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Editorial Volume 6 Issue 1

Abstract

Welcome to the first issue of AABFJ for 2012. This issue is weighted towards finance and economics with a diverse range of geographical regions represented in this issue's offerings. Papers in this issue present studies from Indonesia, Italy, Portugal, Australia, Canada, the UK and the US. A variety of ontological approaches are also present, from social constructionist to the assumed realist approaches of the economics and finance articles.

Keywords

Editorial, AABFJ

Editorial Volume 6 Issue 1

Ciorstan Smark[1]*

Welcome to the first issue of AABFJ for 2012. This issue is weighted towards finance and economics with a diverse range of geographical regions represented in this issue's offerings. Papers in this issue present studies from Indonesia, Italy, Portugal, Australia, Canada, the UK and the US. A variety of ontological approaches are also present, from social constructionist to the assumed realist approaches of the economics and finance articles.

Gaffikin and Lindawati (2012) explore user perceptions of moral reasoning in regard to a code of ethics for audit practice in Indonesia.

From finance, there are two articles relating to earnings management in this issue of AABFJ. Sun and Rath (2012) explore 'benchmark beating' behaviour (using discretionary accruals) in managers of Australian firms. Alvez (2012) examines the relationship between corporate ownership structure and earnings management behaviour in Portugal. La Rocca and Staglianò (2012) examine the relationship between performance and unrelated diversification in listed Italian firms. Finally, Suleman (2012) examines the effects of terrorist attacks on stock prices using data from the Karachi Stock Exchange.

From economics, Karunanayake, Valadkhani and O'Brien (2012) examine the dynamics of cross-country GDP volatility transmission using data from Australia, Canada, the UK and the US and find significant growth spillover between those economies.

Cheung and Powell (2012) complete this issue and provide a somewhat unusual teaching case in showing step by step how value at risk modelling can be performed without access to expensive software.

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The Moral Reasoning of Public Accountants in the Development of a Code of Ethics: the Case of Indonesia

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The Moral Reasoning of Public Accountants in the Development of a Code of Ethics: the Case of Indonesia

Abstract

The objective of this study is to explore the user's perceptions of the role of moral reasoning in influencing the implementation of codes of ethics as standards and guidance for professional audit practice by Indonesian public accountants. The study focuses on two important aspects of influence: (i) the key factors influencing professional public accountants in implementing a code of ethics as a standard for audit practice, and (ii) the key activities performed by public accountants as moral agents for establishing awareness of professional values. Two theoretical approaches/models are used as guides for exploring the influence of moral reasoning of public accountants: first, Kolhberg's model of moral development (Kolhberg 1982) and, secondly, the American Institute of Certified Public Accountants (AICPA)'s Code of Conduct, especially the five principles of the code of ethics (1992, 2004). The study employs a multiple case study model to analyse the data collected from interviewing 15 financial managers of different company categories (as users). The findings indicate that (i) moral development is an important component in influencing the moral reasoning of the individual public accountants, (ii) the degree of professionalism of public accountants is determined by the degree of the development of their moral reasoning, and (iii) moral reasoning of individuals influences both Indonesian public accountants and company financial managers in building and improving the effectiveness of the implementation of codes of conduct. It is concluded that the role of moral reasoning is an important influence on achieving ethical awareness in public accountants and financial managers. The development of a full code of ethics and an effective compliance monitoring system is essential for Indonesia if it is to play a role in the emerging global economy.

Keywords

Moral development, role of moral reasoning, institutional ethics, codes of ethics, Indonesia's public accountants, globalisation

The Moral Reasoning of Public Accountants in the Development of a Code of Ethics: the Case of Indonesia.

M. J. R. Gaffikin[1] A S L Lindawati[2]

Abstract

The objective of this study is to explore the user's perceptions of the role of moral reasoning in influencing the implementation of codes of ethics as standards and guidance for professional audit practice by Indonesian public accountants. The study focuses on two important aspects of influence: (i) the key factors influencing professional public accountants in implementing a code of ethics as a standard for audit practice, and (ii) the key activities performed by public accountants as moral agents for establishing awareness of professional values. Two theoretical approaches/models are used as guides for exploring the influence of moral reasoning of public accountants: first, Kolhberg's model of moral development (Kolhberg 1982) and, secondly, the American Institute of Certified Public Accountants (AICPA)'s Code of Conduct, especially the five principles of the code of ethics (1992, 2004). The study employs a multiple case study model to analyse the data collected from interviewing 15 financial managers of different company categories (as users). The findings indicate that (i) moral development is an important component in influencing the moral reasoning of the individual public accountants, (ii) the degree of professionalism of public accountants is determined by the degree of the development of their moral reasoning, and (iii) moral reasoning of individuals influences both Indonesian public accountants and company financial managers in building and improving the effectiveness of the implementation of codes of conduct. It is concluded that the role of moral reasoning is an important influence on achieving ethical awareness in public accountants and financial managers. The development of a full code of ethics and an effective compliance monitoring system is essential for Indonesia if it is to play a role in the emerging global economy.

Key words: Moral development, role of moral reasoning, institutional ethics, codes of ethics, Indonesia's public accountants; globalisation.

JEL Classification: M41, M42, M48.

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Introduction

As the world has moved inexorably towards the global economy it has become obvious that there exist many national differences which, if left unchanged, may inhibit progress towards a shared universal awareness. The accounting profession has long realised this and has for some time been striving for the international harmonisation of accounting practices notably through the development of international accounting standards such as International Financial Reporting Standards (IFRS). However, business practices are far from universal and there are many infrastructural differences between individual states that have arisen from different cultural, political and social contexts as well as stages of economic development. There needs to be an effective reconciliation of these differences if global consistency is to be achieved. One example, in respect to the harmonisation of accounting practices, is that accountants must have fairly common perceptions as to their functions. Therefore, it is desirable that there be some commonly accepted standards of behaviour; that is, acceptable behaviour in respect of fulfilling their responsibilities to their clients, their profession and their society in general, a large part of which is generally referred to as their standards of professional ethics.

Differences in the levels of economic development or business sophistication have resulted in some nations seeming to lag in the development of effective ethical codes of practice which would serve as the benchmark for acceptable professional conduct. Thus, despite recent concerns resulting from the spectacular financial disaster at the beginning of this century such as interest in the “Enron effect” or the implications of the WorldCom debacle (and the resultant changes in accounting regulation), the accounting profession in the USA has long had codes of professional ethics with which its members are required to comply. However, the accounting profession in Indonesia is far less “developed”. But, as Grace and Cohen have clearly stated, codes of practice “have long been used to establish standards in the professions” and, despite “a certain degree of scepticism about the self-seeking nature of codes” a “profession without one would be an impossibility these days” (1995, p 187). Consistent with this sentiment the International Federation of Accountants (IFAC) some time ago issued a Code of Ethics for Professional Accountants which was recently reissued in a revised form (June 2005, effective June 2006) in the belief that "[A] distinguishing mark of the accountancy profession is its acceptance of the responsibility to act in the public interest". This, they hold is (amongst other things) in order to "contribute to the development of strong international economies by establishing and promoting adherence to high-quality professional standards".

Nevertheless, until very recently such a code for public accountants did not exist in Indonesia. This study was undertaken prior to the development of a code and is a preliminary investigation into some of the difficulties faced by the accounting profession in Indonesia in developing an (internationally) acceptable code of ethics[3]. Specifically, this study sought to determine the perceptions of the ethical behaviour of Indonesian auditors as major members of the professional accounting community. In so doing it proceeded on the assumption that two approaches to assessing ethical behaviour can provide useful guidelines for determining the need for ethical standards, namely, Lawrence Kohlberg’s stages of moral development and the AICPA Code of Conduct.

[3] The Indonesian Accountants Association (IAI) established a code of ethics in October 2008 which was to take effect from 1 January 2010. This code only covers public accountants and not accountants in private industry or the public sector.

The Auditor (as Public Accountant)

An auditor is an accounting professional, who supposedly performs his/her duties in a professional manner. This can be achieved by applying standards or principles of accounting and auditing correctly, and abiding by ethical codes. These regulations and guidelines have been specifically prepared for and enforced by professional bodies on their members. They are intended to avoid any fraudulent or inappropriate conduct and improve professional quality: the ability to cope with difficult situations in a manner beneficial to clients is a reflection of professionalism (Nixon 1994, p.2). Since the spectacular company failures early in this century considerable attention has been directed to the functions and performance of the auditor.

At present, there are many debatable issues relating to the extent to which public accountants appropriately render their services – such as providing information in the form of financial reports. In fact, as economic agents, public accountants frequently face complicated situations and are faced with choosing between their self-interest (the client's benefit) and the public interest (observing rules of conduct). This is a moral dilemma that often poses great difficulties for professional accountants. Consequently, regulations, standards, principles and ethical codes are devised by professional bodies as guidelines to ensure that all public accounting practitioners serve society (users).

In principle, professional accounting body ethical codes have seven aspects, which need to be considered. In the USA, the AICPA has listed these as independence, objectivity and integrity, public interest, responsibility, due care and scope and nature of services (AICPA 1992). Therefore, such codes of ethics are more than just instruments for the maintenance of a moral, ethical and honest image among the public: professional bodies need to ensure that the trust of society is upheld. The maintenance of high professional ethical standards relies on an understanding of the moral reasoning process. This moral reasoning process forms part of the entire moral consciousness of an individual's belief system from which a decision is made when an individual is facing a difficult dilemma (Au & Wong 2000). Hence, in this study, the moral reasoning process of professional accountants is investigated by utilising the theory of ethical development.

Theoretical Development

Most public accountants would not expect their actions to adversely affect the interests of a client. However, it is possible that as a result of strictly following a professional code of conduct a public accountant could damage a client's interests. Hence, most public accountants who desire to protect a client from harm may find that following the code could lead to a moral conflict. On the one hand, taking care of a client's interests disregarding existing ethical rules or values ethics can be considered as prioritising self-interest (improving the financial benefit of the public accountant). On the other hand placing a higher priority on public interest (users) by upholding the ethical rules and values might damage a client's interests. Consequently, these different conditions will create a moral conflict of interest for public accountants.

The actions chosen by professional accountants are determined by the extent to which they understand the meaning of and utilise codes of conduct and the principles underlying them. Moral reasoning as a development process of the moral levels of public accountants (from cognition-judgment to moral action) will influence decision making of public accountants in action.

Moral reasoning can be defined in terms of the arguments about how people should act or in terms of providing reasons to justify or criticise behaviour. The reasoning is offered

to show why an action is believed to be wrong or why that judgment is thought to be correct. Thus, moral reasoning involves offering reasons for or against moral beliefs in an attempt to show that those beliefs are either correct or mistaken (Fox & DeMarco 1990, p.4). Furthermore, the definition of moral reasoning is an argument that means a reason or a series of reasons that aims to support a particular claim, which is called the conclusion. Hence, these arguments consist of reason and conclusion (Thompson 1998, p.5). For example, in respect of particular ethical issues, moral reasoning arises from demonstrating an action or behaviour, which is a response to the question "what ought I to do", not "what shall I do"? It also involves several issues such as, considering the consequences of various courses of action, or some weighting of the conflicting responsibilities, and attempting to come to a conclusion on the issues (Thompson 1998, p.6). From the definition above, it can be concluded that reasoning consists of three points of view, namely: (a) thinking about what people should do and why people should do it; (b) forming ideas to describe and evaluate actions, and (c) judging a particular action by means of a general rule.

In addition, moral reasoning is an argument (of an individual) that has the objectives of explaining the process of that individual's ethical decision making, or describing a process of establishing behaviour or action based on individual moral judgment (cognition-judgment-action process). Thus, the moral reasoning process of an individual can also be understood by examining how individuals internalise moral standards (Adams, Malone & James, 1995, p.3).

Lawrence Kohlberg (1969) developed a theory of moral development with roots in the work of Swiss psychologist Jean Piaget which he intended to be applied to moral education. His ideas have since been applied to analysis of moral development in many areas and disciplines. For example, Velasquez (2002) uses it as a basis for evaluating virtue and particularist theories (of ethics in business). Despite it having its critics[4] it was felt to be an appropriate basis for this study as it is concerned with determining the degree of moral consciousness or awareness which can serve as the foundations for a (regulated) code of professional ethics. In addition, as Thomas (2004) has suggested, it deals with the extent to which ethics "can develop in later stages of life" (p 32). According to Kohlberg (1976), moral development occurs at three levels with each level having two distinct stages. These stages determine the level of moral reasoning used by individuals in distinguishing right actions from wrong actions. Level 1: *Preconventiona*l, contains stage 1 – physical consequences of actions, avoidance of punishment, and stage 2 – satisfaction of one's own needs. Level 2: *Conventional*, involves stage 3 – desire to please others and stage 4 – respecting authority and preserving the rules of society. Level 3: *Post-conventional* embraces stage 5 – morality of contracts, individual rights and democratically accepted law and stage 6 – universal moral and ethical principles (Kohlberg 1976). Furthermore, Kohlberg maintains that these stages are sequential such that a person does not enter into a later stage until they have passed through each of the previous stages.

Based on statements of the objectivity of moral reasoning it can be stressed that moral reasoning is influenced by levels of an individual's moral development. Thus, the higher the individual moral development is the higher her/his level of moral reasoning (this is consistent with the work of Rest, as described by Thomas 2004, p 32). Consequently, the higher level of moral reasoning will influence an individual's ethical decision making behaviour or actions and hence supports an individual's choice of whether or not to apply rules of a code of conduct with full awareness. Thus, the process of moral reasoning is specifically the process of an individual's moral reasoning in respect of conscious ethical decision-making.

[4] Subsequent to its publication in the early 1980s there was considerable interest in Kohlberg's work and it attracted support and criticism. There were many studies in many disciplines employing his analytical framework published in the last decades of the 20th century. While interest seems to have waned we believe it was still a useful basis for our analysis. (cf Dellaportas 2005, chapter 2)

Moral Reasoning as the Basis for a Code of Ethics

In this study, moral reasoning in the context of a moral argument is defined as the arguments about how people should act or give a reason to justify or criticise specific behaviour. Suggestions are made to show why one kind of action is believed to be wrong or why a judgment is thought to be correct (Fox & DeMarco 1990). There are several presuppositions in this study including the following.

1. Consciousness of public accountants is defined as the extent to which the moral reasoning of public accountants influences ethical decision-making (judgments of good or bad and of right or wrong behaviour) towards the upholding of a principal code of conduct.
2. The principles of a code of conduct contains seven ethical "standards" for professional accountants that address moral and ethical behaviour regarding activities, attitudes, and procedures involved in most aspects of professional conduct.
3. The attributes of codes of conduct will be designed in such a way as to monitor and measure performance of public accountants.
4. The key factors of the level of moral reasoning of professional public accountants are defined in respect of the increase in the level of individual moral development of public accountants.
5. Key effectiveness is defined as the adherence of public accountants to appropriate codes of conduct, and consequently, the improvement in the implementation of codes of conduct is achieved.

Research Design

The research comprised interviews of fifteen financial managers of three classes of companies in Indonesia. The company classes were "family owned companies" (FOC), "state owned companies" (SOC) and multinationals, or "foreign owned companies" (FrOC). Because of issues of access and availability the companies were not randomly chosen. The financial managers of the companies were selected for interview because they are in effect the chief financial officers and as such would have been involved in appointing the external auditors as well as working sufficiently closely with them to be able to assess their performance. In addition some internal auditors were interviewed as they too would have worked closely with the external auditors and have had some opportunity to observe their performance. The same questions were addressed to all financial managers but were supplemented by informal discussion.

In the study, the discussion regarding implementation of ethics in accounting practices focused more on the specific scope of ethics in ethical codes or principles of conduct for professional public accountants (AICPA 1992; 2004), and utilised qualitative methods to resolve the ethical codes problem. According to Lemon (1996), qualitative methods are several lines of empirical research that enable researchers to examine the behaviour of professional public accountants in relation to culture, social issues, gender issues, environmental issues, employment issues such as downsizing, codes of conduct and cooperative morality. Thus, in this study, a qualitative approach is used to explore the existence of problems. It forms part of what Denzin and Lincoln (2003, p 3) have referred to as the "moral discourse" and results in a (sort of) "sacred textualit(y)" – a professional code. A case study-type analysis is used to explore the factors that influence the consciousness of professional public accountants in performing in accordance with principal codes of conduct,

and how professional public accountants improve effectiveness in the implementation of suitable principles codes of conduct.

In so doing, two groups of variable categories are used in this study: independent variables and dependent variables (presented in Table 1 Summary of Variables and Table 2 Overview of Dependent Variables). The independent variable is the levels of moral development of professional public accountants in Indonesia. The dependent variables are five parts of the code of professional conduct of the AICPA, namely; independence and objectivity; integrity; due care; public interest and scope and service of nature.

Table 1
Summary of Variables

Classificatory Variables	- Dependent variables - Independent variables
Independent Variables	The performance of Professional Public Accountants in Indonesia.
Dependent Variables	-Independence & Objectivity. -Integrity. -Due Care -Public Interest. -Scope & Services of nature.
Performance & Measurement Variables	-The code of professional conduct in Indonesia called SPAP (Standard Auditing of Public Accountant) -MID (Moral Individual Development)

Table 2
Overview of Dependent Variables

Variables of independence, objectives and integrity (Rule 101-102)	1. Independence and objectivity 2. Integrity
Variables of Professional Due Care (Rule 201-204)	1. Competence 2. Auditing Standards 3. Accounting Principles 4. Forecasts
Variables of Responsibility to Client (Rule 301 – 302)	1. Confidential client Information 2. Contingent fee
Variables of Responsibility to Colloquies (Rule 401-402)	1. Encroachment 2. Offers of employment
Scope and Nature Service (Rule 501-505)	1. Act discreditably 2. Solicitation and advertising 3. Commission 4. Incompatible Occupations 5. Form of Practice & Name

Source: Adapted from Loeb 1978, pp.114-116

As a result, auditors can make decisions regarding ethics in real professional work. Hence, there are three levels in the model of individual moral development, employed in this study: pre-conventional level; conventional level; and post-conventional level (Kohlberg 1976). Additionally, five variables were analyzed with the use of the data collection in the survey and observation. To answer the research question use of a multiple case study with

five cases studies (based on the principles of the code of conduct. AICPA 1996) and three typologies of companies (foreign owned companies, state owned companies and family owned companies) were used. These variables were operationalised in the interview schedules used. To enhance the analysis, process questions pertaining to variables are repeated in interview schedules. Moreover, the interview approach adopted for this phase of the research is that advocated by Emory (1985), Sekaran (1992) and Yin (1989).

Analysis

All the data gathered from the interviews of fifteen companies in Indonesia, (three kinds, viz foreign companies, government/state companies and family business) were analysed according to the methods suggested by Yin (1989). This involved analysis using a cross case study technique, namely pattern matching and explanation building (Yin 1989). Pattern matching involves the comparison of the findings with the predicted pattern of specific variables as defined for the classificatory variable. Lack of precision is a limitation in this method, as interpretive discretion is exercised by the researcher in deciding whether there is a pattern matching by providing theoretical replication. Cross-case results provide more robust explanations. Furthermore, explanation building is the analysis of the case study data presented in narrative form. The explanations attempt to stipulate a set of causal links about some observed phenomena. Limitations of this type of method include the fact that links may be complex and difficult to measure in any precise manner and narratives may tend to drift away from the issues. The study uses the model of the AICPA Code of Professional Conduct and moral reasoning theory and focuses on upholding of the ethics codes, responsibilities and duties by the Indonesian public accountants.

This analysis is organised as follows; first, the data description of five ethics codes, which provide a sketch of the performance of ethics codes in Indonesian companies (case report), then, secondly, a discussion of an ideal measurement, which is in line both with the accounting (IAI – Indonesian Accountants Institute) body's rules and standards and with the measurement results of those three types of companies. The analysis then makes use of two approaches, namely; first, individual analysis using the approach of moral theory (i.e. moral reasoning), and, secondly, a professional approach with special reference to the existing standard rules and ethics code, the IAI's SPAP (Audit Standards of Public Accountants).

DATA DESCRIPTIONS & MEASUREMENT

Various aspects of ethics codes of accountants and auditors will be discussed. The discussion is based on the data collected in various ways from some sources such as in-depth interviews, observations and documents. There are two aspects to the interview results. First, the criteria for the selection of the particular public accountants/auditors by fifteen financial managers in the three categories of companies. Secondly, the interview results explain the perceptions of the five principles of ethics codes for public accountant/auditor by the three categories of companies (users), and which is based on the IAI's SPAP.

The results from the interviews (summarised in the Tables appearing in the appendices to this article) can explain many different perceptions in each of the company categories. These differences in perceptions emerge from the difference in the interpretations of the financial managers of each company about the code of ethics (SPAP-Standards Auditing of Public Accountant) in Indonesia. In addition, the interviews disclosed many interpretations of the users (15 financial managers) of the practices of public accountants/auditors in respect of the application of ethics codes in each level of company. Furthermore, the interviews indicated the extent to which auditors/public accountants will

comply with the ethics codes and in which level of company. Therefore, the study will need standard measurements for determining the extent of compliance by public accountants and auditors with the ethics codes, as well as the level of other services they provide to the company or users. These measurements have two aspects. The first, a measurement based on the professionalism of the auditor/public accountant and, the other, the measurement of the individual auditor's level of moral reasoning in accordance with Kohlberg's theory of the development of moral reasoning.

The Professional Approach

The professional approach (measurement of professionalism) used to analyse cases in this study has been guided by the standards implicit in ethical codes. The key factor of the professional approach is the implementation of the standards that consist of the five principles of ethics that the public accounting profession regulates and that guide auditors to achieve high levels of professional performance. The ethical-code standard increases the professionalism of public accountants in respect of a greater awareness of, and compliance with, the modes that have been agreed upon by the accounting bodies (in Indonesia, the IAI). However, as alluded to above, there is a possibility of a conflict of interest in regards to whether to accommodate the interests of the clients, the accountants, or the public.

Investigations showed that there are many instances of different perceptions of ethical codes standards held by the FMs (financial managers) in the family owned companies (FOC) and government/state owned companies (SOC). This raises questions regarding the requirements of the code of ethics such as:

1. Have the auditors been truly independent in appearance or independent in performance?
2. Have the auditors implemented their responsibilities in a professional manner, particularly the external responsibilities?
3. Have auditors increased the quality of the audit or are they going to improve knowledge and ability as a part of the professional workers in their area?
4. Have the auditors provided other services under other principles of the ethical codes? And to what extent is the auditor's duty as an auditor to audit the financial report of the company as well as provide other services such as being a consultant in various aspects?
5. Have the auditors in the institution (BPKP- The Supreme Government Audit Department) been independent in appearance and performance (in fact) during the sole time regulation of the maximum of 2 years of auditing?
6. Have the auditors implemented the fifth principle, scope and services, properly?

Responses to the questions indicated that violations of the code of ethics primarily occurred in the FOC category and are caused by a lack of understanding of companies and the extent to which the auditor's practices are confined by the standards (assumption 1). Another cause of non-compliance is the failure of auditors to grasp the purpose of the ethical code standards (assumption 2). More importantly it is apparent that auditors take advantage of the companies that have a lack of knowledge of the code of ethics (assumption 3). The next cause of non-compliance is that the standards might not be appropriate for implementation in Indonesia (assumption 4). Last but not least, collusion, cronyism, and nepotism are wide-spread in Indonesia particularly in the government institutions. This phenomenon is also evident in the government institutions of BPKP (assumption 5) so it is little wonder that they find it difficult to promote healthy practices.

The cases in the companies in the foreign-investing category (FrOCs) were considered to be not significant in the sense that they were found not to have violations of the ethical codes.

It is important to explore the five assumptions mentioned above, in order to find a solution to the problem of non-compliance or an improvement in the rate of compliance with the ethical codes. Regarding the first assumption, it is expected that, first, a financial manager and the people who work in the financial area would have substantial knowledge through continuous improvement in formal and informal education, secondly, the auditors should not choose work based only on the biggest fee, while he/she neglects professionalism and, thirdly, the period of contract between auditors and the companies is not too long, even though it is true that the longer a public accountant stays in a company, the more adaptable he/she becomes to the situation and problems confronting the company. Hopefully, these findings will stimulate the IAI into being more sensitive to the issues, outward looking and able to anticipate the problems as they arise in the world of practice.

The second assumption addresses the issue of the ability of the auditors to understand the meaning of the ethical codes. Any increased understanding of the ethics codes will increase and improve the capacity of the auditors to recognise and confront ethical dilemmas through education and the obtaining of sufficient relevant experience.

The most important recommendation for the IAI (which currently governs all Indonesian accountants) is to determine reliable criteria to determine minimum standards of professional public accounting practice. The third assumption is derived from the insufficient knowledge in the company of ethical (and other) considerations that leads to the auditor violating the ethical codes; this needs to be addressed. This condition cannot be ignored since it will serve as a strong incentive for the auditors to extend dubious practices to other companies. Again, this is the responsibility of the IAI to alleviate this problem by exercising proper sanctions against public accountants violating the ethical code standards.

The fourth assumption is a problem that questions whether the standard fits with the conditions in Indonesia and thus, fits overall the companies in every category. Obviously, this is a matter that needs to be addressed and as the global movement proceeds there will need to be a reconciliation of the specific requirements and conditions to the expectation of the global community.

