive, and the Japanese government retains 45 per cent of the NTT’s holdings.

By contrast, this is not the same for BT and AT&T.

Nevertheless, the strength of the relationships as measured by R squared is sometimes low. Also, a 10 per cent cut-off NTT’s change on competitive advantage is independent of BT and AT&T, which BT’s and AT&T’s changes in competitive advantage are positively related, i.e. they are not rivals (see figure 6.3).
Historically, the linkage between BT and AT&T arises from the cross investments by both countries in each other’s economies. The policy of the Japanese government throughout the 20th century was to limit and frequently bar inward investments, which would result in Japanese companies being owned from abroad. NTT like the other telecoms companies was an offshoot of the postal services business, which was seen as a strategic industry and, therefore, protected from competition both internally and externally by being a public service industry. It gained its investments need from highly successful banking services attached to the post office in Japan, and thereby sustained its dominance of the Japanese market after part-privatisation. BT had a similar history in that the post office in the UK was the originator of BT in its formative years. However, with privatisation, the intention was to liberalise the market and encourage competition initially through Mercury and, in addition, by allowing external competitors to enter the market. AT&T, which was a subdivision of Bell telecoms sees the opportunity to be a technical provider and competitor for the expanding services, which emerged after 1980s. A reciprocal opportunity arose in the USA for BT to participate in the new technologies. As a result, it can be observed that they are very close cross commercially and there are cultural links between these two companies, whereas there appears to be little linkage with NTT.
6.7 Final comment

Chapter 6 indicated that three telecoms companies have competitive advantage, and the 4 per cent risk premium was the most suitable risk premia for these three companies. The forecasted figures from 2002-2005 showed that BT and NTT are likely to gain competitive advantage in the future, whereas AT&T had a negative competitive advantage. The dominant firm section (see 6.6.2.1.6) indicated that BT performed better than AT&T and NTT, and had gained more competitive advantage.

Hypothesis 4 is rejected for most of the study period, and so, in terms of competitive advantage, NTT did not exhibit through time a superior competitive advantage position compared with BT and AT&T. However, the forecasted period from 2002-2005 supported the hypothesis.

Hypothesis 5 is supported, given that AT&T is more adversely affected in its competitive advantage position by the other two companies.

Chapter 7 is a reflection chapter, including an overview of issues arising from the research. This chapter will also try to update the reader with the financial situation of the telecoms markets worldwide.
### Competitive advantage model calculation

**Table 6.28: BT Cost of Capital Estimate**

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*WACC calculation used Dividend Growth model and a year-ahead earnings model without CAPM rate.
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<td>1.48</td>
<td>2.31</td>
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* The EPS for 1995 was changed because it was low and gave a negative figure for year ahead forecasting for 1996, and it has been decided to take the years before and year after to add them together and divide them by 2.

** The WACC calculation used Dividend Growth model and a year-head earnings model, and CAPM rate has been taken out.
Table 6.30: NTT (Japan) Cost of Capital estimate

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Chapter Seven: Reflections
Chapter Seven: Reflections

The investigation in this chapter deals with the side issues of some important events in the telecoms market. This chapter deals with two aspects. Firstly, it analyses the rights issue as an important management action for BT. Secondly, it begins with a brief reflection on the study, and some of the valuable lessons will be identified, which arise from the analysis of the telecoms industry and in particular from the study of the three conglomerates BT, AT&T and NTT.

7.1 Reflective comments (analysis) on BT’s rights issue

Table 7.1: Changes in BT’s figures before and after rights issue

<table>
<thead>
<tr>
<th></th>
<th>Before £</th>
<th>After £</th>
<th>Overall results</th>
</tr>
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<tbody>
<tr>
<td>Short-term debt (%)</td>
<td>20,733 (52.5%)</td>
<td>9,390 (37.0%)</td>
<td></td>
</tr>
<tr>
<td>Long-term debt %</td>
<td>18,775 (0.475)</td>
<td>16,245 (0.63)</td>
<td></td>
</tr>
<tr>
<td>MV as of 31 March</td>
<td>£33,571.09bn</td>
<td>£24,282.77bn</td>
<td></td>
</tr>
<tr>
<td>Ratio of STD+LTD/STD+LTD+MV</td>
<td>0.54%</td>
<td>0.514%</td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td>0.87</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>S.D.</td>
<td>.03732</td>
<td>.0241269</td>
<td></td>
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<tr>
<td>Cochran’s C test P-Value</td>
<td></td>
<td></td>
<td>0.006256</td>
</tr>
<tr>
<td>Kruskal-Wallis P-value</td>
<td></td>
<td></td>
<td>0.6774</td>
</tr>
<tr>
<td>Standard skewness</td>
<td></td>
<td></td>
<td>+0.068</td>
</tr>
<tr>
<td>Standard kurtosis</td>
<td></td>
<td></td>
<td>-0.798</td>
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7.1.1 Introduction

On 10 May 2001 BT announced a one-for three rights issue at an exercise price of £3, compared with the previous day’s closing middle market price of £5.685. What is so significant about this? Firstly, it is noticeable because of its sheer size, for the firm raised nearly six billion pounds after expenses. Secondly, the size of the discount of 47.23 per cent on the price of the previous day, is untypical of rights issues. Thirdly, it was not underwritten. Fourthly, around 90 per cent of the rights were absorbed by existing
shareholders and the remainder sold to other shareholders. Fifthly, BT’s motivation was not to finance the expansion of activities, but primarily to reduce its debt.

As the analysis unfolds, it will be seen that this rights issue can be considered a success story. Of course, for a company as complex as BT not every substantive argument can be covered, but the emphasis here is upon valuable lessons that can be learned from such an investigation.

A rights issue is an invitation to existing shareholders to purchase additional shares in the company. This is a very popular method of raising new funds, it is easy and relatively cheap. The shares are usually offered at a discounted price from the market value—typically 15 per cent. Shareholders can either buy these shares themselves or sell the right to buy to another investor (Arnold, 2002:405).

Watson and Head (2001:120) claimed that:

“If the rights offered are fully taken up, there is no dilution of ownership and control, but they are not appropriate if the amount of finance needed to be raised is large, since the funds available to individual shareholders are likely to be limited.”

They add (p. 125) that:

“Deeply discounted rights issues are so rare, and Pearson used the deeply-discounted rights issue to minimise costs of underwriting”.

Brealey and Myers (2003:421) state that in some countries such as USA and Japan, rights issues a rarity and generally cash offers are the norm and as long as companies successfully sell new shares, the issue price in a rights offering is irrelevant, but this is not the case in a general cash offer.
Atrill (2003: 219) points out some of the advantages of the rights issue:

- Most common form of share issue;
- Issue expenses are quite low and issue procedures are simpler than for other forms of share issue;
- The existing shareholders, presumably, find that it suits their risk/return requirements;
- The law now requires shares, which are to be issued for cash to be offered first to existing shareholders (this is known as ‘pre-emptive rights!’); and
- the offer price is below the current market price.

According to Gapper and Lewis (1996: 23) the shares usually remain on sale for three weeks and to avoid the risk, the companies tend to insure themselves by asking a merchant bank to underwrite the issue. For a standard fee of 2 per cent, the bank guarantees to buy the shares if the market price falls too far.

The rights issues are fairly active, and rare in practice to fail (McLaney, 2000). Based on an article Clay Harris (FT, 25th Feb. 1999, p. 11) MMC fees in UK are not that high compared with elsewhere: 3-6% (US); 1-5% (Germany); 2-4% (France); 2-2.5% (Australia); and 3-5% in Japan. In UK, the fees are 2.8% based on the study by MMC, and they said deep discounting should be used more than it is, but said this appeared to be because of management preference.
7.1.2 Testing the rights issue

The ANOVA test has been used to examine the BT’s return index. To prove the hypothesis, a table (7.1) has been constructed, which includes some of financial figures for 2001 and 2002 and some other ratios such as beta, standard deviation and some AVOVA test measures have been used to find out if the financial risk has changed after the rights issue or not.

The rights issue and the selling of some of the profitable assets such as Yell, Japan Telecom and J-Phone and some other holdings, has decreased the net debt in the 2002 to £13,930bn, even though it had increased in 2001 by £18,942bn (see BT annual report 2002:79). Hence, this transaction has decreased the total loans and other borrowings to £18,440bn in 2002 (£30,911- 2001).

7.1.3 Share Price Analysis

A naive investor may think that a large discount suggests that the shares were originally under-priced at the time of the announcement. But three shares at £5.685, say, worth £17.055, together with one share at £3.00, now worth £20.055, are translated into four shares at £5.01375 each. This is exactly the same as £17.055 plus the £3 cash.

Now, of course, the share price is likely to change before the exercise date. Price movements depend upon the arrival of new information about the company, its sector, the economy and world events. A principle of Einstein's is the standard deviation of the movement of microscopic particles suspended in liquid as a linear function of the square root of time! This translates very simply. For a period of 36 days before the rights could be exercised, this means that the square root of 36, i.e. 6, would be the relevant factor to be applied. Actually, there were 37 days, so we use root 37. The standard deviation of BT’s
own index is 0.03732 for the previous 42 days up to the announcement. The predicted standard deviation over the next 37 days would be 0.03732 times \( \sqrt{37} = 22.70 \) per cent, approximately.

The 47.23 per cent discount in the share price translates into \(-0.4723/0.2270 = -2.08\) standard deviations. The smaller shaded area in the panel illustration 7.1 (at the end of this chapter) shows that the probability of achieving worse than 2.08 standard deviations below the mean is 2 per cent. It follows that BT's strategic risk probability, of the price falling by more than 47.23 per cent to below the exercise price, was also around 2 per cent (see panel illustration 7.1).

This presumes that BT's own index follows a normal distribution. The normal distribution is neither skewed to the right, nor the left and it is not too 'peaked'. The terms for these are 'skewness' and 'kurtosis'. With a sample of observations there will be some departure from an underlying distribution. For BT, it was found that the skewness measure was +0.068 and the kurtosis was −0.798. In practice, values of these between -2 and +2 are considered to be acceptable. The conclusion is that we can reasonably apply the standard normal distribution.

