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Accounting harmonisation in Europe : country effects and sector effects

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ACCOUNTING HARMONISATION IN EUROPE: COUNTRY EFFECTS AND SECTOR EFFECTS

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A THESIS SUBMITTED TO THE UNIVERSITY OF WALES IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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Aziz Jaafar
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Abstract

In measuring harmonisation, prior research has focused almost exclusively on the country of domicile of the firm in quantifying differences in financial reporting practices. However, this approach offers little by way of explanation of the impact of the harmonisation process, particularly as different financial reporting treatments may be attributable to the specific characteristics of the firms that are selected for analysis. The main aim of the present study is to address this issue and to measure *de facto* accounting harmonisation by taking into account firms' operating circumstances. Specifically, it seeks to assess the combined effects of each firm's country of domicile and sector of operations on its choice of accounting methods, together with the firm's size and international exposure, and any changes in these factors through time. In addition, it assesses the impact of sector diversifications on accounting policy choice. This research sets out the results of a statistical analysis of financial reporting harmonisation, obtained by employing a logistic regression to predict the odds of using alternative accounting methods. The policies studied concern inventory, depreciation and goodwill. The empirical results suggest that country of domicile and sector of operations are each significant determinants of the choice of accounting method across the European Union. However, country differences still appear to be greater than sector differences, even allowing for differences between countries in industrial structure, which is inconsistent with harmonized accounting. In addition, international listing and firm size appear to be significant variables. Indeed, there has been little significant change in policy choices through time amongst European firms. This leads to the conclusion that, rather than a process of convergence, a combination of structural factors at the firm level that demand different accounting treatments and barriers to harmonisation at the country level that restrict choice are the likely causes of persistent international differences in accounting. Prior research that attempts to measure harmonisation on the basis of convergence towards uniformity without allowing for the use of different accounting methods in different circumstances is entirely misinformed. Indeed, comparability between financial statements requires that the reported results reflect the different circumstances in which firms operate, and the harmonisation metric must take this into account.

CHAPTER ONE

INTRODUCTION

1.1 Background and Objectives of the Study

Increasing internationalisation of business and world-wide integration of financial markets have resulted in greater pressures for harmonisation of financial information across national frontiers (Hoarau, 1995). The pressures for improvement in the comparability of financial reporting practices arise, in principal, from the diverse interests and concern of a wide range of stakeholders. Advocates of harmonisation suggest that benefits follow from more comparable reporting because it facilitates more efficient allocation of resources and decision-making, thus reducing costs for both producers and users of financial information (Gernon and Meek, 2001). Moreover, demand for international accounting comparability stems from a need for information by the financial markets, caused by the globalisation of international capital markets, creating an awareness of accounting differences across national boundaries (Thorell and Whittington, 1994).

A number of regulatory organisations at international and regional levels, such as the International Accounting Standard Board (IASB), the International Organisation for Securities Commissions (IOSCO), the European Union (EU) and the Financial Accounting Standard Board (FASB), are either directly or indirectly involved in movements towards accounting harmonisation. These organisations have devoted significant resources and effort towards enhancing financial statement comparability and, in recent years, they have begun to coordinate development efforts in recognition of increased globalisation and the consequent need for harmonised accounting standards. The IASB, for instance, has worked progressively towards its aim of being the global standard setter and has produced a set of standards that are used in many countries throughout the world in the preparation of national

standards. Momentous support for the IASB's efforts has been achieved recently. First, the IOSCO has recommended its members to allow multinational corporations (MNCs) that are planning cross-border exchange listings to prepare their financial statements according to IAS (IOSCO, 2000). Secondly, the European Parliament passed a Regulation in 2002 requiring all listed EU firms to prepare their financial statements in accordance with IAS by 2005 at the latest (EU, 2002). In addition, in October 2002, the IASB and the FASB published a common memorandum of understanding stating their commitment on the convergence of US and international accounting standards and setting a joint short-term convergence project to achieve it (FASB, 2002).

Despite strong evidence in the extant literature that international accounting harmonisation is desirable, it has also been suggested that it may be unnecessary, given that the absence of internationally accepted accounting standards does not appear to have impeded the growth of international capital markets (Goeltz, 1991). It has also been argued that harmonisation may be harmful (Hoarau, 1995). Further, it has been suggested that harmonisation attaches priority to the needs of one category of users, i.e., investors, although other users, such as creditors and regulators, are relatively more important in some jurisdictions (Biener, 1994). Nevertheless, from the review of accounting literature, it is evident that harmonisation of accounting is a desirable exercise, and thus, the measurement of accounting harmonisation is a vital area of research.

The Measurement of Accounting Harmonisation

The measurement of international accounting harmonisation provides accounting policy makers with a means of identifying where their harmonisation efforts should be concentrated (Pierce and Weetman, 2000). In addition, it assists in the systematic evaluation of the success or otherwise of prior harmonisation efforts. Early attempts to assess accounting harmonisation exposed the lack of comparability between accounting standards issued by different regimes (e.g., Nair and Frank, 1981; McKinnon and Janell, 1984; Doupnik and Taylor, 1985), but without reference to the harmonisation process itself. The methodological problems associated with these early studies were examined in detail by Nobes (1983 and 1992), Tay and Parker

(1990) and van der Tas (1992b), and much of the research in the meantime has attempted to index financial statement comparability in order to assess the impact of harmonisation programmes.

Two major approaches to measuring harmony (a state) and harmonisation (a process) amongst financial reporting practices have been developed and applied in the extant literature: index-based techniques and statistical modelling. The index-based techniques, introduced in accounting literature by van der Tas (1988), measure a notion of harmony which is different from that adopted in the statistical modelling of the harmonisation process. The concept of harmony underpinning this approach is based on uniformity whereby maximum harmony is achieved when all firms adopt the same accounting treatment. However, a number of critics (e.g. Arwidi, 1992; Archer, Delvaille and Mcleay, 1996; McLeay, Neal and Tollington, 1999; Rahman, Perera and Ganesh, 2002) note that the index-based approach is simplistic, in that it ignores the possibility of firms operating under different conditions which justify different treatments for a given accounting item. The idea of applying distributional analysis in measuring financial reporting harmony was suggested by Tay and Parker (1990) but not operationalised. When this approach was taken further (Archer, Devaille and McLeay, 1996; McLeay, Neal and Tollington, 1999), it was based on the premise that accounting diversity is a natural result of differing operating environments. That is to say, the interfirm comparability of financial statement items will depend on the use of the accounting method that is appropriate to the firm's operating circumstances (e.g. FIFO required if and only if physical inventory movements actually follow the First In First Out convention), and not on the use of the same method by all firms (e.g. FIFO required of all firms in all circumstances).

Following McLeay, Neal and Tollington (1999), the present study reinterprets harmonisation policy by assuming that accounting will be fully harmonized when all firms operating in similar circumstances adopt the same accounting treatment for similar transactions, regardless of their domicile. In this way, if we were to assume that economic structures are similar across countries, we would expect a number of different accounting treatments to be used, but we would not expect the frequency distribution of such treatments in the corporate sector to vary across countries.

However, given that economic structures differ, under complete harmonisation we would expect the distribution of accounting treatments to vary across countries, but only to an extent that is consistent with differences in operating circumstances. Accordingly, this study employs a statistical modelling approach using logistic regression to determine, for a given firm, the odds of selecting alternative accounting treatments.

In addition, as mentioned above, the underlying assumption in prior research studies applying the index-based approach is that harmonisation leads to removal of alternative methods, and that maximum harmony is achieved when all firms adopt the same accounting treatment (e.g., van der Tas, 1988 and 1992b; Emenyonu and Gray, 1992 and 1996; Archer, Devaille and McLeay, 1995; Herrmann and Thomas, 1995; Cańibano and Mora, 2000; Pierce and Weetman, 2000; Aisbitt, 2001; Parker and Morris, 2001). This notion of harmony implies that the choice between accounting treatments will be mutually exclusive. However, a firm that diversifies its operations may require multiple accounting methods in order to appropriately capture the different nature of its accounting transactions. For instance, it is not surprising that firms may write down their fixed assets using more than one method of depreciation, as the various assets differ in nature. Indeed, this example shows that comparability between firms depends on the use by each firm of the method or methods appropriate to its circumstances. In contrast, one of the fundamental limitations of prior research studies into harmonisation measurement has been the assumption that inter-firm comparability is achieved through uniformity rather than appropriate selection, and this has led to some illogical conclusions as a result. For example, Emenyonu and Gray (1992 and 1996), Murphy (2000) and Parker and Morris (2001) each treat firms which use more than one policy for a given accounting item as a distinct subset whose financial statements are deemed not to be comparable with other firms which use only a single method. Other researchers (e.g., Herrmann and Thomas, 1995), while recognising that many firms in their sample adopt more than one method, resolve the issue by omitting them from the harmonisation metric altogether. In the present study, the binomial logistic regression model that is employed is structured so that the use of more than one accounting policy is captured in the statistical analysis.

Determinants of Accounting Policy Choice

In measuring international accounting harmonisation, most previous research studies (e.g., van der Tas, 1988 and 1992b; Emenyonu and Gray, 1992 and 1996; Archer, Devaille and McLeay, 1995; Herrmann and Thomas, 1995; Pierce and Weetman, 2000; Aisbitt, 2001; Parker and Morris, 2001) have concentrated almost exclusively on the country in which a firm is domiciled as the determinant of the firm's accounting policy choice. Since the research design focuses solely on between-country differences in the accounting policies adopted by firms, the underlying assumption in these studies has been that changes in accounting practice are caused by regulatory changes in the country where the firm is registered. However, the choice of accounting method depends not only on the firm's location and the set of regulations involved, but also on its operating circumstances (Herrmann and Thomas, 1995; Archer, Devaille and McLeay, 1996; McLeay, Neal and Tollington, 1999). Accounting diversity is the natural result of differing business circumstances, which by necessity takes their argument further to the firm-level and requires alternative accounting treatments.

Indeed, positive accounting research provides evidence that the accounting policy choices made by firms are determined not only by the regulations in force but also by factors that are specific to the firm, including its operating circumstances and managerial preferences, all of which will result in a diversity of accounting treatments (Watts and Zimmermann, 1986 and 1990). This raises the doubt as to whether harmonisation endeavours based only on inter-country regulatory uniformity will filter through to actual accounting practices, and it follows therefore that the measurement of harmonisation simply on the basis of between-country differences in accounting practices is likely to be misleading. In this regard, Aisbitt (2001) argues that past attempts to associate changes in harmony with a single factor such as legislation were clearly not successful because firms do not prepare their financial statements in a vacuum, and that other factors, including changes in non-legislative regulations, developments in accounting practice and thought, firm-specific factors and the demands of the market, also play a significant role in accounting policy choice. Rahman, Perera and Ganesh (2002) also argue that

differences in firm characteristics should be accounted for when assessing the impact of harmonisation policies, and they provide evidence with a comparison between Australia and New Zealand that the sector of operations is one of the important determinants of accounting practice harmony.

There is already an extensive body of research concerning the firm-level and industry-level determinants of financial reporting practices. This is particularly so with respect to the extent of financial disclosure. For instance, Cooke (1992) finds that manufacturing firms disclose more information than non-manufacturing firms. Meek, Roberts and Gray (1995) argue that proprietary costs may differ across industries, which accounts in part for inter-sectorial variability in disclosure. Firm size is another important determinant (Christie, 1990), and the evidence shows that larger firms provide more voluntary disclosures (e.g., Cooke, 1992; Meek, Roberts and Gray, 1995; Ashbaugh, 2001). Since larger firms generally have a higher level of analyst following, the costs of information dissemination are reduced, but higher political costs caused by higher public exposure, and higher agency costs caused by more widely dispersed ownership, also result in larger firms voluntarily making more disclosures (Lang and Lundholm, 1993). Foreign listing is also associated with more information disclosure (Cooke, 1989; Malone, Fries and Jones, 1993). Such firms face additional capital market pressures, including stock exchange requirements, which may motivate them to increase their level of disclosure. Firm-specific attributes are indeed important in determining disclosure policies, and this also applies to their accounting policy choices. In the international context, for example, Leuz and Verrecchia (2000) demonstrate how size, financing needs and performance positively affect the firm's international reporting strategy. Yet most previous attempts at measuring accounting harmonisation have ignored this aspect. It is therefore the aim of this study to address these issues, and to measure the impact of financial reporting harmonisation on accounting policy choice by taking into consideration firms' operating conditions and other characteristics. In particular, this study seeks to assess the combined effects of each firm's country of domicile and its sector of operations on its choice of accounting methods, together with the effect of a firm's size, internationality and any changes in these factors through time.

To summarise, the main objectives of this thesis is to measure the impact of accounting harmonization on accounting policy choice by taking into account firms' operating conditions and other characteristics. Specifically, it seek to demonstrate the combined effects of country of domicile and sector of operations on the choice of accounting methods, together with size, international exposure and changes through time. Secondly, this study presents a statistical analysis of financial reporting harmonisation employing the logistic model to predict the odds of using alternative accounting methods. Finally, it also attempts to assess the effects of diversification across different sectors of operations on accounting policy choice.

1.2 Research Implementation

The present research study focuses on the measurement of the impact of financial reporting harmonisation on accounting policy choice by taking into account operating circumstances and firm-specific attributes. To achieve these objectives, the approach followed is that introduced by Archer, Devaille and McLeay (1996) who applied a hierarchy of nested statistical models based on logistic Poisson regression to measure the degree of harmonisation with respect to the treatment of goodwill and deferred taxation for European interlisted firms. This statistical model was developed further by McLeay, Neal and Tollington (1999) when they analysed goodwill accounting practices in Europe. This study also employs a statistical modelling approach, in this case using the binomial logistic regression to assess the effects of each firm's country of domicile and its sector of operations on accounting policy choice, together with the effect of its size and international exposure, and any changes in these factors through time. The research study was divided into four main stages:

Stage 1

All the relevant articles on financial reporting harmonisation and accounting policy choices were listed using a number of database search programmes including FirstSearch, ZETOC and Web of Science. The main purpose of this stage was to review the extant literature and particularly to identify the various terms associated with financial reporting harmonisation, and to analyse efforts undertaken by both

national and international organisations to promote harmonisation. In addition, previous research studies on accounting policy choices were also identified in order to determine factors underlying managerial preferences and other criteria on selecting accounting methods.

Stage 2

The main objective of this study, as mentioned in Section 1.1, is to measure the impact of financial reporting harmonisation on accounting policy choice. Once again, prior research studies focusing on the harmonisation measurement approaches were identified using the database search programmes. Two main approaches to measuring harmonisation amongst financial reporting practices have been identified: the index-based approach and statistical modelling. The present study employs the statistical modelling approach since it provides a richer interpretation into harmonisation process (McLeay et al., 1999) than the use of index measures.

Stage 3

The data for this study was hand-collected from actual annual reports of quoted firms domiciled in the European Union countries, except Greece and Luxembourg, with respect to three accounting policies: inventory costing, depreciation of fixed assets and goodwill arising on consolidation. These annual reports were collated either from the Global Access database, microfilms or firms' websites. All relevant information needed for the statistical model was recorded in spreadsheets as a dataset. The final number of sampled firms was 541, 673 and 698 during the financial years ending 1991/92, 1994/95 and 1998/99 respectively.

Stage 4

The binomial logistic regression analysis was employed to estimate the statistical models. The statistical analysis compares a hierarchy of nested linear logistic models to describe the odds of adopting a given accounting policy relative to not adopting accounting policy as a function of a different set of regressors. Data analysis and all estimations in the model were carried out using Minitab and Generalised Linear Interactive Modelling GLIM 4 (Francis, Green and Payne, 1993).

1.3 Main Empirical Results

The main empirical findings with regard to each of accounting methods examined in this thesis, i.e., inventory costing method, goodwill on consolidation and depreciation of fixed assets, are summarised below:

Inventory Costing Methods

The results indicate that the country of domicile and sector of operations are each highly significant ($p < 0.001$) in influencing the use of all inventory methods, i.e., average cost, First-In First-Out (FIFO) and Last-In First-Out (LIFO). Overall, disharmony is the main characteristic of the results, with the average cost method dominating in countries such as Austria and Spain and FIFO dominating in Sweden and Finland. By comparison, reductions in deviance of main effects demonstrate that country of domicile is far greater than that found in sector of operations. In addition, the interactions between main effects (i.e., country of domicile and sector of operations) and firm specific attributes (i.e., listing status and size) reveal that they are significant variables in determining inventory method. However, the *Country.Time* and *Sector.Time* interactions show that there has been little change through time in the pattern of adopting inventory policies across Europe. On the whole, when main effects and interaction effects are accounted for jointly in explaining inventory method choices, the country of domicile dominates the sector of operations, with the proportion of deviance explained by all country effects being approximately five times greater than the equivalent sector effects.

Goodwill Arising on Consolidation

The p-values for all goodwill cases are highly significant ($p < 0.001$) demonstrating that a firm's country of registration is an important determinant of goodwill policy choice. It is also revealed that a firm's sector of operations is a significant explanatory factor of goodwill policy choices, except in the case of amortisation between 11-20 years. Again, by comparison, reductions in deviance of main effects demonstrate that country of domicile is far greater than that found in sector of operations. When fitting *Country.Listing* and *Country.Size* interactions, the model improvement is generally significant indicating that firm-specific attributes are indeed important in influencing goodwill policy choice. This is also the case in

Sector.Listing and *Sector.Size* interactions. However, it is the *Country.Time* and *Sector.Time* interactions that are a major feature in that the results show the substantial changes in fitted probabilities arising from the considerable changes that have taken place in selecting goodwill methods in the 1990s due to a switch at the sample level from the immediate write-off to amortisation methods. Overall, it remains the case that the country effect and its interactions contribute significantly more to the explanation of variability between companies in their choices of goodwill than the sector effect and its interactions, the proportion of the explained deviance attributable to all country effects being approximately three times as much as that attributable to all sector effects.

Depreciation of Fixed Assets

The reductions in deviance demonstrate that a firm's country of domicile and sector of operations are each important in determining depreciation policy choice. The results also indicate that firm-specific characteristics (i.e., listing status and size) are also significant explanatory variables. The fitted probabilities indicate that there is a high degree of uniformity in that the straight-line method is the dominant approach across Europe. It is also shown that the declining-balance method is favoured by firms operating in jurisdictions where financial reporting is strongly affected by tax considerations such as in Germany, France and Belgium. In comparison with the country effects, the reductions of deviance indicate that sector of operations is important in explaining the choice of unit-of-production method. Overall, however, country effects explain more firm-level behaviour in depreciation policy preferences than sector effects (the error explained by country main effects and interactions is more than three times greater than by the respective sector effects).

The present study also assesses the diversification effects across different sectors of operations on accounting policy choice. The results demonstrate that sector diversification is an important element in the choice of accounting methods especially if firms operate in Mining, Construction or Manufacturing sectors. Thus, the association between firm operating conditions and financial reporting harmonisation implies that caution needs to be exercised in seeking to achieve harmony only through inter-country standardisation. In this respect, the results are

similar to those documented in prior research, which have suggested that the context within which different firms operate is an important factor in understanding the process of accounting harmonisation (e.g., Archer et al., 1996; McLeay et al., 1999; Aisbitt, 2001; Rahman et al., 2002).

As shown above, the overall results demonstrate that country of domicile and sectors of operations are each a significant determinant in accounting policy choice across Europe. However, country differences appear to be far greater than sector differences, even allowing for differences between countries in industrial structure. Firm-specific characteristics, such as listing status and size, also appear to be significant explanatory variables in accounting policy choice. Therefore, the present study suggests that harmonization efforts should take account of sector differences and other firm-characteristics that might influence the choice of accounting policies, to ensure that the policy debate is informed about the likelihood of firms in similar contexts adopting the same accounting treatments.

1.4 The Contributions made by this Research

The main contribution of this thesis is to demonstrate how, by taking into account the operating conditions of firms and certain other characteristics that may influence their choice of accounting policies, this will bring about an improvement in measuring accounting harmonization. Specifically, the thesis

- Presents a statistical analysis of financial reporting that employs a structured logistic model in order to predict, for a given firm, the odds of using alternative accounting methods.

- Restructures the binomial logistic regression to avoid a pitfall that is common in previous research where outcomes have usually been treated as mutually exclusive, such that the use of more than one accounting method by a single firm that diversifies its interests may now be captured accurately in the statistical analysis.

- Assesses the effects of each firm's sector of operations on its choice of accounting methods and the constraints that may be associated with its country of domicile, together with the effect of a firm's size, international exposure and any changes in these factors through time.

Based on the understanding that full harmonisation would be achieved when all firms operating in similar circumstances account for their performance in the same way, this leads to the expectation that firms operating in the same industry would be likely to account in a similar way regardless of their domicile. Empirically, it is shown in this thesis that pronounced differences across EU member states still persist at the end of the 1990s. Moreover, the statistical effect of this domicile variation is shown to be greater than the variation that may be attributed to sector differences. This is taken as an indication of the continued existence of structural barriers to full harmonisation, that changed little in the period following the EU's initial harmonisation programme, which is also evident after controlling at the firm level for the influence of size and international exposure.

In arriving at these conclusions from the empirical analysis, the present thesis provides an analysis of accounting policy choices and harmonisation using data that has been compiled by the author from the annual reports published by a wide cross-section of firms domiciled in the European Union, for three different periods in the 1990s. This also represents an important contribution, as the use of data compiled from original sources overcomes a further shortcoming that is evident in some prior research studies that employed secondary data from commercial suppliers of financial information, which are shown here to suffer from serious inaccuracies and ambiguities. With regard to the policy implications of the study and its incremental contribution to robust analysis in this area, the thesis evaluates these with an in-depth analysis of the development of international accounting harmonisation and a critique of the associated harmonisation measurement research literature.

1.5 Organisation of the Dissertation

This dissertation is presented in seven chapters. Following this introduction, Chapter Two presents a general overview of the international accounting harmonisation literature. In particular, it seeks to define various terms associated with accounting harmonisation, to describe efforts undertaken by international organisations in promoting comparability of financial statements and to discuss the rationales, benefits of and obstacles to financial reporting harmonisation. In addition, this chapter explains the different aspects of international accounting harmonisation research studies that have been conducted in the accounting literature.

Chapter Three reviews the specific literature on accounting harmonisation measurement and provides an in-depth description on measurements techniques developed and applied in prior research studies. This discussion highlights on a number of limitations associated with previous works that provides opportunities for the present study to develop a better technique and understanding of accounting harmonisation measurement methods.

Chapter Four provides a review of prior literature on the determinants of accounting policy choices in the preparation of the firm's financial statements. These factors include institutional framework, managerial preferences and firms' specific characteristics. In addition, this chapter examines the determinants of policy choices on three specific accounting issues selected for the purpose of the present study i.e., inventory costing, goodwill arising on consolidation and depreciation of fixed assets. This analysis is important as it provides evidence that the accounting policy choices made by firms are determined not only by the regulations in force but also by factors that are specific to the firm, including its operating circumstances and managerial preferences.

Chapter Five focuses on the research methodology and data, which is the backbone of this thesis. It begins with background information on the binomial logistic regression followed by a description of statistical modelling which incorporates the main effects and interactions. Details of the sample selection, data sources and data

collection are then discussed. This chapter ends with an exploratory data analysis on the accounting issues selected for the present study, i.e., inventory costing, goodwill on consolidation and depreciation of fixed assets.

In addition to the country of domicile, the present study also considers the sector of operations as a main effect in measuring accounting harmonisation across the EU. Two firm-level attributes, i.e., size and listing status, that might be associated with the choice of accounting method are also added, and allowed to interact with both the country of origin and the sector of operations. In addition, the three points in time at which financial reporting practices were observed are dealt with as a covariate, which also interacts with the main effects to allow for different evolutionary paths in different countries and sectors. The empirical results reported in this study, based on the binomial logistic regression analysis, are reported in Chapter Six.

Finally, Chapter Seven gives a summary of the research and the methodology employed. In order to place the results in context and to demonstrate the contribution of this thesis with regard to measurement of accounting practice harmonisation, the findings of the present study are compared with previously published results. In addition, the implications of the results for accounting harmonisation are discussed and possible avenues for further research into the measurement of financial reporting practice are suggested.

CHAPTER TWO

INTERNATIONAL ACCOUNTING HARMONISATION

2.1 Introduction

The internationalisation of economies, and particularly of capital markets, has resulted in a greater need for harmonisation of financial information across national frontiers (Hoarau, 1995). The needs for improvement in the comparability of financial reporting and disclosure by companies arise from the diverse interests and concern of a wide range of organisations. These pressures are based on the premise that accounting harmonisation enables more informed international comparisons of economic and investment opportunities.

The objective of the present chapter is to provide a review of literature on international financial reporting harmonisation. In particular, it seeks to offer definitions of various terms associated with accounting harmonisation, to describe efforts undertaken by interested organisations in promoting comparability of financial statements and to discuss the rationales, benefits of and obstacles to financial reporting harmonisation. In addition, this chapter explains the different aspects of accounting harmonisation research studies that have been conducted in the extant literature.

This chapter is organised as follows: the next section defines key concepts used in this research such as harmony and harmonisation, standardisation, uniformity, comparability, equivalence and mutual recognition. Attempts to achieve international financial reporting comparability by a number of organisations including the IASB, EU, UN, IOSCO and OECD are described in Section 2.3. Motivations for and obstacles to harmonisation are summarised in Section 2.4 and

2.5 respectively. Section 2.6 examines the various aspects of accounting harmonisation literature and finally, Section 2.7 offers concluding remarks.

2.2 Definition of Concepts

This section defines the terms 'harmony' and 'harmonisation' of financial reporting used in the extant literature and their relationship to 'standardisation', 'uniformity' and 'comparability'. These concepts are applicable both at a national and at an international level, although prior research studies are mainly focused on the latter. In addition, other concepts associated with accounting harmonisation, such as 'equivalence' and 'mutual recognition', are clarified in this section.

Harmony and Harmonisation, Uniformity and Standardisation

In previous research studies, the concepts of harmony and harmonisation have been defined in a number of different ways. According to Tay and Parker (1990), harmony is a point on the continuum between the two states of total diversity and total uniformity. At one end, complete diversity means each firm adopts a different method to account for a given item; at the other end complete harmony, also called uniformity, means that every firm uses the same accounting treatment. Emenyonu and Gray (1996) characterize harmony as a state measured at a point of time, but harmonisation as a process measured by comparing harmony at different times. Hoarau (1995) interprets harmonisation as a political process which aims to reduce differences in financial reporting practices across the world in order to achieve compatibility and comparability. Other similar definitions of harmonisation offered by previous researchers are illustrated in Table 2.1.

Table 2.1 Definitions of Harmonisation

Author(s)	Definitions
Arpan and Radebaugh (1985)	A process of setting boundaries to the degree of variation among accounting practices.
Doupnik (1987)	The process by which differences in financial reporting practices among countries are reduced.
van der Tas (1988)	Harmonisation is coordination or tuning of two or more objects.
Tay and Parker (1990)	A process which entails a movement away from total diversity of practice.
Weetman, Adams and Gray (1993)	A process of improving the comparability of financial statements by limiting the degree to which accounting practices can vary.
Mathews and Perera (1996)	The reconciliation of different accounting and financial reporting systems by fitting them into common broad classifications so that form becomes more standard while content retains significant differences.
Saudagaran and Meek (1997)	A process by which differences in financial reporting practices among countries are reduced with a view to making financial statements more comparable and decision useful across countries.
Nobes and Parker (2002)	A process of increasing the compatibility of accounting practices by setting bounds to their degree of variation.

As shown in the above definitions, it is assumed that the degree of harmonisation increases as the number of firms adopting the same accounting policy increases. However, Archer, Delvaille and McLeay (1996) argue that this notion ignores the possibility that firms may be subject to different operating conditions which arguably justify the use of correspondingly different accounting methods. For instance, differences in economic circumstances, financing arrangements, legal structures as well as firm-specific characteristics could influence firms' accounting policy choice. Thus, they define international harmony as:

> '....a state of international harmony exists when, other things being equal, the odds of selecting a given accounting method are identical in each country' (Archer, Devaille and McLeay, 1996, p. 3).

As demonstrated by them, this alternative approach to international harmonisation allows for within-country, between-country, inter-temporal, and firm-specific differences in accounting policy choice. McLeay, Neal and Tollington (1999) further develop this notion of harmonisation, by arguing that the use of uniform accounting

method does not necessarily enhance comparability. They suggest that international harmony should be viewed as a state in which firms located in different countries are able to use an internationally-recognised accounting method that is suitable to their operating conditions without being constrained to do otherwise by local accounting regulations or practices. This leads them to define international harmonisation as:

> '.....a process which results in a systematic choice between accounting methods dependent upon the nature of the firm and its operating environment but otherwise independent of the location in which the firms happens to be registered' (McLeay, Neal and Tollington, 1999, p.43).

The present study builds on the concept of accounting harmonisation proposed by Archer, Devaille and McLeay (1996) and McLeay, Neal and Tollington (1999). Specifically, in addition to a firm's country of domicile, it also takes into consideration firm's operating circumstances and specific characteristics such as sector of operations, internationality and size impact on accounting policy choice.

The concept of harmonisation and standardisation has been used interchangeably in the accounting literature. However, Tay and Parker (1990) distinguish between harmonisation and standardisation in terms of relative flexibility or strictness in their application i.e., standardisation applies to situations where regulations and practices are increasingly strict or rigid, resulting ultimately in a state of uniformity. Similarly, Choi, Frost and Meek (1999) defined standardisation as the imposition of a rigid and narrow set of rules, and this may even apply a single standard or rule to all situations. In other words, standardisation is a movement away from total diversity towards total uniformity. Most (1994, p.4) differentiates between uniformity, standardisation, and harmonisation as follows:

1. Uniformity – the elimination of accounting alternatives in accounting for economic transactions, other events, and circumstances.
2. Standardisation – the reduction of alternatives while retaining a high degree of flexibility of accounting response.

3. Harmonisation – the reconciliation of different accounting and financial reporting systems by fitting them into common broad classifications, so that form becomes more standard while content retains significant differences.

From a statistical modelling approach however, McLeay, Neal and Tollington (1999) espouse a slightly different view by suggesting that whilst international standardisation implies a movement towards global uniformity, harmonisation implies a movement towards similarity in the choice between alternative accounting treatments.

Formal, Material and Spontaneous Harmonisation

Van der Tas (1988) differentiates between the concepts of formal, material and spontaneous harmonisation. Formal harmonisation refers to harmonisation of the financial reporting standards including legal, regulations and guidelines. On the other hand, material harmonisation is the harmonisation of the accounting practices actually adopted in the financial statements, while spontaneous harmonisation arises from market forces and not from regulations. Alternatively, Tay and Parker (1990) adopt different terms, i.e., *de jure* and *de facto* harmony, to identify the same concepts. *De jure* harmony refers to the extent that regulations in company acts, law, accounting standards, etc. are uniformed. On the contrary, *de facto* harmony refers to the actual practices of firms, that is, to their disclosed accounting policies. *De jure* harmony and formal harmony are in fact equivalent terms, as are material harmony and *de facto* harmony, while spontaneous harmony is a subset of material harmony (Parker and Morris, 2001).

In the present study, the objective is to measure financial reporting practice, which is studying material or *de facto* harmonisation. Ball, Kothari and Robin (2000) argue that there are numerous advantages of studying actual financial reporting over simply examining the standards. For instance, much accounting practice is determined by rules, rules lag innovations in practice; and firms invariably do not follow the rules. The extent to which accounting practice is determined by formal standards varies internationally, and the incentive to follow accounting standards depends on penalties under different enforcement institutions, thus examining

accounting rules *per se* is incomplete and potentially misleading in an international context. In addition, given that the ultimate aim is to enhance the comparability of financial information, then any measure of success in the context of international accounting harmonisation would seem best focused on the actual accounting practices (Emenyonu and Gray, 1992).

Comparability

Comparability is one of the qualitative characteristics of accounting information in conceptual framework documents (Belkaoui and Jones, 1996). According to Hoarau (1995), comparability of financial information appears to be necessary a condition for a better allocation of resources at an international level and a reduction of transaction costs. Van der Tas (1992) argues that comparability increases when the result of the choice that firms make between alternative accounting methods becomes concentrated on one or only a limited number of accounting methods, even where the number of available methods remain the same. *Ceteris paribus*, the greater the level of convergence in accounting standards, the greater should be the level of comparability between accounting reports (Parker and Morris, 2001). On the contrary, Archer, Devaille and McLeay (1996) and McLeay, Neal and Tollington (1999) argue in their papers that this notion of comparability ignores the fact that firms may be subject to different circumstances which arguably justify the use of correspondingly different accounting treatments in respect to a particular item. Thus, according to the authors, it is the availability of alternative accounting treatments and the use by individual firms of the appropriate methods that generates accounting information which are comparable.

The Accounting Standard Board's (ASB) Statement of Principles identifies comparability as an important element that makes financial accounts useful. Meaningful comparisons can only be achieved between the operating results and financial position of different periods for the same entity or between different entities, if the accounts are prepared on a consistent basis and the accounting policies, are sufficiently disclosed. However, the need for comparability should not be confused with mere uniformity and should not be allowed to become an impediment to the introduction of improved accounting standards.

Comparability is affected by the accounting policies adopted by the firm and particularly by two characteristics of accounting policies: consistency and disclosure (Flower and Ebbers, 2002). For information to be comparable, it must be measured and presented consistently in three different ways: within the firm, over time for the firm and between firms. In addition, in order for users to be able to compare financial data, they must be informed of the accounting policies used in their preparation and particularly of any changes in these policies. These policies should disclose all relevant information about the enterprise. Moreover it is useful if financial statements present information not only for the current period, but also comparable information for previous periods.

Equivalence and Mutual Recognition

The notion of 'equivalence' which was introduced by the EU Seventh Directive, implies that financial statements can be equivalent even though they are prepared in accordance with different requirements, provided that additional information is disclosed to explain the effects of the use of different accounting regimes. For instance, the Directive allows certain exemptions for accounts which are drawn up in a manner 'equivalent' to those prepared according to the Directive. However, as stated by Cairns (2000a), the Directive does not define, nor provide, any implementation guidance on what is meant by equivalent.

Another mechanism whereby international accounting harmonisation can be achieved is through the concept of mutual recognition. In the basic form of mutual recognition, country A should accept the financial statements of a firm from country B and vice versa, regardless how and on what basis they are being prepared. For example, where a firm in one member state wishes to seek listing on another EU stock exchange, it can draw up accounts in accordance with its home country's accounting regulations with the second country's stock exchange (Cairns, 1997). The US Financial Accounting Standards Board (FASB) has a policy of fostering mutual recognition on a bilateral basis between the US and other individual countries, such as Canada, by means of joint projects to develop compatible standards (Beresford, 1990). Although this form of mutual recognition allows the

greatest possible flexibility for preparers, it shifts the burden onto users of financial statements (Cairns, 1994; Schuetze, 1994). Moreover, the mutual recognition approach suffers another drawback, i.e., the lowest-common-denominator syndrome, in which managers of some firms may not necessarily act in the best interests of investors by factually and openly reporting financial information. This approach is unlikely to achieve worldwide acceptance, particularly where regulatory concern with investor protection is vital, such as in the US (Gleeson, 1998).

Another approach to mutual recognition involves the harmonisation of at least the core issues or acceptable international benchmark. Compliance with a common denominator set of standards would be necessary. Under this form of mutual recognition, country A would accept the financial statements of a firm from country B only if those financial statements conform with the national requirements of country B and the international benchmark and vice versa. Mutual recognition with an acceptable international benchmark recognises that national financial reporting differences are originated from a variety of social, economic and legal conditions. Cairns (1994) suggested three possibilities as the international benchmark: the US GAAP, the EU Directives and the IASB standards. However, in recent developments, the EU has abandoned this idea and required that all listed firms prepare their accounts in accordance with the IASB standards by the year 2005.

2.3 International Accounting Harmonisation Efforts

International pressures for improvement in the comparability of accounting information by firms arise from the diverse interests and concerns of a wide range of participant groups and organisations. Among these, the most significant bodies are the United Nations, the Organisation for Economic Cooperation and Development, the European Union, the International Organisation of Securities Commission and the International Accounting Standards Board.

2.3.1 The United Nations (UN)

The United Nations became involved when a group of experts, appointed to study the impact of multinational corporations, advocated the formulation of an international, comparable system of standardised accounting and reporting. In particular, it reviews the reporting practice by multinational corporations (MNCs) and recommends a list of minimum items that should be included in financial reports. The motivation was the demand of the host countries that MNCs disclose more detailed information about their operations in each country in which they operated. The group produced a series of recommendations, but they have been ignored by the MNCs (Walton, Haller and Raffournier, 1998). In 1999, the working group of the United Nations Conference on Trade and Development (UNCTAD) published 'Agreed Conclusions and Recommendations' for financial issues. Their conclusions go a long way in explaining the UN's position on harmonisation. Hence, as a rule maker, it appears that the UN has a very little impact on the actual practice of the MNCs (Flower and Ebbers, 2002).

2.3.2 The Organisation for Economic Cooperation and Development (OECD)

The OECD is an intergovernmental organisation whose members include 24 industrialised countries in Europe, Asia, North America and Australia. It was established in 1961 to promote economic cooperation among its members and has from time to time displayed an interest in financial reporting, although this has never been its major concern.

In 1976, a set of Guidelines for Multinational Enterprises was issued, which were mainly concerned with disclosure requirements of MNCs. These guidelines, which were based on the US standards for segmental reporting, have had some influence on the conduct of MNCs. In addition, they promotes research and issues reports on other aspects of financial reporting; areas that it has undertaken include environmental accounting and intangible assets. In 1985, it organised a forum on harmonisation of accounting standards at which a list of major items requiring

further harmonisation was presented. This forum was the basis which prompted the IASC into the comparability project it undertook between 1989 and 1995 (Salter, Roberts and Kantor, 1996). Nevertheless, in the field of financial reporting, the OECD has never gone further than issuing voluntary recommendations on a number of disconnected subjects. It has never aimed to be the global rule-maker for financial reporting.

2.3.3 The European Union (EU)

The European Union was established by the Treaty of Rome on March 25, 1957 with six original Member States. The group has expanded its membership to currently fifteen nations: Austria, Belgium, Denmark, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, the Netherlands and the United Kingdom. In May 2004, another ten European country, mostly former Eastern Block countries, Cyprus and Malta, joined the group making it one of the largest trading nations. One of the fundamental objectives of the EU is to allow free mobility of capital, labour and enterprise, as well as trade, across the borders between member countries. Arguably, the free flow of financial information resulting from the harmonisation of accounting practice is thus one of the necessary conditions for achieving this objective.

The EU has been involved in the international harmonisation of accounting and financial reporting standards since the mid 1960s as part of its company law harmonisation programme. It attempts to harmonise laws and accounting regulations through two main mechanisms: Directives, which must be incorporated into the laws of Member States; and Regulations, which become law throughout the EU without the need to pass through national legislatures. Table 2.2 lists the Directives and Regulations that have been issued by the EU. The Commission has stressed that the harmonisation pursued through implementation of the directives does not necessarily mean uniformity. Rather, the objective is the comparability and equivalence of financial information (Van Hulle, 1993). The most important directives which directly relate to corporate financial reporting are the Fourth and the Seventh Directives.

The Fourth Directive, which was approved in 1978, includes requirements relating to information disclosure, classification and presentation of information, and methods of valuation and the overriding requirement of true and fair view. The objective of the directive was not to produce uniformity but rather to bring about a coordination of existing legal requirements. An important feature of the Fourth Directive is its detailed requirements concerning the principles and application of historical cost accounting. In addition, the directive incorporates disclosure requirements that have significantly increased the level of information disclosed in many of the EU countries. Overall, the Fourth Directive seems to have been very much a starting point in the harmonisation process. Its inherent flexibility concerning measurement and valuation principles and its lack of comprehensiveness leaves much to be desired (Radebaugh and Gray, 1997). Nobes (1997) suggested that the Directive resulted in more of a disclosure document than a change in accounting measurement practices.

The Seventh Directive, which was approved in June 1983, addresses the issue of consolidated financial statements. It requires EU firms which meet certain conditions to publish consolidated accounts. The principle of legal power of control determines the consolidation obligation. However, a subsidiary can be excluded if its activities are so different that the inclusion of the undertaking would prevent the group financial statement from providing a true and fair view.

The implementation of the directives into national laws brought changes to the legal accounting requirements, with varying significance for the Member States. For instance, detailed account formats were prescribed by law for the first time in the UK. Similarly, for Italy and Spain, where only general but no specific requirements regulating the form or content of accounts had existed in firm law prior to the implementation of the Fourth Directive (Thorell and Whittington, 1994). In addition, the purpose of financial statements changed in many Member States. While in many European accounting systems individual accounts had the almost exclusive purpose, traditionally speaking, to determine the basis of tax and dividend payments, the aim of financial reporting has also shifted towards providing useful information for the

business community. In this respect, group accounts in particular have increasingly become recognised as a basis for investment decisions.

Prior research into the effectiveness of these Directives has found mixed results. In addition, in order to assess whether the efforts of the directives have been a success, one has to be aware that the issue of harmonising financial reporting across the European Union was a highly political task (Haller, 1995). For instance, the FEE surveys (1989 and 1993) concluded that where the Directives provide detailed regulations, there is a fairly high level of harmonisation among countries whose financial accounts were examined. On the other hand, it also demonstrates that there are many detailed areas in which the EU has not yet sought to harmonise accounting practice and within which there are significant variations of practice across EU member countries. The EU accounting legislation has provided a base for harmonisation, with regard to reporting requirements for limited liability firms. These findings were also supported by the work of Emenyonu and Gray (1992).

Table 2.2: List of EU's Company Law Directives and Regulations

Directives	**Subject**	**Year Adopted**
First	*Ultra vires* rules	1968
Second	Separation of public companies, minimum capital, distributions	1976
Third	Mergers	1978
Fourth	Formats and rules of accounting	1978
Fifth	Structure, management and audit of companies	-
Sixth	De-mergers	1982
Seventh	Consolidated Accounts	1983
Eight	Qualifications and work of auditors	1984
Ninth	Links between public company groups	-
Tenth	International mergers of public companies	-
Eleventh	Disclosures about branches	1989
Twelfth	Single member company	1989
Thirteenth	Takeovers	-
Fourteenth	Employee information and consultation	-
Regulations		
Societas Europaea	European company subject to EU laws	-
European Economic Interest Grouping	Business form for multinational joint ventures	1985
International Standards	Use of IASs for consolidated accounts and a mechanism for their endorsement	2002

In the mid 1990s, the EU realised that financial statements prepared by European MNCs in accordance with their national legislation, based on the Directives do not meet the different standards required elsewhere in the world for international capital market purposes. These firms are thus obliged to prepare two sets of accounts, one set which is in conformity with the Directives and another set which is required by the international capital markets. This situation is viewed as unfavourable and costly, and the provision of different figures in different environments is confusing both to investors and to the public at large. As a result in 1995, the EU adopted an important change in its policy on accounting harmonisation, i.e., to permit large European MNCs or 'global players' to present their consolidated accounts in accordance with the IASC standards (EU, 1995). This event seemed to imply a *rapprochement* between the European Commission (EC) and the IASC (Flower, 1997). In addition, it has demonstrated that the EC is prepared to be flexible and to accept standards for the consolidated accounts of large European MNCs that deviate substantially from those enshrined in its directives.

The Commission also agreed to look at the possibility of changing the directives to remove conflicts with IASs and as a result the Commission published in 2000 an amendment to the Fourth Directive. In addition, the Commission agreed that large EU firms should be allowed to present IAS consolidated financial statements, provided that those financial statements also complied with the Fourth and Seventh Directives. Subsequently, several Member States introduced national laws which allow their large firms to publish consolidated financial statements that comply with IASs (and the directives) in place of national requirements.

In its further efforts to harmonise works with the IASC, the Commission adopted its 'Communication the EU's Financial Reporting Strategy: The Way Forward' in the year 2000 (EU, 2001). The Communication presented a proposal for a regulation that would require all EU listed firms to prepare consolidated accounts using the IAS standards in 2005 by the latest. This proposal has been broadly endorsed by the European Parliament as a Regulation in March 2002 (IASB, 2001). Unlike Directives, EU Regulations have the force of law without requiring transposition into national legislation. In addition, Member Countries have the option to extend

this requirement to unlisted firms and the preparation of individual accounts. This Regulation would also establish a new EU mechanism to assess and to decide whether to endorse IAS on the basis of Commission recommendations. In addition, an accounting technical committee has been set up as a private-sector initiative, named the European Financial Reporting Advisory Group (EFRAG). This committee would provide technical expertise concerning the use of IAS within the European legal environment and would participate in the accounting standard setting process, and organise the coordination within the EU of views concerning IASs. This initiative signals the EU's intention to remove financial reporting differences as a step forward towards the development of integrated capital markets to improve capital raising efficiency while preserving investor protection.

2.3.4 International Organisation of Securities Commission (IOSCO)

IOSCO was established in 1974 as the Interamerican Conference of Securities Agencies and Similar Organisations, and adopted its current name and wider scope in 1983. IOSCO is a federation of regulators of securities and futures markets, with other organisations as affiliate members, from over 100 countries. Its objectives are to promote high standards of securities regulation, to exchange information for the development of domestic capital markets, to internationally harmonise securities rules, and to work across borders to implement and enforce securities laws (IOSCO, 2003).

In order to respond to the significant growth in cross-border capital flows, IOSCO has sought to facilitate cross-border offerings and listings. IOSCO believes that cross-border offerings and listings would be facilitated by high quality, internationally accepted accounting standards that could be used by incoming multinational issuers. Thus, IOSCO worked with the International Accounting Standards Committee (IASC) as the latter sought to develop a complete set of international accounting standards. IOSCO urged the IASC to ensure that their standards were sufficiently detailed and complete, contained adequate disclosure requirements, and were prepared with a visible commitment to the needs of the users of financial statements.

In 1989, IOSCO gave its support to the IASC's comparability project and participated in the development of *E32 Comparability of Financial Statements* and the subsequent *Statement of Intent on the Comparability of Financial statements*. IOSCO completed a review of the accounting principles issued by the International Accounting Standards Committee (IASC) in 1994. As a result of this review, IOSCO identified standards that needed to be improved before it would consider endorsing IASC standards as a basis for the preparation of financial statements to be used in cross-border offerings and listings.

In 1995, IOSCO reached an agreement with the IASC that it would consider endorsing IAS standards for use in cross-border securities offerings if the IASC put in place 30 core standards that satisfied IOSCO's requirements. The deadline for the process was 1999. Although the IASC had the core standards in place by the end of 1999, IOSCO did not give endorsement until May 2000. The endorsement was not unconditional; in its report on IAS, IOSCO mentioned a number of points where an IAS should be supplemented by additional reconciliations, disclosures or interpretations as stated in the following (IOSCO, 2000):

> ... that IOSCO members permit incoming multinational issuers to use the 30 IASC 2000 standards to prepare their financial statements for cross-border offerings and listings, as supplemented in the manner described in the "supplemental treatments", where necessary to address outstanding substantive issues at a national or regional level.

The collaboration between IOSCO and the IASC has had important effects on the latter's activities. It has led to a significant tightening of the rules laid down in IASs. In the first 15 years of its existence the IASC issued some 30 IASs, but they permitted so many alternative accounting treatments that they had little impact on the diversity of financial reporting internationally (Cairns, 2000).

2.3.5 The International Accounting Standards Board

The International Accounting Standards Board (IASB), formerly the International Accounting Standards Committee (IASC), was founded in 1973 through an agreement made by accountancy professions from nine countries. It is essentially a co-ordinating body, which relies on the voluntary co-operation of its constituent bodies to encourage harmonisation of national standards in accordance with its own standards. Its objectives include formulating and publishing in the public interest accounting standards to be observed in the presentation of financial statements and to promote their worldwide acceptance and observance. Despite the voluntary nature of the IASC's standards, there has been wide international support for its work, and it has been productive (Thorell and Whittington, 1994). Being the most influential body and the one which is furthest advanced in matters of harmonisation, it currently has a membership of 100 professional accounting bodies from seventy-eight countries and has issued more than 40 international standards (Table 2.3).

In its early years, the IASC issued consensus standards, which were essentially summaries of accepted practice in various countries, allowing a wide choice of methods. These reflected the lack of authority behind the standards. They did provide an exchange of information, enabling national standard setters to have a better understanding of practice elsewhere, and they were of particular value to countries which did not have any standards in place, by providing them with an instant set of minimum standards which would have a degree of international credibility (Thorell and Whittington, 1994). However, while IASs issued during the 1970s and 1980s were recognised to have made some progress towards international harmonisation, by the late 1980s the performance of the IASC was increasingly criticised because of the flexibility of IASs and a continuing lack of comparability across country borders. In particular, the IASC has been hampered by the absence of an accounting theory, much less a universally accepted theory of accounting, in its efforts to harmonise financial reporting across nations. Without such a theory, the removal of national accounting biases is difficult to envisage. In 1988, in pursuing its objective as global standard setter, the IASC and the International Organisation of Securities Commissions (IOSCO) entered an

agreement to work together to find a way to allow a firm to its securities in any foreign stock exchange on the basis of one set of financial statements conforming to IASs (Cairns, 1995). As a result, the IASC published the 1989 Comparability Project defined in Exposure Draft (E32), Comparability of Financial Statements (IASC, 1989). The aim of the proposals was to eliminate most of the choices of accounting methods then permitted so as to enhance the credibility and acceptability of IASs by the international investment community. This project marks a shift in the approach adopted by the body since its formation (Hoarau, 1995).

The result of the Comparability project was the revision of ten IASs, effective from 1995, including the elimination of twenty previously permitted accounting treatments. However, subsequent to completion of the Comparability project, IOSCO indicated that further work would be required and provided a list of core standards that it might be willing to accept subject to the full program being completed by the end of 1999 (Zeff, 1998). The IASC substantially completed the key components of its core standards work program in March 1999 with the publication of an interim standard on financial instruments. In May 2000, IOSCO finally announced that it would endorse these standards for cross-border securities' listings. However, countries can still require 'supplementary treatments' including reconciliation of IAS GAAP with domestic GAAP (IOSCO, 2000).

In April 2001, the new restructured body, known as the International Accounting Standard Board (IASB) came into operation to replace the IASC. The new IASB concentrates its work in three main areas: continuing projects, major reforms and a new improvement projects. The continuing projects include accounting for insurance firms and for extractive industries, on which discussion papers have already been issued. The major reforms include the proposed extension of capitalisation to all leases and the extension of the income statement to include all aspects of comprehensive income. In May 2002, the IASB published an exposure draft 'Improvement to IAS', which includes proposals to revise twelve IASB Standards. This project aims to raise the quality and consistency of financial reporting by drawing on best practice from around the world, and removing options in international standards. The Improvements project is a first step by the IASB to

promote convergence on high quality solutions in its objective to establish a globally accepted set of accounting standards (IASB, 2002).

As mentioned, one of the greatest achievements of the IASB is the decision of European Parliament to adopt international accounting standards for the purpose of financial reporting for publicly traded firms (IASB, 2002). In particular, the Regulation requires listed firms, including banks and insurance firms to prepare their consolidated accounts in accordance with International Accounting Standards from 2005 onwards. This development is highly favourable to international accounting harmonisation, especially given the fact that the EU had seriously considered the idea of introducing some kind of European accounting standards, which would have been a middle layer between national and international GAAP. In addition, there has been growing support for the use of IASs by national standard setters. For example, IASs have been adopted *en bloc* in some countries (e.g., Malta and Pakistan) and by accountancy bodies (e.g., Malaysia and Singapore). Across the EU, Belgium, France, Germany, and Italy have agreed to permit certain firms to use IASs since the late 1990s. Most importantly, a growing number of MNCs are adopting IASs as the basis for preparing their financial statements, including global players such as Bayer, Fiat, Lafarge and Nokia (Flower and Ebbers, 2002).

Table 2.3 List of International Accounting Standards/International Financial Reporting Standards

No.	International Accounting Standards	Last Revised/Published
1	Presentation of Financial Statements	1997
2	Inventories	1993 (Revised in 2003)
3	Consolidated Financial Statements	Superseded in 1989 by IAS 27 and IAS 28
4	Depreciation Accounting	Replaced by IAS 16, 22 and 38 in 1998
5	Information to be Disclosed in Financial Statements	Superseded by IAS 1 in 1997
6	Accounting Responses to Changing Prices	Superseded by IAS 15
7	Cash Flow Statements	1992
8	Profit or Loss for the Period, Fundamental Errors and Changes in Accounting Policies	1993
9	Accounting for Research and Development Activities	Superseded by IAS 38 in 1999
10	Events After the Balance Sheet Date	1999
11	Constructions Contracts	1993
12	Income Taxes	2000
13	Presentation of Current Assets and Current Liabilities	Superseded by IAS 1
14	Segment Reporting	1997
15	Information Reflecting the Effects of Changing Prices	1981
16	Property, Plant and Equipment	1998
17	Leases	1997
18	Revenue	1993
19	Employee Benefits	2002
20	Accounting for Government Grants and Disclosure of Government Assistance	1983
21	The Effects of Changes in Foreign Exchange Rates	1993
22	Business Combinations	1998
23	Borrowing Costs	1993
24	Related Party Disclosures	1984
25	Accounting for Investments	Superseded by IAS 39 and IAS 40 in 2001
26	Accounting and Reporting by Retirement Benefit Plans	1987
27	Consolidated Financial Statements and Accounting for Investments in Subsidiaries	1989
28	Accounting for Investments in Associates	2000
29	Financial Reporting in Hyperinflationary Economies	1989
30	Disclosures in the Financial Statements of Banks and Similar Financial Institutions	
31	Financial Reporting of Interests In joint Ventures	2000
32	Financial Instruments: Disclosures and Presentation	1998
33	Earnings Per Share	1997
34	Interim Financial Reporting	1998
35	Discontinuing Operations	1998
36	Impairment of Assets	1998
37	Provisions, Contingent Liabilities and Contingent Assets	1998
38	Intangible Assets	1997
39	Financial Instruments: Recognition and Measurement	2000
40	Investment Property	2000
41	Agriculture	2001
	International Financial Reporting Standards	
	Preface to International Financial Reporting Standards	2002
1	First-Time Adoption of International Financial Reporting Standards	2003

(Source: IASB, 2003)

2.4 Motivations for Accounting Harmonisation

In recent years, both trade and investment have grown rapidly relative to economic growth. A steady increase in Foreign Direct Investment (FDI) is identifiable in particular since the beginning of the 1990s (OECD, 1999). This continuous expansion of FDI flows has been driven by several interrelated factors, such as rapid technological change, trade and investment liberalisation, privatisation, deregulation and demonopolisation as well as a switch in emphasis by firms away from product diversification towards a more balanced geographical distribution of production and sales. It may be understood that this rapid globalisation went alongside a strong increase in demand, especially by investors, for internationally comparable financial information useful for decision-making. Furthermore, with firms becoming global, the need for a similar, efficient and mutually understood performance measurement for internal and external purposes has arisen, hence leading to the adoption of internationally comparable financial information.

According to Sharpe (1999), the benefits of international harmonisation include the reduction of investment risks and cost of capital worldwide, the lowering of costs arising from multiple reporting, the elimination of confusion arising from different measures of financial position and performance across countries, the encouragement of international investment, and the more efficient allocation of savings worldwide. Other advocates of accounting harmonisation, whether on a regional or global basis, outline four similar benefits (e.g., Saudagaran and Diga, 1998). These are cost savings accruing to multinational companies (MNCs); enhanced comprehensiveness and comparability of cross-national financial reports; widespread dissemination of high quality accounting standards and practices; and, provision of low cost financial accounting standards to countries with limited resources. The Group of 100 (2000), an association of senior accounting and finance executives representing the major public firms and government owned enterprises in Australia considered that international harmonisation had the potential to provide the following benefits:

1. Reductions in the cost of capital through the resolution of uncertainty relating to the interpretation and implementation of national standards.
2. Administrative benefits arising from the ease of multiple filing in multiple jurisdictions.
3. The facilitation of cross-border investment and fund raising and the removal of an impediment to a more efficient allocation of resources.
4. The reduction of investment risk because harmonisation reduces an element of risk associated with understanding financial reporting for investors and lenders.

As described by Radebaugh and Gray (1997), the pressures for international accounting harmonisation come from a wide range of participant groups and organisations including governments, trade unions and employees, investors, bankers and lenders, the general public and accountants and auditors. Nobes and Parker (2002) simplify these groups into regulators, preparers and users of financial information.

Regulators

Efforts by accounting regulators and international organisations to harmonise financial reporting practices are influenced by concerns for investor protection, efficient operation of capital markets and promotion of free trade and investment (Gleeson, 1998). This is evidenced by substantial resources committed by various national and international organisations including the FASB, ASB, IASB, EU and OECD, to achieve the objective of accounting harmonisation (Emenyonu and Gray, 1992). In addition regulators, especially governments, perceive that accounting harmonisation may help redress any competitive imbalance between MNCs and host-country domestic corporations and improve the bargaining position of host governments.

However, the objective of protecting investors from potentially misleading financial disclosures by firms must be weighed against increased greater access to investment

opportunities in these firms (Saudagaran and Meek, 1997). For instance, the agreement between IOSCO and IASC came about because stock exchange regulators were concerned that requirements to reconcile accounts prepared using domestic standards with those using host country standards deterred many multinational firms from seeking capital in highly regulated stock markets, such as the NYSE. Other international organisations such as the EU, OECD and UN are also interested in free trade at all levels of economic conduct (Thorell and Whittington, 1994). They suggest that harmonisation of accounting information is a necessary condition for such free trade.

Regulators are also concerned about the credibility of financial reporting information originated from following different standards in different countries. A well-known example of this potential confusion was evidenced by Daimler Benz in 1993. Profit of DM 602million under German GAAP was reconciled to a US GAAP loss of DM 1 839 million in its Form 20-F filed with the SEC (Flower, 1997). This credibility problem casts doubts on any aspirations which accounting as a discipline might have of being recognised as the universally understood language of business.