So far, the five principles are generally described so can only be grasped by companies that have knowledgeable people in the accounting and financial area (foreign-owned companies - FrOC). The last assumption addresses the issue of collusion, cronyism, and nepotism occurring in the BPKP as the institution that governs auditors of government-owned companies. With the changes in the political situation, this phenomenon is no longer a secret for Indonesian society. The majority of Indonesian people question the credibility of accountants. There have been very critical issues since independence and the objectivity of accountants has been questioned. In order to reduce this public cynicism it is important to involve the government in creating regulations associated with guidelines for appropriate professional practice and to execute appropriate punishment for non-compliance with or violations of the ethical codes. Part of the problem here involves the question of auditor (accountant) independence and was an issue of grave concern in the United States in the 1990s and resulted in increased activism by the regulatory bodies, especially the SEC (Securities and Exchange Commission) under its then Chairman, Arthur Levitt. However, collusion, cronyism and nepotism is probably far more evident in Indonesia so there needs to be a concerted joint effort by government and professional regulators to develop regulatory structures that draw attention to the seriousness of winning public confidence in the work of accountants. This will mean that a violation of the ethical code is not only a violation of the

profession that will result in punishment from the Indonesian accounting body, the IAI, but also a violation of the country's regulations. Hence, the development and improvement of the regulations, either from the government or the accounting body, is expected to enhance the professionalism of every professional accountant.

The Individual Approach

An individual approach is that which emphasises the genuine ethical behaviour arising from the individual principles of accountants as human beings, members of a society. In other words, the way of thinking is influenced by the values, morals or inner principles of an individual which are influenced by their conscience. In this analysis, based on the interviewees' perceptions, there emerged several assumptions that relate to the auditor's violations of their code of ethics. Below are details of these assumptions that interviewees perceived auditors made.

1. The auditor's assumption is that there would only be light sanctions imposed by accounting bodies on auditors who commit violations.
2. Auditors believe that they can earn more if they are more respectful towards the rights of others.
3. It is believed that auditors have to be responsive to their clients in order to warrant their clients' approval.
4. Auditors need to adopt social rules without further considering the underlying ethical principles involved.

Thus, any violations of the code of ethics are primarily based on the four assumptions above. The first assumption emerges because the accounting body has little disciplinary power in responding to the violations that occur. In addition, there are no clear rules in regard to the mechanism for sentencing and the court processes in regard to violation cases. The individual's process of moral development that emerges from punishment (stage 1) cannot be applied in this case.

The second assumption emerges because auditors assume that if they act respectfully towards the rights of others, such as being loyal to a client, they will get more respect as well as business from the client. In this case the assumption tends to be self-serving. Additionally, the "right" behaviour is the behaviour that can satisfy an individual's needs. Hence, an individual's process of moral development in this stage will result in an awkward situation because on one side auditors have to be loyal towards their client companies and on the other side, auditors also have a responsibility towards the public. Auditors, therefore, often face moral dilemmas and there are many violations of their duty (stage 2).

The third assumption emerges because auditors assume that a "moral situation" occurs because each person has to demonstrate consideration towards others (stage 3). This condition makes auditors less distinct in implementing the code of ethics. For example, auditors as members of the professional body often are placed in a paradoxical situation; they have to balance against two conflicting sides. On the one hand, auditors have to reject every violation of the code of ethics, but on the other hand, they have to permit these violations. Another example would be the reluctance of auditors to report the violations of their peers.

The fourth assumption emerges because auditors, as members of society, have to defend the social rules as well as law and order at their highest value. It is obvious that auditors' morals are developed from the rules and cultures of their society. In other words, auditors have been adopting many social rules as part of their process of moral development. As a matter of fact, auditors sometimes forget the importance of applying the principle of ethics in their practices. For example, an unethical social environment relates to the theory of social psychology, whereby an individual is seeking to conform to the environment and

develop trust towards society. In this case, trust means that if there are differences in their individual beliefs, auditors tend to refer to what is "right" in society. Thus, the process of moral development until this fourth stage can be one of the reasons why auditors may sometimes violate the code of ethics.

Hence, after exploring the four assumptions above, several potential solutions can be generated. First, there has to be a clear and distinct statement of the sanctions that the IAI, as the official body of professional accountants, may impose on its members. Moreover, there is a need for a good system of court processes available to the BPP and the DPP. Sanctions could be imposed in several steps, such as a letter of warning, to suspension or dismissal from membership of the IAI (the accounting body).

The existing code of ethics needs to be reviewed. Interpretations of the existing code and the results of cases or complaints against accountants by their peers or the public in general, need to be published. In addition, a hierarchy of needs has to be included in the implementation of ethics. To implement the existing principles of ethics, what is needed is the ability to identify some ethical issues and make some predictions about the effects of some decisions, and also to explain the determination of the ethical issues from different perspectives, in the context of time, place and environment.

An individual practitioner needs to be able to justify the effect of his/her ethical decisions.

The two forms of analysis – professional and individual - are closely related. Both analyses explore violations of and avoidance by auditors in applying the rules (the ethics codes). There are two areas of influence on auditors. There is first their position as a part of a group of professionals (members of a professional accounting body), to which they have to have an obligation to comply with the rules of professionalism (the ethics codes), and, secondly, their position as humans, in which they also have the unwritten rules (way of life) of society and are mostly influenced by their consciousness, culture and religion.

Specific Findings and Contributions

This research revealed several findings which are set out below. The findings have been classified in respect of how they relate to various aspects of the study, namely, the development of moral reasoning generally, the moral reasoning of public accountants, the activities of public accountants and financial managers and in respect of the determination of a code of ethics. These findings are offered as contributions to understanding the issues involved and as suggestions for consideration by the Indonesian policy makers.

First, there are the findings of this study that relate to the moral development on the basis of the moral reasoning process. These include the conclusions that moral behaviour depends on:

- the prospect of any punishment and the desires of the individual.
- the social norms and the rights of others
- the law and responding to the obligation of duty (in a deontological sense)
- a social contract orientation such as, equality and human dignity, and also respect for universal principles such as values, truth, honour and integrity (in a virtue theory sense).

Secondly are the findings of this study that relate to the level of the public accountant's moral reasoning as a moral agent. The public accountant, as a member of society, has the ability as a professional to be involved in the four processes of the development of moral reasoning as an ethical decision maker. As was mentioned earlier, Kohlberg (1969) states that the theory of moral development is one of the most widely used approaches in the examination of moral reasoning. According to him the level of moral reasoning development is influenced by:

- the age level
- the education level
- the environment or situational level

Thirdly are the findings of this study that relate to the key activities performed by both the Indonesian public accountants (members of IAI) and the financial managers and which can be used to build and improve the effectiveness in the implementation of the principles of a code of conduct for professional practice. They have sufficient knowledge, especially in understanding the meaning of the ethics codes to make continuous improvement through education and obtaining relevant experience in this area.

It is advisable that the period of contract between the public accountant and the companies is not too long. This conclusion is consistent with many recent recommendations of regulatory bodies in many parts of the world (eg. Sarbanes Oxley requirements).

Codes of ethics are appropriate to be followed by accountants dealing with all categories of companies in Indonesia. There should be no exceptions as the ethical principles are relevant to activities of all Indonesian companies despite the variation in form and function, that is, family owned or state owned or other ownership structure.

Given the current "stage of development" of Indonesian business organisation it is advisable that the government be involved in creating regulations in respect of ethical guidelines or more formal pronouncements. Once again this conclusion is consistent with current developments in many other countries post-Enron.

Fourthly, there are the findings of this study that relate to the establishment and improvement of ethics codes. Control of public accountants by BPKP, BPP, DPP, and the Public Accountant Compartment should be increased and properly managed. Meaningful punishment or sanctions against violators of the codes should be implemented and enforced. Less negative steps could also be implemented such as greater communication to public accountants advising them of the importance of respecting professional practice. This should also include encouragement to partners and senior management to educate their staff about the need to avoid ethical code violations. Obviously leading by example would be beneficial but there is also the need to make staff aware that the firm values ethical professional conduct. Systems of monitoring and control of staff behaviour could supplement the education programs. Most importantly the IAI, as the major responsible professional body, would need to clearly demonstrate continuous upgrading of its required standards of professional behaviour. Many professional bodies around the world have mandatory continuing professional development. As part of such a program the IAI could have regular courses on what constitutes best professional ethical behaviour. In addition it would be necessary to have effective monitoring of compliance with the ethics code.

General Contributions

In addition to the specific findings above there are some more general inferences that can be drawn from this study. These also relate to Indonesian audit theory and practice and are grouped under similar headings to the specific findings. Although many are similar to the specific findings it is felt they are of a more general nature.

First, in respect to a code of ethics there needs to be far greater general awareness of its purpose and the intentions behind it; the need for and the importance of compliance with a code. This awareness should not be restricted to public accountants but should extend to the business community and probably the public at large as potential stakeholders. However, any code has to be properly drawn up and subject to continual improvement and relevance to the practice of accounting. Perhaps there needs to be a validation of the five standards/principles

for every category of company – the relevance question. As indicated above, there needs to be effective and efficient assurance of application of the code and compliance with it.

The aim would be to significantly influence the practices of public accountants and internal auditors without inhibiting the free flow of appropriate market forces. This is, of course, a difficult question but a balance needs to be derived in order to instil confidence of prospective investors – internal and international – in the practices of accounting and auditing in Indonesia. While to some this may seem obvious it is important to stress this to accounting practitioners. The professional dilemma – the balance between the interests of the client and the public – are ever present but often not so obvious to those within organisations, in this case, those involved with the internal audit function.

Secondly, an awareness of moral development theory would create a formal morality, and hence contribute to the adherence to principles of conscience of the individual, comprehensive and universal. It bestows a higher value in the degree and equality of rank to an individual's life. It would enhance public interest through expressing ethics to the public in order to increase public care, public alertness, and public awareness. Not only would it influence the public accountant's professional behaviour it would create a greater consciousness of the importance of ethics in his/her personal life.

Thirdly, there are implications for audit practices in Indonesia's companies. For example, it would require increased co-ordination and control of public accountants by the Ministry of Finance, BPKP, BPP, DPP and the Public Accountants Department which, in turn, would necessitate cooperation between these regulatory bodies. The imposition of severe sanctions by the IAI and the government for ethics codes offences would first require government regulation or intervention and an explicit statement of likely sanctions from the courts of law if there was to be a violation[5].

With the increased cooperation of the regulatory bodies there would be an improvement in the public accountants' professional practice; the emphasis on the importance of codes of ethics would result in (written) documentation of statements of "acceptable" professional behaviour. If this was to be continually updated it would make accountants more aware of the need for ethical behaviour and the importance of encouraging their staff to provide solutions to ethical problems.

A Preliminary Study

The research reported here was a modest study yet it deals with problems of global concern. We acknowledge there are some limitations in the study that arise from the fact that the research relates to an Indonesia case study selection. Audit regulations in Indonesia are few and at the time of the study were contained in the one general standard, SPAP. The research did not canvas all public accountant audit activities but only those related to issues connected with ethics. Secondly, in Indonesia, the relationship between the public accountant and the financial manager of a company is very specific and arises from many factors too difficult to fully categorise. A major characteristic of most public accountants in Indonesia is their lack of knowledge of ethics codes and a lack of awareness in implementing audit practices that in more developed economies would be regarded as standard practice. Moreover, a major characteristic of most financial managers of companies in Indonesia is that they have little knowledge and experience in understanding and preparing company financial reports. Thirdly, there were demographic limitations to the data collection. Due to time (and resource)

[5] As indicated earlier there is now an Indonesian code but to date its application is to public accountants only. To date there is no evidence - no study has been undertaken - of the impact of the code on the practices of public accountants.

constraints, data was gathered only from interviews of fifteen companies (in the different categories) situated in major cities on the island of Java, viz Jakarta, Surabaya and Malang.

Conclusion

Despite these limitations this research was involved with an issue of global concern and is one of the very few studies to examine the concern in the context of a developing economy. There have been some studies generally related to this subject of this study. For example, Tsui and Windsor (2001) compared ethical reasoning of Chinese and Australian accountants. Endicott, Bock and Navarez (2003) examined moral reasoning in a cultural context. However, neither work addresses moral reasoning, ethics and accounting in the developing economy context. Similarly, while Clements, Neill and Stovall (2009) investigate the impact of cultural differences on international accounting codes of ethics they too do not specifically address the case of developing countries (nor moral reasoning).

In the study, two elements of analysis were used to examine the problem of non-compliance with codes of ethics and unethical business behaviour - professional analysis and individual analysis. They complement each other. Individual analysis is used to assess an individual's level of moral development which will determine their awareness of ethical issues. An auditor/public accountant is an individual who has membership of a professional body which expects members to behave professionally and in accordance with its rules and codes of conduct. The level of moral development is an indicator of the accountant's awareness of the significance of a code of ethics and the likelihood of compliance with it. The professional approach is concerned with the degree of compliance with professional codes; in this instance the code of ethics. Thus, the two approaches are the two side of the same coin: moral development indicates awareness of the significance of professional ethics and determines the extent of compliance. Conversely, non-compliance may not necessarily indicate poor moral development as the code of ethics needs to be constructed in such a manner as to be appropriate and relevant to professional conduct.

The results of this study suggest that there is both a low level of moral development in Indonesian accountants and a lack of an appropriate code of ethics to guide accountants' actions. Thus, if Indonesia is to participate fully in the global economy with its attendant free flow of capital and investment the profession and the government have much work to do to establish an infrastructure that will provide international investors with the confidence to make investments. In so far as this study is concerned, an important element of this infrastructure is an appropriate code of ethics and a system for ensuring compliance with it. The US is a major player in the global economy so the code of ethics it has established for its accountants is a good model with which to start. Therefore, the elements of that code were used in this study.

However, there are major ontological and epistemological questions not addressed in this study. These involve issues surrounding the desirability and the implications of globalisation; the determination of appropriate professional behaviour across different cultures; the usefulness of professional codes of ethics especially in a global environment; the ideological bases of differing economic systems; the relationship between the regulatory bodies within an economy; and other factors.

Graham and Neu (2003, p 449) tell us that "The age of globalisation is upon us". However, they caution that despite the attention paid to globalisation "gaps still exist in our understanding" (p 449) of it. Also, "detailed research is required into the concrete and specific mechanisms that constitute globalization" (p 450). This study is one such attempt. Political change in Indonesia has ushered in greater political freedoms. A desired consequence is that responsible economic management will lead to increased economic

development to allow Indonesia to become part of the global economy. As indicated above, this necessitates greater assurance to global investors in the quality of the accountability – the financial information provided them. The age of "crony capitalism" must be seen to have died if investors are to have full confidence in any investment in the country.

This begs the question of the efficacy of codes of ethics but that is beyond the scope of this study. Black (2004) has suggested that "fundamentalist believers in the efficient markets hypothesis consider all accounting irrelevant". However, he continues that many recent debacles (he cites the Savings and Loans case) should have put an end to extreme views and "the current crisis in which control frauds have deceived investors for years to the tune of billions of dollars of fictional capital has shattered the remaining hubris". Thus, the use in this study of the US ethical codes as a desirable model may well be questioned. However, it is not the codes that are defective so much as the operation of them and these frauds in the US have resulted in greater regulation of accountants. Indonesia could do well to have tight regulations before such a situation arises. Cultural factors are an important consideration as the collusion, nepotism and cronyism, referred to earlier, have been in existence for some time and may well be entrenched in some business behaviour. Analysis of moral development and the development of a professional code of ethics will hopefully remedy such a situation.

There is a dilemma for the accountant in deciding between the client's interest or the public interest. Black (2004) has suggested this may be a bigger problem in smaller firms as the need for bringing in and maintaining clients is less in the public sphere. This could lead to what he sees as a variation in Gresham's law: "bad accounting can drive good accounting out of circulation".

The research findings of this study provide useful information for the principal professional accounting regulator, the IAI, to encourage the development of sound ethical regulations and surveillance. It also provides useful information for the financial managers who need to build and improve knowledge of accounting practices. And, finally, it provides useful information for public accountants who will increase professionalism in their practices. As Black says:

"Audit partners have to rediscover the professional and ethical restraints that once made them symbols of rectitude"(2004).

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Appendices

Table 3.
Auditor Selection Criteria of Interviewees from FOCS

The five Financial Managers of "Family-Owned Companies"	Key reasons: • *Good services by public accountant (auditor firm)* • *Loyalties, care and independent* • *Cheaper fees* • *Confidential*

Table 4.
Auditor Selection Criteria of Interviewees from SOCS

The five Financial managers of "State-owned Companies"	Key reasons: • *Professional skill* • *High integrity* • *Independence* • *Loyalties* • *Time limitation* • *Confidential* • *Objective*

Table 5.
Auditor Selection Criteria of Interviewees from FROCS

The five Financial managers of "Foreign-owned Companies"	Key reasons: • *Independence* • *Objectivity* • *Integrity* • *Professional skill* • *Confidential* • *Responsibility to user*

Table 6.
Auditor Selection Criteria of the Interviewees from Three Categories Companies (Summary)

• Good services	5 interviewees = 33.3%
• Loyalty	15 interviewees = 100%
• Independence	15 interviewees = 100%
• Care	5 interviewees = 33.3%
• Cheaper fees	5 interviewees = 33.3%
• Integrity	10 interviewees = 66.6%
• Objectivity	10 interviewees = 66.6%
• Professional skill	10 interviewees = 66.6%
• Limitation time	5 interviewees = 33.3%
• Confidential	15 interviewees = 100%
• Responsibility	15 interviewees = 100%

Table 7.
Reasons for Auditors Implementing the First Ethics Code (Independence and Objectivity) by FOCS, SOCS and FROCS (User Perceptions)

The five Financial Managers of "Family – owned Companies	Key reasons: • *Fairness* • *Avoiding the relations that can lead to bias and negative impact on audit result.*
The five Financial Mangers of "State-owned Companies"	Key reasons: • *Fairness* • *Objectivity* • *Independence* • *No family relations, financial and any personal interest* • *Auditor has limitation time max 2 years to change regularly.*
The five Financial Managers of "Foreign-owned Companies"	Key reasons: • *Fairness* • *Objectivity* • *Independence* • *No family relations, financial and any personal interest* • *No priority towards self-interest and groups* • *Free from conflict of interest.*

Table 8.
Independence and Objectivity (Summary)

Fairness	15 interviewees = 100%
Free from bias and other negative impact	15 interviewees = 100%
Independence	10 interviewees = 66.6%
Objectivity	10 interviewees = 66.6%
No relationships; family, business, financial and personal	10 interviewees = 66.6%
No priority towards self-interest and groups	10 interviewees = 66.6%
Time limitation to change regularly max 2years	8 interviewees = 50%
Free from personality and conflict of interest	5 interviewees = 33.3%

Table 9.
Reasons for Auditors Implementing the Second Ethics Code (Integrity) by FOCS, SOCS and FROCS (User Perception)

The five financial Managers of "Family-owned Companies"	Key reasons: • *Honesty* • *Clarity* • *Fittingness of Financial Report* • *Client confidentiality*
The five Financial Managers of "State-owned Companies"	Key reasons: • *Honesty* • *Clarity* • *Confidentiality* • *Trustworthy* • *High loyalty*
The five financial Managers of "Foreign-Based Companies"	Key reasons: • *Honesty* • *Clarity* • *Trustworthy* • *Adhere to the rule of the standard auditing* • *High loyalty to profession*

Table 10.
Integrity (Summary)

Honesty	15 interviewees = 100%
Clarity	15 interviewees = 100%
Client confidentiality	15 interviewees = 100%
High loyalty to profession	10 interviewees = 66.6%
Fittingness of Financial Report	5 interviewees = 33.3%
Trustworthy	7 interviewees = 45%
Follow the rule of auditing standards	5 interviewees = 33.3%

Table 11.
Reasons for Auditors Implementing the Third Ethics Code (Responsibility) by FOCS, SOCS and FROCS (User Perception)

The five financial Managers of "Family-owned Companies"	Key reasons: • *Responsibility to user (company)* • *On time* • *Responsibility to all services*
The five Financial Managers of "State-owned Companies"	Key reasons: • *Responsible for punctual audit practices* • *Responsible for user to understanding of financial report* • *Responsible for objectivity of financial report information ot public and user* • *Responsible for result of financial report*
The five Financial Mangers of "Foreign-owned Companies"	Key reasons: • *Responsible for maintenance of public trust.* • *Responsible for work relationship with others auditor* • *Responsible for increase of public interest* • *Responsible to give objective information to all users of the Financial report*

Table 12.
Responsibility (Summary)

• Responsible for user (company)	15 interviewees = 100%
• Responsible for other user of financial report	10 interviewees = 66.6%
• Responsible for all services	5 interviewees = 33.3%
• Responsible for punctual audit practices	10 interviewees = 66.6%
• Responsible for maintenance of public trust	5 interviewees = 33.3%
• Responsible for work relationship with others auditor	5 interviewees = 33.3%
• Responsible for increase of public interest	5 interviewees = 33.3%
• Responsible to give objective information to all users of the financial report	10 interviewees = 66.6%

Table 13.
Reasons for Auditors' Implementing the Fourth Ethics Code (Due Care) by FOCS, SOCS and FROCS (User Perception)

The five financial Managers of "Family-owned Companies"	Key reasons: • *Care* • *Diligence* • *Consistency* • *High dedication*
The five Financial Managers of "State-owned Companies"	Key reasons: • *Care* • *Diligence* • *Consistency* • *More professional* • *High dedication*
The five Financial Mangers of "Foreign-owned Companies"	Key reasons: • *Care* • *Diligence* • *Competence* • *Consistency* • *High dedication* • *Professionalism* • *Greater knowledge of ability*

Table 14.
Due Care (Summary)

• Care	15 interviewees = 100%
• Diligence	15 interviewees = 100%
• Consistency	15 interviewees = 100%
• High dedication	15 interviewees = 100%
• Professional	10 interviewees = 66.6%
• Competence	5 interviewees = 33.3%
• More knowledge of ability	5 interviewees = 33.3%

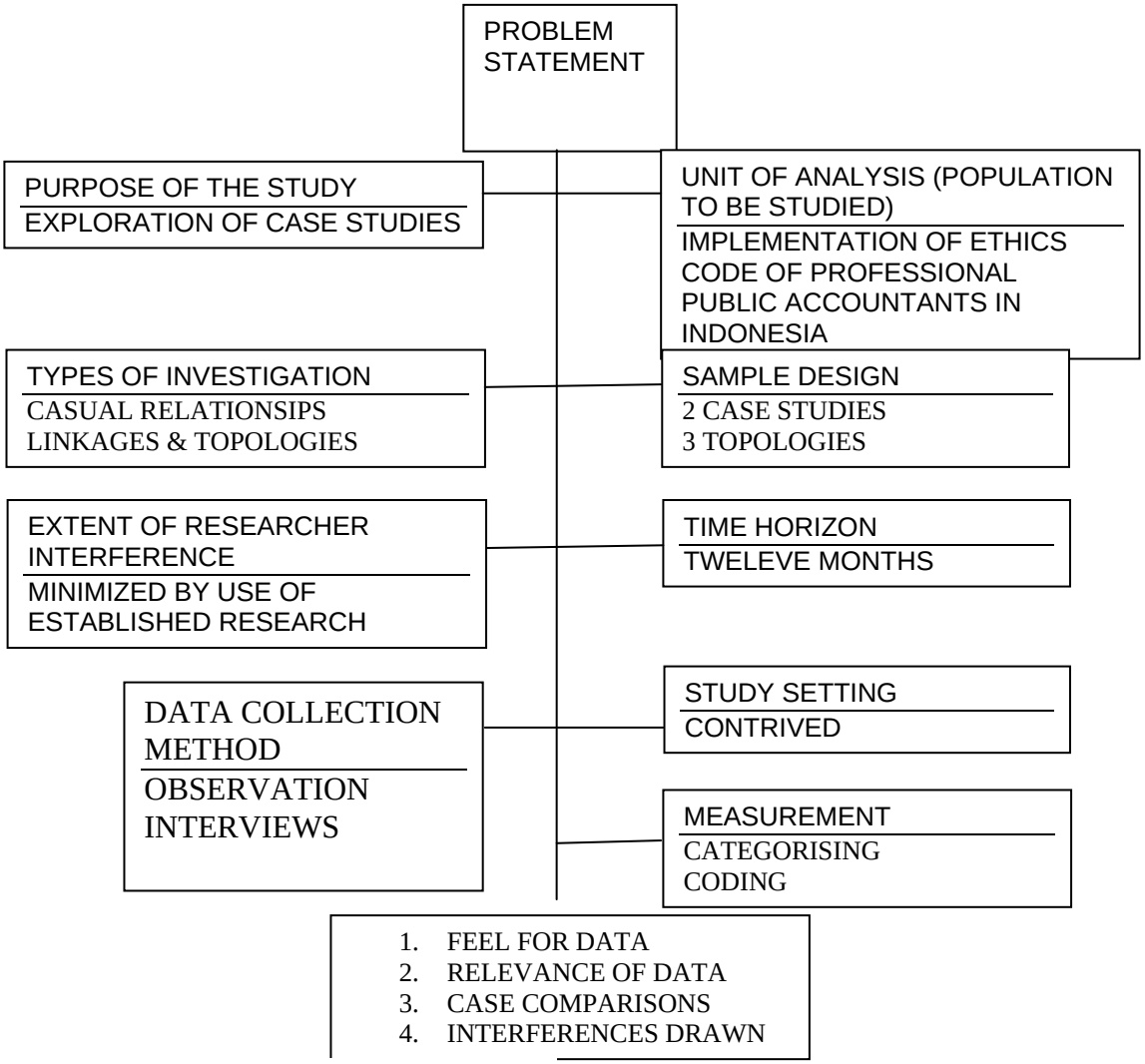
Table 15.
Reasons for Auditor Implementing the Fifth Ethics Code (Scope and Service) by FOCS, SOCS and FROCS (User Perception)