But why should Einstein's square root of time be applied? Well, if information arrives unpredictably and each day's price change is unrelated to the previous day's, then each day's standard deviation of returns is independent of the previous day's. A basic principle of statistics is that the variance of the sum is equal to the sum of the variances, if events are independent of each other. Over 37 days there are 37 individual daily variances. The standard deviation is equal to the square root of the variance. Therefore, the 37-day standard deviation is equal to the square root of the result of 37 times the daily variance.
which equals the daily standard deviation times root 37. It is the application of the square root of time, e.g. root 37, as Einstein suggests.

Now, historically typical rights issues have offered a 15 per cent discount. If BT had followed this alternative strategy, the probability of the price falling below its exercise price would reflect $-0.15/0.2270 = -0.66$ standard deviations. The risk of this alternative strategy of a 15 per cent discount is shown as the larger shaded area in the panel illustration 7.2 (at the end of this chapter), and represents a probability of 25 per cent.

7.1.4 No underwriting

Because the probability of the price falling below the exercise price within 37 days is small with a 47.23 per cent discount, there is perhaps no real need to have the issue underwritten. Even if underwriting costs were 2 per cent, this would have represented a cost to BT and hence, to its shareholders. So, the deeply discounted rights issues provided a saving for the company in underwriting fees and no overall loss to the investor because the under-pricing of the new shares is cancelled by the overpricing of the old shares in terms of their post-rights value, when account is taken of the shareholding.

7.1.5 Debt reduction

From the financial reports ended March 2001 and 2002, it can be seen that the short-term debt was reduced from around £21 billion to around £9 billion, and long term debt was reduced by £2.5 billion. This was achieved by a combined strategy of the rights issue and the sale of Yell, Japan Telecom and J-Phone.

Because of the importance of this event to BT’s debt reduction as of the 2002 financial year, it has been decided to examine the alternative hypothesis that the risk has reduced,
since there is less debt (i.e. less financial risk) following the rights issue. So, for BT, the standard deviation of BT’s own index before the rights issue announcement with the standard deviation after the issue itself was compared.

The daily standard deviation reduced from 3.7 per cent to 2.4 per cent. By using a standard result known as a Cochran test, we needed to know whether the reduction in risk was by chance or not. There was a less than one per cent chance (0.0063) that, if we rejected the proposition that the underlying risk had stayed the same, then we would be wrong. In other words, the risk had almost certainly been altered for the better. However, the UK FTSE ALL-Share Index has generally been falling (see panel illustration 7.3, at the end of this chapter).

But, for BT’s shareholders that do not hold a widely diversified portfolio, this is still good news. As to diversified shareholders, there was also a reduction in the beta coefficient from 2001 to 2002, although since then the beta has increased substantially. At the time, the rights issue had been successful in terms of debt reduction, financial risk and shareholder risk.

An added complexity was that the market value of the equity fell from 2001 to 2002, so the gearing ratio, when applying a mixed measure of the book value of long-term and short-term debt to the value of these combined elements plus the market value of equity, fell only marginally. However, risk dimensions and the ability to service debt are no doubt much more important than market value ratios.
7.1.6 Flexibility

To regain financial flexibility is very important indeed, for otherwise excessive short-term debt can result in restrictions on the firm's ability to restructure and expand. Traditionally, share issues have been seen as timed events, when share price performance is at a high. However, for BT this was not the case, yet they created their own window of opportunity despite the circumstances.

7.1.7 MMC Recommendations

Indeed the Monopolies and Mergers Commission in recent years has recommended the use of deeply discounted rights issues to avoid altogether the underwriters' costs, which rationally can be considered to have been too high in the past. Yet, by international standards, compared with the US and Japan, UK underwriters' fees are quite reasonable. Furthermore, more sophisticated investors, such as large institutional investors, are more likely to appreciate the rationale for a deeply discounted rights issue. The shareholders' response was well understood.

7.1.8 Gearing ratio

Despite the dramatic fall in the market value of equity (£24,282.77bn) after the rights issue, the gearing ratio \[\frac{(STD+LTD)}{(STD+LTD+MV)}\] actually decreased (0.514), i.e. the fall on the MV did not have any affect on the gearing ratio because of the reduction in debt. This would suggest a decrease in the beta. In table (7.1), this is shown to be true (return, 0.87, 0.82). This result is consistent with the previous conclusion in chapter 4, where in the ANOVA test the beta was a significant factor, when the privatised and non-privatised groups were compared. Hence, as Fama and French (1992) have suggested, the
beta is dead. Our result disagreed with Fama and French’s conclusion and agrees with Clare, Priestly and Thomas (1998).

However, according to the ANOVA test (0.7082), the mean returns are not significantly different afterwards compared with beforehand, and the medians are not significantly different at the 95.0% confidence level according to the Kruskal-Wallis test (0.6774).

7.1.9 France Telecom

It is interesting to note that France Telecom is also facing a gearing problem of whether a massive rights issue can successfully prevent the rating agency from downgrading its bonds. Based on a similar analysis to BT’s, if France Telecom had launched a rights issue at a 47.23 per cent discount at the same time as BT’s issue, then it could be reckoned that the probability of France Telecom’s price falling below the exercise price would also have been 2 per cent, because its daily standard deviation as a proportion of the price was virtually identical to BT’s.

7.1.10 Conclusion

BT’s rights issue was launched at the right time. Indeed, most of the telecoms companies have since been watching BT’s rights issue closely. Also, because of the September 11th events, most of the global stock market indices have dropped significantly, so other companies did not proceed with rights issues at that time. Other telecoms companies are expected to follow the same strategy as BT’s, because they too are burdened with heavy debts. A good example is France Telecom whose intention is to launch a rights issue to raise around €10 billion by the end of the year (Euroweek, June 9th 2002, p. 1-2).
7.1.11 Comment

This is favourable news for the shareholders because the (median) return stayed the same whilst the financial risk was being reduced.

7.1.12 Final comment

The financial risk has decreased immediately after the rights issue agreeing with the hypothesis. A separate calculation has revealed that the risk of the market has decreased faster than for BT. This indeed tended to push up the beta (see tables 7.2 and 7.3 at the end of this chapter).

Conditionally, the rights issue in general reduces the financial risk, but this could happen effectively if the stock markets are stable and the equity prices are not volatile, because the changes and movements in the stock prices could have an effect on the rights issue’s effectiveness. A good example is Swiss Life, one of the biggest casualties of the recent problems in Europe’s insurance industry. It faced a struggle to convince shareholders to back up its SFr1bn-plus rights issue after revealing its shareholder funds have fallen by one-third since the start of the year 2002. Another good example is France telecom, where they are trying to raise €9bn rights issue (Financial Times, Sept. 19th 2002, p. 26).

Meanwhile, the financial statement figures reveal only the cash flow and balance sheet effects of the rights issue in the account figures, but the importance of the market reaction and changes in risk are vital. This reflective comment was to point out the importance of this event to BT and what has changed since that event.
7.2 Evaluation and interpretation of our models

The financial analysis has been taken a step further than by previous writers on the subject. This has been achieved by applying the techniques and pathways prescribed in the literature on financial performance and by introducing a new model aimed at examining the degree of competitive advantage of the telecom companies chosen for this thesis.

A similar analysis can be undertaken for European telecoms companies or indeed any other telecoms companies that have gone through the privatisation process. Indeed, it may be the model in this thesis will be applicable across a broad spectrum of privatised companies and it is arguable that companies who have always been private, but have the same private monopoly advantages, would show a similar long-term trend in competitive advantage.

However, there are limiting factors which make the model less suitable for more competitive situations but, nevertheless, perhaps the original Pointon’s model (2001) has wider applications (see chapter 6).

One might ask to what extent the measurement of the competitive advantage for these companies adds to our understanding of the viability of the privatised telecoms’ businesses. It is the view that it does give a significant measure of this factor since it incorporates a number of key variables, which can be considered crucial for the success of any company.
In the model, the key variables are dividend-growth, the CAPM rate, PE inverse, and the year-ahead earnings yield. These accounting and financial measures are conventionally applied and understood by the management of all companies and have been tested historically in other theses as good measures for the successful performance of an enterprise.

By projecting forward through a time series, the likely performance of the companies relative to each other has been forecasted, where it presumed that they have a similar market structure, investment strategy, management culture and parallel technological development.

### 7.3 News reportage of the telecoms industry worldwide

While writing this thesis, there are quite considerable changes in the telecoms market, the stock market crisis in confidence is spreading right across the globe, and hitherto otherwise reliable stable companies are now in serious financial difficulty because their debt burdens are larger than the equity value. This is the case for France Telecom, which has led to a discussion by Jo Johnson about possible renationalisation by the French government (Financial Times, July 1st 2002, p. 21).

The consensus view appeared to be that the government should be unwilling or indeed incapable of purchasing even at market value the equity of the company, which has been falling from €120bn in 1999 to only £7bn today as of 2002. The primary reason for this is not the cost of the shares, but the burden of debt of £45.2bn at the end of 2002. However, recent news on this matter suggests that the French government will attempt to underwrite or purchase sufficient equity to support the rights issue.
Under the Euro regulation, the French government is obliged to restrain its public sector debts overall to 60% of its GNP (Gross National Product). As they are marginally around this figure, any acquisitions of debt in supporting their industry would reach that regulation and require permission of the European Central Bank. This is to say nothing of the likely precautions of the competition commission in Brussels, where direct industry protection is seen as anti-competitive.

There was a speculative bubble in the telecoms shares during 2000/2001, which resulted in the share values of the telecoms companies accelerating to an unsustainable value thirty times earnings in some cases with little prospect of generating income to make a reasonable return for the investment.

Some telecoms companies used inflated share values to embark upon mergers and take-overs of their competitors or indeed to enlarge themselves into global players, and it seemed there was no limit to the value placed on those shares. As a consequence, when the share values collapsed in 2001/2002, the companies were left exposed with large debt and massive intrinsic devaluation of the assets acquired. A classic case is that of WorldCom in the USA, and to some extent Vodafone in the UK.