Users

Users of financial information include diverse groups such as investors, tax authorities, employees and the public. Investors, including financial analysts, are those who have access to corporate reports and use them, and other publicly available information, as a basis for making investment decisions. They must be able to compare the financial statements of an entity through time in order to identify trends in its financial position and performance and also be able to compare the financial statements of different firms in order to evaluate their relative financial position and performance.

It has been suggested that published financial statements are difficult to comprehend because different firms adopt different accounting treatments. Users, and especially investors, would like reassurance that the financial information originated from different firms is comparable and reliable (Cairns, 1994). As a consequence, problems in assessing financial information would impede investors from

diversifying their investment resulting in inefficiency in the international capital market.

It should be emphasised that the evident concern by investors with comparability does not necessarily indicate uniformity, but rather a degree of harmonisation whereby a minimum of information disclosure concerning accounting differences, enabling comparisons to be made. Evidence concerning the operations of well-developed capital markets, such as in the US, the UK and Japan suggests that there is a tendency for such markets to be 'efficient' in the sense that expert investors will ensure that share prices quickly reflect all publicly available information (e.g., Beaver, Foster and Keane, 1980).

Preparers

The need for companies to raise capital across national frontiers has increased the demand for accounting harmonisation. In effect, suppliers of capital tend to rely on financial reports to make the optimum investment and loan decisions and tend to show preference for comparable reporting. To attract foreign funds at lower cost, companies may provide information similar to their competitors in order to demonstrate the quality of earnings and assets (Diamond and Verrenchia, 1991).

In addition, harmonisation of financial reporting is perceived to provide a number of tangible benefits to companies and especially to Multinational Corporations (MNCs). Firstly, the effort to prepare financial statements would be much simplified if statements from subsidiaries operating in foreign countries were prepared on the same basis. This benefit assumes that one set of general purpose financial statements can be prepared by the MNCs to satisfy the information requirements of various users internationally. Similarly, the task of preparing comparable internal information for the purpose of performance appraisal would be made much easier. In addition, many aspects of investment appraisal, performance evaluation, and other decision-making uses of management accounting information would benefit from harmonisation. Finally, accounting harmonisation could eliminate potential competitive disadvantages arising from differential use of measurement methods or the need to disclose sensitive proprietary information.

2.5 Obstacles to Harmonisation

Concerns have been raised about the wisdom of the pursuit of harmonisation as a strategy to correct market imperfections of incomparable information. For instance, accounting harmonisation has been suggested to be unnecessary (Choi and Levich, 1991) and even harmful in certain perspectives (Samuels and Oliga, 1982). Choi (1981) points out that the thesis of environmentally stimulated and justified differences in financial reporting runs directly counter to efforts at global harmonisation of accounting. In addition, incomparable information arises from market idiosyncrasies and firm characteristics (Rahman, Perera and Ganesh, 2002). It could be that firms may have suboptimal financial reporting if faced with regulations that are not suitable for their particular circumstances.

According to Goeltz (1991), harmonisation of international accounting principles is unlikely to come about. Too many different national groups have vested interests in maintaining their own standards and practices, which have developed from widely different perspectives and histories. In addition to political pressures, there are other arguments which may be made against harmonisation, such as the fact that the differences in national backgrounds and traditions may not be overcome with simple standards. In addition, the International Accounting Standards have been criticised for being too simple for complex problems.

In their study of the behavioural effects of accounting diversity, Choi and Levich (1991) interviewed financial analysts in the UK and US and three countries (Japan, Switzerland and Germany) where reporting practices differ quite significantly from international norms. They found that only about half of those interviewed felt that accounting diversity affected their capital market decisions. The other half of the interviewees did not find accounting diversity to be a problem, either because successful coping mechanisms were used or because information less sensitive to accounting treatment was used.

It is assumed that the differences between the Anglo-American and Continental European financial reporting have been caused by a variety of social, economic and legal circumstances, and by different countries having in mind the needs of different users of financial statements when setting national requirements. In the FASB Statements of Concepts, it is clearly stated that investor-owners are usually more interested in returns from dividends and market-price appreciation of their securities than in active participation in directing corporate affairs. It is obvious that this interest has first priority in developing financial reporting standards in the US. This may not be so in Continental Europe, where the protection of creditors, shareholders, employees and the enterprise itself seems to have equal priority (Biener 1994).

2.6 International Accounting Harmonisation Research Studies

Prior research studies on various aspects of international accounting harmonisation can be broadly categorised into four groups. These groups are not mutually exclusive, as some research at times tends to relate issues of one group to that of another. The first group focuses on classification of accounting practices and regulations, as well as the environmental factors that influence them. These studies have classified countries according to regulations and practices to provide morphologies of macro characteristics that differentiate country clusters. The second group investigates the relationship between financial reporting harmonisation and accounting numbers such as profit and key financial ratios. These studies examined countries that were perceived as having low regulation harmony and attempted to see whether the practice differences arising from lack of regulation harmony affected reported income. In addition, this group investigates the relationship between *de jure/de facto* harmonisation and share prices in which the association between share returns and earnings are computed through the use of accounting rules of different countries. The next group of research examines chiefly on different aspects of *de jure* harmonisation such as measurement of *de jure* harmony and reasons that give raise to different levels of *de jure* harmony. Finally, the fourth group, in which the present study is located, measures financial reporting harmony

at a point in time, and harmonisation, through measurements in harmony over a period of time.

2.6.1 Accounting Classification Studies

The objective of classification studies is to group countries according to the common factors and unique features of their financial accounting systems. It facilitates understanding of how specific national accounting systems differ from each other and the international norm (Gleeson, 1998). In addition, such classification assists understanding of accounting regulations most relevant for the international economy (Doupnik and Salter, 1993).

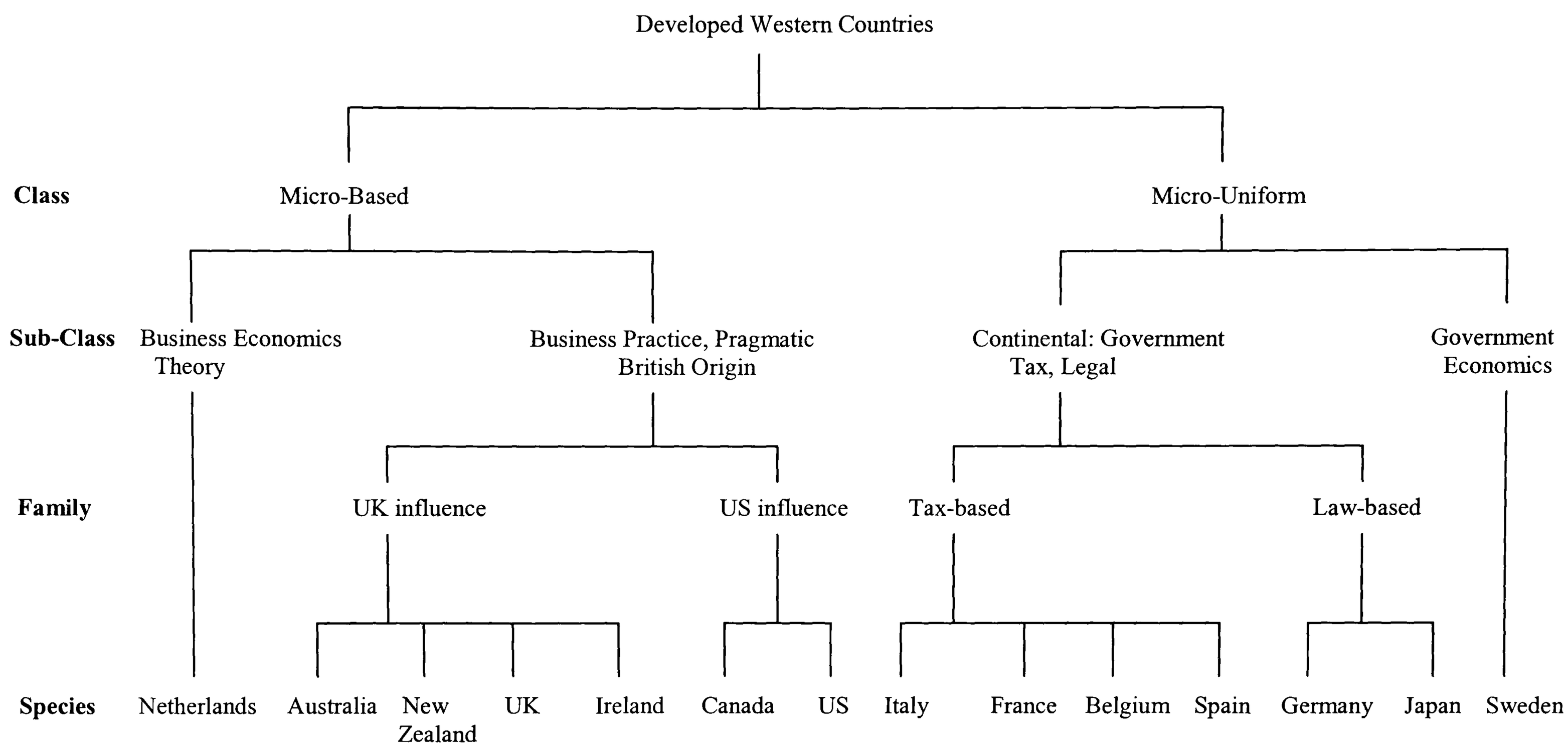
Prior research studies on classification of accounting systems have taken two main forms: the deductive and the inductive approaches. In the deductive approach, relevant factors are identified and, by linking these to national accounting practices, international groupings or development patterns are proposed. On the other hand, in the inductive approach, individual accounting practices are analysed, development patterns or groupings are then identified, and finally explanations keyed to a variety of economic, social, political and cultural factors are proposed (Radebaugh and Gray, 1997).

In a number of research studies (e.g., Frank, 1979; Nair and Frank, 1980; 81), classifications of accounting practices were developed through statistical analysis of data of financial reporting practices published by the Price Waterhouse (PW) surveys conducted in 1973, 1975 and 1979. Factor analysis was applied to categorise groups of countries with similar accounting practices. These studies were criticised by Nobes (1981; 1983 and 1992) for both the data used and the statistical analysis employed. He argued the use of PW data in these studies ignores the obvious errors in the data, swamping important by trivial data, and exaggerating certain inter-country differences. Meek and Saudagaran (1990) point out that the PW data tends to blur the distinction between officially pronounced standards and observed practices. In addition, as the PW data is categorical and factor analysis requires proportional data, researchers were forced to subjectively transform that data to a

ratio-scale. Nevertheless, the PW (1979) publication provided a useful basis for Doupnik and Salter (1993 and 1995) who based their questionnaire on the survey. They argued that classification based on current, unbiased data that is organised into group of accounting systems can provide useful information to financial analysts in making comparison financial statements across different countries.

Nobes (1981 and 1983) focused on the measurement practices used in the financial reporting of public firms based in countries in the developed Western world in 1980. He developed a hierarchical classification of accounting systems to provide more subtlety and discrimination to the assessment of country differences (Figure 2.1). First, he constructed a basic distinction between microeconomic and macroeconomic systems, and then further disaggregated each class into sub-classes. The micro-based class included a business practice/pragmatic category and a business economics/theory grouping. Under the macro-uniform group, he made a disaggregation between a government, tax, and legal orientation and a government economics orientation. The micro-based class/business practice subclass is further divided into two families: U.K and U.S influence. The macro class/continental subclass is hypothesised to comprise of two families: tax-based and law-based. Particular countries (i.e. species) were then identified with each of the six families.

Figure 2.1 Hierarchical classifications of financial reporting systems



(Source: Nobes ,1983, p.7)

Environmental Factors

It has been suggested in the extant literature (e.g., Nobes and Parker, 2002; Radebaugh and Gray, 1997) that there is a close connection between environmental factors and accounting systems. The most frequently cited environmental factors discussed in the literature are the legal system, the providers of capital, influence of the accounting profession, the tax system, and the importance of capital markets. In addition, there are other influences including standards and political systems (Choi and Mueller, 1992).

The environmental analysis performed by Mueller (1967) provides a starting point to international accounting classification. He linked his intuitive judgement of national environmental factors with accounting practices to produce four distinct approaches to accounting development namely, macroeconomic, microeconomic, independent discipline and uniform accounting patterns. Further, Mueller (1968) classified international business environments into ten groups and linked them to accounting systems. However, the relationship between these factors and national accounting systems is merely described and not analysed further or tested empirically.

Nobes (1998) identified problems with Mueller's classification. The fact that there are only four exclusive groups and no hierarchy reduces the usefulness of the classification. In effect, the Netherlands is the only country in one of the groups and the classification does not show whether Dutch accounting is closer to UK accounting than it is to Swedish accounting. Similarly, the classification cannot include such facts as that German accounting exhibits features which remind one of macroeconomic accounting as well as of uniform accounting. In addition, he did not classify financial reporting systems directly, on the basis of differences in practices, but indirectly, on the basis of differences in the importance of economic, governmental and business factors in the development of particular systems.

Cultural Environments

Cultural-related study links cultural areas to accounting system characteristics (e.g., Hofstede, 1980; Gray, 1988b; Parera, 1989) or to the structure of standard setting

processes (Belkaoui, 1990). For example, Gray (1988b) adopts Hofstede's (1980) cultural classification in order to propose explanations for international differences in accounting practices. Hofstede categorised four cultural principles viz. power distance, individualism, masculinity and uncertainty avoidance, from examining data collected from IBM workforces worldwide. Parera (1989) used Gray's theory in a descriptive analysis of different cultural environments and financial reporting systems. He found that the Anglo-American accounting model espoused by the IASB was likely to face relevance problems in the Continental Europe and other countries with different cultural values from the US and UK.

However, d'Archy (2001) argues that classification of financial reporting and regulations based on cultural values has a number of drawbacks. Firstly, the choice of criteria which are used to define cultural areas is subjective. For instance, it is not known whether Hofstede's four dimensions or other factors used by other authors are sufficient and exhaustive enough to describe culture. Secondly, all empirical research in the field is based on data which focuses only on a small part of the 'accounting world' because of the input of questionnaires used. Finally, it is apparent that there is a relationship between cultural peculiarities and national accounting systems. Thus, it is debateable whether cultural values alone can explain accounting developments.

2.6.2 Impact of Different GAAP Regimes

Another major aspect of international financial accounting research has been efforts to quantify the impact of different GAAP regimes, particularly on the measurement of profits and return on equity. The US GAAP is often used as a benchmark for comparison, as the USA is the largest capital market and an important source of finance for foreign multinational firms.

Gray (1980) introduced the 'index of conservatism' in comparing profit measurement practices in the UK, France and Germany. The purpose of this index is to measure the extent to which disclosed profits in a country are more or less conservative than in other countries on the basis of differences in accounting

principles. This index features in a number of subsequent studies of comparative reported profits and/or equity. For example, Walton and Wyman (1990), Weetman and Gray (1990; 1991), Goldberg and Goodwin (1992), Hellman (1993), Cooke (1993) and Norton (1995) examined the financial statements of firms from the UK, the Netherlands, Sweden, Ireland, Denmark, France, Japan and Australia using the reported reconciliations in Form 20-F. The results revealed that in all cases except Sweden, Japan and Australia, firms were identified as reporting lower earnings under US GAAP than their respective 'home' GAAP.

Weetman, Jones, Adams and Gray (1998) subsequently renamed the index as a measure of 'comparability' to place clearer emphasis on relative accounting treatments without requiring a judgement as to which is more or less conservative. Applying the index, they found that an increasing gap between the reported profit under UK GAAP and that restated under US GAAP. The difference rests most frequently in accounting for goodwill, provision for deferred tax, and the accounting treatment of pension costs, with accounting for goodwill showing a particularly significant impact in 1994.

2.6.3 Harmonisation of Accounting Regulation

This group of research studies focuses on different aspects of regulation or *de jure* harmony. As argued by Rahman, Perera and Ganesh (1996), a primary factor driving *de facto* harmonisation is *de jure* harmonisation. They suggest that previous research studies (Nair and Frank, 1981; Evans and Taylor, 1982; Doupnik and Taylor, 1985) that evaluate material harmonisation have actually measured the effects of the state of formal harmony on accounting practice. Other researchers (e.g., Alford, Jones and Zmijewski, 1993; Amir, Harris and Venuti, 1993; Barth and Clinch, 1996) examining the effects of certain countries accounting standards on share prices found that differences between generally accepted accounting principles of different countries led to share price and return variations. Consequently, Rahman et al. (1996) argue that due to the strong influence of accounting regulations on financial reporting practice and market indicators, it is essential that formal accounting

harmonisation be more carefully and extensively examined to make material harmonisation effective.

For their study of the degree of regulatory harmonisation, Adhikari and Tondkar (1992) surveyed the reporting requirements of 35 stock exchanges from different countries. Using a cross-national disclosure model, five environmental factors were used to explain the variation observed in disclosure requirements of the different stock exchanges. The five factors examined are: degree of economic development, type of economy, size of equity market, activity on the equity market, and the dispersion of share ownership in the equity market. The overall results showed that the level of accounting disclosure requirements of stock exchanges is related to environmental factors, particularly the size of equity market.

Rahman, Perera and Ganesh (1996) attempted to demonstrate the use of a research methodology that allows for the measurement of formal accounting harmonisation across countries. Applying multiple discriminant analysis as a statistical tool, they compare the measurement and disclosure requirements for Australian and New Zealand listed firms. These requirements were taken from three main sources of accounting regulation, i.e., statutory requirements, stock exchange requirements and accounting standards. The overall results indicate that degree of harmony for the disclosure and measurement requirements are high between the two countries. This is expected since cluster studies based on broad environmental variables have identified Australia and New Zealand as members of the same cluster and comparisons of accounting standards and detailed comparisons of accounting regulatory mechanisms (Rahman, Perera and Tower, 1994) also confirm the view, that the two countries' accounting regulatory environments are generally similar.

2.6.4 Harmonisation of Accounting Practices

The objective of harmonisation measurement research is to determine to what extent harmonisation has taken place, and to measure the impact of various organisations, such as the IASB and EU, involved in international harmonisation. For instance, Nair and Frank (1981) and Evans and Taylor (1982) assessed the impact of IASC

initiatives on global accounting practices, and Walton (1992), Emenyonu and Gray (1992) and van der Tas (1992a) studied the impact of EU Fourth Directive on financial reporting harmonisation of certain EU countries.

Until the late 1980s, the existence of harmonisation of financial reporting was conducted without quantification. These studies were mainly judgemental, identifying areas of similarity and difference in international financial reporting practice (Nair and Frank, 1981; Choi and Bavishi, 1983). According to Tay and Parker (1990), who analysed six measurement studies conducted in the 1980s, the purpose of the studies was unclear, and practices and regulations were dealt with as if they were the same and interchangeable.

Since 1988, two major techniques to measure accounting practice harmonisation have been developed and applied in the extant literature: index-based techniques and statistical modelling. It has been acknowledged that the index-based methods measure the notion of harmony, which is different from that adopted in the statistical model. The concept of harmony underpinning indices is based on uniformity whereby maximum harmony is achieved when all firms adopt the same accounting method (e.g. van der Tas, 1988; 1992a; Emenyonu and Gray, 1992; 1996; Archer, Devaille and McLeay, 1995; Herrmann and Thomas, 1995; Cañibano and Mora, 2000; Murphy, 2000; Pierce and Weetman, 2000; Aisbitt, 2001; Parker and Morris, 2001). Critics note (e.g., Arwidi, 1992; Archer, Devaille and McLeay, 1996; McLeay, Neal and Tollington, 1999) that this technique is simplistic in that it ignores the possibility of firms' different operating conditions and specific characteristics employing different treatments for a given accounting item.

The possibility of using a statistical approach in measuring financial reporting harmony was suggested by Tay and Parker (1990), but not operationalised. When this method was taken further, it was based on the premise that accounting diversity is a natural result of different operating circumstances which require different accounting approaches (Herrmann and Thomas, 1995; Archer, Devaille and McLeay, 1996; McLeay, Neal and McLeay, 1999; Rahman, Perera and Ganesh, 2002). Thus, the interfirm comparability of financial statement items would depend

on the use of the accounting method that is appropriate to the firm's operating circumstances. The present research employs the statistical modelling approach, in this case using binomial logistic regression to measure *de facto* accounting harmonisation in the European Union. In particular, this approach allows us to examine, in addition to a firms' country of domicile, the extent to which firm-specific characteristics, such as sector of operations, size and internationality, influence accounting policy choices. This approach together with the index-based approach will be discussed in detail in the next chapter.

2.7 Summary and Conclusions

This chapter has provided a review of literature on international accounting harmonisation. Key concepts which are important in understanding financial reporting harmonisation have been clarified in Section 2.2. It has been suggested in Section 2.3 that the main benefits of the harmonisation is to improve the allocation of goods, labour and capital in international markets, to reduce a firms' cost of capital and operating expenses, and to facilitate social control of MNCs. These are perceived advantages because accounting harmonisation would, among other things, enhance the comparability and understanding of financial reporting of firms from different countries. However, other researchers argue that harmonisation of financial reporting is not only unnecessary but potentially detrimental in certain aspects. Nevertheless, as summarised in section 2.5, efforts by a number of organisations, especially the IASB and the EU, indicate harmonisation of accounting practices to be a worthwhile pursuit. This chapter has also described different aspects of international accounting research studies have been conducted in prior literature including measurement of accounting harmonisation where the present research is located.

The current study aims to measure the impact of harmonisation on accounting policy choice. In the accounting literature, two main approaches have been used to develop and used to measure accounting harmonisation: index-based approach and statistical modelling. The index-based approach is based on uniformity whereby it is assumed that maximum harmony is achieved when all firms adopt the same treatment for a given accounting item. However, as shown by Archer, Devaille and McLeay (1996)

and McLeay, Neal and Tollington (1999), this notion of harmony ignores firms' different operating circumstances. Applying statistical modelling, they posit a different concept of accounting harmonisation where *ceteris paribus* the odds of selecting a given accounting method are identical across countries and harmonisation occurs when those distributions become aligned over time. In addition, this approach aims to estimate from the observed patterns of policy choice the extent to which the observed changes may be attributed to a process of international harmonisation, rather than to behaviour that is specific to individual firms or countries. The detailed analysis of both accounting harmonisation approaches will be investigated in the next chapter.

CHAPTER 3

THE MEASUREMENT OF ACCOUNTING HARMONISATION

3.1 Introduction

The measurement of international accounting harmonisation provides accounting policy makers with a means of identifying where their efforts should be concentrated (Pierce and Weetman, 2000). In addition, it assists in the systematic evaluation of the success or otherwise of programmes aimed at the international standardisation of accounting methods. It may be concluded that robust measures of international accounting harmonisation serve to enhance policy making, and this thesis builds on the research efforts in this respect that have taken place to date. Chapter two noted that early attempts to assess accounting harmonisation were based on descriptive statistics, and to some extent variance analysis, which were used to evaluate the success of the accounting standards produced by the IASC (e.g., Nair and Frank, 1981; McKinnon and Janell, 1984; Doupnik and Taylor, 1985). The problems associated with these studies have been highlighted in detail by Nobes (1983; 1992), Tay and Parker (1990) and van der Tas (1992a). More recent research studies have been concerned with *measuring* accounting harmonisation, and have applied mainly two approaches, i.e., the use of index-based methods that capture the tendency towards increasing uniformity in accounting, and the statistical modelling of the accounting changes that take place during the harmonisation process.

This chapter aims to review the extant literature on accounting harmonisation measurement and in particular to discuss the measurement methods developed and applied in prior research studies. This analysis sheds light on a number of limitations associated with previous work and provides the opportunity to develop a better understanding of harmonisation measurement methods.

The present chapter is organised as follows. The next section describes prior research studies on accounting harmonisation measurement. As mentioned above, two main techniques can be found in the extant literature, i.e., index-based approaches and statistical models. The index-based approaches, which were first introduced by van der Tas (1988) and adopted in most previous research studies, measure a different concept of harmonisation than that of statistical models. Although the index-based approaches are not used in the present study, the methods that have been employed to date are described in Section 3.2.1. Prior studies that applied statistical models are then discussed in Section 3.2.2. Subsequently, Section 3.3 shows how harmonisation measurement methods have been applied to accounting policy data. The different areas of accounting that have been examined in the past are discussed in Section 3.4, which provides a basis for the selection of accounting issues for the present study, i.e., goodwill arising on consolidation, inventory costing method and depreciation of fixed assets. Finally, from the review of the extant literature, we identify the research questions that form the basis of this study. These are summarised in Section 3.5, and Section 3.6 sets out the chapter summary and offers some concluding remarks.

3.2 Methods of Measuring Accounting Harmonisation

Starting with van der Tas (1988), a number of different methods of measuring harmonisation have been developed and applied to international samples of corporate financial reporting data. The discussion below focuses on the mathematics of each of the methods involved.

3.2.1 Index-based Approaches

Two groups of indices have been employed to measure the degree of harmony and harmonisation in prior research studies, firstly indices based on the Hirschman-Herfindahl index of industrial concentration (*H* and *I*), and secondly comparability indices based on combinatorial mathematics (*C*). Conceptually, there is a slightly different approach between concentration-based and combination-based indices in measuring harmonisation. The method based on concentration reflects the idea that

harmonisation increases as accounting choice is reduced and as more firms concentrate on fewer of the choices available. On the other hand, the combination-based indices take a different approach by measuring the number of pairs of firms that adopt a comparable accounting policy relative to the total number of pairings that would be possible if all firms were to produce comparable accounts.

Concentration-based indices

The first group of indices is based on the Hirschman-Herfindahl index of concentration, which was originally used by industrial economists to measure the concentration of an industry. In the accounting literature, these indices were first applied by van der Tas (1988) as techniques to measure national and international harmony in financial reporting. Applying this method, the degree of harmony is measured by the extent to which there is convergence of accounting policy choice within a sample of firms. The level of harmony increases when the result of the choices made by firms between alternative accounting methods becomes concentrated on one or on only a limited number of accounting methods. The index values range from zero for extreme diversity to one for absolute uniformity of accounting methods, and it is the change in the index over time that indicates the degree of harmonisation.

H index

The *H* index measures the degree of harmony of accounting policy choice for a particular item within an individual country or sector. It is the sum over accounting methods of their squared frequencies of use, that is:

$$H = \sum_{j=1}^{J} (p_j)^2$$

where:

p_j = relative frequency of accounting method j

J = total number of alternative accounting methods

Table 3.1 illustrates the calculation of the *H* index. Suppose that the choice of alternative methods A, B and C is equiprobable. The *H* index in this case is 0.33, and the table shows for a sample of 30 firms how the index value would increase with a greater concentration of policy selection. Eventually, the index reaches its maximum value of 1 when all firms adopt the same method.

Table 3.1: Calculation of the *H* Index

	Country			
	A	B	C	*H*
Method 1	10	10	10	0.333
2	15	15	0	0.500
3	20	10	0	0.556
4	30	0	0	1.000

Non-linearity in the *H* index is demonstrated in Figure 3.1. Suppose in this case that there are just two accounting method choices, and that there are again 30 firms in the sample. The figure shows how the *H* index decreases from the maximum of 1 when all firms adopt the same policy to a minimum value of 0.5 when 15 firms select one method and the remaining 15 select the alternative.

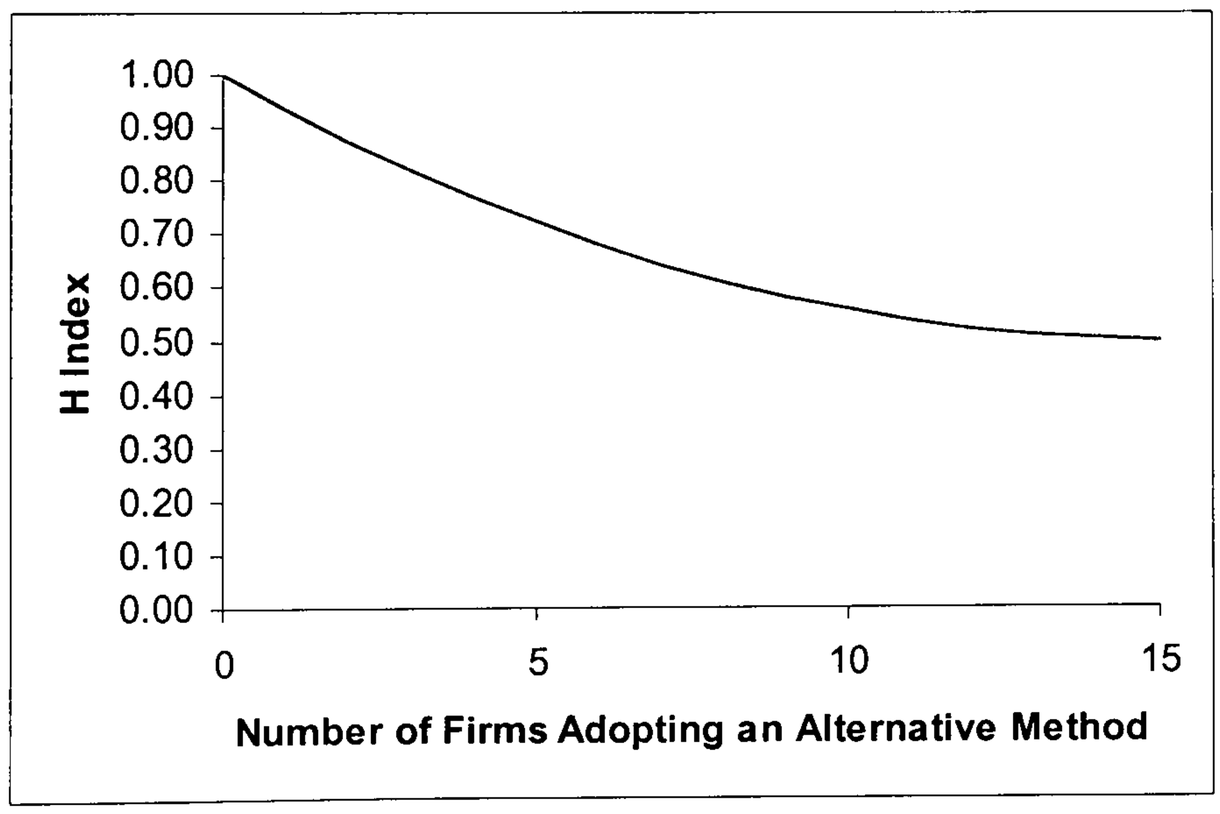


Figure 3.1: The Behaviour of the *H* Index

I Index

In order to measure the extent to which there is harmony of accounting policy choice across different countries, van der Tas (1988) introduced the *I* index as the international equivalent of the *H* index. The *I* index can be calculated by

multiplying the relative frequency or proportion of use of each particular accounting method across countries, and subsequently adding together the results for each of the alternative methods. The *I* index is defined by van der Tas as

$$I = \sum_{j=1}^{J} (f_{1j} f_{2j} \cdots f_{ij})$$

where:

f_{ij} = relative frequency of adoption in country *i* of accounting method *j*

J = total number of alternative accounting methods

As an example of the use of the *I* index, assume the relative frequencies of the alternative accounting methods 1, 2 and 3 in countries A and B are as follows:

Table 3.2 Calculation of the *I* index

	Country	
	A	*B*
Method 1	10	20
2	15	15
3	20	10
	45	45
	I Index = 0.309	

Calculation:

(10/45 x 20/45) + (15/45 x 15/45) + (20/45 x 10/45) = 0.309

That is to say, each of the three methods is adopted by 30 companies, and there are 45 companies in each of the two countries. For instance, 10 out of 45 companies in country A adopt method 1, and 20 out of 45 companies in country B also adopt that method. The product of these proportions is summed across the three methods to give an index value of 0.309. However, as demonstrated in Table 3.3 and Figure 3.2, the *I* index tends to zero as more countries are added to the analysis, since additional relative frequencies will almost always be fractions, resulting in a skewed distribution for *I* over the range 0 – 1.

Table 3.3: The Behaviour of the *I* Index

	Country				
	A	*B*	*C*	*D*	*E*
Method 1	15	15	15	15	15
2	15	15	15	15	15
3	15	15	15	15	15
Total	**45**	**45**	**45**	**45**	**45**

	Number of countries			
	2	3	4	5
I index	0.333	0.111	0.037	0.012

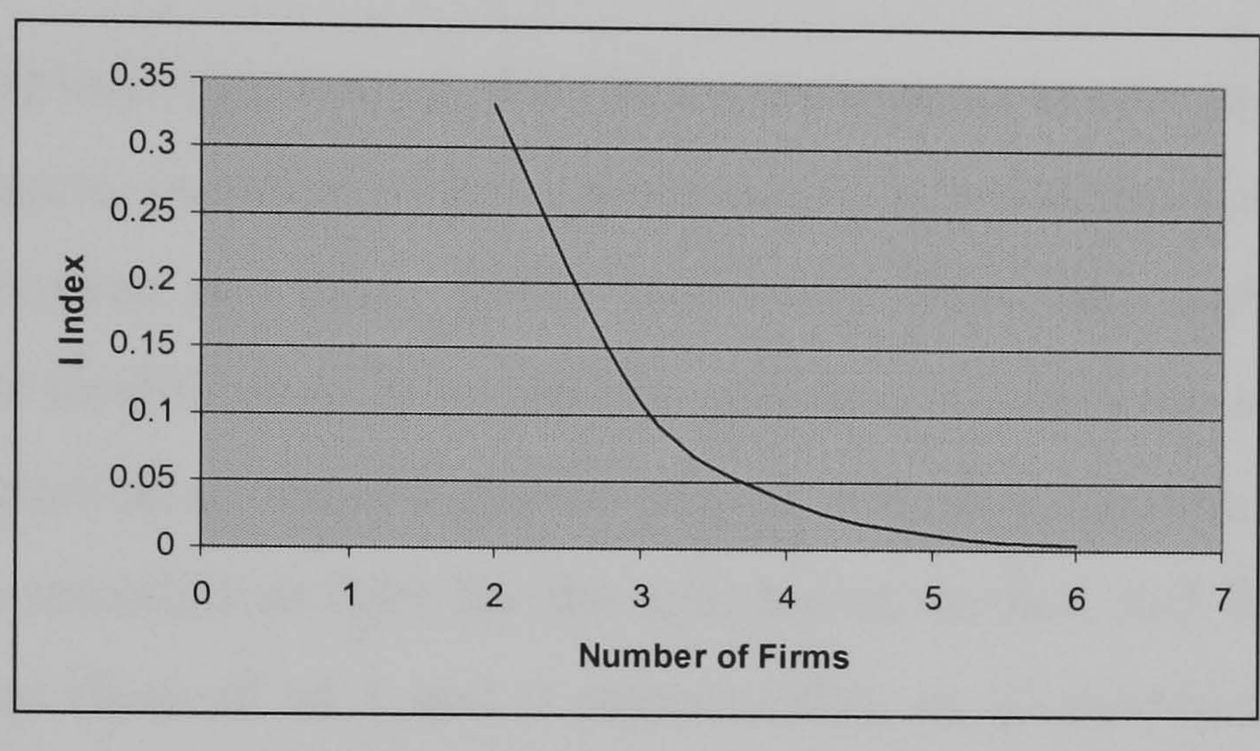


Figure 3.2: The Behaviour of the *I* index

To overcome this skewness, van der Tas proposed applying the $(i\text{-}1)^{\text{th}}$ root as a correction factor:

$$I' = \sum_{j=1}^{J} (f_{1j} f_{2j} \cdots f_{ij})^{1/(i-1)}$$

In the example above, for instance, the corrected index I' for three countries would be:

$$I' = 0.111^{1/2} = 0.333$$

Archer and McLeay (1995) criticise van der Tas's formulation of the *I* index. They argue that the factor $1/(i\text{-}1)$ is not consistent with the *I* index being an analogue of the *H* index because $1/(i\text{-}1)$ does not equal 2 (the exponent in the *H* index) and is applied to the sum of cross products and not to individual cross products for each

accounting method. To ensure that the I index is an analogue of the H index, they propose that the adjusted index I'' be calculated as:

$$I'' = \sum_{j=1}^{J} (f_{1j} f_{2j} \cdots f_{ij})^{2/i}$$

Mathematically, Archer and McLeay's (1995) adjusted index, I'', is the sum across accounting methods of the squared geometric means of relative frequencies of accounting method j in each of the countries.

Due to the multiplication involved, the I index is sensitive to zero proportions. When this situation occurs, one easy solution to the problem is that the I index score is not computed (Emenyonu and Gray, 1996). In contrast, Herrmann and Thomas (1995) employ a simple modification to rectify this problem, whereby in cases where all of the firms in a particular country choose one of, say, two alternative methods, the proportions are recorded as 0.99 for the unanimous method and 0.01 for the non-practised method (instead of 1 and 0 respectively), as illustrated in the following table:

Table 3.4 Comparison of the Unadjusted and Adjusted I' Index

						Unadjusted I index	Adjusted I index
Scenario 1:							
	Country	*1*	*2*	*3*	*4*		
Method	A	20	20	0	0	0 [1]	0.0581 [2]
	B	0	0	20	20		
Scenario 2:							
	Country	*1*	*2*	*3*	*4*		
Method	A	20	20	10	0	0	0.1704
	B	0	0	10	20		
Scenario 3:							
	Country	*1*	*2*	*3*	*4*		
Method	A	20	20	20	0	0	0.2133
	B	0	0	0	20		

[1]For scenario 1, Unadjusted $I' = [(1 \times 1 \times 0 \times 0) + (0 \times 0 \times 1 \times 1)] = 0$

[2]For scenario 1, Adjusted $I' = [(0.99 \times 0.99 \times 0.01 \times 0.01) + (0.01 \times 0.01 \times 0.99 \times 0.99)] = 0.0581$

(Source: Herrmann and Thomas, 1995, p. 257)

Combinatorial-based indices

Van der Tas (1988) first developed the combinatorial-based index, the *C* index, as a measure of comparability and later used it as a tool to quantify international harmony (van der Tas, 1992a). By definition, *C* is the ratio of the actual number of pairwise comparisons in a set of financial reports to the maximum possible number of comparisons. It can be calculated as:

$$C = \frac{\sum_{j=1}^{J} x_j (x_j - 1)}{x_{++}(x_{++} - 1)}$$

where:

x_j = the number of firms applying method j

J = total number of alternative accounting methods

x_{++} = total number of firms

The *C* index is a ratio that ranges from 0 when each firm prepares its accounts using a different method to all others (and where, therefore, no pairs of annual accounts are comparable) to a maximum of 1 where all firms adopt the same accounting treatment. The minimum level of zero is unlikely to be found in practice: once the number of firms disclosing their accounting policy exceeds the number of accounting methods that are available, the *C* index must be greater than zero. With larger numbers of firms and full disclosure, the index approaches $\frac{1}{n}$ when there is an equal distribution of accounting policy choices, where *n* is the number of accounting methods applied (Archer, Delvaille and McLeay, 1996). For example, with 1,500 firms and three equiprobable accounting methods, the *C* index is calculated as follows:

$$C = [(500^2 + 500^2 + 500^2 - 1500) \div (1500^2 - 1500)] = 0.333$$

Archer, Delvaille and McLeay (1995) restated the C index to incorporate firms not disclosing their accounting policy, as follows:

$$C = \frac{\sum_{j=1}^{J} x_{+j}\left(x_{+j} - 1\right)}{x_{++}\left(x_{++} - 1\right)}$$

where:

x_{+j} = total number of firms adopting method j

x_{++} = total number of firms <u>including 'non-disclosers'</u>

Both formulae are effectively the same with the exception of the treatment of non-disclosers (Gleeson, 1998). Effectively, whilst the results published by van der Tas are based on an analysis that limits n to the number of firms disclosing their accounting method, the total number of accounts examined by Archer, Delvaille and McLeay, x_{++}, includes both disclosing and non-disclosing firms.

Refinements to the Basic C Index

In the context of international harmonisation measurement, Archer, Delvaille and McLeay (1995) argue that the basic C index does not necessarily measure *international* financial reporting comparability, as the concept is commonly understood, because it ignores the country of origin of the companies involved and hence the set of regulations that are followed in preparing the accounts. Harmonisation addresses the difference between such sets of regulations, and its measurement should therefore reflect this. For instance, as illustrated in the following figure, in comparing accounting in two countries based on a sample of 50 financial statements from each country, where 50 firms in total use method 1 and 50 firms use method 2, the C index value remains constant whatever the country of origin of each of the firms in the two groups.

Example A

	Method 1	Method 2	Total
Country A	25	25	50
Country B	25	25	50
	50	50	100

$$\text{C index} = \frac{[(50x49) + (50x49)]}{(100x99)} = 0.495$$

Example B

	Method 1	Method 2	Total
Country A	50	0	50
Country B	0	50	50
	50	50	100

$$\text{C index} = \frac{[(50x49) + (50x49)]}{(100x99)} = 0.495$$

(Source: Gleeson, 1998)

Figure 3.3 Illustration of Basic *C* Index Deficiency

For the two combinations of firms illustrated in the above figure, *I* indices would be as follows:

Example A:

$$I = [(0.5 \text{ x } 0.5) + (0.5 \text{ x } 0.5)] = 0.5$$

Example B:

$$I = [(0.5 \text{ x } 0) + (0 \text{ x } 0.5)] = 0$$

In order to rectify this deficiency, Archer, Delvaille and McLeay (1995) decomposed the basic *C* index into a within-country index component and a between-country index component, which provide a more precise analysis of intra-national and inter-national comparability, respectively. The within-country index is the ratio of the number of pairs of comparable firms operating within a country to the total number of interfirm comparisons that can be made between firms operating

in that country, if all select the same accounting method. For an international sample, within country comparability overall may be measured by aggregating across countries. Using the notation in Archer, Delvaille and McLeay (1995), the formula is:

$$\text{Within-country } C \text{ index} = \frac{\sum_i \sum_j (x_{ij}(x_{ij} - 1))}{\sum_i (x_{i+}(x_{i+} - 1))}$$

On the other hand, the between-country index is indicated by the ratio of the number of pairwise comparisons that may be made between firms selecting the jth accounting method, but operating in different countries, to the maximum number of such comparisons that may be made. The index formula is expressed as follows:

$$\text{Between-country } C \text{ index} = \frac{\sum_i \sum_j (x_{ij}(x_{+j} - x_{ij}))}{\sum_i (x_{i+}(x_{++} - x_{i+}))}$$

where:

x_{ij} = the number of firms adopting accounting method j in country i

x_{i+} = the total number of firms in country i

x_{+j} = the total number of firms adopting method j

x_{++} = the total number of firms

Archer, Delvaille and McLeay (1995) argue that the between-country C index is a more robust measure of international harmony than the I index. The I index tends to zero if one or more accounting methods have low frequencies in one country. As shown below in Table 3.5, the three country I index is only 0.07, yet the corresponding between-country C index is 0.24, because method 2 and method 3 are not used in countries A and B respectively, and hence do not contribute to the I

index even though these accounting methods are used by 103 firms (69%) in the total sample.

Table 3.5 Comparison between the *I* Index and Between-country *C* Index

		Country			
		A	B	C	Total
Method	1	25	5	17	47
	2	25	0	16	41
	3	0	45	17	62
Total		50	50	50	150

	A & B	B & C	A & C	A & B & C
Adjusted *I* Index	0.05	0.34	0.33	0.07
Between-country *C* Index	0.05	0.34	0.33	0.24

Calculations:

Adjusted *I* Index:

Country A & B: (25/50 x 5/50) + (25/50 x 0/50) + (0/50 x 45/50) = 0.05

B & C: (5/50 x 17/50) + (0/50 x 16/50) + (45/50 x 45/50) = 0.34

A & C: (25/50 x 5/50) + (25/50 x 16/50) + (0/50 x 17/50) = 0.33

A & B & C: $(25/50 \times 5/50 \times 17/50)^{2/3} + (25/50 \times 0/50 \times 16/50)^{2/3} + (0/50 \times 45/50 \times 17/50)^{2/3} = 0.07$

Between-country *C* Index

Country A & B: [25(5) + 25(0) + 0(45)] / (50 x50) = 0.05

B & C: [5(17) + 0(16) + 45(17)] / (50 x50) = 0.34

A & C: [25(17) + 25(16) + 0(17)] / (50 x50) = 0.33

A & C: [[25(5) + 25(0) + 0(45)] + [17(25 +5)] + [16(25+0)] + [17(0 +45)]] / [(50 x50) + (50 x 100)] = 0.24

(Source: adapted from Morris and Parker, 1998, p. 75)

Adjusted C Index Incorporating Non-disclosure

As mentioned above, non-disclosure of regarding an accounting policy could cause problems when measuring harmonisation and may limit the meaningful interpretation of results (Archer, Delvaille and McLeay, 1995; Morris and Parker, 1998; Pierce and Weetman, 2000). Without the requisite information in a company's financial report, there are two potential interpretations of the behaviour of non-disclosers (Archer, Delvaille and McLeay, 1995). Firstly, a 'default assumption' can be made that the firm in question has used the method applicable to its circumstances, such as the method required by law in its country of registration. In this case, the financial statements may be assumed to be comparable with others prepared using that method. On the other hand, it may not be possible to make such a default assumption, in which case the financial statements are not comparable with those prepared by other forms with respect to the item in question.

In addition, a firm may not disclose an accounting policy because it is simply not applicable. For example, a firm that has no inventories does not need to select between the various methods of stock accounting that exist. Where a particular accounting policy is not applicable, these accounts can be considered comparable with all other accounts (Morris and Parker, 1998 and, Pierce and Weetman, 2000) on the basis that the reported results and financial position would not change whichever accounting treatment is chosen from available alternatives. As a result, the accounts of each non-discloser categorised as not applicable are comparable with those of all other non-disclosers and also with every disclosing firm, at least with respect to the item in question. This concept has been labelled as the 'universal comparability of non-applicable observations' by Archer, Delvaille and McLeay (1995).

$$\text{Adjusted } C \text{ index} = \frac{\left(\sum_j x_{+j}(x_{+j}-1)\right)+(x_{+na}(x_{++}-x_{+na}))}{x_{++}(x_{++}-1)}$$

However, Pierce and Weetman (2000) demonstrate that the above adjustment is inaccurate and revised the basic C index formula accordingly, describing it as the Non-Applicable Adjusted C index (*NAAC* index):

NAAC between-country index:

$$\frac{\left(\sum_i \sum_j (x_{ij}(x_{+j}-x_{ij}))\right)+2(x_{+ina}(x_{+j}-x_{ij}))+x_{+ina}(x_{+na}-x_{+na})}{\sum_i (x_{i+}(x_{++}-x_{i+}))}$$

where:

x_{ij} = number of firms adopting method j in country i

x_{+ina} = total number of firms in country i for which the policy item is 'non-applicable'.

x_{i+} = total number of firms in country i

x_{+j} = total number of firms adopting method j.

x_{++} = total number of firms including 'non-disclosers' and 'non-applicables'.

In this case, the index numerator also includes the number of pairwise comparisons between accounts for which the item is not-applicable and with all other accounts regardless of their policy. As illustrated in the following table, the *NAAC* index formula consistently produces the expected value of 1.0 where different mixes of 'non-applicable' observations and application of one specific accounting method were assumed.

Table 3.6 *C* Indices for Universal Comparability of 'Non-applicable' Observations

EXAMPLE	1	2	3	4	5
Method A	5	4	3	7	125
Not-applicable	1	2	3	3	25
Total	**6**	**6**	**6**	**10**	**150**
NAA *C* index using Gleeson (1998) approach:					
Numerator	(5x4) + 2x1(6-1) + 1x(1-1) =30	(4x3) + 2x2(6-2) + 2x(2-1) =30	(3x2) + 2x3(6-3) + 3x(3-1) =30	(7x6) + 2x3(10-3) + 3x(3-1) =90	(125x124) + 2x25(150-25) + 25x(25-1) =22 350
Denominator	6x5 =30	6x5 =30	6x5 =30	10x9 =90	150x149 =22 350
C index	1	1	1	1	1
Adjusted *C* index using Archer et al. (1995) approach					
Numerator	(5x4) + 1(6-1) =25	(4x3) + 2(6-2) =20	(3x2) + 3(6-3) =15	(7x6) + 3(10-3) =63	(125x124) + 25(150-25) =18 625
Denominator	6x5 =30	6x5 =30	6x5 =30	10x9 =90	150x149 =22 350
C index	0.833	0.667	0.500	0.700	0.833

(Source: adapted from Pierce and Weetman (2000), p.29)

Entropy Index

In addition to the index-based approaches discussed above, Krisement (1997) employed another index adapted from industrial concentration research in economics, the Entropy (*E*) index, to measure international accounting harmonisation. Entropy is a measure of the degree of randomness in a system, a measure of disorganisation, or nondifferentiation (Tay, 1991). Chambers (1960) explained Entropy as follows:

> The greater the diversity of rules generally prevailing in respect of the derivation and communication of information, the greater the entropy of the system (p.362).

The Entropy index is computed as (Curry and George, 1983):

$$E = \sum_{j=1}^{J} f_{ij} \cdot \ln \frac{1}{f_{ij}}$$

where:

f_{ij} = relative frequency of adoption on country i of accounting method j

J = total number of alternative accounting methods

ln = natural logarithm

As an example of the use of the E index, assume the relative frequencies of alternative accounting methods 1, 2 and 3 in countries A, B and C are as follows:

Table 3.7 Calculation of Entropy Indices

		Country			*Total*
		A	*B*	*C*	
Method	*1*	30	0	10	40
	2	0	20	10	30
	3	0	10	10	20
Total		30	30	30	90
Relative propotions:					
Method	*1*	1.000	0.000	0.333	0.444
	2	0.000	0.667	0.333	0.333
	3	0.000	0.333	0.333	0.222
Entropy (*E*)		0.000	0.637	1.099	1.061

Calculation of the E indices:

A = [ln(1/1.000) x 1.000] + [ln(1/0.000) x 0.000] + [ln(1/0.000) x 0.000] = 0

B = [ln(1/0.000) x 0.000] + [ln(1/0.667) x 0.667] + [ln(1/0.333) x 0.333] = 0.637

C = [ln(1/0.333) x 0.333] + [ln(1/0.333) x 0.333] + [ln(1/0.333) x 0.333] = 1.099

Total = [ln(1/0.444) x 0.444] + [ln(1/0.333) x 0.333] + [ln(1/0.222) x 0.222] = 1.061

That is to say, there are 30 companies in each of the three countries and, in total, 40 companies adopt method 1, 30 companies adopt method 2 and 20 companies adopt method 3. It can also be seen that all companies in country A adopt the same method, and, on the other hand, the choice of alternative methods 1, 2 and 3 in country C is equiprobable. Applying the above formula, the E index for country A is zero which indicates maximum uniformity and, for country C where the number of

companies selecting each of the three methods is equiprobable and thus, the least harmony, the index is the highest.

As shown in the above example, greater entropy means less harmony. Thus, unlike the concentration-based (*H* and *I*) and combination-based (*C*) indices, the *E* index increases when the level of accounting harmony falls. In addition, unlike the first two groups of indices, Entropy does not have a predetermined range of zero to one. Thus, it is more difficult to interpret and its results are not directly comparable with indices calculated under the other two approaches. Krisement (1997) also claims that the advantage of the *E* index is that, alone among indices measuring accounting harmonisation, is additive. However, the author did not demonstrate this additive characteristic in a way that could be operationalised further.

Jaccard Coefficients

More recently, Rahman, Perera and Ganesh (2002) have employed another metric, the Jaccard coefficient, to measure the degree of accounting practice harmony between firms domiciled in Australia and New Zealand. The Jaccard coefficient is useful for quantifying the degree of likeness between two sets of binary observations (Krzanowski, 1990). Rahman, Perera and Ganesh compute two types of Jaccard coefficient in their study. The first measures the extent of likeness between accounting practices by firms in the two countries, and the second measures the degree of likeness between accounting practices not in use in the two countries.

For each alternative method that may be adopted, the accounting practice is coded as '1' if the method is used, or '0' otherwise. To measure the likeness in accounting practices between two firms, which are domiciled in two different countries *A* and *B*, the four possible pair-wise comparisons between the two firms are scored for each area of accounting. Below, *a* represents the number of matches when both firms adopt a method and *d* is the number of matches when both firms do not adopt the method, whilst *b* and *c* represent the number of mismatches for the pair of firms.

		x^{th} firm in country A	
		1	0
y^{th} firm in country B	1	a	b
	0	c	d

The Jaccard coefficient for each firm pair for similarity in practices adopted (*JACC1*) is given by:

$$D1_{xy} = \frac{a}{a+b+c}$$

The Jaccard coefficient for each firm pair for similarity in practices not adopted in a category (*JACC2*) is as follows:

$$D2_{xy} = \frac{d}{b+c+d}$$

The Jaccard coefficient for all company pairs in a category, the average of the Jaccard coefficients of all those pairs, is given by:

$$JACC1 = \frac{\sum_{x=1}^{X}\sum_{y=1}^{Y} D1_{xy}}{X \times Y}$$

$$JACC2 = \frac{\sum_{x=1}^{X}\sum_{y=1}^{Y} D2_{xy}}{X \times Y}$$

Items that are not applicable to a firm are excluded from the analysis.

Table 3.8 illustrates the calculation of the Jaccard coefficients. Suppose that five companies are sampled, two from Country A (A1 and A2) and three from Country B (B1, B2 and B3). Using inventory accounting as an example, each method would be assigned '1' if it is used by a company and '0' otherwise. From the matrix, the matching coefficients for similarity (*D1*) and dissimilarity (*D2*) for each pair are then calculated. For example the coefficient *D1* for A1 and B1 is equal to 0.33 (1/1+1+1) and the coefficient *D2* is equal to 0 (0/1+1+0). Finally, the Jaccard coefficients (*JACC1* and *JACC2*) for all pairs are computed by averaging over the individual pairs.

Table 3.8 Calculation of Jaccard Coefficients

	Country				
	A		B		
Company	A1	A2	B1	B2	B3
Inventory method: FIFO	1	0	0	1	0
Average	1	1	1	1	0
LIFO	0	0	1	1	1

Jaccard coefficient for each pair:

A1 and B1

		A1	
		1	0
B1	1	1	1
	0	1	0

$D1 = 1/3 = 0.33$
$D2 = 0/2 = 0$

A1 and B2

		A1	
		1	0
B2	1	2	1
	0	0	0

$D1 = 2/3 = 0.67$
$D2 = 0/1 = 0$

A1 and B3

		A1	
		1	0
B3	1	0	1
	0	2	0

$D1 = 0/3 = 0$
$D2 = 0/3 = 0$

A2 and B1

		A2	
		1	0
B1	1	1	1
	0	0	1

$D1 = 1/2 = 0.50$
$D2 = 1/2 = 0.50$

A2 and B1

		A2	
		1	0
B1	1	1	2
	0	0	0

$D1 = 1/3 = 0.33$
$D2 = 0/2 = 0$

A2 and B1

		A1	
		1	0
B1	1	0	1
	0	1	1

$D1 = 0/2 = 0.50$
$D2 = 1/3 = 0.33$

Jaccard coefficient for all pairs:

$$JACC\ 1 = \frac{0.33 + 0.67 + 0 + 0.50 + 0.33 + 0}{2 \times 3} = 0.305$$

$$JACC2 = \frac{0 + 0 + 0 + 0.50 + 0.33}{2 \times 3} = 0.138$$

According to Rahman et al. (2002), the matching coefficients for similarity in practices that are adopted (*JACC1*) are likely to be more useful for understanding the level of accounting harmony than in the case of non-adoption (*JACC2*), as it is difficult to identify why firms do not adopt a particular method. On the one hand, this may be due to the existence of regulations prohibiting such practice, but on the other hand it may be the case that a firm has no transactions related to such practices. Nevertheless, Rahman, Perera and Ganesh (2002) compute the second set of Jaccard coefficients (*JACC2*) in order to identify any significant association prohibiting certain practices.

Limitations of Index-based Methods

Cańibano and Mora (2000) highlighted a major deficiency in the index-based methods of measuring harmonisation in that no test of significance has been included in prior studies. Pierce and Weetman (2000) noted similar difficulties with respect to the significance of levels of harmony and changes in those levels. For instance, it might be asked whether an index value of 0.6 is a high or a low level of harmony, or whether a change from 0.6 to 0.8 is considered to be significant. To rectify this problem, Cańibano and Mora (2000) suggested a bootstrapping test as a means of measuring the significance of the change in the value of *C* indices. The bootstrapping technique is used to determine the distribution of an estimator by resampling the data. Rather than relying on a statistical rule to determine the confidence limits, these are inferred from the bootstrap test in order to be able to judge whether or not a result is significant. In their study, Cańibano and Mora (2000) considered that a difference which is within the tail of their bootstrap distribution, specifically within the first ten out of 1000, could be regarded as a significant change in the value of the index, and not a random difference.

A more fundamental limitation to the index-based approach is the fact that its underlying notion of harmonisation is too simplistic, as it assumes that maximum harmonisation is achieved when all firms in all countries adopt the same treatment for a given accounting item. As indicated by McLeay, Neal and Tollington (1999),

the uniform use of a single accounting method across different firms does not necessarily enhance comparability. Different circumstances in which firms operate may motivate the use of different accounting treatments and the harmonisation metric must take this into consideration. Rahman, Perera and Ganesh (2002) demonstrate that firms' operating conditions and specific attributes have considerable influence over the choice of accounting policy. Positive accounting research also provides extensive evidence that firms with different characteristics will adopt different disclosure and measurement practices (e.g., Watts and Zimmermann, 1986 and 1990). In addition, Watts (1992) suggests that accounting policy choice varies by industry, indicating that firms with different attributes may not use the same methods. These problems limit the meaningful interpretation of harmonisation results when measured by index-based methods and thus, they will not be employed in the present study.

3.2.2 Modelling Observed and Expected Outcomes under Harmonisation

The possibility of applying a statistical tool in measuring harmony was hinted by Tay and Parker (1990). They argue that the degree of harmony in the financial reporting practices adopted by firms in different countries may be assessed for a particular financial statement item by comparing '*the observed distribution of firms between different methods with either a random distribution or some expected distribution*', and that a suitable representation of a random distribution could be '*a distribution in which equal numbers of firms would be expected to use each of the available alternatives*'. Given this approach, Tay and Parker propose that '*evidence of harmony would then be the existence of a significant difference between the observed and expected distributions, as measured by some appropriate significance test, for example chi-square*' (Tay and Parker, 1990, p. 85). In the extant literature, two main statistical approaches have been used with accounting data to measure this notion of comparability: the chi-square test of the goodness of fit to expected outcomes and statistical modelling of the harmonisation process.