The five financial Managers of "Family-owned Companies"	Key reasons: • *Tax consultation* • *Correction of accounting system* • *Consultation about expansion company*
The five Financial Managers of "State-owned Companies"	Key reasons: • *Resolve the problem of taxation* • *Consultation for accounting system* • *To give guidelines about standards of financial report.*
The five Financial Mangers of "Foreign-owned Companies"	Key reasons: • *Consultation for taxation* • *Consultation for accounting system* • *Consultation for expansion/go public company* • *Consultation for make financial report with right direction standards*

Table 16.
Scope of Services (Summary)

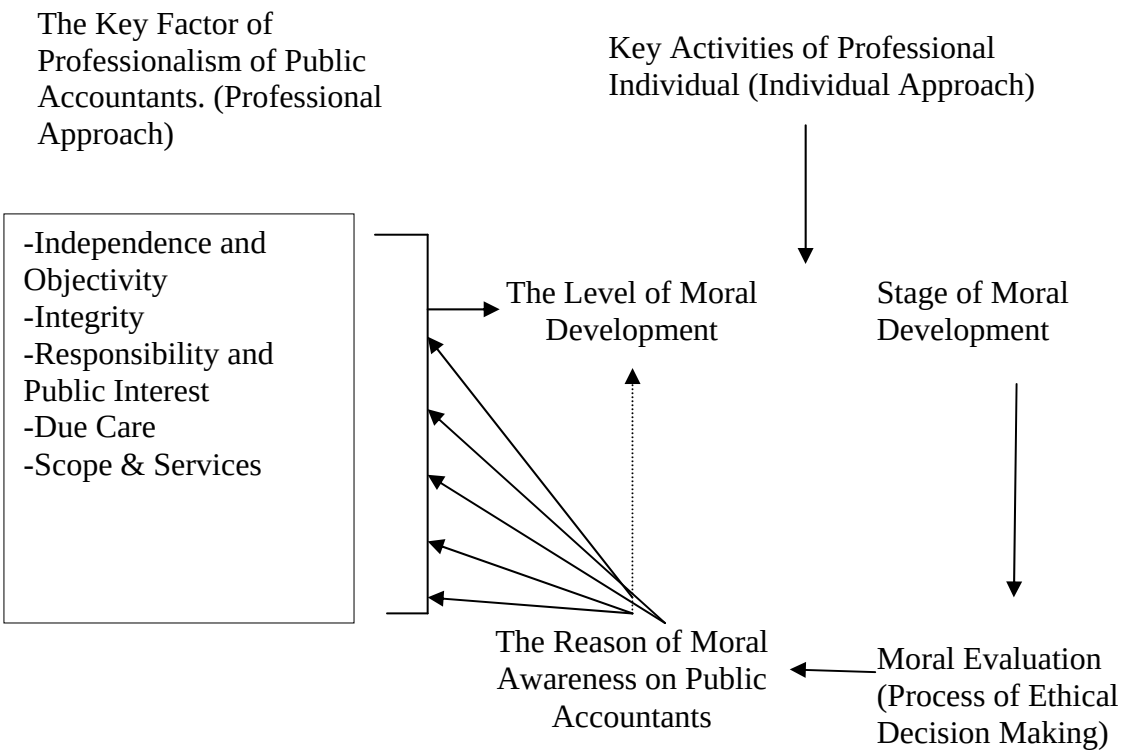
• Consultation for Taxation	15 interviewees = 100%
• Consultation for accounting system	10 interviewees = 66.6%
• Correction of accounting system	5 interviewees = 33.3%
• Consultation for expansion of company	10 interviewees = 66.6%
• Consultation for financial report with right direction standards	5 interviewees = 33.3%
• Consultation for guidelines of standards financial report	5 interviewees = 33.3%

Diagram 1
THE RESEARCH DESIGN



Sources: Adapted from Sekaran (1992, p.67)

Diagram 2
Flow Chart of the Relationship Between the Professional Approach and the Individual Approach



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Pre Managed Earnings Benchmarks and Earnings Management of Australian Firms

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Pre Managed Earnings Benchmarks and Earnings Management of Australian Firms

Abstract

This study investigates benchmark beating behaviour and circumstances under which managers inflate earnings to beat earnings benchmarks. We show that two benchmarks, positive earnings and positive earnings change, are associated with earnings manipulation. Using a sample of Australian firms from 2000 to 2006, we find that when the underlying earnings are negative or below prior year's earnings, firms are more likely to use discretionary accruals to inflate earnings to beat benchmarks.

Keywords

Benchmark beating, earnings management, pre-managed earnings

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JEL classification: M41

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Introduction

The issue of benchmarks in the context of earnings manipulation is a much investigated issue in accounting literature[3]. Burgstahler and Dichev (1997) investigate earnings management behaviour of firms and link it to earnings benchmarks: profits and earnings increase. Using distribution of earnings, they postulate that discontinuities around zero earnings and zero changes in earnings to be evidences of managers manipulating earnings to report profits and to sustain last year's earnings. Later studies of managers engaging in earnings management to meet or beat earnings targets have replicated this methodology of examining distribution of earnings with mixed results, casting doubts on validity of using distributions method to ascertain earnings management behaviour.

In addition to the mixed results shown by using the distribution of earnings, whether benchmark beating is caused by earnings manipulation remains an unresolved issue for at least two reasons. First, the assertion of causality between earnings management and benchmarks is based on *ex post* reported earnings. However, real managerial effort to meet benchmarks that results in improved firm performance cannot be distinguished from apparent earnings manipulation by examining reported earnings, especially for firms that are on the margins of benchmarks (Dechow, Richardson & Tuna 2003). Second, although earnings discontinuities are observable, the distribution of "normal earnings level" in the absence of managerial manipulation is not defined (Kerstein & Rai 2007). In fact, managerial discretion to beat earnings targets, in part at least, is conditional on the nature of true earnings, that is, pre-managed earnings. For example, managers may increase earnings to reach targets when pre-managed earnings are below benchmarks. Managers can also decrease earnings when pre-managed earnings are well above benchmarks in order to save some income to beat benchmarks in the future (known as income smoothing or 'cookie jar accounting') or when pre-managed earnings are at a level so far below target that management discretion or effort is insufficient to reach it so that accruals are used to deflate earning ('big bath accounting'). Besides these two reasons, econometric and measurement issues of what constitutes earnings manipulation also create problems in using the earnings discontinuities to establish evidence of earnings management per se.

In the Australian context, the issue of benchmark beating and its association with earnings management is also not settled. Holland and Ramsay (2003) examine earnings distribution at two benchmarks (zero earnings and increase or sustaining last year's earnings) to find greater than expected frequency of firms around small profits and small earnings increases, and fewer than expected small losses and small earnings decreases to draw inferences regarding earnings manipulations. However, Coulton, Coulton and Taylor (2005) do not find significant difference between discretionary accruals for the benchmark beating and 'just-miss' groups. As such, they suggest that caution is needed to interpret benchmark beating caused by earnings management, especially for 'just-miss' groups.

Based on this evidence in the Australian context, and the mixed evidence of benchmark beating in general, we are motivated to examine the behaviour of benchmark beating further. We extend Holland and Ramsay (2003) and Coulton et al. (2005) by investigating

[3] Notable studies among these are: Barua, Elliott and Finn (2006), Coulton et al. (2005), Dechow, Richardson and Tuna (2000), Dechow et al. (2003), Degeorge, Patell and Zeckhauser (1999), Durtschi and Easton (2005), Holland and Ramsay (2003), Jacob and Jorgensen, (2007), Kerstein and Rai (2007) and Plummer and Mest (2001)

whether managers manipulate earnings to meet or beat the same benchmarks: above-zero earnings (profits) and earnings increase (sustain prior year's earnings). However, we differentiate our research design by conditioning our analysis and results on benchmarks of 'pre-managed earnings'. We use pre-managed earnings as a measure of true earnings level of a firm and postulate that managers engage in earning manipulation only if the earnings are short of benchmark levels on an *ex ante* basis. Our focus on the examination of pre-managed earnings, to the extent that accruals are used on an ex-post basis to adjust earnings, is an *ex ante* condition under which firms seek to manipulate earnings. Our research design allows us to condition the earnings manipulation behaviour, either to increase or decrease earnings when pre-managed earnings are below or above these benchmarks.

In addition to shedding light on the link between earnings manipulation and benchmark, we refine the standard Jones model for several alternate measures of accrual measurement. Operating cash flows (McNichols & Wilson 1988) and relative earnings performances (Dechow, Sloan & Sweeney 1995) are identified to contribute to model misspecification in estimating discretionary accruals. In our study, we estimate discretionary accruals by using a variation of the Jones model with the change of operating cash flows as an additional variable. We employ the performance adjusted technique of Kasznik (1999) to adjust the effect of industry-wide relative earnings performance.

Our summary of results is as follows. We first find significant discontinuities in the distribution of reported earnings and changes in earnings. However, these discontinuities disappear when the earnings are purged of discretionary accruals. We then estimate frequency of firms achieving earnings targets with the aid of earnings manipulation. The result suggests that a relatively low level of earnings management takes place among the subset of Australian firms confronted with reporting earnings decreases and losses compared to that of U.S. Third, we find when pre-managed earnings are negative or below prior year's earnings, firms are more likely to exercise positive discretionary accruals to inflate earnings to beat earnings benchmarks.

The remainder of the paper is organised as follows. The second section is the literature review and hypothesis development; the third section discusses research design and methodologies; the fourth describes data and sample selection process; the fifth presents the empirical results and, the sixth section concludes the paper.

Prior Literature and Hypotheses

In an important study of earnings manipulation, Burgstahler and Dichev (1997) state two theories to provide rationales to avoid reporting earnings losses and decreases. Using transaction cost theory they suggest that firms who report losses or earnings decrease tend to face higher transactions costs from the firms' stakeholders. Further, the prospect theory postulates losses and gains are valued differently implying that a firm may realise the largest value increase when it turns an expected loss to a profit. In addition, negative earnings decrease affect firms' credit ratings and their cost of capital resulting in loss of firm value and imply further earnings decreases in future.

The role of benchmarks or targets is important for earnings manipulation. From an accounting perspective, income smoothing requires that to reduce fluctuation managers may use accruals to increase or decrease current reported earnings to match pre-determined earnings target levels. From the managerial incentive perspectives, however, earnings manipulation behaviour is generally based on the notion that managers are assumed to be wealth-maximisers

who recognise that their wealth is adversely impacted when their firms' reported earnings fail to achieve benchmarks. Balsam (1998) shows evidence that CEO cash compensation is associated with discretionary accruals and such association varies depending on the circumstance where positive discretionary accruals are used to achieve earnings benchmarks. Supporting this conjecture Healy (1985) finds that shareholders increase their monitoring when a firm fails to meet their benchmarks and Gaver , Gaver and Austin (1995) find managers are punished in the form of reduced compensation and an increased probability of dismissal. The compensation committees can also distinguish between the components of earning and reward managers when their discretionary behaviour achieves the firms' goals. Ke (2001) links beating profits and last year's earnings behaviour with CEOs' compensation and pointed out that CEO compensation incentive formed one set of economic determinants of benchmark beating behaviour. Matsunaga and Park (2001) found that CEO compensation would be reduced when a firm misses an earnings benchmark because the compensation committee may view this as a signal of poor management performance. In Australian annual reports, corporate earnings figure is widely used as a key indicator of business performance. Earnings are one of the first measures highlighted and most of executive's review will compare this year's earnings performance with those of previous years. Target Based Incentive Plans are the most common incentive schemes used in determining CEOs' compensation level (Holland & Ramsay 2003). These evidences strongly imply that accounting benchmarks matter for managerial behaviour and provide incentives to manipulate earnings.

It is a necessary condition that earnings manipulation is dependent on true earnings of a firm. After all, earnings manipulation is not necessary when true earnings are adequate for the current period. Researchers have modelled this conditionality in circumstances leading to earnings manipulation. Fundengerg and Tirole (1995) present a theory that under the threat of CEO dismissal, a manager's decision to shift earnings is based on the firm's pre-managed earnings performance. They predict managerial action to shift future earnings to the current period as poor current pre-managed earnings could lead to a manager being dismissed. Payne and Robb (2000) found that when pre-managed earnings are below market expectation, managers will use income-increasing discretionary accruals to increase earnings toward analysts' forecasts. Gao and Shrieves (2002) showed the relationship between CEO compensation components and earnings management is conditional on proximity of pre-managed earnings to an earnings benchmark, the closer the level of pre-managed earnings to earnings benchmarks, the more likely that managers engage in earnings management. Peasnell, Pope and Young (2000b, 2005) found that firms with pre-managed earnings below zero or below last year's earnings are more likely to report positive discretionary accruals. Daniel, Denis and Naveen (2008) reported that managers have the incentive to manage earnings upwards to avoid dividend cuts when managers anticipate that pre-managed earnings would otherwise fall short of the expected dividend levels.

Techniques to meet benchmarks are not limited to discretionary accruals only. Dechow et al. (2000) found that working capital and positive special items, in addition to discretionary accruals are used as mechanisms to achieve small profits and to meet analysts' forecasts. Analysts' forecasts are also achieved through either managing sales upward or managing operating expense downward (Plummer & Mest 2001). Phillips et al. (2003) found that deferred tax expenses are associated with benchmark beating behaviour of reporting profits and earnings increases, whereas total accruals are associated with benchmark beating behaviour of meeting analysts' earnings forecasts. Using real earnings manipulations (accelerated sales recognition,

increasing production to reduce cost of goods sold), Roychowdhury (2006) documented that managers avoid reporting annual losses and negative changes in earnings. In a fundamental sense, however, as observed by Jones (1991), management discretions are made through accruals. More accruals are in place simply because the accounting system creates accruals to recognise revenues when they are earned and match expenses to those revenues, irrespective of whether cash has been received or paid. In addition, discretionary accruals are likely to be the prime measures for earnings management because the level of discretionary accruals is difficult to be monitored by outsiders (Gaver et al. 1995). Given the scope of this research, and based on prior literature, we rely on the discretionary accruals (DA) of Jones (1991) to estimate earnings manipulation. Nonetheless, we subject this estimation to alternate specifications and robust adjustments.

In this paper, we postulate that when pre-managed earnings are below benchmarks, managers will inflate income to report profits and earnings increase. In our setting, the pre-managed earnings is the condition of managerial discretion to adjust earnings from losses or earnings decreases to report *ex post* profits or earnings increases. We examine firms with negative pre-managed earnings (and pre-managed earning changes) and categorise them to have negative profits or earnings decreases prior to any earnings manipulation. Our two hypotheses (in alternative forms) are thus as follows:

> *H1: When pre-managed earnings are negative, firms are more likely to use discretionary accruals to report marginal profit.*
>
> *H2: When the current period pre-managed earning are below previous period reported earning, firms are more likely to use discretionary accruals to report positive change in earnings.*

Research Methodology

Earnings Distribution

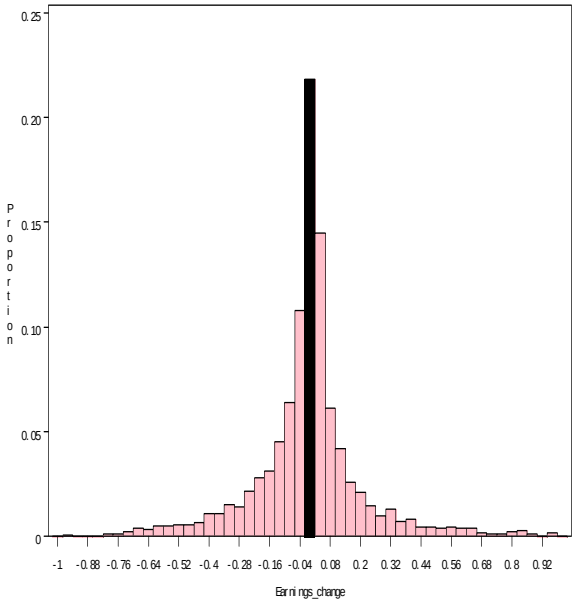
In a manner similar to Burgstahler and Dichev (1997), we construct histograms of the earnings and earnings changes. Earnings are measured as income before extraordinary items deflated by beginning total assets. The changes of earnings are measured as difference of income before extraordinary items between year *t* and year *t-1* deflated by beginning total assets. Our two benchmarks are reported profits and earnings increases. Silverman (1986) and Scott (1992) suggest that the interval width of a histogram should be positively related to the variability of the data and negatively related to the number of observations. To determine the interval widths, we performed both the calculations and the visual inspection, we calculate histograms interval width as $2(IQR)n^{-1/3}$, where *IQR* is the sample inter-quartile range and *n* is the number of observations. This returns an interval width of 0.04 for both earnings level and earnings change distributions. [4] Although we would prefer to have a finer width, we are constrained by our sample size which is smaller than those of Burgstahler and Dichev (1997), Holland and Ramsay (2003) and Coulton et

[4] Burgstahler and Dichev (1997) use interval widths of 0.005 for scaled earnings and 0.0025 for scaled changes in earnings. Holland and Ramsay (2003) use 0.01 for scaled net profit after tax and 0.005 for scaled changes in net profit after tax. Coulton et al. (2005) use 0.01 for both earnings levels and changes in earnings.

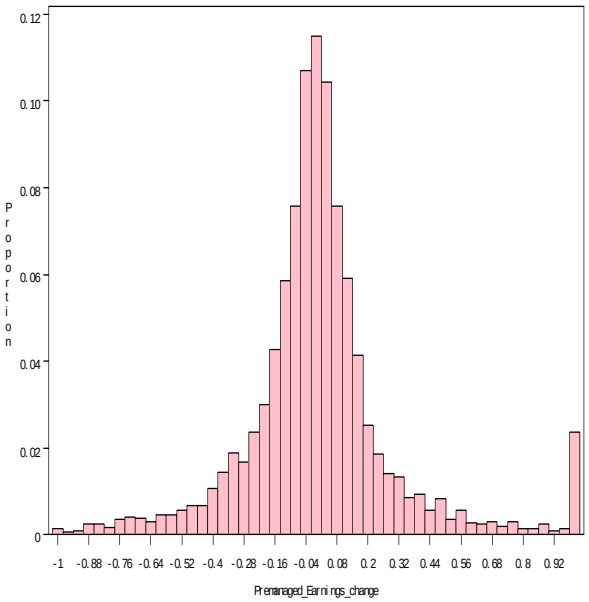
al. (2005). Following our empirical calculation and visual inspection, we chose 0.04 as an appropriate interval width for our sample size. This interval width is also consistent with Cheng and Warfield (2005) who measure earnings surprises that are equal to or greater than four cents.

Figure 2-Histograms of earnings and pre-managed earnings changes

Panel A-Earnings changes (ΔEit)



Panel B-Pre-managed earnings changes (ΔPMEit)



We then formally test whether observed discontinuities are significant. Under the null hypothesis with smooth earnings distribution, the standardised difference of each interval with respect to distribution should be equal to zero (Burgstahler & Dichev 1997). If managers exercise positive discretionary accruals to report profits or earnings increase, we would expect to see the standardised difference to be significantly negative for the interval immediately below zero and significantly positive for the interval immediately above zero. The z-statistic used to test the null is the difference between the actual and expected number of observations in an interval divided by the estimated standard deviation of the difference.[5]

Discretionary Accruals

We use discretionary accruals as a proxy for earnings management. Peasnell et al. (2000a) evaluated different models in estimating discretionary accruals and suggested that the power to

[5] The Z-statistic is defined as: Z= $\frac{n - E(n)}{\sqrt{Var}}$ where n is actual number of observations in the interval; *E(n) is* expected number of observations in the interval, defined as the average of the number of observations in the intervals immediately adjacent to the interval; $\sqrt{Var}$ is the estimated standard deviation of the difference, calculate as: $\sqrt{Var} = \sqrt{N \cdot p_i(1 - p_i) + (1/4)N \cdot (p_{i-1} + p_{i+1}) \cdot (1 - p_{i-1} - p_{i+1})}$;Where N is the total number of observations and p_i is the probability that an observation will fall into interval i

detect earnings management seems to be higher for the cross-sectional Jones (1991) model. We include change in cash flows from operations as an additional explanatory variable into the Jones model based on evidence in McNichols and Wilson (1988) and Dechow (1994, 1995) indicating that change in cash flow from operations are negatively correlated with total accruals. The modified Jones model used in our analysis is:

$$TAC_{it} / TA_{it-1} = a_1(1/TA_{it-1}) + a_2(\Delta REV_{it} / TA_{it-1}) + a_3(PPE_{it} / TA_{it-1}) + \alpha_4 \Delta CF_{it} + \varepsilon_{it} \qquad (1)$$

where TAC_{it} is total accruals for firm i for year t scaled by total assets for year t-1; total accruals are calculated as the difference between net operating income and operating cash flows. TA_{it-1} is total assets for firm *i* at the beginning of year *t*. ΔREV_{it} is net sales for firm i for year t less net sales for firm *i* for year *t-1* scaled by total assets for year *t-1*. PPE_{it} is the gross property, plant and equipment for firm i for year t scaled by total assets for year *t-1*. ΔCF_{it} is operating cash flows for firm i for year t less operating cash flows for firm *i* in year *t-1* scaled by total assets for year t-1. $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ denote industry year specific estimated coefficients. ε_{it} is the error term.

Researchers also argue that tests related to earnings management that do no control for a firm's earnings performance are misspecified. For example, Dechow et al. (1995) found that the measurement errors in estimation of discretionary accruals are negatively correlated with firm earnings performance. We employ Kasznik's (1999) matched-portfolio technique to adjust potential measurement error that is correlated with earnings performance. First, we obtain discretionary accruals, *i.e.* the residual from cross sectionally estimating equation (1) by GICS industry and by year. Then, we rank discretionary accruals into percentile groups by return on assets in period t (ROA_t), defined as operating income deflated by lagged total assets. We then compute the median discretionary accruals for each percentile and subtract it from each observation's discretionary accruals in that percentile (see equation 2). By standardising the residuals in this manner we remove the possible bias that firms having higher (lower) residuals are likely to manage earnings at a rate higher (lower) than the median performance firm. As such our measure of discreationary accrual is

$$Adj(DA_{it}) = DA_{it} - Median(DA)_{pt} \qquad (2)$$

Where DA_{it} is raw discretionary accruals for firm *i* for year *t* obtained as residual from equation (1), $Median(DA)_{pt}$ is median value of the discretionary accruals for a portfolio *p* at year *t*, and *p* is the percentile ranking of raw discretionary accruals based on firm's return on assets.

Pre-managed Earnings

The research design used in this study involves examining the link between discretionary accruals and whether pre-managed earnings are below or above earnings benchmarks. By definition, the sum of true pre-managed earnings and discretionary accruals is equal to reported earnings. Following Gore et al. (2007), the pre-managed earnings are measured as earnings in year *t* minus adjusted discretionary accruals and is used to capture the true earnings levels prior to managerial manipulation; the pre-managed changes in earnings are measured as the difference between earnings in year *t* and year *t-1* minus adjusted discretionary accruals and is used to capture the true earnings changes before earnings management.

$$PME_{it} = E_{it} - Adj(DA)_{it} \quad (3)$$

$$\Delta PME_{it} = \Delta E_{it} - Adj(DA)_{it} \quad (4)$$

Where PME_{it} is pre-managed earnings; ΔPME_{it} is pre-managed earnings change; E_{it} is reported earnings, measured as income before extraordinary items deflate by the beginning total assets; ΔE_{it} is reported earnings change, measured as the difference of income before extraordinary items between year *t* and year *t-1* deflated by the beginning total assets; $Adj(DA)_{it}$ is adjusted discretionary accruals obtained from equation (2); *i* and *t* denote firm and year, respectively.

Regression Model

In testing under what circumstances managers will inflate income to beat two earnings benchmarks, we predict when pre-managed earnings are below benchmarks, managers will inflate income to report profits and report earnings increase. We test whether firms with pre-managed earnings below benchmarks will use positive discretionary accruals to beat the benchmarks. Accordingly, our dependent variable is the adjusted discretionary variable ($Adj(DA_{it})$ from equation (2) above.

We partition our sample where pre-managed earnings (changes) are below and above zero. The changes in earnings and pre-managed earnings are standardised around 0. We then condition our analysis by having firms which have the reported earnings (changes) above zero. These firms are more likely to engage in income-increasing earnings management as their pre-managed earnings levels (changes) are below benchmarks but try to report *ex post* profits (earnings increases). Following Holland and Ramsay (2003) and Coulton et al. (2005), we also focus on small earnings intervals of [−0.04, 0] and [0, +0.04] immediately surrounding these benchmarks. Firms which are expected to make small losses (earnings decreases) are more likely than other firms to engage in earnings manipulation. Accordingly, we create several clusters of firms based on these benchmarks conditioned on changes in earnings and pre-managed earnings.

Our regression model to test earnings management behaviour takes the following form:

$$Adj(DA)_{it} = \alpha_0 + \beta_1 CLUSTER\_N_{it} + \beta_2 SIZE_{it} + \beta_3 GROWTH_{it} + \beta_4 ROA_{it} + \beta_5 WC_{it} + \beta_6 LEV_{it} + \beta_j \Sigma IND_j + \epsilon_{it} \quad (5)$$

The variable of interest in this model is the indicator variable $CLUSTER\_N_{it}$. The $CLUSTER\_N_{it}$ takes four constrained form as follows:

$CLUSTER\_1_{it}$ = 1 if ($PME_{it} < 0$ OR $\Delta PME_{it} < 0$), 0 otherwise;

$CLUSTER\_2_{it}$ = 1 if ($PME_{it} < 0$, $E_{it} \geq 0$ OR $\Delta PME_{it} < 0$, $\Delta E_{it} \geq 0$), 0 otherwise;

$CLUSTER\_3_{it}$ = 1 if ($-0.04 \leq PME_{it} < 0$ OR $-0.04 \leq \Delta PME_{it} < 0$), 0 otherwise;

$CLUSTER\_4_{it}$ =1 if ($-0.04 \leq PME_{it} < 0$, $0 \leq E_{it} < 0.04$ or $-0.04 \leq \Delta PME_{it} < 0$, $0 \leq \Delta E_{it} < 0.04$), 0 otherwise.