However, in the UK example, there is no evidence yet of any false accounting to compound the problem (the sale to France Telecom of their shareholdings in Orange at premium prices seems to have avoided cash crises for Vodafone).
In the case of Worldcom, they not only falsified their accounts, but their acquisitions of BT’s shares in Qwest, during the massive take-over of a competitor in the US, required a cash payment to BT of $30bn at an inflated value at the time. This resulted in a massive debt mountain for WorldCom contributing to its need to hide its true financial position (Financial Times, June 18, 2002, p. 31).

Most of the telecoms companies are trying to eliminate strategic overlaps and inefficiencies in divisions or subsidiaries. These companies are taking this strategy to raise some cash to pay for their debts, and one way or the other, they are trying to implement a new investment and financing strategy. A good example is NTT, Japan’s dominant telecommunications group, where the new management is trying to carry out a comprehensive review of group operations in order to close down some of its unprofitable operations (Financial Times, 2002, July 1st p. 26).

It can be seen clearly from the telecoms companies’ situation world-wide that many telecoms companies are burdened with heavily unpayable debts, of which most came from the licence of the 3G package. These companies are trying to overcome the financial difficulty by introducing a rights issues similar to what BT did in 2001 (Financial Times, July 9th 2002, p. 23; and Financial Times, June 28th 2002: 24).

In July 9th 2002, Deutsche Telecom is contemplating a sale of its information technology services arm as part of its debt-reduction programme, a company insider said on July 8th 2002. Selling the IT services unit, which ABN-Amro valued at €4bn-€6bn in a note published on July 8th 2002, would mark a reversal of DT’s “four-pillar” strategy- the joint development of fixed-line and mobile telephony, the internet, and corporate services. By this new tactic of selling the IT, it could allow the group to reduce significantly its €67.3bn debt (Financial Times, July 9th 2002, p. 28).
In the wake of the latest revelations from WorldCom, accountants have reported a wave of calls from non-executive directors at telecommunications companies to review their practices (Financial Times, July 4th, 2002:1).

All these dilemmas and financial difficulties for most of the telecoms companies have reduced the appetite from investors for taking a chance that telecoms will turn round according to Stephen Michel, telecoms credit analyst at Barclays Capital (Financial Times, June 27th 2002, p. 21). However, recent market information suggests that there is now in October 2002, a recovery of interest in telecoms shares.

The situation in the global capital markets is unstable. After the accounting corruption scandals in the US, many observers and analysts expect to see more accounting frauds in the future. It is hard to say which or when, but the market and the replacement of new management might reveal the hidden secrets.

The expectation of the future is uncertain, but the recent events in the market can say a few things about what will happen in the future. In this thesis, the writer is not trying to predict the future, but he is making some assumptions on whether or not the telecoms markets are stable or not. The likely situation suggests that most of telecoms companies are suffering from high debts, and this somehow reflects on the investors' reaction against telecoms.

What worries most of these telecoms companies is the credit rating. However, they try to reduce their debt burden in order to stay in a comfortable investment grade territory. Most likely, some of these telecoms companies are in a race to refinance some of their maturing bonds and loans. Deutsche Telecom is trying to refinance €7.2bn of bonds and loans maturing next year 2003 (Financial Times, July 5th 2002, p. 26).
These companies are working on property disposals to generate some cash to meet their debt requirements and to avoid the downgrade of the Standard & Poor’s and Moody’s Investor Service rate.

These credit ratings have already been downgraded for French Telecom (Financial Times, July 9th 2002, p. 31), and Deutsche Telecom is hanging on the edge to keep its grade stable, but conditionally, Deutsche Telecom must reduce their debts of €67.3bn in order to stay BBB+ (Standard & Poor’s) and Baal (Moody’s Investors Service rate), but arguably the months to come would prove this action (Financial Times, July 5th 2002, p. 26).

Analysts do not expect significant increases in Capex as many operators are eager to conserve cash to service their large debt burdens by introducing the 3G package in 2003 and 2004 (Financial Times, June 6th 2002, p. 4).

Aggressive battles are evident between the telecoms underdogs companies and small Asian companies to launch the most advance technology in the market. Most of these small privatised telecoms companies in the developing countries in Asia are taking the same pathway as BT when it was privatised. They begin to spread globally across the countries in Asia and beyond Asia in some of the European countries to establish some alliances with European telecoms companies.
South Korean Telecom company, has built up new overseas markets for their CDMA technology ahead and instead of the rival GSM platform adopted by the European wireless industry and has made an alliance with New Zealand Telecom company. The company introduced a new technology innovation called the CDMA2000 1X, which replaces the 3G network, which is more advance than 3G in services for speed and quality, and 3G development in South Korea was delayed because of the success of CDMA2000 1X (Financial Times, July 10th 2002, p. 29).

AT&T looks poised to fall out of the Dow Jones industrial average following the expected shareholder approval in July 10th 2002 of a planned break-up of the venerable telecommunications company. However, AT&T which once dominated the US telecoms landscape, will be left as a marginal player after it shrinks back to its core long-distance business. The break-up is also expected to lead to a take-over of the remaining AT&T, with SBC communications itself a member of the Dow tipped as the most likely buyer (Financial Times, July 10th 2002, p. 26).

The viability of third generation (3G) mobile phone services was thrown into further doubt on June 25th 2002 when Telefonica of Spain and Sonera of Finland abandoned plans for 3G operations in Germany and wrote off the £5.3bn they paid for a licence two years ago. European telecommunications groups spent more than €100bn acquiring 3G licences at the height of the technology boom. Telefonica and Sonera, partners in Group 3G, one off six licence holders in Germany, are the first to knowledge that that investment is in effect worthless (Financial Times, July 26th 2002, p. 23).
7.4 Regulation situation in the telecoms market

When it is launched next year, OfCom will cover more industries in the telecoms sector with the possibility of more power to intervene than its predecessor. It is expected to take on the role of enforcing competition law held by the Office of Fair Trading (Financial Times, May 28th, 2002, p. 4).

However, this is partly conjecture by the financial commentators, and it is more likely to continue to be a price-capping agency of the state and part of an EU-wide regulatory structure. It is assumed that Oftel will maintain its price control on BT until it sees that the regime is working (Financial Times, June 21st, 2002, p. 5).

The telecoms market is evolving slowly towards a more competitive environment, but has been inhibited by the collapse of telecoms shares in the stock market, making it difficult for existing competitors to remain solvent and manage their current indebtedness. Britain is as competitive now as anywhere in Europe, but with only two significant players in the shape of Vodafone, Orange and BT. This has partly fed through to lower prices and a choice of service.

The UK is not a low-cost economy, but Internet access is available nationwide at tariffs among the lowest in the OECD and broadband prices are below the average of the Group of Seven leading Industrial Countries (Financial Times, May 23rd 2002, p. 20).

The regulation issue is one of the main concerns of most of the telecoms companies who hold private monopolies in their markets. After the company transfers to private hands, the governments have chosen to implement a regulation regime in order to restrict the abuse of the monopoly by these companies.
The main role of the regulation is to watch the market from any awkward behaviour such as limiting the competition or having a policy or strategy, which prevents new entrants in the market.

The 1984 Telecommunications Act in the UK was introduced to regulate and monitor BT. Oftel was the regulator watchdog for telecoms companies in the UK and more precisely for BT. Many observers have questioned the ability of Oftel to monitor BT’s actions. Oftel managed to cap the prices charges by BT, but not the behaviour of BT itself towards other competitors.

The main goal of Oftel has shifted from being a watchdog to a price control agent. As we write this thesis, BT is still under price control by Oftel. No doubt that Oftel is doing its best to serve the customers, from my readings many telecoms companies in the UK’s market have admitted that Oftel is not doing its work properly.

The competition in the UK market has been intensified in some parts of the telecoms market such as the Mobile, Internet and Cablevision businesses. The main networking system has to be leased from BT in order to provide services to different customers. This results in BT sustaining its network monopoly.

The Oftel has enforced BT to demolish the monopoly in networks by allowing other users access to the network as reasonable prices. However, BT still owns more than 80 per cent market share in the fixed line and the provisions exchange lines.

Oftel only has price control over BT’s services. Nevertheless, BT has suffered severely from this price cap. Oftel should formulate itself to monitor the market and allow more freedom for entry and competition.
BT as a private monopoly and the main key player in the UK telecoms market has obtained more than a 50 per cent market share as of 2002 financial year. The only way to allow more competition is not by regulation, but to try to free the market from any restriction and let the market be the judge for the survival of telecoms companies.

The process in the UK telecoms market and the way BT was privatised are a lesson for many state-owned telecoms companies worldwide. An alternative route to privatisation would be to break the monopoly by dividing the businesses into different components and allow them to compete with each other, instead of handing over the whole network system. The break up of National Bell in the USA was perhaps a better model for creating a competitive environment than that chosen by the Europeans and others who followed the BT model. The regulation situation is very serious and needs thorough investigation, because the market is moving swiftly and the telecoms technology is sweeping through the market, and the regulators may not have the ability to cope with these changes.

The regulation is not making any direct effect on the monopoly situation in most of the telecoms companies. The monopolist companies are retaining most of the market share because of their scale of economies. They can react to any change of situation easily, because they own the network system in the country. Good examples of companies with flexible strategies to deal with change are BT, NTT and Deutsche telecoms, the current exception being France Telecom, which may well be renationalised as a means of avoiding bankruptcy.
The technology will have a little effect on the market position of telecommunications monopolies and their high profit margins. According to Petrazzini (1996:4) the governments could consider 2 proactive reform strategies. First, if a government believes that its national carrier can withstand the challenges of competition, it should consider corporatising the state-owned operator and gradually lowering entry barriers in both value-added and basic services.

Second, if a government believes that its national carrier will not be able to stand up to competition or if fiscal considerations are a priority, privatisation alone may be a good alternative.

If a government hands over the entire network to a company after its privatisation, it is a private monopoly transfer. A company can enjoy its private monopoly for very long time before it can be broken by others.