The Chi-Square Statistic (χ^2)

The chi-square statistic (χ^2) may be used as a test of the significance of differences between observed distributions of firm choices amongst alternative accounting methods, based on either a random distribution or some expected distribution. In the context of accounting harmony, it is used to test for equal proportions across countries, i.e., to determine whether or not the pattern of usage of recognition, measurement and disclosure practices by firms in different countries is the same. The computed test statistic that summarises the observed and expected outcomes is compared to a known critical value in order to determine whether the null hypothesis can be rejected. Failure to reject the null hypothesis provides evidence in favour of the harmonisation of accounting practices, and rejection of the null hypothesis implies that there is a lack of harmonisation. This method was applied by Emenyonu and Gray (1992 and 1996) and Herrmann and Thomas (1995) in conjunction with the index-based approach.

An example from Emenonyu and Gray (1992, p. 55) may be used to illustrate the calculation and interpretation of the chi-square statistic in this context. The following table shows methods for the treatment of goodwill adopted by French, German and UK companies.

Table 3.9 Treatment of Goodwill

		France	Germany	UK	Total
Immediate write-off	Observed	2	18	23	**43**
	Expected	*14.33*	*14.33*	*14.33*	
Amortised over a period	Observed	22	6	1	**29**
	Expected	*9.67*	*9.67*	*9.67*	
	Total	**24**	**24**	**24**	**72**

The observed frequencies (O) are the actual results, whereas the expected frequencies (E) refer to the hypothetical distribution based on the overall proportions between the two goodwill methods, as if companies in all three countries were drawn from the same population.

The formula for calculating the chi-square statistic is:

$$\chi^2 = \frac{(O-E)^2}{E}$$

Hence, the calculation of χ^2 is as follows:

$$\frac{(2-14.33)^2}{14.33}+\frac{(18-14.33)^2}{14.33}+\frac{(23-14.33)^2}{14.33}+\frac{(22-9.67)^2}{9.67}+\frac{(6-9.67)^2}{9.67}+\frac{(1-9.67)^2}{9.67}=41.687$$

The next step is to determine the degrees of freedom (df) which can be expressed by the following formula:

df = (r-1) x (c-1)

That is, a table's degrees of freedom equals the number of rows (r) in the table minus ones multiplied by the number of columns (c) in the table minus one, e.g., for 2 x 3 tables as in the above example, df = (2-1) x (3-1) = 2.

Finally, the calculated chi-square statistic (χ^2 = 41.687) with *2* degrees of freedom is compared with the chi-square distribution table, as follows:

probability level (α)

df	0.5	0.1	0.05	0.02	0.01	0.001
1	0.455	2.706	3.841	5.412	6.635	10.827
2	1.386	4.605	5.991	7.824	9.21	13.815
3	2.366	6.251	7.815	9.837	11.345	16.268
4	3.357	7.779	9.788	11.668	13.277	18.465
5	4.351	9.236	11.07	13.388	15.086	20.517

The critical value, as shown in the table, for a level of significance of 0.05 (or 95% level of confidence) is 5.991. Since the calculated chi-square is greater than this critical value, the null hypothesis is rejected and therefore, it can be concluded that the application of methods of treating goodwill by French, German and UK companies is significantly differently, reflecting the predominance of the immediate write-off in Germany and the UK but not in France during the period in question.

Although the chi-square statistic is easy to calculate and interpret, it can be unreliable when expected cell frequencies are small. Cochran (1954) suggested that

the minimum expected cell size could be 1 if the degrees of freedom were greater than 1 and no more then about 20 per cent of cells should have expected frequencies less than 5.

As mentioned, the chi-square statistic measures a different notion of harmonisation than does the index-based technique. That is, comparability indices are driven by convergence towards uniformity whereas chi-square measures the similarity in the pattern of choices across countries. The latter approach has been developed further by modelling the harmonisation process statistically, as discussed below.

Statistical Models

Archer, Delvaille and McLeay (1995) introduce a statistical model which aims to estimate from the observed patterns of policy choices the extent to which the observed changes may be attributed to a process of international harmonisation, rather than to behaviour that is specific to individual countries or firms. This approach is based on the assumption that different operating conditions motivate the choice of different accounting methods. Hence, they propose the concept of '*distributional harmony*', whereby, other things being equal, the expected distribution of accounting policy treatments is identical in each country. Based on a position where the actual distribution of accounting policy choice is seen as a function of the country involved, the year, and the choice of accounting method for a particular item, models of accounting policy choice are used to systematically isolate the effects of country, policy choice and/or year.

Using the example in Archer *et al.* (1996), the following will illustrate this approach to the modelling of accounting policy choice. The actual observations are presented in Panel A (Table 3.10), which shows for each year the number of firms in each country selecting each accounting method, cross-classified for two years, two countries and three accounting methods. It can be seen that, for the two countries combined, the distribution of accounting policy choices has changed from a distribution in year 1 (33%:33%:33%) to a high degree of convergence in year 2 on

method 2, the generally accepted practice adopted by 80 percent of firms. The difference between these observed values and the expected values predicted by a model of accounting harmony gives an indication of the lack of harmony that is not explained. The expected values will differ depending on the model that is applied, and the expected values from the different models are described below.

Expected values under Complete Independence

In this model, the expected value of accounting policy choices is equal in each cell, regardless of country or year. However, this model provides no insight, and indeed has no validity when subsamples are unbalanced because there are different numbers of observations in each country and/or in each year. The first improvement therefore is to introduce these conditions whilst still allowing for a model that describes the situation where accounting policy choices are independent of influences from within countries that may change over time.

Expected values under Conditional Independence

As the model of conditional independence provides estimates of the effects associated with the numbers of observations by country and by year, the components of the model are a country factor (C), a year factor (Y) and the second-order interactions between countries and years ($C.Y$). Thus, the linear model of conditional independence is denoted as:

$$C + Y + C.Y$$

In this model, the selection of an accounting method from among the possible methods is random, with each of the possible methods having an equal chance of being selected. The expected number of firms selecting a particular method in a given country in a given year is conditional on the total number of firms in that country for that year and the number of accounting methods. The results reflect

equal probabilities of selection. This model controls for variation in year and method choice and produces a model based on equal probabilities, as shown in Panel B.

Expected Values under the Static Model of Harmony

This model allows policy choices to depart from equiprobability and to vary overall, although not within each country, and not from year to year within countries. The resulting model describes the most likely pattern across countries in a state where there is an unchanging level of harmony between the years. This model is based on the actual proportions of policy choice each year for the two countries combined i.e., 1:1:1 in year $k = 1$ and 1:8:1 in year $k = 2$. This model may be achieved by adding the three-level policy factor (P) to the model as a main effect, giving the following:

$$C + Y + P + C.Y \ (or\ C * Y + P)$$

As illustrated in Panel C, the model is based on total proportions remaining unchanged (1:3:1) over time. Consequently, there is no harmonisation between years. The only influence is the variation across policies whereby year and country have no effect on the model.

Expected Values from the Dynamic Model of Harmonisation

This model is based on the actual proportions of policy choice each year for the two countries combined i.e., 1:1:1 in year $k = 1$ and 1:8:1 in year $k = 2$. The actual proportions for the two countries combined are applied to the total number of firms in each of the two countries, for each year. This model allows policy choices to vary from year to year, but still not from country to country, and the model therefore describes the change in harmony from one period to the next. This is achieved by adding the interaction between years and policy ($Y.P$) to the model to give:

$$C + Y + P + C.Y + Y.P \ (or\ C * Y + Y * P)$$

The *Y.P* interaction terms represent, for each policy, the change from one year to the next in the relative odds of it being selected. As illustrated in Panel D, the situation where two countries are seen as being in harmony in each year separately, but there is disharmony within each country across the two years.

Expected Value from the Full Model

This model allows policy choices to vary systematically from country to country from year to year. The components of the full model are as follows:

$$C + Y + P + C.Y + Y.P + C.P \ (or\ C*Y+Y*P+C*P)$$

The full model provides a description of systematic accounting policy choice, including the effects of international harmonisation (*Y.P*) and national standardisation (*C.P*), the significance of each being reflected in the parameter estimates. This is illustrated in Panel E.

Table 3.10 Statistical Models of Harmonisation

Panel A. An Illustration of Policy Choices in Two Periods (Actual observations)

Method	Year k = 1				Year k = 2				*Combined*			
Country	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total
i = 1	51	61	38	**150**	19	169	12	**200**	70	230	50	**350**
i = 2	99	89	112	**300**	41	311	48	**400**	140	400	160	**700**
Total	150	150	150	**450**	60	480	60	**600**	210	630	210	**1050**

Panel B. Expected Values under Conditional Independence

Method	Year k = 1				Year k = 2				*Combined*			
Country	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total
i = 1	50	50	50	**150**	67	67	67	**200**	117	117	117	**350**
i = 2	100	100	100	**300**	133	133	133	**400**	233	233	233	**700**
Total	150	150	150	**450**	200	200	200	**600**	350	350	350	**1050**

Panel C. Expected Values from the Static Model of Harmony

Method	Year k = 1				Year k = 2				*Combined*			
Country	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total
i = 1	30	90	30	**150**	40	120	40	**200**	70	210	70	**350**
i = 2	60	180	60	**300**	80	240	80	**400**	140	420	140	**700**
Total	90	270	90	**450**	120	360	120	**600**	210	630	210	**1050**

Panel D. Expected Values from the Dynamic Model of Harmonisation

Method	Year k = 1				Year k = 2				*Combined*			
Country	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total
i = 1	50	50	50	**150**	20	160	20	**200**	70	210	70	**350**
i = 2	100	100	100	**300**	40	320	40	**400**	140	420	140	**700**
Total	150	150	150	**450**	60	480	60	**600**	210	630	210	**1050**

Panel E. Expected Values from Full Second-Order Interaction Model

Method	Year k = 1				Year k = 2				*Combined*			
Country	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total	j =1	j =2	j =3	Total
i = 1	52	61	37	**150**	18	169	13	**200**	70	230	50	**350**
i = 2	89	89	113	**300**	42	311	47	**400**	140	400	160	**700**
Total	**150**	**150**	**150**	**450**	**60**	**480**	**60**	**600**	**210**	**630**	**210**	**1050**

(source : Archer, Delvaille & McLeay, 1996, pp. 7-11)

Archer, Delvaille and McLeay applied these statistical models to the deferred tax and consolidation goodwill data that they had used in their previous study (Archer et al., 1995). Employing a hierarchy of nested statistical models, they distinguish between two sets of systematic effects: those which account for the level of international harmony; and those systematic effects which account for international disharmony, which may be attributed to national differences in the distribution of accounting policy choice. The analysis also permits them to identify the effects of

non-systematic policy choices by firms, i.e., the random company effects accounted for in the residuals not explained by the models. In addition to confirming the results of their 1995 study, the statistical models facilitated greater refinement of within-country and between-country comparability by mapping the changes in the related C indices when moving from one model to the next.

McLeay, Neal and Tollington (1999) extended the statistical modelling approach applied in Archer, Delvaille and McLeay (1996) in measuring international standardisation and harmonisation. This new technique provides a measure of harmonisation which permitted a definition of financial statement comparability that is less restrictive than has been applied in previous research. They suggest that the interfirm comparability of financial statements would depend on the use of accounting methods appropriate to a firm's operating conditions, and not on the use of the same method by all firms. The authors also demonstrate that the models permit the use of more than one accounting treatment for a given financial statement item.

Based on examples set out in McLeay et al. (1999), the following illustrates their attempt to distinguish between the concepts of standardisation and harmonisation. Three factors, indicated by A for alternative accounting methods, C for countries and Y for years, were introduced successively into the models. The factor C has i levels, providing a main effect for each country. To allow for the use of multiple accounting methods, each accounting method A_j is introduced as a separate factor in vectors of ones and zeros. Lastly, the factor Y has k levels, providing a main effect for each year. Interactions among factors are represented as $A.Y$ (the standardisation effects), $A.C$ (the systematic effects of disharmony by country) and $A.C.Y$ (the random effects of disharmony attributable to non-systematic policy choices by firms. The linear structure of the four successive models described in McLeay et al. (1999) is given below:

Steady state model

$$\log_e(x_{ijk}) = \beta_j^A$$

The first model includes only the main accounting policy effects. The overall differences in the odds of using the alternative accounting methods are allowed for, but the distributions do not vary between years nor between countries. The model describes a steady state where there is neither harmonisation nor standardisation in the period under investigation. The reduction in error between the model of conditional independence and the steady state model is attributable therefore to prior standardisation.

Model of standardisation

$$\log_e(x_{ijk}) = \beta_j^A + \beta_{jk}^{A.Y}$$

This model allows the accounting policy effects to vary from year to year but with no differences between countries. It describes a process of standardisation occurring between successive states of harmony, i.e., without harmonisation. The reduction in error between the static model and this model is attributable to the standardisation which occurred during the period under investigation.

Full model of harmonisation and standardisation

$$\log_e(x_{ijk}) = \beta_j^A + \beta_{ij}^{A.C} + \beta_{jk}^{A.Y}$$

This model includes the accounting policy effects in each country and describes how the pattern of policy choices in each country differs from international norms. The reduction in error between the model of standardisation and the full model is attributable to systematic disharmony, any reduction in the components of this error over time therefore being attributable to systematic harmonisation.

Random effects model

$$\log_e(x_{ijk}) = \beta_j^A + \beta_{ij}^{A.C} + \beta_{jk}^{A.Y} + \beta_{ijk}^{A.Y.C}$$

This saturated model includes all effects, adding non-systematic changes in policy choice by individual firms to the full model as a random effect. The expected values are equal to observed values.

The authors employed the statistical model described above to estimate goodwill data collected from interlisted European firms for the years ending in 1987 and 1993. The overall result indicates that there is a considerable diversity in goodwill practices amongst the sampled firms, and that little convergence has taken place over the years in spite of successive harmonisation and standardisation efforts. However, in reaching these conclusions, some broad assumptions have been made with regard to similarities in industrial structure and corporate behaviour. That is, the authors have assumed that, unconditionally, the pattern of accounting policy choices should be constant across different countries. The present research study reported in this thesis extends the statistical modelling approach developed by Archer, Delvaille and McLeay (1996) and McLeay, Neal and Tollington (1999) in measuring international accounting harmonisation by taking into consideration the operating conditions of individual firms. In particular, this study incorporates, in addition to the country of domicile, a firm's sector of operations and other specific attributes, i.e., its listing status and size, in measuring accounting harmonisation.

3.3 Prior Research on Measurement of Accounting Harmonisation

A summary of empirical research concerned with the measurement of harmonisation is provided in Table 3.11, showing the range of index-based and statistical modelling approaches that have been applied to date. A more complete description of each of the studies involved is set out in Appendix 3A. It can be seen that the

index-based techniques (*H, I* and *C*), which were first introduced in the accounting literature by van der Tas (1988), constitute the most widely used measurement approach. In addition, as discussed earlier, a measure of Entropy (the *E* index) and a measure of similarity (the Jaccard coefficient) have also been applied, by Krisement (1997) and Rahman, Perera and Ganesh (2002) respectively. The use of a statistical approach based on the goodness-of-fit to expected distributions of policy choices was first hinted at by Tay and Parker (1990), although not investigated empirically by them, and was subsequently employed in a number of studies in conjunction with index-based techniques. A fuller statistical model of international accounting harmonisation was developed by Archer, Delvaille and McLeay (1996) and later extended by McLeay, Neal and Tollington (1999). Whilst the specific aim of the present study is to build directly on the latter approach, a detailed discussion of the empirical results arising from the indexation of harmonisation is given below before reviewing the published evidence from statistical modelling.

Index-based Approaches

Van der Tas (1988) in his exploratory article proposed techniques to measure the impact of national and international organisations such as the FASB, IASC, and the EU, on the extent of financial reporting harmony. The study seeks to determine when and to what extent harmonisation had taken place by applying three indices: the *H*, *C*, and *I* indices described in Section 3.2 above. The data used to calculate the indices was obtained by surveying financial reporting practices in the UK, the Netherlands and the US. However, as argued by Tay and Parker (1990), these surveys were not undertaken with a purpose to such measurement, i.e., the surveys mixed up accounting policy choice with presentation matters, and thus, did not provide information on accounting policy choice in sufficient detail to be able to generate meaningful results from subsequent analysis.

Table 3.11 Summary of Major Accounting Harmonisation Measurement Studies

Author	Data Source	No. of Countries	No. of Firms	No. of Accounting Issues	Method
van der Tas (1988)	Surveys (1978-84)	3	various	3	*H, I, C*
van der Tas (1992a)	Annual reports (1978-88)	9	154	1	*C*
Emenyonu and Gray (1992)	Annual reports (1989)	3	78	6	*I*, χ^2
Archer, Delvaille & McLeay (1995)	Annual reports (1986/87 and 1990/91)	8	89	2	Within-country *C* Between-country *C*
Archer, Delvaille & McLeay (1996)	Annual reports (1986/87 and 1990/91)	8	89	2	Statistical models
Emenyonu and Gray (1996)	Annual reports (1970/71 and 1990/91)	5	293	26	*I*, χ^2
Krisement (1997)	Survey data (1989)	15	261	1	*E*
McLeay, Neal and Tollington (1999)	Annual reports (1987 and 1993)	15	148 and 193	1	Statistical models
Pierce and Weetman (2000)	Annual reports (1986-93)	2	various	1	*H, I, C*
Cańibano and Mora (2000)	Annual reports (1991/92 and 1996/97)	13	85	4	*I*, Bootstrapping
Murphy (2000)	Database (1988-1995)	4	104	4	*I*
Aisbitt (2001)	Annual reports (1981/82, 92, 94 and 98)	4	48	6	Between-country *C*
Parker and Morris (2001)	Annual reports (1993)	2	80	11	Between-country *C*, χ^2
Rahman, Perera and Ganesh (2002)	Annual reports (1999)	2	156	28	Jaccard coefficient

In subsequent research, van der Tas (1992a) conducted his own survey of the annual reports for the years 1978 to 1988 of 154 quoted firms from nine European countries which had implemented the EU Fourth Directive before January 1989. The objective of the survey was to investigate changes in 'material' measurement harmony for deferred taxation and to assess the impact of the Directive in this respect. When the *C* index was applied to the measurement of harmonisation, the results, as reported in

Table 3.12, indicate that the degree of material harmony increased over the period, particularly when additional disclosures were taken into account.

Table 3.12 Measurement of Accounting Harmonisation in Europe: Deferred Taxation

	Method								Reconciliation			*No. def.*	*C* Index	
Year	*A*	*B*	*C*	*D*	*E*	*G*	*H*	*I*	*A&B*	*B&C*	*B&D*	*tax*	*Excl. recon*	*Incl. recon*
Panel A: Individual accounts														
1978	29	22		20				0	2		13	83	0.333	0.476
1979	29	18		25				1	3		17	81	0.327	0.483
1980	29	17		25				1	1		18	82	0.329	0.463
1981	29	16		23				1	2		16	85	0.332	0.468
1982	29	15		22				1	2		15	87	0.336	0.464
1983	29	17		22				0	3		16	86	0.339	0.502
1984	30	16		23				0	20		17	84	0.344	0.742
1985	27	16		25				0	19		19	85	0.338	0.764
1986	27	19		21				0	22		16	87	0.331	0.817
1987	23	24		19				0	23		14	88	0.326	0.89
1988	22	25		19				0	22		13	88	0.327	0.869
Panel B: Consolidated Accounts														
1978	27	32	9	37	1	1	0	1	2	0	30	22	0.268	0.456
1979	26	28	7	46	1	1	0	1	2	0	39	22	0.293	0.498
1980	25	27	8	46	1	1	0	1	1	0	40	22	0.291	0.486
1981	24	30	8	47	1	1	0	1	1	0	41	22	0.293	0.502
1982	25	29	9	47	1	1	1	1	1	0	41	20	0.283	0.478
1983	26	32	9	48	1	0	1	1	2	0	41	17	0.288	0.499
1984	26	33	9	48	0	0	2	1	2	0	41	15	0.287	0.501
1985	25	33	9	48	0	0	1	1	2	1	42	17	0.294	0.531
1986	20	42	9	48	0	0	1	1	2	0	43	17	0.305	0.577
1987	10	57	7	48	0	0	1	1	2	0	43	15	0.366	0.714
1988	10	62	4	49	0	0	1	1	2	0	43	13	0.390	0.749

Notes:
A : tax payable method
B : at nominal value, comprehensive liability with separate deferred taxes
C : at nominal value, comprehensive deferral method with deferred taxes
D : at nominal value, partial liability with separate deferred taxes
E : some defferred taxes are accounted for applying method B, and some using the net of tax method
F : at discounted value, comprehensive liability, separate deferrd taxes
G : some deferred taxes are accounted for applying method B and some method D
H : the deferred taxes of some subsidiaries are not accounted for,
the rest of deferred taxes are accounted for applying method C
I : some of deferred taxes are accounted for applying method B and some are
accounted for applying method F.

(source: van der Tas, 1992a, pp. 87 & 90)

In the first of a number of applications of the harmonisation measurement tools developed by van der Tas (1988), Emenyonu and Gray (1992) analysed whether or not asset and profit measurement practices of large firms in three major EU countries, i.e., France, Germany and the UK, were significantly different as at the end of 1989. Data were obtained from the financial statements of 26 large quoted firms from each of the three countries. These authors also carried out χ^2 tests of the

cross-country consistency of the distributions of policy choices, as suggested by Tay and Parker (1990), which showed significant differences in measurement practices between the three countries. Moreover, the *I* indices used to measure the overall degree of financial reporting harmony in France, Germany and the UK produced a relatively low range of values in the case of depreciation and goodwill, but higher in the case of stock valuation methods, the valuation basis of fixed assets and the treatment of extraordinary and exceptional items, as shown below in Table 3.13.

Table 3.13 Measurement of Harmony: French, German and UK Large Firms

	France	*Germany*	*UK*	*Total*
Depreciation Methods				
Straight line (S)	15 (58%)	0 (0%)	25 (96%)	40 (51%)
Declining Balance (D)	1 (4%)	1 (4%)	1 (4%)	3 (4%)
Both (S) and (D)	10 (38%)	25 (96%)	0 (0%)	35 (45%)
Total companies	*26*	*26*	*26*	*78*
$X^2 = 48.75$ *I* Index = 0.0076				
Stock Valuation Methods				
Cost	16 (61%)	4 (15%)	0 (0%)	20 (26%)
Market value (MV)	0 (0%)	0 (0%)	2 (8%)	2 (2%)
Lower of cost/MV	10 (39%)	22 (85%)	24 (92%)	56 (72%)
Total companies	*26*	*26*	*26*	*78*
$X^2 = 27.97$ *I* Index = 0.5481				
Treatment of Goodwill				
Immediate write-off	2 (8%)	18 (75%)	23 (96%)	43 (60%)
Amortised over a period	22 (92%)	6 (25%)	1 (4%)	29 (40%)
Total companies	*24*	*24*	*24*	*72*
$X^2 = 41.69$ *I* Index = 0.2636				
Valuation Bases for Fixed Assets				
Historical cost	23 (88%)	26 (100%)	11 (42%)	60 (77%)
Modified historical	3 (12%)	0 (0%)	15 (58%)	18 (23%)
Total companies	*26*	*26*	*26*	*78*
$X^2 = 25.77$ *I* Index = 0.6079				
Treatment of Extraordinary and Exceptional Items				
Income statement	23 (88%)	12 (46%)	22 (85%)	57 (73%)
Reserves/Retained earnings	3 (12%)	14 (54%)	4 (15%)	21 (27%)
Total companies	*26*	*26*	*26*	*78*
$X^2 = 14.47$ *I* Index = 0.5959				

(source: Emenyonu and Gray, 1992, p.53)

With reference to the case of depreciation methods, it can be seen that the computed chi-square value of 48.75 reported by the authors is significant at the 5% level. Thus, it can be concluded that the depreciation policy choices exercised by large

French, German and UK firms are significantly different. This is reflected in the low *I* index value of 0.0076, which implies that there is about a one percent harmony on the issue of the depreciation.

However, when the tests were re-computed for two countries at a time, as indicated in Table 3.14, the level of harmony was shown to be higher, i.e., 0.04 for Germany versus UK, 0.38 for France versus Germany and 0.57 for France versus the UK, compared to 0.0076 for the three countries taken together.

Table 3.14 Results of Further Country Analysis

	France & Germany	*France & UK*	*Germany & UK*
Chi-square (X^2) values:			
Stock valuation methods	11.70*	23.11*	4.33
Depreciation methods	21.09*	10.83*	48.15*
Goodwill	21.94*	36.81*	4.18
Valuation bases for fixed assets	3.18	12.24*	21.08*
Extraordinary exceptional items	10.58*	0.17	8.50*
**denotes significant results at 5% level*			
I Index values			
Stock valuation methods	0.42	0.39	0.85
Depreciation methods	0.38	0.57	0.04
Goodwill	0.29	0.11	0.73
Valuation bases for fixed assets	0.88	0.44	0.42
Extraordinary exceptional items	0.47	0.77	0.47

(source: Emenyonu and Gray, 1992, p.58)

In a more extensive study, Herrmann and Thomas (1995) investigated the 1992/93 financial statements of 217 firms from eight European countries to determine the extent of harmony of selected financial reporting measurement practices. They computed the *I* index and carried out χ^2 tests for six accounting policy choices: fixed asset valuation, depreciation, goodwill, research and development costs, inventory and foreign currency translation. Their results revealed a relatively high degree of harmony in foreign currency translation, inventory valuation, and depreciation methods. Although the index for depreciation methods was high, there was nevertheless a statistically significant difference in the patterns of adoption of accounting methods for these items across the eight countries as measured by χ^2 (see Table 3.15). As mentioned earlier, this is due to the fact that index-based approaches measure a concept of harmony which is different from that measured by χ^2.

Table 3.15 Measurement of Harmony for Eight European Countries in 1992/93

Measurement practices	*I* Indices	X^2 test
1. Foreign currency translation		
a. Translation of the balance sheet	0.904	7.22
b. Translation of the income statement	0.6433	54.39*
c. Treatment of translation differences	0.8494	6.88
2. Inventory methods		
a. Inventory valuation	0.7943	17.89
b. Inventory costing method	0.2292	71.88*
3. Depreciation method	0.6245	134.82*
4. Research and development	0.4105	38.76*
5. Fixed asset valuation	0.2852	93.34*
6. Goodwill	0.2457	124.90*
*significant at the 0.01 level		

(source: Herrmann and Thomas, 1995, pp. 259-261)

A limitation of the studies by Emenyonu and Gray (1992) and Herrmann and Thomas (1995) described above is that they evaluate harmony at a point in time, rather than the process of harmonisation that has taken place over a relatively long period. In order to address this issue, Emenyonu and Gray (1996) assess the changes in accounting harmony over a 20 year period. These authors analysed 26 accounting measurement issues and 20 associated disclosure practices for 293 firms in France, Germany, Japan, the UK and the US in 1971/72 and 1991/92. Employing the χ^2 test, they found that there were significant differences across countries in the practices adopted by firms for 36 out of 46 areas examined. Despite some significant changes over the period, they concluded from the *I* indices calculated for the 26 measurement issues, that progress in reducing international financial reporting diversity over the 20 year period had been modest. This is evidenced by the following table in which the average *I* index of 0.62 financial year 1970/71 increased minimally to 0.69 in 1991/92.

Table 3.16 International Accounting Harmonisation: *I* Index and Changes from 1971/72 to 1991/92

	Index 1971/72	*Index 1991/92*	*Index Change*	*% Change*
Accounting Methods				
1. Consolidation method	0.0963	0.9269	+0.8306	+862.5
2. Investments in Associates	0.7784	0.9376	+0.1592	+20.4
3. Treatment of goodwill	0.6865	0.5441	-0.1424	-20.7
4. Rate for translating Income Statement of Subsidiaries	0.5417	0.7039	+0.1622	+29.9
5. Treatment of Translation Differences	0.5377	0.5063	-0.0314	-5.8
6. Treatment of Exchange Differences	0.2323	0.8136	+0.5813	+250.2
7. Method used to assign cost to inventories	0.3853	0.2825	-0.1028	-26.7
8. Measurement basis for recording inventories	0.6781	0.7564	+0.0783	+11.5
9. Definition of market value	0.6164	0.6990	+0.0826	+13.4
10. Cost basis for recording property, plant and equipment	0.7629	0.7906	+0.0277	+3.6
11. Gains/Losses on disposal of property, plant and equipment	0.7093	0.9777	+0.2684	+37.8
12. Method of accounting for depreciation	0.3294	0.2295	-0.0999	-30.3
13. Method of valuing long-term investments	0.8471	0.6088	-0.2383	-28.1
14. Gains/losses on disposal of long-term investments	0.5803	0.9889	+0.4986	+85.9
15. Method of valuing current investments	0.5731	0.7662	+0.1931	+33.7
16. Gains/losses on disposal of current investments	0.6999	0.9914	+0.2915	+41.6
17. Method of accounting for borrowing costs	0.9426	0.3843	-0.5583	-59.2
18. Basis for providing for deferred taxes	0.7732	0.2321	-0.5411	-70.0
19. Method of treating deferred taxes	0.4005	0.3953	-0.0052	-1.3
20. Accounting for extra-ordinary and exceptional items	0.9401	0.9950	+0.0549	+5.8
21. Treatment of research expenditures	0.3592	0.9465	+0.5873	+163.5
22. Treatment of development expenditures	0.4145	0.9098	+0.4953	+119.5
23. Determination of the cost of pensions	0.9524	0.4882	-0.4642	-48.7
24. Treatment of past service costs/experience adjustments	0.9439	0.8501	-0.0938	-9.9
25. Method of accounting for long-term contracts	0.6670	0.5933	-0.0737	-11.0
26. Method of treating governments grants	0.7500	0.6300	-0.1200	-16.0
Average *I*-Index Score	**0.6230**	**0.6903**	**+0.0673**	**+10.8**

(source: Emenyonu and Gray, 1996, p. 277)

It is worth noting at this point a questionable aspect of the research design adopted by Emenyonu and Gray (1992, 1996) and Herrmann and Thomas (1995), as insufficient attention is given to the implications of using more than one accounting method for a given accounts item. For example, both the straight line method and the declining balance method of depreciation may be used by a firm in accounting for different types of fixed asset. Unfortunately, each of the above-mentioned studies classifies firms that adopt multiple methods for a particular accounting issue as a separate category, treating these as not comparable to other categories (e.g., firms that only use straight line or firms that only use declining balance). This classification is misleading since a firm that diversifies its operations may use multiple accounting methods in order to appropriately reflect the different nature of its various transactions. Thus, the present study attempts to resolve this issue by allowing for multiple choice of policies in the statistical modelling approach.

In another study that employs the *I* index to measure the degree of harmonisation over time, Murphy (2000) has considered the impact of adopting IASs. The study compares a sample of 16 Swiss firms that adopted IASs, with samples of firms from Japan, the UK, and the US, and includes a control sample of 18 Swiss firms that did not switch from reporting in accordance with local Swiss standards. Four accounting practices were investigated: depreciation, inventory, financial statement cost basis and consolidation practices. Data on accounting policy choices from 1988 to 1995 were obtained from the Worldscope February 1997 database. The results, as reported in Table 3.17, indicate that across the eight-year period, the majority of the *I* index comparisons were positive and statistically significant. However, the author acknowledged that these changes were not solely due to the results of adopting IASs.

Table 3.17 Measurement of Harmonisation: *I* Indices

	I Index 1988	*I* Index 1995	Correlation	*p* value
Depreciation				
Swiss IAS and US	0.327	0.786	0.927	0.0009***
Swiss local and US	0.018	0.515	0.972	0.0001***
Swiss IAS and UK	0.353	0.768	0.949	0.0003***
Swiss local and UK	0.017	0.507	0.968	0.0001***
Swiss IAS and Japan	0.061	0.002	-0.867	0.0053***
Swiss local and Japan	0.037	0.094	0.586	0.1272
Swiss IAS and all three	0.11	0.089	-0.7	0.05330*
Swiss local and all three	0.085	0.115	0.661	0.0741
Inventory				
Swiss IAS and US	0.159	0.278	0.799	0.0171**
Swiss local and US	0.131	0.229	0.755	0.0304**
Swiss IAS and UK	0.315	0.099	-0.322	0.4368
Swiss local and UK	0.395	0.124	-0.36	0.3805
Swiss IAS and Japan	0.203	0.578	0.86	0.0061***
Swiss local and Japan	0.254	0.404	0.707	0.494**
Swiss IAS and all three	0.389	0.131	-0.794	0.185**
Swiss local and all three	0.419	0.14	-0.647	0.0832*
Financial Statement Cost Basis				
Swiss IAS and US	0.873	0.811	-0.168	0.6913
Swiss local and US	0.704	0.763	0.669	0.0697*
Swiss IAS and UK	0.279	0.343	0.859	0.0064***
Swiss local and UK	0.226	0.403	0.913	0.0015***
Swiss IAS and Japan	0.873	0.811	-0.168	0.6913
Swiss local and Japan	0.704	0.763	0.669	0.0697*
Swiss IAS and all three	0.652	0.637	0.049	0.9091
Swiss local and all three	0.608	0.624	0.574	0.1368
Consolidation				
Swiss IAS and US	0.598	0.871	0.672	0.0678*
Swiss local and US	0.394	0.777	0.856	0.0066***
Swiss IAS and UK	0.603	0.872	0.626	0.0966*
Swiss local and UK	0.393	0.776	0.857	0.0065***
Swiss IAS and Japan	0.126	0.099	0.212	0.6137
Swiss local and Japan	0.183	0.146	-0.527	0.1797
Swiss IAS and all three	0.087	0.409	0.859	0.0062***
Swiss local and all three	0.088	0.394	0.86	0.0061***

* Significance level: p <.10
** Significance level: p < .05
*** Significance level: p < .01

(source: Murphy, 2000)

It should be noted at this point that, although the use of the Worldscope database as a source of accounting policy data solves the problem of data collection, it has its own limitations. First, the classification of accounting data may not be accurate nor sufficiently detailed, e.g., a firm that adopts more than one method for a given

accounting method is classified as 'mixed' in this database without specifying the methods involved. This can be seen in the case of depreciation, for example, in Table 3.18 below.

Table 3.18 Depreciation Methods Used

	Swiss IAS	Swiss local	US	UK	Japanese
1988					
Accelerated	0	0	1	0	17
Mixed	3	2	3	3	8
Mixed with excess	0	15	0	0	0
Not disclosed	7	1	0	1	0
Straight-line	6	0	16	21	0
Total	16	18	20	25	25
1995					
Accelerated	0	0	0	0	11
Mixed	0	3	2	3	14
Mixed with excess	0	0	0	0	0
Not disclosed	1	5	0	0	0
Straight-line	14	10	18	22	0
Straight-line with excess	1	0	0	0	0
Total	16	18	20	25	25

(source: Murphy, 2000, p. 490)

A further concern, which only becomes evident when the accounting policy data available in this database is compared with the annual reports published by the firms involved, is that there are numerous inconsistencies between the primary and secondary sources. Therefore, the results described above should be interpreted with caution. This aspect of research design is addressed in a more detailed way in the present thesis (see Chapter 5).

Rather than use the *I* index, Archer, Delvaille and McLeay (1995) refined the basic *C* index in order to measure international comparability. They divided the *C* index into a component that measures the within-country effects of intra-national standardisation and another component that measures the between-country effects of inter-national harmonisation. Using this decomposed set of *C* indices, they examined the impact of harmonisation efforts on the two accounting issues first investigated by Van der Tas, i.e., deferred tax and goodwill, for 89 European interlisted firms for the years 1986/87 and 1990/91. The results are reproduced in Table 3.19 below, where it can be seen that there was little change overall in the use of goodwill methods during the period. Of the 89 sample firms, all but eleven in 1986/87 and nine in 1990/91 either chose to write off goodwill against reserves, or to treat

goodwill as an asset to be amortised through the profit and loss account over its useful economic life, which reflected the options left by the EU Seventh Directive and also by IAS 22 prior to its revision. The proportions opting for these two main methods did not change significantly over the four-year period.

Table 3.19 Goodwill Cross-classifications

	1986/87 Accounting method						*1990/91* Accounting method					
	A	*B*	*C*	*D*	*E*	*Total*	*A*	*B*	*C*	*D*	*E*	*Total*
Belgium	0	0	0	4	0	4	0	0	0	4	0	4
France	0	1	0	11	0	12	0	1	0	11	0	12
Germany	3	10	2	6	1	22	0	11	0	8	3	22
Ireland	1	2	0	0	1	4	1	2	0	0	1	4
Netherlands	0	12	0	0	0	12	0	9	0	1	2	12
Sweden	1	2	0	10	0	13	0	4	0	9	0	13
Switzerland	0	0	0	2	2	4	0	2	0	2	0	4
UK	0	15	0	1	2	18	0	15	0	1	2	18
Total	5	42	2	34	6	89	1	44	0	36	8	89

Key. A: Written off against profit and loss account in the year of acquisition;
B: Eliminated against reserves in the year of acquisition
C: Shown as an asset and not amortissed
D: Shown as an asset and amortised through the profit and loss account
E: Other or unspecified

(source: Archer, Devaille and McLeay, 1995)

The authors concluded that the results in the two areas of deferred tax and goodwill on consolidation showed that little progress in harmonisation took place between the two periods 1986/87 and 1990/91. The decomposition of the comparability indices, as reported below in Table 3.20, suggests that there was a slight increase overall in the level of comparability in goodwill practices between 1986/87 and 1990/91, i.e., from 38.33% to 40%. It is evident that the increase in the level of harmonisation was mainly attributed to changes in between-country *C* index, since the change in within-country comparability was either very small (in the case of deferred tax) or negative (in the case of goodwill).

Table 3.20 Comparability Indices: Goodwill and Deferred Taxation

	Deferred Taxation		Goodwill	
	1986/87	*1990/91*	*1986/87*	*1990/91*
Within-country	37.09	37.91	58.17	53.92
Between-country	10.84	18.61	34.66	37.71
Total comparability	14.94	21.63	38.33	40.25

(source: Archer, Devaille and McLeay, 1995, p.75 & p.79)

Aisbitt (2001) studied the usefulness of the Archer, Delvaille and McLeay (1995) *C* index decomposition in measuring the harmonisation of financial reporting practices among the Nordic countries. Annual report data were obtained for twelve firms each from Denmark, Finland, Sweden and Norway for the years 1981/82, 1992, 1994 and 1998. The analysis covers twenty measurement and disclosure items and provides some evidence of harmonisation although there were also instances of 'disharmonisation', i.e., where the degree of harmony appeared to be lower in later periods. This study has also highlighted a number of limitations associated with prior research in measuring harmonisation. First, the author argues that prior research studies that attempted to associate changes in harmony with a single factor, i.e., legislation, were not entirely successful. This is due to the fact that firms do not prepare their financial statements in a vacuum and that they are influenced by a range of factors including changes in non-legislative regulations, developments in accounting practice and theory, industry factors and the demands of the market. Thus, while possible causes of changes in harmony can be identified, the author argues that it is important to exercise caution in attempting to attribute changes to a single cause. In addition, this study has illustrated that the determination of the number of possible treatments to be incorporated in the model for calculating the indices was highly judgemental in prior research. As the example in Table 3.19 demonstrates, the smaller the number of possible accounting treatments, the easier it is to demonstrate a high level of harmony.

Table 3.21 Example Illustrating the Effect of the Number of Possible Accounting Treatments on the Indices

Panel A: Five possible accounting treatments				
Accounting treatment	*Country*			
	1	*2*	*3*	*4*
A. All assets at strict historical cost	2	1	2	6
B. All assets except land at strict historical cost	2	1	1	2
C. All assets except buildings at strict historical cost	2	1	2	2
D. All assets except land and buildings at strict historical cost	2	1	1	0
E. All assets at current values	2	6	4	0
Total	**10**	**10**	**10**	**10**
Panel B: Two possible accounting treatments				
Accounting treatment	*Country*			
	1	*2*	*3*	*4*
A. All assets at strict historical cost	2	1	2	6
B. Some or all assets at market value	8	9	8	4
	10	**10**	**10**	**10**
Indices of harmony				
Basis of classification of accounting practices		*W-C*[1]	*B-C*[2]	*T-I*[3]
Panel A: Five possible accounting treatments		25.0	19.7	20.9
Panel B: Two possible accounting treatments		63.9	57.7	59.1
W-C[1] = *Within-country index*				
B-C[2] = *Between-counrty index*				
T-I[3] = *Total index*				

(source: Aisbitt, 2001, p. 139)

In view of the above, it is evident that any comparison of the index values reported by different researchers is extremely difficult, and the same applies to comparisons between different accounting items. Consequently, Aisbitt's study provides a well-reasoned warning that the inferences drawn to date from research using index-based harmonisation measurement techniques need to be interpreted with considerable caution.

In another application of the Archer, Delvaille and McLeay (1995) *C* index decomposition, Parker and Morris (2001) set out to study the influence of US GAAP as an impediment to the harmony of financial reporting practices of large firms in the UK and Australia. This hypothesis was tested by measuring the level of international harmony for eleven accounting issues and forty matched pairs of large firms from the two countries involved. Using data obtained from annual reports, they measured harmony by applying the concentration-based *(H)* as well as the

combination-based (*C*) indices, and also included the χ^2 test. The study found that while considerable national uniformity is found in the UK for seven and in Australia for five accounting policies, international harmony is evident in the case of three policies only – inventory valuation, interest on construction and finance leases, as reflected in the high index values and the low χ^2 statistics in Table 3.22.

Table 3.22 Results of Individual Accounting Policies

Accounting policies	*H* Index Australia	*H* Index UK	Between-country *C* Index	χ^2
1. Valuation of tangible fixed assets	0.51	0.86	0.60	10.44*
2. Depreciation of tangible fixed assets	0.56	1.00	0.68	15.52*
3. Inventory valuation	1.00	1.00	1.00	0.00
4. Research and development costs	0.97	0.68	0.76	12.79*
5. Goodwill on consolidation	0.91	1.00	0.22	68.12*
6. Foreign exchange translation	0.76	0.64	0.66	12.29*
7. Interest on construction	0.93	0.89	0.90	1.27
8. Other identifiable intangibles	0.93	0.67	0.82	12.51*
9. Finance leases	0.96	1.00	0.98	1.06
10. Deferred taxation liabilities	0.91	1.00	0.05	72.38*
11. Depreciation method	0.70	0.48	0.55	5.14

(source: Parker and Morris, 2001, p. 317)

Table 3.23 below shows the more detailed results obtained in the case of goodwill and depreciation. In the case of goodwill, it can be seen how uniformity is high in both countries whilst there is little international harmony between the UK and Australia. Parker and Morris (2001) argue that one factor that may explain the poor degree of UK/Australia international harmony is because Australian firms are more likely to adopt US GAAP than UK firms, a state which they describe as 'partial harmony' which restricts the international comparability of financial reports and causes strategic problems for regulators. Table 3.23 also points to the persistent problem of research design that may bias harmonisation measurement and which relates to the implicit assumption made by many researchers that accounting choices are mutually exclusive. As with Emenyonu and Gray (1992), Herrmann and Thomas (1995) and Murphy (2000), Parker and Morris (2001) also classify firms that used multiple accounting methods for a given item (e.g., some of the firm's goodwill is written off and some is amortised) into a separate grouping whose accounts are deemed not to be comparable with those of other firms which adopt only one method. These authors classify each firm's depreciation accounting policy on the

basis of the dominant method used. As pointed out by Aisbitt (2001), as other methods are probably applied in the case of foreign subsidiaries, so the method used in the accounts of the domestic firm is likely to be taken as the dominant method. Consequently, this may lead to a degree of overstatement in the harmony index.

Table 3.23 Measurement of Harmony: Goodwill on Consolidation and Depreciation of Fixed Assets

	U.K.	Australia	Total	Between-country C index		X^2	d.f.
Goodwill on consolidation							
Written off to reserves	37	0	37				
Amortised	1	33	34				
Written off and Amortised	1	0	1				
Not disclosed	1	7	8	discl. adj.	0.22	68.12*	2
Total	**40**	**40**	**80**	unadj.	0.03		
				raw	0.02		
H-discl. adj.		1.00					
-unadj.	0.91	1.00					
-raw	0.90	0.68					
	0.86						
Depreciation of Fixed Assets							
Mainly straight line	33	24	57				
Mainly reducing balance	0	1	1				
Both straight line and reducing balance	4	10	14				
Other	3	4	7				
Not disclosed	0	1	1	discl. adj.	0.55	5.14[a]	3
Total	**40**	**40**	**80**	unadj.	0.54		
				raw	0.53		
H-discl. adj.	0.70	0.48					
-unadj.	0.70	0.46					
-raw	0.70	0.43					

* Significant at 5% level
[a] May not be reliable
discl. adj. = disclosure-adjusted index, i.e., assumes non-disclosures are of items not applicable to firms.
unadj. = index ignores non-disclosures
raw = raw index, i.e., assumes non disclosures are of items relevant to firms.

(source: Parker and Morris, 2001, p. 317)

In order to demonstrate how different indices can produce different indications of the level of harmony, Pierce and Weetman (2000) employed both the concentration-based and combination-based indices (i.e., *H, I* and *C*). Their study also considers the impact of non-disclosure, distinguishing between those circumstances where (i) a firm failed to disclose its accounting policy in the financial statements and (ii) the policy was not disclosed because it was not applicable. The study focuses on deferred tax accounting by Irish and Danish quoted firms for a period of eight years from 1986 to 1993. As shown in Table 3.24, the levels of harmony are different

depending on whether van der Tas's *I* or Archer, Delvaille and McLeay's *C* indices are used as a measure, and whether proper account is taken of non-disclosures. This comparison of concentration-based and combination-based index values obtained by applying different measures to the same data underlines the danger of forming conclusions about the absolute level of harmony based on only one index measure.

Table 3.24 Comparison of Indices between 1986 and 1993

	1986	1993
Comprehensive		
[1]VDT *I*	0.342	0.353
[2]ADMcL between-country *C*	0.075	0.162
[3]NAA *I*	0.084	0.188
[3]NAA between-country *C*	0.129	0.264
Recognition		
[1]VDT *I*	0.407	0.382
[2]ADMcL between-country *C*	0.304	0.322
[3]NAA *I*	0.340	0.372
[3]NAA between-country *C*	0.400	0.455
Measurement		
[1]VDT *I*	0.794	0.900
[2]ADMcL between-country *C*	0.174	0.414
[3]NAA *I*	0.195	0.478
[3]NAA between-country *C*	0.226	0.515

Notes:
[1] van der Tas's *I* index
[2] Archer, Delvaille & McLeay's between-country C
[3] Non-applicable Adjusted

(source: Pierce and Weetman, 2000, p. 40)

In an article that introduces the notion of 'spontaneous' harmonisation of accounting policies amongst firms that operate on the international stage, Cańibano and Mora (2000) show how this behaviour by 'global players' appears to anticipate the harmonisation of regulations. These authors also provide the first statistical tests of the significance of changes in index values. Data gathered from the annual reports of 85 European 'global players' for the periods 1991/92 and 1996/97 were analysed. The *C* index was applied in measuring the degree of harmonisation in four areas of accounting: deferred taxation, goodwill on consolidation, leasing and foreign currency translation. The results, as reported in Table 3.25, indicate a general increase in the level of harmonisation in all four areas. The authors applied a bootstrapping test in order to measure the significance of the change in the indices and found that the difference between the values of the indices could be considered

higher than a random difference for each accounting issue and therefore, that the changes of the indices are significant. These authors also carried out a χ^2 test of differences between indices, and found these to be significant at the 5% level in the case of deferred taxation and leasing, and weakly significant in the case of foreign currency translation.

Table 3.25 Index changes and χ^2 test statistics

Accounting issue	*Total index 1991/92*	*Total index 1996/97*	*χ^2 test*
Deferred taxation	0.27	0.41	15.03**
Leasing	0.33	0.46	6.1**
Goodwill	0.3	0.38	4.39
Foreign currency translation	0.34	0.53	9.08*

* Significance level: $p < .10$
** Significance level: $p < .05$

(source: Canibano and Mora, 2000, p. 365)

In addition to Herfindahl-based and combination-based indices, the Entropy (*E*) index, and the Jaccard coefficient were applied by Krisement (1997) and Rahman, Perera and Ganesh (2002) respectively to measure the degree of international harmony. The Entropy index, originally used in the study of industrial concentration research in economics, is a measure of the randomness in a system. Unlike *H* and *C* indices, the *E* index is an inverse measure of the degree of comparability, i.e., greater entropy means less harmony. Krisement (1997) applied the index to data gathered from the FEE (1991) survey to measure the degree of harmony across Europe. As reported in the table below, the *E* index values for 15 European countries together is 0.96106 and for the three sub-groups, EC I, EC II, and non-EC, are 0.86107, 1.11999 and 1.24983 respectively.

Table 3.26

Entropy Indices for the Recognition of the Income Effect of Translation Differences Across Europe.

	Belgium	Denmark	France	Germany	Greece	Ireland	Luxembourg	Netherlands	UK	*EC I*
Number of companies	12	19	32	43	19	32	9	18	37	*221*
Recognised:										
all gains and losses	6	17	1	0	1	28	2	16	35	*106*
realised gains and all losses	6	0	31	43	18	1	6	0	1	*106*
only realised gains and relised losses	0	2	0	0	0	0	0	0	1	*3*
other	0	0	0	0	0	3	1	2	0	*6*
Entropy	0.69314	0.35129	0.13906	0	0.20619	0.44706	0.84868	0.34883	0.24775	*0.86107*
		Italy	Spain	*EC II*	Finland	Norway	Sweden	Switzerland	Non-EC	***Total***
Number of companies		11	7	*18*	3	6	7	6	22	***261***
Recognised:										
all gains and losses		1	3	*4*	2	1	0	2	5	***115***
realised gains and all losses		9	1	*10*	1	5	3	1	10	***126***
only realised gains and relised losses		1	2	*3*	0	0	0	2	2	***8***
other		0	1	*1*	0	0	4	1	5	***12***
Entropy		0.60016	1.27703	*1.11999*	0.63651	0.45056	0.6829	1.32966	1.24983	***0.96106***

(source: Krisement, 1997, p. 481)

Gleeson (1998) argues that the FEE survey data is of limited use in harmonisation measurement. As shown in the table below, although 261 companies from 15 countries achieved broad country coverage, it was at the expense of depth in individual countries. Furthermore, data analysis was superficial and the mix of countries within the total was neither representative of the volume of companies in each country nor of the relative economic significance of such entities. For instance, 32 Irish companies were included while only seven each from Spain and Sweden were included.

More recently, the Jaccard coefficient has been estimated by Rahman, Perera and Ganesh (2002) in an attempt to analyse factors that are associated with financial reporting harmonisation in Australia and New Zealand. The main objective of their study is to empirically examine the validity of the assumption that *de facto* harmony is associated with *de jure* harmony. These researchers introduce a research design that allows for a number of firm characteristics to be included in the analysis. Employing data collected from the annual reports of 81 New Zealand and 75 Australian firms for the year 1993, the other variables that are included in the study are industry group, firm size, ownership concentration, leverage, decentralisation and the type of auditor. As reported in Table 3.27, the authors find a strong indication that *de facto* financial reporting harmony is associated with certain firm characteristics, especially when *de jure* harmony is weak or where there are no

regulations. In particular, the results indicate that *de facto* accounting harmony is not independent of industry. That is, there is greater conformity in accounting methods in some industries and less in others. Size and ownership seem not to be associated with harmony, especially when disclosure and measurement are mandatory, although there is some evidence of a positive association when disclosure is voluntary. That is to say, larger and more widely-owned firms tend to disclosed similar types of information voluntarily. Leverage on the other hand is negatively associated with harmony, at least insofar as mandatory disclosure is concerned. Also in the case of decentralisation, it appears that the number of subsidiaries is negatively associated with accounting harmony. Thus, more highly geared firms and those with more complex group structures tend to account in different ways to their peers. Finally, there is strong support for a positive influence of big six audit on accounting harmony: for mandatory measurement and voluntary disclosure, auditor type is positively associated with harmony, and even for mandatory disclosure the association is positive, but not significant.

Table 3.27 Association between Practice Harmony and Firm Characteristics

	Mandatory disclosure categories	Mandatory measurement categories	Voluntary disclosure categories
Industry	Yes**	Yes**	Yes**
Size	No (correct sign)	No (correct sign)	Yes**
Ownership concentration	No (wrong sign)	No (correct sign)	Yes**
Leverage	No*	No (correct sign)	No (wrong sign)
Decentralisation	Yes**	Yes**	Yes**
Auditor type/size (Big-6 vs Non-Big-6)	No (correct sign)	Yes**	Yes**

Yes = Confirmation of the hypothesis
No = Rejection of the hypothesis
* = Significance level .01
** = Significance level .001

(source: Rahman, Perera and Ganesh, 2002, p. 73)

The findings reported in Rahman, Perera and Ganesh (2002) have serious policy implications, suggesting that care needs to be exercised in the regulatory effort to achieve *de facto* harmony through *de jure* harmonisation, as environmental conditions in different countries and their effect on specific characteristics of individual firms are indeed important factors in the financial reporting

harmonisation process. With regard to research design, the study underlines the need to model harmonisation at both the firm level and the country level in an international context, and to select appropriate firm-based and country-based covariates accordingly.

Statistical Models

Archer, Delvaille and McLeay (1996) introduced more complex statistical models into the measurement of international harmonisation and standardisation, which simultaneously allow for within-country, between-country, inter-temporal, and firm-specific differences in accounting policy choice. As described in Section 3.2.2, the authors constructed four models in measuring international harmonisation for the goodwill and deferred taxation data that they had used in their previous research (Archer, Delvaille and McLeay, 1995). In their study, a hierarchy of nested statistical models has been employed to distinguish between two sets of systematic effects: those which account for the level of international harmony and hence, harmonisation; and those systematic effects which account for international disharmony, which may be attributed to national differences in the distribution of accounting policy choice.

As shown in Table 3.28, the analysis of goodwill accounting methods reveals that the *Policy* main effects and the *Country.Policy* interaction effects account for most of the reduction in deviance in both the full and restricted analyses. When these terms are added to the model, the F tests indicate respectively (i) that harmony was highly significant throughout the period examined and (ii) that the nationally systematic behaviour of companies causing divergence from complete harmony was also highly significant. The results also demonstrate that there was little evidence that harmony increased during the period, with high p-values arising from the F_2 test which compares the deviances for the static and dynamic models. However, the F_1 test suggests that harmonising policy choices were significant by comparison with company-specific policy choices, suggesting that where companies departed from national preferences in goodwill accounting during the sampled period, they tended to use accounting policies which led to harmonisation.

Table 3.28 Statistical Analysis of Goodwill Harmonisation

	Scope of stochastic model							
	Disclosures and non-disclosures				*Three main policy choices only*			
	Eight countries		Five countries		Eight countries		Five countries	
Models and effects	Deviance	*DF*	Deviance	*DF*	Deviance	*DF*	Deviance	*DF*
Null model	328.16	63	238.29	39	268.74	47	185.3	29
Country.Year	-60.92	-15	-9.87	-9	-58.73	-15	-6.05	-9
Conditional Independence	267.24	48	228.42	30	210.01	32	179.25	20
Policy	-126.19	-3	-125.18	-3	-90.00	-2	-87.77	-2
F_1	*(63.14)*		*(111.0)*		*(91.57)*		*(146.3)*	
p	*(.000)*		*(.000)*		*(.000)*		*(.000)*	
F_2	*(13.42)*		*(10.91)*		*(11.25)*		*(8.64)*	
p	*(.000)*		*(.000)*		*(.000)*		*(.002)*	
Static harmony	141.05	45	103.24	27	120.01	30	91.48	18
Year.Policy	-3.24	-3	-7.19	-3	-3.02	-2	-5.59	-2
F_1	*(1.62)*		*(6.38)*		*(3.07)*		*(9.32)*	
p	*(.215)*		*(.008)*		*(.078)*		*(.008)*	
F_2	*(.329)*		*(.599)*		*(.361)*		*(.521)*	
p	*(.804)*		*(.622)*		*(.700)*		*(.604)*	
Dynamic harmonisation	137.81	42	96.05	24	116.99	28	85.89	16
Country.Policy	-123.82	-21	-91.54	-12	-110.11	-14	-83.49	-8
$F_1=F_2$	*(8.85)*		*(20.30)*		*(16.00)*		*(34.79)*	
p	*(.000)*		*(.000)*		*(.000)*		*(.000)*	
Full model	13.99	21	4.51	12	6.88	14	2.4	8
Random company effects	-13.99	-21	-4.51	-12	-6.88	-14	-2.4	-8

Notes:

1. Classification of policy variable

   Treated as stochastic in each analysis

   A = Goodwill on consolidation is written off against profit and loss in the year of acquisition

   B = Goodwill on consolidation is written off against reserves in the year of acquisition

   D = Goodwill on consolidation is shown as an asset and amortised through the profit and loss account Over more than one year.

   Treated as stochastic zero:

   C = Goodwill on consolidation is shown as an asset and not amortised

   Treated as non-stochastic in the restricted analysis of three main policy choices:

   E = Other or unspecified
2. Countries included in each analysis: France, Germany, Netherlands, Sweden, U.K.
   Small samples included only in eight-country analysis: Belgium, Ireland, Switzerland.
3. The first *F*-test, *F1*, compares the additional explanatory power of successive models with the random company effects, that is, it compares the reduction in deviance for successive models with the deviance after fitting the full model (model 5). The second F-test, F2, compares the additional explanatory power of each model with the unexplained variation after fitting that model.