According to our hypotheses, we should see a positive association between the use of discretionary accruals and the firms in each of these clusters. If managers use discretion to inflate income in order to beat benchmarks, conditioned on the pre-managed earnings, the coefficients on $CLUSTER\_N_{it}$ are expected to be positive across all four clusters. The first cluster

(CLUSTER_1_{it}) is a partition of our sample consisting of firms that have either negative or decline of earnings on a pre-managed basis. CLUSTER_2_{it} is a subset of CLUSTER_1_{it} having firms reporting positive earnings or positive change in earnings. CLUSTER_3_{it} and CLUSTER_4_{it} are similar to previous clusters but belong to group of firms who have narrowly missed out on earnings performance in terms of their pre-managed earnings. We define these narrowly missing firms as 'just-miss' firms.

In our cross sectional regression, we employ a vector of control variables recognised from previous literature to be associated with discretionary accruals. We control for firm size ($SIZE_{it}$), measured as the logarithm of the total assets at year *t,* as smaller firms are documented to be associated with earnings management (Chan, Faff & Ramsay 2005; Holland & Jackson 2004; Sanchez-Ballesta & Garcia-Meca 2007; Sloan 1996). The growth opportunity *(*$GROWTH_{it}$), measured by the change of sales between year *t* and *t-1* divided by total assets at year *t.* As growth firms have relatively strong incentives to meet earnings benchmarks the market penalises growth firms for negative earnings surprise (Barth, Elliott & Finn 1999; Beaver, Kettler5 & Scholes 1970; Minton & Schrand, 1999; Myers & Skinner, 2006; Skinner & Sloan, 2002). Profitability *(*ROA_{it}), measured by net operating income divided by total assets for firm *i* at year *t,* is included because prior studies either found lower accounting profits provide motivation for firms to manipulate earnings to mitigate financial constraints (Ashari et al. 1994; White 1970;), or earnings management firms tend to exhibit a high profitability as it affect managers' job security and the compensation contract (Degeorge et al, Patell & Zueckhauser 1999; Fudenberg & Tirole 1995; Hayn 1995). We expect that firms with greater working capital level (WC_{it}), measured by the difference between current assets and current liabilities for firm *i* in year *t,* are more likely to manage earnings to move from below a benchmark to above the benchmark because short-term working capital accrual gives managers more flexibility in exercising discretions (Burgstahler & Dichev 1997). We control for a firm's proximity to debt covenant violation (LEV_{it}), measured by total debt to total assets for firm *i* in year *t,* and a positive sign is expected (Dechow et al. 2000; Press &Weintrop 1990; Watts & Zimmerman 1978). Finally, we control for industry effects. IND_{jt} equals 1 if firm *i* is from *jth* GICS industry (Energy, Material, Metals and Mining, Industries, Consumer Discretionary, Consumer Staples, Health Care, Information Technology, Telecommunication and Utilities) and 0 otherwise.

The data set used in our study is of panel structure. With panel data structure, the OLS assumption of independence in regression error term is generally violated by the presence of both cross-sectional and time-series dependence (Greene 2002). We use a two-way cluster-robust regression to correct both cross-sectional and serial correlations (Thompson 2006). The two-way cluster-robust procedure allows clustering along the two dimensions and generates the heteroscedasticity-robust standard errors of White (1980).

Data and Sample Selection

The starting point for the sample is the population of all ASX listed firms in the DataStream database including active file, suspended file and dead file with necessary annual accounting and market data from the period 1999 to 2006. The initial sample includes 3,914 firms with 31,312 observations. This study excludes all firms in the financial sector with GICS code (4010-4040) since their financial statements are subject to special accounting regulations. They include 45 banks, 194 equity investment instruments, 228 general financial, 5 life insurance, 44 nonequity invest instruments, 19 nonlife insurance, 276 real estates, altogether 811 firms and 6,488

observations. Regulated firms from the Utilities sector have not been eliminated as the number is relatively few in Australia. Also excluded are 1,832 firm observations whose industry codes are unclassified by DataStream. A further 16,910 firm observations are omitted since necessary data for accrual estimation is missing: this includes the loss of observations for 1999 as lagged variables of total assets and first differencing taken for the variables of revenue, account receivables, and operating cash flows are required in regressions. Firms involved in restructuring activities with 10 observations are excluded. The entire ASX covers very large companies from the Top 200 ASX index, also included are many very small listed companies. Thus, the top and the bottom 1 % observations by extreme values of total assets are trimmed, including 125 observations. These sampling criteria resulted in a sample with necessary data for 5,947 firm-year observations for accrual estimation.

Since the estimation of the cross-sectional accrual model requires at least ten firms per industry-year combination, industry groups with fewer than ten observations in a given sample year are combined if they have close??GICS codes. As Australian markets are dominated by gold and mining industries, the Metals & Mining sector is extracted from the Material sector to see whether this sector has an industry cluster effect on earnings management practices. Both Metals & Mining and Material sectors use the same code (GICS 1510). This procedure results in nine GICS industry groups, that is, Energy (1010), Material (1510), Metals & Mining (1510), Industrials (2010-2030), Consumer Discretionary (2510-2550), Consumer Staples (3010-3030), Health Care (3510-3520), Information Technology (4510-4530), and Telecommunication & Utilities (5010-5510). Each of the firm-year observations in the estimation sample is assigned into one of the nine combined industry groups according to the GICS code. These criteria result in a final sample of 4,746 firm-year observations (Table 1 Panel A). Panel B and C of Table 1 report the distribution of firms across industry and years in our sample.

Table 1
Sample description

Panel A-Sample construction

The sample comprises DataStream equity files including all active suspended and dead equity firms from year 2000 to year 2006

Criteria	Firm-year
Initial firm-years with accounting data:	35,226
Less: Financial firms	(7,299)
Industries are not classified	(2,061)
Missing data	(21,007)
Extreme data (trimmed at 5% and 95% levels)	(110)
Final sample	4,746

Panel B- Final Sample by Industry

GICS	Industry	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1010	Energy	299	6.31	299	6.31
1510	Material	339	7.13	638	13.44
1510	Metals & Mining	1454	30.64	2092	44.08
2010-2030	Industrials	263	5.56	2355	49.64
2510-2550	Consumer Discretionary	783	16.48	3138	66.12
3010-3030	Consumer Staples	391	8.24	3529	74.36
3510-3520	Health Care	477	10.07	4006	84.43
4510-4530	Information Technology	618	13.02	4624	97.45
5010-5510	Telecommunication & Utilities	122	2.56	4746	100.00

Panel C-Final Sample by Year

Year	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2000	184	3.88	184	3.88
2001	265	5.56	449	9.44
2002	502	10.58	951	20.02
2003	442	9.32	1393	29.34
2004	959	20.20	2352	49.55
2005	1163	24.50	3515	74.05
2006	1231	25.95	4746	100.00

Panel D-Summary statistics

Variables	Mean	Median	S.D.	Min	25%	75%	Max
E	-0.1242	-0.0291	0.3020	-1.6713	-0.2517	0.0644	0.5340
ΔE	0.0396	0.0033	0.6166	-2.8276	-0.0806	0.0649	17.9975
PME	-0.1261	-0.0409	0.3189	-1.8191	-0.2693	0.0761	0.6650
ΔPME	0.0378	-0.0011	0.6169	-2.8641	-0.1096	0.1028	17.8976
DA	-0.0271	-0.0037	0.1320	-0.4024	-0.0828	0.0655	0.3369
Adj (DA)	0.0019	-0.0000	0.0867	-0.1897	-0.0563	0.0574	0.2141
SIZE	10.5250	10.1603	2.0809	5.8972	8.9939	11.8425	16.0523
GROWTH	0.7311	0.0854	5.5019	-1.0000	-0.0970	0.3262	168.1289
ROA	-0.0841	-0.0361	0.2814	-3.4855	-0.1908	0.0781	1.3880
WC	0.2370	0.1475	0.5487	-9.3901	0.0238	0.3532	10.6387
LEV	0.1683	0.0812	0.3089	0.0000	0.0000	0.2666	9.0425

Variable definitions:

E	=	Reported earnings level, measured as income before extraordinary items deflate by the beginning total assets
ΔE	=	Reported earnings change, measured as the difference of income before extraordinary items between year *t* and year *t-1* deflate by the beginning total assets
PME	=	Pre-managed earnings level, calculated as reported earnings minus adjusted discretionary accruals
ΔPME	=	Pre-managed earnings change, calculated as reported earnings change minus adjusted discretionary accruals
DA	=	Raw discretionary accruals, estimated from the cash flow Jones model
Adj (DA)	=	Adjusted discretionary accruals, estimated as raw discretionary accruals adjust for extreme earnings performance

SIZE	=	Firm size, measured by the logarithm of the total assets
GROWTH	=	Growth opportunity, measured by the change of sales between year *t* and *t-1* divided by the beginning total assets
ROA	=	Profitability, measured by net operating income divided by total assets
WC	=	Working capital, measured by the difference between current assets and current liabilities
LEV	=	Leverage, measured by total debt to total assets

Basic descriptive statistics (Table 2) show that mean (median) reported earnings (*E*) and earnings change (Δ*E*) are −0.1242 (−0.0291) and 0.0396 (0.0033), respectively. The mean (median) of pre-managed earnings (*PME*) and their changes (Δ*PME*) are −0.1261 (−0.0409). Mean of (median) raw discretionary accruals is −0.0271 (−0.0037).

Table 2
Frequency distribution of reported earnings and pre-managed earnings

Panel A-Reported earnings level and change

Intervals	E			ΔE		
	Obs, Freq. (%)	Obs – Exp.	z-stat	Obs, Freq. (%)	Obs – Exp.	z-stat
−0.20	0.038	0.003	0.89	0.027	0.001	0.18
−0.16	0.039	−0.006	−1.72	0.03	−0.006	−2.00
−0.12	0.051	0.005	1.31	0.045	−0.001	−0.14
−0.08	0.053	−0.001	−0.25	0.061	−0.014	−3.39
−0.04	0.057	−0.013	−2.89***	0.105	−0.032	−6.15***
0	0.086	−0.008	−1.61	0.213	0.093	13.60***
0.04	0.131	0.070	5.52***	0.135	0.001	0.08
0.08	0.112	0.019	3.53	0.056	−0.031	−7.06
0.12	0.055	−0.017	−4.07	0.039	−0.002	−0.43
0.16	0.032	−0.008	−2.48	0.025	−0.005	−1.74
0.20	0.024	0.002	0.75	0.021	0.002	0.58

Panel B-Pre-managed earnings level and change

Intervals	PME			ΔPME		
	Obs, Freq. (%)	Obs – Exp.	z-stat	Obs, Freq. (%)	Obs – Exp.	z-stat
−0.20	0.037	−0.002	−0.60	0.053	0.026	1.93
−0.16	0.043	0.003	0.85	0.039	−0.017	−1.33
−0.12	0.044	−0.007	−1.94	0.058	0.002	0.11
−0.08	0.058	0.005	1.24	0.074	−0.001	−0.06
−0.04	0.063	−0.008	−1.88	0.092	0.021	1.19
0	0.083	0.006	1.26	0.068	−0.019	−1.19
0.04	0.092	0.010	1.90	0.082	0.019	1.13
0.08	0.081	0.004	0.83	0.058	−0.021	−1.41
0.12	0.063	−0.002	−0.46	0.076	0.024	1.45
0.16	0.049	0.003	0.77	0.047	−0.008	−0.58
0.20	0.029	−0.006	−1.92	0.034	0.004	0.34

Notes:
1).Earnings (changes) are deflated total assets as of the beginning of the annual period. The expected frequency is computed as the mean of the frequency in the two adjacent intervals. For the sake of the brevity, only intervals with earnings (changes) scaled by total assets ranging from −0.2 to 0.2 are presented in the table. The intervals are of width 0.04 of total asset. The frequencies are expressed as percentage of the total sample.
2). *** marks the significance levels are at 1% or better for the test of the intervals immediately below or above benchmarks.

Results

Do Firms Beat Benchmarks?

Figure 1, Panel A is a histogram of reported earnings levels with an interval width of 0.04 and a range of -1 to +1. This histogram shows the appearance of a single-peaked, bell-shaped distribution with discontinuities surrounding the standardised zero earnings benchmark. According to our standardised distribution, the expected frequency for firms who are in the interval of [-0.04, 0] is the average of the two adjacent intervals and is 0.70%. However, the observed frequency of reported earnings, E, is 0.57% for firms who are in this interval. This difference in observed frequency being less than the expected frequency by 0.13% ("obs-exp" column) is borne out by our Z-test statistic of -2.89 which is significant at one-percent level.

The firms reporting earnings between the interval of [-0.04, 0] are just-miss firms and their frequency under a normal distribution should not differ significantly for the rest of the distribution. This discontinuity in distribution suggests that some firms in this group may have boosted their earnings to go over the zero-benchmark to report positive earnings. Turning our attention to the group of firms which lie just above the zero-benchmark, we find their observed frequency is more than the expected frequency by 0.07% (0.131% versus 0.061%) and significantly so through our z-test statistic of 5.52 at one-percent level. If managers resort to earnings manipulation to report small profits, earnings discontinuity should be observed at the interval [0, +0.04], as is the case. The number of firms in the earnings interval of [0, +0.04] being in excess of the expected frequency bolsters the suggestion that there may be manipulation of earnings surrounding the zero-benchmark.

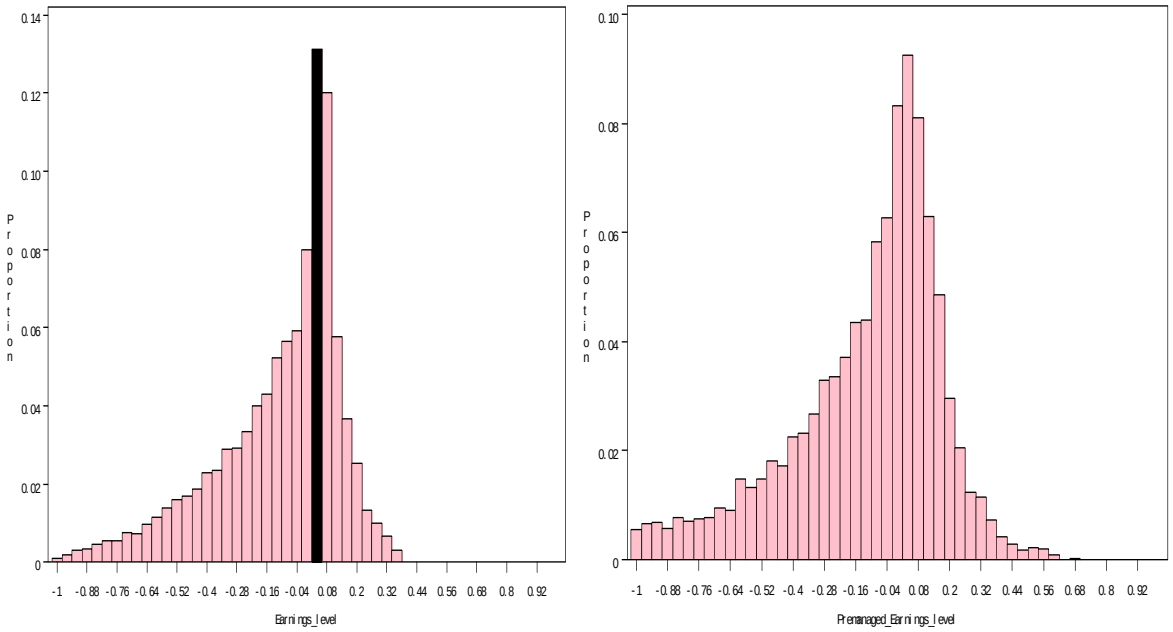
This discontinuity is also apparent when we consider the change in reported earnings (ΔE). The observed frequency of firms reporting just below the standardised earning of no-change benchmark, in the interval [-0.04, 0], is below the expected frequency by 0.032%. This difference is also highly significant through the z-test statistic of -6.15. Further evidence of possible earnings manipulation can be seen by observing the frequency difference for the group of firms at zero-change earnings benchmark. If the purpose of earnings management is to sustain last year's earning, then the discontinuity would also occur just at the zero interval when the change in earnings is considered as a benchmark. The observed frequency of firms reporting zero-change in earnings is significantly higher (z-stat=13.60)) than the expected frequency of 0.118%.

Next we generate a histogram for pre-managed earnings which are purged of the effect of discretionary accruals. Figure 1 Panel B displays the distribution of pre-managed earning levels that appears to be relatively smooth around zero. The smoothness is confirmed through the Z-statistics of standardised difference of frequencies immediately below and above zero-PME intervals and found to be insignificant (-1.88 and 1.90 respectively). Given that our adjusted discretionary accruals are a proxy of earnings management, the removal of adjusted discretionary accruals confirms the evidence of earnings manipulation. That is, in the absence of a discretionary component of accruals, the earnings of firms revert to their expected distribution. A similar result of no discontinuity is observed when we consider the distribution of change in pre-managed earnings. Our result from the distribution of pre-managed earnings, in levels and in

changes, is consistent with the prediction that the removal of adjusted discretionary accruals results in the disappearance of the discontinuity[6].

Figure 1
Distributions of earnings and pre-managed earnings

Panel A-Earnings levels (Eit) Panel B-Pre-managed eanings level (PMEit)



Do Firms Shift Earnings When Pre-managed Earnings are Below (or above) Benchmarks?

Table 3 shows the levels and changes of earnings surrounding our benchmarks, conditioned on pre-managed earnings. Panel A reports proportions of observations when the sample is divided according to reported earnings, E_{it}, being above or below zero, conditional on the pre-managed earnings being above or below zero. The overall proportion of firms with underlying earnings being less than zero is 57.71% (N=2739). However, when we portioned them according to actual reported earnings we found that 8.11% (N=385) have reported positive profits. In order to examine the possibility that this shift in reported earnings is due to earnings management, we check the differences in proportions for the overall group of firms that reported positive earnings against the proportion that has the $PME_{it} > 0$. The portion of observations with the PME_{it} being more than zero is 42.29% (N=2007). Under the assumption that there is no attempt to manage earnings to report an ex-post profit, we should expect the frequency of our sample that reported profits, $E_{it} \geq 0$, to be close to 42.29%. However, we find that the frequency of reported profits is

[6] Holland and Ramsay (2003) use interval width of 0.01 in the range -0.25 to +0.24, and their test statistics are -2.83 for the interval immediately below zero and 3.85 for the interval immediately above zero. This result is also consistent with Coulton et al. (2005) who use 0.01 interval width for in a range of -0.24 to +0.24.

45.36% (N=2153). Following Kanji (1993), we apply the z-test for correlated change in the frequency before and after a given intervention and find the two frequencies are statistically different (z-statistic=5.87, p-value=0.001). This evidence suggests that discretionary accruals have the effect of significantly increasing the frequency of positive earnings levels.

Discretionary accruals also significantly increase the frequency of firms reporting small profits. Table 3 Panel A also shows frequencies of firms within small intervals of earnings, [−0.04, 0] and [0, +0.04], conditioned on similar intervals of pre-managed earnings. The frequency of firms reporting small earnings profits while their underlying pre-managed earnings is 'just-miss' is 11.82% (N=561). However, the overall proportion of firms with pre-managed earnings being positive is only 8.83% (N=419). This is a difference of 2.99 per cent of total sample with 142 observations and statistically different from zero using the Kanji z-test with a z value of 3.81. This evidence suggests that for some just-miss firms, discretionary accruals were used to report a just-above profit. We also find that within this subsample, 2.44 per cent (N=116) shift from pre-managed small earnings losses ($-0.04 \leq PME_{it} < 0$) to report small earnings profits ($0 \leq E_{it} < +0.04$) with significance level being less than one per cent (not reported in the table)[7].

Table 3, Panel B reports the impact of discretionary accruals on changes in reported earnings conditioned by the changes in pre-managed earnings. In our sample, the overall frequency of firms reporting increases in earnings is 52.19% (N=2477). At the same time, the proportion of firms reporting earnings increase while the pre-managed earnings change is also positive is 49.68% (N=2358). This difference in proportion is statistically different with a z-test statistic of 3.81. Moreover, 11.61 per cent (N=551) shift from a negative pre-managed earnings change ($\Delta PME_{it} < 0$) to report positive earnings change ($\Delta E_{it} \geq 0$). This finding is consistent with the argument that managers inflate earnings through discretionary accruals to transform previous year's lower earnings to report earnings that are higher than or at least equal to previous year's level.

In the small intervals of [−0.04, 0] and [0, +0.04], discretionary accruals also significantly increase the frequency of firms reporting small positive earnings change. Panel B Table 3 shows the frequency of firms reporting earnings change surrounding the zero-benchmark increases from 11.23 per cent (N=533) of the sub-sample when pre-managed earnings change is also positive, to 13.49 per cent when the overall group of just-above firms in the whole sample is considered (N=640). This is a shift of 2.26 per cent (N=123) and statistically significant at below one percent level with z-stat of 2.68[8]. Further, 3.88 per cent (N=184) shift from small pre-managed earnings decrease ($-0.04 \leq \Delta PME_{it} < 0$) to report small earnings increase ($0 \leq \Delta E_{it} < 0.04$), with the shift in proportion being significant (z-statistic= 2.68, p-value=0.01). Taken all. together, the results in Table 3 provides evidence that some firms use discretionary accruals to transform earnings in their levels and changes to report positive ex-post profits and earnings increases, shift small losses and earnings decreases into a zero or above profit and a small earnings increases while the underlying pre-managed earnings levels and changes may not be positive.

[7] Burgastahler and Dichev (1997) reported that 30−40% of U.S firms exercise discretion to report profits when pre-managed earnings are slightly negative. Comparatively, our results suggest a lower frequency of earnings management in Australia among the firms confronted with reporting earnings losses.

[8] Burgastahler and Dichev (1997) reported that in the U.S 8 to 12% of firms with small pre-managed earnings decreases exercise discretion to report earnings increase. Our result of 2.26 per cent is lower than that of Burgastahler and Dichev.

Table 3
Frequencies of observations shifting from pre-managed earnings (changes) below benchmarks to above benchmarks

Panel A-Pre-managed earnings level

	Eit < 0	Eit ≥ 0	Total	z-stat[d]
Firm-years with	2354	385	2739	
PMEit < 0	*49.60%*	*8.11%*	*57.71%*	
Firm-years with	239	1768	2007	5.87
PMEit ≥ 0	*5.04%*	*37.25%*	*42.29%*	
Total	2593	2153	4746	
	54.64%	45.36%	100%	

	-0.04≤Eit<0	0≤Eit<0.04		
Firm-years with	60	116	361[a]	
-0.04≤PMEit<0	*1.26%*	*2.44%*	*7.61%*	
Firm-years with	57	119	419[b]	4.49
0≤PMEit<0.04	*1.20%*	*2.51%*	*8.83%*	
Total	270[c]	621[d]	4746	
	5.68%	*13.08%*	*100%*	

Panel B-Pre-managed earnings change

	ΔEit<0	ΔEit≥0	Total	z-stat
Firm-years with	1837	551	2388	
ΔPMEit <0	*38.71%*	*11.61%*	*50.32%*	
Firm-years with	432	1926	2358	
ΔPMEit ≥0	*9.10%*	*40.58%*	*49.68%*	3.81
Total	2269	2477	4746	
	47.81%	*52.19%*	100%	

	-0.04≤ΔEit <0	0≤ΔEit<0.04		
Firm-years with	147	184	527[a]	
-0.04≤ΔPMEit <0	*3.10%*	*3.88%*	*11.10%*	
Firm-years with	136	202	533[b]	
0≤ΔPMEit<0.04	*2.87%*	*4.26%*	*11.23%*	2.68
Total	498[c]	640[d]	4746	
	10.49%	*13.49%*	*100%*	

a. the total number of observations of which pre-managed earnings (change) belong to the interval [−0.04, 0];
b. the total number of observations of which pre-managed earnings (change) belong to the interval [0, 0.04];
c. the total number of observations of which reported earnings (change) belong to the interval [−0.04, 0]; d. the total number of observations of which reported earnings (change) belong to the interval [0, 0.04]
d.. The Z statistics are computed from Kanji (1993) for correlated proportions and their shifts .

$$Z = \frac{(b - c) / N}{\sqrt{\frac{(b + c) - (b - c)^2 / N}{N(N - 1)}}}$$

Z = Z score test for the significant change in the correlated frequency before and after a given intervention
b = the number of observations shifts from pre-managed earnings losses to the reported earnings profits
c = the number of observations shifts from pre-managed earnings profits to the reported earnings losses
N = the total number of observations

e. Significance levels are two-tailed against the standardized normal distribution.

Do Firms have Higher Value of Discretionary Accruals when Pre-managed Earnings are Below Benchmarks?

We now turn our attention to the degrees of earnings management when the pre-managed earnings are below benchmarks. Our focus in this section is to see if the usage of discretionary accruals is limited only to firms who report 'small-profits'. Amongst all firms, firms most likely to manage earnings are likely to be those which are just-miss firms on the pre-managed earnings basis and may use the earnings manipulation methods to push the reported earnings above the benchmarks.