With recent scam and scandals in accountancy frauds, the US accountancy regulator has step in to monitor the work of auditors based outside the US. The new legislation would create an accounting overseeing board with powers to set professional standards for auditors as well as investigate and discipline them (Financial Times, July 12th 2002, p. 19). In the wake of the accounting irregularities in the US, the European Commission has called an emergency meeting of financial regulators and finance ministry officials to discuss Europe’s response to the financial crisis in the US. This meeting is scheduled to be held on July 23rd 2002, and it will focus on measures to avoid a repeat of the US events in Europe and to protect Europe’s financial markets if a large company were to collapse because of financial irregularities (Financial Times, July 12th 2002, p. 7).
For the same reason, the French government on July 11th 2002 promised wide-ranging measures to improve standards of corporate governance and financial reporting in France. The French government will require the companies to create an audit and remuneration committee and that auditing firms be barred from providing consultancy services to the same clients (Financial Times, July 12th 2002, p. 7).

7.5 Overall conclusion

The reflections chapter examined the question of the use of rights issue as a means of redressing the problem of accumulating debt by the telecoms companies. The updated information about the telecoms markets recently was not pleasing because of all the accounting frauds in the USA, which affected some telecoms companies, which in turn, has affected the performance of most of the stock markets worldwide.

The next chapter will comprise a conclusion and a review of the principal findings. In chapter 8, the aim is to highlight some of the future potential research issues that might arise.
Normal Distribution

Panel 7.1: BT’s Strategic Risk at 2%
Panel 7.2: Alternative risk at 25% (15%)
Panel 7.3: BT's share price against the FTSE ALL SHARE index

BT GROUP
FROM 17/10/00 TO 17/10/02 DAILY

PRICE HIGH 566.55 31/10/00, LOW 154.00 25/9/02, LAST 182.50
PRICE REL. TO FTSE ALL SHARE
Source: DATASTREAM
<table>
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<tr>
<th>Time</th>
<th>LOG BT</th>
<th>FTSE All Share</th>
<th>LOG BT-LOG(INDEX)</th>
</tr>
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<td>2740.78</td>
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<td>-0.000131747</td>
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<td>2673.94</td>
<td>-0.007903958</td>
</tr>
<tr>
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STDEV of Index

Total: 0.016193692 0.006229874 -0.242877766
Table 7.3: BT's rights issue after its
launch
BT
912.9
Time
29/06/2001
02/07/2001
03/07/2001
04/07/2001
05/07/2001
06/07/2001
09/07/2001
10/07/2001
11/07/2001
12/07/2001
13/07/2001
16/07/2001
17/07/2001
18/07/2001
19/07/2001
20/07/2001
23/07/2001
24/07/2001
25/07/2001
26/07/2001
27/07/2001
30/07/2001
31/07/2001
01/08/2001
02/08/2001
03/08/2001
06/08/2001
07/08/2001
08/08/2001
09/08/2001
10/08/2001
13/08/2001
14/08/2001
15/08/2001
16/08/2001
17/08/2001
20/08/2001
21/08/2001
22/08/2001
23/08/2001
24/08/2001
27/08/2001
28/08/2001
29/08/2001
30/08/2001
31/08/2001
Index STDEV
Total

951.7
957.8
937.4
940

953.8
930.8
937.4
901.7
959.9
984.4
997.7
973.7
978.3
955.8

931.3
933.8
926.7
927.2
928.7
967
986.4
996.6
979.3
1006.9
1017.6
982.4
972.1
936.4
917
939.5
936.4
933.3
915
867
868
885.9
919.6
897.6

882.3
910.9
910.9
917
905.8
876.2
861.9

FTSE All Share
2660.19
2689.01
0.018076862
2658.29
0.002774763
2641.43
-0.009349884
0.001202904
2616.5
2583.93
0.006329464
2578.71
-0.010600943
0.003068575
2579.93
2547.92
-0.01686288
0.027163922
2586.36
0.010945613
2608.03
0.005828367
2599.78
2561.68
-0.010574802
0.002046884
2551.33
2564.88
-0.010105027
2544.59
-0.011277423
0.001164267
2550.96
2513.1
-0.003314707
0.00023426
2491.21
0.000702023
2495.01
0.017551029
2543.67
0.00862659
2563.77
0.004467819
2599.63
2611.87
-0.007605128
0.012070586
2630.82
0.004590757
2616.16
2607.2
-0.015288745
2609.37
-0.004577411
2585.43
-0.016249538
2552.63
-0.009092069
2562.95
0.010527449
2564.91
-0.001435379
2597.57
-0.001440139
2584.4
-0.008600172
2555.37
-0.023401997
2536.3
0.000500628
2542.43
0.008864977
2573.14
0.016214261
2567.5
-0.010516119
2562.61
-0.007466565
2593.61
0.013854423
2593.61
0
2578.55
0.002898634
2570.95
-0.005337019
2534.7
-0.014429068
2539.06
-0.007146368
0.010730961

LOG BT

LOG FTSE

LOG(BT)-LOG(INDEX)

0.004679761

0.014194545

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-0.002763252
-0.004118367
-0.005439995
-0.00087824
0.000205418
-0.005422135
0.006503187
0.003623608
-0.001375984
-0.006411721
-0.001758242
0.002300415
-0.003449235
0.001085833
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-0.003799432
0.000661952
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0.003418293
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276
-


Chapter Eight: Conclusion
Chapter Eight: Conclusion

8.1 Commentary and contextual material

When a company transfers from the state into the private sector, the financial performance of the company changes, as indicated in the literature review. The research has shown that the privatised telecoms companies perform equally as well as their private counterparts.

Privatisation has been the main financial and economic issue in the developed and developing countries. There were many debates on whether or not privatisation would increase the performance of state-owned enterprises. Many studies have claimed that the SOEs would improve their efficiency in the post-privatisation period.

The improvement of these state-owned enterprises can be difficult to measure, since many have been a transfer of the state monopoly to private monopoly. The telecoms companies are good example of this, where most of the privatised national enterprises retained the fixed line facility. The test for improved privatised performance must be based on the contestability of the market.

In spite of the limitation imposed by Oftel in 1984, BT has remained the prime supplier partly through the inertia of consumers and the dominant brand image of BT. The primary gateways are still under monopoly control of BT. However, there are changes to BT’s control of the network, which since 2002 they are obliged by the regulator to make greater and lower cost provision for their competitors in order to allow for more competition. It is noticeable, however, that BT’s broadband service, recently launched, is in direct competition with other service providers, who are obliged to lease the BT lines, thus placing them at a distinct disadvantage.
An example of BT’s weakening hold on the market was exemplified by the rise and success of competitors in the mobile market sector, where Vodafone and Orange have established themselves as market leaders and BT’s product Cellnet has had to be revived through rebranding to MMO2, which has now been profitably demerged, in the hope of recovering lost market share (Financial Times, pp. 23, 24, 30th May 2002). Adapting the new technologies has been difficult for BT, and most of the privatised telecoms companies. They are having difficulty in competing with specialised mobile operators. France, Germany and Japan telecoms have and are suffering in this contestable market.

However, BT signalled on the 2nd of October its intention to return to the consumer market in mobiles after the demerger of MMO2 recognising the growth prospect for a large service provider depend upon increasing market penetration and market share through new products and services. Mobile Sense is to be marketed solely over the internet, thereby attracting a particular segment of the phone user market (Financial Times, Oct. 2nd 2002, p. 26). Says Law of the market states “supply creates its own demand”. As in this case, BT is creating supply before there is a known demand for their product.

Most of the telecoms companies in other countries followed the same pathway to privatisation as BT. In Qatar, Q-Tel followed BT’s strategy as did most of the European telecoms companies, such as France, Deutsche, Italy, Spain and Netherlands telecoms. These companies have retained their private monopoly of fixed lines with regulatory agencies to monitor the charges and regulate the behaviour of these businesses.

It was interesting to note that BT’s lines were the focus of a partial bid when their debts rose as a consequence of the 3G payments for licences. The German state owned Westdeutsche Landesbank made an £18bn offer to buy these assets, recognising the true worth of the fixed line rental monopoly (Financial Times, p. 25, May 3rd 2002).
The technological changes, and the new agency rules such as the WTO rules on competition internationally and the European Monopolies Commission policy, again on competition rules, may enforce liberalisation of the markets. However, to what extent these policies will impinge on the performance of the major telecoms companies is as yet to be demonstrated.

It was always going to be difficult to measure precisely the financial performance of the major players in the industry, because of their widespread investments in parallel industries and products. Indeed as recent reports inform us the accounting practises and the regulation of the markets have highlighted a further difficulty in using purely accounting information, as evidenced by “ENRON and WorldCom”(Financial Times, pp. 1,18,21,22 June 27th 2002), and a later accounting scandal case of Xerox (Financial Times, p. 26, July 1st 2002).

8.2 Testing

Nevertheless, a comparison of the financial performance of the privatised and non-privatised (private based) companies was analysed in this thesis. Most of the other studies focused on how to measure the financial performance of companies in pre and post privatisation periods (La porta and Lopez-De-Silence 1999; D’Souze, Bortolotti, Fantini and Megginson, 2001; see the methodology chapter 3). A comparison of either privatised, or private, with state-owned firms was also made to identify to what extent privatisation was a real benefit in financial terms (Boardman and Vining, 1989; Pohl, Anderson, Claessens and Djankov, 1997; refer to the methodology chapter 3).
Although systematic risk is emphasised in the financial literature, unsystematic risk (proxied by the standard deviation) was shown to be a significant variable as a financial determinant of performance of the combined privatised and non-privatised groups, and reinforced the other measures. The results proved, however, that there were no significant differences between the two groups in our data set.

In the ANOVA test, beta was a significant determinant of performance and this result has agreed with previous studies, such as Clare, Priestley and Thomas (1988), and the result disagreed with Chan and Chui (1996), and Fama and French (1992). For a further analysis of this debate, see chapter 3.

Similarly the use of the ANOVA and multiple regression tests demonstrated that again there were no significant differences between the two ownership groups. In chapter 4, the general hypothesis 1 states that the privatised telecoms companies perform differently from their non-privatised (private) counterparts, given the present contestability, so the hypothesis is rejected.

What makes it interesting is that the standard deviation of earnings has been a valuable measure in examining the financial performance of privatised and non-privatised groups. This result could contribute to further research and investigation, and the unsystematic risk can be used as a vital measure when examining other comparative financial statistics.