(source: Archer, Delvaille and McLeay, 1996, p. 24)

The inferences drawn above were confirmed by the parameter estimates, obtained from fitting the dynamic model of harmonisation in which there were no significant changes between 1986/87 and 1990/91 in the probability of selecting between the categories of goodwill policy choice. As reported in Table 3.29, this applies to the

analysis of the complete eight-country data set and to the reduced five-country set, and also to a further analysis of all EC member states during the research period.

Table 3.29 Parameter Estimates for Goodwill Harmonisation

	All countries		Five largest countries		EC countries	
	Policy effects	Year effects	Policy effects	Year effects	Policy effects	Year effects
A: Written off against profit and loss		-1.386		-8.445		-1.609
		(1.31)		(20.7)		(1.29)
B: Eliminated against reserves	+2.303*	+1.335	+2.303*	+8.445	+2.128	+1.656
	(.524)	(1.14)	(.524)	(20.7)	(.473)	(1.11)
C: Asset not amortised	+1.705*	+1.514	+1.946*	+8.514	+1.917	+1.667
	(.544)	(1.16)	(.535)	(20.7)	(.479)	(1.12)
D: Asset amortised through profit and loss	-0.693	-5.094	-0.693	+0.693	-0.916	-5.548
	(.866)	(11.0)	(.866)	(29.3)	(.837)	(15.4)
E: Other or unspecified	+0.001	+2.079	-0.288	+9.292	+0.182	+1.897
	(.707)	(1.28)	(.764)	(20.7)	(.605)	(1.22)

Note:
Parameter estimates are reported as log-relatives with respect to Policy A, and are not directly comparable between the full and reduced data sets. The boxed year-policy interaction effects are additive with respect to the main effects outside the box. The estimates are obtained by fitting model 4, the dynamic model of harmonisation. The intercept estimate and the country effects are not included in the above table as they do not affect the interpretation of the policy, year and year-policy parameter values. Standard errors of log-odds are given in brackets and significant values are indicated with an asterisk.
(source: Archer, Delvaille and McLeay, 1996, p. 25)

In the case of deferred tax, the results for which are shown in Table 3.30, a comparison of the model of conditional independence and the static model indicates that there was only weak evidence of harmony when the model was restricted to the main policy choices only. However, a stronger case that there is some harmony in tax accounting arises when non-disclosure is treated as stochastic, with the low *p*-values of 1.2 per cent (eight countries) and 3.1 per cent (five countries) suggesting that a significant impact on harmonisation across Europe has arisen through greater disclosure.

Table 3.30 Statistical Analysis of Deferred Tax Harmonisation

	Scope of stochastic model							
	Disclosures and non-disclosures				*Four main policy choices only*			
	Eight countries		Five countries		Eight countries		Five countries	
Models and effects	Deviance	*DF*	Deviance	*DF*	Deviance	*DF*	Deviance	*DF*
Null model	358.69	79	266.06	49	314.24	63	220.62	39
Country.Year	-60.91	-15	-9.86	-9	-64.71	-15	-7.13	-9
Conditional Independence	297.78	64	256.2	40	249.53	48	213.49	30
Policy	-56.19	-4	-63.92	-4	-33.76	-3	-35.91	-3
F_1	*(19.07)*		*(33.38)*		*(16.75)*		*(41.28)*	
p	*(.000)*		*(.000)*		*(.000)*		*(.000)*	
F_2	*(3.49)*		*(2.99)*		*(2.35)*		*(1.82)*	
p	*(.012)*		*(.031)*		*(.085)*		*(.167)*	
Static harmony	241.59	60	192.28	36	215.77	45	177.58	27
Year.Policy	-6.21	-4	-6.23	-4	-4.09	-3	-5.69	-3
F_1	*(2.11)*		*(3.25)*		*(2.03)*		*(6.54)*	
p	*(.107)*		*(.039)*		*(.141)*		*(.007)*	
F_2	*(.369)*		*(.268)*		*(.271)*		*(.265)*	
p	*(.829)*		*(.896)*		*(.846)*		*(.850)*	
Dynamic harmonisation	235.38	56	186.05	32	211.68	42	171.89	24
Country.Policy	-214.75	-28	-178.39	-16	-197.57	-21	-168.41	-12
$F_1=F_2$	*(10.41)*		*(23.29)*		*(14.00)*		*(48.41)*	
p	*(.000)*		*(.000)*		*(.000)*		*(.000)*	
Full model	20.63	28	7.66	16	14.11	21	3.48	12
Random company effects	-20.63	-28	-7.66	-16	-14.11	-21	-3.48	-12

Notes:

1. Classification of policy variable

   Treated as stochastic in each analysis

   A = Nil provision, or taxes payable approach

   B = Full provision

   C = Partial provision

   D = Deferred tax recognised but method unspecified

   Treated as non-stochastic in the restricted analysis of four main policy choices:

   E = No recognition of deferred tax, and it is not known whether or not deferred tax accounting is applicable

2. Countries included in each analysis: France, Germany, Netherlands, Sweden, U.K.
   Small samples included only in eight-country analysis: Belgium, Ireland, Switzerland.
3. The first *F*-test, *F1*, compares the addititonal explanatory power of successive models with the random company effects, that is, it compares the reduction in deviance for successive models with the deviance after fitting the full model (model 5). The second F-test, F2, compares the additional explanatory power of each model with the unexplained variation after fitting that model

(source: Archer, Delvaille and McLeay, 1996, p. 20)

The parameter estimates obtained for all categories of policy choice when fitting model 4 (the dynamic model of harmonisation) indicate that there was during the sampled period a relatively high probability that companies would select the partial method or would choose not to choose not to disclose the method of deferred taxation used. As reported in Table 3.31, the only change of any statistical significance concerns the increase in probability of selecting the full method. These

inferences remain the same for the full eight-country analysis as well as the restricted analysis of the five larger countries.

Table 3.31 Parameter Estimates for Deferred Tax Harmonisation

	All countries		*Five largest countries*		*EC countries*	
	Policy effects	Year effects	Policy effects	Year effects	Policy effects	Year effects
A: Nil provision		-0.693		-1.386		0.406
		(.881)		(.842)		(1.14)
B: Full method	+0.406	+1.163*	+0.629	+1.814*	+1.946*	-0.100
	(.408)	(.639)	(.437)	(.857)	(.755)	(.977)
C: Partial method	+1.099*	+0.818	+1.179*	+1.460	+2.708*	-0.406
	(.365)	(.602)	(.404)	(.836)	(.729)	(.948)
D: Method unspecified	+0.916*	+0.565	+1.056*	+1.295	+2.303*	-0.629
	(.374)	(.621)	(.410)	(.846)	(.741)	(.972)
E: Deferred tax not recognised	-0.105	-0.118	-0.470	+0.875	+1.099	-0.811
	(.459)	(.813)	(.570)	(1.08)	(.816)	(1.12)

Note: Parameter estimates are reported as log-relatives with respect to Policy A, and are not directly comparable between the full and reduced data sets. The boxed year-policy interaction effects are additive with respect to the main effects outside the box. The estimates are obtained by fitting model 4, the dynamic model of harmonisation. The intercept estimate and the country effects are not included in the above table as they do not affect the interpretation of the policy, year and year-policy parameter values. Standard errors of log-odds are given in brackets and significant values are indicated with an asterisk.

(source: Archer, Delvaille and McLeay, 1996, p. 20)

McLeay, Neal and Tollington (1999) extended the statistical models applied in Archer, Delvaille and McLeay (1996) in measuring international standardisation and harmonisation by allowing for the choice that exists between alternative accounting treatments. Indeed, in their paper, the authors argue that uniform accounting treatment across different countries does not necessarily enhance comparability. Thus, they offer a different notion of standardisation and harmonisation than that given in Tay and Parker (1990):

> 'international standardisation is a process which constrains choice and results ultimately in the adoption of the same accounting method by all firms in all countries, whereas international harmonisation is a process which results in a systematic choice between accounting methods dependent upon the nature of the firm and its operating environment but otherwise independent of the location in which the firms happens to be registered' (p. 43).

In addition to considering that the use of different accounting methods in appropriate circumstances as a pre-requisite of comparability, McLeay, Neal and Tollington (1999) also criticise the assumption made in prior research studies (e.g., Emenyonu and Gray 1992, Herrmann and Thomas, 1995) that treats the choice between alternative accounting treatments as mutually exclusive. The authors argue that, as a firm diversifies its operations, it may use more than one accounting treatment for a given financial reporting item in order that transactions of a different nature each receive the appropriate accounting treatment. Table 3.32 demonstrates this fact in which some firms in their sample used more than one goodwill method. For example, for 1987 (1993), there were 148 (193) companies recording goodwill in the sample and these firms made 160 (219) goodwill policy choices altogether. The number of firms disclosing, say, goodwill income amortisation was 59 (97), of which 49 (73) only used that method whilst a further 10 (24) also used a second method with respect to part of their goodwill.

Table 3.32 Goodwill Reporting Practices by Interlisted Companies Disclosing One or More Methods

	GA	GNR	GRW	GIW	GRA	GIA	NR	NP	NDI	Totals
(1987-148 companies)										
Goodwill-asset	2									2
Goodwill-negative reserve		2								2
Goodwill-reserve write off			65	1	0	3				69
Goodwill-income write off				0		2	1			4
Goodwill-reserve amortisation					2					2
Goodwill-income amortisation						49	5	0	0	59
Negative goodwill-reserve							16			22
Negative goodwill-provision										0
Negative goodwill-deferred income										0
Total										**160**
(1993–193 companies)										
Goodwill-asset	1									1
Goodwill-negative reserve		8								8
Goodwill-reserve write off			74	0	2	7				83
Goodwill-income write off				3		0	0			3
Goodwill-reserve amortisation					2					4
Goodwill-income amortisation						73	10	3	4	97
Negative goodwill-reserve							6			16
Negative goodwill-provision										3
Negative goodwill-deferred income										4
Total										**219**

(source: McLeay, Neal and Tollington, 1999, p.60)

McLeay, Neal and Tollington (1999) employ a hierarchy of nested generalised linear models (see Section 3.2.2) to analyse goodwill accounting practices in Europe. The results reveal that overall, there has been little standardisation during the sampled

period. This is evidenced in the low F-statistic from the addition of the interactions between accounting methods and time ($\beta_{ij}^{A.Y}$) in the model of standardisation shown in Table 3.33. In fact, the main change was a switch at the sample level from immediate write-off (40% in 1987 to 33% in 1993) to amortisation (33% in 1987 to 40% in 1993). In addition, the existence of systematic disharmony in both periods is reflected in the high F-ratios when the interactions between accounting method choices and countries ($\beta_{ij}^{A.C}$) are introduced in the full model. Thus, the authors conclude that the diversity that is shown at the international level is present in some European countries but not others, due partly to systematic disharmony attributable to local regulations and practices.

Table 3.33 Analysis of Model Fitting

	Deviance 1987	*Deviance 1997*	*Deviance 1987 & 1993*	*Degress of freedom*	*F-ratio*	*p-value*
Model of conditional independence	343.0	508.4	851.4	418		
-Prior standardisation (*A*)	-190.2	-293.9	-484.1	-4	136.700	<.001
Steady state model	152.8	214.5	367.3	414		
-Standardisation 1987-93 *(A.Y)*	-1.7	-1.3	-3.0	-4	0.841	0.500
Model of standardisation	151.1	213.2	364.3	410		
-Systematic disharmony *(A.C)*	-132.2	-19837	-330.9	-70	47.960	<.001
Full model of harmonisation and standardisation	18.9	14.5	33.4	340		
-Non-systematic disharmony *(A.C.Y)*	-18.9	-14.5	-33.4	-340	0.098	0.998

(source: McLeay, Neal and Tollington, 1999, p. 62)

The current thesis builds on the works of Archer et al. (1996) and McLeay et al. (1999) in measuring the impact of harmonisation on accounting policy choice across the European Union by taking into account firms' operating conditions and other characteristics. In particular, by employing a logistic regression which allows for hierarchical structure, and to which predictor covariates may also be added, this thesis seeks to assess the effects of each firm's country of domicile and its sector of operations on its choice of accounting method, together with the effect of its size and international exposure, and any changes in these factors through time.

3.4 Accounting Issues Examined in Prior Research

As summarised in Table 3.34 below, prior research on measuring the degree of financial reporting harmonisation has examined the practices that surround a number of the principal line items that make up corporate financial statements. Amongst the most widely researched accounting issues have been goodwill arising on consolidation, the depreciation of fixed assets and inventory costing methods. The present study focuses on these three accounting items, as they are considered to be among the most controversial in terms of comparability and they can have large, systematic effects on the assets and expenses reported on firms' financial statements (Pincus, 1994; Christie and Zimmermann, 1994). Although some research studies have widened the scope considerably by investigating up to 28 different accounting measurement issues, the choice here has also been guided by the need to collect precise data from large numbers of firms, as discussed in greater detail in Chapter 5.

1. Goodwill

As shown in Table 3.35, goodwill arising on consolidation has been examined in nine of the fourteen previous accounting harmonisation measurement studies. The table summarises the data examined in each case, the measurement basis adopted, and the different types of goodwill accounting treatment identified in each of the cited papers.

Table 3.34 Accounting Issues Examined in Previous Harmonisation Measurement Studies

Accounting issue	van der Tas (1988)	van der Tas (1992)	Emenyonu and Gray (1992)	Archer, Devaille & McLeay (1995;1996)	Herrmann and Thomas (1995)	Krisement (1997)	McLeay, Neal and Tollington (1999)	Pierce and Weetman (2000)	Canibano and Mora (2000)	Murphy (2000)	Aisbitt (2001)	Parker and Morris (2001)
Deferred tax	*	*		*				*	*			*
Investment tax credit	*											
Fixed asset valuation	*											*
Depreciation of tangible fixed assets			*		*					*	*	*
Depreciation method			*		*					*		*
Goodwill method			*	*	*		*		*		*	*
Inventory valuation			*		*						*	*
Inventory cost flow assumption					*					*	*	
Extraordinary/exceptional items			*									
Foreign currency transactions					*	*						
Foreign currency translations									*			*
Research and development			*		*							*
Consolidated financial statements									*			
Capitalisation of Interest on Construction												*
Capitalisation of finance leases									*			*
Capitalisation of other identifiable intangibles												*
Financial Statement Cost Basis										*		

Excluded from the table:

1. Emenyonu and Gray (1996) - examine 46 accounting measurement and disclosure practices
2. Rahman, Perera and Ganesh (2002) - examine 28 measurement practices

Table 3.35 Prior Research on Harmonisation Measurement: Goodwill on Consolidation

No.	Author(s)	Data	Method	Classification used
1	Emenyonu and Gray (1992)	Annual reports 26 large firms each France, Germany and the UK 1989	X^2 *I* index	1. Immediate write-off 2. Amortised over a period
2	Herrmann and Thomas (1995)	Annual reports 217 firms Eight European Community member states 1992/93	X^2 *I* index	1. Immediate write-off 2. Capitalised and amortised 3. Not disclosed
3	Archer, Delvaille and McLeay (1995)	Annual reports 89 interlisted firms Eight European countries 1986/87 and 1990/91,	Between-country *C* Within-country *C*	1. Immediate write-off - P/L 2. Immediate write-off - reserves 3. Permanent capitalised 4. Capitalised and amortised 5. Other or unspecified
4	Emenyonu and Gray (1996)	Annual reports 293 firms France, Germany, Japan, the UK and US 1971/72 and 1991/92	X^2 *I* index	Not given
5	Archer, Delvaille and McLeay (1996)	same as Archer et al. (1995)	Nested hierarchy of log linear models	same as Archer et al. (1995)
6	McLeay, Neal and Tollington (1999)	Annual reports 148 and 193 firms 1987 and 1993 respectively European countries	Nested hierarchy of generalised linear models	1. Asset capitalised 2. Negative reserve 3. Reserve write-off 4. Income write-off 5. Reserve amortisation 6. Income amortisation
7	Cańibano and Mora (2000)	Annual reports 85 'global players' firms 13 EU countries 1991-92 and 1996-97	*C* index Bootstrapping test	1. Credited to P/L 2. Immediate write-off 3. Amortised > 5 years 4. Amortised < 5 years 5. Method not specified
8	Aisbit (2001)	Annual reports 12 firms each Denmark, Finland, Sweden and Norway 1981/82, 1992, 1994 and 1998.	Between-country *C* Within-country *C*	1. Immediate write-off 2. Amortised 10 years or less 3. Amortised 20 years or less 4. Amortised 40 years or less 5. Not disclosed
9	Parker and Morris (2001)	Annual reports 40 firms each Australia and the UK 1993	X^2 Between-country *C* *H* index	1. Immediate write-off reserves 2. Amortised 3. Written off and amortised

As indicated in the above table, the various classifications of goodwill methods were highly judgemental. McLeay, Neal and Tollington (1999) grouped practices into the

largest number of different treatments. In addition to the different accounting treatments that might be identified, it should be emphasised that the time period over which the asset is amortized can range from immediate write-off to permanent capitalisation. In between, firms may amortise goodwill on consolidation over periods of different length, usually depending on the nature of the acquisition. This raises yet another issue of definition. For instance, a firm might generally amortise goodwill over 10 years, but may decide to amortise the goodwill on a particular strategic acquisition over forty years. In such cases, the accounting policy is not detailed, and could best be described as 'amortisation over an appropriate period'. However, some prior research has classified the firm based on the longest period used (e.g., see Aisbitt's classification in the above table). Consequently, the harmony indices for the treatment of goodwill in these studies have probably been understated, i.e., they demonstrate a lower level of harmony than is probably the case.

Overall, it is evident from the results reported in prior research studies that there has been generally little convergence between countries in goodwill accounting until the early 1990s (Emenonyu and Gray, 1992 and 1996; Herrmann and Thomas, 1995, Archer et al. 1995; 1996 and McLeay et al. 1999, parker and Morris, 2001). In one of the earliest harmonization measurement studies using the χ^2 and the *I* index, Emenyonu and Gray (1992) found a significant difference in goodwill accounting practices between large firms domiciled in France, Germany and the UK as at the end of 1989. The *I* index reported in this study also reflects a low degree of harmony in this accounting issue. With the exception of Germany, these results are consistent with a more extensive study on eight EC member states for the year 1992/93 examined by Herrmann and Thomas (1995). Emenyonu and Gray (1992 in the examination of 1989 annual reports found a higher percentage of German firms writing off goodwill directly to reserves, whereas Herrmann and Thomas (1995) documented a higher percentage of German firms capitalizing purchased goodwill. German firms were not required to apply the Accounting Directives Law, which governs the treatment of goodwill in Germany, until fiscal years ending *after* 1989, which may explain the change in the German practice. In another study by Emenyonu and Gray (1996), the authors also found that there was a significance difference in goodwill practices for 293 firms in France, Germany, Japan, the UK and the US in

1971/72 and 1991/92. In fact the degree of harmony measured by the *I* index was lower in the later period (i.e., 0.686 in 1971/72 versus 0.544 in 1991/92).

Employing the *C* index, Archer, Delvaille and McLeay (1995) also found that there was little change overall in the use of goodwill methods amongst 89 European interlisted firms for the years 1986/87 and 1990/91. These authors reported that the sample was divided into two groups of similar size: those which chose to eliminate goodwill against reserves, and those which treated goodwill as an asset to be amortised through the profit and loss account over its useful life. This division did not change significantly over the four year period, and reflects the options left by IAS 22 prior to its revision. Archer et al. (1995) suggests that, for large European firms, the impact of the EU seventh directive had already taken place by 1986/87. In another study applying the *C* index, Parker and Morris (2001) reported that whilst there was considerable standardisation in Australia and the UK as at the end of 1993, little international harmony was found between these countries. This reflects the fact that whereas the capitalisation and amortisation of goodwill was the predominant practice in Australia, in the UK almost all companies then wrote it off against reserves.

Archer at al. (1996) confirmed their C index results of considerable diversity in goodwill accounting across countries and little change between 1986/87 and 1990/91 by estimating a statistical model of the harmonisation process. In a similar study that fits statistical models, but this time accounting for multiple method adoption, McLeay, Neal and Tollington (1999) analysed goodwill accounting practices in Europe for the years 1987 and 1993. Again, their results reveal that generally, there had been little harmonisation during the period. In fact, according to these authors, the main change was a switch at the sample level from elimination (40% in 1987 to 33% in 1993) to amortization (33% in 1987 to 40% in 1993). However, using more recent datasets, Cańibano and Mora (2000) and Aisbitt (2001) found evidence of a general increase in the level of harmonisation in goodwill accounting in Europe in the 1990s. The increase, according to Cańibano and Mora (2000), is due mainly to the companies which passed from writing off the goodwill in the year of acquisition to amortising goodwill over its 'useful life'. Nevertheless, many companies domiciled in the UK and the Netherlands still favoured the former goodwill method at that time.

2. Inventory

Table 3.36 provides a summary of prior harmonisation measurement studies on inventory costing methods. Another aspect of inventory accounting, i.e., inventory valuation, has been examined by a number of different researchers (Emenyonu and Gray, 1992; Herrmann and Thomas, 1995; Aisbitt, 2001 and Parker and Morris, 2001). With regard to stock flows however, the main categories of accounting treatment are FIFO, LIFO and the averge cost, although Murphy (2000) identified a further practice, similar to LIFO, described as 'Current', and also allowed for sundry other practices as a separate category. All authors have noted the use of more than one method, defining this as either 'combination' or 'mixed'.

Table 3.36 Prior Research on Harmonisation Measurement: Inventory Method

No.	Author	Data	Method	Classification used
1	Herrmann and Thomas (1995)	Annual reports 217 firms 8 European countries 1992/93	χ^2 *I* index	1. FIFO 2. LIFO 3. Average cost 4. Combination 5. Not disclosed
2	Emenyonu and Gray (1996)	Annual reports 293 firms i.e., France, Germany, Japan, the UK and US 1971/72 and 1991/92	χ^2 *I* index	Not given
3	Murphy (2000)	Worldscope database Switzerland vis a vis Japan, the UK and the US 1988 to 1995	*I* index	1. Average cost 2. FIFO 3. LIFO 4. Mixed 5. Current 6. Other 7. NA/ND
4	Aisbit (2001)	Annual reports 12 firms each from Denmark, Finland, Sweden and Norway 1981/82, 1992, 1994 and 1998.	Between-country *C* index	1. Average cost 2. FIFO 3. LIFO 4. Mixed 5. Not Disclosed

As shown in the above table, previous research studies in measuring inventory harmonisation have employed the index-based approach. Besides Emenyonu and Gray (1992) who did not report the detailed classification used, other researchers categorised firms that used more that one inventory method as a separate group of firms that are comparable with each other but not with other firms that only adopt a single method. As pointed by McLeay, Neal and Tollington (1999), this is indeed one of the fundamental limitations in previous research design in measuring accounting harmonisation, the pervasiveness of which is clearly illustrated in Table 3.35. With this in mind, the present study takes into consideration the effects of sector diversification on firms' accounting policy choice in a statistical model that allows for harmonisation in the context of accounting diversity.

The results reported in prior research have shown that, generally, significant differences exist in inventory practices across different countries. Based on the χ^2 test, Herrmann and Thomas (1995) found that the pattern of inventory methods used by large companies is significantly different across the eight EC countries involved. The *I* index in this study also signifies a low level of harmony in inventory accounting. This result is similar to that reported by Emenonyu and Gray (1996), who examined the changes in accounting harmony in five developed countries from 1971/72 to 1991/92.

In another paper that employs the *I* index to evaluate harmonisation in inventory accounting, Murphy (2000) compared a sample of Swiss firms that adopted IASs, with samples of firms from Japan, the UK and the US, and with a control sample of Swiss firms that continued to use Swiss accounting standards. Although both the IAS adopters in Switzerland and the non-adopters show some convergence over the period towards the practices of the US and Japanese samples when considered separately, when comparing both groups of Swiss companies with firms from all three other countries taken together, the results are the opposite. In other words, the *I* index for inventory flows decreases. Similarly, based on the decomposed *C* index, Aibitt (2001) also reports that levels of harmonisation in inventory policy choice have not improved among the Nordic countries for the years 1981/82, 1992, 1994 and 1998. In addition,

Murphy (2000) reports non-disclosure of policy choice as a serious problem in examining the levels of harmony in inventory accounting.

2. Depreciation

Table 3.37 provides a summary of previous research studies on depreciation harmonisation measurement. As with inventory accounting, harmonisation research to date in this area has only adopted an index-based approach, together with the χ^2 test. Again, the published results are questionable as researchers have either treated firms that use both the straight-line method and declining-balance method as if they comprise a separate group of firms whose accounts are not comparable with those of other firms that just use a single method or, in the case of Parker and Morris (2001), have used the dominant method as the basis of classification into mutually exclusive subsets. As mentioned previously, the present study attempts to resolve this research design issue by taking into consideration the multiple methods used by firms in the analysis.

Table 3.37 Prior Research on Harmonisation Measurement: Depreciation of Fixed Assets

No.	Author	Data	Method	Classifications
1	Emenyonu and Gray (1992)	Annual Reports 26 large firms each France, Germany and the UK 1989.	χ^2 *I* index	1. Straight-line 2. Declining-balance 3. Straight-line and Declining-balance
2	Herrmann and Thomas (1995)	Annual reports 217 firms 8 European countries 1992/93.	χ^2 *I* index	1. Straight-line 2. Straight-line and declining-balance
3	Emenyonu and Gray (1996)	Annual reports 293 firms France, Germany, Japan, the UK and US 1971/72 and 1991/92.	χ^2 *I* index	Not given
4	Murphy (2000)	Worldscope database 104 firms Switzerland vis a vis Japan, the UK and the US 1988 to 1995.	*I* index	1. Accelerated 2. Mixed 3. Mixed with excess 4. Not-disclosed 5. Straight-line
5	Aisbit (2001)	Annual reports 12 firms each Denmark, Finland, Sweden and Norway 1981/82, 1992, 1994 and 1998.	Between-country *C*	1. Straight-line 2. Declining-balance 3. Mixture of methods 4. Maximum permitted for tax purposes. 5. Not disclosed
6	Parker and Morris (2001)	Annual reports 40 firms each Australia and the UK 1993.	χ^2 Between-country *C* *H* index	1. Mainly straight-line 2. Mainly reducing balance 3. Both straight line and reducing balance 4. Other 5. Not disclosed

The previous studies on measuring the degree of harmony in depreciation accounting have produced mixed results. Whilst Emenonyu and Gray (1992 and 1996), Herrmann and Thomas (1995) and Parker and Morris (2001) have reported significant differences across countries in the patterns of adopting depreciation methods, Murphy (2000) and Aisbitt (2001) found instances of harmonisation in this area. One possible explanation is that the countries examined in these studies were not the same. Due to

the influence of tax accounting, firms domiciled in Germany and to a lesser extent in France included in the Emenonyu and Gray (1992 and 1996) and Herrmann and Thomas (1995) analyses tend to use the declining-balance method and then switch to the straight-line method in the later years of a fixed asset's useful life in order to obtain the maximum possible tax benefits.

Employing the *C* index, Parker and Morris (2001) also reported little international harmony in depreciation, in their case between Australia and the UK as at the end of 1993. However, these authors acknowledge that their results are influenced by the way in which they categorised firms that used both the declining balance and straight line methods. Murphy (2000), on the other hand, reported that Swiss firms, both IAS adopters and non-adopters, showed statistically significant increases in depreciation accounting harmony when compared to the samples from the three other countries involved (Japan, the UK and the US). Similarly, in examining the levels of harmonisation in the Nordic countries in 1981/82, 1992, 1994 and 1998, Aisbitt (2001) also found evidence that the levels of harmonisation have improved in the area of depreciation accounting. This is due to the fact that accounting practices in the Nordic countries have often been classified as a single group (e.g. Doupnik and Salter, 1995) and that, in the case of depreciation, the straight line method was more common than the declining balance method in all these countries.

3.5 Methodological Issues Arising from Prior Harmonisation

The analysis of the extant literature on harmonisation measurement and particularly in the areas of goodwill arising on consolidation, inventory costing method and depreciation has generated a number of substantive research questions that provides the basis of the present study. Firstly, with the exception of Rahman, Perera and Ganesh (2002), prior research has mainly focused on the firms' country of domicile as the sole determinant of accounting policy choice. Given the internationalisation of company activities and their exposure to different regulatory regimes, together with the likelihood that firm size and sector of operations will influence accounting policy choice, harmonisation research would be improved if such factors were controlled for

in measuring convergent behaviour that is ascribed to regulatory effects. The present study, therefore, takes into consideration the firm's operating circumstances and specific characteristics such as its sector of operations, size and listing status, in addition to its country of incorporation, in explaining the choice of accounting policy.

Secondly, with the exception of Archer et al. (1996) and McLeay et al. (1999), previous research studies have used the index-based approach to measure accounting practice harmonisation. Although this approach has its advantages, i.e., it is easy to calculate and interpret, the underlying assumption of the metric that maximum harmony is achieved when all firms in all countries adopt the same accounting method is in fact its fundamental limitation. Thus, the current study employs a binomial logistic regression model that measures the reduction in error arising from deviations from the international norm in the patterns of accounting method usage across countries after controlling for the impact of the firm's operating circumstances on its accounting policy choice.

Finally, as shown in Tables 3.35, 3.36 and 3.37, previous research studies have classified firms that used more than one of the available accounting treatments as a separate group of firms which are not comparable with other firms using only one method. Some attempts to allow for this have been made in the past. In the case of goodwill, for example, a number of researchers (e.g., Cańibano and Mora, 2000; Aisbitt, 2001) have classified firms based on the longest amortisation period, and with respect to depreciation accounting, Parker and Morris (2001) categorised practice according to the dominant method used. As mentioned above, these various classification approaches might lead to inaccuracy in harmonisation results, as they fail to recognise the fact that diversified firms adopt different treatments for different types of asset or liability. To overcome this problem, the present study adapts the logistic regression in order to permit firms that use more than one method to be incorporated within the harmonisation model. This statistical approach will be discussed in detail in Chapter 5.

3.6 Summary and Conclusions

The main objective of this chapter has been to provide a review of the extant literature on *measuring* accounting harmonisation. It has been shown that the different research methods used - statistical models and index-based methods - measure different concepts of harmonisation. The basic premise of accounting harmonisation underlying the index-based techniques is one of uniformity, i.e., maximum harmony is achieved when all firms adopt the same accounting method. However, this notion of harmony ignores the possibility of different operating circumstances and firm-specific attributes that may influence accounting policy choice. Positive accounting research (e.g., Watts and Zimmerman, 1986 and 1990) also provides extensive evidence that these factors indeed have an impact on the selection of accounting policies. Therefore, in measuring accounting harmonisation, the present study assesses the degree of harmonisation in European accounting that is attributable to changes in national practices after controlling for the influence of the industries and the markets in which the firms operate.

Based on the analysis of previous research in Section 3.3 and 3.4, a number of research issues relevant to the objectives of the present study were then discussed in Section 3.5. Firstly, although a statistical modelling approach was introduced by Archer, Delvaille and McLeay (1996) and extended by McLeay, Neal and Tollington (1999) in order to provide a richer interpretation of accounting harmonisation, as shown in Section 3.3.2, it has not been extended to include covariates. Therefore, this study restructures the harmonisation model, which is based on country and time interactions, as a set of logistic regressions that allow for the inclusion of other effects in measuring accounting harmonisation. Secondly, almost all prior research studies ignored the diversification effect where firms adopt different accounting treatments for different types of transaction. The present study overcomes this limitation by adapting the statistical model to handle firms that report a combination of accounting methods for any given financial statement item. In addition, the effects of sector diversification on firms' accounting policy choice will be assessed. These research issues will be addressed further in the following chapter which considers prior research into the determinants of accounting policy choice.

CHAPTER FOUR

DETERMINANTS OF ACCOUNTING POLICY CHOICE

4.1 Introduction

It is argued that, with complete and perfect markets, there is no substantive role for financial reporting and thus no demand for accounting information nor for its regulation (Fields, Lys and Vincent, 2001). In the case of imperfect and incomplete markets, however, the demand for financial statements and accounting standards implies that accounting-based contracts and accounting disclosures are efficient ways of addressing market imperfections, and this in turn gives rise to discretionary behaviour by the managers of reporting firms. To analyse the role of accounting policy choice in this context, Fields, Lys and Vincent offer the following broad definition:

> 'An accounting choice is any decision whose primary purpose is to influence (either in form or substance) the output of the accounting system in a particular way, including not only financial statements published in accordance with GAAP, but also tax returns and regulatory filings' (p. 256).

Positive accounting research provides ample evidence concerning such influence on mandatory accounts and other financial disclosures, and shows that the accounting policy choices made by firms in their financial reports are determined not only by the regulations in force but also by factors that are specific to the firm, including operating circumstances and managerial preferences, all of which will result in a diversity of accounting treatments (Watts and Zimmerman, 1978; 1986 and 1990). This raises the doubt as to whether harmonisation endeavours based only on inter-country regulatory uniformity will filter through to actual accounting practices. In this

regard, Aisbitt (2001) argues that past attempts to associate changes in harmony with a single factor, such as legislation, were clearly not successful because firms do not prepare their financial statements in such a vacuum, and that other factors, including changes in non-legislative regulations, firm-specific characteristics, managerial preferences and demands of the market, also play a significant role in accounting policy choice. Thus, the objective of the present chapter is to provide a review of the extant literature on factors underlying accounting policy choices in order to inform the harmonisation modelling that is presented in this thesis.

The remainder of this chapter is organised in the following way. The next section describes how the main components of the institutional framework affect accounting policy choices in Europe, with reference to the various accounting regulations that are in force and the requirements that firms must follow in the financial markets. Given this institutional framework, which varies nevertheless across different types of regime, the extant literature has identified a number of other influences on the preparation of financial statements. These include managerial preferences and specific characteristics of the firms involved, which are examined in Sections 4.4 and 4.5 respectively. Section 4.6 considers prior research on the determinants of policy choices on the three accounting issues which have been selected for the purpose of the current study i.e., inventory costing, goodwill arising on consolidation and depreciation of fixed assets. Finally, Section 4.7 provides a summary and offers concluding remarks.

4.2 The Institutional Framework Surrounding Accounting Policy Choice in the EU

The decision to adopt a particular set of accounting standards is generally pre-determined by the firm's institutional framework, i.e., the body of accounting regulations which govern the firm and the institutions that formulate, administer and enforce these requirements. However, since institutional frameworks are known to differ across regimes, it follows that a firm's country of domicile will influence its choice of accounting methods (Tarca, 2002). This section describes the main components of an institutional framework, involving the accounting regulations in force in the form of company law, accounting standards and tax rules, and those

surrounding capital market operations that are laid down by stock exchanges, together with an assessment of their impact on accounting policy choice.

In general, all countries have at least some specific accounting requirements relating to the preparation of financial statements by firms that are domiciled within their jurisdiction (IASB, 2003). In addition, firms may also apply rules that are applicable in other accounting regimes when presenting their financial information to the public, by adopting accounting standards that are issued either in other countries or as international accounting standards. In such cases, more than one set of financial accounts might need to be prepared although, given the cost and other constraints, firms would be unlikely to do this without some specific incentives and benefits. In recent years, however, a number of member states across the EU have removed some of the barriers involved by allowing the use of non-local accounting regulations without necessarily imposing additional costs. For instance, since 1998, firms domiciled in Austria, Belgium Finland and Germany have been able to adopt IASB or FASB reporting standards in the preparation of consolidated financial statements. There has been similar legislation in France to allow the use of IASB standards, and law that will allow firms domiciled in Luxembourg and the Netherlands to use IASB standards is also under way (IASB, 2002). However, in other EU member states, including the UK, Ireland, Portugal and Spain, statutory reporting obligations mean that national accounting standards remain the basis of the financial statements presented to the public. To some extent, the different requirements that still exist across regimes may reflect the slow progress of international convergence in accounting regulation.[1] However, with respect to the period that is examined in this thesis (the 1990s), the institutional flexibility that continued to exist throughout that period provided for considerable diversity in the accounting practices of EU firms, as documented in some of the more recent research studies discussed in Chapter 3.

The extant literature has also documented evidence that tax regulation is an important determinant in the preparation of financial statements in a number of EU member

[1] In a subsequent development, the European Commission issued a regulation in 2002 that requires listed companies to prepare consolidated financial statements based on IASB standards by the year 2005 (EU, 2002). This new regulation also provides Member States with an option to extend the IAS requirement to unlisted firms and to parent company accounts.

states (e.g., Lamb, Nobes and Roberts, 1998; Hoogendoorn, 1996 and Eberhartinger, 1999). Indeed, it has been suggested that conformity between financial reporting and taxation serves as an impediment to harmonisation, because some countries have greater linkages between their tax and financial reporting systems than others (Lamb, Nobes and Roberts, 1998). In Europe, as illustrated in Table 4.1, Hoogendoorn (1996) and Eberhartinger (1999) identify two different structures of the relationship between financial reporting and taxation. Firstly, financial reporting and taxation rules are independent of one another and they do not interact. Independence implies that income determination for financial reporting purposes is distinct and separate from income determination for tax purposes. Firms may select different accounting policies for tax and for financial reporting purposes and the use of specific tax computations is not linked to the amounts disclosed in commercial accounts. Examples of the EU member states with this structure include the UK, Ireland, the Netherlands and Denmark.

Table 4.1 The General Relationship between Financial Reporting and Taxation

Independence	***Dependence***	
Denmark	Austria	Greece
Ireland	Belgium	Germany
Netherlands	Finland	Italy
United Kingdom	France	Portugal
	Spain	Sweden

(souce: adapted from Eberhartinger, 1999)

On the other hand, dependence means that either the commercial accounts follow the tax rules, or that income determination for tax purposes is determined by the choices made in commercial accounts. This approach, which can lead to a strong interaction between the two, can be found at its most pronounced in Germany but also to some extent in many of the other EU Member States, including Austria, Belgium, Finland, France, Greece, Italy, Luxembourg, Portugal, Spain and Sweden. It would be expected in such a regime that firms would strive to minimise or postpone the payment of taxes, and therefore the dependence between the two sets of regulations will normally lead to low-income figures. Thus, it can be said that the degree to which

tax provisions influence the financial reporting of firms varies across EU member states. At the one extreme stands Germany with a very close connection between financial reporting and taxation, and a strong influence. On the other extreme stands the UK with a very loose connection and almost no influence of tax provisions on company accounts, while other EU member states stand in between.

Stock exchange requirements influence the choice of accounting methods because they include rules stipulating which accounting standards can be followed by listed firms (Tarca, 2002). Each stock exchange has listing rules, including requirements relating to the presentation of financial information, which apply to firms trading on the exchange. Previous studies on firms that list on foreign stock exchanges have confirmed that a stock exchange's reporting requirements influence a firm's choice of exchange, with firms being less likely to choose an exchange with more stringent reporting requirements than the firm's home exchange (Saudagaran and Biddle, 1992 and 1995). Cheung and Lee (1995) put forward the counter argument that some firms will list on an exchange with stricter requirements because this gives positive signals about the firm's future prospects. They argue that the choice of exchange reflects a firm's evaluation of greater listing costs versus pricing benefits. In the EU, however, steps have been taken to remove market barriers, particularly the directives aimed at harmonising minimum listing and filing requirements, i.e., the Admission, Listing, and Interim-Reporting Directives (Tondkar, Adhikari and Coffman, 1990). The Admission Directive specifies minimum conditions for admission of securities to official exchange listing in member states and minimum filing requirements for listed firms. The Listing Directives specifies the minimum listing particulars necessary for listing on an exchange in a member state to ensure that comparable information is provided. Finally, the objective of the Interim-Reporting Directive is to protect investors by providing regular information on listed firms by half-yearly reports.

At the same time, the demand for foreign equities as a means of enhancing investment performance (Choi and Levich, 1994) has given rise to attempts by the capital market institutions to enhance the international comparability of financial information, and the International Organisation of Securities Commissions (IOSCO, 2000) recommended its members to allow firms that are planning cross-border exchange listings to prepare their financial statements according to International Accounting

Standards. In the US, the Securities Exchange Commission (SEC) requires that foreign firms listed on US exchanges provide US GAAP financial statements or reconcile their domestic accounts to US GAAP in Form 20-F (Ucieda and Garcia, 2004). For example, a German firm listed on the NYSE has the option of using US GAAP in its consolidated financial statements and may thereby avoid reconciliation costs. On the other hand, a UK firm listed on the NYSE must prepare a second set of financial statements according to US GAAP or a-Form 20F reconciliation. Thus, any accounting policies followed by the firm that are unacceptable under US GAAP must be restated to US GAAP. In Europe, a growing number of stock exchanges have allowed financial statements from foreign firms to be drawn up in accordance with another country's national financial reporting regulations or IAS standards, as shown in Table 4.2,. The Copenhagen Stock Exchange, for example, accepts accounts prepared using IAS, FRS, FASB standards or other foreign national accounting standards with reconciliation to Danish accounting standards. For domestic firms, most European stock exchanges - including Amsterdam, Brussels and Milan - accept consolidated financial accounts that are prepared using IAS. In addition, a number of 'new' stock exchanges including ESDAQ (Brussels), *Neuer Markt* (Frankfurt) and the A-Market and Austrian Growth Market (Vienna) require both domestic and foreign firms to prepare their financial statements based on either IAS or US GAAP. On the other hand, the Irish, Portuguese, Spanish and UK stock exchanges still require domestic firms to adopt their national standards in preparing financial statements.

Table 4.2 Financial Reporting Requirements for European Stock Exchanges

Countries	Stock Exchanges	Financial Reporting Requirements
Austria	Vienna	A-Market and Austrian Growth Market: All domestic and foreign firms: IAS or US GAAP starting April 2001. Other listed companies (domestic and foreign): IAS or US GAAP for consolidated financial statements
Belgium	Brussels EASDAQ	Domestic firms: IAS (significant foreign operations or foreign capital sources for consolidated financial statements) Foreign firms: IAS All firms: either IAS or US GAAP
Denmark	Copenhagen	Domestic firms: IAS or US or UK GAAP (with a reconciliation to Danish GAAP) Foreign firms: national GAAP (with a reconciliation to Danish GAAP) or IAS, US, UK GAAP (without reconciliation)
Finland	Helsinki	Domestic firms: IAS (>50% owned by foreigners-with reconciliation to Finnish GAAP) Foreign firms: IAS or US or UK GAAP or national GAAP (with reconciliation to Finnish GAAP)
France	Paris	Domestic firms: IAS for consolidated financial statements Foreign firms: IAS
Germany	Deutsche Börse, Frankfurt, Bavarian, and Stuttgart	Domestic firms: IAS for consolidated financial statements Foreign firms: IAS
Ireland	Dublin	Domestic firms: UK GAAP Foreign firms: based in the EU may use their national GAAP
Italy	Milan	Domestic firms: IAS for consolidated financial statements Foreign firms: IAS
Netherlands	Amsterdam	Domestic firms: Netherlands GAAP or IAS, US GAAP Foreign firms: IAS or US GAAP (without reconciliation to Netherlands GAAP)
Portugal	Lisbon	All firms: Portuguese GAAP
Spain	Madrid, Barcelona, Bilbao, and Valencia	Domestic firms: Spanish GAAP Foreign firms: IAS, US GAAP, or their own national GAAP (with an audited reconciliation to Spanish GAAP)
Sweden	Stockholm	Domestic firms: Swedish GAAP Foreign firms: Swedish GAAP, IAS, UK, or US GAAP (with reconciliation to Swedish GAAP)
United Kingdom	London	Foreign firms: IAS

(source: adapted from IASB, 2002)

In summary, there have been a number of important changes to the institutional environment of corporate accounting in the EU over recent years, including harmonisation programmes in law that took effect in the 1980s, schemes of co-operation between stock markets and, latterly, moves towards the enforceable international standardisation of accounting. Thus, following the initial harmonisation of company law in the EU, the 1990s could be characterised as a period of potential convergence. In many respects, however, there is evidence at the present time of sustained national distinctiveness in financial reporting practices, of continued constraints on the use of foreign and international standards, and of persistent

segmentation in financial markets with respect to financial reporting requirements. It may be concluded, therefore, that any analysis of harmonisation must account for the country-specific effects associated with this institutional framework and for the company's exposure internationally, particularly through capital markets, and also for changes through time in these aspects of the reporting environment. The above analysis of the institutional framework surrounding accounting policy choice in the EU provides strong support for the inclusion of these factors in harmonisation modelling, which will be taken up in Chapter 5.

4.3 Firm-specific Determinants of Accounting Policy Choice

Prior research has shown that firm-specific characteristics, such as the internationality mentioned above and their industry membership and size, are important determinants of accounting policy choice and other financial reporting practices (e.g., Eggleton, Penman and Twombly, 1976; Watts and Zimmerman, 1978; 1986; 1990; Cooke, 1992; Lang and Lundholm, 1993; Malone, Fries and Jones, 1993; Meek, Roberts and Gray, 1995; Luez and Verrenchia, 2000; Rahman, Ganesh and Parera, 2002; Tarca, 2002). This has important implications for the harmonisation of accounting practices, as efforts to harmonise without taking into account the constraints associated with differing attributes of firms are likely to be futile.

In particular, the American Institute of Certified Public Accountants' publication *Accounting Trends and Techniques* (1990) has consistently found the adoption of different accounting policies to be strongly affected by industry classification. Firms within an industry tend to use the same accounting methods because their operations are similar (Eggleton, Penman and Twombly, 1976). In addition, where the choice is entirely discretionary, industry membership is predicted to impact on policy choice because firms in an industry could share specific features that make it beneficial to adopt a particular policy (Cooke, 1992; McKinnon and Dalimunthe, 1993; Meek, Roberts and Gray, 1995; Mitchell, Chia and Loh 1995).

There is already an extensive body of research concerning the industry-level determinants of financial reporting practices. For instance, Hagerman and Zmijewski (1979) argue that firms which are in highly concentrated industries would prefer accounting alternatives which result in lower reported earnings. Their argument is based upon the belief that high accounting profits by firms with these characteristics are likely to lead politicians to subject these firms to negative wealth transfers through regulation. Rahman, Perera and Ganesh (2002) also provide evidence that the sector of operations is one of the important determinants of accounting practice harmony between firms domiciled in Australia and New Zealand. Furthermore, a number of other research studies suggest that the sector of operations impacts on the extent of financial disclosure. Cooke (1992), for example, finds that manufacturing firms disclose more information than non-manufacturing firms. Meek, Roberts and Gray (1995) suggest that proprietary costs may differ across industries, which accounts in part for inter-sectorial variability in disclosure.

There is also an extensive body of research concerning the firm-level determinants of financial reporting practices. Managerial preferences with regard to accounting methods may depend not only upon the relative income effects of the methods adopted but also on the size of the firm. As mentioned earlier, the size of a firm is seen as a proxy for political visibility and competitive advantage, i.e., the larger a firm, the higher its political costs and the greater the threat of adverse regulatory action. Moreover, there are more information sources about large firms and the actions of large firms affect a larger portion of the public. Watts and Zimmerman (1978; 1986), Hagerman and Zmijewski (1979), Zmijewski and Hagerman (1981), Christie (1990) and Skinner (1993) have all found empirical support for the hypothesised relationship between firm size and the income effect of the accounting methods used by the firm. Archambault and Archambault (1994) indicate that larger firms either face pressure to report lower income or that a larger size is needed to realise the benefits of using income-decreasing method for taxes. Extant literature also shows that larger firms provide more voluntary disclosures (e.g., Cooke, 1992; Meek, Roberts and Gray, 1995; Craig and Diga, 1998; Ashbaugh, 2001). Since larger firm generally have a higher level of analyst following, the costs of information dissemination are reduced, but higher agency costs caused by more widely dispersed

ownership, also result in larger firms voluntarily making more disclosures (Lang and Lundholm, 1993).

The extent of a firm's operation in international markets is another attribute that could determine accounting policy choices and information disclosure. Craycraft, Sedo and Gotlob (1998) for instance, found that US firms are influenced by the extent of their internationality and the accounting methods permitted in the international arena. One possible reason for this is that firms with foreign operations incur a relatively higher bookkeeping costs and the higher costs of raising capital in international markets due to their lack of harmonisation with other MNCs. Foreign listing is also associated with more information disclosure (Cooke, 1989; Malone, Fries and Jones, 1993). As noted in Section 4.2 above, such firms may face additional capital market pressures, including stock exchange requirements, which may motivate them to increase their level of disclosure. Leuz and Verrecchia (2000) demonstrate how in the international context, for example, size, financing needs and performance positively affect the firm's international reporting strategy. Similarly, Tarca (2002) found that firms adopting 'international' standards have a greater proportion of foreign revenue and are listed in a foreign stock exchange, and also that they are larger.

Most previous attempts at measuring accounting harmonisation have ignored these aspects of accounting policy convergence, where the reporting behaviour of the firm is influenced not only by the regulatory environment that is subject to harmonisation, but also by its operating conditions and its internationality, and the interactions between these. It is therefore the aim of the present study to empirically examine the extent to which such firm-specific characteristics, i.e., the sector of operations, the firm's size and its internationality, affect policy choice, and to control for such variability in assessing harmonisation.

4.4 Managerial Preferences

Positive accounting research has presented a plethora of evidence in support of the hypothesis that corporate accounting policy choice is influenced by the self-interests of the managers making such choices (Watts and Zimmerman, 1986; 1990). Jensen

and Meckling (1976) suggested that accounting policy choice arises from the nature of the contractual relationship between the principals (shareholders and debtholders) and their agents (managers). In particular, both managers and shareholders may benefit from management discretion over accounting policies as it enables choices to be made in their combined interests, with respect to political costs and contracts with other parties, such as debtholders.

One method of aligning the interests of the firm's managers with those of its shareholders is to link managers' remuneration to profit. As a consequence, however, there are managerial incentives to exercise discretion over accounting methods when such compensation agreements either explicitly or implicitly rely on the reported accounting results. Indeed, there is substantial evidence to support this view (Healy, 1985; Watts and Zimmerman 1986 and 1990; Christie and Zimmermann, 1994; Gaver, Gaver and Austin 1995; Holthausen, Larcker and Sloan, 1995; Guidry, Leone and Rock, 1999). Whether directly through a bonus plan or indirectly through salary reviews, linking their remuneration to reported profit creates incentives for managers to adopt accounting policies that accelerate the recognition of revenue and defer the recognition of expenses. Watts and Zimmerman (1986) hypothesise that, where accounting-based plans are in place, managers will choose policies to increase or decrease firm earnings consistent with maximizing their wealth under the terms of their bonus plans. Nevertheless, the evidence has generally found that the managers of firms with accounting-based bonus plans choose accounting policies which maximise earnings (e.g., Watts and Zimmerman, 1990; Christie, 1990).

On the other hand, Healy (1985) contends that management is not always motivated to choose the income-increasing accounting method to maximize compensation, as the management of highly profitable companies may have reached the upper bounds of their bonus plans. Any additional increase in earnings may result in small increases in bonus compensation. Guidry, Leone and Rock (1999) find support for the Healy bonus plan hypothesis using internal data from different business units within a single firm. Gaver, Gaver and Austin (1995), on the other hand, report evidence inconsistent with Healy in that they find that, when earnings before discretionary accruals fall below the lower bound, managers select income-increasing discretionary accruals. Holthausen, Larcker and Sloan (1995) suggest that the preference for income-

reducing accounting policies applies when earnings are outside the upper bound only. These authors find no evidence that managers manipulate earnings downward when earnings are below the minimum necessary to receive their bonus and thus reach different conclusions about managerial incentives around the lower bound.

As mentioned, not only managers but also shareholders may benefit from management discretion over accounting policies as it enables choices to be made in their combined interests, particularly with respect to contracts with other parties such as debtholders. As reported by Kalay (1982), debt contracts generally include covenants or constraints using numbers derived from published financial statements. The covenants restrict the actions of management, e.g., they limit the payment of dividends, or restrict the issue of new debt. Violation of these covenants can result in substantial costs, such as legal fees, renegotiation fees and increased difficulty of obtaining trade credit. Thus, managers have incentives to avoid the violation of debt covenants and to distance the firm from these constraints. The closer a firm gets to a breach of a debt covenant, the greater the incentive to adopt income-maximising accounting policies in order to avoid violating existing conditions agreed upon in the covenants (Watts and Zimmerman, 1986; Press and Weintrop, 1990), and highly levered firms are more likely to adopt income-increasing accounting methods (Christie, 1990; Sweeney, 1994). Leftwich (1983), in a study of private debt contracts, found that debt contracts specify the methods of accounting for intangibles, and that the methods specified are completely inconsistent with GAAP. If the accounting treatment of intangibles was completely specified in all debt contracts, there would be no opportunity to improve the position of the firm relative to the debt covenants through the use of alternative goodwill accounting methods.

Other debt covenant influences are pressures on dividend payout and impending default. Healy and Pelapu (1990) investigate whether managers make accounting changes to avoid violating the dividend constraint in debt covenants. They measure the proximity of the firm to violation of the debt covenant as the ratio of funds available for dividends to dividends paid. They find no difference in the frequency of accounting changes but they do find that firms close to violating the dividend constraints cut and even omit dividends, raising the question of whether firms make accounting decisions in response to potential covenant violations only when there is

no lower cost solution. Sweeney (1994) finds that managers of firms approaching default on the debt covenant respond with income-increasing accounting changes. This study examines a sample of firms that actually defaulted by violating debt covenants together with a matched firm control sample. The results indicate that the defaulting firms made more accounting changes in the period leading up to default and that a higher percentage of these changes were income-increasing compared to the control group. In particular, the defaulting group made more cash-increasing accounting changes such as inventory-related changes. DeAngelo, DeAngelo and Skinner (1994) test the apparent importance of actual debt covenant violations on accounting practices. In their study, these authors select a sample of financially troubled firms with reduced dividends, some of which did so due to binding debt covenants, and they hypothesise that firms facing potentially binding debt covenants have greater incentives to make income-increasing accounting choices than firms without such binding debt covenants. The results show that there is no statistical difference in the accounting choices made by the two groups of firms and conclude that the accounting choices reflected the firms' financial difficulties rather than attempts to either avoid debt covenant violation or mask their financial difficulties. DeFond and Jiambalvo (1994) also find evidence of accounting choices consistent with the debt hypothesis that firms approaching covenant violation would choose income-increasing methods. In the year preceding and in the year of the violation, abnormal total accruals and abnormal working capital accruals are both significantly positive, consistent with the debt hypothesis.

The term 'political costs' is used to refer to wealth transfers resulting from the actions of governments, government bodies, regulators or other interest groups. These actions include income tax demands, increased regulation and threat of antitrust action. Watts and Zimmerman (1986) hypothesise that managerial accounting choices are influenced by such political costs, and that managers of firms that are more politically sensitive prefer accounting policies that reduce reported profits in order to reduce political visibility. Firm size, measured in various ways including sales, total assets, market value of equity, is the variable most frequently used as a surrogate measure of the firm's exposure to political costs. Prior literature (e.g., Watts and Zimmerman, 1986; 1990; Hagerman and Zmijewski, 1979; Tarca, 2002) suggests that because political costs increase with size, larger firms are more likely to choose accounting

policies that reduce current period income to avoid regulatory intervention. Bowen, DuCharme and Shores (1999) suggest that firms engaging in transactions with government agencies are also likely to increase political scrutiny and thus, select income-decreasing accounting methods. In addition, a number of previous studies hypothesise that (e.g., Hagerman and Zmijewski, 1979; Zmijewski and Hagerman, 1981; Bowen, DuCharme and Shores, 1999) some political scrutiny is focused at the industry rather than firm level. Specifically, the higher the industry concentration, the more likely the government will conclude that profitable firms are engaging in practices that restrain trade.

In conclusion, if accounting regulations permit a choice of treatment, then managers may be motivated to exercise discretion over such choices in order to increase or decrease corporate income in a way that will suit the managers' objectives relating to their compensation and bonus plans, or with regard to the firm's debt covenants or with respect to the 'political' costs to which the firm is exposed. In some cases, such discretion will be specific to the circumstances of the individual firm and to the accounting period in question, and therefore cannot be considered as a systematic effect through time within the scope of a harmonisation model but as an unpredictable random effect instead. In this thesis, the size of the firm, which has been shown to be a primary determinant of policy choice in the context of managerial preferences, will be introduced into the model as a main effect, whilst managerial behaviour that is likely to vary over time is treated as a residual effect. Equally important, however, are the findings of the above studies with regard to the areas of accounting policy investigated here - inventory costing, goodwill on consolidation and asset depreciation - and the insights that are offered for the research design employed in this thesis. A more detailed review of prior research into these three issues is presented below.

4.5 The Determinants of Specific Policy Choices

This section examines factors influencing accounting policy choices on issues selected for this study: inventory costing, goodwill arising on consolidation and depreciation of fixed assets.

4.5.1 Inventory Costing

In general terms, the main treatments relating to inventory costs are the First-In First-Out (FIFO), Last-In First-Out (LIFO) and average cost methods. It is well known that the method that is used will have a direct impact on earnings. For example, assuming that input prices in a given year are rising and that firms using LIFO do not liquidate layers of stock, FIFO results in a higher reported income than LIFO, with average costs falling between the two. Thus, in periods of inflation, adopting LIFO can create cash-flow benefits by deferring tax payments. Not only are there potential benefits to the firm and its managers in terms of earnings effects arising from method selection and method switching or rebalancing, but also, as will be shown below, different sets of regulations permit (or require) different methods.

Across the EU, accounting regulations covering inventory costing methods have been diverse. The EU Fourth Directive (Article 40) is flexible in that it permits the First-In First-Out, the average cost, the Last-In First-Out and other similar methods. In the UK, the Companies Act 1985 (Schedule 4) also permits the use of the main methods. However, the LIFO method is not permitted by SSAP 9 nor by the Inland Revenue. If the reporting firms insist on using the LIFO method, contrary to the expectation of the Inland Revenue, this means that the accounting profit chargeable to tax would have to be recomputed using another inventory valuation method acceptable to the Revenue. In Germany, the allowed methods of inventory accounting include LIFO, FIFO (HGB § 256) and average cost method, and since 1990 the LIFO method has become generally accepted for tax purposes (EStG § 6). In France, LIFO is only allowed in consolidated financial statements. The LIFO method is banned in some other EU jurisdictions including Denmark, Ireland, and Sweden. Under the benchmark treatment in IAS 2, the costs of inventories should be assigned using either the FIFO or the weighted average cost formula as the principal method, although the LIFO method is allowed as an alternative treatment. However, the revised IAS 2 issued in December 2003 (IASB, 2002) prohibits the optional use of LIFO as from the beginning of 2005. Table 4.3 provides a summary of inventory methods permitted in various regimes.