Table 4 presents the frequencies of adjusted discretionary accruals conditioned on pre-managed earnings. Panel A shows that, of all the firms which have positive discretionary accruals, roughly two thirds of firms (62.91%, N=1723) have underlying losses on a pre-managed basis ($PME_{i\,t} < 0$). If discretionary accruals (positive and negative) are to be randomly distributed amongst all firms, we would expect to see their distribution evenly split between firms which are making losses and profits on a pre-managed basis. This evidence suggests those firms with a pre-managed loss have a lot more usage of the positive discretionary accruals and thereby inflating earnings than those making pre-managed profits. A similar comparison for firms in small intervals surrounding the zero-benchmark ($-0.04 \leq PME_{it} < 0$) shows that 58.72 per cent (N=212) of pre-managed small-loss making firms have positive discretionary accruals while the corresponding frequency for small-profit making firms ($0 \leq PME_{it} < +0.04$) is 45.34 per cent. In Panel B, when we condition the discretionary accruals with corresponding changes in pre-managed earnings 69.14 per cent (N=1651) of firms with negative changes in pre-managed earnings have positive discretionary accruals as compared to only 30.58 per cent (N=721) when the underlying pre-managed earning changes are positive ($\Delta PME_{it} \geq 0$). In the smaller intervals, there are 57.31 per cent of firms (N=302) with pre-managed earnings slightly below last year's earnings ($-0.04 \leq \Delta PME_{it} < 0$) that have positive discretionary accruals, whereas 33.21 per cent of firms (N=177) with pre-managed earnings slightly above last year's earnings ($0 \leq \Delta PME_{it} < 0.04$) show positive discretionary accruals. This evidence in table 4 suggest that firms are likely to have much more usage of positive discretionary accruals when faced with negative changes in underlying earnigns, possibly to manipulate and report earnings higher than last year's earnings. This pattern is especially prominent for those firms which can be characterised as just-miss firms.

Table 4
Frequencies of positive adjusted discretionary accruals when pre-managed earnings (changes) below benchmarks

Panel A-Pre-managed earnings level

	$Adj(DA)_{it} < 0$	$Adj(DA)_{it} \geq 0$	Total
Firm-years with	1016	1723	2739
$PME_{it} < 0$	*37.09%*	*62.91%*	*100%*
Firm-years with	1358	649	2007
$PME_{it} \geq 0$	*67.66%*	*32.34%*	*100%*
Total	2374	2372	4746
Firm-years with	113	212	361
-0.04≤PMEit<0	*31.309%*	*58.72%*	*100%*
Firm-years with	137	190	419
0≤PMEit<0.04	*32.69%*	*45.34%*	*100%*
Total	250	402	780

Panel B-Pre-managed earnings change

	$Adj(DA)_{it} < 0$	$Adj(DA)_{it} \geq 0$	Total
Firm-years with	737	1651	2388
$\Delta PME_{it} < 0$	*30.86%*	*69.14%*	*100%*
Firm-years with	1637	721	2358
$\Delta PME_{it} \geq 0$	*69.42%*	*30.58%*	*100%*
Total	2374	2372	4746
Firm-years with	172	302	527
-0.04≤ΔPMEit <0	*32.64%*	*57.31%*	*100%*
Firm-years with	279	177	533
0≤ΔPMEit<0.04	*52.34%*	*33.21%*	*100%*
Total	451	479	1060

Note: This table evaluates whether firms with pre-managed earnings (changes) below benchmarks more likely to exercise positive discretionary accruals to manage earnings upwards. PME is pre-managed earnings level, calculated as reported earnings minus adjusted discretionary accruals; ΔPME is pre-managed earnings change, calculated as reported earnings change minus adjusted discretionary accruals; Adj (DA) is adjusted discretionary accruals, estimated from Jones (1991) version cash flows model adjust for extreme earnings performance

Table 5 reports the mean and median levels of discretionary accruals conditioned on pre-managed earnings. Panel A reports that firms with pre-managed earnings below zero have significantly positive mean and median discretionary accruals of 0.0273 and 0.0311 resepectively while firms with pre-managed earnings of above zero exhibit significantly negative mean and median discretionary accruals of −0.0329 and −0.0292. Two sample t-test for the mean show that discretionary accruals are significantly different between the two sub samples of pre-managed earnings partitioned at zero. This result supports our earlier result in table 4 that firms with negative pre-managed earnings have higher usage of positive discretionary accruals. Within the small interval of $[-0.04 \leq PME_{it} < 0]$ discretionary accruals of firms with pre-managed earnings loss there is significantly positive mean and median, 0.0154 and 0.0260, respectively. Further, the mean and median discretionary accruals of firms within the interval of $[0 \leq PME_{it} < 0.04]$ are statistically not different from zero. For the firms whose pre-managed earnings are already positive, though small, are already meeting benchmarks and hence do not have incentive to manipulate earnings.

Panel B of Table 5 shows a similar pattern of $Adj(DA)_{it}$ to that of Panel A when pre-managed earnings change is considered. Firms with negative pre-managed earnings change have higher positive discretionary accruals than those with positive pre-managed earnings change. The

mean (median) discretionary accruals for firms with worsening pre-managed earnings ($\Delta PME_{it} < 0$) is 0.0336 (0.0349) and significantly positive. However, when we consider firms with improving pre-managed earnings ($\Delta PME_{it} > 0$), the mean (median) discretionary accruals is significantly negative −0.0303 (−0.0334). Within the small interval of pre-managed earnings change ($-0.04 \leq \Delta PME_{it} < 0$), the mean (median) discretionary accruals of firms within is also positive 0.0099 (0.0129) and significantly different from zero. Conversely the mean (median) discretionary accruals of firms within the small interval of positive change in pre-managed earnings ($0 \leq \Delta PME_{it} < 0.04$) is significantly negative at −0.0073 (−0.0090). Two sample t- tests show that discretionary accruals are significantly different between two sub samples of pre-managed earnings that are below and above last year's earnings.

Table 5
Adjusted discretionary accruals comparing firms with pre-managed earnings are below to above benchmarks

Panel A-Pre-managed earnings level

	PME < 0			PME ≥ 0			Test for difference	
	N	Mean	Median	N	Mean	Median	t-test	p-value
Adj(DA)	2739	0.0273***	0.0311***	2007	−0.0329***	−0.0292***	25.96	<.0001

	−0.04 ≤ PME < 0			0 ≤ PME < 0.04			Test for difference	
	N	Mean	Median	N	Mean	Median	t-test	p-value
Adj(DA)	361	0.0154***	0.0260***	419	0.0010	0.0073	2.98	0.0029

Panel B-Pre-managed earnings change

	ΔPME < 0			ΔPME ≥ 0			Test for difference	
	N	Mean	Median	N	Mean	Median	t-test	p-value
Adj(DA)	2388	0.0336***	0.0349***	2358	−0.0303***	−0.0334***	27.36	<.0001

	−0.04 ≤ ΔPME < 0			0 ≤ ΔPME < 0.04			Test for difference	
	N	Mean	Median	N	Mean	Median	t-test	p-value
Adj(DA)	527	0.0099***	0.0129***	533	−0.0073***	−0.0090***	4.84	<.0001

Note:

1).This table evaluates whether discretionary accruals are different between pre-managed earnings loss (decline) firms and pre-managed earnings profit (increase) firms. We compare two intervals: (1) pre-managed earnings loss (decline) versus pre-managed earnings profit (increase); and (2) small pre-managed earnings loss (decline) versus small pre-managed earnings profit (increase). PME is pre-managed earnings level, calculated as reported earnings minus adjusted discretionary accruals; ΔPME is pre-managed earnings change, calculated as reported earnings change minus adjusted discretionary accruals; Adj (DA) is adjusted discretionary accruals, estimated from Jones (1991) version cash flows model adjust for extreme earnings performance. 2). T-statistics are based on t-test for the difference in means across samples and p-values are two-tailed.

These results support our prediction that firms manage earnings upward when the firm's pre-managed earnings performance under-shoots the benchmark. Our results are consistent with Peasnell et al. (2000a, 2005) who find evidence of 'cookie-jar' accounting and that earnings management to beat benchmarks is associated with board composition of non-executive and outside board members. Our evidence supports the 'cookie jar accounting' theory of managers decreasing earnings when pre-managed earnings are well above benchmarks in order to save some income to beat benchmarks in the future. This is also consistent with Degeorge et al. (1999) who documented that managers systematically manipulate reported earnings downwards when pre-managed earnings exceed threshold earnings by a substantial amount.

Discretionary Accruals and Pre-managed Earnings Benchmarks

In this section, we test whether discretionary accruals associated with pre-managed earnings fall short of particular benchmarks. We use equation (5) to test for benchmarks after controlling for firm size, growth rate, profitability, working capital, leverage, and industry effects discussed earlier.[9] Since our focus is on the association between benchmarks and discretionary accruals, we do not discuss estimates of controlling factors but are note them in tables.

Regression models 1 and 2 of Table 6 Panel A present regression results of $Adj(DA_{it})$ of firms with underlying losses. The positive and significant coefficient estimate on *CLUSTER_1* in model 1 is consistent with the hypothesis that managers make use of positive discretionary accruals when pre-managed earnings are negative. In model 2, we restrict our sample to firms reporting *ex-post* profits ($E_{it} \geq 0$) while the underlying earnings are negative. The coefficient on *CLUSTER_2* is significantly positive, indicating that for these profit reporting firms, managers tend to use positive discretionary accruals when pre-managed earnings are negative. It should be also noted that the coefficient estimate on *CLUSTER_2* is stronger than *CLUSTER_1* (0.0819 versus 0.1126). This larger estimate on CLUSTER_2 provides some evidence that the earnings management activity is likely to be concentrated in firms that have reported positive profits among the loss-making firms. Model 3 and 4 are regressions based on small intervals surrounding zero. Both coefficients on *CLUSTER_3* and *CLUSTER_4* are significant positive, which is consistent with the view that when firms have pre-managed earnings slightly below zero, managers use positive discretionary accruals to inflate reported earnings to report small profits. Again, the larger coefficient estimate on *CLUSTER_4* (0.0403 versus 0.0268) signifies our conjecture that small-loss firms have stronger incentive to use discretionary accruals to push into positive profit territory. Expectedly the predictive ability of our model, signified by R^2 estimates of regressions, increases as testing intervals move from bigger to smaller and more specific regions surrounding benchmark. Nevertheless these results validate our hypotheses that firms use discretionary accruals to beat benchamarks.

[9] For the sake of brevity, the control variables results are not discussed.

Table 6
Two-way cluster-robust regression of adjusted discretionary accruals on pre-managed earnings are below benchmarks and control variables

Panel A-Pre-managed earnings level

Independent Variables	Expected sign	Model 1	Model 2	Model 3	Model 4
Intercept	?	-0.0450	-0.0381	-0.0052	-0.0295
		(-3.45)***	(-2.44)**	(-0.35)	(-3.03)***
CLUSTER_1 (PMEit<0)	+	0.0819			
		(25.87)***			
CLUSTER_2 (PMEit < 0, Eit≥ 0)	+		0.1126		
			(29.39)***		
CLUSTER_3 (−0.04≤PMEit<0)	+			0.0268	
				(8.41)***	
CLUSTER_4 (−0.04≤ PMEit <0, 0≤ Eit <0.04)	+				0.0403
					(19.29)***
SIZE	−	-0.0012	-0.0019	-0.0015	0.0015
		(-1.61)	(-2.28)**	(-1.50)	(2.32)**
GROWTH	+	0.0000	0.0000	-0.0003	0.0002
		(0.84)	(0.84)	(-1.45)	(0.18)
ROA	?	0.0856	0.0917	0.4518	0.0459
		(14.10)***	(8.82)***	(25.67)***	(3.03)***
WC	+	0.0123	0.0149	0.0272	0.0140
		(3.46)***	(2.37)**	(4.38)***	(2.18)**
LEV	?	0.0159	0.0425	0.0007	-0.0021
		(3.66)***	(4.48)***	(0.07)	(-0.29)
INDUSTRY EFFECTS		Yes	Yes	Yes	Yes
N		2739	385	361	116
Adj. R^2		0.2005	0.3521	0.5610	0.6437

Adj(DA) = Adjusted discretionary accruals scaled by total asset at year t-1, estimated from equation (2)

CLUSTER = An indicator variable equals to 1 if pre-managed earnings (change) is less than zero and zero otherwise. We test four regions for each of earnings benchmarks, where 1) PME_{it} (ΔPME_{it}) < 0; 2) PME_{it} (ΔPME_{it}) < 0; E_{it} (ΔE_{it}) ≥ 0; 3) −0.04≤ PME_{it} (ΔPME_{it}) < 0; and 4) −0.04≤ PME_{it} (ΔPME_{it}) < 0; 0 ≤ E_{it}< 0.04. Pre-managed earnings level (PME) are defined as reported earnings (E) minus adjusted discretionary accruals; pre-managed earnings change (ΔPME), calculated as reported earnings change (ΔE) minus adjusted discretionary accruals (see Equation 3,4)

SIZE = Firm size for firm *i* for year *t*, measured by the logarithm of the total assets at year *t*;

GROWT = Growth opportunity for firm *i* for year *t,* measured by the change of sales between year *t* and *t-1* divided by total assets at year *t*

ROA = Profitability, measured by net operating income divided by total assets for firm *i* at year *t*

WC = Working capital, measured by the difference between current assets and current liabilities for firm *i* in year *t*

LEV = Leverage, measured by total debt to total assets for firm *i* in year *t*

$\sum_j IND_j$ = 1 if firm *i* is from industry *j*, based on GICS industrial codes and 0 otherwise

2). P-values are given in parentheses below the coefficient, one-tailed tests when we have explicit predictions and two-tailed otherwise.
3). the estimated coefficients and *t* statistics are two-way cluster-robust adjusted with White (1980) method.

Table 7 shows regression tests of $Adj(DA_{it})$ of firms which have pre-managed earnings below last year's earnings. We find positive and significant coefficient estimate on *CLUSTER_1*. In model 2, we restrict our sample to reported earnings above last year's earnings ($\Delta E_{it} \geq 0$) and find that the coefficient on *CLUSTER_2* is not only significantly positive but also higher than the model 1 estimate. This means managers tend to use positive discretionary accruals to report income increase to give appearance of sustaining previous year's earnings even when pre-managed earnings fall short of the prior year's level. In Model 3 and 4, we consider the intervals

[-0.04, 0] and [0, +0.04] surrounding zero. Both the coefficients on *CLUSTER_3* and *CLUSTER_4* are significantly positive, which is consistent with the hypothesis that when pre-managed earnings are slightly below last year's earnings, managers use income increasing discretionary accruals to inflate earnings to report small but positive earnings increase. From Model 1 to Model 4, we find a consistent and positive association between discretionary accruals when pre-managed earnings are below targets. This suggests that managers shift earnings from losses or earnings decreases on a pre-managed basis to report *ex post* profits or earnings increases.

Table 7
Pre-managed earnings change

Independent Variables	Expected sign	Model 1	Model 2	Model 3	Model 4
Intercept	?	0.0071	0.0697	-0.0105	-0.0056
		(0.55)	(3.66)***	(-0.58)	(-0.50)
CLUSTER_1 (ΔPMEit <0)	+	0.0612			
		(23.20)***			
CLUSTER_2 (ΔPMEit < 0, ΔEit ≥ 0)	+		0.1004		
			(26.06)***		
CLUSTER_3 (−0.04≤ΔPMEit<0)	+			0.0189	
				(5.36)***	
CLUSTER_4 (−0.04≤ ΔPMEit <0, 0≤ ΔEit <0.04)	+				0.0354
					(21.09)***
SIZE	−	-0.0052	-0.0074	-0.0036	-0.0010
		(-7.05)***	(-8.13)***	(-3.54)***	(-2.05)**
GROWTH	+	0.0000	0.0000	0.0002	0.0002
		(1.04)	(1.36)	(2.82)**	(0.51)
ROA	?	0.0402	0.0002	0.0877	0.0243
		(7.03)***	(0.03)	(7.9)***	(2.68)***
WC	+	0.0039	0.0131	-0.0029	-0.0130
		(1.09)	(2.41)**	(-0.44)	(-2.42)**
LEV	?	0.0167	0.0408	0.0023	-0.0008
		(3.78)***	(4.86)***	(0.20)	(-0.13)
INDUSTRY EFFECTS		Yes	Yes	Yes	Yes
N		2388	551	527	184
Adj. R^2		0.1749	0.2997	0.1078	0.5845

Notes:
1). Variable definitions:

Adj(DA) = Adjusted discretionary accruals scaled by total asset at year t-1, estimated from equation (2)

CLUSTER = An indicator variable equals to 1 if pre-managed earnings (change) is less than zero and zero otherwise. We test four regions for each of earnings benchmarks, where 1) PME_{it} (ΔPME_{it}) < 0; 2) PME_{it} (ΔPME_{it}) < 0; E_{it} (ΔE_{it}) ≥ 0; 3) −0.04≤ PME_{it} (ΔPME_{it}) < 0; and 4) −0.04≤ PME_{it} (ΔPME_{it}) < 0; 0 ≤ E_{it}< 0.04. Pre-managed earnings level (PME) are defined as reported earnings (E) minus adjusted discretionary accruals; pre-managed earnings change (ΔPME), calculated as reported earnings change (ΔE) minus adjusted discretionary accruals (see Equation 3,4)

SIZE = Firm size for firm *i* for year *t*, measured by the logarithm of the total assets at year *t*;

GROWT = Growth opportunity for firm *i* for year *t,* measured by the change of sales between year *t* and *t-1* divided by total assets at year *t*

ROA = Profitability, measured by net operating income divided by total assets for firm *i* at year *t*

WC = Working capital, measured by the difference between current assets and current liabilities for firm *i* in year *t*

LEV = Leverage, measured by total debt to total assets for firm *i* in year *t*

$\sum_j IND_j$ = 1 if firm *i* is from industry *j*, based on GICS industrial codes and 0 otherwise

2). P-values are given in parentheses below the coefficient, one-tailed tests when we have explicit predictions and two-tailed otherwise.
3). the estimated coefficients and *t* statistics are two-way cluster-robust adjusted with White (1980) method.

Further Tests

We perform a variety of additional tests to assess the robustness of our findings to measurement errors associated with discretionary accruals.

The finding of the disappearance of the discontinuity around zero in the histogram analysis could be argued as a statistical artefact because the construction of the pre-managed earnings basically removes the variation from the Jones model. To test this, following the method of Gore et al (2007) we generate a randomly determined 'pseudo discretionary accruals' for each firm-year observation. The sample of pseudo discretionary accruals has a normal distribution with mean and standard deviation set equal to the sample distribution of $Adj(DA_{it})$. We then construct the pre-managed earnings as reported earnings minus the pseudo discretionary accruals (rather than removing the $Adj(DA_{it})$) and recreate the histogram. The histogram shows that simulated distribution of pre-managed earnings is fairly smooth around zero. Moreover, Z-statistics in the intervals immediately below and above zero are −0.62 and −1.10 (not reported), which are insignificantly different from the expected frequencies. We also construct the pre-managed earnings change as reported earnings changes minus the 'pseudo discretionary accruals change'. We obtain similar results in that the simulated distribution of pre-managed earnings change is smooth. Therefore, without invoking Jones model, the simulation of discretionary accruals through pseudo accruals illustrates how accrual manipulation contributes to a discontinuity in the distribution of reported earnings and earnings changes.

Second, the construction of pre-managed earnings is to essentially 'back out' or deduct estimates of discretionary accruals from reported earnings. Error in estimating discretionary accruals can lead to possible error in the estimation of pre-managed earnings. This in turn could induce spurious association between accounting discretions and pre-managed earnings (Lim & Lustgarten 2002). Following Barua et al. (2006), we use non-discretionary accruals to replace discretionary accruals when pre-managed earnings are below or above targets to test for accounting discretion. The intuition behind this procedure is that non-discretionary accruals are not supposed to involve earnings management. However, if results are similar to that of discretionary accruals, then the findings are likely to be a consequence of the backing-out error. We redefine pre-managed earnings as net income before extraordinary items minus non-discretionary accruals ($PME_{it}=E_{it}-NDA_{it}$) and repeat all the tests. The regression results show that $CLUSTER\_N_{it}$ are significantly *negative* in all the four models suggesting that our results are not simply a consequence of the backing-out problem.

Finally, we use two smaller interval widths of 0.01 and 0.005 to assess whether the discontinuity presented in the primary analysis is an artefact of a pre-determined interval. If the interval width is too large or small, then the frequencies may not be sensitive to shifts in proportions in them. Our tests from the adjustments of intervals are qualitatively similar to earlier results in Tables 2 and 3, although with the finer interval we lose the power of our tests.

We also use operating cash flow as an instrumental variable to surrogate for pre-managed earnings as operating cash flow is not related to discretionary accruals (Peasnell et al. 2005). For the profit benchmark, the results remain qualitatively unchanged to those reported in the main text.

Conclusion

This study exploits the distributional properties of *ex post* earnings and links such properties with *ex ante* pre-managed earnings to identify behaviour that is consistent with earnings management practices to beat benchmarks. Using a sample period of 2000 to 2006, we find significant discontinuities in the distribution of reported earnings. These discontinuities disappear after the removal of discretionary components of the earnings in its pre-managed earnings form. This evidence is broadly supportive of prior research in Australian context.

We attempt to find the causality of spikes in reported earnings by examining whether managers attempt to influence earnings in trying to meet implicit two earnings benchmarks: avoiding losses (zero profit) and positive change in earnings. We find that when pre-managed earnings are below zero or prior year's earnings, firms are more likely to exercise positive discretionary accruals to inflate earnings to beat both of these earnings benchmarks. We document this through establishing links between frequencies of firms in various subsets of our sample to these benchmarks and through our cluster-robust regressions.Our approach and measure of pre managed earnings sheds useful insight into the *ex ante* conditions under which firms seek to manipulate earnings. It also has implications for regulators to identify conditions under which firms are likely to engage in earnings management practices.

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Ownership Structure and Earnings Management: Evidence from Portugal

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Abstract

This paper examines the relationship between corporate ownership structure in Portugal and earnings management. The Portuguese governance structure is characterised by the dominance of the largest shareholder who typically exercises significant influences on management decisions directly or indirectly. Existing literature suggests that ownership structure decreases the incentive to manage earnings but also provides the opportunity and incentive to anipulate earnings. Therefore, the main purpose of this paper is to analyse whether a firm's ownership structure (measured with three variables: managerial ownership, ownership concentration and institutional ownership) exacerbate or alleviate earnings management. Using a sample of 34 non-financial listed Portuguese firms for years from 2002 to 2007, we find that discretionary accruals as a proxy for earnings management is negatively related both to managerial ownership and to ownership concentration. The study's results suggest that both managerial ownership and ownership concentration improve the quality of annual earnings by reducing the levels of earnings management.

Keywords

Earnings management, Discretionary accruals, Ownership structure, Ownership Management: Evidence from Portugal

Ownership Structure and Earnings Management: Evidence from Portugal

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Abstract

This paper examines the relationship between corporate ownership structure in Portugal and earnings management. The Portuguese governance structure is characterised by the dominance of the largest shareholder who typically exercises significant influences on management decisions directly or indirectly. Existing literature suggests that ownership structure decreases the incentive to manage earnings but also provides the opportunity and incentive to manipulate earnings. Therefore, the main purpose of this paper is to analyse whether a firm's ownership structure (measured with three variables: managerial ownership, ownership concentration and institutional ownership) exacerbate or alleviate earnings management. Using a sample of 34 non-financial listed Portuguese firms for years from 2002 to 2007, we find that discretionary accruals as a proxy for earnings management is negatively related both to managerial ownership and to ownership concentration. The study's results suggest that both managerial ownership and ownership concentration improve the quality of annual earnings by reducing the levels of earnings management.

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Introduction

In a world characterised by imperfect information and costly monitoring, a divergence of interests between shareholders and management can lead to suboptimal management decisions. Such decisions are possible because the actions of managers are largely unobservable and the goals of the managers and their shareholders are not necessarily aligned. Managers are posited to opportunistically manage earnings to maximise their utility at the expense of other stakeholders. Agency theory suggests that the monitoring mechanisms can improve the alignment of management and shareholders' interests and mitigate any opportunistic behaviour resulting from conflict of interests.

Accounting earnings is considered as one of the main indicators of financial performance of a firm. Naturally, the phenomenon of earnings management has already drawn the attention of academic researchers, financial markets regulators, operators and investors.

Previous studies have focused mainly on the incentives of earnings management. The most important incentives investigated in prior literature include: compensation contracts (Guidry, Leone & Rock 1999; Healy 1985; Holthausen, Larcker & Sloan 1995), reduce political costs (Key 1997; Watts & Zimmerman 1986), signal manager's private information (Healy & Papepu, 1995), avoid losses (Burgstaher & Bichev 1997), meet analysts' forecasts (Athanasakou, Strong & Ealker 2009; Kasznik 1999), avoid debt covenant violations (DeFond & Jiambalvo 1994), initial public offerings (Teoh, Welch & Wong 1998a), seasoned equity offerings (Teoh, Welch & Wong 1998b) management buyouts (DeAngelo 1986; Perry & Williams 1994) and stock-financed acquisitions (Erickson & Wang 1999).

However, there exists a variety of factors that limit earnings management. In fact, some studies have indicated that certain corporate governance factors have an impact on corporate accounting behaviour, including earnings management (Dechow, Sloan & Sweeney 1996; Dempsey, Hunt & Schroeder 1993; Jiambalvo 1996). For example, Warfield, Wild and Wild (1995) argue that managers who own a significant portion in the equity of a firm have less incentive to manipulate reported accounting information. Dechow et al. (1996) suggest that large block-holders of shares improve credibility of a firm's financial statements by providing close scrutiny over its earnings management activity. Balsam, Bartov and Marquardt (2002) state that institutional investors, who are sophisticated investors, are more capable of detecting earnings management than non-institutional investors because they have more access to timely and relevant information. Chung, Firth and Kim (2002) find that the institutional shareholdings inhibit managers from managing accruals to achieve desired level of earnings. These studies suggest that a firm's ownership structure have a significant impact on the magnitude of earnings management and earnings quality.