In chapter 5, BT, AT&T and NTT were examined as the biggest three telecoms companies. BT was partially privatised in 1984, and fully privatised in 1993, AT&T was a part of the Bell group as a private based company, whereas NTT was part privatised in 1985 with the Japanese government still retaining more than 50 per cent of NTT as of the 2002 financial year (Meggison, 2000).
The main reason behind testing these three companies was to discover where BT stands financially compared to the other two companies, and to see whether or not the financial performance of these companies are related to each other, or more related to their local markets (see chapter 5).

From the financial examination undertaken, the results showed that the financial performance indicators of the three telecoms companies were not normally distributed. However, the BT measure was close to being normally distributed according to the standard skewness and standard kurtosis result (see chapter 5).

Tests revealed that the three companies’ data sets demonstrated no sign of autocorrelation (Durbin-Watson statistic test), and that they were related to each other, but the results indicated that these companies are related more to their markets than to each other.

The downside risk indicated that BT was more of a safe investment than both AT&T and NTT. The overall results of the investigation supporting this thesis is that BT performed better than AT&T and NTT over the whole period. Applying a one year ahead forecast, BT and NTT have positive results, whereas AT&T had a negative result, but BT still performs better than NTT. The forecasting undertaken in chapter 5 reveals a superior performance by BT, whereas the competitive advantage forecast in chapter 6 reveals that both BT and NTT have positive results, but AT&T has a negative outcome (as revealed in chapters 5 and 6). One can conjecture that these results were influenced by the contestability factor (the degree of liberalisation in the market place) in that the privatised monopolies with the security of line rental have a competitive advantage over others who have to struggle for market share.
In part fulfilment of hypothesis 1, the two hypotheses in chapter 5 are pertinent.

**H2**: The financial performance of each company is positively related to that of the other companies. The rationale is that, in the telecoms market, companies would be affected by similar technological factors. This can be represented by \( \beta_2, \beta_3 > 0 \) where the financial performance of company \( j \) at time \( t \) is given by \( f_{jt} \). So, for the first company:

\[
 f_{1,t} = \alpha + \beta_2 f_{2,t} + \beta_3 f_{3,t} \quad \text{(Equation 5.1)}
\]

This hypothesis stands.

**H3**: In a global market, company performance is related more closely to the sector (i.e. other respective companies) than each respective stock market. This can be represented by:

\[
 f_{1,t} = \alpha + \beta_2 f_{2,t} + \beta_3 f_{3,t} + \gamma F_{1,t} \quad \text{(Equation 5.2)}
\]

where \( F_{1,t} \) represents the performance of the stock market index of the chosen company 1, and the \( \gamma \) coefficient is less significant than \( \beta_2 \) and \( \beta_3 \).

This hypothesis is rejected.

The competitive advantage model, a theoretical work introduced by Pointon (2002), has been used empirically for the first time, and proved to be important for this thesis. The original formula was not entirely appropriate for these telecoms companies, so a revised model was introduced, called Al-Shafi's method, which takes into consideration: the dividend growth model, the PE ratio inverse, the CAPM rate and an earnings based model, in order to calculate the competitive advantage in this case (see chapters 3 and 6).
By using the competitive advantage model, it has been shown that of the three companies: from 1990-93, AT&T had a competitive advantage over the others; from 1993-2000, it was the turn of BT; and projecting from 2001-2005, it would appear that NTT will have the competitive advantage.

The competitive advantage model indicated that BT was the dominant firm overall according to the study period. The forecasted competitive advantage was that both BT and NTT’s measures will increase over the forecasted period from 2002 to 2005.

The estimated risk premia at 3, 4, 5 and 6 per cent have been used to examine the competitive advantage. The overall result indicated that the 4 per cent risk premium provides the most plausible explanation in examining BT, AT&T and NTT, because the result has shown that the competition between the companies in the global sphere is more visible.

In order to examine their performance from a wider stakeholder perspective, the WACC approach was adopted using the average of the dividend growth model and earnings based model instead of the CAPM model. The CAPM suffers from the difficulty of the time dimension, and that the risk premium values are dependent on the state of the market at a given time. The WACC result showed that BT outperformed both AT&T and NTT, whereas NTT had consistently the lowest performance over the time period chosen. In part of fulfilment of hypothesis 1, the hypotheses in chapter 6 are:
H4: In terms of competitive advantage, NTT exhibits through time a superior position compared with BT and AT&T on account of its monopoly position. This hypothesis is rejected for the study period, but accepted in the forecasted period (2002-2005).

H5: Of the three global players, AT&T is more adversely affected in its competitive advantage position by the other two companies on account of its having a weaker monopoly position. This hypothesis stands.

8.3 Financial Strategies

Despite the high and negative figures for 2001, BT’s management planned to reduce their debts from £31bn to less than £20bn by December 2002, by raising £5.9bn through a rights issue, and by selling some of their acquisitions to generate another £5bn (see BT annual report 2001). The company managed to raise that amount to pay some of its debts (see BT annual report, 2002). The 2002 figures reveal an improved position for BT as a consequence of the debt reduction occasioned by a fortuitous rights issue.

Another good example of a similar financial difficulty in the telecoms industry is France Telecom, whose share price was 11.82 euros as of July 2nd 2002, where it dropped from being 200 euros as of March 2000. The French company had a huge debt and the debt level was forecasted to reach 70bn euros (£45.2bn) by the end of 2002 (Financial Times, p. 21, July 2nd 2002). In October we read that the debt will be partially reduced through a rights issue substantially supported by the French government, which still retains 54 per cent of the equity. It is argued, however, that the market will re-rate the debt of France Telecom despite this reduction, since the onus of the debt will remain with France Telecom (Financial Times, Oct 16th 2002, p. 30).
According to forecasts BT's management is set to reach its target of annual growth in earnings of 25 per cent until 2005. The new mobile services should generate annual revenue of £500m by 2005 and the revenues are expected to grow by 35 per cent a year until 2005. The pre-tax profits are set to increase to £2.1bn in 2003-04 (Investor Chronicle, 2002:22-23; Financial Times, May 17th 2002:23; and Financial Times, May 17th 2002:24). However, a recent article in FT by Robert Budden reports that Ben Verwaayen, the new chief executive of BT, has had to reduce his forecast of growth, which had been 6 to 8 per cent annualised growth to 2.8 per cent. This suggests the telecoms market growth rate will match the national growth rate of the UK (FT, Nov. 1st 2002, p. 1).

According to Key Note (2001:25) reports, most of the Europe's operators have already spent 120 billion Euros on 3G licences and now face a similar bill to construct networks (while realising that services will not actually get started in earnest until at least 2003 or 2004). There is a difficulty in implementing the 3G mobile services and according to the financial press, it is expected to be delayed.

It can be argued that the telecoms industry as a whole has faced times of financial difficulty in 2000 and 2001 and this difficulty might remain for a few years to come. This difficulty is derived mainly from three problems. First, the competition is intensified gradually every year, while we see new entrants enter the market. Second, technology and liberalisation, have changed the telecoms markets everywhere. This indeed created many new companies in mobile and internet services, which the market as a whole could not absorb. Third, many telecoms companies have borrowed huge amounts of money to fund for the 3G services, which might or might not, be a successful service. According to Fransman (2002) some of this could have been foreseen if the dynamics of the new telecoms industry had been more rigorously analysed (Financial Times, Oct 16th 2002, p. 15).
The current unstable state of the world telecommunications industry has its roots in the over-expansion of the industry since 1996. Between 1996 and 2001, analysts estimate that bank loans to the sector exceeded $900bn in syndicated loans, the bond market may have provided at least $400bn and $500bn was raised from private equity and stock market issues, and nearly half of European bank lending in 1999 was to telecoms companies (Key Note, 2001:48).

There are four factors that characterise the future telecoms system. First, is broadband communications, which make it possible to transfer large enough quantities of data to have one-to-one transfer of real-time moving pictures (video) and sound to make them interactive. Second, is mobility so that these systems can be accessed from virtually anywhere on the globe. Third, wireless communication, making all services accessible through a handset. Fourth, Multimedia and Internet technologies constitute the major networks and protocols in the ‘Information Super Highway’ (Eliassen and Sjøvaag, 1999:269).

Even though there are some financial difficulties facing the telecoms worldwide, the growth of new technologies and services such as the internet, cable TV, new broadcasting services and new switching and transmission technologies have enabled new participants to enter telecommunications field. Increasing private participation and foreign investments will allow the telecoms industries to spread globally and will increase the degree of competition to launch new technological products and the prices of services are likely to dramatically decrease.
8.4 Overall conclusion

Against this background, this research has demonstrated that there are no significant differences between the privatised and non-privatised (private) groups. The unsystematic risk rather than beta, has been identified as a significant variable that can be used again in future research as one of key variables in the determination of financial performance.

In examining the three biggest telecoms companies, the analysis revealed that the financial performance of these three companies are generally related to each other; they move in the same direction. This suggests that the companies may employ the same finance and management strategies. However, they are more related to their financial stock markets indices.

The forecast has shown that AT&T is not performing well at this time and the forecasted results in chapters 5 and 6 for the future performance and the future competitive advantage indicate that AT&T will not be performing well in the future. The Financial Times article of July 10th 2002 “AT&T poised to tumble out of Dow” on page 26, agrees with the forecasting for AT&T. The company is now breaking up, and it has done so by the end of 2002. There is a possibility of a take-over by SBC communications in the USA.

For BT, the rights issue was a successful strategic move and as a result they may have avoided some of the financial problems of their immediate competitors.