Table 4.3 Accounting Regulations on Inventory Methods

Jurisdictions	Source of Regulations	Allowed Methods
IASB	IAS 2	Average cost, FIFO, LIFO (Revised IAS 2 bans LIFO as of 1.1.2005)
European Union	The Fourth Directive, Article 40	Average cost, FIFO and LIFO
Austria	HGB § 209, para.2	Average cost, FIFO and LIFO
Belgium	The Royal Decree 1976, Art. 33	Average cost, FIFO and LIFO
Denmark	The Financial Statement Act (ÅRL, sect. 32) Danish Accounting Standards (DRV 8, sect. 32)	Average cost, FIFO and LIFO The LIFO should not be applied
Finland	The Accounting Act	Average cost, FIFO and LIFO
France	PCG (p.II.10)	Average cost, FIFO LIFO is allowed in consolidated accounts only.
Germany	HGB § 256 and HGB § 240, paras 3-4 EStG § 6, para. 1, No.2a	Average cost, FIFO and LIFO LIFO has become generally accepted method for tax purposes
Italy	Civil Code Article 2426 CSPC No. 3	Average cost, FIFO and LIFO
Netherlands	The Civil Code	Average cost, FIFO and LIFO
Portugal	Official Accounting Plan (Ch. 5)	Average cost, FIFO and LIFO
Spain	The Code of Commerce, The General Accounting Plan, The Companies Act	Average cost, FIFO and LIFO
Sweden	The Annual Accounts Act, The Redovisningsrådet	Average cost, FIFO
UK and Ireland	The Companies Act 1985 (Schedule 4, para. 26) SSAP 9	Average cost, FIFO and LIFO Average cost and FIFO

(source: adapted from Ordelheide and KPMG, 2001)

In addition to accounting regulations, a number of other determinants influence inventory policy choice, including anticipated tax savings or deferral, stock market reactions, contracting costs and the nature of the firm and its operations (e.g., Hagerman and Zmijewski, 1979; Biddle, 1980; Abdel-khalik, 1985; Hunt, 1985; Lee and Hsieh, 1985; Lindahl, Emby and Ashton, 1988; Hughes and Schwartz, 1988; Lindahl, 1989; Neihaus, 1989; Cushing and LeClere, 1992; Jennings, Mest and Thompson, 1992; Kang, 1993; Hand, 1993; Guenther and Hussein, 1995).

The most frequent explanation of inventory policy choice is that a firm will select an accounting method which results in the lowest expected present value of future tax

payments. In periods of inflation, adopting LIFO can generally create cash-flow benefits by deferring tax payments. Many research studies document the potential for this. For example, Dopuch and Pincus (1988) examined the differences in accounting results and accounting ratios between long term users of the FIFO and LIFO methods, finding evidence that the choice of LIFO is more related to tax savings than any other predictor variable that has been tested. Cushing and LeClere (1992) studied the characteristics of US listed firms that had chosen to stay with their original choice of FIFO or LIFO in the period 1975 to 1984. They also found that firms using LIFO had significant tax savings while those using FIFO had no single dominant characteristic that explained their inventory accounting choice. Hughes and Schwartz (1988) suggest that the fact that LIFO was rarely used prior to its acceptance for tax accounting is consistent with the view that a switch to LIFO for financial reporting is merely a by-product of the decision to minimize the current tax payment.

Guenther and Hussein (1995) also provide evidence of tax-motivated preferences for LIFO through an examination of publicly available responses to the IASC exposure drafts. The results suggest that support for LIFO is confined to those countries in which LIFO provides a tax advantage. In supplementary analysis of the use of LIFO in Canada and South Africa, where the method is allowed for financial reporting purposes but not for tax purposes, it has been found that those few Canadian firms which have used LIFO appeared to have done so because of the US tax laws, and when LIFO was disallowed for tax purposes in South Africa, those firms previously using LIFO for financial reporting purposes subsequently switched to FIFO or average cost.

A number of other research studies have attempted to explain why firms do not use the LIFO method in periods of rising prices and thus forego potential tax savings (e.g., Abdel-khalik, 1985; Hunt, 1985; Lee and Hsieh, 1985). One of the considerations that a firm remains on non-LIFO methods is because they fear their security prices will be adversely affected when they report lower earnings under LIFO, even though the switch should reduce their future tax payments. However, empirical studies on the market reaction to LIFO adoption have thus far shown mixed results. Some studies demonstrate a positive reaction surrounding LIFO adoption (e.g., Ball, 1972; Sunder, 1973, Biddle and Lindahl, 1982, Jennings et al. 1992) while other studies report a

negative market reaction to LIFO adoption (e.g., Ricks 1982; Biddle and Ricks, 1988; Kang, 1993). The first of these research studies to investigate the effect of LIFO adoptions on stock prices was conducted by Ball (1972), in which the author analysed a number of accounting changes, including inventory method, for 71 firms over a period from 1946 to 1958. The results indicated that the cumulative residuals of firms that switched to LIFO averaged +7.0 percent over the 12 months preceding the change, with essentially no further price adjustments after the change. Along the same lines, Sunder (1973) observed that firms which switched from FIFO to LIFO experienced positive cumulative abnormal returns in the switch year. These findings have been interpreted as evidence that the market rewarded the firms involved for switching to LIFO. Lanen and Thompson (1988), who model stock price reaction to voluntary accounting changes, include LIFO adoption amongst the method changes which they document. These authors report that investors rationally anticipate voluntary accounting changes such as LIFO adoption, although the sign of association between the stock price reaction at the announcement date and firm-specific characteristics are difficult to predict.

In a later study, Kang (1993) has challenged the findings discussed above by arguing that LIFO adoptions should be accompanied by negative rather than positive stock returns because the decision to adopt LIFO is rational if a firm on FIFO sees unexpectedly higher future inflation for its input prices. Hand (1993) has tested Kang's theory using firms that announced they were considering adopting LIFO and then resolved that uncertainty by either adopting LIFO or remaining on FIFO. Hand's results were broadly consistent with the major predictions of the Kang model. In particular, firms that resolved the uncertainty by adopting LIFO experienced reliably negative mean excess returns at the resolution of the uncertainty date.

The contract theory of accounting method choices provides what some believe to be a more appealing alternative explanation. Under this explanation, firms remain on FIFO because a switch to LIFO would increase contracting costs of one type or another. Applied to inventory accounting specifically, the prediction would be that firms which face constraints imposed by debt covenants or whose managers would suffer from lower reported accounting earnings through their compensation contracts will choose FIFO; otherwise they are predicted to choose LIFO in order to minimize future tax

payments. It must be assumed here that FIFO firms are willing to forego tax savings in order to report higher accounting income, presumably because income-related contracting costs would exceed these tax savings. Unfortunately, direct tests of a contracting theory explanation of inventory accounting method choices are often not feasible because data on the actual costs of contracting or recontracting under one method of accounting versus another are difficult to obtain. Less direct tests of the contracting hypothesis of inventory accounting choices were conducted by Abdel-khalik (1985), Hunt (1985) and Lee and Hsieh (1985), and these authors conclude that managerial compensation plans do not explain the inventory choices of their samples of firms, but that debt constraints may do so. Indeed, when Gopalakrishan (1994) examined inventory method choices for a set of firms that do not have long-term debt in their capital structure, the author found that even without the presence of long-term debt, leverage, measured as total short-term liabilities over equity, is an important determinant of inventory policy choice.

Another explanation of inventory accounting method choices can be derived from the assumption that firms choose accounting methods which 'best' fit the characteristics of their operating, financing, and investment decisions, assuming the existence of appropriate criteria for doing so (e.g., Eggleton, Penman and Twombly, 1976; Hagerman and Zmijewski, 1979; Neihaus, 1989; Kuo, 1993; Archambault and Archambault, 1994 and 1999; Craycraft, Sedo and Gotlob, 1998). The market reaction studies take as their premise that when LIFO is adopted, inflation results in tax savings. Yet even in regimes that allow the use of LIFO, it has been used by few firms. Among the several ways in which this explanation could manifest itself in accounting method choices is the possibility that firms' managers and owners wish to select accounting methods that lead to a more accurate assessment of their firms' future operating cash flows.

Eggleton, Penman and Twombly (1976) studied the relationship between a number of firm characteristics such as management change, industry membership and auditor, and the inventory accounting method. They found no management change effect, but in univariate tests of association found that both industry and auditor changes were related to LIFO adoption. Because of collinearity between these two variables, they were unable to attribute the change to one factor or the other, but their results form the

basis for the use of industry as a control variable in later matched-pairs research designs.

Hagerman and Zmijewski (1979) examined several firm-specific factors potentially related to the choice among accounting methods, one of which was LIFO. They found only two factors to be associated with LIFO. One was concentration, chosen on the assumption that firms in concentrated industries have monopoly power and seek to discourage entry by reporting low accounting profits. That concentration entails monopoly power seems to have been assumed. The second factor was capital intensity, on the premise that more capital-intensive firms will report higher accounting profits than less capital-intensive firms, *ceteris paribus*, because accounting income is not charged with the cost of capital. If, in addition, these capital-intensive firms are subject to 'political costs', they will choose LIFO to reduce reported net income.

Neihaus (1984 and 1989) studied the relation between inventory method choice and the ownership structure of US listed firms and found that with higher managerial ownership firms tended to choose LIFO, a method that lowered reported earnings but also resulted in tax savings. With lowered managerial ownership, there was a negative relationship with the LIFO method of inventory accounting.

Kuo (1993) examined the factors affecting the choice of inventory accounting method amongst small firms. He found that, as the size of the firm increased, the likelihood that the firm would use LIFO increased, while the debt to equity ratio had an inverse effect, suggesting that small firms, like their bigger counterparts, were more likely to choose an income increasing method when debt increased due probably to the covenants placed in their debt contracts.

In addition, a number of studies have investigated inventory accounting choice when firms operate in international markets. Craycraft, Sedo and Gotlob (1998) seek to determine if a firm's level of international operations influences its choice of inventory cost flow assumptions for its domestic inventory. Their results indicate that firms with higher relative levels of international operations are more likely to use a non-LIFO inventory method for their domestic inventory than firms that are less

involved in international markets. One possible reason for this difference is that firms with foreign operations incur a relatively higher cost in reporting their domestic inventory on a LIFO basis than firms without international operations. These higher costs include additional bookkeeping costs but also possibly the higher costs of raising capital in international markets.

Archambault and Archambault (1994) examine factors affecting inventory accounting policy choice among Canadian firms. The dataset includes 80 firms that use FIFO and 45 firms that use average cost. Their results indicate that average-cost firms operate in industries with lower but more variable inflation rates, have a lower inventory turnover rate, higher variance of income and inventory, higher leverage, and tighter dividend restrictions, and are larger than FIFO firms. In their later study (Archambault and Archambault, 1999), these authors compared characteristics of Canadian and US firms in their choices of FIFO and non-FIFO cost methods, and found that the characteristics of Canadian and US firms choosing FIFO were similar and the Canadian firms choosing average costing had similar characteristics with US firms choosing LIFO as the inventory costing method.

The above review shows that any analysis of systematic changes in inventory policy choice that are consistent with harmonisation must take into account the influences on such choices that are known to exist at the firm level. These include not only the preferences of managers that may be related to their compensation, but also the size of the firm, the industry in which the firm operates and the international exposure of the firm. In addition, from the above review, it can be said that tax and non-tax explanations of inventory accounting method choices are not completely independent. That is, the selection of inventory accounting methods may require a simultaneous consideration of the interactions between influential factors. These key considerations will be taken into account when the harmonisation model is constructed in Chapter 5.

4.5.2 Goodwill on Consolidation

The significant growth of mergers and acquisitions in recent years has highlighted the importance of goodwill and the problem of how to account for it. In essence, goodwill on consolidation or purchased goodwill is the difference between the

purchase consideration and the fair value of net identifiable assets acquired. Goodwill is acknowledged for financial reporting purposes only it is purchased as part of an acquisition. Where the merger or pooling-of-interests method is applied, the nominal value of the shares issued rather than the market value of the consideration is recognised, with the result that goodwill does not become a concern. McLeay, Neal and Tollington (1999) in their research in international standardisation and harmonisation analysed in detail the goodwill accounting method that was practised by the European inter-listed firms. The description of policy, accounting treatment and the effect on financial statements is illustrated in Table 4.4.

Table 4.4 A Summary of Goodwill Accounting Methods

Description of Policy	Accounting Treatment	Effect on Financial Statement
Goodwill – Asset	The difference between the consideration and the fair value of the asset acquired is included amongst assets in the balance sheet. The asset is either left at its original cost or revalued.	The book value of the firm reflects the view that the value of the asset is not likely to be impaired for the foreseeable future (e.g., brands).
Goodwill – Negative Reserve	The goodwill (arrived at as above) is disclosed in reserves as a 'dangling debit' instead of as an asset.	The effect is to reduce total assets and distributable reserves by the amount of the goodwill, reflecting current uncertainty as to whether the asset is realisable.
Goodwill – Reserve Write Off	The goodwill (arrived at as above) is written off immediately against reserves.	A reduction in distributable reserves would occur as if a terminal dividend equivalent to the goodwill is paid to the shareholders in the acquired company.
Goodwill – Income Write Off	The goodwill (arrived at as above) is written off entirely against income in the year of acquisition.	A charge in the income statement in the year of acquisition reflects the immediate loss of any value in excess of the carrying amount.
Goodwill – Reserve Amortisation	The goodwill is amortised over some fixed or variable period, the reserves being reduced accordingly in each period.	Goodwill amortisation is not included in the Income Statement as if a distribution on acquisition were made conditional upon later realisation of the asset.
Goodwill – Income Amortisation	The goodwill is amortised over some fixed or variable period, a charge being made each year against the current income.	Goodwill amortisation is included in the Income Statement. The treatment is the same as any other fixed asset and reflects the use of the wasting asset over its economic life.
Negative Goodwill – Reserve	Where the consideration is less than the fair value of the asset acquired, negative goodwill arises. This reflects a bargain purchase, or some particular feature of the assets concerned. The negative goodwill is shown as a reserve.	The effect is similar to a revaluation reserve. The surplus can either be left at cost until the asset to which it relates is disposed of, or it can be transferred to distributable reserves as the asset is depreciated.
Negative Goodwill – Provision	As above but the provision is shown as a reduction of net assets	The provision is taken to income if the gain is realised and as the related asset is depreciated.
Negative Goodwill – Deferred Income	As above but the negative goodwill is shown as a separate asset.	The amount deferred is taken to income when the gain is realised.

(source: McLeay, Neal & Tollington , 1999)

In practice, a variety of approaches is evident across different regimes and, depending on the accounting regulations concerned, firms may be able to immediately write-off the cost of goodwill against reserves or capitalise goodwill as an asset, with or without subsequent systematic amortisation. In the first approach, as soon as it is acquired, goodwill is immediately written off against an account in the shareholders' equity section, generally retained earnings. Some proponents of the immediate write-off of goodwill argue that this treatment is consistent with non-purchased goodwill, i.e., it is not an asset for the purposes of financial reporting (e.g., Taylor, 1987; Arnold et al., 1992). Goodwill is not independently realisable but exists only by virtue of a valuation of the business entity as a whole. The true value of goodwill has no predictive relationship to the amount paid on acquisition in that its value will fluctuate over time depending on various economic factors and changes in investor opinion. Moreover, it is not a resource consumed in a similar way to other productive assets. Taylor (1987) suggests that the removal of purchased goodwill by immediate write-offs treats purchased and non-purchased goodwill similarly by removing them both, and that this may be helpful when comparing two similar firms, one of which has grown by acquisition and another by internal growth. Gray (1988a) favours immediate write-off because the balance sheet is misleading if it includes only purchased goodwill, which is likely to understate the total goodwill which also includes self-constructed goodwill.

The second approach advocates that goodwill should be capitalised and amortised systematically over a reasonable period of time. This is consistent with a primary function of accounting, which is to match costs, and income, the cost of purchased goodwill should be amortised as a means of matching the cost of securing the income actually received (e.g., Russell, Grinyer, Malton and Walker 1989). Under stewardship accounting, management should be required to justify its acquisition of other companies by demonstrating cash inflows from the cash outflows are incurred when making the investment. It seems reasonable to claim that appropriate reporting for monitoring and control of the management can only be achieved if the cash outlay committed to achieve the future net profit inflows are charged as costs in a profit and loss at some time. To do otherwise is analogous to treating gross profit as the net gain

from trading during a period by charging all overhead costs to reserves. It follows that payments for goodwill should be debited at some time to the profit and loss account.

The third approach to accounting for purchased goodwill states that goodwill should not be written off at all, unless there is strong evidence to support this procedure. According to Zeff and Thomas (1973), this school of thought bases their argument on the major points as follows: First, it is over-conservative to write goodwill off the books when it has not depreciated in value below the purchase price. To write off goodwill in such a case creates a secret reserve while to recognise this reserve is thought to be unorthodox accounting. Goodwill suffers no actual decline in value so long as the earning capacity of the enterprise is maintained. Secondly, when goodwill has actually depreciated, it is not necessary to record that depreciation in the operating account. The profit and loss record best shows the degree to which goodwill exists. Its value fluctuates according to the expected future earning possibilities of the enterprise. It is permissible to write goodwill off the books when it is declining in value or when it has lost its value but amortisation is not required. Furthermore, it is impossible to accurately determine the extent to which the goodwill has depreciated. Some accountants have accepted this fact as one of the major reasons why it should not be brought into published accounts, unless purchased. The owner of a business cannot make an impartial estimate of the extent to which goodwill has depreciated. Consequently, since appreciation of goodwill is not recognised in the accounts, neither should depreciation be charged.

A number of accounting regulations for goodwill are evident in different regimes and they are fairly flexible in which firms are allowed to either capitalise goodwill as an asset or to write it off immediately against reserves (Table 4.5). According to IAS 22, goodwill arising on acquisition should be treated as an asset and amortised over its useful life, and there is a rebuttable presumption that the useful life of goodwill will not exceed 20 years. The situation in the UK differs from the rest of the EU. In its recently issued FRS 10, the ASB outlawed the previously preferred treatment of eliminating the full amount of goodwill against reserves at the time of acquisition. This new standard also requires UK firms to amortise goodwill systematically over its useful life. Furthermore, permanent capitalisation is another method that has been

accepted in the UK, as the Companies Act 1985 allows firms to depart from requirements to the extent necessary to provide a true and fair view. In this method, the amount of purchased goodwill is treated as an asset in the balance sheet without subsequent amortisation. However, the firm has to conduct an annual impairment test to examine if there is any diminution in its value.

Despite the controversy surrounding goodwill, evidence regarding the managerial discretionary of its financial reporting treatment is fairly limited (e.g., Gore, Taib and Taylor, 1999; Chan and Loftus, 2000; Dunstan 2002). Dunstan (2002) examines the determinants of the accounting treatment of goodwill for corporate subsidiary acquisition in Australia. The basic premise of his research is that both *ex ante* and *ex post* factors, as suggested by Watts and Zimmermann (1990), play a role in the determination of goodwill policy choice. This contention is generally supported by the finding that the overall model, including the six hypothesized independent variables and five control variables, had significant power. In particular, the results show that the accounting treatment of goodwill is found to be *ex ante* directly related to the investment opportunity set acquired being the assets already held by the target and the *ex post* exercise of discretion is determined by the contracting choices of the firm.

Chan and Loftus (2000) use an Australian sample to investigate factors, including growth options, management compensation, interest cover, political costs and the legal life of intangibles that may explain cross-sectional variation in firms' policies for the amortisation of goodwill and identifiable intangible assets. The results suggest that firms with stable or declining earnings per share are more likely to adopt lower amortisation policies, as are firms with lower interest cover. Consistent with the principle of prudence in financial reporting, firms with a larger percentage of goodwill with limited legal lives are more likely to adopt higher amortisation policies.

Table 4.5 Accounting Regulations for Consolidation Goodwill

Jurisdictions	Source	Accounting Treatments
Austria	The Commercial Code HGB § 261	1. Write off immediately to reserves 2. Amortise over up to 5 years 3. Amortise over useful economic life
Belgium	The 1976 Royal Decree, The 1990 Royal Decree	1. Amortise over up to 5 years 2. Amortise over useful economic life
Germany	The Commercial Code (HGB § 309)	1. Write off immediately to reserves 2. Amortise over up to 5 years 3. Amortise over useful economic life (20 years)
Denmark	The Company Account Act	1. Amortise over useful economic life 2. Write off immediately to reserves
Finland	The Accounting Act and Company Act	1. Amortise over up to 5 years 2. Amortise over useful economic life (not exceeding 20 years)
France	The National Accounting Plan (PCG 1986)	1. Amortise systematically over useful life, or 2. Exceptionally, write off immediately to reserves
Italy	The Civil Code, decree No. 127	1. Write off immediately to reserves 2. Amortise over up to 5 years, or 3. Amortise over a limited period not exceeding the asset's life
Netherlands	The Civil Code BW Art. 2:389.7 RJ 2.03.221	1. Immediate write off to reserves or profit and loss 2. Amortise over not more than 5 years, or 3. If reasonable, amortise over a longer period.
Portugal	The Official Accounting Plan (1989 and 1991)	1. Amortise over 5 years, or 2. Amortise over useful economic life
Spain	The Code of Commerce, The General Accounting Plan, The Companies Act NC Art. 24	1. Amortise over 5 years, or 2. Amortise over a maximum of 10 years (maximum 20 years starting from 1998)
Sweden	The Annual Accounts Act the Redovisningsrådet RR 01, §§ 31, 32	1. Amortise over expected economic life (maximum 10 years) or 2. Exceptionally, amortise up to a period of 20 years
UK and Ireland	The Companies Act 1985 SSAP 22 FRS 10	1. Amortise on a systematic basis over useful economic life 2. Permanent capitalised (Before FRS 10 which was introduced in 1998, the preferred method under SSAP 22 was the immediate write-off)
EU	The Seventh Directive	1. Treat in accordance with the 4th Directive 2. Immediate write off to reserves
IASB	IAS 22	1. Amortised on a systematic basis over its useful life (maximum 20 years)

(source: Ordelheide and KPMG, 2001)

Further, Chan and Loftus (2000) found that the amortisation of goodwill is independent of growth options. The 'political' cost hypothesis, i.e., larger firms are

more likely to adopt higher amortisation policies, was not supported in this study. Overall, the observed associations indicate that firms preferences for amortisation policies are linked to economic consequences; and that regulations mandating amortisation for identifiable intangible assets, or the use of the straight-line method for goodwill, may have a differential impact on entities required to adopt them.

Gore, Taib and Taylor (1999) investigate factors that determined the position of senior managers of UK-listed firms for a new standard on goodwill accounting, i.e., whether they preferred the immediate write-off of goodwill to reserves or capitalisation and amortisation. Their results provide support for factors derived from contracting cost theory, including those associated with debt covenants and management compensation schemes, and transactions costs. In particular, binding gearing debt covenant restrictions seem to influence firm preferences and they also find, to a lesser extent, so does the existence of relevant profit-based management compensation plans.

Hall (1993) addresses the question of whether managers are influenced by economic consequences in choosing the number of years over which goodwill is amortised. They find that the choice is affected by the size of the firm and by nearness of the firm to its debt covenant constraints. His study showed that the length of the goodwill amortisation period is related to the size of the firm and, for those with debt contract provisions sensitive to goodwill accounting, to the firm's leverage. Skinner (1993) seeks to demonstrate the cross-sectional relation between firms' investment opportunities, their debt and compensation contract, their size and financial leverage, and their accounting procedure choices. The results show that highly-levered firms are more likely to select income-increasing goodwill procedures, than are other firms. Thus, it appears that managers consider economic consequences in deciding the number of years over which goodwill is amortised and, in particular, political costs and debt contracting costs.

Grinyer, Russell and Walker (1991) examine factors, including those based on contracting costs, that influence the proportion of the company purchase price assigned to net tangible assets and therefore to goodwill. These authors argue that UK firms had two conflicting motives regarding the goodwill accounting policy choice.

Firms faced a trade-off between their incentive to maximise the recognition of tangible assets to strengthen balance sheet ratios and their incentive to recognise goodwill to improve post acquisition profits. Grinyer, Russell and Walker find that the proportion of purchase price allocated to goodwill is negatively associated with the leverage of the acquiring firm and the size of the acquisition. The authors explain the negative relation between the recognition of goodwill and leverage as being driven by the incentives of highly levered firms to opportunistically improve their balance sheet position. They contend that management is able to maximise the assets available to secure future debt by recording a greater proportion of the purchase price as tangible assets. The explanation offered for their finding that larger acquisitions are more likely to result in the recognition of lower goodwill balances is based on the premise that, the more material the acquisition is to the acquiring firm, the greater the exposure to the risk associated with the acquisition. This provides management with an incentive to recognise a greater proportion of tangible assets to provide greater assurance to shareholders of the availability of security, should the target firm fail. However, it should be noted that at the time of the Grinyer, Russell and Walker paper, the preferred treatment of goodwill on consolidation in the UK was to immediately write it off against reserves. This means that maximising the recognition of goodwill avoided the annual amortisation charges associated with the recognition of identifiable assets and was therefore an income increasing accounting policy choice in the UK.

Wong and Wong (1999) examine the accounting treatment of goodwill arising from corporate acquisitions in New Zealand. Consistent with Grinyer, Russell and Walker (1991), they also find a negative relation between leverage and the recognition of goodwill. The authors conclude that the negative association found between goodwill and both leverage and assets-in-place is consistent with an endogenous relation between the firm's investment opportunity set, financing policy and acquired goodwill. This endogeneity, however, makes it impossible for them to empirically identify the separate direct and indirect effects.

Dunne (1990) seeks to explain the continued use of merger accounting in the US despite the recommendation of several accounting studies that the acquisition method be used because that method more accurately reflects the economic substance of the

transaction. Four factors i.e., owner-control, accounting-based compensation plans, lending agreements and political visibility, are hypothesised to affect the decision between merger and acquisition method. The results show that for the firms in the sample there are firm-specific characteristics associated with the use of the two accounting treatments. The findings provide evidence that economic and political considerations play a significant role in management's choice of the accounting treatment for business combinations.

4.5.3 Depreciation of Fixed Assets

Accounting depreciation affects firm's financial statements that are frequently used in contracts, disclosures to capital markets, internal decision-making and control, and tax computations. A variety of depreciation methods is used in practice including the straight-line method, the declining-balance method, and the unit-of-production method. The basic requirement is that the depreciable amount of a tangible fixed asset is to be allocated on a systematic basis over its useful life, using a method that reflects as fairly as possible the pattern in which its economic benefits are consumed.

The accounting regulation in most EU member states does not specify which depreciation method to use in any particular situation. The firm may therefore choose the method that is most suitable economically. However, in countries such as Germany and France, depreciation policy choice is strongly influenced by tax considerations. In this case, where declining-balance depreciation is used and is classified as tax-accelerated depreciation rather than as ordinary depreciation, it is possible to change methods from year to year provided that the tax rules are respected and that, at least the straight-line charge is recorded. Such changes are not regarded as changes in accounting policy and do not have to be disclosed. On the contrary, in other countries including the UK, the amount of depreciation charged in the published accounts is quite independent of that of tax purposes.

Accounting depreciation affects firms' income statements and balance sheets which are frequently used in contracts and disclosures to capital markets, internal decision making and control, and tax computations. The extant accounting literature (e.g.,

Hagerman and Zmijewski, 1979; Skinner, 1993; Gopalakrishan, 1994; Bowen, DuCharme and Shores, 1995) documents statistically cross-sectional associations between depreciation method and firm size, leverage, risk, investment opportunity set, and bonus plans. Holthausen (1981) and Sweeney (1994) find evidence of associations between changes in depreciation methods and hypothesised determinants of depreciation policies, such as debt covenants and investment opportunities.

Dhaliwal, Salamon and Smith (1982) examine the relationship between the ownership control status of firms and the depreciation method they adopt. The arguments of Watts and Zimmerman's positive theory are integrated with those of managerial economists to generate the prediction that management controlled firms are more likely than owner controlled firms to adopt accounting methods which increase reported earnings. Their paper compares the depreciation methods used by a sample of management and owner controlled firms for financial reporting purposes. The comparison considers and controls the factors of firm size, leverage, and the depreciation method used for tax reporting purposes. The comparison reveals that there is a significant difference in the depreciation methods adopted by management controlled and owner controlled firms for financial reporting purposes.

Healy, Kang and Palepu (1987) examine the effect of accounting procedure changes (i.e., accelerated to straight-line depreciation) on cash salary and bonus compensation to CEOs. These authors estimate whether there is an adjustment to the statistical relation between compensation and corporate earnings following changes that raise earnings. Their results indicate that subsequent to these changes, salary and bonus payments are based on reported earnings, rather than earnings under the original accounting method, and the potential compensation effect of the changes is small compared to the effect of economy.

Keating and Zimmerman (2000) argue that previous studies only focused on the income effect of depreciation method changes, i.e., income-increasing versus income-decreasing. In this paper, the authors extend existing works by examining whether two depreciation accounting policy changes, one being changes in depreciation methods the other being revisions of useful lives and salvage values of depreciable assets, are in response to changes in the tax code, to offset poor performance, or

because the firm's investment opportunities change. Their results suggest that managers change depreciation policies in response to tax law changes, poor performance and changes in investment opportunities. In addition, the results show that firms change financial accounting depreciation policies if those policies affect tax depreciation and tax laws are revised.

Firms also change depreciation to better align managers' incentives with those of shareholders whenever the firm's operating environment changes (Skinner, 1993). The author finds that larger firms are more likely to select income-decreasing depreciation, more highly levered firms are more likely to select income-increasing depreciation and firms with bonus plans are more likely to select income-increasing depreciation, than are other firms. These findings confirm extant results in the literature, that is, they are consistent with the size, debt/equity, and bonus plan hypothesis.

4.6 Summary and Conclusions

It is clear from this chapter that firms do not choose accounting methods in a random manner, yet research into the harmonisation of accounting has focused almost exclusively on regulatory differences as the predictor of accounting diversity and has tended to treat firm-level effects as a residual and hence to assume their randomness. Here, it has been shown that, in addition to regulations, managers are influenced by economic motives in choosing among alternative accounting methods. Furthermore, specific attributes of firms such as industry membership, size and internationality are found to be important factors in the selection of accounting policies. Thus, this literature review indicates that rule creation and rule enforcement on their own may not necessarily bring about market, contract and social efficiencies, the main reasons often cited in the literature for accounting harmonisation. It is therefore the objective of the present study to consider the impact not only of the country of domicile on a firm's accounting policy choices, but also its sector of operations, capital market exposure and size, in order to attribute convergence through time to harmonising forces. The next chapter will examine how the research methodology employed in this study takes account of the above, and the data requirements in the light of the models proposed.

CHAPTER FIVE

RESEARCH METHODOLOGY AND DATA

5.1 Introduction

The main focus of the statistical analysis carried out for this research is to measure accounting practice harmonisation by taking into account firms' operating conditions. Specifically, it seeks to assess the combined effects of each firm's country of domicile and its sector of operations on the choice of accounting methods, together with the firm's size and international exposure, and any changes in these factors through time. In addition, the present research provides a statistical analysis of financial reporting harmonisation using the binomial logistic regression to predict the odds of adopting alternative accounting methods.

The possibility of using statistical modelling was suggested by Tay and Parker (1990) but was not operationalised. When this method was taken further, it was based on the premise that accounting diversity is a natural result of differing operating environments, which require different accounting approaches (Archer, Devaille and McLeay, 1996; Herrmann and Thomas, 1995; McLeay, Neal and Tollington, 1999). Thus, the interfirm comparability of financial statement items would depend on the use of the accounting method that is appropriate to the firm's operating circumstances (e.g. FIFO if and only if physical inventory movements actually follow the First In First Out convention), and not on the use of the same method by all firms (e.g. FIFO required of all firms). Following Archer, Devaille and McLeay (1996) and McLeay, Neal and Tollington (1999), the present study employs the statistical modelling approach, in this case using binomial logistic regression to measure accounting harmonisation in the EU.

This chapter focuses on the research methodology and data, which is the backbone of the present thesis. The next section discusses the background information of the binomial logistic regression. Statistical modelling, which incorporates the main effects and interactions, is described in Section 5.3. The data employed in this research is examined in Section 5.4 and the categorisation of accounting methods selected for this study, i.e., inventory costing, goodwill on consolidation and depreciation of fixed assets is presented in Section 5.5. Finally, Section 5.6 offers some conclusions.

5.2 The Binomial Logistic Regression

The nature of binary qualitative data, such as adopting a given accounting method, implies that conventional regression methods would be inappropriate, as both the dependent response variable and the predictors are discrete rather than continuous outcomes, with assigned qualitative values (Fienberg, 1977). Hence, the present study employs the binomial logistic regression to predict the odds of using a given accounting method as a function of explanatory variables.

The binomial or binary logistic regression is a form of regression which is used when the dependent is a dichotomy and the independents are continuous variables, categorical variables, or both. It is basically a non-linear transformation of the linear regression. The relationship is similar to that in multiple regressions except that each one-unit change in a predictor is associated with a change in log odds rather than the response directly.

Underlying logistic regression are three basic assumptions. The first assumption requires the dependent random variable, Y, to be binary. Further, the data is assumed to be generated from a random sample which therefore requires that observations on Y be statistically independent of each other, thus ruling out the problem of serial correlation. The final assumption, similar to Ordinary Least Squares (OLS) regression analysis, is that there is no exact linear dependence among the predictor variables.

The use of binomial logistic models in measuring the degree of harmonisation overcomes the problem of multiple accounting methods used by firms. Indeed this is one of the fundamental problems identified in prior research studies (e.g., Emenyonu and Gray, 1992; 1996; Murphy, 2000; Parker and Morris, 2001) into harmonisation measurement. As noted by McLeay, Neal and Tollington (1999), they treat firms which use more than one policy choices for a given accounting item as a separate group and not comparable with other firms which use only a single method. Other researchers (e.g., Herrmann and Thomas, 1995), while recognising many firms in their data set employ more than one method, omit them in harmonisation metric altogether.

Applying the binary logistic regression for the inventory costing method, for instance, the outcomes are assigned to each possible method (i.e., FIFO, average cost and LIFO) as follows: the value 1 is assigned if the firm used the method and 0 for vice versa. Further, in the case of a firm which used a combination of inventory methods, i.e., FIFO and LIFO for example, the value 1 is assigned to both categories. In so doing, we treated this firm as comparable with a firm using only a FIFO method and another firm applying only a LIFO method. The logistic models are then being 'stacked' over the potential outcomes and this allows firms employing more than one accounting method to be captured in the statistical analysis.

5.2.1 The Binomial Distribution

In the particular case of a binary response, the random variable Y can take only two values, which are conventionally assigned: the value of 1 (for our purpose, adopting a given accounting policy) and the value 0 (not adopting a given accounting policy). The success probability p, that $Y = 1$ is denoted the adopting accounting policy probability which can be written as $P(Y = 1) = p$, and the corresponding probability of failure or not adopting accounting policy is $P(Y = 0) = 1 - p$. Expressing the two probabilities in a single equation, where y, the observed value of the random variable Y, is either 1 or 0, leads to the probability distribution which is known as the Bernoulli distribution.

$$P(Y = y) = p^y (1 - p)^{1-y}, y = 0,1$$

The mean, or expected value of the random variable Y is defined as $E(Y) = 0 \times P(Y = 0) + 1 \times P(Y = 1) = p$. The variance of Y, a measure of dispersion of the random variable, is given by $Var(Y) = p(1-p)$. For n binomial observations of the form y_i/n_i, where $i = 1, 2, \ldots, n$ and where $E(y_i) = n_i p_i$, p_i is the probability of adopting a given accounting method corresponding to the ith observation.

5.2.2 The Logistic Transformation

Instead of using a linear model for the dependence of success probability on explanatory variables, the probability scale is first transformed from the range (0,1) to $(-\infty, \infty)$. A linear model is then adopted for the transformed value of the success probability, a procedure which ensures that the fitted probabilities will lie between zero and one. In principle, any continuous probability distribution is adequate. However, in econometric applications the probit and logit models have been used almost exclusively (Greene, 1990). In the current study, the logistic function will be used mainly due to its mathematical convenience.

The logistic transformation of a success probability p is log $(p/(1-p))$, which is written as logit (p). Note that $p/(1-p)$ is the odds of a success and so the logistic transformation of p is the log odds of a success. It can be seen that any value of p in the range (0,1) corresponds to a value of logit (p) in $(-\infty, \infty)$. As $p \rightarrow 0$, logit $(p) \rightarrow -\infty$; as $p \rightarrow 1$, logit $(p) \rightarrow \infty$, and for $p = 0.5$, logit $(p) = 0$. The function logit (p) is a sigmoid curve that is symmetric about $p = 0.5$, and which is essentially linear between $p = 0.2$ and $p = 0.8$; a graph of this function is illustrated in Figure 5.1 below:

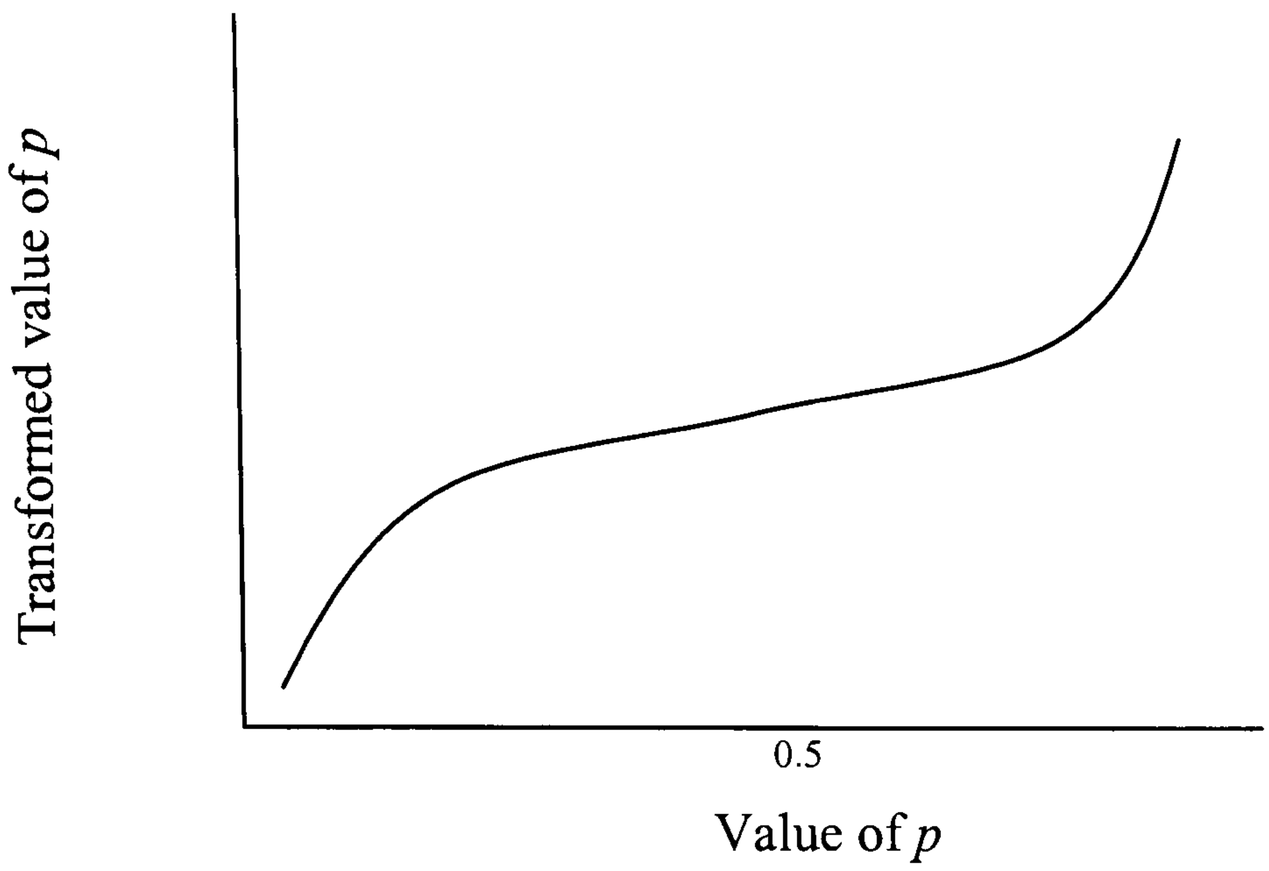


Figure 5.1 The logistic transformations of p as a function of p

(source: Collett, 1991, p. 54)

5.2.3 The Linear Logistic Model

The associated linear logistic model for the dependence of p_i on the values of k explanatory variables, $x_{1i}, x_{2i}, \ldots, x_{ki}$, is

$$\log it(p_i) = \log \frac{p_i}{(1-p_i)} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki}$$

which can be written as,

$$p_i = \frac{\exp(\beta_0 + \beta_1 x_{1i} + \ldots + \beta_k x_{ki})}{1 + \exp(\beta_0 + \beta_1 x_{1i} + \ldots + \beta_k x_{ki})}$$

or, writing the linear predictor η_i as $\sum_j \beta_j x_{ji}$, the fitted probability is

$$p_i = \frac{e^{\eta_i}}{1 + e^{\eta_i}}$$

5.3 Statistical Modelling

5.3.1 Comparing Linear Logistic Models

The empirical analysis compares a hierarchy of nested linear logistic models to describe the odds of adopting a given accounting policy as a function of different sets of regressors. For the present study, the analysis was carried out using the generalised linear modelling system GLIM4 (Francis, Green and Payne, 1993).

In general, two models are defined as nested if one model includes additional variables with regard to another. The effect of each explanatory variable in a model cannot be estimated independently of the others, so the order in which the terms are included is important when interpreting the model. The comparison of model (1), which is nested within model (2), may be generalised as follows:

Model (1): $$logit(p) = \beta_0 + \beta_1 x_1 + \ldots + \beta_h x_h$$

Model (2): $$logit(p) = \beta_0 + \beta_1 x_1 + \ldots + \beta_h x_h + \beta_{h+1} x_{h+1} + \ldots + \beta_k x_k$$

F-Test

The reduction in error, i.e., the deviance in the case of a generalised linear model, of two nested models measures the relevance of the additional variables for the improvement of the fit of the model. As mentioned above, the effect of each additional variable in a model cannot be estimated independently of the others, so the order in which the terms are included is important when interpreting the model. The relative goodness of fit of two nested models, the F-test, can be calculated by examining the ratio of (i) the change in deviances between the two models within a hierarchy scaled by the change in the degrees of freedom, to (ii) the deviance for the full model scaled by the remaining degrees of freedom.

Where the deviance of a higher order model, M_H, is D_H on v_H degrees of freedom and the deviance of the lower order model, M_L, containing a subset of the terms in the higher order model, is D_L on v_L degrees of freedom, and D_F is the deviance of

$$\frac{[(D_L - D_H)/(v_L - v_H)]}{(D_F / v_F)}$$

the full model on v_F degrees of freedom, the ratio has an F-distribution on (v_L - v_H), (v_F). A small F-statistic indicates that model M_H and model M_L may not be distinguished, as the residual deviance for the reduced model M_L is not much larger than for model M_H. In general terms, a ratio greater than one indicates that the average contribution to explanation by the parameters added to the lower order model exceeds the average residual error in the full model when scaled over the remaining degrees of freedom. More formally, the F-statistic provides a likelihood ratio test of the hypothesis that the variables added to the model do not contribute to the regression function with respect to successive higher-order models.

5.3.2 Incorporating Main Effects and Interaction Effects into the Linear Predictor

In addition to the country of domicile, the present study also considers the sector of operations as a main effect in measuring accounting harmonisation across the EU. Two firm-level attributes that might be associated with the choice of accounting method are also added, and allowed to interact with both the country of origin and the sector of operations. The first interacting factor that is included for this purpose is listing status, categorised either as international listing or as domestic listing only. The second is size, which is also reduced to two groupings, in this case where market capitalisation is above or below the median. Finally, the three points in time at which financial reporting practices were observed are dealt with as a covariate, which also interacts with the main effects to allow for different evolutionary paths in different countries and sectors. The variables and model specifications are described as follows:

Table 5.1 Classifications of Main Effects and Interaction Effects.

Main and Interaction effects	Classifications
Country of Domicile	1 = Austria; 2 = Belgium; 3 = Germany; 4 = Denmark; 5 = Spain; 6 = Finland; 7 = France; 8 = Ireland; 9 = Italy; 10 = Netherlands; 11 = Portugal; 12 = Sweden; 13 = UK
Sector of Operations	1 = Basic Industry; 2 = Consumer Goods; 3 = Services; 4 = General Industries; 5 = Information Technology; 6 = Resources; 7 = Utilities.
Listing Status	1. Domestic; 2 = Interlisted
Size (Market Capitalisation)	1 = Below the median; 2 = Above the median
Time period	1 = 1991/1992; 2 = 1994/1995; 3 = 1998/1999

Model 0: Complete Independence

In linear logistic regression modelling, the lowest-order model is generally denoted as the model of complete independence. Under this model, the odds of adopting accounting policies are entirely independent of explanatory variables, i.e. country of domicile and firm-specific attributes. Furthermore, this model is unconstrained by the statistical design which is confined to binary data analysis; that is, in the model of complete independence, the alternative outcomes of the response variable are treated as stochastic. Further, when sub-samples are unbalanced because there are different numbers of observations with respect to each of the main effects, the model of complete independence has no descriptive validity, and will be modified according to the research design described below.

Model 1: Conditional Independence

This model reflects the constraints imposed by the research design. Firstly, the statistical analysis is restricted to firms whose annual reports are actually available for analysis, a major factor being the variation in the populations of firms between countries and sectors, and changes in the population of firms from one time period

to another. Secondly, the model is also conditional on disclosure, with non-disclosure of accounting policy choices being-treated as non-stochastic.

$$\log it(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = \beta_0$$

The model of conditional independence estimates the odds of adopting a given accounting method, which are entirely independent of any main effects or interaction effects. This model is the basis against which the impact of country of domicile, sector of operations and firm-specific characteristics are assessed.

Model 2: Main Effects

The second model adds the main effects to the model of conditional independence to assess their impact on the choice of accounting method. There are thirteen separate countries of domicile, as indicated in Table 5.1, and the sector of operations is classified into seven broad categories following the Reuters Surveys. The associated linear model incorporating each main effect is denoted as follows:

$$log\ it(p_i) = \beta_0 + \beta_i^A$$

where A represents either the country of domicile or the sector of operations.

Model 3: Listing Effects

The third model adds the interaction effects of differences in listing status. In this analysis, firms have been classified as either domestically-listed or internationally-listed. This explanatory factor is allowed to interact with the main effects, and therefore the choice of accounting method is described as a function of the country of domicile or sector of operations main effects (A) and the listing status (L), together with the second-order interactions between the main effects and listing status ($A.L$). The associated linear model is denoted as:

$$log\ it(p_i) = \beta_0 + \beta_i^A + \beta_i^L + \beta_i^{A.L}$$

Model 4: Size Effects

This model assesses the effect of firm size (*S*) on the choice of accounting method across the EU. Based on market capitalisation on 1st January 2000, firm size is simplified by categorising firms either as small (below the median size) or large (above the median). This factor also interacts with the main effects, in order to allow for size-related differences across sectors and countries. The linear model is as follows:

$$log\,it(p_i) = \beta_0 + \beta_i^A + \beta_i^S + \beta_i^{A.S}$$

Model 5: Time Effects

This model estimates changes through time in accounting policy choices across different EU countries and sectors. Three time periods were selected for this purpose: (1). 1991/1992, (2). 1994/1995 and (3). 1998/1999. These periods have been witness to major harmonisation initiatives, starting before the full impact across all EU member states of the European company law harmonisation directives in the early 1990s and continuing through to the beginning of the current international standardization programme in the late 1990s. Time (*T*) is dealt with in this model as a covariate, allowing for a smoothed evolutionary path through periods 1, 2 and 3. The associated linear structure is denoted as:

$$log\,it(p_i) = \beta_0 + \beta_i^A + \beta_i^T T + \beta_i^{A.T}$$

5.3.3 Treatment of Non-Disclosure in Statistical Models

Non-disclosure of accounting policy choice poses a serious problem for harmonisation measurement studies (e.g., Archer, Devaille and McLeay, 1995 and 1996; Morris and Parker, 1998; Pierce and Weetman, 2000). Pierce and Weetman (2000) suggested that the presence of non-disclosing cases in any set of accounting

data places severe limitations on the interpretations of trends which at the first instance might be taken as indications of harmonisation. Archer, Devaille and McLeay (1995 and 1996) discussed several possible reasons to explain non-disclosure of accounting policies. The first possible explanation may be that there were no transactions of the relevant kind, thus obviating the need for disclosing an accounting policy in that area. Secondly, there were such transactions but the firms chose not to recognise the item for reporting purposes. Thirdly, the item was reported, while the firm provided insufficient information to allow the reader to determine the accounting treatment used. One explanation of this may be that the firm in question viewed that readers of its financial statements would be able to make an informed 'default' assumption on the basis, for example, that only one method is allowable by law in the firm's country of domicile. An alternative explanation is that the firm may have decided not to report the policy used even though no default assumption was applicable.

Archer, Devaille and McLeay (1995 and 1996) also suggested three alternative ways to handle non-disclosures: they can be omitted from all statistical analyses, treated as non applicable, or treated as if the item exists but the method is not disclosed. When a 'default' assumption is made whereby non-disclosers can be assumed, from the surrounding circumstances, such as one required by an accounting standard. In that case, non-disclosers can simply be added to firms disclosing that they do use the method. In the statistical analysis carried out in the current study, we were unable to may any default assumptions. As a result, censoring of accounting policy choice is treated as non-stochastic, that is, it is not considered as one of the policy choices.

5.4 The Data

The data on which the statistical analysis is based was collected from quoted firms domiciled in thirteen EU Member States. An initial working list of firms was obtained from the Reuters Surveys of companies in the UK and continental Europe (Reuters, 2000a; 2000b; 2000c). These surveys provide reliable information on industry sectors based on analyst following, and represent a cross-section of firms in

the EU that are influenced, in some cases, by international factors and by country-specific factors. Financial institutions and insurance firms are excluded, as these firms have specialised accounting treatments, which in general limit their comparability with the other firms that make up the majority of the sample. The number of firms across different countries of domicile and across different sectors of operations is shown in Table 5.2. As reported in the table, the aggregate number of sampled firms is 541, 673 and 698 during the financial years ending 1991/92, 1994/95 and 1998/99 respectively, and the full sample of EU firms is 706.

Table 5.2 EU Firms: Sample Structure

Panel A: Country of Domicile	1991/92	1994/95	1998/99	Full Sample
Austria	11	14	15	15
Belgium	24	24	26	26
Germany	59	71	74	76
Denmark	16	23	23	23
Spain	36	42	43	55
Finland	20	27	33	33
France	76	99	106	107
Ireland	13	15	15	15
Italy	32	38	40	41
Netherlands	41	52	53	54
Portugal	7	9	10	10
Sweden	38	48	47	48
United Kingdom	168	211	213	203
Total	541	673	698	706
Panel B: Sector of Operations				
Basic Industrials	118	141	145	148
Consumer Goods	114	144	145	147
Services	137	174	186	187
General Industries	112	139	144	146
Information Technology	10	18	20	20
Resources	18	19	19	19
Utilities	32	38	39	39
Total	541	673	698	706

For the purpose of this study, the data set is further classified according to firms' characteristics, that is, listing status and size. These attributes are cited in the extant literature as important variables in influencing accounting policy choices (e.g, Rahman, Ganesh and Parera, 2002). As shown in Table 5.3, the number of firms which is listed only in their country of domicile is 471, as compared to 235 which are listed in their country of domicile as well as in international exchanges. A firm's size is measured by market capitalisation and classification is based on the median, i.e., firms below the median are classified as small. Table 5.4 presents the number of

firms according to the country of domicile and sector of operations respectively, with respect to size characteristic.

Table 5.3. EU Firms: Interlisting Cross-classifications

Panel A: Country of Domicile	Domestic	Interlisted
Austria	12	3
Belgium	15	11
Germany	54	22
Denmark	17	6
Spain	24	21
Finland	22	11
France	62	45
Ireland	11	4
Italy	23	18
Netherlands	27	27
Portugal	6	4
Sweden	34	14
United Kingdom	164	49
Total	471	235
Panel B: Sector of Operations		
Basic Industrials	106	42
Consumer Goods	77	70
Services	136	51
General Industries	107	39
Information Technology	14	6
Resources	6	13
Utilities	25	14
Total	471	235

Table 5.4. EU Firms: Size Cross-classifications

Panel A: Country of Domicile	Small	Large
Austria	13	2
Belgium	15	11
Germany	30	46
Denmark	16	7
Spain	27	18
Finland	23	10
France	44	63
Ireland	11	4
Italy	22	19
Netherlands	32	22
Portugal	3	7
Sweden	24	24
United Kingdom	93	120
Total	353	353
Panel B: Sector of Operations		
Basic Industrials	94	54
Consumer Goods	68	79
Services	81	106
General Industries	89	57
Information Technology	9	11
Resources	5	14
Utilities	7	32
Total	353	353

Accounting policy choices were systematically examined using actual annual reports obtained from three sources. The main source of firm annual reports was the Global Access[2] database, and these were downloaded in machine-readable format. This technique solves the common problem faced by collecting annual reports directly from the firms concerned, where often there is a non-response bias caused by firms that do not provide the required reports (Cańibano and Mora, 2000). If the annual reports were not available on this database, the second alternative was to collate them in the form of microfilms available at the Manchester Business School Library. This service is provided as part of a project funded by the Research Support Libraries Programme, which can be accessed at www.score.ac.uk. Finally, a small number of annual reports were downloaded directly from firms' websites.

[2] Provided by Thomson Financial, Global Access is the financial information research tool that combines management information with more than six million source documents. Offering more than 12 datasets, Global Access delivers an online collection of US and international company coverage. It allows access to such information as the Disclosure database of SEC filings and images of annual reports, I/B/E/S earnings estimates, Thomson Financial's Research collection, articles online and insider trading analysis.

Initially the present study attempted to use the Worldscope database[3] as the source of accounting policy data. However, when the accounting policy information provided in this database was compared to that disclosed in published annual reports, numerous inconsistencies were discovered and, that, were impossible to reconcile. Further, the Worldscope database does not provide the detailed information that is required for the statistical analysis. For example, in the case of a firm adopting more than one treatment for a given accounting item, this database would simply describe it as 'mixed' without specifying the exact combination of accounting policy choices.

Three areas of accounting policy were considered for this study: inventory costing method, goodwill on consolidation and depreciation of fixed assets. Accounting treatments for these items were analysed from the statement of accounting policies, together with the notes to the accounts found in the financial statements. A number of difficulties were encountered during the process of analysing the data. Firstly, not all statements of accounting policies were written with sufficient clarity. Thus, annual reports had to be examined thoroughly to find any indication of the firm's policy choice. Judgement was exercised when classifying accounting policy choices, as illustrated in the following section. Some annual reports were available in the English language in addition to the source language, and some were available in English in a summarised format. These summarised annual reports often do not have the required information on accounting practices adopted, thus it was necessary to analyse the comprehensive report. Where necessary, assistance from experts with a background in accounting was sought in translating the relevant sections. This research study has also benefited from the HARMONIA European Research Training Network whose research members are from different European countries, help to clarify the terms and translating the relevant sections of financial statements.

[3] Published by Bureau van Djik and renamed OSIRIS, this database of listed firms delivers historical and current financial data, ratios, company profiles, stock price information, and accounting practices. The accounting practices section contains data on 33 practices over a 10-year period. Covering approximately 90% of the world's stock market value, Worldscope includes records on more than 20,000 active companies representing over 50 emerging and established markets.

5.5 The Categorisation of Accounting Methods

In this section, we describe how we analysed the accounting practices studied for the purpose of measuring the degree to which harmony existed in 1991/92, 1994/95 and 1998/99 and hence the process of harmonisation, i.e., the change in harmony between those dates. As indicated, the accounting policies considered in the current study are inventory costing, goodwill on consolidation and depreciation of fixed assets. The main reason for selecting these specific issues is that they have all been considered as among the most controversial in terms of comparability and they can have large, systematic effects on the assets and expenses reported on firms' financial statements (Pincus, 1994; Christie and Zimmermann, 1994).

5.5.1 Inventory Costing Method

Inventory methods across different EU Member States are set out in Table 5.5 where it is shown that EU firms adopt FIFO (554 firm-years), the average cost method (532 firm-years) and LIFO (131 firm-years). Whilst the proportion of firms reporting only FIFO or only the average cost method remains reasonably stable, there has been a downward trend in the number of firms using only the LIFO method, which seems to anticipate the International Accounting Standard Board (IASB) project on the Improvement of Financial Reporting (IASB, 2002) that intends to prohibit the use of LIFO. In Sweden, where the regulation only prescribes FIFO, all Swedish firms in the sampled period adopted this method. The LIFO method was prevalent in countries where it is allowed by the local accounting regulations and permitted for tax purposes, i.e., Germany and Italy. An example of a German firm applying the LIFO method due to tax consideration is given below:

> "Raw materials and supplies, work in progress, finished goods and merchandise are basically valued at acquisition or production cost.....We apply the LIFO method taking advantage of the fact that simplified valuation methods are admissible under commercial and tax regulations (German Commercial Code [HGB], Art. 256, in conjunction with German Income Tax Law [EStG], Art. 6, para.1, No. 2a)". (**Schmalbach-Lubeca AG, Annual Report 1992, p. 31**)

Table 5.6 reports inventory accounting method adopted by the EU firms across sector of operation, regardless of their country of domicile. Throughout the sampled period, it can be observed that the average cost and FIFO methods were favoured in all sectors. In addition, all sectors with the exception of information technology, adopted the LIFO method. This is probably due to the nature of inventories found in information technology such as computers, and communication equipment for which the LIFO method is not suitable.