In this study, we examine the effect of ownership structure on a firm's earnings management activity. Using a sample of 34 Euronext Lisbon non-financial firms over a period of 6 years, from 2002 through 2007, we find evidence that both managerial ownership and ownership concentration reduce management flexibility in generating abnormal accounting accruals. Thus, this study suggests that despite differences in institutional environments, ownership structure is important to ensure high-quality financial reporting.

The study makes three-fold contributions to the existing earnings management literature. First, the subject of financial reporting is of great value to all users of financial statements in making decisions. Therefore, the study of earnings management is expected to be very significant to the users. The findings of this study will be important to Euronext Lisbon and other regulators that are concerned about earnings management and improving the quality of financial reporting. Second, although a few studies using mainly US and UK data have examined whether the ownership structure constrains earnings management activity, to our knowledge there is no study in Portugal that analyse this issue. The Portuguese market presents a unique case in the study of the association between ownership structure and earnings management, because, while the ownership in the US and in the UK listed firms is widely diffused, the ownership in Portuguese listed firms is highly

concentrated. This feature can influence the earnings management activity, because highly concentrated ownership determines the nature of the agency problem in Portuguese firms. In fact, in firms with a concentrated ownership, there is a real danger that dominant shareholders may mistreat or expropriate minority shareholders. Third, contrary to major earnings management research that examines the main incentives; we directly study the effects of corporate governance, mainly the ownership structure, on the magnitude of earnings management.

This paper is structured as follows. In the next section we provide an overview of the literature review and develop testable hypotheses. We present the variable measurement and describe the research methodology in the third section. The sample selection process and characteristics of the sample are presented in the fourth section. The results are reported and discussed in the fifth section. We provide sensitivity tests in the sixth section. The final section concludes the study.

Literature Review and Testable Hypotheses

According to agency theory, separation of ownership and control leads to a divergence in the pursuit of managerial interests versus owners' interests (Jensen & Meckling 1976), and thus monitoring managerial decisions becomes essential to assure that shareholders' interests are protected, and to ensure reliable and complete financial reporting. Corporate governance provides a set of constraints to reduce the agency costs originated by the nexus of contracts in the firm (Iturriaga & Hoffmann 2005) or a framework to ensure suppliers of corporate finance achieve a return on their investment (Shleifer & Vishny 1997). The role of the corporate governance structure in financial reporting is to ensure compliance with financial accounting system and to maintain the credibility of financial statements (Bushman & Smith 2003). Thus, properly structured corporate governance mechanisms are expected to reduce earnings management because they provide effective monitoring of management in the financial reporting process. Some studies have documented that the manager's incentive to manage earnings is limited by certain corporate governance mechanisms (Dechow et al. 1996; Jiambalvo 1996). The ownership structure of a firm is considered an important managers' monitoring mechanism, so it may have a monitoring role in constraining the occurrence of earnings management. Extant literature suggests that different ownership structures imply different incentives to control and monitor a firm's management (Morck, Shleifer & Vishny 1988; Shleifer & Vishny 1986). For example, ownership concentration has implications for the level of information asymmetry between managers and investors, and this influences the quality of earnings and managers' accounting choices (Donnelly & Lynch 2002; Fan & Wong 2002). The quality of earnings is also associated with different types of ownership. For example, management ownership could have a negative effect on earnings management (Warfield et al. 1995) or a positive effect due to entrenchment or expropriation effects (Cheng & Warfield 2005). Other studies have also investigated whether institutional investors have an impact on earnings management (Cornett, Marcus & Tehraniam 2008; Ebrahim 2007).

To analyse whether a firm's ownership structure provides effective monitoring of earnings management, three types of ownership are considered: managerial ownership, ownership concentration and institutional ownership.

Managerial Ownership and Earnings Management

Jensen and Meckling (1976) suggest that CEOs deviate from the goal of shareholder wealth-maximisation by consuming perquisites when they do not have an ownership stake in the firm. Accordingly, contracts are written, often containing accounting-based constraints, to restrict managers' value-reducing (or non-value-maximising) behaviour when ownership and control are distinct (Warfield et al. 1995). Thus, lower managerial ownership has greater incentives to manage accounting numbers to relieve or relax the behavioural constraints imposed in accounting-based contracts (Warfield et al. 1995).

According to agency theory managerial shareholdings encourage managers to improve firm value, since managers bear a proportion of the wealth effects as a shareholder. As a result, CEO's stock ownership can lead to a convergence of interests between managers and shareholders (alignment of interest hypothesis). Consequently, whether CEO's stock ownership helps in aligning managerial interests with those of the stockholder, we can expect that as management ownership increases, the incentives to manipulate earnings will decrease. In this vein, Ali, Salleh and Hassan (2008), Banderlipe (2009), Dhaliwal, Salamon and Smith (1982), Ebrahim, (2007), Klein (2002) and Warfield et al. (1995) find that managerial ownership is associated with lower levels of earnings management.

Nevertheless, to the extent that managers' and shareholders' interests are not fully aligned, higher stock ownership can give managers much power to pursue their own objectives without fear of punishment; i.e., it can entrench managers (Denis & McConnell 2003; Fama & Jensen 1983; Weisbach 1988). Hence, the entrenchment hypothesis suggests that CEO's stock ownership, instead of reducing managerial incentive problems, may entrench the incumbent management team, leading to increasing managerial opportunism (Fama & Jensen 1983). In this sense, the results of prior studies indicate that CEOs manage earnings to maximise their personal wealth (Cheng & Warfield 2005; Guidry et al 1999; Healy 1985; Holthausen et al. 1995). In fact, managers with high stock ownership could gain from earnings management with the purpose of keeping stock prices high and increasing the value of their shares (Yang, Lai & Tan 2008). Therefore, higher managerial ownership may encourage managers to use discretionary accruals to improve earnings and, consequently, the value of their stock holdings. Al-Fayoumi, Abuzayed and Alexander (2010), Cheng and Warfield (2005) and Mitani (2010) find that firms with higher managerial ownership are associated with more earnings management.

There is no consensus in studies examining the relationship between managerial ownership and earnings management, so our hypothesis is non-directional and states:

Alternative Hypothesis (H1a): Ceteris paribus, the percentage of managerial ownership in the firm is related to earnings management.

Ownership Concentration and Earnings Management

Small shareholders would not be interested in monitoring because they would bear all the monitoring costs, but only share a small proportion of the benefit. Consequently, shareholders owning a small fraction of outstanding share have incentives to free-ride in monitoring management. Shleifer and Vishny (1986) suggest that large shareholders have a strong incentive to actively monitor and influence firm management to protect their significant investments (the efficient monitoring hypothesis). Therefore, ownership concentration may reduce agency costs by increasing monitoring and alleviating the free-ride problem (Demsetz & Lehn 1985; Shleifer & Vishny 1986, 1997). Large shareholders are expected to monitor managerial behaviour actions effectively, which reduce the scope of managerial opportunism to engage in earnings management (Dechow, Sloan & Sweeney 1996). Additionally, there will be less pressure on management to meet short-term earnings expectations because controlling shareholders focus more on the long term. Thus, according to the efficient monitoring hypothesis ownership concentration limit earnings management. Ali et al. (2008) and Iturriaga and Hoffmann (2005) find that ownership concentration reduces the managers' discretionary behaviour.

However, firms with concentrated ownership may be subject to conflicts of interest between majority and minority shareholders. Large shareholders can exercise their control rights to create private benefits, sometimes expropriating minority shareholders (expropriation hypothesis). In fact, controlling shareholders may impose their personal preferences even if those preferences run contrary to those of minority shareholders (Shleifer & Vishny 1997). Therefore, large shareholders may intervene in the firm's management, and may encourage managers to engage in earnings management to maximise their private benefits (Jaggi & Tsui 2007). As managers fear negative

repercussions for declining performance from large shareholders, they may also have a strong motivation to engage in earnings management. Choi, Jean and Park (2004) and Kim and Yoon (2008) document that earnings management is positively related with ownership concentration.

Given this discussion, our hypothesis on the effect of ownership concentration on earnings management is non-directional and states:

Alternative Hypothesis (H2a): Ceteris paribus, higher ownership concentration in the firm is related to earnings management.

Institutional Ownership and Earnings Management

Agency theory suggests that monitoring by institutional ownership can be an important governance mechanism (the efficient monitoring hypothesis). In fact, institutional investors can provide active monitoring that is difficult for smaller, more passive or less-informed investors (Almazan, Hartzell & Starks 2005). Additionally, institutional investors have the opportunity, resources, and ability to monitor managers. Therefore, the efficient monitoring suggest that institutional ownership is associated with a better monitoring of management activities, reducing the ability of managers to opportunistically manipulate earnings. The efficient monitoring hypothesis suggests an inverse relationship between a firm's earnings management activity and its institutional share ownership. In this vein, several studies document that institutional ownership inhibits managers to opportunistically engage in earnings management (Bange & De Bondt 1998; Bushee 1998; Chung et al. 2002; Cornett et al. 2008; Ebrahim 2007; Koh 2003).

However, some argue that institutional investors do not play an active role in monitoring management activities (Claessens & Fan 2002; Porter 1992). According to Duggal and Millar (1999, p. 106), 'institutional investors are passive investors who are more likely to sell their holdings in poorly performing firms than to expend their resources in monitoring and improving their performance'. Institutional investors may be incapable of exerting their monitoring role and vote against managers because it may affect their business relationships with the firm. Accordingly, institutional investors may collude with management (Pound 1988; Sundaramurthy, Rhoades & Rechner 2005). It is also argued that institutional owners are overly focused on short-term financial results, and as such, they are unable to monitor management (Bushee 1998; Potter 1992). So, there will be a pressure on management to meet short-term earnings expectations. These arguments indicate that institutional investors may not limit managers' earnings management discretion and may increase managerial incentives to engage in earnings management (passive hands-off hypothesis).

In view of the different expectations regarding the effect of institutional ownership on earnings management, our hypothesis is non-directional and states:

Alternative Hypothesis (H3a): Ceteris paribus, the presence of institutional ownership in the firm is related to earnings management.

Variable Measurement and Research Design

Measuring Ownership Structure

As referred previously, to analyse whether a firm's ownership structure provide effective monitoring of earnings management, we use three variables: managerial ownership, ownership concentration and institutional ownership. The managerial ownership (*Managerial*) is calculated as the proportion of the company's shares directly or indirectly owned by the manager. Portuguese listed firms need to disclose the ownership levels of shareholdings in excess of 2%. Thus, ownership concentration (*Concentration*) is calculated as the proportion of stocks owned by shareholders who own at least 2% of the common stock of the company. Institutional ownership

(*Institutional*) is measured as an indicator variable taking the value 1 if there are institutional investors who own at least 2% of the common stock of the company, and 0 otherwise.

Measuring Earnings Management

Following standard accounting literature, we use discretionary accruals as a proxy for earnings management. Discretionary accruals are estimated using both the cross sectional variation of the Jones model (1991) and the cross sectional variation of the modified Jones model proposed by Dechow, Sloan & Sweeney (1995), that are commonly used by most of earnings management research (Caneghem 2002; Jaggi & Leung 2007; Klein 2002; Koh 2003; Liu & Lu 2007). Furthermore, recently some researchers have argued that current discretionary accruals are the most powerful models for estimating discretionary accruals among the existing models (Ashbaugh, LaFond & Mayhew 2003; Guay, Kothari & Watts 1996; Jaggi & Leung 2007).

The Jones' model consists of regressing total accruals (*TACC*) on two variables: the change in revenues (*ΔRev*), which models the normal component of working capital accruals; and the level of gross property, plant and equipment (*PPE*), included to control for the non-discretionary component of depreciation and amortisation expense, the main component of long-term accruals. Both variables and the intercept are divided by lagged total assets in order to avoid problems of heteroskedasticity. Non-discretionary accruals (*NDACC_Jones*) are the predictions from the ordinary least squares (OLS) estimation of model (1), while discretionary accruals (*DACC_Jones*) are the residuals.

The specific Jones model is as follows:

$$\frac{TACC_{it}}{TA_{it-1}} = \alpha_1\left(\frac{1}{TA_{it-1}}\right) + \alpha_2\left(\frac{\Delta \mathrm{Re}v_{it}}{TA_{it-1}}\right) + \alpha_3\left(\frac{PPE_{it}}{TA_{it-1}}\right) + \varepsilon_{it} \qquad (1)$$

Where,
TACC = total accruals in year t, calculated as the difference between net income and operating cash flows.
TA = total assets at the beginning of year t.
ΔRev = change in revenues.
PPE = gross property, plant and equipment.
i,t = firm and year index.

The modified Jones model differs from the original Jones model in that the change in revenues is adjusted for the change in receivables (*ΔRec*). Non-discretionary accruals (*NDACC_ModJones*) are the predictions from the OLS estimation of model (2), while discretionary accruals (*DACC_ModJones*) are the residuals.

The modified Jones model is as follows:

$$\frac{TACC_{it}}{TA_{it-1}} = \alpha_1\left(\frac{1}{TA_{it-1}}\right) + \alpha_2\left(\frac{\Delta \mathrm{Re}v_{it} - \Delta \mathrm{Re}c_{it}}{TA_{it-1}}\right) + \alpha_3\left(\frac{PPE_{it}}{TA_{it-1}}\right) + \varepsilon_{it} \qquad (2)$$

Where,
TACC; TA; ΔRev*; PPE; i,t* = as defined previously.
ΔRec = change in accounts receivable.

Regression Models and Control Variables

We evaluate the association between ownership structure and earnings management by estimating the following OLS regression:

$$DACC_{it} = \beta_0 + \beta_1 (Managerial_{it}) + \beta_2 (Concentration_{it}) + \beta_3 (Institutional_{it}) + \varepsilon_{it} \quad (3)$$

Where:
$DACC_{it}$ = earnings management of firm i for period t by using two different proxies for earnings management: Jones model and the modified Jones model.
$Managerial_{it}$ = proportion of the company's shares directly or indirectly owned by the manager of firm i for period t.
$Concentration_{it}$ = proportion of stocks owned by shareholders who own at least 2% of the common stock of firm i for period t.
$Institutional_{it}$ = dummy variable: 1 if there are institutional investors who own at least 2% of the common stock of firm i for period t, and 0 otherwise.
ε_{it} = residual term of firm i for period t.
β_0 is a constant, β_1 to β_3 are the coefficients.

Given that the three ownership categories (M*anagerial*, *Concentration and Institutional*) are not the sole factors affecting earnings management, we also evaluate the association between ownership structure and earnings management, after controlling for the impact of other relevant variables. Several control variables are introduced to isolate other contracting incentives that may be influence managers' accounting choices. Previous studies suggest that political costs (*Size*), performance (*Performance*), leverage (*Lev*), board size (*Board*) and operating cash flows (*Cash flows*) are associated with earnings management (Dechow, Sloan & Sweeney 1995; DeFond & Jiambalvo 1994; Klein 2002).

The association between ownership structure and earnings management, controlling the impact of other relevant variables is estimated using the following OLS regression:

$$DACC_{it} = \beta_0 + \beta_1 (Managerial_{it}) + \beta_2 (Concentration_{it}) + \beta_3 (Institutional_{it}) + \beta_4 (Size_{it}) + \beta_5 (Performance_{it}) + \beta_6 (Lev_{it}) + \beta_7 (Board_{it}) + \beta_8 (Cash\ flows_{it}) + \varepsilon_{it} \quad (4)$$

Where:
$DACC_{it}$, $Managerial_{it}$, $Concentration_{it}$, $Institutional_{it}$ and ε_{it} = as defined previously.
$Size_{it}$ = logarithm of market value of equity of firm i for period t.
$Performance_{it}$ = average stock returns of firm i for period t.
Lev_{it} = ratio between the book value of all liabilities and the total assets of firm i for period t.
$Board_{it}$ = number of members of the board of the firm i for period t.
$Cash\ flows_{it}$ = ratio between the operating cash flows and the total assets of firm i for period t-1.
β_0 is a constant, β_1 to β_8 are the coefficients.

CONTROL VARIABLES EXPLAINED

Watts & Zimmerman (1978) suggest that larger firms may face greater political costs relative to small firms due to higher analyst following and investor scrutiny. Consequently, the political cost (size) hypothesis suggests that large firms are more likely to choose income-decreasing earnings management in order to reduce the probability of adverse impact from political exposure. Consistent with this hypothesis, Banderlipe (2009), Jiang, Lee & Anandarajan (2008) and Peasnell, Pope & Young (2000) find that larger firms are associated with lower absolute discretionary accruals. On the other hand, large firms may have more incentives to increase earnings because this can bring more benefit to their managers (Lobo & Zhou 2006). In addition, large firms face more pressures than small firms to meet or beat the analysts' expectations (Barton & Simko 2002). Chen,

Elder & Hsieh (2007), Chung et al. (2002) and Yang et al. (2008) find that larger firms are associated with higher absolute discretionary accruals.

Chen et al. (2006), Chen, Cheng & Wang (2010) and Shah, Zafar & Durrani (2009) provide evidence suggesting that firms with lower *performance* have higher behaviour of earnings management.

Previous studies document that managers of highly *leveraged* firms have strong incentives to use income increasing accruals to loosen the contractual debt-constraints (Ali et al. 2008; DeFond & Jiambalvo 1994; Jiang et al. 2008). Nevertheless, highly indebted firms may be less able to practice earnings management because they are under close scrutiny of lenders. Chung et al. (2002), Paesnell, Pope & Young (2000), Park & Shin (2004) and Yang et al. (2008) find a negative relationship between leverage and earnings management.

Board size can affect boards' functions and potentially firm performance (Jensen 1993; Kiel & Nicholson 2003). The higher the number of members on the board; the greater the monitoring activity of management. If large boards enhance monitoring, they would be associated with less use of earnings management. In this vein, Chtourou, Bédard & Courteau (2001), Ebrahim (2007), Eisenberg, Sundgren & Wells (1998) and Xie, Davidson & DaDalt (2003) find that larger boards are associated with lower levels of discretionary accruals.

Chen et al. (2007), Dechow et al. (1995), DeFond & Jiambalvo (1994), Peasnell, Pope & Young (2000) and Yang et al. (2008) find that operating cash flows are negatively associated with discretionary accruals, suggesting that firms with strong operating cash flows are less likely to use discretionary accruals to engage in earnings management.

Sample Selection and Characteristics

The initial sample includes all companies whose stocks are listed, in the main market, in Euronext Lisbon. A total of 52, 50, 48, 51, 51 and 51 companies were listed at the year end of 2002, 2003, 2004, 2005, 2006 and 2007, respectively (303 firm-year observations in total). We select 2002 as the starting period because data on board structure are not available before 2002.

Foreign companies (2 in each of the six years, 12 in total) are excluded. Companies not having shares listed in the previous year and companies whose shares were delisted in the following year are also excluded (8, 6, 4, 7, 8 and 8 firms in 2002, 2003, 2004, 2005, 2006 and 2007, respectively). Companies (1 in each of the first four years) with missing data are also excluded. As a result, the final sample size is 34 non-financial companies per year and, thus, 204 observations in total. This reduced number of observations may influence some results. Nevertheless, this limitation is an immediate consequence of the small size of the Portuguese stock market.

Information on managerial ownership, ownership concentration, institutional ownership, leverage, board size, operational cash flows, total assets, revenues, gross property, plant and equipment, receivables and net income are collected from the Annual Report and Corporate Governance Report. Both the Annual Report and Corporate Governance Report are available on-line at www.cmvm.pt. We obtain stock price data from the Euronext Lisbon, which allows measuring of the variables political costs (*Size*) and *Performance*.

Table 1 presents the sample descriptive statistics for the variables used in this research.

Table 1 shows that, while *DACC_Jones*, ranges between about – 87% and 69%, the mean and median are about -44% and -49%. The mean (median) *DACC_ModJones* is -44% (-48%), with a minimum of -66% and a maximum of -100%. On average, the sample firms have negative discretionary accruals. This may indicate that Portuguese firms are managing their earnings downwardly. The mean (median) managerial ownership (*Managerial*) is 5.6% (0.1%), with a minimum of 0.0% and a maximum of 60.6%. The difference between the mean and the median reveals a considerable skewed nature, suggesting the existence of large percentages of shares held by managers in some companies (as can be confirmed by the maximum of the variable). The ownership concentration (*Concentration*) variable shows that, on average, listed companies in Euronext Lisbon display a large degree of ownership concentration. Table 1 also shows that about

Table 1
Summary of Descriptive Statistics
Number of observations: 204; Period: 2002-2007

	Mean	Median	Min.	Max.
DACC_Jones	-0.439	-0.486	-0.866	0.687
DACC_ModJones	-0.438	-0.483	-0.661	-1.000
Managerial	0.056	0.001	0.000	0.606
Concentration	0.685	0.723	0.161	0.978
Institutional	0.642	1.000	0.000	1.000
Size	19.085	18.928	14.590	23.517
Performance	0.001	0.000	-0.004	0.035
Lev	3.200	1.841	0.176	19.744
Board	8.015	7.000	3.000	23.000
Cash flows	0.069	0.071	-0.197	0.308

DACC represents earnings management; *Managerial* represents the equity held by managers; *Concentration* represents the proportion of stocks owned by shareholders who own at least 2% of the common stock; *Institutional* dummy variable which takes a value 1 if there are institutional investors who own at least 2% of the common stock and 0 otherwise; *Size* represents the firm's size; *Performance* is the firm's performance; *Lev* represents the ratio between the book value of all liabilities and the total assets; *Board* is the number of members of the board; *Cash flows* is the ratio between the operating cash flows and the total assets.

64% of companies have institutional ownership (*Institutional*) as shareholders. The mean of political costs (*Size*) is about EUR 1.203 million with a minimum of EUR 2.170 thousand and a maximum of EUR 16.345 million. The mean and the median of *Performance* variable are 0.1% and 0.0%, respectively, with a minimum of -0.4% and a maximum of 3.5%. *Lev* variable represents on average 3.2 of the total assets of the company (with a median of 1.841). Board size (*Board*) is comprised of approximately 8 members (with a median of 7 members). *Cash flows* variable represents on average 6.9 of the total assets of the company (with a median of 7.1).

Table 2
Pearson Correlation Coefficients Matrix

	DACC_ Jones	DACC_ ModJones	Managerial	Concentration	Size	Performance	Lev	Board	Cash flows
DACC_Jones	1								
DACC_ModJones	-	1							
Managerial	-0.147*	-0.151*	1						
Concentration	-0.212**	-0.229**	-0,476**	1					
Size	0.561**	0.553**	-0,288**	-0,032	1				
Performance	-0.052	-0.069	-0,084	0,084	0,107	1			
Lev	0.186**	0.199**	0,120	0,002	-0,592**	-0,095	1		
Board	0.567**	0.591**	-0,121	-0,101	0,705**	-0,042	-0,324**	1	
Cash flows	-0.108	-0.069	-0,132	0,117	0,428**	0,045	-0,302**	0,248**	1

DACC represents earnings management; *Managerial* represents the equity held by managers; *Concentration* represents the proportion of stocks owned by shareholders who own at least 2% of the common stock; *Institutional* dummy variable which takes a value 1 if there are institutional investors who own at least 2% of the common stock and 0 otherwise; *Size* represents the firm's size; *Performance* is the firm's performance; *Lev* represents the ratio between the book value of all liabilities and the total assets; *Board* is the number of members of the board; *Cash flows* is the ratio between the operating cash flows and the total assets.

*** Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed).

The analysis of Table 2 shows that there are some significant correlations between the variables. *Managerial* and *Concentration* are negatively related with both *DACC_Jones* and *DACC_ModJones*, suggesting that earnings management is significantly lower for firms with

greater managerial ownership and higher ownership concentration. A negative correlation between *Managerial* and *Concentration* indicates that managers' equity interest in the firm is declining as ownership concentration increases. *Size* is positively correlated with both *DACC_Jones* and *DACC_ModJones*, suggesting that large firms have greater earnings management activity. *Managerial* is negatively correlated with *Size*, suggesting that managers' equity interest in the firm is declining as firm size increases. *Lev* is positively correlated with both *DACC_Jones* and *DACC_ModJones*, suggesting that an increase in leverage encourages managers to use more accruals to manage earnings to avoid debt covenant violation. *Size* is negatively associated with *Lev*, suggesting that larger firms have lower leverage constraint levels. A positive correlation between the *Board* and both *DACC_Jones* and *DACC_ModJones* indicates that as board size increases, boards become less effective at monitoring management. *Size* is positively correlated with *Board*, suggesting that large firms have greater board size. A negative correlation between *Lev* and *Board* indicates that firms with high leverage tend to have smaller boards. *Size* is positively correlated with *Cash flows*, suggesting that large firms have greater operating cash flows. A negative correlation between *Lev* and *Cash flows* indicates that firms with high leverage have lower cash flows from operations. A positive correlation between *Board* and *Cash flows* suggests that firms with greater board size have more cash flows from operations. Correlation coefficients are, in general, low (below the 0.9 threshold) (Tabachnick and Fidell, 2001), suggesting the absence of serious statistical problems related with multicollinearity.

Results and Discussion

Table 3 presents OLS regression estimates for equation 3 and equation 4 developed in the third section.