The general hypothesis 1 that the privatised telecoms companies perform differently from their non-privatised (private) counterparts, given the present contestability, is rejected.
8.5 Limitations and directions for further research studies

The limitations to the present study were that: (1) the analysis was conditional on accepting the present levels of contestability in the telecoms sector and therefore, although the general hypothesis was not accepted, it is not certain this would apply if the chosen industries had a greater contestability; (2) the research has thrown up a valuable tool for assessing the degree of competitive advantage, such a model might well be extendable to other sectors of industry on a cross country basis; and (3) the use of unsystematic risk, as a means of analysing the financial performance of the companies chosen has been the preferred choice to the beta measure, and this may well be applied in other scenarios for further research.
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BT (2001) Annual report

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Appendices
## Appendix 1: Privatisation World-wide

### Table (1) Privatisation revenues in East Asia and Pacific, 1990-98 (millions of US$)

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<td>2,226</td>
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<td>919</td>
<td>9,120</td>
<td>611</td>
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<td>1,008</td>
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<td>798</td>
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<td>214</td>
<td>704</td>
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<td>22</td>
<td>278</td>
<td>639</td>
<td>-</td>
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<td>242</td>
<td>-</td>
<td>291</td>
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<td>18</td>
<td>-</td>
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<td>226</td>
<td>-</td>
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<td>10,680</td>
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### Table (2) Privatisation revenues in Latin America and the Caribbean, 1990-98 (millions of US$)

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<tbody>
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<td>5,741</td>
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<td>10</td>
<td>895</td>
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<td>13</td>
<td>187</td>
<td>-</td>
<td>181</td>
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<td>5</td>
<td>391</td>
<td>170</td>
<td>-</td>
<td>2,075</td>
<td>2,876</td>
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<td>132</td>
<td>140</td>
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<td>Total</td>
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<td>18,723</td>
<td>15,560</td>
<td>10,488</td>
<td>8,199</td>
<td>942</td>
<td>33,897</td>
<td>37,685</td>
<td>154,225</td>
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### Table (3) Privatisation revenues in European and Central Asia, 1990-98 (millions of US$)

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<td>-</td>
<td>-</td>
<td>-</td>
<td>45</td>
<td>147</td>
<td>111</td>
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<td>645</td>
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<td>1,645</td>
<td>-</td>
<td>72</td>
<td>181</td>
<td>2,549</td>
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<td>798</td>
<td>779</td>
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<td>1,507</td>
<td>3,988</td>
<td>945</td>
<td>2,139</td>
<td>342</td>
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<td>641</td>
<td>980</td>
<td>605</td>
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<td>-</td>
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<td>4,177</td>
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<td>572</td>
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<td>3,957</td>
<td>9,742</td>
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### Table (4) Privatisation revenues in Middle East and North Africa, 1990-98 (millions of US$)

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<td>-</td>
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<td>-</td>
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<td>212</td>
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Table (5) Privatisation revenues in South Asia, 1990-98 (millions of US$)

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<td>-</td>
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<td>-</td>
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Table (6) Privatisation revenues in Sub-Saharan Africa, 1990-98 (millions of US$)

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<td>9</td>
<td>6</td>
<td>2</td>
<td>26</td>
<td>38</td>
<td>21</td>
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<td>139</td>
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<tr>
<td>Nigeria</td>
<td>16</td>
<td>35</td>
<td>114</td>
<td>541</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<td>27</td>
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<td>77</td>
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<td>16</td>
<td>111</td>
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<td>-</td>
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<td>19</td>
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<td>47</td>
<td>30</td>
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<tr>
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<td>Zimbabwe</td>
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<tr>
<td>Other</td>
<td>33</td>
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<td>32</td>
<td>2</td>
<td>9</td>
<td>5</td>
<td>86</td>
<td>238</td>
<td>402</td>
<td>809</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>1,121</td>
<td>207</td>
<td>641</td>
<td>605</td>
<td>473</td>
<td>745</td>
<td>2,348</td>
<td>1,356</td>
<td>7,571</td>
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</table>


Table (7) Privatisation by sector, 1990-1998 (millions of U.S. dollars)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>9,704</td>
<td>6,863</td>
<td>9,715</td>
<td>5,360</td>
<td>9,399</td>
<td>9,240</td>
<td>15,063</td>
<td>37,370</td>
<td>39,964</td>
<td>142,677</td>
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<td>Telecoms.</td>
<td>7,643</td>
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<td>3,007</td>
<td>1,083</td>
<td>5,069</td>
<td>5,814</td>
<td>3,812</td>
<td>12,863</td>
<td>26,619</td>
<td>70,771</td>
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<td>Power</td>
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<td>1,741</td>
<td>2,180</td>
<td>4,523</td>
<td>6,156</td>
<td>17,979</td>
<td>9,994</td>
<td>47,882</td>
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<td>Manufacturing</td>
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<td>7,188</td>
<td>7,491</td>
<td>6,091</td>
<td>5,787</td>
<td>3,546</td>
<td>7,795</td>
<td>2,167</td>
<td>47,025</td>
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<td>185</td>
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<td>1,614</td>
<td>2,900</td>
<td>1,219</td>
<td>135</td>
<td>193</td>
<td>916</td>
<td>3</td>
<td>9,310</td>
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<td>Chemicals</td>
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<td>466</td>
<td>315</td>
<td>415</td>
<td>1,285</td>
<td>291</td>
<td>488</td>
<td>1,222</td>
<td>514</td>
<td>5,152</td>
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<tr>
<td>Construction</td>
<td>196</td>
<td>484</td>
<td>732</td>
<td>491</td>
<td>790</td>
<td>592</td>
<td>745</td>
<td>318</td>
<td>718</td>
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<td>Other manuf.</td>
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<td>4,528</td>
<td>3,685</td>
<td>2,798</td>
<td>4,769</td>
<td>2,120</td>
<td>3,743</td>
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<td>3,394</td>
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<td>Petroleum</td>
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<td>2,085</td>
<td>2,760</td>
<td>5,162</td>
<td>2,115</td>
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<td>1,687</td>
<td>7,956</td>
<td>1,975</td>
<td>27,089</td>
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<td>Mining</td>
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<td>235</td>
<td>382</td>
<td>187</td>
<td>1,220</td>
<td>618</td>
<td>468</td>
<td>4,418</td>
<td>971</td>
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<td>Financial services</td>
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<td>7,793</td>
<td>5,263</td>
<td>3,411</td>
<td>1,065</td>
<td>1,933</td>
<td>2,895</td>
<td>3,445</td>
<td>3,149</td>
<td>29,001</td>
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<td>Banking</td>
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<td>779</td>
<td>1,853</td>
<td>2,646</td>
<td>3,055</td>
<td>2,471</td>
<td>25,919</td>
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<tr>
<td>Other services</td>
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<td>420</td>
<td>621</td>
<td>1,184</td>
<td>1,088</td>
<td>606</td>
<td>1,108</td>
<td>5,031</td>
<td>905</td>
<td>11,100</td>
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<tr>
<td>Total</td>
<td>12,658</td>
<td>24,242</td>
<td>26,181</td>
<td>23,661</td>
<td>21,712</td>
<td>21,901</td>
<td>25,399</td>
<td>66,573</td>
<td>49,309</td>
<td>271,636</td>
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Appendix 2: Major privatisation companies in the UK

<table>
<thead>
<tr>
<th>Companies</th>
<th>Date of first sale</th>
<th>Industry</th>
<th>Proceeds £m</th>
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<tbody>
<tr>
<td>British Petroleum</td>
<td>1977</td>
<td>Oil</td>
<td>6,053</td>
</tr>
<tr>
<td>National Enterprise Board Investments</td>
<td>1980</td>
<td>Various</td>
<td>354</td>
</tr>
<tr>
<td>British Aerospace</td>
<td>1981</td>
<td>Aerospace</td>
<td>390</td>
</tr>
<tr>
<td>Cable and Wireless</td>
<td>1981</td>
<td>Telecommunications</td>
<td>192</td>
</tr>
<tr>
<td>Amersham International</td>
<td>1982</td>
<td>Scientific products</td>
<td>64</td>
</tr>
<tr>
<td>National Freight Corporation</td>
<td>1982</td>
<td>Road Transport</td>
<td>5</td>
</tr>
<tr>
<td>Britoil plc</td>
<td>1982</td>
<td>Oil</td>
<td>1,078</td>
</tr>
<tr>
<td>British Rail Hotel</td>
<td>1983</td>
<td>Hotels</td>
<td>-</td>
</tr>
<tr>
<td>Associated British Ports</td>
<td>1983</td>
<td>Ports</td>
<td>97</td>
</tr>
<tr>
<td>British Leyland (Rover)</td>
<td>1984</td>
<td>Automotive</td>
<td>150</td>
</tr>
<tr>
<td>British Telecom</td>
<td>1984</td>
<td>Telecommunications</td>
<td>16,138</td>
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<tr>
<td>Enterprise Oil</td>
<td>1984</td>
<td>Oil</td>
<td>384</td>
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<tr>
<td>Sealink</td>
<td>1984</td>
<td>Sea Transport</td>
<td>-</td>
</tr>
<tr>
<td>British Shipbuilders and Naval Dockyards</td>
<td>1985</td>
<td>Shipbuilding</td>
<td>-</td>
</tr>
<tr>
<td>National Bus Company</td>
<td>1986</td>
<td>Transport</td>
<td>-</td>
</tr>
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<td>British Gas</td>
<td>1986</td>
<td>Gas</td>
<td>8,141</td>
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<td>Rolls-Royce</td>
<td>1987</td>
<td>Aero Engine</td>
<td>1,032</td>
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<td>British Airways</td>
<td>1987</td>
<td>Airports</td>
<td>-</td>
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<td>British Airways Authority</td>
<td>1987</td>
<td>Armaments</td>
<td>854</td>
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<td>Royal Ordnance Factories</td>
<td>1987</td>
<td>Energy</td>
<td>186</td>
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<tr>
<td>British Steel</td>
<td>1988</td>
<td>Steel</td>
<td>2,425</td>
</tr>
<tr>
<td>Water</td>
<td>1989</td>
<td>Water</td>
<td>3,468</td>
</tr>
<tr>
<td>Electricity industries</td>
<td>1990</td>
<td>Electricity</td>
<td>15,474</td>
</tr>
<tr>
<td>Trusts Ports</td>
<td>1992</td>
<td>Ports</td>
<td>-</td>
</tr>
<tr>
<td>British Coal</td>
<td>1993</td>
<td>Coal</td>
<td>925</td>
</tr>
<tr>
<td>Railways</td>
<td>1995</td>
<td>Railways</td>
<td>1,121</td>
</tr>
<tr>
<td>British Energy</td>
<td>1996</td>
<td>Energy</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>58,531</strong></td>
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</table>