It can be seen from the table that about 10% of the sampled firms used more than one method, i.e., they applied different cost formulae to different component of inventories. This practice is in-line with SIC 1 issued by the IASB Standing Interpretation Committee, which requires different types of inventories to be assigned with different cost principles. The following extract from a German annual report illustrates this point:

> "In the steel segment, the cost of similar inventories is determined predominantly using the LIFO method. In other segments, the valuation of similar inventories is dominated by the average cost method." (Thyssen, Annual Report 1999, p.77)

Prior research studies (e.g., Emenyonu and Gray, 1992 and 1996; Herrmann and Thomas, 1995; Murphy, 2000; Parker and Morris, 2001) and Worldscope database have simplified firms that adopt more than one inventory method as a 'mixed' method, regardless of different sets of combinations. For instance, Emenyonu and Gray (1992 and 1996) each treat those firms that report more than one policy for a given accounting item as a distinct subset whose financial statements are deemed to be comparable only with each other and not with other firms which use just one accounting method. Other researchers (e.g. Herrmann and Thomas, 1995), while acknowledging that many firms in their sample adopt more than one method, resolve the issue by omitting them from the harmonisation metric altogether. Following Archer, Delvaille and McLeay (1996) and McLeay, Neal and Tollington (1999), the current study has examined in greater detail firms that use multiple inventory methods such as applying the average together with the LIFO method. In this

research, the binomial logistic regression that is employed is structured so that the use of more than one inventory accounting method by a firm is captured in the statistical analysis.

It is also evident that the number of firms not disclosing their inventory policy was consistently high throughout the 1990s (47% of cases). Tonkin (1989) argues that the low level of policy disclosure, coupled with the inherent variability in measurement practices, represents yet another information inefficiency within the international capital market. The low level of disclosure is perhaps due to the fact that the firm is following a 'default method' in the country in which it operates, such as compliance with the prescribed local regulation (Archer, Delvaille and McLeay, 1996). On the other hand, non-disclosure of the inventory method may simply reflect the fact that the local accounting standard does not require the firm to do otherwise. For the purpose of measuring harmonisation, we have treated such censoring (i.e. non-disclosure) as non-stochastic, that is, it is not considered as one of the policy choices.

Table 5.5 Inventory Costing Methods Tabulated Across Country of Domicile

	Average cost	FIFO	LIFO	Average cost + FIFO	Average cost + LIFO	FIFO + LIFO	Average cost + FIFO + LIFO	Other	ND	Total
Panel A: 1991/92										
Austria	4	0	0	1	0	0	0	0	6	11
Belgium	7	4	0	0	2	1	0	0	10	24
Germany	16	1	8	0	8	1	1	0	24	59
Denmark	3	7	0	0	0	0	0	0	6	16
Spain	22	2	0	1	1	0	0	0	10	36
Finland	0	15	0	0	0	1	0	0	4	20
France	24	15	2	11	1	0	2	0	21	76
Ireland	1	3	0	0	0	0	0	0	9	13
Italy	9	4	7	2	3	4	0	0	3	32
Netherlands	4	8	0	2	0	1	0	0	26	41
Portugal	3	2	0	0	0	0	0	0	2	7
Sweden	0	23	0	0	0	0	0	0	15	38
UK	5	28	0	4	0	2	0	0	129	168
Total	98	112	17	21	15	10	3	0	265	541
Panel B: 1994/95										
Austria	7	0	0	0	0	0	1	0	6	14
Belgium	8	5	0	0	2	1	0	0	8	24
Germany	16	0	6	2	11	1	1	1	33	71
Denmark	4	13	0	1	0	0	0	0	5	23
Spain	27	3	0	2	1	0	0	0	9	42
Finland	0	14	0	1	0	1	0	0	11	27
France	25	16	1	14	1	0	2	1	39	99
Ireland	1	6	0	0	0	0	0	0	8	15
Italy	15	5	5	3	4	2	1	0	3	38
Netherlands	5	11	0	2	0	1	0	1	32	52
Portugal	6	2	0	0	0	0	0	0	1	9
Sweden	0	33	0	0	0	0	0	0	15	48
UK	7	32	0	6	0	1	0	0	165	211
Total	121	140	12	31	19	7	5	3	335	673
Panel C: 1998/99										
Austria	8	1	0	0	1	0	1	0	4	15
Belgium	8	8	0	0	1	1	1	0	7	26
Germany	26	2	2	6	12	1	2	2	21	74
Denmark	4	14	0	1	0	0	0	0	4	23
Spain	28	2	0	4	1	0	0	0	8	43
Finland	5	20	0	2	0	1	0	0	5	33
France	31	23	1	14	1	1	1	1	33	106
Ireland	1	6	0	0	0	0	0	0	8	15
Italy	15	4	3	6	7	1	1	0	3	40
Netherlands	10	13	0	1	0	1	0	0	28	53
Portugal	8	2	0	0	0	0	0	0	0	10
Sweden	0	32	0	1	0	0	0	0	14	47
UK	4	42	0	7	0	2	0	0	158	213
Total	148	169	6	42	23	8	6	3	293	698

Table 5.6 Inventory Costing Methods Tabulated Across Sector of Operations

	Average cost	FIFO	LIFO	Average cost + FIFO	Average cost + LIFO	FIFO + LIFO	Average cost + FIFO + LIFO	Other	ND	Total
Panel A: 1991/92										
Basic Industrials	27	21	5	4	5	1	1	0	55	**119**
Consumer Goods	25	33	4	7	3	2	0	0	40	**114**
Services	20	22	1	2	1	1	0	0	89	**136**
General Industries	14	29	4	4	3	2	1	0	55	**112**
Information Tech.	1	5	0	0	0	0	0	0	4	**10**
Resources	3	0	0	4	2	3	1	0	5	**18**
Utilities	8	2	3	0	1	1	0	0	17	**32**
	98	**112**	**17**	**21**	**15**	**10**	**3**	**0**	**265**	**541**
Panel B: 1994//95										
Basic Industrials	32	25	3	8	6	1	2	0	64	**141**
Consumer Goods	29	39	4	11	2	1	0	2	56	**144**
Services	25	26	1	4	2	0	1	1	114	**174**
General Industries	22	42	1	4	6	1	1	0	62	**139**
Information Tech.	1	6	0	0	0	0	0	0	11	**18**
Resources	2	0	0	4	2	3	1	0	7	**19**
Utilities	10	2	3	0	1	1	0	0	21	**38**
	121	**140**	**12**	**31**	**19**	**7**	**5**	**3**	**335**	**673**
Panel C: 1998/99										
Basic Industrials	34	33	2	10	6	3	3	0	54	**145**
Consumer Goods	30	45	2	14	3	0	1	1	49	**145**
Services	37	32	0	5	1	1	1	2	107	**186**
General Industries	33	47	0	8	7	2	0	0	47	**144**
Information Tech.	2	6	0	2	0	0	0	0	10	**20**
Resources	2	1	0	2	4	2	0	0	8	**19**
Utilities	10	5	2	1	2	0	1	0	18	**39**
	148	**169**	**6**	**42**	**23**	**8**	**6**	**3**	**293**	**698**

5.5.2 Goodwill Arising on Consolidation

A summary of goodwill methods adopted in the various EU Member States and sector of operations is given in Tables 5.7 and 5.8 respectively. There are three different treatments of purchased goodwill: an immediate write-off to reserve, systematic amortisation to the Profit and Loss account, and permanent capitalisation. Throughout the sampled period, the amortisation method was favoured by firms domiciled in most EU countries including Belgium, Spain, Finland, France and Sweden. An example of a Finnish firm that use this method is illustrated below:

> "Goodwill represents the excess of the purchase cost over the fair value of the net assets of acquired companies. The excess of purchase price allocated to fixed assets is depreciated concurrently with the underlying assets. Goodwill arising from acquisitions is amortised over a period not to exceed twenty years." (**Metso Corporation, Annual Report 1999, p. 25**)

As shown in the table, before the introduction of FRS 10 in 1998, firms domiciled in the UK and Ireland preferred the use of the immediate write-off method as accounting standards in these member states permit such treatment. However, FRS 10 requires the use of amortisation method and this new accounting standard is reflected in the table in that many firms domiciled in the UK and Ireland shifted to this method in 1998/99. The switch in goodwill methods is evidenced from the following accounting policy extracted from Rolls-Royce annual reports in 1995 and 1999:

> "Goodwill, which represents the excess of the value of the purchase consideration for shares in subsidiary and associated undertakings over the fair value to the Group of the net assets acquired, is written off to reserves in the year of acquisition." (**Rolls-Royce plc, Annual Report 1995, p. 37**).

> "Goodwill represents the excess of the fair value of the purchase consideration for shares in subsidiary undertakings and joint ventures over the fair value to the Group of the net assets acquired. From January 1, 1998, goodwill has been recognised within fixed assets in the year which it arises and amortised on a straight-line basis over its useful economic life, up to a maximum of 20 years." (**Rolls-Royce plc, Annual Report 1999, p. 45**)

Table 5.7 Goodwill Methods Tabulated Across Country of Domicile

	Immediate Write-off	Amortised (< 10 yrs)	Amortised (11-20 yrs)	Amortised (>20 yrs)	Immediate write-off + Amortised (< 10 yrs)	Immediate write-off + Amortised (11-20 yrs)	Immediate write-off + Amortised (>20 yrs)	Immediate write-off + Amortised (< 10 yrs) + Amortised (11-20 yrs)	Immediate write-off + Amortised (11-20 yrs) + Amortised (>20 yrs)	Amortised (< 10 yrs) + Amortised (11-20)	Amortised (< 10 yrs) + Amortised (11-20) + Amortised (>20 yrs)	Amortised (11-20 yrs) + Amortised (>20 yrs)	Amortised (11-20 yrs) + Permanent capitalised	Permanent capitalised	ND	Total
Panel A: 1991/92																
Austria	3	2	2	0	0	0	0	0	0	0	0	0	0	0	4	11
Belgium	0	5	11	1	0	0	0	0	0	0	0	1	0	0	6	24
Germany	39	0	7	1	0	1	0	0	0	0	0	0	0	0	10	58
Denmark	8	2	0	0	0	1	0	0	0	0	0	0	0	0	5	16
Spain	0	20	0	0	0	0	0	0	0	0	0	0	0	0	16	36
Finland	2	14	0	0	0	0	0	0	0	0	0	1	0	0	3	20
France	0	7	18	29	0	0	0	0	0	1	0	8	0	0	14	77
Ireland	8	0	0	0	1	0	1	0	0	0	0	1	0	0	2	13
Italy	12	9	1	0	2	0	0	0	0	0	0	0	0	0	8	32
Netherlands	35	2	1	1	0	0	0	0	0	0	0	0	0	0	2	41
Portugal	0	1	1	0	0	0	0	1	0	0	0	0	0	0	4	7
Sweden	0	11	14	1	0	1	0	0	0	1	0	0	0	0	10	38
UK	145	0	2	0	1	0	1	0	0	0	0	0	0	0	19	168
Total	252	73	57	33	4	3	2	1	0	2	0	11	0	0	103	541
Panel B: 1994/95																
Austria	5	2	4	0	0	0	0	1	0	0	0	0	0	0	2	14
Belgium	0	5	13	1	0	1	0	0	0	0	0	0	0	0	4	24
Germany	32	5	19	1	0	2	0	0	0	1	1	1	0	0	9	71
Denmark	11	2	3	0	0	1	0	0	0	1	0	0	0	0	5	23
Spain	2	31	0	0	0	0	0	0	0	0	0	0	0	0	9	42
Finland	1	14	5	0	0	0	0	0	0	4	1	1	0	0	1	27
France	1	10	39	26	0	1	0	0	1	3	2	3	0	1	12	99
Ireland	9	0	0	1	0	0	1	0	0	0	1	1	0	0	2	15
Italy	4	16	7	1	2	0	0	0	0	1	0	0	0	0	7	38
Netherlands	36	3	2	1	1	0	0	0	0	1	0	0	0	0	8	52
Portugal	0	2	3	0	0	0	0	0	0	0	0	0	0	0	4	9
Sweden	0	19	16	1	0	0	0	0	0	5	1	0	0	0	6	48
UK	160	0	2	0	0	29	1	0	0	0	0	0	0	0	19	211
Total	261	109	113	32	3	34	2	1	1	16	6	6	0	1	88	673
Panel C: 1998/99																
Austria	2	1	5	0	0	1	0	1	0	2	0	0	0	0	3	15
Belgium	0	3	15	2	0	1	0	0	0	2	0	1	0	0	2	26
Germany	14	7	33	2	0	0	0	0	0	10	1	2	0	0	5	74
Denmark	6	1	9	1	1	0	0	0	0	3	0	0	0	0	2	23
Spain	0	12	19	0	0	0	0	0	0	5	0	0	0	0	7	43
Finland	0	15	10	0	0	0	0	0	0	7	0	0	0	0	1	33
France	0	9	44	25	0	0	0	0	1	8	3	0	0	1	8	99
Ireland	0	0	11	0	0	0	0	0	0	0	0	7	1	0	2	21
Italy	3	13	6	3	1	1	0	0	0	3	3	1	0	0	7	41
Netherlands	30	3	9	5	0	0	0	0	0	1	1	0	0	0	3	52
Portugal	0	1	2	0	0	0	0	0	0	1	0	1	0	0	6	11
Sweden	0	10	17	0	0	0	0	0	0	16	2	0	0	0	2	47
UK	2	2	165	1	0	1	0	0	0	0	0	0	10	7	25	213
Total	57	77	345	39	2	4	0	1	1	58	10	12	11	8	73	698

Table 5.8 Goodwill Methods Tabulated Across Sector of Operations

	Immediate Write-off	Amortised (< 10 yrs)	Amortised (11-20 yrs)	Amortised (>20 yrs)	Immediate write-off + Amortised (< 10 yrs)	Immediate write-off + Amortised (11-20 yrs)	Immediate write-off + Amortised (>20 yrs)	Immediate write-off + Amortised (< 10 yrs) + Amortised (11-20 yrs)	Immediate write-off + Amortised (11-20 yrs) + Amortised (>20 yrs)	Amortised (< 10 yrs) + Amortised (11-20)	Amortised (< 10 yrs) + Amortised (11-20) + Amortised (>20 yrs)	Amortised (11-20 yrs) + Amortised (>20 yrs)	Amortised (11-20 yrs) + Permanent capitalised	Permanent capitalised	ND	Total
Panel A: 1991/92																
Basic Ind	43	23	11	6	1	1	0	1	0	2	0	4	0	0	26	118
Con Goods	57	8	13	10	2	0	0	0	0	0	0	3	0	0	21	114
Services	54	19	16	7	0	1	0	0	0	0	0	3	0	0	12	112
General Ind	4	4	0	0	1	0	0	0	0	0	0	0	0	0	1	10
Info Tech	5	3	2	2	0	0	0	0	0	0	0	0	0	0	6	18
Resources	81	12	14	7	0	1	2	0	0	0	0	1	0	0	19	137
Utilities	8	4	1	1	0	0	0	0	0	0	0	0	0	0	18	32
Total	252	73	57	33	4	3	2	1	0	2	0	11	0	0	103	541
Panel B: 1994/95																
Basic Ind	51	29	25	7	0	0	0	1	0	6	1	0	0	0	21	141
Con Goods	63	17	29	10	2	2	1	0	0	3	2	3	0	0	12	144
Services	51	29	25	7	1	3	1	0	1	5	2	2	0	0	12	139
General Ind	10	3	2	0	0	1	0	0	0	0	0	0	0	0	2	18
Info Tech	1	4	4	2	0	2	0	0	0	0	0	0	0	0	6	19
Resources	72	18	25	6	0	26	0	0	0	2	1	0	0	1	23	174
Utilities	13	9	3	0	0	0	0	0	0	0	0	1	0	0	12	38
Total	261	109	113	32	3	34	2	1	1	16	6	6	0	1	88	673
Panel C: 1998/99																
Basic Ind	9	23	66	9	1	1	0	0	1	10	1	3	0	2	19	145
Con Goods	20	11	68	7	1	1	0	0	0	14	1	6	3	1	12	145
Services	13	21	68	9	0	0	0	1	0	15	6	2	0	1	8	144
General Ind	1	3	11	0	0	0	0	0	0	1	0	0	0	1	3	20
Info Tech	1	2	7	4	0	0	0	0	0	1	0	0	0	0	4	19
Resources	12	15	102	10	0	2	0	0	0	10	2	1	8	3	21	186
Utilities	1	2	23	0	0	0	0	0	0	7	0	0	0	0	6	39
Total	57	77	345	39	2	4	0	1	1	58	10	12	11	8	73	698

The permanent capitalised is another method that has been used among the UK firms as the Companies Act 1985 allows firms to depart from the requirements to the extent necessary to provide a true and fair view. In this method, the amount of purchased goodwill is treated as an asset in the balance sheet without subsequent amortisation. However, the firm has to conduct an annual impairment test to examine if there is any diminution in its value. An example of a UK firm that adopted this policy is given below:

> "Goodwill is treated as having an indefinite economic life where it is considered that the acquired business has strong customer loyalty built up over a long period of time, based on advantage of the retail brand. The carrying value of the goodwill will be reviewed annually for impairment and adjusted to its recoverable amount if required ..... For amounts stated as goodwill which are considered to have an indefinite life, no amortisation is charged to the Profit and Loss Account." **(J. Sainsbury plc, Annual Report 1999, p. 34)**

As can be seen from Table 5.8, the period of amortisation used by EU firms in the early 1990s was relatively shorter, i.e., the majority of firms used a 10 year period or less, as compared to the late 1990s when more than 60% adopted a longer period, i.e., 20 years. This is partly because, in some Member States, there were changes in accounting regulations concerning goodwill. For example, in Spain the accounting regulation with respect to goodwill was amended in 1998 allowing firms to use a maximum of 20 years amortisation period as compared to a maximum of 10 years previously allowed. As mentioned earlier, the introduction of FRS 10, which requires a firm to use the amortisation method with a maximum allowable period of 20 years in the UK and Ireland has led to many firms switching to such a method. In addition, firms domiciled in Germany, Austria and Italy could prepare their consolidated accounts in accordance with the IASB standards which permit a maximum of 20 years as the amortisation period. Further, since the regulation with respect to goodwill is generally flexible in France, it can be observed in practice that diversity exists in determining the amortisation period amongst French firms. In addition, a large number of French firms adopted the US GAAP which allows goodwill to be amortised up to a maximum period of 40 years. This is illustrated by the following example:

> "Cost in excess of net assets of acquired businesses represents the difference between the purchase price of acquired businesses and the fair value of the Group's share of their underlying net assets at the date of acquisition. Amortisation is computed using the straight-line method over periods not exceeding 40 years." **(LVMH Annual Report 1995, p. 53)**

In addition, there are a number of firms that employed multiple accounting methods with respect to treatment of goodwill, for instance applying both the immediate write-off and amortisation methods in order to reflect the different nature of business acquisitions. Prior literature (e.g., Parker and Morris, 2001) has classified the use of more than one goodwill method as a separate subset and treated it as not comparable with the other firm which used only a single method. In so doing, their metric analysis was superficial and, as a result, the measured harmonisation outcomes were misleading. The present study overcomes this limitation by employing the statistical modelling approach, which is structured to allow the use of more than one goodwill method.

For the purpose of statistical analysis, classification of goodwill methods has been divided into the following categories: immediate write-off, amortised 10 years or less, amortised between 11 to 20 years, amortised more than 20 years, capitalised, and non-disclosure. In the case of a firm that used more than one method, for instance the immediate write-off and amortised 10 years or less, it would be classified under both categories. Further, in logistic regression analysis, censoring of goodwill policy choice is treated as non-stochastic.

5.5.3 Depreciation of Fixed Assets

Overall, it can be seen from Table 5.9 that the majority of EU firms used the straight-line method throughout the sampled periods. In addition, in some countries, especially Germany and France, the combination of straight-line and double-declining methods is common practice, principally due to tax savings. In this approach, the straight-line method is used in the early years of fixed asset useful life and as soon as the declining balance method yields a higher depreciation amount the

firm will switch to the latter. An example of a German firm applying this method is illustrated below:

> "Property, plant and equipment is recorded at acquisition or production cost, less scheduled depreciation....We use the declining balance method for the depreciation of property, plant and equipment to the extent possible under the tax laws, at the maximum allowable rates, switching to the straight-line method as soon as the latter results in higher depreciation."
> **(Siemens, Annual Report 1992, p. 37)**

A number of firms, as reported in Table 5.10, particularly those engaging in resource-based industries, applied the unit-of-production method in addition to the straight-line method, in order to appropriately reflect the nature of assets. An example of this policy is illustrated by BP, in the following extract:

> "Oil and minerals production assets are depreciated using a unit-of-production method based upon estimated proved reserves. Other tangible and intangible assets are depreciated on the straight-line method over their estimated useful lives."
> **(BP plc, Annual Report 1991, p. 33)**

In the statistical analysis, depreciation methods have been categorised into the straight-line, declining balance and unit-of-production. In contrast to other accounting areas investigated in this study, non-disclosure of depreciation policy is not a serious problem, i.e., only two percent of total sampled firms, on average, did not disclose depreciation policy. For the purpose of measuring harmonisation, we have again treated non-disclosure of depreciation policy as non-stochastic.

Table 5.9. Depreciation Methods Tabulated Across Country of Domicile

	SL	DB	SL+DB	SL+UP	ND	Total
Panel A: 1991/92						
Austria	10	0	0	0	1	11
Belgium	19	0	2	0	3	24
Germany	5	2	51	0	0	58
Denmark	16	0	0	0	0	16
Spain	36	0	0	0	0	36
Finland	20	0	0	0	0	20
France	51	0	21	0	5	77
Ireland	12	0	0	1	0	13
Italy	29	0	0	1	2	32
Netherlands	39	0	1	1	0	41
Portugal	6	0	1	0	0	7
Sweden	37	0	1	0	0	38
UK	158	2	1	7	0	168
Total	438	4	78	10	11	541
Panel B: 1994/95						
Austria	11	0	1	1	1	14
Belgium	17	1	2	0	4	24
Germany	10	3	58	0	0	71
Denmark	22	0	0	0	1	23
Spain	39	0	2	0	1	42
Finland	26	0	1	0	0	27
France	63	3	27	0	6	99
Ireland	13	0	0	1	1	15
Italy	35	0	0	1	2	38
Netherlands	47	0	2	1	2	52
Portugal	9	0	0	0	0	9
Sweden	47	0	1	0	0	48
UK	195	2	7	4	3	211
Total	534	9	101	8	21	673
Panel C: 1998/99						
Austria	15	0	0	0	0	15
Belgium	20	1	3	0	2	26
Germany	26	0	47	0	1	74
Denmark	23	0	0	0	0	23
Spain	39	0	2	0	2	43
Finland	31	0	1	1	0	33
France	70	2	30	0	4	106
Ireland	13	0	0	1	1	15
Italy	38	0	0	1	1	40
Netherlands	46	0	2	1	4	53
Portugal	10	0	0	0	0	10
Sweden	46	0	1	0	0	47
UK	195	2	8	6	2	213
Total	572	5	94	10	17	698

Table 5.10. Depreciation Methods Tabulated Across Sector of Operations

	SL	DB	SL+DB	SL+UP	ND	Total
Panel A: 1991/92						
Basic Industrials	97	0	19	2	0	**118**
Consumer Goods	95	1	17	0	1	**114**
Services	119	1	13	0	4	**137**
General Industries	83	1	23	0	5	**112**
Information Technology	9	1	0	0	0	**10**
Resources	10	0	0	8	0	**18**
Utilities	25	0	6	0	1	**32**
	438	**4**	**78**	**10**	**11**	**541**
Panel B: 1994/95						
Basic Industrials	113	3	22	0	3	**141**
Consumer Goods	112	3	24	0	5	**144**
Services	145	2	22	0	5	**174**
General Industries	107	1	25	0	6	**139**
Information Technology	17	0	1	0	0	**18**
Resources	11	0	0	8	0	**19**
Utilities	29	0	7	0	2	**38**
	534	**9**	**101**	**8**	**21**	**673**
Panel C: 1998/99						
Basic Industrials	125	2	17	0	1	**145**
Consumer Goods	117	1	23	0	4	**145**
Services	156	2	22	0	6	**186**
General Industries	119	0	21	0	4	**144**
Information Technology	17	0	3	0	0	**20**
Resources	10	0	0	9	0	**19**
Utilities	28	0	8	1	2	**39**
	572	**5**	**94**	**10**	**17**	**698**

5.6 Summary and Conclusions

This chapter has demonstrated the research methodology and data employed in the present study. The present study employs the statistical modelling approach, in this case using the binomial logistic regression to measure the impact of harmonisation on accounting policy choice. This methodology overcomes a number of limitations inherent in index-based approach. First, it allows the combined effects of each firm's country of domicile and its sector of operations, together with the firm's size and international exposure, and any changes in these factors through time to be assessed. Furthermore, the linear logistic models were structured in a way that allows firms employing more than one accounting method to be captured in the statistical

analysis. The statistical analysis is based on the data which was collected from listed firms domiciled in thirteen EU member states. Due to their idiosyncratic accounting treatments, financial firms were excluded from the sample. Three specific areas of accounting policy choice were considered for the present research study: inventory costing, goodwill on consolidation and depreciation of fixed assets. These issues have all been considered as among the most controversial in terms of comparability and they could have significant effects on the firm's financial reporting. Accounting policy choices were systematically analysed using actual annual reports obtained from three different sources: Global Access database, microfilms and a firm's website. Although a number of difficulties were associated with the use of annual reports, this is the most accurate method to assess *de facto* reporting practices (Tay and Parker, 1992).

This chapter has also conducted an exploratory analysis on the selected accounting practices. Among others, it was found that sampled firms adopted more than one accounting treatment, e.g., FIFO and LIFO, for a given financial statement item. Although this was a major problem in previous research studies into harmonisation measurement, the binomial logistic regression that is applied in this study is structured so that the use of more than one accounting method by a firm is captured in the statistical analysis. In addition, it is also evident that the number of firms not disclosing their accounting policy choice was consistently high throughout the sampled period, especially in the case of inventory and goodwill on consolidation. Archer, Devaille and McLeay (1996) suggested that the low level of disclosure is perhaps due to the fact that the firm is adopting a 'default method' in the country in which it operates, such as compliance with the prescribed local accounting regulation. The present study was unable to make any default assumptions and thus, such censoring, i.e., non-disclosure, is treated as non-stochastic, that is, it was not considered as one of the policy choices. The empirical results will be presented in detail in the following chapter.

CHAPTER SIX

EMPIRICAL RESULTS

6.1 Introduction

This chapter presents empirical results of the accounting practices studied for the purpose of measuring the degree to which harmony existed in 1991/92, 1994/95 and 1998/99 and hence the process of harmonisation, i.e., the change in harmony between those dates. The analysis has been carried out by comparing binomial linear logistic models applying the Generalised Linear Modelling GLIM4 (Francis, Green and Payne, 1993), as discussed in the preceding chapter. Accounting policies considered in the current study are inventory costing method, goodwill on consolidation and depreciation of fixed assets. The main reason for selecting these specific issues is that they have all been considered as among the most controversial in terms of comparability and they can have large, systematic effects on the assets and expenses reported on firms' financial statements (Pincus, 1994; Christie and Zimmermann, 1994).

The current study differs from the previous research studies in several ways. First, in addition to country of domicile, this study takes into account firms' operating circumstances in measuring accounting practice harmonisation. Specifically, it seeks to assess the combined effects of each firm's country of domicile and sector of operations on the choice of accounting methods, together with the firm's size and internationality, and any changes in these factors through time. Secondly, the binomial logistic models employed in this research allow us to determine, for a given firm, the odds of selecting alternative accounting treatments, and the modelling approach is structured to permit the use of more than one accounting

method for different components of a financial statement item. Indeed, this is a major limitation in prior research into measuring harmonisation (e.g. Emenyonu and Gray, 1992 and 1996; Herrmann and Thomas, 1995; Parker and Morris, 2001).Finally, it also attempt to assess the effects of diversification across different sectors of operations on accounting policy choice.

The remainder of this chapter is organised as follows. The next section presents the statistical results of the main effects (i.e., country of domicile and sector of operations) and interaction effects (i.e., listing status and size), as well as changes through different time periods on each accounting policy selected in this research: inventory costing methods (section 6.2), goodwill arising on consolidation (section 6.3) and depreciation of fixed assets (section 6.4). Finally, section 6.5 summarises the main results and offers some concluding remarks.

6.2 Empirical Results: Inventory Costing Methods

The first accounting area which is analysed in the present study is the treatment of inventory accounting. As indicated, three main methods of inventory policy choice have been identified from the analysis of annual reports: the average cost, First-In First-Out (FIFO) and Last-In First-Out. Further, it is found that the number of firms not disclosing inventory costing policy was consistently very high during the period and this was a serious impediment to financial statement comparability. In applying the generalised linear model, the censoring of inventory method choice is treated as non-stochastic, i.e., it is not considered as one of the policy choices and is therefore, excluded from the statistical analysis. The descriptions of accounting regulations covering this item for the respective EU countries have been described in the previous chapter.

6.2.1 Inventory Methods: Country Effects

As shown in Table 6.1, the extent to which the firm's country of domicile affects accounting policy choice is fitted in model 2. As described in the previous chapter,

Country of domicile has been categorised into 13 factors, which include all existing EU Member States except Greece and Luxembourg. By adding this explanatory variable to the model of conditional independence, the reduction in error, i.e., the deviance in the case of generalised modelling, indicates the contribution of country main effects to the selection of inventory method. It can be seen from Table 6.1 that the country main effect is highly significant ($p<0.001$) in determining the use of all inventory methods, at its greatest in the case of FIFO ($F=72.56$), followed by the average cost method ($F=63.35$) and LIFO ($F=54.08$).

Table 6.2 reports an illustration of the linear prediction of the underlying probabilities of adopting each of the alternative inventory methods. On the whole, disharmony is the main characteristic of the results (Figure 6.1), with the average cost method dominating in countries such as Austria and Spain and FIFO dominating in Sweden and Finland. The LIFO was only widely used in a few EU countries such as Germany, Italy and Belgium where it is permitted by both accounting and tax regulations. It should be noted that, as the model permits firms to use more than one method, the sum of these probabilities can exceed 1.0, and does so in all countries except in Sweden, Ireland and Portugal, with the probability of selecting more than one inventory accounting method being the highest for a firm domiciled in Germany (1.37).

Table 6.1: Statistical Analysis of Inventory Harmonisation: Country Effects

Models and Effects	Average cost			FIFO			LIFO		
	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	1410.7	1909		1404.9	1909		781.9	1909	
Main Effects:									
2. Country	1007.1	1897	63.35	962.9	1897	72.56	582.6	1897	54.08
Change in Deviance	403.6	12	*(p < 0.001)*	442.0	12	*(p < 0.001)*	199.3	12	*(p < 0.001)*
Interaction Effects									
3. Country . Listing	977.3	1884	4.42	935.2	1884	4.29	551.1	1884	8.28
Change in Deviance	29.8	13	*(p < 0.001)*	27.7	13	*(p < 0.001)*	31.5	13	*(p < 0.001)*
4. Country. Size	974.8	1884	4.80	935.4	1884	4.26	568.4	1884	3.62
Change in Deviance	32.3	13	*(p < 0.001)*	27.5	13	*(p < 0.001)*	14.2	13	*(p < 0.001)*
5. Country. Time	983.9	1884	3.42	947.6	1884	2.34	575.0	1884	1.92
Change in Deviance	23.2	13	*(p < 0.001)*	15.3	13	*(p = 0.005)*	7.6	13	*(p = 0.754)*

Notes:
The model of conditional independence predicts the odds of adopting a given inventory method, which are entirely independent of main effect and interaction effects. The extent to which country of domicile affects inventory choice is evaluated in the second model. In the third and fourth models firm-specific characteristics, i.e., listing status and size, are allowed to interact with the main effects, and thus the choice of inventory accounting method is described as a function of main effects and interaction effects, together with the second-order interactions between the main effects and interaction effects. Finally, the fifth model estimates changes through time in inventory policy choices across different EU countries.

The contribution of the explanatory factors added to a model is given by the reduction in deviance (i.e., total binomial error). The F-ratio expresses the average change in deviance obtained from each additional explanatory factor (i.e., the reduction in deviance divided by the reduction in degrees of freedom) proportional to the scaled deviance after fitting the model (i.e., residual error divided by residual degrees of freedom). Low p-values indicate significant explanatory power.

Table 6.2. Fitted Probabilities of Inventory Methods:Country Effects

Country	Average cost	FIFO	LIFO
AT	0.96	0.17	0.13
BE	0.59	0.43	0.18
DE	0.80	0.14	0.43
DK	0.28	0.77	0.00
ES	0.93	0.15	0.03
FI	0.13	0.92	0.05
FR	0.68	0.53	0.07
IE	0.17	0.83	0.00
IT	0.65	0.33	0.38
NL	0.40	0.67	0.05
PT	0.74	0.26	0.00
SE	0.01	1.00	0.00
UK	0.24	0.92	0.04

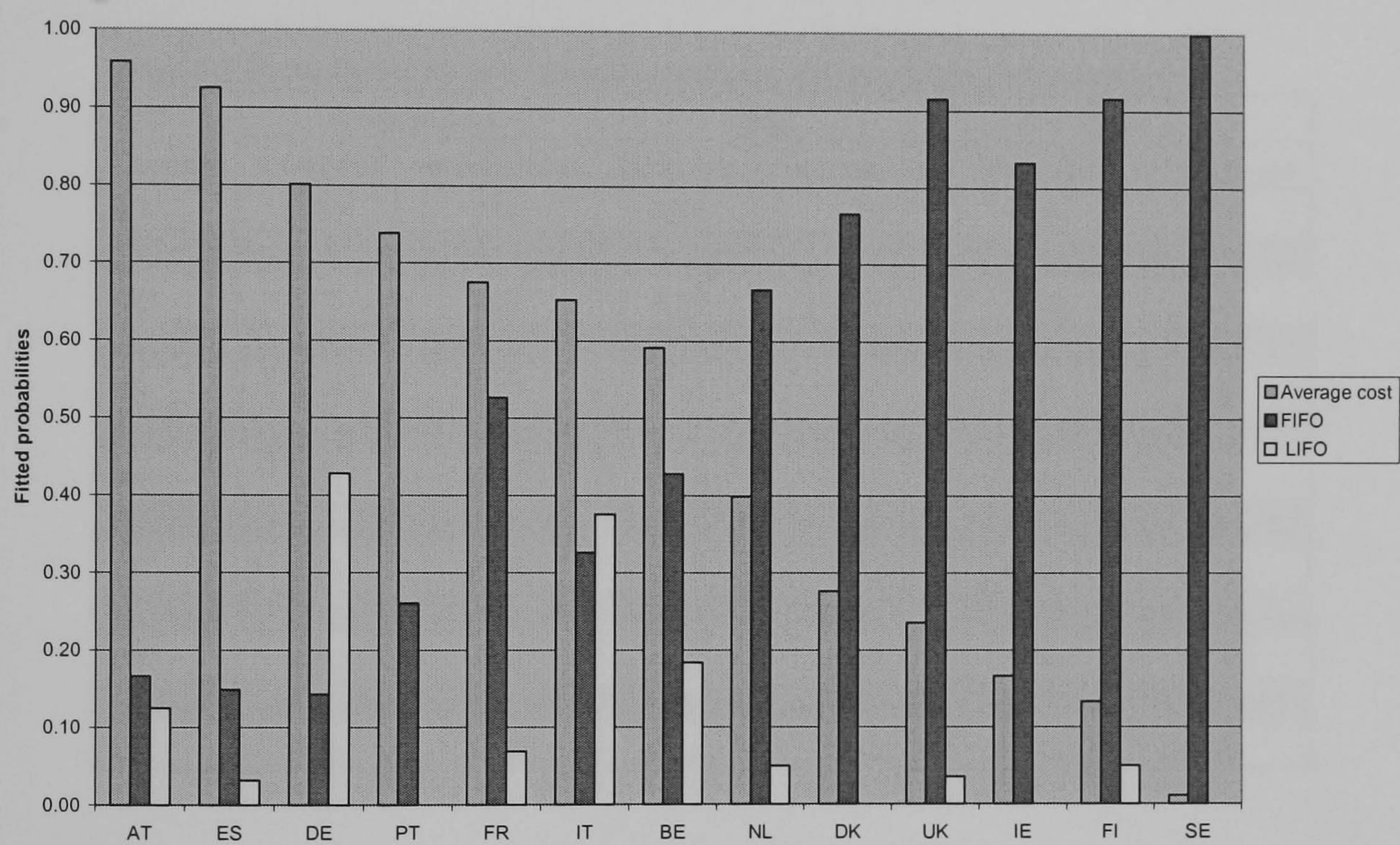


Figure 6.1: Inventory Methods: Country Effects

The third model assesses the influence of a firm's international exposure on inventory policy choices (Table 6.1). A firm's listing status is classified into two: domestically-listed and internationally-listed. As can be seen in Table 6.1, the *Country.Listing* interaction is highly significant ($p<0.001$) in explaining the choice of inventory methods in all cases, with the change in deviance the greatest in the case of LIFO ($F = 8.28$), followed by FIFO ($F = 4.29$) and the average cost method ($F = 4.42$).

Table 6.3 presents the linear predictor of underlying fitted probabilities of inventory policy choices for *Country.Listing* interactions. For instance, a French firm listed only in Paris has a probability of 0.38 of selecting FIFO, as compared to 0.69 for a French firm listed in Paris and in the international market. On the other hand, a Swedish firm quoted either in the domestic or international stock market has the same probability of employing the FIFO. In addition, the odds of using more than one inventory method are generally higher for a firm which is internationally-quoted. This is probably due to the fact that the interlisted firm is likely to have more diversified operations and thus has a different nature of inventories which requires different inventory treatments.

Table 6.3. Fitted Probabilities of Inventory Methods: *Country.Listing* Interactions

	Average cost		FIFO		LIFO	
Country	Domestic	International	Domestic	International	Domestic	International
AT	0.94	1.00	0.18	0.14	0.12	0.14
BE	0.58	0.61	0.42	0.44	0.00	0.39
DE	0.75	0.89	0.15	0.11	0.44	0.43
DK	0.33	0.18	0.73	0.82	0.00	0.00
ES	0.89	0.97	0.16	0.13	0.05	0.00
FI	0.14	0.13	0.89	0.96	0.00	0.13
FR	0.71	0.64	0.38	0.69	0.05	0.08
IE	0.25	0.00	0.75	1.00	0.00	0.00
IT	0.53	0.80	0.39	0.24	0.42	0.33
NL	0.36	0.42	0.64	0.68	0.00	0.08
PT	0.79	0.67	0.21	0.33	0.00	0.00
SE	0.02	0.00	1.00	1.00	0.00	0.00
UK	0.16	0.40	0.91	0.82	0.02	0.07

In the fourth model (Table 6.1), the impact of a firm's size on inventory policy choice is estimated. As indicated, firm's size is simplified into either small or large, measured by market capitalisation as of 1st January 2000. As reported in the table, the *Country.Size* interactions are highly significant ($p<0.001$) in all cases, i.e., average cost method ($F = 4.80$), FIFO ($F = 4.26$) and LIFO ($F = 3.62$). The fitted probability for *Country.Size* interactions given in Table 6.4 demonstrate that diversity is evident in selecting inventory methods. For example, a small Irish firm has zero probability of selecting the average cost method as compared to 0.37 probability for a large firm. On the other hand, a Spanish firm, regardless of size, has the same probability of employing the FIFO method.

Table 6.4. Fitted Probabilities of Inventory Methods: *Country.Size* Interactions

Country	Average cost		FIFO		LIFO	
	Small	Large	Small	Large	Small	Large
AT	0.94	1.00	0.17	0.17	0.11	0.17
BE	0.52	0.70	0.52	0.30	0.10	0.30
DE	0.82	0.79	0.16	0.14	0.29	0.51
DK	0.19	0.40	0.89	0.60	0.00	0.00
ES	0.92	0.93	0.15	0.15	0.03	0.03
FI	0.12	0.16	0.93	0.89	0.05	0.05
FR	0.60	0.72	0.40	0.59	0.05	0.08
IE	0.00	0.37	1.00	0.63	0.00	0.00
IT	0.48	0.82	0.42	0.24	0.42	0.33
NL	0.41	0.39	0.73	0.63	0.00	0.08
PT	0.50	0.82	0.50	0.18	0.00	0.00
SE	0.00	0.02	1.00	1.00	0.00	0.00
UK	0.18	0.27	0.91	0.87	0.02	0.05

The final model presented in Table 6.1 estimates changes through different time periods in inventory policy choices across different EU countries. Three financial years, 1991/92, 1994/95 and 1998/99 have been selected for this purpose. The result shows that *Country.Time* interactions are highly significant only in determining the average cost ($F = 3.42$) and FIFO ($F = 2.34$). Table 6.5 summarises the fitted probabilities of selecting a given inventory method when time interactions are added to country main effect. Overall, the results show that there has been little change in the odds of adopting each inventory policy during the period.

Table 6.5. Fitted Probabilities of Inventory Methods: *Country.Time* Interactions

Country	Average cost		FIFO		LIFO	
	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3
AT	1.00	0.91	0.17	0.17	0.03	0.20
BE	0.66	0.54	0.33	0.51	0.22	0.16
DE	0.71	0.85	0.07	0.19	0.56	0.35
DK	0.30	0.26	0.72	0.80	0.00	0.00
ES	0.91	0.94	0.12	0.17	0.04	0.03
FI	0.01	0.25	1.00	0.82	0.07	0.04
FR	0.70	0.65	0.52	0.55	0.09	0.05
IE	0.19	0.22	0.81	0.78	0.00	0.00
IT	0.48	0.79	0.34	0.31	0.47	0.31
NL	0.37	0.42	0.75	0.61	0.07	0.04
PT	0.62	0.81	0.38	0.19	0.00	0.00
SE	0.00	0.03	1.00	1.00	0.00	0.00
UK	0.26	0.23	0.85	0.90	0.04	0.03

6.2.2 Inventory Methods: Sector Effects

Table 6.6 presents the impact of sector of operations and interaction effects on determining inventory methods, regardless of the firm's country of registration. As described in the preceding chapter, sector of operations is classified into seven broad categories following the Reuters Survey (2000a; 2000b and 2000c), i.e., Basic Industries, Consumer Goods, Services, General Industries, Information Technology, Resources and Utilities. As shown in the same table, the sector main effects are also significant ($p < 0.001$) with respect to each of the inventory policy choices, the F-ratio being at its highest in the case of LIFO ($F=27.78$), followed by FIFO ($F=9.06$) and then the average cost method ($F=6.75$). However, by comparison with country effects, there is a substantially lower contribution to explanation, as the following main effect deviance reductions indicate:

	Average Cost	**FIFO**	**LIFO**
13 countries	-403.6 (28.6%)	-442.0 (31.5%)	-199.3 (25.5%)
7 sectors	-29.4 (2.1%)	-39.0 (2.8%)	-62.9 (8.0%)

NB. The figures in brackets indicate the proportion of the total error (from Model 1) that is explained

The fitted probabilities of selecting each inventory method are given in Table 6.7. It can be seen that the information technology sector is predominantly FIFO-based with no use of LIFO, which contrasts with the utilities sector where the majority adopt the average cost method. The results also indicate that a firm belonging to a resources-based industry has the highest odds of employing more than one inventory method, and LIFO is most prevalent. These findings are consistent with the fact that the LIFO method provides a reasonable description of inventory movements in oil and gas, and FIFO in the case of information technology. However, the over-riding impression at this level of sector classification is one of weak alignment with alternative inventory costing methods by comparison with the influence of corporate domicile.

Table 6.6: Statistical Analysis of Inventory Harmonisation: Sector Effects

Models and Effects	Average cost			FIFO			LIFO		
	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	1410.7	1909		1404.9	1909		781.9	1909	
Main Effects:									
2. Sector of Operations	1381.3	1903	6.75	1365.9	1903	9.06	718.9	1903	27.77
Change in Deviance	29.4	6	*(p < 0.001)*	39.0	6	*(p < 0.001)*	62.9	6	*(p < 0.001)*
Interaction Effects									
3. Sector . Listing	1365.1	1896	3.21	1347.6	1896	3.68	707.7	1896	4.30
Change in Deviance	16.2	7	*(p = 0.002)*	18.3	7	*(p < 0.001)*	11.2	7	*(p < 0.001)*
4. Sector . Size	1357.2	1896	-0.02	1343.3	1896	4.56	704.1	1896	39.80
Change in Deviance	24.1	7	*(p < 0.001)*	22.6	7	*(p < 0.001)*	14.8	7	*(p < 0.001)*
5. Sector . Time	1377.3	1896	0.00	1361.1	1896	0.96	713.6	1896	14.03
Change in Deviance	4.0	7	*(p = 0.584)*	4.8	7	*(p = 0.452)*	5.3	7	*(p = 0.051)*

Notes:
The model of conditional independence predicts the odds of adopting a given inventory method, which are entirely independent of main effect and interaction effects. The extent to which country of domicile affects inventory choice is evaluated in the second model. In the third and fourth models firm-specific characteristics, i.e., listing status and size, are allowed to interact with the main effects, and thus the choice of inventory accounting method is described as a function of main effects and interaction effects, together with the second-order interactions between the main effects and interaction effects. Finally, the fifth model estimates changes through time in inventory policy choices across different EU sector of operations.

The contribution of the explanatory factors added to a model is given by the reduction in deviance (i.e., total binomial error). The F-ratio expresses the average change in deviance obtained from each additional explanatory factor (i.e., the reduction in deviance divided by the reduction in degrees of freedom) proportional to the scaled deviance after fitting the model (i.e., residual error divided by residual degrees of freedom). Low p-values indicate significant explanatory power.

The aggregate deviance explained by country main effects and two-way interaction in Table 6.1 (1254.0) is 4.96 times greater than the equivalent explanation attributable to the respective sector effects (252.6) in this table.

Table 6.7. Fitted Probabilities of Inventory Methods: Sector Effects

Sector	Average Cost	FIFO	LIFO
Basic Industries	0.59	0.48	0.16
Consumer	0.48	0.59	0.08
Gen. Industries	0.45	0.61	0.12
Info. Technology	0.26	0.83	0.00
Resources	0.75	0.58	0.50
Services	0.53	0.51	0.05
Utilities	0.64	0.25	0.28

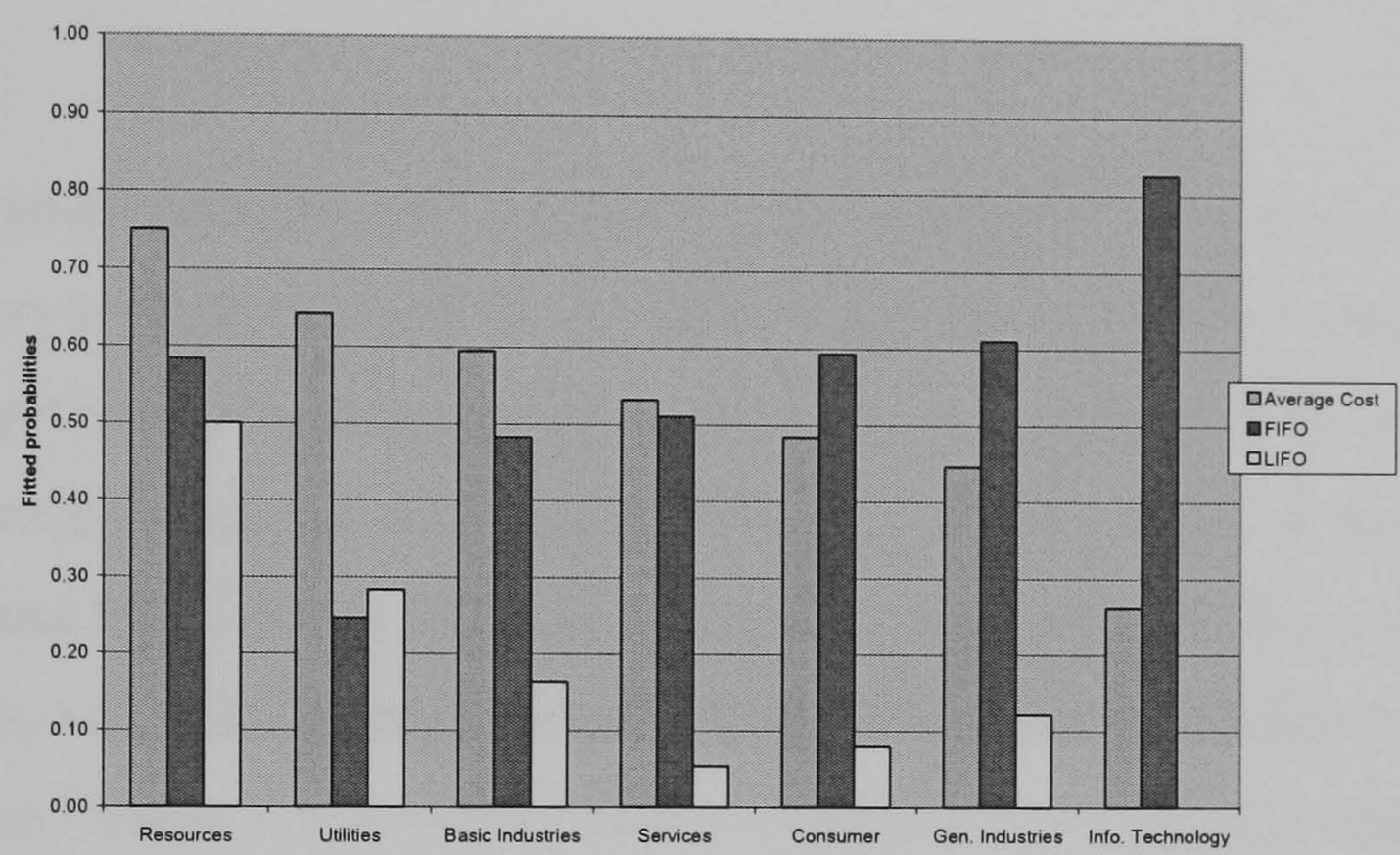


Figure 6.2. Inventory Methods: Sector Effects

The third model (Table 6.6) estimates the impact of a firm's international exposure on inventory policy choices by sector. The results show that the *Sector.Listing* interactions are highly significant ($p < 0.001$) with the F-statistic being the highest in the case of LIFO ($F = 4.30$), followed by FIFO ($F = 3.68$) and the average cost method ($F = 3.21$). As reported in Table 6.8, the linear predictor of underlying fitted probabilities of *Sector.Listing* interactions indicates that, as in country effects, there is diversity in selecting inventory methods across different sectors of operation. For instance, the fitted probability of selecting FIFO is relatively higher if a domestically-listed firm operates in the Information Technology sector (0.91) as compared to that of Utilities (0.29). As for the LIFO method, there is a zero probability if a domestically-quoted firm belongs to the Information Technology sector, compared to 0.86 probability for another similar firm operating in a

Resource-based industry. The results also indicate that, generally, an internationally-quoted firm has a probability of adopting more than one inventory method.

Table 6.8. Fitted Probabilities of Inventory Methods: *Sector.Listing* Interactions

Sector	Average cost		FIFO		LIFO	
	Domestic	International	Domestic	International	Domestic	International
Basic Industries	0.61	0.57	0.40	0.64	0.15	0.21
Consumer	0.43	0.53	0.61	0.57	0.11	0.06
Gen. Industries	0.54	0.53	0.49	0.54	0.04	0.08
Info. Technology	0.37	0.59	0.64	0.54	0.12	0.15
Resources	0.27	0.25	0.91	0.75	0.00	0.00
Services	0.57	0.79	0.43	0.62	0.86	0.41
Utilities	0.54	0.76	0.29	0.20	0.32	0.24

The fourth model provides the statistics of the impact of firm's size interactions on each inventory method (Table 6.6). As displayed in the table, the p-values are highly significant ($p<0.001$) in determining inventory policy choice for all cases with the F-statistic being the highest in the case LIFO ($F = 39.80$), followed by average cost ($F = 4.81$), and FIFO ($F = 4.56$). Given this, it can be concluded that a firm specific-characteristic, i.e., size, is an important explanatory factor in determining inventory policy choice. Table 6.9 reports fitted probabilities of adopting each inventory methods across different sectors when size interactions were added to the model. Again, disharmony is the main characteristic of the results. It can be seen for instance, in the Information Technology sector, a small firm has a probability of 0.45 of adopting FIFO method as compared to 0.08 for a large firm. On the other hand, the same odds in selecting the LIFO method can be observed for a firm operating in resources industry, regardless of size. It is also shown in the table that there is a high probability of using multiple inventory methods if a firm operates in the Resources sector.

Table 6.9. Fitted Probabilities of Inventory Methods: *Sector.Size* Interactions

Sector	Average cost		FIFO		LIFO	
	Small	Large	Small	Large	Small	Large
Basic Industries	0.44	0.55	0.58	0.62	0.15	0.18
Consumer	0.66	0.56	0.34	0.56	0.09	0.08
Gen. Industries	0.46	0.47	0.47	0.57	0.04	0.06
Info. Technology	0.65	0.56	0.40	0.50	0.05	0.21
Resources	0.64	1.00	0.45	0.08	0.00	0.00
Services	0.33	0.63	0.67	0.77	0.50	0.50
Utilities	0.11	0.27	0.56	0.66	0.33	0.27

Table 6.10. Fitted Probabilities of Inventory Methods: *Sector.Time* interactions

Sector	Average cost		FIFO		LIFO	
	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3
Basic Industries	0.41	0.53	0.60	0.60	0.20	0.15
Consumer	0.56	0.61	0.47	0.50	0.12	0.06
Gen. Industries	0.54	0.48	0.49	0.57	0.07	0.04
Info. Technology	0.64	0.59	0.37	0.48	0.17	0.10
Resources	0.85	0.81	0.12	0.37	0.00	0.00
Services	0.66	0.50	0.77	0.73	0.46	0.54
Utilities	0.17	0.31	0.61	0.67	0.34	0.24

The final model in Table 6.6 provides the statistical results of the extent to which time periods, i.e., from the beginning to the end of the last decade, influence the inventory policy choices. As in the country main effects, the *Sector.Time* interactions show that there has been little change through time in the pattern of adopting inventory method. For instance, a firm operating in the Basic Industries sector has the same odds of employing the FIFO throughout the sampled period (Table 6.10). From the above results, it is evident that, in addition to country of domicile, firm-specific characteristics appear to be important factors in determining the choice of inventory method. Nevertheless, the time interaction is not a significant factor leading to a tentative conclusion that rather than a process of convergence, a combination of structural factors at the firm-level and regulatory barriers at the country-level are the likely causes of persistent to harmonisation. Overall, when main effects and interaction effects are accounted for jointly in explaining inventory method choices, the country of domicile dominates the sector of operations, with the proportion of deviance explained by all country effects being 4.96 greater than the equivalent sector effects.

6.3 Empirical Results: Goodwill Arising on Consolidation

The second accounting policy considered in the present research study is the treatment of goodwill arising on consolidation. Three main goodwill methods have been identified from the content analysis of annual reports: the immediate write-off to reserves, amortised systematically to the Profit and Loss account and permanent capitalised with annual impairment review. For a more meaningful analysis, the amortised method has been further classified into three different periods: ten years or less, between 11-20 years and more than 20 years. In addition, it was found that many EU firms did not report their goodwill policy although the number is relatively lower than that of inventory policy. Again, this study treated censoring of goodwill policy as non-stochastic in the statistical models. The following section presents the empirical results of goodwill analysis with respect to both main effects and interactions.

6.3.1 Goodwill on Consolidation: Country Effects

Model 2 estimates the impact of country main effects on goodwill policy choices (see Table 6.11). The results indicate that the p-values for all cases are highly significant ($p<0.001$) in all cases, indicating that a firm's country of registration is an important explanatory variable in determining goodwill method. Comparing across each method reveals that the greatest F-statistic is in the case of the immediate write-off ($F = 77.26$) and the lowest is in the case of amortised between 11-20 years ($F = 9.91$), and other methods fall in between.

The linear predictor of underlying probabilities of selecting each goodwill policy when country main effect is added to the model of conditional independence is shown in Table 6.12. Overall, the main characteristic of the results indicates that disharmony in goodwill policy choice exists across different EU Member Countries, with firms domiciled in Spain, Finland and Sweden having a higher probability of adopting the shortest amortisation period (less than 10 years) whilst firms domiciled in France appear to use the longest amortisation period (more than 20 years). The immediate write-off method is favoured by firms domiciled in the UK, Ireland, the Netherlands, Denmark and Italy and few EU firms adopt the permanent capitalised method. This result reflects the diversity of goodwill accounting across Europe, as described in the previous chapter.