Table 3
OLS Regressions Results
Number of observations: 204, Period: 2002-2007

Dependent variable	**DACC_ Jones Model (3)**		**DACC_ Jones Model (4)**		**DACC_ ModJones Model (3)**		**DACC_ ModJones Model (4)**	
Independent variables	**Coef.**	**t test**	**Coef.**	**t test**	**Coef.**	**t test**	**Coef.**	**t test**
Constant	-0,213	-3,075***	-0,305	-4,274***	-0,211	-3,340***	-0,328	-4,861***
Managerial	-0,499	-4,056***	-0,189	-1,763*	-0,500	-4,268***	-0,222	-2,193**
Concentration	-0,345	-4,178***	-0,229	-3,339***	-0,348	-4,427***	-0,235	-3,621***
Institutional	0,059	1,996**	-0,017	-0,657	0,074	2,599***	-0,001	-0,045
Size			0,048	4,840***			0,039	4,192***
Performance			-2,952	-1,164			-3,338	-1,392
Lev			0,009	2,424***			0,006	1,797*
Board			0,015	3,516***			0,017	4,323***
Cash flows			-0,308	-1,802*			-0,388	-2,404***
R-squared	14,17%		44,52%		16,87%		46,94%	
Adjusted R-squared	12,89%		42,24%		15,62%		44,76%	
F-statistic	11,013***		19,558***		13,530***		21,568***	

DACC represents earnings management; *Managerial* represents the equity held by managers; *Concentration* represents the proportion of stocks owned by shareholders who own at least 2% of the common stock; *Institutional* dummy variable which takes a value 1 if there are institutional investors who own at least 2% of the common stock and 0 otherwise; *Size* represents the firm's size; *Performance* is the firm's performance; *LEV* represents the ratio between the book value of all liabilities and the total assets; *Board* is the number of members of the board; *Cash flows* is the ratio between the operating cash flows and the total assets.

*** Significant at the 1-percent level; ** Significant at the 5-percent level; * Significant at the 10-percent level.

The empirical tests of the main hypotheses examine the association between ownership structure and earnings management. Table 3 reports the results from equation (3) which examines the association between the three measures of the ownership structure and the two measures of earnings management. Additionally, Table 3 presents the results from equation (4) which also analyse whether a firm's ownership structure affects the levels of earnings management controlling the impact of other relevant variables.

Table 3 shows that, in all models, the managerial ownership is significantly negatively related to earnings management. Consistent with the alignment of interest hypothesis, this negative relationship suggests that the higher managerial ownership, the lower the magnitude of discretionary accounting accruals, which confirms the findings of Ali et al. (2008), Banderlipe (2009), Dhaliwal et al. (1982), Ebrahim, (2007), Klein (2002) and Warfield et al. (1995).

As in Ali et al. (2008) and Iturriaga & Hoffmann (2005), we find, in all models, a negative relationship between ownership concentration and earnings management, suggesting that earnings management is significantly lower for firms with higher ownership concentration. This result corroborates the efficient monitoring hypothesis which suggests that large shareholders reduce the scope of managerial opportunism.

In model (3) the coefficient institutional ownership variable is positive and significant, consistent with the passive hands-off hypothesis which suggests that institutional investors may increase managerial incentives to engage in earnings management. However, this result is not corroborated in model (4). In reality, in model (4) the coefficient on institutional ownership is negative, but not statistically significant. Thus, it is not possible to conclude that firms having institutional ownership have higher flexibility to use accruals to manage earnings.

Regarding the other variables, included as control variables, we find, in all models, that earnings management is significantly higher for firms with greater political costs (*Size*). *Lev* is significantly positive, in all models, providing evidence that an increase in leverage encourages managers to use more accruals to manage earnings to avoid debt covenant violation, confirming the prediction and results of DeFond & Jiambalvo (1994) and Jiang et al. (2008). As in Kao & Chen (2004), we document, in all models, a positive relationship between the *Board* and the earnings management, suggesting that the higher the number of the directors on the board the greater is the likelihood to use accruals to manage earnings. This result seems to indicate that small boards might be more effective in monitoring managerial behaviour. Finally, the results suggest, in all models, that earnings management is significantly lower for firms with greater operating cash flows.

Results suggest no evidence that firm performance affects the levels of earnings management.

Summing up, the results reveal that while managerial ownership, ownership concentration and operating cash flow alleviate earnings management, the political costs, leverage and board size exacerbate the levels of discretionary accruals.

Sensitivity Analyses

To ensure the robustness of our results, we perform several sensitivity checks. The first sensitivity analysis examines the effect of influential observations on results. Where outliers are found (namely in the variables *Managerial*, *Board*, *Lev* and *Performance*), a winserization method is used to test the robustness of the results. Extreme values (defined as values that are more than three standard deviations away from the mean) are replaced by values that are exactly three standard deviations away from the mean. The results (not reported here) do not differ from results presented previously in Table 3. Thus, the influential observations do not affect the results.

The next sensitivity analysis examines the effects of board composition on discretionary accruals. Extant literature indicates that board composition and accruals are negatively correlated (Benkel, Mather & Ramsay 2006; Cornett et al. 2008; Peasnell, Pope & Young 2000). The *Board Composition* variable is introduced to examine the robustness of the results found in the fifth section of this paper. The *Board Composition* variable is calculated by dividing the number of non-

executive directors by the total number of board members. The unreported results of these tests are qualitatively the same as those observed in the earlier section. All the estimated coefficients for *Managerial*, *Concentration* and *Institutional* retain their significance level and have the same signs. The *Board Composition* is significantly negatively related to earnings management, which suggests board composition is effective in deterring managers' opportunistic earnings management.

Sloan (1996) finds evidence of a concave relation between firm size and total accruals. Thus, equation (3) and equation (4) are re-estimated by including an additional variable, $Size^2$, to examine whether there is a size effect in the relationship between ownership structure and earnings management. Both *Size* and $Size^2$ are statistically positive. All the results (not reported) are qualitatively the same as the main findings where the three measures of ownership structure retain their significance level and have the same signs. Thus, the observed impact of the ownership structure on earnings management is unlikely to be a size effect.

Ding, Zhang & Zhang (2007) find evidence of a non-linear relationship between ownership concentration and earnings management. Accordingly, equation (3) and equation (4) are re-estimated by including the squared *Concentration* ($Concentration^2$), to examine the possibility that the relationship between concentration and earnings management may be non-linear. The results (not reported) are qualitatively the same as the main findings. The coefficient of $Concentration^2$ variable is not statistically significant. Thus, no evidence suggests that the relationship between ownership concentration and earnings management is non-linear.

The above analyses indicate that the results of this paper are robust after controlling the effect of influential observations, the effect of board composition, different specification of the relation between *Size* and earnings management and different specification of the relation between *Concentration* and earnings management.

Summary and Conclusions

Previous studies have indicated that ownership structure has an impact on corporate accounting behaviour (Banderlipe 2009; Chung et al. 2002; Dechow, Sloan & Sweeney 1996; Klein 2002; Kim & Yoon 2008; Mitani 2010; Warfield et al. 1995).

Therefore, the aim of this paper is to examine the effect of ownership structure on a firm's earnings management activity, within the Portuguese capital market. For this reason we selected a sample of 34 firms listed in Euronext Lisbon from 2002 to 2007 (204 firm-year observations). The empirical findings suggest that the earnings management practices of Portuguese listed firms are influenced by these firms' ownership structure. Specifically, our study shows that both managerial ownership and ownership concentration inhibit earnings management. This result is consistent with both the alignment of interest hypothesis, which suggests that managers who own a significant portion of the equity in a firm have less incentive to manipulate reported accounting information, and the efficient monitoring hypothesis, which suggests that large shareholders reduce the scope of managerial opportunism.

Moreover, the results also reveal that there is less earnings management when operating cash flows are high and that there is more earnings management when political costs, leverage and board size are high.

In sum, our findings highlight the importance of ownership structure, mainly managerial ownership and ownership concentration, in constraining the likelihood of earnings management in Portugal. Therefore, our study indicates that both managerial ownership and ownership concentration affect the informational quality of earnings positively, and consequently enhance the quality and value relevance of published financial data.

The findings of this study make the following contributions. First, the results indicate that, on average, managerial ownership and ownership concentration provide effective monitoring of earnings management in Portuguese listed firms. Second, the findings are relevant for countries with an institutional environment (mainly concentrated ownership) similar to that of Portugal.

Finally, investors may also benefit from the findings because they provide insight into the impact of ownership structure on earnings quality.

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Unrelated Diversification and Firm Performance: 1980-2007 Evidence from Italy

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Unrelated Diversification and Firm Performance: 1980-2007 Evidence from Italy

Abstract

The goal of this article is to examine the relationship between unrelated diversification and performance. Results indicate that diversified firms, investing in activities far from the core business, have high performance. Unrelated diversification positively affects firms' performance. In addition, the estimation methods applied are fundamental in order to verify if there are endogeneity problems in the diversification decision and evaluate the effective role of diversification on performance.

Keywords

Corporate diversification, unrelatedness, performance.

Unrelated Diversification and Firm Performance: 1980-2007 Evidence from Italy

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Abstract

The goal of this article is to examine the relationship between unrelated diversification and performance. Results indicate that diversified firms, investing in activities far from the core business, have high performance. Unrelated diversification positively affects firms' performance. In addition, the estimation methods applied are fundamental in order to verify if there are endogeneity problems in the diversification decision and evaluate the effective role of diversification on performance.

Key words: Corporate diversification, unrelatedness, performance.

JEL classification: G30, M20.

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1. Introduction

This paper deals with the traditional but still controversial debate regarding the relationship between product diversification strategies and a firm's value. Till the end of the nineties the vast majority of Corporate Finance studies assumed a negative effect of diversification on performance, while the Strategic Management literature highlighted the contribution of diversification to value creation processes. In recent years a growing number of studies have shown a renewed interest among the scientific community in this area of research (Campa & Kedia 2002; Graham, Lemmon & Wolf 2002; Maksimovic & Phillips 2002; Singh, Nejadmalayeri & Mathur 2007; Villalonga 2004a; 2004b). Substantial empirical work confirms the existence of a relationship between corporate diversification and firm value, although there is no consensus on the negative or positive direction of this relationship (Martin & Sayrak 2003; Palich, Cardinal & Miller 2000; Villalonga 2003). Therefore, continued efforts to clarify the association between firm diversification and firm performance are useful.

Financial studies offer two competing theoretical perspectives providing theoretical motivations for diversification[3]: agency costs theory and efficient view of corporate diversification.

The first perspective, based on the search for private benefits explanations, considers diversification as a decision taken for opportunistic reasons (Jensen 1986; Jensen & Meckling 1976; Shleifer & Vishny 1989). According to the agency theory, diversification can somehow exacerbate opportunistic problems, resulting from the pursuit of managerial self-interest at the expense of stockholders (Fama & Jensen 1983). This explanation is consistent with a negative effect of diversification on firm performance. Many authors (Aggarwal & Samwick 2003; Berger & Ofek 1995; Denis, Denis & Sarin 1997; Lang & Stulz 1994) have shown that firm value decreases in diversification for this reason. In particular unrelated diversification might be consistent with agency theory, which could explain why diversified firms, especially conglomerates, make less profit and have a lower market value.

The second perspective concerns the benefits of corporate diversification. It is argued that the extent of corporate diversification is related to the level of information asymmetry between managers and outside investors (Hadlock, Ryngaer & Shawn 2001; Thomas 2002). From this perspective, according to Myers and Majluf (1984), problems of asymmetric information are often less severe for diversified firms than for focused firms. In addition, according to efficiency of the internal capital markets (Rajan, Servaes & Zingales 2000: Stein 1997), there should be a coinsurance effect derived from combining businesses whose cash flows are less than perfectly correlated, providing a tax benefit related to the fact that the tax liability of the diversified firm may be less than the cumulated tax liabilities of the different business units (Lewellen 1971). Specifically, unrelated diversification is associated with the financial synergies hypothesis, which states that firms diversify to benefit from the economies of an internal capital market and an internal labour market, to obtain tax benefits, and to reduce business risk (coinsurance argument).

These are two competing arguments that, although both based on managerial discretion, consider diversification decisions, in particular the one based on unrelated businesses, differently as an output of opportunistic behaviours, or as a means for fostering firms' efficiency. According to prominent literature, the effect of diversification on performance is expected to be particularly relevant when taking into consideration firms that

[3] Research work explaining why firms diversify, in management, financial and economic literature, is synthesised by Montgomery (1994).

diversify into business segments dissimilar to the firm's core business, showing different industries' features (Kim et al. 2009; Lins & Servaes 1999; Palich, Cardinal & Miller 2000).

The goal of this study is to analyse the effectiveness of the prediction of the main literature in explaining the performance implications of unrelated diversification, and to verify which of the relationships – i.e. positive, negative - prevails as a general (net) effect.

The paper is organised as follows. Section 2 describes the context of analysis. Section 3 provides information about the methodology and the variables used. Section 4 reports the descriptive statistics of the data. The results of our empirical analysis are presented in Section 5. The conclusions follow in Section 6.

2. Context of Analysis

The Italian economic environment presents a large number of elements of inefficiency in the allocation of funds. Capital markets in Italy are relatively undeveloped compared not only to those in the US but also, to some extent, to those of other large European countries. The stock market is not an important source of finance in Italy. Corporate debt is not issued on the market, but is often raised through banks and other financial institutions. Due to the lack of transparency regulations and high information asymmetries, contract costs between borrowers and lenders are high. In particular, benefits provided by diversification strategies, arising from the internal capital market, can be extremely relevant in the presence of significant external capital market constraint and imperfections.

Another feature of the Italian economy is that, in most cases, the Italian model of corporate governance is quite different to the one proposed by Berle and Means (1932). Families represent an important class of large shareholders. In particular, family firms face severe agency problems that arise between controlling and non-controlling shareholders. If the large shareholder is an individual or a family, it is potentially greater the incentives to both extract private benefits at the expense of the small shareholders and monitor the firm. This agency problem is likely to be exacerbated in the presence of a context such as Italy, with weak disclosure requirements and governance mechanisms and a poorly developed financial market (Faccio & Lang 2002; La Porta et al. 1998; La Rocca et al. 2009).

In the light of these arguments, Italian firms represent an interesting case study to verify the value of diversification, because of a context characterised by market inefficiency with considerable asymmetric information, and where whoever is in control has considerable discretionary power to use financial resources, even for opportunistic behaviours.

3. Methodology and Variables

To verify empirically the effect on corporate performance of unrelated diversification, the following model is estimated.

$$\text{Performance}_{it} = f(\text{D\_DivUnrel}_{it}, \text{Control Variables}_{it}) \qquad (1)$$

The corporate performance of firm *i* at time *t* is a function of diversification unrelated (D_DivUnrel) and a set of control variables.

Since the stock market in Italy, as in other continental European countries, is not an important source of finance and very few Italian companies trade publicly, not even companies that are quite large (e.g. Ferrero, Fininvest, Barilla), we take into consideration an accounting-based measure of performance (Palich et al. 2000; Singh et al. 2007; Wan & Hoskisson 2003). Similar to Jiraporn et al. (2008) we use a relative performance measure; more specifically, we measure operating performance (*Ind-rel ROA*) as the industry-adjusted ratio of earnings before interest, taxes, depreciation, and amortisation (EBITDA) to total assets

(Denis & Kruse 2000). We adjust each firm's operating performance by subtracting the median ratio of EBITDA to assets for all other companies having the same two-digit Standard Industrial Classification (SIC) code.

Diversification is proxied by a dummy diversification unrelated (*D_DivUnrel*), that is a binary variable taking a value of one if the firm diversifies in unrelated businesses (at least one business division has to be different at 2-digit SIC code), and zero otherwise.

Theoretical and empirical studies have shown that leverage, ownership concentration, tangibility, age and growth opportunities affect corporate performance and these have also been included in the model. Moreover, a dummy family and a dummy listing are also included.

We use different methods to examine the effect of unrelated diversification on firm performance. First, we use an ordinary least squares (OLS) regression. A possible concern with the analysis is that *D_DivUnrel* and error term in equation (1) may be correlated. In this case, OLS estimations generate biased estimates (Campa & Kedia 2002; Villalonga 2004a). We use three econometric methods each of which addresses the endogeneity problem from a different perspective. To avoid unobservable firm heterogeneity we use a fixed-effect estimator (FE). In addition, we apply the instrumental variables estimation (IV) to examine the underlying causal relation. Finally, we use the treatment estimator to verify if there is self-section bias (Heckman)[4]. The additional instruments used in the last two cases include industry and time dummies and macroeconomic indicators such as the overall economic growth (log of GDP).

4. Data and Descriptives

The sample consisted of a panel made up of 229 Italian firms, listed and unlisted, evaluated in the period from 1980 to 2007 (28 years). Firms belonging to the financial-services industry, which present specific features that make them difficult to compare to other firms, and firms belonging to the regulated utilities industries, which at the beginning of the period were government-owned but then were involved in a privatisation process, were excluded. The hand-collected data were provided by Mediobanca - Ricerche & Studi (R&S). This is a unique database, created using the R&S paper-based reports until 2000, and the PDF-files up to 2007. The whole sample comprised 2,613 observations. Table 1 shows the descriptive statistics for the variables used in the analysis.

Table 1
Descriptive statistics of the variables

Variables	Mean	Median	St.Dev.	Min	Max
Ind-rel ROA	0.212	0.00	0.148	-0.425	0.992
D_DivUnrel	0.260	0	0.439	0	1
Leverage	0.434	0.441	0.237	0	1
Own.Conc.	0.657	0.633	0.263	0.00760	1
D_Family	0.594	1	0.491	0	1
D_Listing	0.339	0	0.474	0	1
Tangibility	0.355	0.332	0.168	0.000190	1
Age	3.437	3.638	0.958	0	4.913
Growth Opp.	0.105	0.0630	0.350	-0.959	9.527
Observations	2,613				

[4] Compared to the standard Heckman model, treatment effects models, in the performance equation, consider the dummy variable *D_DivUnrel* as additional variable. For details on this point see Li and Prabhale (2007).

Considering descriptive statistics for the whole sample, approximately 26% of the firms diversify in unrelated businesses. Some variables, such as debt, seem to be symmetrically distributed while others, such as growth opportunity, are asymmetrically distributed.

5. Results

This section presents the results of the analysis. Table 2 shows the results of four regressions that characterise the relationship between diversification and performance. In particular, *Ind-rel ROA* is the proxy used to measure industry-adjusted firm's performance.

Table 2
The effect of unrelated diversification on firm performance

	(OLS)	(FE)	(IV)	(Heckman)
Variables	(1)	(2)	(3)	(4)
D_DivUnrel	-0.008*	-0.034***	0.060*	0.049*
	(0.004)	(0.013)	(0.032)	(0.027)
Leverage	-0.154***	-0.231***	-0.247***	-0.244***
	(0.008)	(0.013)	(0.016)	(0.013)
Own.Conc.	0.013	0.020	0.046***	0.044***
	(0.009)	(0.012)	(0.013)	(0.012)
D_Family	0.009**	-0.044	0.005	0.005
	(0.004)	(0.027)	(0.006)	(0.006)
D_Listing	-0.031***	-0.046***	-0.050***	-0.049***
	(0.005)	(0.011)	(0.006)	(0.007)
Tangibility	-0.035***	-0.095***	-0.078***	-0.014***
	(0.012)	(0.023)	(0.017)	(0.003)
Age	-0.010***	-0.031***	-0.014***	-0.076***
	(0.002)	(0.007)	(0.003)	(0.017)
Growth Opp.	0.070***	0.031***	0.030**	0.030***
	(0.006)	(0.006)	(0.014)	(0.008)
Constant	0.110***	0.299***	0.168***	0.170***
	(0.012)	(0.030)	(0.017)	(0.017)
Observations	2611	2612	2612	2612
Adjusted R^2	0.191	0.145	0.155	
F-statistic (p-value)	76.96(0.00)	50.37 (0.00)	53.22 (0.000)	
Lambda (p-value)				-0.032**(0.016)
Hausman test (p-value)			224.97 (0.000)	

Notes: *Ind-rel ROA* defined as firm's ROA minus industry (2-digit SIC code) median ROA. (*), (**) and (***) indicates that coefficients are significant at 10, 5 and 1 percent level, respectively. Lambda, if significant, indicates the prevalence of self-selection and suggests that characteristics that make firms choose to diversify are negatively correlated with firm value. To test for the existence of endogeneity, we use Hausman's test (Hausman 1978). This test is based on the difference between the OLS estimator and the IV estimator.

The results in regressions (1) to (2), based on OLS specification and the fixed effect model alternatively, are qualitatively similar. The variable *D_DivUnrel* shows a negative and significant coefficient, indicating that unrelated diversified firms have low performance compared to other firms.

The results in regressions (3) and (4) show a changed sign of the variable *D_DivUnrel*, while all the other explanatory variables for the most part maintain similar

effects. Regression (3), in which IV estimator is considered, shows that the coefficient of the instrumented D_DivUnrel, is significant and positive. Finally, regression (4), in which an endogenous self-selection model is considered, also shows that the coefficient on *D_DivUnrel*, is significant and positive. These results suggest that after accounting for endogeneity problems, with both the instrumental variables and self-selection models, the impact of unrelated diversification on a firm's performance is positive. This implies that the decision to diversify unrelated is made in the shareholders' best interest. These results are consistent with the efficient view of corporate diversification, which suggests that managers invest efficiently in unrelated diversification. In general, in order to evaluate the impact of diversification on firm value it is of great importance to verify the endogeneity of the diversification decision.

6. Conclusions

The results reveal the predominant role of the efficient view argument; that is, the benefits of diversification outweigh its costs (mainly based on opportunistic problems). In an institutional context like the Italian one, full of frictions and inefficiencies, firms mainly diversify for financial purposes, to reduce asymmetric information problems and to obtain benefits from the creation of internal capital markets. Empirically, the estimation methods applied are fundamental in checking if there are endogeneity problems in the diversification decision and in evaluating the effective role of diversification on a firm's performance.

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GDP Growth and the Interdependency of Volatility Spillovers

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Abstract

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GDP Growth and the Interdependency of Volatility Spillovers

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Abstract

This paper examines the dynamics of cross-country GDP volatility transmission and their conditional correlations. We use quarterly data (1961-2008) for Australia, Canada, the UK and the US to construct and estimate a multivariate generalised autoregressive conditional heteroskedasticity (MGARCH) model. According to the results from the mean growth equations, we identified significant cross-country GDP growth spillover among these countries. Furthermore, the growth volatility between the US and Canada indicates the highest conditional correlation. As expected, we also found that the shock influences are mainly exerted by the larger economies onto the smaller economies.

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JEL classification: C59, F43, O47.

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1. Introduction

The volatility of output growth is profoundly important in assessing economic growth: the high volatility of output growth causes random shocks, makes the economy contract and can trigger a recession (Simon 2001). There is a consensus in the literature that output growth and its volatility have declined during the past few decades (Barrell & Gottschalk 2004; Perez, Osborn & Artis 2003; Stock & Watson 2005). Fountas and Karanasos (2006, p. 639) state that this decline in macroeconomic volatility is known in the literature as 'the Great Moderation' . According to Barrell and Gottschalk (2004), the Great Moderation could be due to rising openness to trade and holdings of financial wealth, along with reductions in inflation volatility.

Many studies have focused on different aspects of output growth. One group of studies, such as Artis, Kontolemis and Osborn (1997), Baxter (1995) and Otto, Voss and Willard (2001), has examined cross-country output correlations. For instance, Baxter (1995) identified a pair-wise positive correlation between US output and that of nine OECD countries using a two-country model to evaluate one pair of countries at a time.[3] Otto et al. (2001) found a bilateral output growth correlation for 17 OECD countries arising from common shocks and transmission of shocks between countries via trade and monetary policy. Boone and Hall (1999) identified a positive correlation in GDP among G5 countries (Italy, Japan, Germany, the UK and the US) during the post-war period.[4]

Similar to these output-growth correlations, other studies have documented the evidence of output volatility and changes in cyclical co-movements of output volatilities across different countries (Backus & Kehoe 1991; Perez et al. 2003; Stock & Watson 2005). For instance, Backus and Kehoe (1991) identified that the output volatility fluctuations of 10 countries were larger before World War I than after World War II.[5] The extent of these volatility fluctuations differed from country to country. Perez et al. (2003) examined the volatility shocks of GDP growth and their transmission across G7 countries, including the US. They identified that the business cycles of all G7 countries were influenced by the changes in the transmission of GDP shocks over time.

In addition, some empirical studies have documented the common properties of business cycles and common international volatility shocks (Kose, Otrok & Whiteman 2003a; Stock & Watson 2005). Using data from 61 countries over seven world regions, Kose et al. (2003a) identified the common dynamic properties of business-cycle fluctuations.[6] They found that countries with less-volatile GDPs were synchronised with the world business cycle (i.e. common world factors), while less-developed and more-volatile economies followed country-specific cycles. Using the per-capita real GDP volatilities of G7 economies, Stock and Watson (2005) identified the common international shocks, country-specific idiosyncratic shocks and country-specific effects of international idiosyncratic shocks. They also provided some evidence that these countries experienced a reduction in GDP volatility due to the declining magnitude of the common international shocks.

It is evident that output-volatility interdependencies have increased with the high synchronisation of business cycles across countries. One can argue that shocks emanating from one country are having greater ramifications for other economies than in the past because of these cross-border economic interdependencies (Kose, Prasad & Terrones 2003b). Although some empirical studies, such as Ahn and Lee (2006), Caporale and Spagnolo

[3] Australia, Austria, Canada, France, Germany, Italy, Japan, Switzerland and the UK.
[4] Sample periods were 1950-1986 for Germany, 1950-1985 for Italy, 1952-1986 for Japan and 1950-1983 for the UK and the US.
[5] Australia, Canada, Denmark, Germany, Italy, Japan, Norway, Sweden, the UK and the US.
[6] Africa, Asia (Developed), Asia (Developing), Europe, Latin America, North America and Oceania.

(2003), Diebold and Yilmaz (2008) and Leon and Filis (2008), have attempted to establish the link between financial variables and output growth in individual countries, the motivation of the current study is to provide an evaluation of cross-country spillovers of GDP growth rates and their volatilities across four major industrialised countries using more sophisticated techniques.