Appendix 3: BT Privatisation Timetable

I. First offer

<table>
<thead>
<tr>
<th>First offer for sale</th>
<th>Date</th>
<th>Amount</th>
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<tbody>
<tr>
<td>First instalment</td>
<td>28 November 1984</td>
<td>£0.50</td>
</tr>
<tr>
<td>First day of dealing</td>
<td>3 December 1985</td>
<td></td>
</tr>
<tr>
<td>Second instalment</td>
<td>24 June 1985</td>
<td>£0.40</td>
</tr>
<tr>
<td>Final instalment</td>
<td>9 April 1986</td>
<td>£0.40</td>
</tr>
<tr>
<td>Total payable</td>
<td></td>
<td>£1.30</td>
</tr>
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II. Second offer

<table>
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<tr>
<th>Second offer for sale</th>
<th>Date</th>
<th>Amount UK offer</th>
<th>Amount International offer</th>
</tr>
</thead>
<tbody>
<tr>
<td>First instalment</td>
<td>6 December 1991</td>
<td>£1.10</td>
<td>£1.25</td>
</tr>
<tr>
<td>First day of dealing</td>
<td>9 December 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second instalment</td>
<td>7 July 1992</td>
<td>£1.20</td>
<td>£1.20</td>
</tr>
<tr>
<td>Final instalment</td>
<td>2 March 1993</td>
<td>£1.05</td>
<td>£1.05</td>
</tr>
<tr>
<td>Total payable</td>
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<td>£3.35</td>
<td>£3.50</td>
</tr>
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</table>


III. Third offer

<table>
<thead>
<tr>
<th>Third offer for sale</th>
<th>Date</th>
<th>Amount UK offer</th>
<th>Amount International offer</th>
</tr>
</thead>
<tbody>
<tr>
<td>First instalment</td>
<td>14 July 1993</td>
<td>£1.50</td>
<td>£1.60</td>
</tr>
<tr>
<td>First day of dealing</td>
<td>19 July 1993</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second instalment</td>
<td>1 March 1994</td>
<td>£1.40</td>
<td>£1.40</td>
</tr>
<tr>
<td>Final instalment</td>
<td>11 October 94</td>
<td>£1.20</td>
<td>£1.20</td>
</tr>
<tr>
<td>Total payable</td>
<td></td>
<td>£4.10</td>
<td>£4.20</td>
</tr>
</tbody>
</table>


In November 1984, the UK government offered a total of up to 3,012 million of the company’s shares for sale in the UK and elsewhere. All of those shares were taken up.

In December 1991, the UK government sold over half its remaining shares in BT, retaining a holding of about 22 per cent. It sold this holding in July 1993.
Appendix 4: The rest of the privatisation issues

1. Privatisation methods

(a) Restitution and reprivatisation

Rondinelli (1995:12, 1991), Canning and Hare (1994:197) stated that the restitution and reprivatisation has been used in the government of Germany, Hungarian government and in the former Czechoslovakia.

(b) Auctioning of small companies

According to Luders (1993) Chile used managed auctions during the late 1970s and early 1980s to sell both small and large state enterprises. The Chile government allowed the bidders to offer cash or credit terms for shares in SOEs.

(c) Mass Privatisation

(1) Direct Sale

(2) **Stock offerings (Public share offering)**


BT was privatised through the public share offerings method in 1984 (see Megginson, 2000).

(3) **Liquidation**

According to Luders (1993:107), Bobinski (1992:4), Gomulka and Jasinski (1994:231) the liquadiation method has been exercised in Chile, Poland, and some former Communist countries.

(4) **Employee or management buy-outs**


(d) **Public distribution of shares**

Rondinelli (1995:17), Vacha (1995:61), Ryszard (1997:261), argued that the public distribution of shares are obvious in countries such as Mongolia, former Czechoslovakia, Russia, Slovakia, Ukraine, Poland and Romania.
A paper was presented to Commission of the European Communities in 1991, indicated that Romania government issued a free certificate of ownership in Private Ownership Funds to all citizens over 18 years of age to obtain some shares in more than 2,000 large state companies (see Ewing, Lee and Leeds, 1993).

(e) Marketisation or demonopolisation

According to Rondinelli (1995:18) in Malaysia, the government has already corporatised several ports, the National Board and Sabah Gas Industries; and it is planning to restructure the Selangor Water Supply Company, several airports, the postal service and railway system.

(f) Public service contacting

(1) Service contacts

According to McBain (1997:213), Savas (1990:232), Rondinelli (1995:19), the services contracts have been in countries such as Jamaica, United States, in Latin America such as Chile and Guatemala governments.

A published paper by US Agency for International Development shows that Peru government contacts out activities in water supply, such as meter-reading, computer services, billing and collection to private companies (see Maureen Lewis and Miller, 1986).
(2) Management contracts

Kean (1988:1-2), McBain (1997:209), Bouin and Michalet (1991:139), and Rondinelli (1995:19) said that the management contracts have been famous projects in Malaysia (see Woon 1989), in Guyana, Jamaica, Morocco, Ghana, and both Canada and United States.

(3) Lease contacts

Kozachenko, Monakov and prokopenko (1995:128), Kelegama (1997:187), McBain (1997:214), and Vocha (1995:55) have shown that the lease contracts are used in Ukraine, Sri Lanka, Caribbean states and in both Czech Republic and Slovakia.

(g) Public private partnership

According to Chi (1998) the public private partnership programmes are used mostly in correction, health care, mental health and retardation and transportation.

(1) Joint ventures

Cooper and Johri (1995:150), Rowley and Lewis (1996), Rondinelli (1995:21), and Ralph (1997:155) stated that the joint ventures are used in countries such as Canada, China government, and in both Trinidad and Tobago government.
(2) Build-operate-transfer agreements

Hensley and White (1993), Central Bank of Oman (1998), and Rondinelli (1995:22), they said that the BOT method is used in Malaysian, Oman, and in Indonesia.

(3) Joint investment

According to Yeh (1990), and Rondinelli (1995:23), the joint investment method has been in the Hong Kong and India governments.

(h)Transferring services to private or non-governmental organisations

A paper was published in California University (1981) showed that every cooperative organisations or clubs or religions communities can participate in the public provision in some services in Asia countries, such as Malaysia, Singapore, and Indonesia (see Ralston, 1981), and in Canada (Veit, 1990:207).

2. Comments on privatisation's methods

A public share offerings of shares has understandable political appeal. However, it is risky for a small investor to participate in such a highly risky equity market. Small investors can suffer from a lack of legal information, little legal appeal in the event of distortion and typically a lack of experience to make good decisions in the market.

A private shares sale to corporate buyers, more wisely by tender, may represent a good privatisation technique, because new owners take the lead in transforming the enterprise into a feasible business. However, the problem with private sale of shares to corporate
buyers is how many potential buyers there are. There is a possibility of too few compared to the number of assets to be sold.

Mass privatisation or free distribution schemes can create a broad ownership position that balances efficiency, information needs and corporate structure with a fair distribution of property, and may require the creation of an investment portfolio, such as mutual funds. However, mass privatisation has risks that are significant in that if strong intermediaries do not arise, the large number of shareholders make corporate governance ineffective.

Sales of assets through liquidation may be good, even though there is potentially a heavy social and economic cost to be paid by this method. Management and employee buyouts can also be used especially where there are not attractive private sector buyers. The two main difficulties here are fairness and whether or not the acting management can improve the performance of the enterprise in question. Management contracts are an effective way of bringing in foreign expertise, without the risk of investment, but they are expensive and should not be used in highly uncertain environments where foreign interest would not otherwise exist.

3. The process of privatisation

Whatever the objectives and whatever the approach to be taken or adopted, the overriding rule is that each privatisation must be successful if the momentum of a privatisation programme is not to be lost. The privatisation process needs a careful preparation to path the way for successful programme.

The process itself has a complexity connects to it and it will vary from one privatisation to another depending on the type of privatisation that is taken. For example, a trade sale or an employee buy-out will require less preparation, whereas the more sophisticated form of
privatisation is the flotation on a stock exchange and it is the widely known method. This type involves far greater effort and a lengthy period of preparation.

Ernst and Young corporation (1999: 4-5) is specialised and has done many privatisation programmes worldwide and in the developing countries, has explained in more details that the privatisation process goes through series of channels, such as corporatisation; feasibility; preparation for sale; vesting; marketing the shares; and after the sale. Let's consider each one of these process individually.

(a) Corporatisation

The preparation does not necessarily start with the decision to privatise. If there is a state-run organisation of some size, various aspects of which are controlled by different parts of government; and organisation evolved over time, possibly into an unwieldy combination of activities. Government has to decide how those activities can be molded together to improve efficiency and results, with the possibility of privatisation in the future. Specialists are engaged to help the government to asses how best to proceed through passing legislation, and the government will be able to target its defined structure and improve the focus and performance (see Ramanadham 1988, for more details).

The UK government has done some changes internally for BT. They have reorganise BT through cultural transformation, which is the change in the dominant behavioral norms, value systems and the spirit of the organisation through recruiting senior managers committed to changing the SOE to a more commercially viable corporation (see Hills, 1986:122).
The UK government has appointed Sir Jefferson (he was British Aerospace’s chair) and Dyke Weyer (he was the financial manager in British Aerospace), both of them had a distinguished experience and they were committed to make BT more sensitive to consumers’ needs and more profit oriented (see Zahariadis, 1995).

(b) Feasibility

The enterprise might be already in the form of a corporation, therefore the privatisation process begins with a feasibility study to consider the options. A team will be formed comprising civil servants and external consultants. The team will weigh the political sensitivities against the benefits to be gained and will look at how to achieve the transfer of ownership.

There was a feasibility study done on BT before privatisation. After the feasibility study, the UK government had two options available. One was to privatise BT through public share offerings method, and the other one was to break up BT. The UK government chose not to break up BT for few reasons. First, BT was the first public utility to denationalised; second, it meant to be the largest company flotation; and thirdly, it was considered as a national flagship with international potential and was politically aspirations and financial needs (see Kay, 1984).