Table 6.11. Statistical Analysis of Goodwill Harmonisation: Country Effects

	Immediate write-off			Amortised (10 years or less)			Amortised (11-20 years)			Amortised (>20 years)			Permanent capitalised		
Model and Effects	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	2258.0	1910		1772.4	1910		2318.2	1910		1041.0	1910		217.9	1910	
Main Effects															
2. Country of Domicile	1517.0	1898	77.26	1200.6	1898	75.33	2181.5	1898	9.91	736.2	1898	65.47	183.5	1898	29.72
Reduction in Deviance	741.0	12	*(p<0.001)*	571.8	12	*(p<0.001)*	136.7	12	*(p<0.001)*	304.8	12	*(p<0.001)*	34.5	12	*(p<0.001)*
Interaction Effects															
3. Country . Listing	1498.9	1885	1.75	1171.8	1885	3.56	2151.9	1885	1.99	713.4	1885	4.64	179.3	1885	3.39
Reduction in Deviance	18.1	13	*(p=0.046)*	28.8	13	*(p<0.001)*	29.6	13	*(p=0.018)*	22.8	13	*(p<0.001)*	4.2	13	*(p<0.001)*
4. Country . Size	1487.3	1885	2.89	1169.0	1885	3.91	2158.3	1885	1.56	681.8	1885	11.59	178.9	1885	3.70
Reduction in Deviance	29.7	13	*(p<0.001)*	31.6	13	*(p<0.001)*	23.2	13	*(p=0.090)*	54.5	13	*(p<0.001)*	4.6	13	*(p<0.001)*
5. Country . Time	811.9	1885	125.92	1146.0	1885	6.90	1597.6	1885	52.99	711.5	1885	5.05	145.2	1885	38.21
Reduction in Deviance	705.1	13	*(p<0.001)*	54.5	13	*(p<0.001)*	583.9	13	*(p<0.001)*	24.8	13	*(p<0.001)*	38.3	13	*(p<0.001)*

Notes:
The model of conditional independence predicts the odds of adopting a given goodwill method, which are entirely independent of main effect and interaction effects. The extent to which country of domicile affects goodwill choice is evaluated in the second model. In the third and fourth models, firm-specific characteristics, i.e., listing status and size, are allowed to interact with the main effects, and thus the choice of goodwill accounting method is described as a function of main effects and interaction effects, together with the second-order interactions between the main effects and interaction effects. Finally, the fifth model estimates changes through time in goodwill policy choices across different EU member states.

The contribution of the explanatory factors added to a model is given by the reduction in deviance (i.e., total binomial error). The F-ratio expresses the average change in deviance obtained from each additional explanatory factor (i.e., the reduction in deviance divided by the reduction in degrees of freedom) proportional to the scaled deviance after fitting the model (i.e., residual error divided by residual degrees of freedom). Low p-values indicate significant explanatory power.

Table 6.12. Fitted Probabilities of Goodwill Methods: Country Effects

Country	Immediate write-off	Amortised (10 or less)	Amortised (11-20yrs)	Amortised (>20yrs)	Permanent capitalised
AT	0.39	0.27	0.48	0.00	0.00
BE	0.03	0.22	0.67	0.09	0.00
DE	0.46	0.13	0.41	0.05	0.00
DK	0.55	0.20	0.35	0.02	0.00
ES	0.02	0.74	0.26	0.04	0.00
FI	0.04	0.72	0.38	0.04	0.00
FR	0.02	0.16	0.52	0.40	0.01
IE	0.53	0.05	0.42	0.18	0.03
IT	0.57	0.49	0.22	0.07	0.00
NL	0.76	0.09	0.12	0.07	0.00
PT	0.08	0.46	0.62	0.00	0.00
SE	0.01	0.53	0.60	0.04	0.00
UK	0.65	0.01	0.39	0.01	0.03

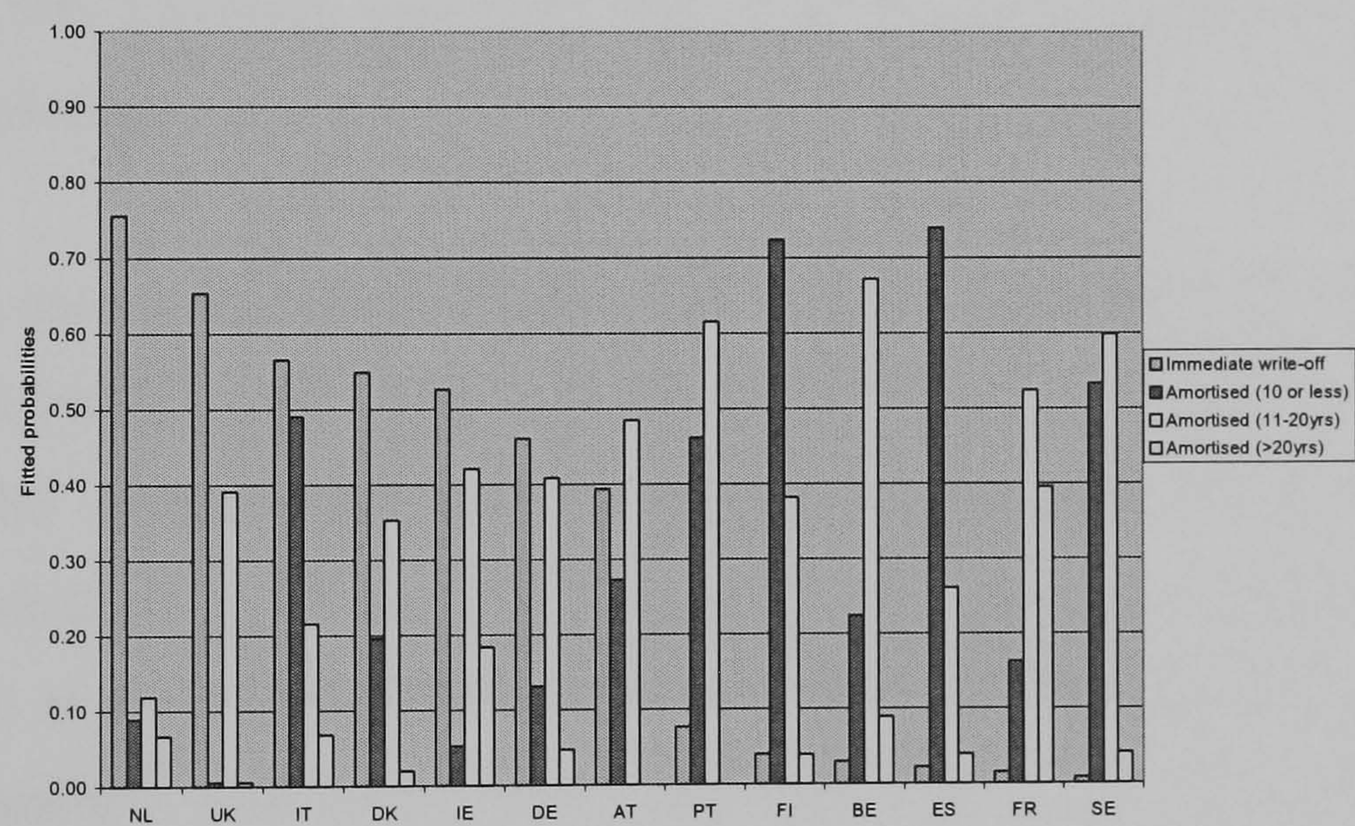


Figure 6.3 Goodwill Methods: Country Effects

The summary statistics of *Country.Listing* interactions is given in Model 3 (Table 6.11) revealing that the change is highly significant in most methods ($p<0.001$) except in the cases of amortised (between 11-20 years) and the immediate write-off. Table 6.13 compares the fitted probabilities of selecting each goodwill policy between domestic and interlisted firms, and across different EU countries. It can be seen that, for instance, the probability of selecting a shorter amortised period (10 years and less) is higher (0.80) for

a Portuguese firm listed only in Lisbon as compared to a Portuguese firm listed in Lisbon and in international exchanges (0.25). On the other hand, firms domiciled in Germany, Spain, Sweden and the UK have almost similar probabilities in choosing the amortised (10 years or less), regardless of listing status. For the immediate write-off method, an Austrian firm listed only in Vienna has the probability of 0.46 of adopting it compared to zero probability if it has an international capital market exposure. Again, the diversity is the main feature of the *Country.Listing* results.

The extent to which firm's size influences the choice of goodwill policy is fitted in Model 4 (Table 6.11). The results indicate that the p-values are highly significant in all cases except in the case of the amortised (between 11-20 years) method. The fitted probability in Table 6.14 reports that generally smaller firms in certain countries tend to adopt a shorter amortisation period, i.e., for a small Austrian firm, the probability of employing the amortised (10 years or less) is 0.31 as compared to zero for a large Austrian firm. Given this, we can conclude that firm size is an important explanatory variable in goodwill policy choice.

The final model shown in Table 6.11 provides the statistical results of time interactions on goodwill policy choice. As displayed in the table, the change in deviance is significant ($p < 0.001$) in all methods with the F-statistics being the strongest in the case of the immediate write-off ($F = 125.92$) and the smallest in the case of the amortised (> 20 years). In fact, it is the *Country.Time* interaction that is a major feature, and Table 6.15 shows the substantial changes in fitted probabilities arising from the considerable changes that have taken place in selecting goodwill methods in the 1990s, due to a switch at the sample level from the immediate write-off to amortisation methods. In addition, it can be observed that a longer amortisation period was used in certain countries, such as Spain, Finland and Portugal, in the late 1990s.

Table 6.13. Fitted Probabilities of Goodwill Methods: *Country.Listing* Interactions

	Immediate w/off		Amortised (10yrs or less)		Amortised (11-20yrs)		Amortised (> 20yrs)		Permanent Capitalised	
Country	Domestic	International	Domestic	International	Domestic	International	Domestic	International	Domestic	International
AT	0.46	0.00	0.29	0.20	0.46	0.60	0.00	0.00	0.00	0.00
BE	0.00	0.07	0.13	0.33	0.81	0.50	0.08	0.10	0.00	0.00
DE	0.46	0.47	0.13	0.12	0.40	0.42	0.06	0.02	0.00	0.00
DK	0.49	0.69	0.26	0.06	0.37	0.31	0.00	0.06	0.00	0.00
ES	0.02	0.02	0.74	0.73	0.25	0.27	0.00	0.00	0.00	0.00
FI	0.02	0.07	0.83	0.54	0.33	0.46	0.00	0.11	0.00	0.00
FR	0.02	0.01	0.18	0.14	0.56	0.48	0.32	0.48	0.01	0.00
IE	0.54	0.50	0.08	0.00	0.38	0.50	0.15	0.25	0.03	0.00
IT	0.30	0.19	0.46	0.52	0.24	0.19	0.06	0.08	0.00	0.00
NL	0.77	0.74	0.15	0.02	0.11	0.13	0.03	0.10	0.00	0.00
PT	0.00	0.13	0.80	0.25	0.00	1.00	0.00	0.00	0.00	0.00
SE	0.00	0.03	0.54	0.51	0.61	0.57	0.03	0.06	0.00	0.00
UK	0.64	0.62	0.00	0.01	0.39	0.41	0.02	0.02	0.03	0.05

Table 6.14. Fitted Probabilities of Goodwill Methods: *Country.Size* Interactions

	Immediate w/off		Amortised (10yrs or less)		Amortised (11-20yrs)		Amortised (> 20yrs)		Permanent Capitalised	
Country	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large
AT	0.45	0.00	0.31	0.00	0.45	0.75	0.00	0.00	0.00	0.00
BE	0.05	0.00	0.28	0.14	0.69	0.64	0.05	0.14	0.00	0.00
DE	0.52	0.41	0.07	0.17	0.40	0.42	0.02	0.06	0.00	0.00
DK	0.56	0.53	0.22	0.16	0.59	0.93	0.00	0.05	0.00	0.00
ES	0.02	0.02	0.72	0.75	0.27	0.26	0.00	0.00	0.00	0.00
FI	0.05	0.00	0.79	0.53	0.35	0.47	0.05	0.00	0.00	0.00
FR	0.00	0.02	0.25	0.11	0.53	0.52	0.20	0.52	0.02	0.00
IE	0.59	0.36	0.04	0.09	0.33	0.64	0.11	0.36	0.04	0.00
IT	0.36	0.12	0.49	0.49	0.15	0.29	0.06	0.08	0.00	0.00
NL	0.81	0.68	0.09	0.08	0.09	0.15	0.01	0.13	0.00	0.00
PT	0.00	0.11	0.75	0.33	0.00	0.89	0.00	0.00	0.00	0.00
SE	0.00	0.02	0.59	0.48	0.52	0.67	0.00	0.08	0.00	0.00
UK	0.63	0.61	0.00	0.01	0.40	0.39	0.00	0.01	0.04	0.03

Table 6.15. Fitted Probabilities of Goodwill Methods: *Country.Time* Interactions

	Immediate w/off		Amortised (10yrs or less)		Amortised (11-20yrs)		Amortised (> 20yrs)		Permanent Capitalised	
Country	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3
AT	0.48	0.34	0.25	0.29	0.24	0.67	0.00	0.00	0.00	0.00
BE	0.01	0.05	0.26	0.19	0.61	0.72	0.08	0.10	0.00	0.00
DE	0.78	0.20	0.02	0.26	0.15	0.64	0.02	0.07	0.00	0.00
DK	0.80	0.36	0.15	0.23	0.09	0.57	0.00	0.05	0.00	0.00
ES	0.03	0.02	0.98	0.48	0.00	0.65	0.00	0.00	0.00	0.00
FI	0.12	0.01	0.78	0.69	0.13	0.58	0.08	0.02	0.00	0.00
FR	0.01	0.02	0.12	0.20	0.40	0.62	0.49	0.32	0.00	0.01
IE	0.98	0.05	0.11	0.02	0.02	0.87	0.26	0.13	0.00	0.07
IT	0.47	0.10	0.43	0.54	0.07	0.36	0.00	0.16	0.00	0.00
NL	0.90	0.61	0.07	0.11	0.02	0.24	0.01	0.13	0.00	0.00
PT	0.33	0.00	0.60	0.36	0.65	0.59	0.00	0.00	0.00	0.00
SE	0.03	0.00	0.41	0.62	0.45	0.71	0.04	0.05	0.00	0.00
UK	1.00	0.03	0.00	0.01	0.00	0.91	0.01	0.01	0.00	0.09

6.3.2 Goodwill on Consolidation: Sector Effects

The results reported in Table 6.16 demonstrate that the sector of operations is a significant determinant of goodwill policy choices, except in the case of amortisation (between 11- 20 years). However, by comparison with country effects, there is a substantially lower contribution to explanation, as the following summary of main effect deviance reductions indicates:

	Immediate write-off	**Amortised (10 or less)**	**Amortised (11-20)**	**Amortised (>20 years)**	**Permanent capitalisation**
13 countries	-741.0 (32.8%)	-571.8 (32.3%)	-136.7 (5.8%)	-304.8 (29.3%)	-34.5(15.8%)
7 sectors	-27.5 (1.2%)	-39.8 (2.2%)	-4.6 (0.2%)	-24.6 (2.4%)	-15.3 (7.0%)

NB. The figures in brackets indicate the proportion of the total error (from Model 1) that is explained

Figure 6.4 reflects this, and, for the pooled sample, shows that there is greater similarity in goodwill accounting across sectors than across countries. Nevertheless, some variation between sectors is evident, e.g. no firms in the information technology sector adopted the longest amortisation period (i.e., > 20 years) whilst firms operating in the resources sector had the highest probability of selecting this method (Table 6.17).

The relationship between the *Section.Listing* interaction effects and goodwill methods is estimated in Model 3 (Table 6.16). Again, it can be seen that the p-values are highly significant *($p<0.001$)* in all cases except the amortised (11-20 years) method. The F-statistic, by comparison, is the greatest in the case of amortisation more than 20 years ($F = 11.15$) and the lowest is in the case of amortisation between 11-20 years ($F=0.34$). Table 6.18 compares the linear predictor of underlying probability of selecting each goodwill policy between domestically-listed and internationally-listed firms across different sectors. It can be observed, for instance, in Resource-based sector, that a domestically-quoted firm has a zero probability of employing the longest amortisation period (i.e., > 20 years) as compared to 0.24 for an internationally-quoted firm.

Model 4 predicts the association between a firm's size and goodwill policy choice across different sectors of operations (Table 6.16). The results suggest that the

Sector.Size interaction effects are again highly significant in all goodwill methods except in the case of amortisation between 11-20 years. This finding confirms that firm-specific characteristic, i.e., size, is an important variable in explaining accounting policy choice. As reported in Table 6.19, with the exception of the Services sector, the fitted probability of employing the immediate write-off method is higher amongst small firms in all sectors.

The final model in Table 6.16 estimates the impact of different time periods on the selection of goodwill policy across different sectors of operations. The change in deviance indicates that time interaction is significant in all methods except in the case of amortisation more than 20 years. The fitted probabilities displayed in Table 6.20 show that the probability of adopting the amortisation between 11-20 years is significantly higher by the end of the 1990s in all sectors; correspondingly, there was a sharp decrease in the probability of using the immediate write-off method during the same period. Although there was a convergence towards using the amortisation method over time, the period in which goodwill was amortised differed across sectors. For instance, while in the resources sector the probability of using the longest amortisation period is more than 0.2, the same method was not favoured in either the utilities or information technology sectors. It remains the case however, that the country effect and its interactions contribute significantly more to the explanation of variability between companies in their choices of goodwill than the sector effect and its interactions, the proportion of the explained deviance attributable to all country effects being 3.04 as much as that attributable to all sector effects.

Table 6.16 Statistical Analysis of Goodwill Harmonisation: Sector Effects

	Immediate write-off			Amortised (10 years or less)			Amortised (11-20 years)			Amortised (> 20 years)			Permanent capitalised		
Model and Effects	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	2258.0	1910		1772.4	1910		2318.2	1910		1041.0	1910		217.9	1910	
Main Effects															
2. Sector of Operations	2230.5	1904	3.91	1732.6	1904	7.29	2313.6	1904	0.63	1016.4	1904	7.67	202.7	1904	23.88
Reduction in Deviance	27.5	6	*(p<0.001)*	39.8	6	*(p<0.001)*	4.6	6	*(p=0.707)*	24.6	6	*(p<0.001)*	15.3	6	*(p<0.001)*
Interaction Effects															
3. Sector . Listing	2197.1	1897	4.12	1710.3	1897	3.53	2310.7	1897	0.34	976.3	1897	11.15	199.6	1897	4.15
Reduction in Deviance	33.4	7	*(p<0.001)*	22.3	7	*(p<0.001)*	2.9	7	*(p=0.936)*	40.2	7	*(p<0.001)*	3.1	7	*(p<0.001)*
4. Sector . Size	2221.8	1897	1.06	1712.5	1897	3.17	2298.5	1897	1.78	973.3	1897	12.00	197.9	1897	6.53
Reduction in Deviance	8.7	7	*(p=0.389)*	20.0	7	*(p=0.002)*	15.1	7	*(p=0.088)*	43.1	7	*(p<0.001)*	4.8	7	*(p<0.001)*
5. Sector . Time	1924.8	1897	43.04	1719.7	1897	2.02	1937.7	1897	52.58	1012.9	1897	0.94	170.1	1897	52.00
Reduction in Deviance	305.7	7	*(p<0.001)*	12.8	7	*(p=0.049)*	376.0	7	*(p<0.001)*	3.5	7	*(p=0.476)*	32.6	7	*(p<0.001)*

Notes:
The model of conditional independence predicts the odds of adopting a given goodwill method, which are entirely independent of main effect and interaction effects. The extent to which sector of operations affects goodwill choice is evaluated in the second model. In the third and fourth models, firm-specific characteristics, i.e., listing status and size, are allowed to interact with the main effects, and thus the choice of goodwill accounting method is described as a function of main effects and interaction effects, together with the second-order interactions between the main effects and interaction effects. Finally, the fifth model estimates changes through time in goodwill policy choices across different EU sector of operations.

The contribution of the explanatory factors added to a model is given by the reduction in deviance (i.e., total binomial error). The F-ratio expresses the average change in deviance obtained from each additional explanatory factor (i.e., the reduction in deviance divided by the reduction in degrees of freedom) proportional to the scaled deviance after fitting the model (i.e., residual error divided by residual degrees of freedom). Low p-values indicate significant explanatory power.

The aggregate deviance explained by country main effects and two-way interaction in Table 6.11 (3442.5) is 3.04 times greater than the equivalent explanation attributable to the respective sector effects (1130.9) in this table.

Table 6.17. Fitted Probabilities of Goodwill Methods: Sector Effects

Sector	Immediate write-off	Amortised (10 or less)	Amortised (11-20yrs)	Amortised (>20yrs)	Permanent capitalised
Basic Industries	0.31	0.28	0.38	0.09	0.01
Consumer	0.40	0.16	0.40	0.12	0.01
Services	0.44	0.14	0.04	0.07	0.03
Gen. Industries	0.33	0.26	0.40	0.11	0.00
Info. Technology	0.40	0.28	0.35	0.00	0.02
Resources	0.21	0.24	0.38	0.19	0.00
Utilities	0.27	0.27	0.43	0.02	0.00

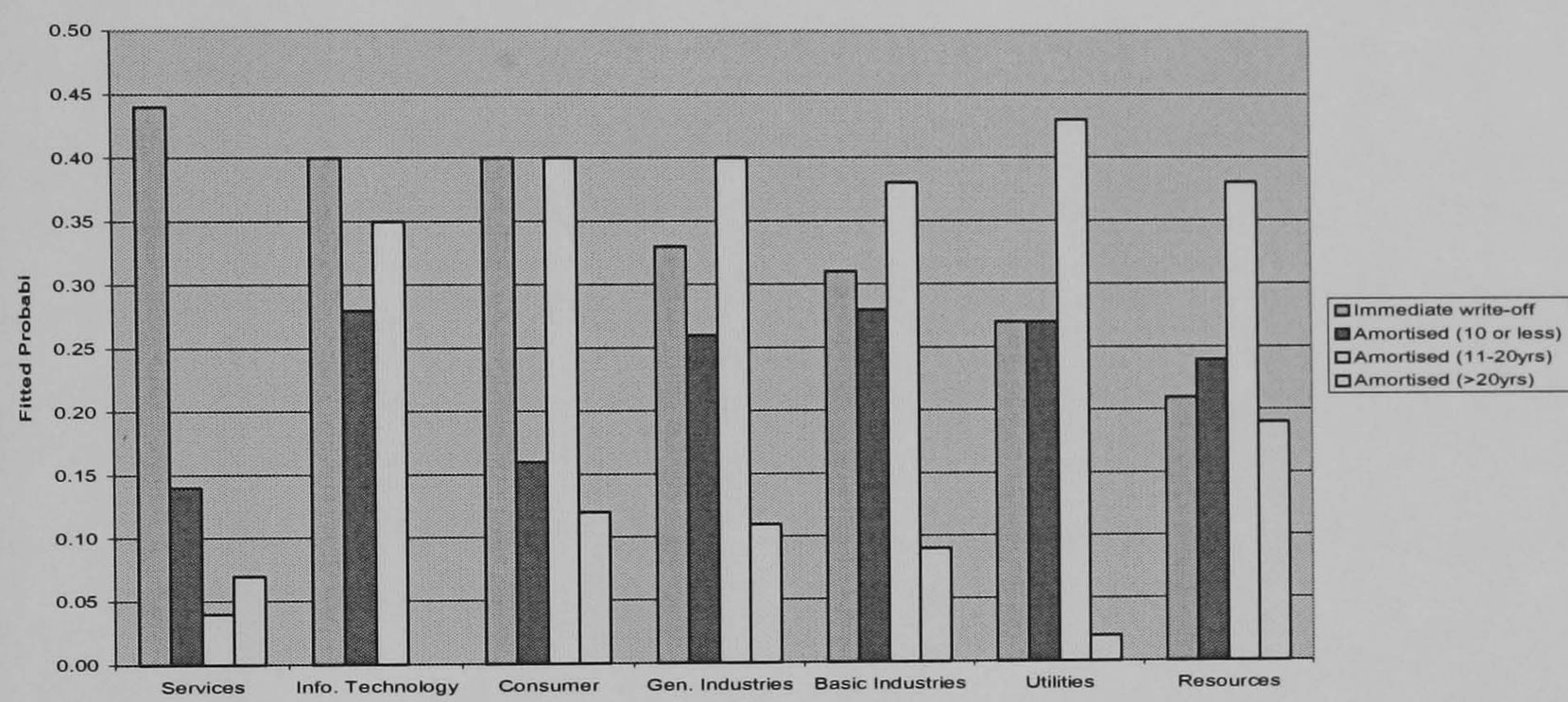


Figure 6.4 Goodwill Methods: Sector Effects

Table 6.18. Fitted Probabilities of Goodwill Methods: *Sector.Listing* Interactions

Sector	Immediate write-off		Amortised (10yrs or less)		Amortised (11-20yrs)		Amortised (> 20yrs)		Permanent Capitalised	
	Domestic	International	Domestic	International	Domestic	International	Domestic	International	Domestic	International
Basic Industries	0.36	0.19	0.23	0.40	0.39	0.35	0.05	0.14	0.01	0.00
Consumer	0.48	0.32	0.16	0.17	0.40	0.39	0.04	0.17	0.01	0.01
Services	0.42	0.50	0.14	0.12	0.46	0.39	0.07	0.04	0.02	0.03
Gen. Industries	0.33	0.33	0.29	0.17	0.39	0.41	0.09	0.14	0.00	0.00
Info. Technology	0.50	0.20	0.18	0.47	0.36	0.33	0.00	0.00	0.03	0.00
Resources	0.45	0.13	0.27	0.23	0.36	0.39	0.00	0.24	0.00	0.00
Utilities	0.29	0.25	0.22	0.34	0.43	0.44	0.04	0.00	0.00	0.00

Table 6.19. Fitted Probabilities of Goodwill Methods: *Sector.Size* Interactions

Sector	Immediate write-off		Amortised (10yrs or less)		Amortised (11-20yrs)		Amortised (> 20yrs)		Permanent Capitalised	
	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large
Basic Industries	0.35	0.24	0.29	0.26	0.33	0.45	0.03	0.18	0.01	0.00
Consumer	0.42	0.39	0.16	0.17	0.41	0.39	0.11	0.12	0.01	0.00
Services	0.43	0.45	0.15	0.13	0.45	0.43	0.04	0.09	0.02	0.02
Gen. Industries	0.34	0.32	0.33	0.15	0.34	0.48	0.07	0.17	0.00	0.00
Info. Technology	0.40	0.39	0.20	0.32	0.40	0.32	0.00	0.00	0.01	0.01
Resources	0.38	0.18	0.25	0.24	0.50	0.35	0.00	0.24	0.00	0.00
Utilities	0.29	0.27	0.21	0.28	0.43	0.43	0.00	0.03	0.00	0.00

Table 6.20. Fitted Probabilities of Goodwill Methods: *Sector.Time* Interactions

Sector	Immediate write-off		Amortised (10yrs or less)		Amortised (11-20yrs)		Amortised (> 20yrs)		Permanent Capitalised	
	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3
Basic Industries	0.55	0.14	0.29	0.27	0.15	0.57	0.09	0.09	0.00	0.01
Consumer	0.66	0.20	0.12	0.20	0.13	0.64	0.13	0.10	0.01	0.00
Services	0.80	0.16	0.10	0.16	0.11	0.74	0.07	0.07	0.00	0.01
Gen. Industries	0.58	0.15	0.20	0.31	0.15	0.63	0.09	0.12	0.00	0.00
Info. Technology	0.77	0.16	0.46	0.17	0.02	0.68	0.00	0.00	0.01	0.00
Resources	0.43	0.07	0.28	0.21	0.21	0.53	0.14	0.23	0.00	0.00
Utilities	0.60	0.10	0.26	0.28	0.01	0.86	0.07	0.00	0.00	0.00

6.4 Empirical Results: Depreciation of Fixed Assets

The final accounting policy analysed in this study is depreciation of fixed assets. In the statistical analysis, depreciation methods have been categorised into straight-line, declining balance and unit-of-production. In contrast to other accounting areas investigated in this research study, non-disclosure of depreciation policy is not a serious problem, i.e., only two percent of total sampled firms, on average, did not report depreciation policy. For the purpose of measuring harmonisation, non-disclosure of depreciation policy is treated as non-stochastic.

The following section reports the empirical results of the country effects and sector effects in determining depreciation policy choice. In addition, fitted probabilities are calculated for each depreciation method in order to assess the impact of accounting harmonisation across the EU with respect to different explanatory variables.

6.4.1 Depreciation Methods: Country Effects

Table 6.21 sets out the statistical results of depreciation harmonisation when fitting the country main effects and interactions. The reductions in deviance reveal that a firm's country of domicile, as well as specific attributes, is significant with the strongest F-ratios in the case of the declining-balance method ($F = 120.03$), followed by the unit-of-production ($F = 24.52$) and the straight-line method ($F = 18.75$). The fitted probabilities indicate that there is a high degree of uniformity in that the straight-line method is the dominant approach across the EU. Nevertheless, the declining-balance method is favoured by firms operating in regimes where financial reporting is very much influenced by tax considerations such as in Germany, France and Belgium.

Table 6.21. Statistical Analysis of Depreciation Harmonisation: Country Effects

Models and Effects	Straight-line			Declining-balance			Unit-of-Production		
	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	202.9	1910		1614.6	1910		290.7	1910	
Main Effects:									
2. Country	181.4	1898	18.75	918.0	1898	120.03	251.7	1898	24.52
Change in Deviance	21.5	12	*(p < 0.001)*	696.6	12	*(p < 0.001)*	39.0	12	*(p < 0.001)*
Interaction Effects									
3. Country . Listing	164.9	1885	14.51	858.9	1885	9.98	215.6	1885	24.28
Change in Deviance	16.5	13	*(p < 0.001)*	59.1	13	*(p < 0.001)*	36.1	13	*(p < 0.001)*
4. Country. Size	170.6	1885	9.15	884.7	1885	5.46	225.1	1885	17.11
Change in Deviance	10.8	13	*(p < 0.001)*	33.3	13	*(p < 0.001)*	26.6	13	*(p < 0.001)*
5. Country. Time	178.2	1885	2.61	894.1	1885	3.87	249.3	1885	1.37
Change in Deviance	3.2	13	*(p < 0.001)*	23.9	13	*(p < 0.001)*	2.3	13	*(p = 0.170)*

Notes:
The model of conditional independence predicts the odds of adopting a given depreciation method, which are entirely independent of main effect and interaction effects. The extent to which country of domicile affects depreciation choice is evaluated in the second model. In the third and fourth models, firm-specific characteristics, i.e., listing status and size, are allowed to interact with the main effects, and thus the choice of depreciation accounting method is described as a function of main effects and interaction effects, together with the second-order interactions between the main effects and interaction effects. Finally, the fifth model estimates changes through time in depreciation policy choices across different EU member states.

The contribution of the explanatory factors added to a model is given by the reduction in deviance (i.e., total binomial error). The F-ratio expresses the average change in deviance obtained from each additional explanatory factor (i.e., the reduction in deviance divided by the reduction in degrees of freedom) proportional to the scaled deviance after fitting the model (i.e., residual error divided by residual degrees of freedom). Low p-values indicate significant explanatory power.

Table 6.22. Fitted Probabilities of Depreciation Methods: Country Effects

Country	Straight-line	Declining-balance	Unit-of-production
AT	1.00	0.03	0.03
BE	0.97	0.14	0.00
DE	0.97	0.80	0.00
DK	1.00	0.00	0.00
ES	1.00	0.03	0.00
FI	1.00	0.03	0.01
FR	0.98	0.32	0.00
IE	1.00	0.00	0.07
IT	1.00	0.00	0.03
NL	1.00	0.04	0.02
PT	1.00	0.04	0.00
SE	1.00	0.02	0.00
UK	0.99	0.04	0.03

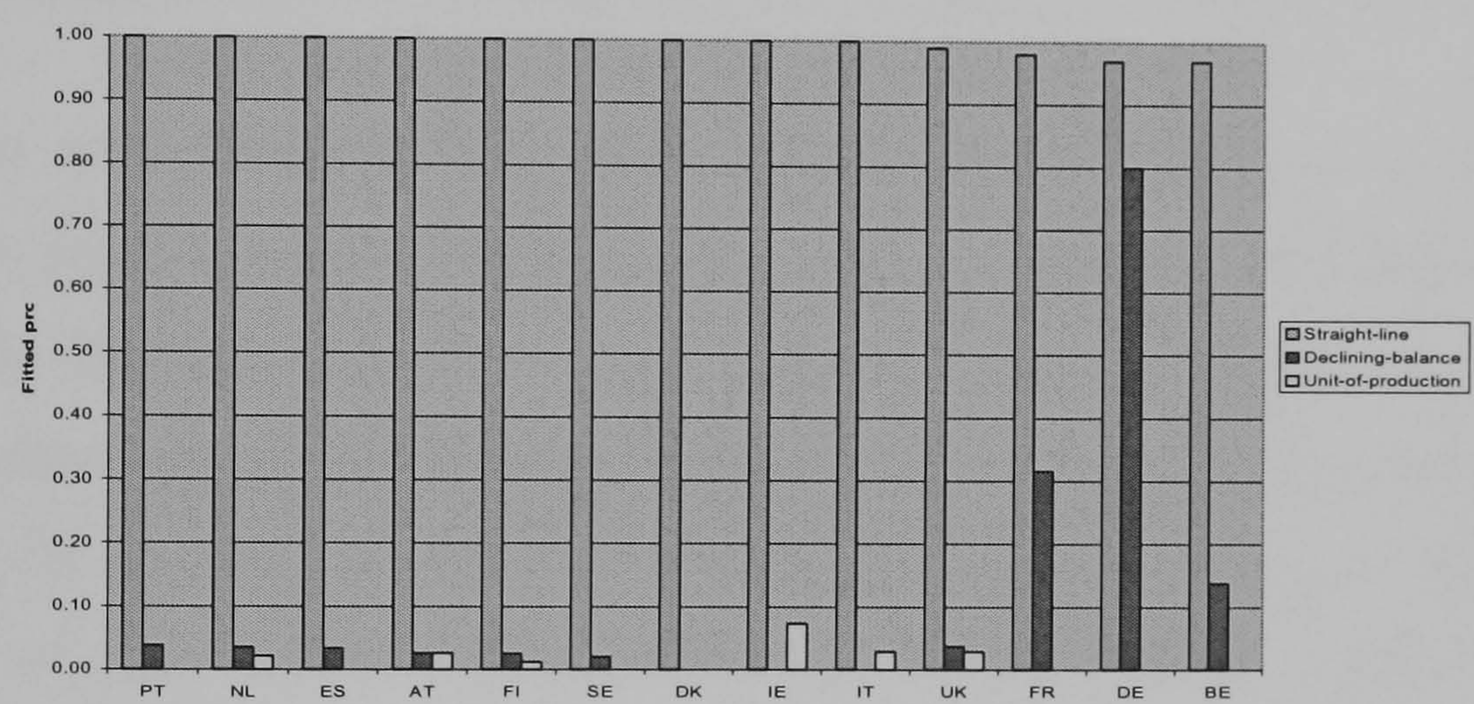


Figure 6.5. Depreciation Methods: Country Effects

Model 3 estimates the impact of *Country.Listing* interactions on depreciation policy choice among EU firms. The p-values are highly significant in all cases with the F-statistics for the straight-line, declining-balance and unit-of-production being 14.51, 9.98 and 24.28 respectively. The fitted probability displayed in Table 6.22 shows that overall there is a harmony in selecting the straight-line method between the domestically-listed and internationally-listed EU firms. On the contrary, diversity can be found in the case of the declining-balance method in which Belgian firms listed in Brussels and in international equity markets have a higher probability of adopting declining-balance method compared to those only listed in Brussels, and the situation is the opposite among French firms. Among German firms, the odds of

adopting the declining-balance method remain the same regardless of international exposure.

Table 6.23. Fitted Probabilities of Depreciation Methods: *Country.Listing* Interactions

Country	Straight-line		Declining-balance		Unit-of-production	
	Domestic	International	Domestic	International	Domestic	International
AT	1.00	1.00	0.03	0.00	0.00	0.11
BE	1.00	0.93	0.05	0.25	0.00	0.00
DE	0.96	1.00	0.80	0.79	0.00	0.00
DK	1.00	1.00	0.00	0.00	0.00	0.00
ES	1.00	1.00	0.06	0.00	0.00	0.00
FI	1.00	1.00	0.00	0.07	0.02	0.00
FR	0.97	1.00	0.41	0.21	0.00	0.00
IE	1.00	1.00	0.00	0.00	0.10	0.00
IT	1.00	1.00	0.00	0.00	0.00	0.06
NL	1.00	1.00	0.07	0.00	0.00	0.00
PT	1.00	1.00	0.00	0.11	0.00	0.00
SE	1.00	1.00	0.00	0.08	0.00	0.00
UK	0.99	1.00	0.05	0.00	0.01	0.09

The impact of a firm's size on depreciation policy choice across different EU countries is fitted in Model 4 (Table 6.21). The p-values are again virtually zero in all methods, demonstrating that a firm's size is indeed a significant explanatory factor in determining depreciation method. Table 6.24 reveals that the fitted probability for adopting the straight-line method is almost uniform among EU firms, regardless of size. On the other hand, the double-declining method was only favoured in certain countries, for instance, by firms domiciled in Germany and Belgium, and by small firms domiciled in France.

The final model presented in Table 6.21 predicts depreciation policy choice in different country of domicile from the beginning to the end of the 1990s. The change in deviance shows that the *Country.Time* interactions are highly significant only in the case of the straight-line and declining-balance methods. As shown in Table 6.25, there was a decrease in the use of the declining balance method in Germany by the end of the 1990s, possibly due to the change in German accounting regulation, which permits the use of IAS GAAP in the preparation of consolidated financial statements.

Table 6.24. Fitted Probabilities of Depreciation Methods: *Country.Size* Interactions

Country	Straight-line		Declining-balance		Unit-of-production	
	Small	Large	Small	Large	Small	Large
AT	1.00	1.00	0.03	0.00	0.00	0.17
BE	0.97	0.96	0.10	0.20	0.00	0.00
DE	0.95	0.99	0.76	0.82	0.00	0.00
DK	1.00	1.00	0.00	0.00	0.00	0.00
ES	1.00	1.00	0.03	0.00	0.00	0.00
FI	1.00	1.00	0.00	0.00	0.00	0.05
FR	0.96	0.94	0.45	0.00	0.00	0.00
IE	1.00	1.00	0.00	0.00	0.10	0.00
IT	1.00	1.00	0.00	0.00	0.00	0.06
NL	1.00	1.00	0.06	0.00	0.00	0.05
PT	1.00	1.00	0.00	0.00	0.00	0.00
SE	1.00	1.00	0.00	0.00	0.00	0.00
UK	0.98	0.98	0.04	0.00	0.01	0.05

Table 6.25. Fitted Probabilities of Depreciation Methods: *Country.Time* Interactions

Country	Straight-line		Declining-balance		Unit-of-production	
	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3
AT	1.00	1.00	0.03	0.02	0.03	0.02
BE	0.99	0.95	0.10	0.17	0.00	0.00
DE	0.94	0.99	0.93	0.66	0.00	0.00
DK	1.00	1.00	0.00	0.00	0.00	0.00
ES	1.00	1.00	0.01	0.06	0.00	0.00
FI	1.00	1.00	0.01	0.04	0.00	0.03
FR	0.99	0.97	0.30	0.33	0.00	0.00
IE	1.00	1.00	0.00	0.00	0.08	0.07
IT	1.00	1.00	0.00	0.00	0.03	0.03
NL	1.00	1.00	0.03	0.04	0.02	0.02
PT	1.00	1.00	0.14	0.00	0.00	0.00
SE	1.00	1.00	0.03	0.02	0.00	0.00
UK	0.99	0.99	0.02	0.05	0.04	0.02

6.4.2 Depreciation Methods: Sector Effects

The impact of a firm's sector and interactions is summarised in Table 6.26. Again, the p-values are highly significant, demonstrating that a firm's specific attributes are an important explanatory variable in determining depreciation policy choice. Compared with the country effects, the following reductions of deviance demonstrate that sector of operations is important in explaining the choice of unit-of-production method:

	Straight-line	**Declining-balance**	**Unit-of-production**
13 countries	-21.5 (10.6%)	-696.6 (43.1%)	-39.0 (13.4%)
7 sectors	-5.2 (2.5%)	-28.3 (1.8%)	-177.2 (60.9%)

NB. The figures in brackets indicate the proportion of the total error (from Model 1) that is explained

As shown in Table 6.27, there is almost full convergence on the straight-line method across different sectors. The declining-balance method was combined with the straight-line method in all sectors, with the exception of the resources sector where the unit-of-production method is found (Figure 6.6).

The *Sector.Listing* interactions, as in country effects, are also highly significant in all cases with the F-statistic being the highest in the case of the straight-line method ($F = 10.98$), followed by the unit-of-production method ($F = 5.18$) and the declining-balance method ($F = 4.36$). As reported in Table 6.28, in the Information Technology sector for example, the fitted probability of adopting the double declining method was 0.16 for a domestically-listed firm as compared to zero probability for an internationally-listed firm. Model 4 estimates the relationship between a firm's size and depreciation policy choice across different sectors of operations. The results also suggest that the *Sector.Size* interaction effects are highly significant in all depreciation methods. Table 6.29 reports that regardless of size, the double-declining method was not used by firms operating in the Resources as well as the Utilities sectors. The final model presented in Table 6.26 predicts the impact of different periods of time in depreciation policy choice across

sectors. The *Sector.Time* interactions are highly significant in the case of the straight-line and unit-of-production methods only. In addition, the fitted probabilities in Table 6.30 demonstrate that the degree of uniformity for the straight-line method in the 1990s across different sectors. Overall, however, country effects explain more firm-level behaviour in depreciation policy preferences than sector effects (the error explained by country main effects and interactions is 3.29 times greater than by the respective sector effects).

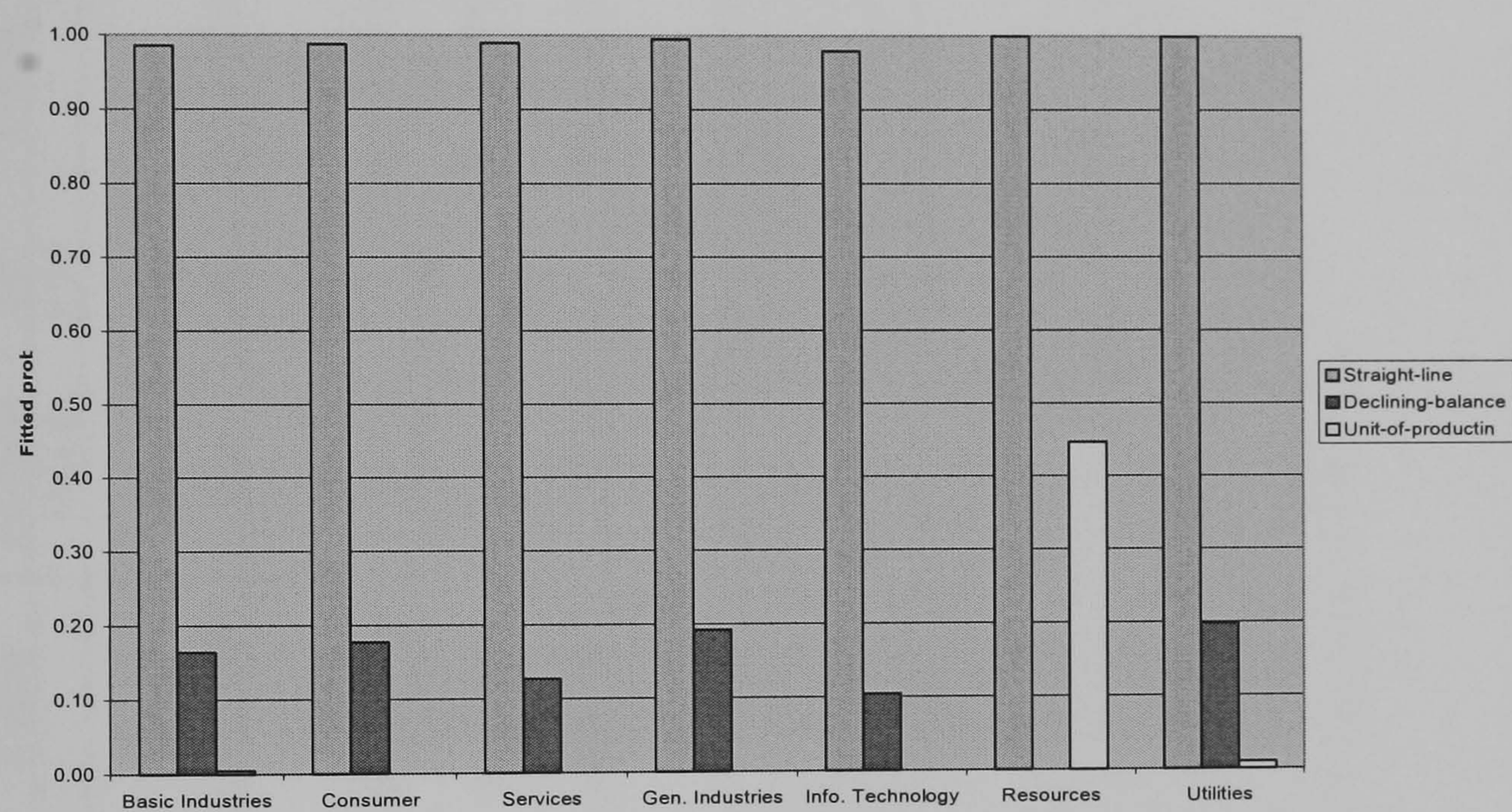


Figure 6.6. Depreciation Methods: Sector Effects

Table 6.26. Statistical Analysis of Depreciation Harmonisation: Sector Effects

Models and Effects	Straight-line			Declining-balance			Unit-of-Production		
	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	202.9	1910		1614.6	1910		290.7	1910	
Main Effects:									
2. Sector	197.7	1904	8.32	1586.3	1904	5.65	113.5	1904	495.46
Change in Deviance	5.2	6	*(p < 0.001)*	28.3	6	*(p < 0.001)*	177.2	6	*(p < 0.001)*
Interaction Effects									
3. Sector . Listing	190.0	1897	10.98	1561.2	1897	4.36	111.4	1897	5.18
Change in Deviance	7.7	7	*(p < 0.001)*	25.1	7	*(p < 0.001)*	2.1	7	*(p < 0.001)*
4. Sector. Size	185.2	1897	18.28	1571.8	1897	2.50	108.2	1897	13.15
Change in Deviance	12.5	7	*(p < 0.001)*	14.5	7	*(p < 0.001)*	5.3	7	*(p < 0.001)*
5. Sector. Time	192.3	1897	7.57	1582.7	1897	0.62	106.5	1897	17.84
Change in Deviance	5.4	7	*(p < 0.001)*	3.6	7	*(p = 0.074)*	7.0	7	*(p < 0.001)*

Notes:
The model of conditional independence predicts the odds of adopting a given depreciation method, which are entirely independent of main effect and interaction effects. The extent to which sector of operations affects depreciation choice is evaluated in the second model. In the third and fourth models firm-specific characteristics, i.e., listing status and size, are allowed to interact with the main effects, and thus the choice of depreciation accounting method is described as a function of main effects and interaction effects, together with the second-order interactions between the main effects and interaction effects. Finally, the fifth model estimates changes through time in depreciation policy choices across different EU sectors of operations.

The contribution of the explanatory factors added to a model is given by the reduction in deviance (i.e., total binomial error). The F-ratio expresses the average change in deviance obtained from each additional explanatory factor (i.e., the reduction in deviance divided by the reduction in degrees of freedom) proportional to the scaled deviance after fitting the model (i.e., residual error divided by residual degrees of freedom). Low p-values indicate significant explanatory power.

The aggregate deviance explained by country main effects and two-way interaction in Table 6.21 (968.3) is 3.29 times greater than the equivalent explanation attributable to the respective sector effects (293.9) in this table.

Table6.27. Fitted Probabilities of Depreciation Methods: Sector Effects

Sector	Straight-line	Declining-balance	Unit-of-productin
Basic Industries	0.99	0.16	0.01
Consumer	0.99	0.18	0.00
Services	0.99	0.13	0.00
Gen. Industries	0.99	0.19	0.00
Info. Technology	0.98	0.10	0.00
Resources	1.00	0.00	0.45
Utilities	1.00	0.20	0.01

Table 6.28. Fitted Probabilities of Depreciation Methods: *Sector.Listing* Interactions

Sector	Straight-line		Declining-balance		Unit-of-production	
	Domestic	International	Domestic	International	Domestic	International
Basic Industries	0.97	1.00	0.18	0.14	0.00	0.01
Consumer	0.98	0.99	0.23	0.13	0.00	0.00
Services	0.99	0.99	0.15	0.06	0.00	0.00
Gen. Industries	0.99	1.00	0.16	0.28	0.00	0.00
Info. Technology	0.96	1.00	0.16	0.00	0.00	0.00
Resources	1.00	1.00	0.00	0.00	0.35	0.49
Utilities	1.00	1.00	0.17	0.24	0.01	0.00

Table 6.29. Fitted Probabilities of Depreciation Methods: *Sector.Size* Interactions

Sector	Straight-line		Declining-balance		Unit-of-production	
	Small	Large	Small	Large	Small	Large
Basic Industries	0.98	0.99	0.15	0.18	0.01	1.00
Consumer	0.98	0.99	0.18	0.17	0.00	0.00
Services	0.98	1.00	0.13	0.13	0.00	0.00
Gen. Industries	0.99	1.00	0.16	0.23	0.00	0.00
Info. Technology	1.00	0.96	0.10	0.11	0.00	0.00
Resources	1.00	1.00	0.00	0.00	0.48	0.71
Utilities	1.00	1.00	0.00	0.00	0.01	1.00

Table 6.30. Fitted Probabilities of Depreciation Methods: *Sector.Time* Interactions

Sector	Straight-line		Declining-balance		Unit-of-production	
	Period 1	Period 3	Period 1	Period 3	Period 1	Period 3
Basic Industries	0.99	0.98	0.19	0.15	0.01	0.00
Consumer	0.99	0.99	0.17	0.18	0.00	0.00
Services	0.99	0.99	0.11	0.14	0.00	0.00
Gen. Industries	0.99	1.00	0.23	0.16	0.00	0.00
Info. Technology	0.90	1.00	0.07	0.13	0.00	0.00
Resources	1.00	1.00	0.00	0.00	0.48	0.46
Utilities	1.00	1.00	0.19	0.21	0.01	0.03

6.5 Summary and Conclusions

This chapter has presented the empirical results of the thesis. The present study has employed a statistical modelling approach in an attempt to reassess international accounting harmonisation, taking into consideration each sampled firms' operating circumstances and other specific characteristics, in addition to its country of domicile. The overall results demonstrate that country of domicile and sector of operations are each significant determinants in accounting policy choice across Europe. However, country differences appear to be far greater than sector differences, even allowing for differences between countries in industrial structure.

Firm-specific characteristics, such as listing status and size, also appear to be significant explanatory variables in accounting policy choice. The study suggests therefore that harmonisation efforts should consider sector differences and other firm-characteristics that might influence the choice of accounting policies, to ensure that the policy debate is informed about the likelihood of firms in similar contexts adopting the same accounting treatments.

The association between firm-specific characteristics and accounting practice harmonisation suggests that further care needs to be exercised in measurement studies. This closely resembles expressions of caution found in previous published works, which have indicated that the operating conditions of different firms are important factors in the accounting harmonisation process (e.g., Choi, 1981; Perera, 1989, Ball, 1995; Nobes, 1998; Barth, Clinch and Shibano, 1999; Rahman, Perera and Ganesh, 2002). Therefore, it is reasonable to recommend that regulators should not overlook firm specific attributes in individual countries in their efforts to achieve financial statement comparability.

CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

7.1 Introduction

The preceding chapter has presented the results of the empirical analysis of this study. This chapter aims to summarise the methodology employed, synthesise the findings and compare the empirical results with those reported in prior research works. In addition, the implications of this study for policy makers and other parties are discussed and possible avenues for further research in accounting harmonisation, and particularly in harmonisation measurement techniques, are outlined.

7.2 Summary of Research Methods and Main Findings

The present study builds on the concept of accounting harmonisation developed by Archer, Devaille and McLeay (1996), taken further by McLeay, Neal and Tollington (1999). In particular, by employing a statistical model, it aims to investigate accounting harmonisation in the European Union focusing on the effects of a firm's country of domicile and its operating circumstances on accounting policy choice. In addition, this study examines the effects of sector diversification on the choice of accounting method.

In order to better understand the process of financial reporting harmonisation, related concepts such as harmony and harmonisation, standardisation, uniformity and comparability, have been defined in Chapter 2. It has been documented, from the extant literature that the main benefits of accounting harmonisation are, among others, to improve the allocation of goods, labour and capital in international markets, to reduce firms' costs of capital and operating expenses, and to facilitate social control

of MNCs. In addition, the harmonisation process is said to enhance the comparability and understanding of financial reporting of firms originating from different countries. However, some research studies suggest that harmonisation of financial reporting is not only unnecessary but potentially detrimental in certain aspects. Nevertheless, efforts undertaken by a number of international, regional and national organisations, especially by the IASB and the EU, to improve financial statement comparability indicate harmonisation of accounting practices to be a worthwhile pursuit. The European Union, which is the focus of this research study, has been very active in removing financial reporting differences across its member states in order to improve comparability of financial information, to develop an integrated capital market, and to facilitate capital raising efficiency and to preserve investor protection. Recently, in its efforts to harmonise financial reporting across the EU and with the IASB standards, the European Commission has passed a regulation that would require all EU listed firms to prepare consolidated accounts, using the IAS standards, in 2005 by the latest.

As indicated earlier, the main objective of this study is to measure the degree of accounting harmonisation across Europe. Reviews on extant literature have indicated that two main harmonisation measurement approaches have been developed and applied on accounting data: index-based methods and statistical models. It has been shown from the analysis that these two techniques measure a different concept of harmonisation. The first being the index-based approach was introduced by van der Tas (1988) and since then it has been featured in numerous research studies on measuring financial reporting harmonisation. The basic premise of accounting harmonisation underlying the index-based techniques is one of uniformity, i.e., maximum harmony is achieved when all firms adopt the same accounting method. However, the selection of a particular accounting method depends not only on the firm's location and the set of regulations involved, but also on its operating circumstances along with other factors. Indeed, accounting diversity is the natural result of differing business circumstances, which by necessity may require alternative accounting treatments, but this has been recognised only to a limited extent in interpreting harmonisation (Herrmann and Thomas, 1995; Archer, Devaille and McLeay, 1996 and McLeay, Neal and Tollington, 1999).

In addition, positive accounting research provides evidence that the accounting policy choices made by firms are determined not only by the regulations in force but also by factors that are specific to the firm, including its operating circumstances and managerial preferences, all of which will result in a diversity of accounting treatments (Watts and Zimmermann, 1986 and 1990). This raises a doubt as to whether harmonisation endeavours based only on inter-country regulatory uniformity will filter through to actual accounting practices, and it follows therefore that the measurement of harmonisation simply on the basis of between-country differences in accounting practices is likely to be misleading. Aisbitt (2001) suggests that past attempts to associate changes in harmony in a single factor, such as legislation, were clearly unsuccessful because firms do not prepare their financial statements in a vacuum, and that other factors, including changes in non-legislative regulations, developments in accounting practice and thought, firm-specific characteristics, managerial preferences and demands of the market, also play a significant role in accounting policy choice. Rahman, Perera and Ganesh (2002) also highlight that differences in firm characteristics should be accounted for when assessing the impact of harmonisation policies. Thus, following Archer et al. (1996) and McLeay et al. (1999), this study has used a statistical modelling approach in an attempt to reassess international accounting harmonisation by taking into consideration each sampled firm's operating circumstances and other specific characteristics in addition to its country of domicile.

As indicated in the review of literature, the basic assumption in most prior research studies is that harmonisation leads to uniformity, and that maximum harmony is achieved when all firms adopt the same accounting treatment (e.g., van der Tas, 1988 and 1992; Emenyonu and Gray, 1992 and 1996; Archer, Delvaille and McLeay, 1995; Herrmann and Thomas, 1995; Adhikari and Emenyonu, 1997; Cańibano and Mora, 2000; Murphy, 2000; Pierce and Weetman, 2000; Aisbitt, 2001; Parker and Morris, 2001). This notion of harmony implies that the choice between accounting treatments will be mutually exclusive. However, as argued by McLeay, Neal and Tollington (1999), a firm that diversifies its operations may report multiple accounting methods as these capture appropriately the different nature of its various activities. In contrast, one of the fundamental limitations of prior research studies into harmonisation

measurement has been the assumption that inter-firm comparability is achieved through uniformity rather than appropriate selection, and this has led to some illogical conclusions as a result. For example, in order to fit the data to a misconceived research design, Emenyonu and Gray (1992 and 1996), Murphy (2000) and Parker and Morris (2001) each treat those firms that report more than one policy for a given accounting item as a distinct subset whose financial statements are deemed to be comparable only with each other and not with other firms which use just one accounting method. Other researchers (e.g. Herrmann and Thomas, 1995), while recognising that many firms in their sample adopt more than one method, resolve the issue by omitting them from the harmonisation metric altogether. In the current study, the binomial logistic regression that is employed is structured so that the use of more than one accounting method by a firm is captured in the statistical analysis.

In carrying out this research, the annual reports of European firms were analysed for the years 1991/92, 1994/95 and 1998/99 with respect to three accounting policies: inventory costing method, depreciation of fixed assets and goodwill on consolidation. The main reason for selecting these specific issues is that they have all been considered as among the most controversial in terms of comparability and they could have large, systematic effects on the assets and expenses reported on firms' financial statements (Pincus, 1994; Christie and Zimmerman, 1994).

The empirical analysis compares a hierarchy of nested linear models to describe the odds of adopting a given accounting policy as a function of different sets of explanatory variables. As indicated earlier, in addition to the country of domicile, the present study also considers the sector of operations as a main effect in measuring accounting harmonisation across the EU. Two firm-level attributes that might be associated with the choice of accounting methods are also added, and allowed to interact with both the country of origin and sector of operations. The first interacting factor that was included for this purpose is listing status, categorised either as international listing or as domestic listing only. The second is size, which is also reduced to two groupings, in this case where market capitalisation is above or below the median. Next, the three points in time at which financial reporting practices were observed are dealt with as a covariate, which also interacts with the main effects to allow for different evolutionary paths in different countries and sectors. In addition,

the model assesses the impact of sector diversification on accounting policy choice. The variables and model specifications have been described in Chapter 5. For the current study, the analysis was carried out using the generalised linear modelling system, GLIM 4 (Francis, Green and Payne, 1993).