The UK government then finally decided to privatise BT through public share offerings and ignored the idea of breaking up BT. It seems that UK government was scared from future takeover threats.
(c) Preparation for the sale

The amount of preparation necessary prior to a sale will vary. Normally, for major flotation, this preparatory period can take up to two years, but problems are encountered, the preparation might take longer. The government and the enterprise will have separate advisors. The government, as vendor, will be trying to achieve the most politically acceptable result, which will involve maximising the proceeds. The management of the enterprise, will need to take into the interests of investors-the purchasers- as future growth will have to be delivered. The opposing positions are tempered by the desire of both sides to see a successful flotation.

The BT privatisation took very long time to prepare it for sale. It costed the government more than £270 millions for the preparation. It was worth it afterall, most of BT shares were sold immediately and were oversubscribed. The UK government had to adjust the shares distribution levels. They gave the priority to smaller investors to gain more shares than bigger investors and institutions. The updated shares information show that financial institutions own more than 50 per cent of BT’s shares after small investors sold their shares for profit making (see Newman, 1986).

The government had to change the management of BT before privatisation to prepare it for private enviornment culture and after the privatisation, the profit center management was established to provide a variety of incentives and penalties for managers, which force them to adopt a commercial, private sector style of management. This approach was later used for some privatisation companies, such as water industry (Davidson, 1993:49).
(d) Vesting

The business of the corporation is transferred into a limited company. A new capital structure is put in place, which requires a decision on the mix of equity and debt finance. The BT has gone through the process of transferring the company into limited company in 1982, and BT’s capital was structured before the privatisation took place (see Newman, 1986; and Harper, 1997)

(e) Marketing the shares

For success, marketing is all-important. It is critical that the image of the business is improved. The promotional campaign will be strictly controlled and designed to link with the marketing of the flotation. This gradually will build to a peak just before the offer to subscribe for shares closes. It makes potential investors aware of the opportunity to invest and where and how they can obtain information about the share offer.

BT was successfully privatised in 1984. In the first trading day, BT’s shares made more than 70 % profit, and it was astonishing for the UK government and investors. Most of these small investors sold their shares in early stages after making big junk of profit and the financial institutions took over these shares and bought them directly from the small investors or through the stock market. The BT successful privatisation programme has encouraged the UK government to privatise more companies to generate more profit for the government.
(f) After the sale

Following flotation, share application audits may be conducted for investor protection. Management has to deliver the promises it made in the prospectus. In fact, it is worth remembering that throughout all the preparation, which involves an enormous commitment from the top management, that very same management has to keep running the business. The privatisation must be controlled and a feasible timetable established to ensure all issues are highlighted and tackled. Above all, it is down to flexibility, imagination, communication and cooperation (see Miller, 1994; and Hyman, 1988 for more details of preparation process).

BT privatisation has gone through the privatisation process stages step by step. In 1980, BT was separated from the post office and UK government appointed Sir Jefferson (Chairman of British Aerospace) to restructure the company. In 1981, BT Telecom became a public corporation. On 19 July, 1982 the government announced its intention to sell up to 51 per cent of British Telecom to the public. The government appointed advisory group to have a feasibility study of BT and to estimate its value. In 1984, BT was privatised (see BT 1999; and Newman, 1986 for more details of the process).
See the graph of the privatisation process:

Illustrative example not based on a particular case

<table>
<thead>
<tr>
<th>Stage 1</th>
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<tbody>
<tr>
<td><strong>Public Corporation</strong></td>
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<tr>
<td>Governed by statute</td>
</tr>
<tr>
<td>Loan financed</td>
</tr>
<tr>
<td>Public sector style administration</td>
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</tbody>
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<p>| |</p>
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<th></th>
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<tbody>
<tr>
<td><strong>Feasibility Study</strong></td>
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<tr>
<td>Study undertaken by civil servants, investment banks or management consultants.</td>
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<tbody>
<tr>
<td><strong>Background &amp; Options</strong></td>
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<tr>
<td>Report to Ministers on possibility, options and prerequisites of any sale</td>
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<tbody>
<tr>
<td><strong>Ministerial Decision</strong></td>
</tr>
<tr>
<td>Decision in principle to proceed, choice of option to be pursued.</td>
</tr>
</tbody>
</table>
Stage 2 This example assumes sale of the business as one unit by share flotation

Select Advisor
Investment bank advisors selected for advice leading up to sale also accounting and legal advisors.

Prepare Business
- Strengthen management team
- Ensure management systems are suitable for private sector

Prepare Legislation
- Power to wind-up the public corporation and create PLC (Public Limited Company)

Consider Regulation/Deregulation
- Powers included to regulate or deregulate any monopoly business.

Improved results

Pass Legislation including any Regulatory Measures

Stage 3
Consider Balance Sheet
- Adjust balance sheet if necessary

Power to create and sell PLC
Well Run PLC With Appropriate Balance Sheet

Companies Act company; appropriate debt/equity ratio

Commercially oriented management

Reduced monopoly power; initial price caps set (for regulated companies).

Stage 4

Select/ Reselect Advisors for Sale

Financial Legal and PR advisors etc.

Good results

Develop corporate image and track record

Develop offer structure

Choose Market Slot

Agree Timetable for listing

Number of Shares to be Sold.

Produce prospectus

Including path-finder and Mini-prospectus for retail investors

Marketing

Retail

-Advertising Campaign
-Mass Mailing
-Retail Incentives

Institutional

-Roadshows
-Analysts Research
At the outset of the privatisation process, there are a number of strategic decisions that need to be made, which will determine the ultimate form the sale will take. These might include government fund-raising requirements, the timing of sale, or wider political objectives such as extending share ownership or expanding capital markets. These decisions will determine the type of sale that is appropriate, ranging from a public share issue to a management buy-out or a trade sale (Hyman, 1988).
4. Final comments

Privatisation is unlike all other financial transactions. The differences arise because of size, political sensitivities, investor interest, and the complexity of privatisation’s objectives. After a strategic evaluation has been taken, an enterprise will undergo an often-extensive process of preparation for life in the private sector. This will involve creating an appropriate legal form for the enterprise and creating a track record to attract investors.

As the final form of the enterprise will often differ considerably from the form in which it operated in the public sector, this can be a protracted process and will involve financial restructuring to make the business self-sufficient and commercially viable. As a final stage of the process, a valuation will need to be placed on the business and appropriate selling techniques developed to enable a successful privatisation (Grimstone, 1988).

The governments worldwide try to increase the image of its enterprises before launching the privatisation programme. They increase the financial performance of their enterprises before privatisation by arranging the right strategy tools and proper funds to make the enterprise financially successful. The financial performance is considered to be the key aspect of the whole privatisation process.
Appendix 5: (UNCTAD Objectives)

1. Encouraging and enhancing economic efficiency;

2. Redefining the role of the state to allow it to concentrate on control and governing;

3. Reducing the financial burdens allocated for public projects and enterprises;

4. Reducing the level of debts;

5. Freeing the limited financial resources of the state in order to finance other sectors such as education;

6. Creating and establishing new investment including foreign private investment;

7. Mobilizing local resources for development;

8. Widening and expanding the ownership base;

9. Spreading the habit of investment and developing it amongst the citizens in order to establish the knowledge of the ways and means of employing accumulated finances and consequently mobilizing their savings in the market;

10. Creating new employment opportunities together with increasing investment and as a result the absorption of the annual increases in national labour;

11. The possibility of allowing employees of the privatised corporations to subscribe and have shares in their capital;

12. Reducing routing and widespread bureaucracy in the government civil service and administration because simplicity and directness characterize the management of the private sector; and

13. Attracting back emigrant national capital as privatisation represents one of the tools and means of attracting back national capital abroad.
Appendix 6: The three companies history

A. British Telecom Profile

BT Group plc is the holding company for the BT Group of companies. The Company operates primarily through British Telecommunications plc (BT), a wholly owned subsidiary.

BT’s principal activities include local, long distance and international telecommunications services, Internet services and information technology (IT) solutions. In the United Kingdom, British Telecommunications plc serves 29 million exchange lines, as well as providing network services to other licensed operators.

Geographically, British Telecommunications plc has operations worldwide, although it is its intention in the future to focus more on the United Kingdom and Western Europe. British Telecommunications plc is comprised of BT Ignite, BTopenworld, BT Retail, BT Wholesale, BTexact Technologies and BT Affinitis
B. History of NTT

1985 April: Nippon Telegraph and Telephone Corporation established.


1987 Nov: 1.95 million government-owned shares of NTT stock sold.

1988 July: Sales activities covered by Central Data Communications Division transferred to NTT Data Corporation.

1988 Oct.: 1.5 million government-owned shares of NTT stock sold.

1992 July: Sales of car phones and other mobile phones transferred to NTT Mobile Communications Network, Inc. (NTT DoCoMo).

1992 Dec.: Responsibility for electrical power and administration of construction and building management transferred to NTT Facilities, Inc.

1994 Sep. 29: NTT listed on New York Stock Exchange


1995 Apr. 26: NTT Data Communications Inc. listed Nov. Stocks held by shareholders (based on shareholders' register as of the end of September 1995) split at a ratio of 1 to 1.02.

1997 Sep.: Sales activities covered by Software Division transferred to NTT Communicationware Corp.


1999 Nov.: 952,000 million government-owned shares of NTT stock sold.

2000 Feb.: Treasury stock acquired (28,512 shares)

2000 Oct.: One million shares of government-owned NTT stock sold
C. History of AT&T corporation

The history of AT&T is in large measure the history of the telephone in the United States. AT&T's roots stretch back to 1875, with founder Alexander Graham Bell's invention of the telephone. During the 19th century, AT&T became the parent company of the Bell System, the American telephone monopoly.

The Bell System provided what was by all accounts the best telephone service in the world. The system broke up into eight companies in 1984 by agreement between AT&T and the U.S. Department of Justice.

From 1984 until 1996 AT&T was an integrated telecommunications services and equipment company, succeeding in a newly competitive environment. Today, AT&T is rapidly evolving from a company that handles mostly long-distance voice calls to a family of four businesses that connects people to information in any form that is useful to them - voice, data and video, over any of three different networks - wireless, data and cable.

On September 20, 1995, AT&T announced that it was restructuring into three separate publicly traded companies: a systems and equipment company (which became Lucent Technologies,) a computer company (NCR) and a communications services company (which would remain AT&T.) It was the largest voluntary break-up in the history of American business.