The empirical results with respect to each of the accounting methods, i.e., inventory costing methods, goodwill arising on consolidation and depreciation of fixed assets, analysed in this study are summarised as follows:

Inventory Costing

Overall, the country main effect is highly significant ($p<0.001$) in determining the use of all inventory methods, at its highest in the case of FIFO, followed by average cost and LIFO. The fitted probabilities of adopting each of the alternative inventory methods indicate that disharmony is the main characteristic, with the average cost method dominating in countries such as Austria and Spain and FIFO dominating in Sweden and Finland. The sector main effects are also significant ($p<0.001$) with respect to each of the inventory policy choices. However, by comparison with country effects, there is substantially lower contribution to explanation, as the following main effect deviance reductions indicate:

	Average Cost	**FIFO**	**LIFO**
13 countries	-403.6 (28.6%)	-442.0 (31.5%)	-199.3 (25.5%)
7 sectors	-29.4 (2.1%)	-39.0 (2.8%)	-62.9 (8.0%)

The p-values of main effect (i.e., country of domicile and sector of operations) and firm-specific attributes (i.e., listing status and size) interactions indicate that they are important variables in influencing inventory method. However, the *Time* interactions show that there has been little change through time in the pattern of adopting inventory policies across different countries as well as sectors. Overall, when main effects and interaction effects are accounted for jointly in explaining inventory method choices, the country of domicile dominates the sector of operations, with the proportion of deviance explained by all country effects being 4.96 greater than the equivalent sector effects.

Goodwill Arising on Consolidation

Overall, the p-values for all goodwill cases are highly significant ($p<0.001$), indicating that a firm's country of registration is an important determinant of goodwill policy choice. A firm's sector of operations is also a significant determinant of goodwill policy choices, except in the case of amortisation between 11-20 years. Again, by comparison with country effects, there is a considerably lower contribution to explanation, as indicated by the following summary of main effect deviance reductions:

	Immediate write-off	**Amortised (10 or less)**	**Amortised (11-20)**	**Amortised (>20years)**	**Permanent capitalisation**
13 countries	-741.0 (32.8%)	-571.8 (32.3%)	-136.7 (5.8%)	-304.8 (29.3%)	-34.5(15.8%)
7 sectors	-27.5 (1.2%)	-39.8 (2.2%)	-4.6 (0.2%)	-24.6 (2.4%)	-15.3 (7.0%)

When fitting *Country.Listing* and *Country.Size* interactions, the model improvement is generally significant indicating that firm-specific characteristics are indeed important in determining the goodwill policy choice. However, it is the *Country.Time* interaction that is a major feature in that the results show the substantial changes in fitted probabilities arising from the considerable changes that took place in selecting goodwill methods in the 1990s, due to a switch at the sample level from the immediate write-off to amortisation methods. The *Sector.Listing* and *Sector.Size* interactions provide evidence that firm-specific characteristics are indeed significant in determining the goodwill policy choice. In addition, the change in deviance indicates that there have also been significant changes through time. It remains the case however that the country effect and its interactions contribute significantly more to the explanation of variability between companies in their choices of goodwill than the sector effect and its interactions, the proportion of the explained deviance attributable to all country effects being 3.04 as much as that attributable to all sector effects.

Depreciation of Fixed Assets

The reductions in deviance reveal that a firm's country of domicile, as well as sector of operations are each significant in determining depreciation policy. The fitted

probabilities indicate that there is a high degree of uniformity in that the straight-line method is the dominant approach across the EU. However, the declining-balance method is preferred by firms operating in jurisdictions where financial reporting is strongly influenced by tax factors, such as Germany, France and Belgium. The impact of a firm's sector and interactions are also highly significant, demonstrating that a firm's specific attributes are an important explanatory variable in determining depreciation policy choice. In comparison with the country effects, the reductions of deviance indicate that sector of operations is important in explaining the choice of unit-of-production method.

	Straight-line	**Declining-balance**	**Unit-of-production**
13 countries	-21.5 (10.6%)	-696.6 (43.1%)	-39.0 (13.4%)
7 sectors	-5.2 (2.5%)	-28.3 (1.8%)	-177.2 (60.9%)

As with country effects, the *Sector.Listing* and *Sector.Size* interactions are also highly significant in explaining depreciation policy choice. In addition, the *Sector.Time* interaction indicates a significant change a significant change in policy choices during the 1990s, which is mainly due to greater use of the straight-line method in the Information Technology sector. Overall, however, country effects explain more firm-level behaviour in depreciation policy preferences than sector effects (the error explained by country main effects and interactions is 3.29 times greater than by the respective sector effects).

The empirical results confirm that both the country of domicile and the sector of operations are significant determinants of the choice of accounting method. However, country differences appear to be greater than sector differences, even allowing for differences between countries in industrial structure. In addition, international listing and firm size appear to be significant variables. Nevertheless, there has been little significant change in policy choices through time amongst European firms.

In addition, the present study assesses the diversification effects across different sectors of operations on accounting policy choice. The empirical analysis shows that sector diversification is also an important variable in the choice of accounting

methods, especially if firms operate in Mining, Construction or Manufacturing sectors. This association between firm operating conditions and accounting harmonisation implies that caution needs to be exercised in seeking to achieve harmony only through inter-country standardisation. In this respect, the findings are similar to those indicated in prior research, which have suggested that the context within which different firms operate is an important factor in understanding the accounting harmonisation process (e.g., Archer, Devaille and McLeay, 1996; McLeay, Neal and Tollington, 1999; Aisbitt, 2001; Rahman, Parera and Ganesh, 2002).

7.3 Implications of the Findings and Suggestions for Future Research

The study suggests that harmonisation efforts should consider sector differences and other firm-characteristics that might influence the choice of accounting policies, to ensure that the policy debate is informed about the likelihood of firms in similar contexts adopting the same accounting treatments. The association between firm-specific characteristics and accounting practice harmonisation suggests that further care needs to be exercised in measurement studies. This closely resembles expressions of caution found in previous published works, which have indicated that the operating conditions of different firms are important factors in the accounting harmonisation process (e.g., Choi, 1981; Perera, 1989, Ball, 1995; Nobes, 1998; Barth, Clinch and Shibano, 1999; Rahman, Perera and Ganesh, 2002). Therefore, it is reasonable to recommend that regulators should not overlook firm specific attributes in individual countries in their efforts to achieve financial statement comparability.

Much of the previous research in this area is misguided in this respect, as it has attempted to measure harmonisation through convergence to a single method, when in fact the selection amongst different accounting treatments exists for perfectly good reasons. Indeed, comparability between financial statements requires that firms should use the appropriate method in the circumstances in which they operate, and the harmonisation metric must take this into account.

It should be noted that the inferences drawn in the present research study are subject to a number of limitations. First, although this study adopts a research design that takes account of our expectation that, when firms diversify across different sectors, alternative accounting treatments may be required in order to reflect the differences in operating conditions, appropriate weightings have not been introduced as comparable segmented information is not available across the sample. Thus, the results reported here take into consideration each firm's exposure to different sectors as if they are equally weighted. Second, the interlisting variable also indicates that a firm is either exposed or not exposed, in this case to international capital markets. Again, this cannot be taken further in the present study as we do not have access to comparable data across the sample on the extent of equity market exposures. Finally, the harmonisation model is evaluated with respect to each policy separately.

A number of avenues for future research are possible arising from the main results and implications of the present study. First, the statistical models employed in this research could be applied to analysed account data for other accounting issues in order to confirm the impact of sector of operations and firm's specific characteristics on accounting policy choice. It is also a worthwhile effort to construct a generalised harmonisation model that may account for any interactions across the full set of policy choices made by a firm. Secondly, in addition to the firm-specific features examined in this study (e.g., size and listing status), other criteria such as foreign operations and ownership structure could be used as explanatory variables. Finally, replication of the present study for a different time period and especially for recent years could be useful given the fact that the decision of the European Union to adopt IASB standards in 2005.

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Appendix A: Chronology of Prior Research Studies on Accounting Harmonisation

No	Author(s) and Objective(s)	Data	Method	Findings and Comments
1.	**Van der Tas (1988)** To measure the impact of national and international organisations on the degree of harmony	Surveys of accounting practice undertaken in the UK, the Netherlands and US. e.g., Surveys of Published Accounts in the UK between 1968-1981 (ICAEW 1969-1981).	*H* and *C* indices	Introduce the index-based approach to measure the degree of accounting harmonisation. However, data used were not undertaken with a view to such measurement and thus, did not analyse accounting policy choice comprehensively enough to produce meaningful results.
2.	**Van der Tas (1992a)** To examine changes in 'material' measurement harmony for selected topics and the impact of the Fourth Directive	Annual reports of 154 listed firms for the years 1978-1988 from nine European countries.	*C* index	The degree of material measurement harmony for deferred tax increased over the period, particularly when additional disclosures. Problem of non-disclosure
3.	**Emenyonu and Gray (1992)** To measure whether or not asset and profit measurement practices of large firms in France, Germany and UK were significantly different at the end of 1989.	Annual reports of 26 large listed firms from each of the three countries.	*I* index χ^2	Significant differences in the measurement practices of the three countries. When the measures were re-computed taking two countries at a time, there was an improvement in the level of harmony.
4.	**Archer, Delvaille and McLeay (1995)** To assess the impact of accounting harmonisation on the financial reporting practices or policy choices of the European multilisted firms.	Annual reports (1986/87 and 1990/91) of 89 multilisted firms from eight European countries.	C index Decomposed the C index into a within-country and a between-country C index.	In the two areas of deferred tax and consolidation goodwill, little progress took place between the two periods. Such progress that did take place was attributed to changes in between-country comparability.

5.	**Herrmann and Thomas (1995)** To measure the level of harmony of selected accounting issues.	Annual reports (1992/93) of 217 firms from eight European countries.	*I* index χ^2	Relatively high levels of harmony in foreign currency translation, inventory valuation, and depreciation methods. However, there were significant differences in the patterns of adoption of accounting methods for these items across the eight countries as indicated by X^2.
6.	**Archer, Delvaille and McLeay (1996)** To present a method of modelling statistically the process of international accounting harmonisation.	Data collected from 89 interlisted firms from eight European countries.	A hierarchy of nested statistical models	Overall, there was little evidence that harmony increased during the period. Introduce the use of statistical models in measuring accounting harmonisation.
8.	**Emenyonu and Gray (1996)** To assess the extent to which the accounting measurement and associated disclosure practices of large listed firms.	293 annual reports (1971/72 and 1991/92) from five major developed stock markets, i.e., France, Germany, Japan, UK and US.	*I* index and χ^2 test	From 26 major accounting measurement issues examined, the results are mixed with 14 cases showing increase in harmonisation and 12 cases showing decrease in harmonisation.
9.	**Krisement (1997)** A preliminary exploration of the suitability of entropy as a measure of comparability was undertaken. To measure 'the total amount of European entropy'	1991 FEE survey	Entropy (*E*) index.	The *E* index was applied to data from the 1991 FEE survey, which is of limited used in harmonisation measurement.
10.	**McLeay, Neal and Tollington (1999)** To present a statistical modelling method for measuring harmonisation which allows for choice between alternative accounting treatments.	Data were collected from annual reports of European interlisted firms for the years 1987 and 1993.	Hierarchy of nested generalised linear models.	Harmony does not depend on there being a general acceptance of a uniform method.

11.	**Pierce and Weetman (2000)** To explore the problem of non-disclosure as it affects measures of harmony and harmonisation.	Listed Irish and Danish firms from 1987 to 1994	Between-country *C* index	Providing a general formula for the NAA between-country C index and has refined their analysis by distinguishing the treatment of 'not-applicable' from 'applicable but not disclosed'
12.	**Cañibano and Mora (2000)** To ascertain whether there has been such a 'spontaneous harmonisation' in recent years among the accounting practices of firms that operate on the international stage, independently from the harmonisation of laws.	85 firms from thirteen European countries whose shares traded internationally. Annual reports for 1991/92 and 1996/97	*C* index, χ^2 test and bootstrapping test.	A higher value for the C index in 1996/97 period; there has been an increase in the level of harmonisation of European accounting practices. Introduce a bootstrapping test as a way of measuring the significance of the change in the harmonisation index.
13.	**Murphy (2000)** To investigate the affect on the harmonisation, or comparability, of accounting practices when a sample of firms chooses to use international accounting standards (IASs).	Sample data was obtained from the Worldscope, February 1997. 16 Swiss firms who adopted IASs in 1992, 18 Swiss firms who used local standards, 20 US firms, 25 UK firms, and 25 Japanese firms.	*H* and *I* indices	The results indicated that across the 8-period, the majority of the indices comparisons were positive and statistically significant. However, the results did not support that these increases were due to primarily to the adoption of IASs
14.	**Aisbitt (2001)** The study aims to examine the usefulness of Archer *et al.*'s (1995) decomposed C-index in measuring harmony and hence harmonisation.	Twelve firms each from Denmark, Finland, Sweden and Norway. Data were obtained from the annual reports for the years 1981/82, 92, 94 and 98.	Between-country *C*	The level of harmony was higher in 1998 than in 1981. Analysis of results revealed a number of problems of interpretation, which bring the helpfulness of the indices into question: problems relating to causal inference and problems relating to properties of the indices.

15.	**Parker and Morris (2001)** To examine the influence of U.S. GAAP as an impediment to the international harmony of accounting measurement policies between other countries.	Published accounts of 40 listed firms each from UK and Australia and eleven measurement policies were examined	Between-country C and χ^2 test	There is considerable or complete international harmony for only three policies. Evidence is presented of the influence of U.S. GAAP as one factor explaining the poor degree of U.K./Australia international harmony. Australian firms appear to follow U.S. GAAP to a greater extent than do U.K. firms.
16.	**Rahman, Perera and Ganesh (2002)** To empirically test the validity of the assumption that practice harmony is associated with regulation harmony and to establish with empirical support whether there are factors such as firm-specific characteristics that are associated with practice harmony.	Annual reports from 81 New Zealand and 75 Australian firms for financial year 1999.	Jaccard coefficient	The general results indicate that financial reporting practices harmony is associated with both accounting regulation harmony and firm characteristics.

APPENDIX B: List of Companies

No	Company Name	*Country*	Market Capitalisation 1/1/2000 (million Euro)
1	Austria Technologie & Systemtechnik	Austria	980.00
2	Austrian Airlines AG	Austria	639.20
3	Bau Holding AG	Austria	219.80
4	Boehler-Uddeholm AG	Austria	503.80
5	BWT AG	Austria	220.28
6	EVN AG	Austria	1710.00
7	Flughafen Wien AG	Austria	724.71
8	Lenzing AG	Austria	198.45
9	Mayr Melnhof Karton AG	Austria	552.00
10	OMV AG	Austria	2605.50
11	RHI AG	Austria	569.51
12	VA Technologie AG	Austria	966.13
13	Voest-Alpine Stahl AG	Austria	1072.50
14	Wienerberger Baustoffindustrie AG	Austria	1487.74
15	Wolford AG	Austria	217.55
16	Agfa-Gevaert NV	Belgium	2961.00
17	Barco (New) NV	Belgium	1720.28
18	Bekaert NV	Belgium	1237.40
19	Cimenteries CBR	Belgium	2385.98
20	CMB-Cie Maritime Belge	Belgium	388.59
21	Colruyt NV	Belgium	1695.00
22	Compagnie Nationale a Portefeuille SA	Belgium	1904.01
23	Creyf's Interim	Belgium	490.05
24	Deceuninck Plastics Ind SA	Belgium	476.47
25	Electrabel SA	Belgium	17712.04
26	Establis. Delhaize-Le Lion	Belgium	3888.33
27	Geveart NV	Belgium	1261.91
28	GIB Group S.A.	Belgium	1172.74
29	Glaverbel SA	Belgium	549.16
30	Innogenetics NV	Belgium	444.48
31	Mobistar SA	Belgium	3534.78
32	Quick Restaurants SA	Belgium	173.92
33	Recticel SA	Belgium	275.20
34	Sioen Industries NV	Belgium	705.91
35	Solvay SA	Belgium	6911.78
36	Spector Photo Group SA	Belgium	201.64
37	Telindus SA	Belgium	954.31
38	Tessenderlo Chemie	Belgium	1439.88
39	Tractebel SA	Belgium	10247.39
40	UCB SA	Belgium	6282.42
41	Union Miniere S.A.	Belgium	979.51
42	Adidas-Solomon AG	Germany	3378.52
43	Altana AG	Germany	2634.52
44	Andreae-Noris Zahn AG	Germany	286.18
45	AVA Allg Handel AG	Germany	1617.75
46	Axel Springer Verlag AG	Germany	4029.00
47	Babcock Borsig AG	Germany	357.29
48	BASF AG	Germany	31670.22
49	BAYER AG	Germany	34326.07
50	Bayerische Motoren Werke AG	Germany	20321.84

51 Beiersdorf AG	Germany	5599.44
52 Bewag AG	Germany	3348.80
53 Bilfinger & Berger AG	Germany	781.90
54 Buderus AG	Germany	1055.60
55 Celanese	Germany	1012.07
56 Contigas Deutsche Energie AG	Germany	2809.94
57 Continental AG	Germany	2539.00
58 DaimlerChrysler AG	Germany	77451.78
59 Degussa AG	Germany	1958.42
60 Deutsche Lufthansa AG	Germany	8814.96
61 Deutsche Telekom AG	Germany	213793.89
62 Deutz AG	Germany	364.15
63 Douglas Hldgs AG	Germany	1511.26
64 DR. ING. H.C.F. Porsche AG	Germany	4121.25
65 Dyckerhoff AG	Germany	952.47
66 EM.TV & Merchandising AG	Germany	6658.66
67 Energie Baden-Wuerttemberg AG	Germany	8806.42
68 FAG Kugelfisher AG	Germany	543.47
69 Fielmann	Germany	623.11
70 Fresenius AG	Germany	3638.98
71 Fresenius Medical Care AG	Germany	6709.08
72 GEA AG	Germany	1159.93
73 Gehe AG	Germany	2806.65
74 Gerresheimer AG	Germany	364.33
75 Gold-Zack AG	Germany	686.31
76 Heidelberger Druckmaschinen AG	Germany	5326.33
77 Heidelberger Zement AG	Germany	4821.73
78 Henkel KGAA	Germany	9562.10
79 Hochtief AG	Germany	2193.95
80 Hoechst AG	Germany	11724.02
81 Hugo Boss AG	Germany	894.08
82 Isar-Amperwerke AG	Germany	5324.16
83 IWKA AG (Ind-Werke Karl-Aug)	Germany	476.52
84 Jungheinrich AG	Germany	351.54
85 Karstadt Quelle AG	Germany	4678.51
86 Kiekert AG	Germany	273.60
87 Klockner Werke AG	Germany	733.03
88 Krones AG	Germany	285.04
89 KSB AG	Germany	196.15
90 Linde AG	Germany	6475.93
91 LPKF Laser & Electronics	Germany	252.00
92 MAN AG	Germany	5104.02
93 Mannesmann AG	Germany	118343.25
94 Merck KGAA	Germany	5297.60
95 Metro AG	Germany	17450.45
96 MG Technologies AG	Germany	2970.37
97 Mobilcom AG	Germany	3705.56
98 Norddeutsche Affinerie AG	Germany	320.00
99 Preussag AG	Germany	8178.14
100 Puma AG	Germany	261.63
101 RWE AG	Germany	24925.22
102 SAP AG	Germany	62644.09
103 Schering AG	Germany	7911.36
104 Schmalbach Lubeca AG	Germany	483.75
105 SGL Carbon AG	Germany	1400.57
106 Siemens AG	Germany	46126.02

107 Sixt AG	Germany	645.38
108 SKW Trostberg AG	Germany	1687.41
109 Stinnes AG	Germany	1596.00
110 Sud-Chemie AG	Germany	479.52
111 Tarkett Sommer AG	Germany	305.96
112 Thyssen AG	Germany	4424.95
113 Vew AG	Germany	5020.00
114 Viag AG	Germany	12594.07
115 Volkswagen AG	Germany	23298.97
116 Vossloh AG	Germany	214.56
117 Wella AG	Germany	1485.38
118 A/S DET Ostasiatiske Kompani	Denmark	208.87
119 Auriga Industries	Denmark	348.43
120 Bang & Olufsen Hldg AS B	Denmark	803.34
121 Carlsberg	Denmark	2204.41
122 Christian Hansen Holding A/S	Denmark	478.45
123 Coloplast A/S	Denmark	1136.01
124 Danisco	Denmark	2570.84
125 Danske Traelast AS	Denmark	391.61
126 FLS Industries AS	Denmark	1141.14
127 GN Store Nord As	Denmark	1830.30
128 Group 4 Falck AS	Denmark	1329.10
129 Icopal AS	Denmark	303.27
130 ISS A/S	Denmark	2533.03
131 Kobenhavns Lufthavne	Denmark	723.02
132 Navisiondamgaard	Denmark	611.34
133 NKT Hldgs AS	Denmark	292.70
134 Novo Nordisk	Denmark	9318.99
135 Radiometer AS	Denmark	416.92
136 Sondagsavisen AS Reg	Denmark	324.85
137 Sophus Berendsen A/S	Denmark	610.81
138 Tele Danmark	Denmark	15891.08
139 Vestas Wind Systems	Denmark	1836.47
140 William Demant Hldg	Denmark	1383.48
141 Acciona SA	Spain	3706.86
142 Aceralia SA	Spain	1648.75
143 Acerinox S.A	Spain	2294.76
144 Actividades Const.Y Services	Spain	1294.43
145 Aldeasa	Spain	425.36
146 Altadis SA	Spain	4498.59
147 Amper SA	Spain	203.61
148 Asturiana de Zinc SA	Spain	515.02
149 Autopistas, Concensionaria SA	Spain	2557.01
150 Azkoyen SA	Spain	166.22
151 Cememtos Portland SA	Spain	737.70
152 Centros Commerciales Carrefour SA	Spain	2935.20
153 Centros Commerciales Continente SA SA	Spain	1910.40
154 Compania Espanola de Pertroleos SA	Spain	2614.22
155 Cortefiel SA	Spain	835.98
156 Dragados y Construcciones SA	Spain	1509.27
157 Ebro Puleva Agricola	Spain	1126.68
158 Endesa SA	Spain	20868.00
159 Fomento de Construcciones y Contratas	Spain	2397.93
160 Gas Natural SDG SA	Spain	10240.64
161 Grupo Empresarial ENCE	Spain	401.32
162 Grupo Ferrovial SA	Spain	2019.81

163	Hidroelectica del Cantabrico SA	Spain	1539.27
164	Iberdrola SA	Spain	12261.29
165	Iberica de Auto (Iberpistas)	Spain	423.19
166	Indra Sistemas SA	Spain	1348.26
167	NH hoteles	Spain	896.88
168	Obrascon Huarte SA	Spain	528.31
169	Portland Valderrivas SA	Spain	550.87
170	Prosegur Compania Securidad	Spain	530.87
171	Puleva-Uniasa SA	Spain	28.90
172	Red Electrica de Espana	Spain	811.62
173	Repsol-YPF SA	Spain	27347.76
174	Saint-Gobain Cristaleria Espanola SA	Spain	560.17
175	Sociedad General de Aguas De Barcelona	Spain	2004.26
176	Sol Melia SA	Spain	1923.24
177	Superdiplo S.A.	Spain	957.07
178	Telefonica SA	Spain	80918.08
179	Tubacex SA	Spain	256.16
180	Union Electrica Fenosa SA	Spain	5222.55
181	Uralita SA	Spain	341.67
182	Vallehermoso SA	Spain	900.86
183	Viscofan	Spain	377.01
184	Zardoya-Otis SA	Spain	1432.98
185	Zeltia	Spain	565.11
186	Amer Group PLC	Finland	490.19
187	Aspo Group OY	Finland	212.68
188	Comptel	Finland	1494.58
189	Finnlines Oy	Finland	619.35
190	Fiskars Corporation	Finland	719.74
191	Fortum	Finland	3531.52
192	Huhtamaki OY	Finland	1057.59
193	Instrumentarium Corporation	Finland	777.47
194	JOT Automation Group	Finland	1578.21
195	KCI Konecrannes Intl	Finland	561.25
196	Kemira Oyj	Finland	773.19
197	Kesko OY	Finland	1136.69
198	Kone Corporation	Finland	985.56
199	Kyro OY	Finland	277.73
200	Lassila & Tikanoja OY	Finland	387.74
201	Metsa-Serla OY	Finland	1605.44
202	Metso OYJ	Finland	1744.81
203	Nokia	Finland	209370.60
204	Orion-Yhtyma OY	Finland	1552.92
205	Outokumpu OY	Finland	1749.65
206	OYJ Hartwall	Finland	871.92
207	Partek Corporation	Finland	659.02
208	Raisio Group OY	Finland	649.04
209	Rautaruukki OY	Finland	965.26
210	Sanoma Wsoy OY	Finland	1763.76
211	Sonera OYJ	Finland	49132.10
212	Stockmann OYJ AB	Finland	734.78
213	Stora Enso OYJ	Finland	13153.10
214	Tietonator OYJ	Finland	4771.34
215	UPM-Kymmene OYJ	Finland	10361.24
216	Uponor (ASKO OYJ)	Finland	681.42
217	Vaisala OYJ	Finland	332.32
218	Viking Line ABP	Finland	442.80

219	Aerospatiale Matra	France	8796.36
220	Air Liquide	France	13771.76
221	Alcatel	France	43974.99
222	Alstom SA	France	6197.25
223	Altran Technologies SA	France	6003.06
224	Assystem	France	219.53
225	Atos Origin SA	France	2572.49
226	Avenir Telecom	France	470.62
227	Aventis (Rhone-Poulenc SA)	France	44964.33
228	Beneteau	France	342.41
229	Bollore Technologies	France	1240.75
230	Bongrain SA	France	627.42
231	Bouygues SA	France	19115.74
232	Brime Technology	France	164.18
233	Bull SA	France	1322.20
234	Canal +	France	18158.62
235	Carbone Lorraine	France	509.91
236	Carrefour SA	France	61423.54
237	Casino Guichard Perrachon SA	France	10758.88
238	Castorama Dubois Investissements SCA	France	9293.25
239	CEA Industrie SA	France	3465.01
240	CGIP-Cie Generale D'Industrie et de Part	France	4407.79
241	Chargeurs	France	339.62
242	Christian Dior SA	France	9813.84
243	Cie Generale des Establissments Michelin	France	5152.37
244	Ciments Francais SA, Societe Des	France	2565.20
245	Clarins	France	2015.42
246	Club Mediterranee	France	1465.32
247	Colas	France	1591.02
248	Compagnie de Fives-Lille	France	178.20
249	Compagnie de Saint Gobain SA	France	15807.52
250	CS Communication & Systemes	France	207.73
251	Dassault Systemes SA	France	7324.38
252	De Dietrich & Cie	France	370.06
253	Eiffage	France	913.82
254	Elf Aquitane SA	France	40803.59
255	Entrelec Group	France	257.59
256	Eramet	France	1392.15
257	Eridania Beghin-Say SA	France	2775.03
258	Essilor International SA	France	3257.95
259	Euro Disney S.C.A	France	1051.93
260	Faurecia	France	764.27
261	Fonciere Euris	France	1140.09
262	France Telecom SA	France	134531.89
263	Galeries Lafayette	France	2155.65
264	Gaumont	France	223.34
265	Genesys	France	210.10
266	Grandvision	France	770.07
267	Groupe Andre SA	France	999.60
268	Groupe Danone SA	France	15978.55
269	Groupe GTM	France	1489.11
270	Guyenne et Gascogne	France	636.22
271	Hachette Filipacchi Medias	France	2497.43
272	Hermes International SCA	France	5500.75
273	Imerys	France	2384.26
274	Labinal	France	893.81

275 Lafarge SA	France	12135.42
276 Lagardere SCA	France	6617.66
277 Lapeyre SA	France	1427.53
278 Legrand SA	France	6383.83
279 Legris Ind	France	345.12
280 L'oreal SA	France	52899.44
281 LVMH Moet-Hennessy Louis Vuitton SA	France	42340.00
282 M6 - Metropole Television	France	6438.56
283 Manitou BF	France	516.24
284 Marine Wendel	France	1704.77
285 Metaleurop SA	France	172.71
286 Montupet	France	326.84
287 Moulinex	France	503.49
288 Norbert Dentressangle	France	200.24
289 NRJ SA	France	1323.85
290 Pechiney Societe Anonyme	France	5718.11
291 Penauille Polyservices	France	608.81
292 Pernod Ricard SA	France	3145.96
293 Peugeot SA	France	9940.44
294 Pinault Printemps Redaute SA	France	31012.61
295 Plastic Omnium	France	371.25
296 Promodes SA	France	3073.93
297 Publicis	France	3377.93
298 Rallye	France	1994.33
299 Remy Cointreau SA	France	800.97
300 Renault SA	France	11476.76
301 Rexel SA	France	4213.07
302 Rhodia	France	3920.85
303 Sagem SA	France	6389.26
304 Sanofi SA	France	4922.38
305 Schneider Electric SA	France	11761.76
306 SEITA-Societe Nationale des Tabacs SA	France	2225.31
307 Sidel SA	France	3466.11
308 Skis Rossignol	France	166.81
309 Societe Air France	France	3507.43
310 Societe BIC SA	France	2494.11
311 Sodexho Alliance S.A.	France	5208.58
312 Sommer-allibert	France	571.35
313 SR Teleperformance	France	657.31
314 STMicroelectronics	France	44282.68
315 Suez Lyonnaise des Eaux SA	France	31010.03
316 Taittinger	France	454.89
317 Technip	France	1604.22
318 Telelvision Francaise 1 SA-TF1	France	10981.52
319 Total Fine ELF SA	France	95691.99
320 Usinor SA	France	4320.48
321 Valeo SA	France	6343.10
322 Vallourec	France	393.89
323 Vinci (SGE)	France	1795.27
324 Vivendi Universal SA	France	50420.01
325 Zodiac	France	1045.26
326 CRH	Ireland	8377.48
327 DCC	Ireland	223.67
328 Elan Corporation	Ireland	7682.99
329 Fyffes	Ireland	489.71
330 Grafton Group	Ireland	389.00

331	Greencore Group	Ireland	523.09
332	IAWS Group	Ireland	425.91
333	Independent News	Ireland	1490.85
334	Jefferson Smurfit Group	Ireland	3322.59
335	Jurys Hotel Group PLC	Ireland	395.14
336	Kerry Group	Ireland	2047.41
337	Kingspan Group	Ireland	503.03
338	Tullow Oil plc	Ireland	354.97
339	United Drug	Ireland	156.99
340	Waterford Wedgewood	Ireland	745.74
341	Alitalia Linee Aeree SPA	Italy	3662.07
342	Arnoldo Mondadori Editore SPA	Italy	3964.46
343	Autostrade Concessioni E Costruzioni SPA	Italy	7997.64
344	Benetton SPA	Italy	4139.54
345	Brembo SpA	Italy	473.70
346	Bulgari SpA	Italy	2599.46
347	Buzzi Unicem SpA	Italy	1528.20
348	Cartiere Burgo SpA	Italy	831.77
349	CIGA Hotels SpA	Italy	435.96
350	CIR SpA	Italy	1993.39
351	Class Editori	Italy	1575.06
352	Cremonini SpA	Italy	296.06
353	Danieli & C.Officine Meccaniche	Italy	424.73
354	Edison SPA	Italy	5156.85
355	ENI - Ente Nazionale Idrocarburi	Italy	43691.62
356	ERG SPA	Italy	433.01
357	Fiat SPA	Italy	15609.65
358	Finmeccanica SPA	Italy	9562.84
359	Gewiss SpA	Italy	413.17
360	Gruppo Editoriale L'Espresso	Italy	4947.88
361	Impregilo SpA	Italy	451.75
362	Italcementi SPA	Italy	3260.18
363	Italgas Societa Italiana Per IL Gas PA	Italy	2620.53
364	Italmobiliare	Italy	907.43
365	Magneti Marelli SpA	Italy	1155.91
366	Manifattura Lane Marzotto & Figli SpA	Italy	512.54
367	Montedison SPA	Italy	1943.31
368	Olivetti SPA	Italy	13836.06
369	Parmalat SpA	Italy	1941.85
370	Pininfarina SpA	Italy	449.08
371	Pirelli & C. SAPA	Italy	1458.81
372	Rinascente LA SPA	Italy	2644.30
373	SAES Getters SpA	Italy	280.83
374	Safilo SpA	Italy	823.08
375	Saipem SpA	Italy	1580.45
376	Seat Pagine Gialle SPA	Italy	17216.75
377	Simint SpA	Italy	317.45
378	Sirti SpA	Italy	781.00
379	Snia BPD SpA	Italy	837.73
380	Sondel SpA	Italy	824.14
381	Telecom Italia Societa Per Azoni	Italy	103966.20
382	Aalberts Industries NV	Netherlands	378.57
383	Akzo Nobel N.V.	Netherlands	14237.10
384	Amstelland NV	Netherlands	476.20
385	ASM International N.V.	Netherlands	922.48
386	Athlon Groep NV	Netherlands	335.86

387 BAAN Company N.V.	Netherlands	3096.02
388 Beter Bed Holding NV	Netherlands	204.24
389 Buhrmann NV	Netherlands	1417.09
390 Cap Gemini NV	Netherlands	4672.12
391 CSM NV	Netherlands	1860.35
392 Draka Holding NV	Netherlands	950.57
393 Elsevier N.V.	Netherlands	8405.78
394 Equant NV	Netherlands	22706.46
395 EVC International NV	Netherlands	186.24
396 Fugro NV	Netherlands	455.30
397 Gamma Holding NV	Netherlands	280.91
398 Getronics N.V.	Netherlands	9034.32
399 Gucci Groep NV	Netherlands	10962.36
400 Hagemeyer N.V.	Netherlands	2424.49
401 Heijmans NV	Netherlands	283.69
402 Heineken N.V.	Netherlands	15183.72
403 Hollandsche Beton Groep NV	Netherlands	322.56
404 Hunter Douglas NV	Netherlands	1012.29
405 Internatio-Muller NV	Netherlands	539.65
406 KLM NV	Netherlands	1037.04
407 Kon. Nederlandsche Petroleum Maatschappij	Netherlands	129620.84
408 Koninklijke Ahold NV	Netherlands	20435.36
409 Koninklijke Ahrend NV	Netherlands	227.58
410 Koninklijke Boskalis Westminster	Netherlands	459.17
411 Koninklijke Grolsch NV	Netherlands	350.26
412 Koninklijke Hoogovens NV	Netherlands	790.74
413 Koninklijke KPN NV	Netherlands	46349.35
414 Koninklijke Nedlloyd Groep	Netherlands	647.09
415 Koninklijke Numico NV	Netherlands	5293.67
416 Koninklijke Phillips Electronics	Netherlands	44941.52
417 Koninklijke Van Melle NV	Netherlands	481.48
418 Koninklijke Volker Wessels Stevin	Netherlands	524.76
419 Koninklijke Vopak	Netherlands	1237.51
420 Koninklijke Wessanen NV	Netherlands	930.51
421 Laurus N.V.	Netherlands	2294.99
422 Macintosh Confectie NV	Netherlands	219.77
423 NV Twentsche Kabel Holdings	Netherlands	273.74
424 OCE Nederland BV	Netherlands	1441.10
425 Randstad Holdings N.V.	Netherlands	5526.59
426 Smit International NV	Netherlands	167.62
427 Stork NV	Netherlands	463.12
428 Teleplan Int.	Netherlands	1153.62
429 TNT Post Groep N.V.	Netherlands	13587.27
430 Unilever N.V.	Netherlands	57317.84
431 United Services (Unique Intl)	Netherlands	394.23
432 Vendex KBB N.V.	Netherlands	1772.00
433 VNU NV	Netherlands	11459.51
434 Wegener Arcade CVA	Netherlands	443.64
435 Wolters Kluwer N.V.	Netherlands	9333.21
436 Brisa-Auto Estradas Portugal	Portugal	2512.49
437 Cimpor-Cimentos de Portugal	Portugal	2217.60
438 EDP Electricidade de Portugal	Portugal	10416.97
439 Inapa - Investimentos	Portugal	225.28
440 Jeronimo Martins	Portugal	2434.80
441 Modelo Continente SGPS	Portugal	2843.52

442 Portucel Industrial	Portugal	594.21
443 Portugal Telecom	Portugal	11367.68
444 Teixeira Duarte	Portugal	427.00
445 TELECEL - Comunicacoes Pessoais	Portugal	3720.87
446 AB Lindex	Sweden	327.96
447 AB Volvo	Sweden	11318.01
448 ABB Participation AB	Sweden	7799.55
449 AGA AB	Sweden	3602.52
450 Allgon AB	Sweden	567.12
451 Assa Abloy AB	Sweden	4377.83
452 Assidoman ABP	Sweden	1910.29
453 Atlas Copco AB	Sweden	6142.28
454 Atle AB	Sweden	883.50
455 Avesta Sheffield AB	Sweden	648.60
456 BT Industries AB	Sweden	561.15
457 Cardo AB	Sweden	592.50
458 Celsius AB	Sweden	575.56
459 Electrolux AB	Sweden	9130.45
460 Gambro AB	Sweden	3092.21
461 Getinge Industrier	Sweden	508.08
462 H & M Hennes & Mautritz AB	Sweden	26003.31
463 Haldex AB	Sweden	257.19
464 Hexagon AB	Sweden	231.84
465 Hoganas AB	Sweden	824.52
466 Holmen AB	Sweden	3178.57
467 Industriforvaltning Kinnevik AB	Sweden	1936.05
468 Industrivarden AB	Sweden	3541.36
469 Investment AB Bure	Sweden	788.46
470 Investor AB	Sweden	10770.52
471 Kalmar Industries	Sweden	246.52
472 Lindab AB	Sweden	274.05
473 Munksjo AB	Sweden	333.26
474 NCC AB	Sweden	1250.85
475 Nobel Biocare AB	Sweden	348.48
476 Nolato AB	Sweden	361.27
477 Perstorp AB	Sweden	658.93
478 Rottneros AB	Sweden	275.62
479 Sandvik AB	Sweden	8168.74
480 Scancem AB	Sweden	1078.55
481 Scandic Hotels AB	Sweden	586.82
482 Scania AB	Sweden	7142.60
483 Securitas	Sweden	6393.74
484 Skanska AB	Sweden	4205.40
485 SKF AB	Sweden	2745.70
486 SSAB AB	Sweden	1632.87
487 Svedala Industri AB	Sweden	872.71
488 Svenska Cellulosa Aktiebolaget	Sweden	6762.24
489 Sydkraft AB	Sweden	4395.39
490 Tele2 AB	Sweden	7236.10
491 Telefonaktiebolaget LM Ericsson	Sweden	124739.74
492 Trelleborg	Sweden	1045.95
493 WM-Data nordic AB	Sweden	4520.30
494 Admiral PLC	UK	1595.68
495 Aegis Group PLC	UK	3948.83
496 Aggregate Industries PLC	UK	1319.23
497 Airtours	UK	2859.23

498	Alliance UniChem	UK	1947.89
499	AMEC	UK	856.48
500	Anglo American	UK	26726.17
501	Arcadia Group (Burton)	UK	671.97
502	Arjo Wiggins Appleton	UK	2741.94
503	Arriva (T. Cowie)	UK	891.82
504	Ashtead Group	UK	1113.15
505	Associated British Foods	UK	5101.15
506	Associated British Ports Hldgs	UK	1569.97
507	AstraZeneca	UK	73339.21
508	AWG (Anglian Water)	UK	2488.87
509	BAA	UK	6804.05
510	BAE (British Aerospace)	UK	19198.61
511	Barrat Developments	UK	1268.68
512	Bass	UK	9030.70
513	BBA Group	UK	3592.53
514	Bellway	UK	582.39
515	Berkeley Group	UK	1432.23
516	BG	UK	22373.36
517	Blue Circle Industries	UK	4614.23
518	Bodycote International	UK	1238.74
519	Boots Co	UK	8001.26
520	BP Amoco	UK	195452.56
521	BPB	UK	2429.57
522	Brake Bros	UK	484.89
523	Britax International	UK	568.61
524	British Airways	UK	5897.21
525	British American Tobacco	UK	12127.05
526	British Borneo Oil & Gas	UK	813.14
527	British Sky Broadcasting	UK	15501.93
528	British Telecommunications	UK	127472.47
529	British Vita	UK	905.20
530	Bryant Group	UK	644.70
531	BTP	UK	637.96
532	Bunzl	UK	2508.77
533	Burmah Castrol	UK	3376.34
534	Cadbury Schweppes	UK	12847.83
535	Capita Group	UK	3796.51
536	Capital Radio	UK	1017.56
537	Carlton Communications	UK	4384.27
538	Celltech Chiroscience	UK	1275.54
539	Charter	UK	403.62
540	CMG	UK	9460.00
541	Cobham	UK	1230.42
542	Compass Group	UK	6269.43
543	Cookson Group	UK	3021.09
544	Cordiant Communicatins	UK	1078.57
545	Corus (British Steel)	UK	3692.31
546	Croda International	UK	618.14
547	Daily Mail & General Trust	UK	4927.53
548	David S Smith(Hldgs)	UK	529.46
549	Davis Service Group	UK	836.36
550	De La Rue	UK	2094.84
551	De Vere (Greenalls Group)	UK	1315.01
552	Diageo (Guinness)	UK	34895.43
553	Dixons Group	UK	8675.92

554 Eidos	UK	670.83
555 Electrocomponents	UK	4633.51
556 Electronics Boutique	UK	209.68
557 Elementis (Harrisons & Crossfield)	UK	558.81
558 EMAP	UK	4764.06
559 EMI Group	UK	8972.24
560 Enodis (Berisford)	UK	1023.93
561 Enterprise Oil	UK	3339.42
562 Eurotunnel	UK	2396.88
563 Exel Investments (NFC)	UK	1716.05
564 Exel Plc (Ocean Group)	UK	2769.17
565 F. I. Group	UK	1021.42
566 Fairey Group	UK	777.37
567 Filtronic	UK	676.68
568 FKI	UK	2207.29
569 Flextech	UK	723.84
570 George Wimpey	UK	664.82
571 GKN	UK	11614.30
572 Glaxo Wellcome	UK	102743.22
573 Go-Ahead Group	UK	640.55
574 Granada Group	UK	15212.86
575 Great Universal Stores	UK	6433.97
576 Greene King	UK	499.01
577 GWR Group	UK	1757.50
578 Halma	UK	495.71
579 Hanson	UK	5370.43
580 Hays	UK	8776.60
581 Hepworth	UK	744.06
582 Hewden Stuart	UK	525.87
583 Hilton Group	UK	4711.13
584 Hyder (was welsh Water)	UK	573.59
585 Iceland Group	UK	764.56
586 IMI	UK	1591.60
587 Imperial Chemical Industries	UK	7683.54
588 Imperial Tobacco Group	UK	5633.03
589 Inchcape	UK	390.91
590 International Power	UK	5829.48
591 Invensys (Siebe)	UK	16327.97
592 J Sainsbury	UK	11066.85
593 Jarvis	UK	555.49
594 JJB Sports	UK	975.08
595 Johnston Press	UK	1177.32
596 Kelda Group	UK	1823.77
597 Kingfisher	UK	10764.22
598 Laird Group	UK	562.19
599 Laporte	UK	1697.06
600 LASMO	UK	2563.01
601 Lex Service	UK	702.48
602 Logica	UK	4008.38
603 Lonmin	UK	1588.18
604 Manchester United	UK	848.69
605 Marconi (General Electric Co)	UK	34050.93
606 Marks & Spencer	UK	12133.81
607 Mayflower Corporation	UK	904.60
608 McKechnie	UK	809.96
609 Meggitt	UK	864.79

610 MERANT	UK	322.46
611 Mersey Docks & Harbour Co.	UK	671.65
612 Meyer International	UK	641.18
613 Milllenium & Copthorne Hotels	UK	1716.38
614 Misys	UK	4529.11
615 Morgan Crucible Co	UK	1019.22
616 Mothercare (Storehouse)	UK	1870.05
617 National Express Group	UK	1286.85
618 National Grid Group	UK	14194.35
619 Nestor Healthcare Group	UK	810.92
620 News Communications & Media	UK	334.72
621 Next	UK	3205.67
622 Northern Foods	UK	1034.25
623 Nycomed Amersham	UK	4050.17
624 Pearson	UK	19793.23
625 Peninsular & Oriental Steam	UK	11049.93
626 Pennon Group	UK	1138.52
627 Pentland Group	UK	523.57
628 Persimmon	UK	701.64
629 Photo Me International	UK	605.75
630 Pilkington	UK	1345.65
631 PizzaExpress	UK	958.60
632 Powderject Pharmaceuticals	UK	818.54
633 Powell Duffryn	UK	449.56
634 PowerGen	UK	5660.11
635 Premier Farnell	UK	2293.04
636 Psion	UK	3232.73
637 Racal Electronics	UK	1196.41
638 Rank Group	UK	2458.16
639 Reckitt & Colman	UK	5829.59
640 Redrow Group	UK	748.36
641 Reed International	UK	8506.33
642 Renishaw	UK	504.34
643 Rentokil Initial	UK	10402.03
644 Reuters	UK	19451.22
645 Rexam	UK	1590.39
646 Rio Tinto	UK	25406.62
647 RM	UK	742.81
648 RMC Group	UK	3512.50
649 Rolls-Royce	UK	5307.13
650 Rotork	UK	434.10
651 Safeway	UK	4115.51
652 Scottish & Newcastle	UK	6356.08
653 Scottish & Southern Energy	UK	7375.17
654 Scottish Power	UK	15690.12
655 Securior	UK	5569.07
656 Select Appointments Group	UK	160.25
657 Sema Group	UK	8261.01
658 Senior Engineering Group	UK	365.86
659 Severn Trent	UK	3233.01
660 Shanks Group	UK	238.59
661 Signet Group	UK	1612.08
662 SMG (Scottish Media Group)	UK	1089.72
663 Smith & Nephew	UK	3775.81
664 SmithKline Beecham	UK	71112.08
665 Smiths Industries	UK	4140.26

666	South African Breweries	UK	8032.03
667	Spirax-Sarco Engineering	UK	534.58
668	Spirent (Bowthorpe)	UK	3613.87
669	SSL International	UK	1742.26
670	St. Ives	UK	914.67
671	Stagecoach Hldgs	UK	4407.18
672	Swallow Group	UK	537.05
673	Tarmac	UK	1266.01
674	Tate & Lyle	UK	1784.31
675	Taylor Nelson Sofres	UK	1700.92
676	Taylor Woodrow	UK	821.84
677	TBI	UK	474.12
678	Telewest Communications	UK	12442.43
679	Tesco	UK	19251.61
680	Thames Water	UK	4149.31
681	The BOC Group	UK	9604.45
682	The Sage Group	UK	5134.47
683	The Shell Transport & Trading Co.	UK	82269.76
684	The Wolverhampton & Dudley Breweries	UK	629.77
685	Thistle Hotels	UK	1445.08
686	TI Group	UK	3744.85
687	Tomkins	UK	3299.49
688	Trafficmaster	UK	1847.77
689	Trinity Mirror	UK	2982.83
690	Unilever	UK	48485.66
691	Uniq (Unigate)	UK	1260.50
692	United Biscuits (Hldgs)	UK	1798.64
693	United Utilities	UK	6021.97
694	Viridian Group	UK	1492.50
695	Vodafone Airtouch	UK	357996.91
696	W. H. Smith Group	UK	2186.07
697	Waste Recycling Group	UK	802.08
698	Weir Group	UK	707.77
699	Whitbread	UK	4255.86
700	Williams Plc	UK	3325.05
701	Wilson (Connolly) Hldgs	UK	503.34
702	Wilson Bowden	UK	1051.27
703	WM Morrison Supermarkets	UK	3276.82
704	Wolseley	UK	4794.89
705	WPP Group	UK	12149.33
706	Yule Catto & Co	UK	608.09

APPENDIX C

Effects of Sector Diversification on Accounting Policy Choice

The present study also assesses the diversification effects across different sectors of operations on accounting policy choice. Based on the Standard Industrial Classifications (SIC) codes, Table C.1 reports the distribution of EU firms across different sectors for each sampled period. It can be seen that the aggregate number of sectors of each year is higher than the total number of firms in the full sample (706) due to the fact that the majority of EU firms operate in more than one sector.

Table C.1. Distribution of EU Firms across Sectors

Sector of Operations	91/92	94/95	98/99
Construction	64	79	80
Manufacturing	355	434	452
Mining	45	49	49
Transport & Utilities	125	151	158
Trading	237	288	304
Services	152	198	212
Total	**978**	**1199**	**1255**

As Tables C.2, C.3 and C.4 show, sector of operations is predictably associated with accounting policy choice, with respect to inventory, depreciation and goodwill methods. The F-ratios obtained is significant at the 1% level in all three accounting policies and for all choices of method. The F-statistics are particularly high in the case of depreciation, and especially with respect to unit of production. However, the latter is attributable mainly to the specific behaviour of firms operating in the Mining sector.

Table C.2. Statistical Analysis of Inventory Harmonisation: Effects of Sector Diversification

Models and Effects	Average cost			FIFO			LIFO		
	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	1410.7	1909		1404.9	1909		781.9	1909	
Main Effects:									
2. Sector of Operations	1364.0	1900	7.23	1345.5	1900	9.32	713.4	1900	20.27
Change in Deviance	46.7	9	*(p < 0.001)*	59.4	9	*(p < 0.001)*	68.5	9	*(p < 0.001)*
Interaction Effects:									
3. Diversifications	1310.2	1888	6.46	1310.4	1888	4.21	663.6	1888	11.80
Change in Deviance	53.8	12	*(p < 0.001)*	35.1	12	*(p < 0.001)*	49.8	12	*(p < 0.001)*

Table C.3. Statistical Analysis of Depreciation Harmonisation: Effects of Sector Diversifications

Models and Effects	Straight-line			Declining-balance			Unit-of-production		
	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	202.9	1910		1614.6	1910		290.7	1910	
Main Effects:									
2. Sector of Operations	186.7	1901	18.27	1578.0	1901	4.90	132.6	1901	251.88
Change in Deviance	16.2	9	*(p < 0.001)*	36.6	9	*(p < 0.001)*	158.1	9	*(p < 0.001)*
Interaction Effects:									
3. Diversifications	166.1	1889	19.59	1563.2	1889	1.49	103.4	1889	44.33
Change in Deviance	20.7	12	*(p < 0.001)*	14.8	12	*(p < 0.001)*	29.1	12	*(p < 0.001)*

Table C.4. Statistical Analysis of Goodwill Harmonisation: Effects of Sector Diversifications

Models and Effects	Immediate write-off			Amortised (10 yrs or less)			Amortised (11 - 20 yrs)			Amortised (> 20 yrs)			Permanent capitalised		
	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio	Deviance	DF	F-ratio
1. Conditional Independence	2258.0	1910		1772.4	1910		2318.2	1910		1614.6	1910		217.9	1910	
Main Effects:															
2. Sector of Operations	2226.4	1901	3.00	1753.0	1901	2.34	2305.6	1901	1.15	1000.2	1901	129.75	199.7	1901	19.32
Change in Deviance	31.6	9	*(p < 0.001)*	19.4	9	*(p < 0.001)*	12.6	9	*(p < 0.001)*	614.4	9	*(p < 0.001)*	18.3	9	*(p < 0.001)*
Interaction Effects:															
3. Diversifications	2196.3	1889	2.16	1725.6	1889	2.50	2296.9	1889	0.60	985.5	1889	2.35	192.1	1889	6.23
Change in Deviance	30.1	12	*(p < 0.001)*	27.4	12	*(p < 0.001)*	8.7	12	*(p < 0.001)*	14.7	12	*(p < 0.001)*	7.6	12	*(p < 0.001)*

Comparison of parameter estimates

Tables C.5 to C.7 set out the regression estimates obtained from the sector's main effects and interactions. It should be noted that while the reduction in deviance is a measure of the significance of explanatory factors on accounting policy choice, the estimated regression coefficients indicate the impact of different sectors of operations on accounting policy choice. The significant parameter values at the 1% level are printed in bold in the tables.

Table C.5. Inventory Costing Method: Effects of Sector Diversifications

***Panel 1:* Average cost**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	**4.121**	**1.391**	0.213	**1.289**	0.278	-0.768
Interactions:						
Mining		**-5.116**	**-3.992**	1.338	**2.555**	-0.496
Construction			-1.157	1.223	0.388	0.244
Manufacturing				-0.757	-0.049	0.262
Transport/Utilities					-0.829	0.126
Trading						0.368

***Panel 2:* FIFO**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	-0.809	-0.442	0.697	-0.905	0.461	**1.456**
Interactions:						
Mining		**1.924**	0.976	0.154	**-1.648**	-1.023
Construction			0.272	-0.624	-0.809	**-1.099**
Manufacturing				0.506	-0.494	-0.437
Transport/Utilities					0.255	-0.429
Trading						**-1.042**

***Panel 3:* LIFO**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	1.098	**-5.412**	0.462	1.428	-0.627	-1.181
Interactions:						
Mining		-1.369	0.526	-0.204	0.117	**3.305**
Construction			2.027	1.865	**3.815**	**5.239**
Manufacturing				-0.132	1.144	1.102
Transport/Utilities					-0.623	**-3.038**
Trading						0.652

The results in Table C.5 indicate that mining operations are significantly associated with the use of the Average Cost method, and construction and telecommunications also involve in the propensity to adopt Average Cost method. Interestingly, when a

firm operates across mining and construction, the interaction effect cancels out the main effects, because they have a greater tendency to adopt FIFO. A strong interaction is also evident when firms diversify across mining and trading, but in this case increases the odds of using the Average Cost method. With respect to LIFO, there is also a downward main effect, in this case there are significantly low odds of using LIFO in construction, although when construction firms operate in trading and services, the interaction cancels out this effect.

Table C.6 Depreciation Method: Effects of Sector Diversifications

***Panel 1:* Straight-line**						
	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	13.300	-1.925	-0.319	7.793	-0.491	6.004
Interactions:						
Mining		-6.306	-5.998	0.796	-1.628	-14.510
Construction			7.256	0.189	7.273	0.410
Manufacturing				-2.265	0.996	6.756
Transport/Utilities					1.705	-2.358
Trading						-7.494
***Panel 2:* Declining-balance**						
	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	-1.451	0.346	0.272	0.110	0.605	-0.204
Interactions:						
Mining		**1.210**	0.882	0.629	0.256	1.112
Construction			0.031	**-1.151**	0.591	**1.167**
Manufacturing				0.104	-0.260	0.098
Transport/Utilities					**-0.844**	0.047
Trading						0.357
***Panel 2:* Unit-of-production**						
	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	1.937	-8.426	-9.578	-19.120	-8.909	-8.992
Interactions:						
Mining		-4.713	8.165	11.060	-13.060	-3.094
Construction			4.654	6.876	-4.664	-0.352
Manufacturing				9.114	14.840	6.341
Transport/Utilities					5.049	12.350
Trading						-7.733

The results, shown in Table C.6, demonstrate that firms operating in both construction and either mining or services are significantly associated with the use of the declining-balance method. However, the odds of using the declining-balance method are significantly low when Construction firms diversify their operations in the Services

sector. This is also the case when firms operate both in the Trading, and Transport, Communication and Utilities sectors.

Table C.7 reports the parameter estimates of sector main effects and interactions on goodwill policy choice. The main effects indicate that firms operating in the Trading sector have significantly low odds of using the shortest amortisation period (less than 10 years) and this is strongly associated with the use of the longest amortisation period (>20 years). Firms operating in Manufacturing as well as Services sectors have a greater tendency to use the longest goodwill amortisation period. However, when Trading firms also operate in the Manufacturing sector, the interaction effects cancel out the main effects because they have higher odds to use the shortest goodwill amotisation period and *vice versa* in the case of the longest amortisation period. In addition, the interaction effects demonstrate that when Construction firms diversify in either the Manufacturing or the Trading sectors, the odds of adopting a shorter amortisation period (20 years or less) are significantly high. The results also show that Construction firms are associated with the use of the immediate write-off method when they simultenouesly operate in the Mining sector.

Overall, the above results illustrate that sector of operations is indeed a significant explanatory factor in determining accounting policy choice with respect to inventory, depreciation and goodwill methods. Sector diversification is also an important variable in the choice of accounting methods, especially if EU firms operate in the Mining, Construction or Manufacturing sectors.

Table C.7 Goodwill Method: Effects of Sector Diversification

***Panel 1:* Amortised (10 years and less)**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	-0.456	0.092	-0.265	-0.603	**-0.945**	-0.175
Interactions:						
Mining		-1.230	0.763	-0.174	0.238	**1.604**
Construction			**0.734**	0.362	-0.656	0.149
Manufacturing				0.403	**0.924**	-0.171
Transport/Utilities					0.531	0.397
Trading						0.018

***Panel 2:* Amortised (11-20 years)**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	-0.498	-0.770	-0.040	-0.011	-0.151	-0.145
Interactions:						
Mining		0.027	0.255	0.565	-0.241	0.350
Construction			0.355	0.443	**0.828**	0.098
Manufacturing				-0.242	-0.112	0.123
Transport/Utilities					0.256	0.239
Trading						-0.221

***Panel 3:* Amortised (> 20 years)**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	0.491	0.658	**2.165**	0.543	**2.352**	**1.866**
Interactions:						
Mining		-0.707	0.831	-0.383	-0.181	-1.457
Construction			**-1.618**	-0.025	0.310	0.053
Manufacturing				-0.224	**-1.482**	**-0.998**
Transport/Utilities					-0.089	-0.108
Trading						**-1.227**

***Panel 4:* Immediate write-off**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	0.497	-0.251	-0.056	0.057	0.107	0.179
Interactions:						
Mining		**1.507**	**-1.921**	-0.127	-0.884	**-1.841**
Construction			0.112	-0.383	0.398	-0.101
Manufacturing				-0.228	-0.319	0.048
Transport/Utilities					-0.117	-0.055
Trading						0.159

***Panel 5:* Permanent capitalised**

	Mining	Construction	Manufacturing	Transport/Utilities/Communications	Trading	Services
Main Effects:	-7.130	-0.335	-2.283	-1.547	-0.771	-0.006
Interactions:						
Mining		7.951	0.297	0.531	1.658	-1.244
Construction			-4.574	-4.581	-4.950	-6.957
Manufacturing				-4.310	0.751	0.708
Transport/Utilities					-5.493	0.587
Trading						0.195