The current study first investigates the nature of any systematic patterns of GDP growth across individual countries, and examines how the GDP growth of one country can interact with the others. Second, we explore GDP volatility spillovers across countries by evaluating how country-specific shocks and volatilities, as well as cross-country shocks and volatility co-movements, affect GDP volatility within one country, and the transmission of shocks among countries. Finally, we investigate the GDP volatility correlations to shed some light on how constant-conditional correlations relate to time-varying conditional variance and covariance. Specifically, we use quarterly GDP data (1961-2008) from Australia, Canada, the UK and the US for the multivariate framework of generalised autoregressive conditional heteroskedasticity (MGARCH) models.

Unlike previous studies, our methodology simultaneously estimates time-variant, country-specific volatility spillovers, as well as cross-country volatility spillovers, across all the countries in our sample.[7] This will permit us to analyse single- and multi-country influences on other countries. As Bollerslev, Chou and Kroner (1992) and Bollerslev, Engle and Nelson (1994) suggested, these MGARCH models have been developed for analysing volatility transmission across different markets and assets, since the volatility of financial markets moves together across assets and markets. According to Theodossiou et al.(1997), Goeij and Marquering (2004), Bauwens, Laurent and Rombouts (2006) and Caporin and McAleer (2009), MGARCH models are the most appropriate methodology to capture interaction effects within the time-varying conditional mean and variances of two or more series. Although MGARCH models have predominantly been used for analysing the interaction effects of volatility and covolatility across international financial markets in the past, MGARCH models also represent the most suitable methodology for examining the interaction effects of GDP volatility and covolatility and, therefore, economic growth across various countries.

The rest of this paper is organised as follows: Section 2 presents the methodology, which is built upon the diagonal vector GARCH (DVECH)[8] model and the Constant Conditional Correlation (CCC)[9] model. The data and preliminary findings are set out in Section 3, followed by the empirical econometric results in Section 4. The last section provides some concluding remarks.

2. Methodology

This paper evaluates the interplay between GDP growth rates and their volatilities among four industrialised Anglo-Saxon countries: Australia, Canada, the UK and the US. We use the DVECH model to study the volatility spillovers within and across these countries. We also employ the CCC model to evaluate how time-varying conditional variances and covariances link to the constant-conditional correlations. Furthermore, we apply the vector autoregressive stochastic process to GDP growth rates to obtain the mean equations, which allows us to examine the nature of GDP growth-rate interdependencies. The mean equation and the two models used in this paper are as follows.

[7] One group of studies evaluated pairs of countries at a time or incorporated effects from a single country to their model (for example, see Baxter 1995 and Otto et al. 2001), while another group used multivariate methodology based on factor modelling (examples include Stock and Watson 2005 and Kose et al. 2003a).
[8] Diagonal vector GARCH (DVECH) (Bollerslev et al. 1988).
[9] Constant Conditional Correlation (CCC) (Bollerslev 1990).

2.1 The Mean Equation

Equation (1) gives the vector autoregressive stochastic process of GDP growth rates. This serves as the mean equation for the DVECH and CCC models. The GDP growth rate of country *i* (r_{iit}) is specified as a function of its own innovations (ε_{it}) and its own lagged growth rates (r_{ijt-1}), for all $j = 1,\ldots, 4$ and $i = j$, as well as the lagged growth rates of other countries (r_{ijt-1}), for all $j = 1, .., 4$ and $i \neq j$ as follows:

$$r_{iit} = \mu_{0i} + \sum_{j=1}^{4} \mu_{ij} r_{ijt-1} + \varepsilon_{it} \quad (1)$$

where $i = 1$ for Australia, $i = 2$ for Canada, $i = 3$ for the UK and $i = 4$ for the US; μ_{0i} is the intercept term for country *i*; μ_{ij} (for all i = 1, .. , 4 and j = 1, .. , 4) indicates the conditional mean of GDP growth rate, showing the influence from country *i*'s own past growth rates (i.e. own-mean spillovers) when $i = j$ and the cross-mean spillovers from country *j* to *i* when $i \neq j$; and ε_{it} is country *i*'s own innovations (shocks) and is assumed to be independently and identically distributed (IID) with zero mean and variance.

2.2 The DVECH Model

Since the conditional variance and covariance matrix (H_t) contains four variables, this study uses the DVECH model, as it is more flexible for more than two variables (Scherrer & Ribarits 2007). Furthermore, this model is based on the assumption that the conditional variance depends on squared lagged own residuals and the lagged own variances while the conditional covariance depends on the cross-product of the lagged residuals and lagged covariances of other series (Harris & Sollis 2003). In addition, we impose conditions on the initial values as suggested by Bollerslev et al. (1988), and use the maximum likelihood function to generate the parameter estimates. Therefore, this paper uses the unconditional residual variance as the pre-sample conditional variance to guarantee the positive semi-definite of H_t of the DVECH model. The corresponding DVECH model is incorporated into our framework; it can be written as follows:

$$vech(H_t) = C + A^* vech(\varepsilon_{t-1}\varepsilon'_{t-1}) + B^* vech(H_{t-1}) \quad (2)$$

where A^* and B^* are $\frac{1}{2}N(N+1) \times \frac{1}{2}N(N+1)$ diagonal matrices of parameters, which satisfies $A^* = diag[vech(A)]$ and $B^* = diag[vech(B)]$ where *A* and *B* are $N \times N$ symmetrical matrices; and C is a $\frac{1}{2}N(N+1) \times 1$ vector of parameters. The $vech(\cdot)$ operator denotes the column-stacking operator applied to the upper portion of the symmetric matrix. The diagonal elements of matrix *A* (a_{11}, a_{22}, a_{33} and a_{44}) measure the own-volatility shocks, which represent the impacts arising from past squared innovations on the current volatility. The non-diagonal elements (a_{ij} where $i \neq j$) determine the cross-volatility shocks, which can be shown as the cross-product effects of the lagged innovations on the current covolatility. Similarly, the diagonal elements of matrix *B* (b_{11}, b_{22}, b_{33} and b_{44}) determine the own-volatility spillovers that can be considered as the past volatilities on the current volatility, and the non-diagonal elements (b_{ij} where $i \neq j$) capture the cross-volatility spillovers, which are the lagged covolatilities on the current covolatility.

2.3 The CCC Model

Since the CCC model contains time-varying conditional variance and covariance with the constant-conditional correlations, we use this model to evaluate how time-varying conditional variance and covariance influence the constant-conditional correlations. It also allows univariate analyses for each of the data series, assuming the GARCH(1,1) structure for conditional variances and non-zero constant-conditional correlations across series (Bollerslev, 1990). Suppose ε_{it} is the i^{th} elements of the residuals, the CCC model can be written as follows:

$$h_{iit} = \alpha_i + \beta_i \varepsilon_{it-1}^2 + \gamma_i h_{iit-1}$$
$$\rho_{ij} = h_{ijt} \Big/ \left(h_{iit} h_{jjt}\right)^{1/2} \tag{3}$$

where h_{ijt} is the ij^{th} element in H_t; α_i is the intercept term for country *i*; β_i measures the own-volatility shocks; γ_i determines the lagged own-volatility; and ρ_{ij} is the conditional correlation between growth of country *i* and *j*, where $-1 < \rho_{ij} < 1$ and $i \neq j$.

Furthermore, we use the BHHH (Berndt, Hall, Hall, & Hausman 1974) algorithm to obtain the optimal values for the parameters, and the Ljung-Box test statistic to test any remaining ARCH effects in these two models.

3. Data and Preliminary Findings

Quarterly GDP data from Australia, Canada, the UK, and the US for the period spanning from 1961:Q4 to 2008:Q4 (*n* = 189 observations) were obtained from OECD Main Economic Indicators (OECD 2009) for this study. Based on these GDP values, the growth rate (r_t) at time *t* is calculated as $r_t = \ln\left(p_t / p_{t-1}\right)$, where p_t is the GDP value at time *t*.

Table 1 presents the descriptive statistics for the GDP growth series for Australia, Canada, the UK and the US. All four countries show positive mean growth rates during the sample period, ranging from a minimum of 0.006 per cent (the UK) to a maximum of 0.009 per cent (Australia). Based on the sample standard deviations, the US (0.0085) and Canada (0.0086) indicate the lowest output volatility, while Australia exhibits the highest output volatility, with 0.011 (Figure 1). A cursory look at the figure also reveals a decline in output beginning in the early 1980s. Several recent studies have confirmed this decline (Barrell & Gottschalk 2004; Blanchard & Simon 2001; Dijk et al. 2002; Kose et al. 2003b).

The estimated skewness statistics for all the countries except the US exhibit positive skewness. The kurtosis value is greater than 3.0 for all series except Canada. This indicates a typical leptokurtic distribution, whereby growth series are more peaked around the mean, with thicker tails than a normal distribution. The Jarque-Bera statistics for Australia, the UK and the US also support rejecting the null hypotheses of normality at the 5 per cent level of significance.

Table 1 reports the pair-wise unconditional correlations among the four countries. The estimated pair-wise correlation coefficients suggest that the countries are positively interrelated. The lowest correlation (0.348) is between the GDPs of Australia and the UK, while the highest (0.71) is between Canada and the US. The Australian data indicates a correlation coefficient of 0.55 with both the US and the UK series. Table 1 also gives the results of the Augmented Dickey-Fuller (ADF) test for the GDP growth rate series, which suggest that that all four series are stationary.

Figure 1
Quarterly GDP growth rates from 1961:Q4 to 2008:Q4

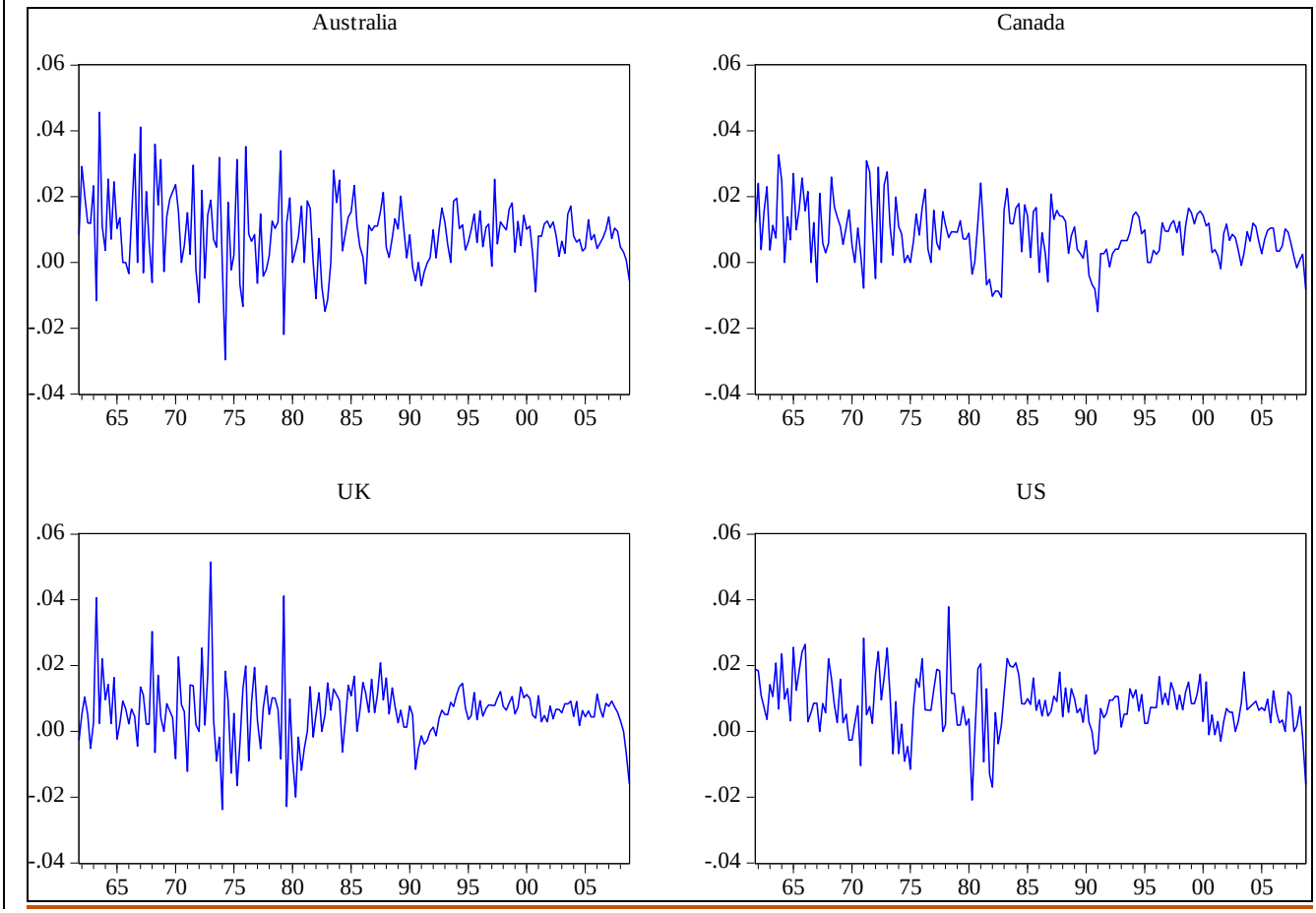

Table 1
Descriptive statistics for GDP growth

Descriptive Statistic	Australia	Canada	UK	US
Mean	0.0090	0.0084	0.0060	0.0079
Median	0.0086	0.0087	0.0062	0.0075
Maximum	0.0456	0.0328	0.0515	0.0379
Minimum	-0.0296	-0.0149	-0.0237	-0.0209
Std. Dev.	0.0111	0.0086	0.0095	0.0085
Skewness	0.1810	0.1700	0.5315	-0.1163
Kurtosis	4.1455	3.2477	7.3702	4.3628
Jarque-Bera	11.3663**	1.3933	159.2991***	15.0512***
	(0.0034)	(0.4982)	(0.0000)	(0.0005)
Correlation Coefficients				
Australia	1.0000			
Canada	0.5498	1.0000		
UK	0.3481	0.5205	1.0000	
US	0.5540	0.7112	0.5245	1.0000
ADF t Statistics				
Based on min. AIC	-3.80	-10.04	-6.04	-6.74
	(0.0106)	(0.0000)	(0.0000)	(0.0000)
Based on min. SIC	-14.58	-10.04	-13.76	-10.03
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Sources: Quarterly GDP data of Australia, Canada, the UK and the US for the period 1961Q4 to 2008Q4 (n = 189 observations) are obtained from OECD Main Economic Indicators (OECD, 2009).

4. Empirical Results

We adopted the DVECH(1,1) and CCC(1,1) specifications for this study as discussed for Equations (2) and (3) respectively, and for the mean structure in Equation (1).[10] This section reports three main findings: the transmission of GDP growth across countries, international co-movements of GDP growth volatility and the nature of cross-country volatility correlations.

4.1 Transmission of GDP Growth Rates

Table 2 presents the estimated results for the mean equation. Panel A reports the parameter estimation of the mean structure using the DVECH(1,1) model, and Panel B represents the results of the mean equation based on the CCC(1,1) model. According to the estimated coefficients, the constant terms in the mean equation in both models are statistically significant at the 1 per cent level for all the countries except Canada, which is significant at the 10 per cent level. The own-mean spillovers (μ_{ii} for all i= 1,..,4) are statistically significant only for Canada, providing weak evidence for the influence of own lagged GDP growth effects on current growth rates.

[10] We tested various DVECH(p,q) and CCC(p,q) specifications (where p = 1, 2, and 3 and q = 1, 2, and 3) using three model-selection criteria: the Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HIC). The results indicated that the DVECH(1,1) specification consistently has the lowest AIC (-27.55), SIC (-27.04) and HIC (-27.34), with a log-likelihood of 2647.22, while the CCCH(1,1) specification consistently has the lowest AIC (-27.64), SIC (-26.97) and HIC (-27.37), with a log-likelihood of 2651.29.

Table 2:
Parameter estimation for mean equation

$$r_{iit} = \mu_{0i} + \sum_{j=1}^{4} \mu_{ij} r_{ijt-1} + \varepsilon_{it}$$

Panel A: Mean structure of DVECH(1,1)

	Australia	Canada	UK	US
μ_{0i}	0.0056***	0.0015*	0.0035***	0.0044***
	(5.03)	(1.87)	(4.99)	(5.43)
μ_{1i}	-0.0184	0.1595***	0.0532	0.0030
	(-0.28)	(3.32)	(1.19)	(0.06)
μ_{2i}	0.0488	0.2350***	0.1683**	0.1728**
	(0.55)	(4.09)	(2.31)	(2.23)
μ_{3i}	0.1843**	0.1333**	0.1233	0.2260***
	(2.38)	(2.34)	(1.52)	(3.43)
μ_{4i}	0.2184**	0.2910***	0.1060	0.1162
	(2.36)	(5.04)	(1.36)	(1.46)

Panel B: Mean structure of CCC(1,1)

	Australia	Canada	UK	US
μ_{0i}	0.0045***	0.0017**	0.0032***	0.0041***
	(4.11)	(2.12)	(4.08)	(4.84)
μ_{1i}	0.0036	0.1601**	0.0580	0.0062
	(0.04)	(3.15)	(1.11)	(0.12)
μ_{2i}	0.1620	0.2398***	0.1880**	0.1934**
	(1.54)	(3.19)	(2.22)	(2.43)
μ_{3i}	0.2301**	0.1878***	0.1108	0.2652***
	(2.66)	(3.26)	(1.22)	(3.71)
μ_{4i}	0.1839*	0.2290***	0.1020	0.0762
	(1.79)	(3.80)	(1.07)	(0.81)

Notes: (a) i = 1 for Australia, i = 2 for Canada, i = 3 for the UK and i = 4 for the US. (b) *** indicates statistical significance at the 1 per cent level, ** indicates statistical significance at the 5 per cent level and * indicates statistical significance at the 10 per cent level.

However, there exist significant positive cross-mean spillovers effects from the UK and the US to both Australia and Canada, indicating a positive influence running from the larger economies towards the relatively smaller economies. Based on the magnitude of cross-mean lagged effects presented in Panel A of Table 2, Australian GDP growth rates are heavily influenced by the lagged growth rates of the UK (0.183) and US (0.218). In addition, our results indicate a positive and significant impact on the US GDP growth rates from the UK (0.226) and Canada (0.173). The GDP growth of Canada is positively influenced by the cross-lagged GDP growth effects of the other three countries in the sample. A bidirectional relationship can be identified between Canada and the UK on the one hand and the US and Canada on the other. Based on the magnitude of the coefficients, this bidirectional relationship is stronger between Canada and the US than between Canada and the UK. Very similar results emerge from the results in Panel B of Table 2.

4.2 International Co-movements of GDP Growth Volatility

Table 3 reports the estimated ARCH and GARCH coefficients of the DVECH(1,1) model. The estimated values of all intercept terms are insignificant and close to zero; thus they are not reported. The significant own-volatility shocks for all four countries (a_{11}, a_{22}, a_{33} and a_{44}) range from 0.033 (Canada) to 0.127 (the US), indicating the presence of ARCH effects. According to Table 3, one can conclude that the shocks arising from the US will have a stronger impact on its own future volatility than those from the other three countries.

Besides own-volatility shocks, the estimated cross-volatility coefficients, a_{ij} $(i \neq j)$, in all four countries are significant at the 1 per cent level. These cross-volatility shocks are generally higher than the own-volatility shocks. This suggests that cross-volatility shocks have a stronger effect on future covolatility than do country-specific volatility shocks. Based on the estimated cross-volatility coefficients, the degree of cross-volatility shocks pair-wise is the weakest between Australia and Canada (0.043) and the strongest between the US and the UK (0.109). In addition, there is evidence of growth-volatility shocks emanating from both the UK and the US to Australia. This cross-output volatility persistence between Australia on the one hand and the UK and US on the other are 0.072 and 0.084, respectively. This suggests that output shocks originating from the US influence the Australian output volatility more than shocks stemming from Canada and the UK. This finding also confirms the findings in the previous section, since GDP growth rates and their volatilities are intertwined with the performance of larger economies.

Table 3 also presents the estimated coefficients for the variance and covariance matrix of DVECH model using equation 2. The own-volatility coefficients b_{ij} $(i = j)$ for the lagged conditional variance of all four countries are again positive and statistically significant. These own-volatility spillovers effects vary from its lowest in the US (0.890) to the highest in Canada (0.956). Similar to the results presented in Table 2, the past volatility in Canada will have the strongest impact on its own future volatility compared to the other three countries while the US has the lowest influence on its own future volatility from the past volatility.

Table 3:
Parameter estimation for variance and co-variance equation

$$vech(H_t) = C + A^* vech(\varepsilon_{t-1}\varepsilon'_{t-1}) + B^* vech(H_{t-1})$$

	Australia	Canada	UK	US
a_{1i}	0.0554**			
	(2.40)			
a_{2i}	0.0425***	0.0326**		
	(3.64)	(2.55)		
a_{3i}	0.0720***	0.0552***	0.0935**	
	(3.63)	(3.52)	(3.18)	
a_{4i}	0.0840***	0.0644***	0.1091***	0.1272**
	(3.80)	(3.63)	(4.10)	(3.15)
b_{1i}	0.9378***			
	(53.22)			
b_{2i}	0.9468***	0.9560***		
	(90.94)	(83.06)		
b_{3i}	0.9215***	0.9304***	0.9055***	
	(63.03)	(68.91)	(43.31)	
b_{4i}	0.9133***	0.9222***	0.8975***	0.8895***
	(54.52)	(53.71)	(46.53)	(30.77)
$a_{ii} + b_{ii}$	0.9932	0.9886	0.999	0.983

Notes: See Table 2.

The estimated non-zero b_{ij} coefficients (where $i \neq j$ for all *i* and *j*) are all significant at the 1 per cent level, providing further evidence for high and positive volatility-spillover persistence across these four industrialised countries. In contrast to the cross-volatility shocks (a_{ij}), the magnitude of the cross-volatility spillovers (b_{ij}), is, pair-wise, the lowest between the UK and the US (0.898), and highest between Australia and Canada (0.947). Furthermore, the significant cross-volatility effects between Australia and the UK and US are 0.922 and 0.913, respectively. These results support the view that volatility initially stemming from the US and the UK affects Australian output almost equally. Furthermore, our findings provide

convincing evidence that volatility persistence usually emanates from larger economies towards smaller economies. In addition, the sum of the lagged ARCH and GARCH coefficients ($a_{ii} + b_{ii}$) for Australia (0.993), Canada (0.989), the UK (0.999) and the US (0.983) are close to unity, supporting the assumption of co-variance stationarity and volatility persistence in the data.

4.3 The Nature of Cross-country Volatility Correlation

Table 4 summarises the estimated results from the CCC(1,1) model, which allows non-zero constant-conditional correlations across these four output growth series. In terms of GDP volatility correlations, our interest here is to identify how constant conditional correlations relate to the time-varying conditional variance and covariance. Thus, we do not report the estimated values of constant parameters, which are insignificant and close to zero. As shown in Table 4, all the parameters in the time-varying conditional variances are individually significant. In addition, the Wald test results for all $\beta_i = \gamma_i = 0$ and for all i confirm the presence of lagged ARCH and GARCH effects on the GDP growth volatility of each country.

Table 4:
Parameter estimation for constant conditional correlations

$$h_{iit} = \alpha_i + \beta_i \varepsilon_{it-1}^2 + \gamma_i h_{iit-1}$$

$$\rho_{ij} = h_{ijt} \Big/ \left(h_{iit} h_{jjt} \right)^{1/2}$$

	Australia	Canada	UK	US
β_i	0.0795*	0.3201**	0.1057**	0.1521*
	(1.67)	(2.44)	(2.63)	(1.89)
γ_i	0.9259***	0.6616***	0.8828***	0.8297***
	(21.23)	(5.76)	(26.74)	(10.86)
ρ_{i2}	0.1333	-		
	(1.60)			
ρ_{i3}	0.1792*	0.1844*	-	
	(1.98)	(1.99)		
ρ_{i4}	0.1648*	0.3408***	0.2180**	-
	(1.79)	(4.40)	(2.56)	

Notes: See Table 2.

According to Table 4, all conditional correlations except for that between the GDP growth volatility of Australia and Canada are statistically significant. The existence of non-zero conditional correlations is also confirmed by the Wald test for $\rho_{ij} = 0$ for all $i \neq j$. The smallest conditional correlation is between Australia and the US (0.1648), and the highest is between Canada and the US (0.341). Similar to our findings, Artis et al. (1997) and Perez et al. (2003) also found a strong association between the US and Canada. Furthermore, the countries with lower own-volatility also have the highest conditional correlations. For instance, Canada and the US have the lowest own-volatilities but the highest conditional correlation. The conditional correlations reported in Table 4 are much smaller (closer to zero) than those reported in Table 1. This could be because the correlation coefficients presented in Table 1 are based on the raw output growth rates, as with most cross-country studies. We further calculated correlation coefficients for residuals estimates obtained from the mean equation (Equation 1) using both the DVECH and CCC models. These correlation

coefficients for residual series are similar to those reported in Table 4 (close to zero), with the highest correlation coefficient between Canada and the US (approximately 0.37) from both models.[11]

Finally, we perform several diagnostic tests on standardised residuals to validate our findings. Panel A of Appendix A reports the system-generated portmanteau test results for the DVECH(1,1) model, and Panel B reports the results for the CCC(1,1) model. The estimated results from the Portmanteau Box-Pierce/Ljung-Box Q-statistics and the adjusted Q-statistics for the standardised system residuals generated from the DVECH and CCC models support the null hypothesis of no autocorrelations at the 5 per cent confidence level. This provides further support for both the DVECH model and the CCC model, as they absorb a great deal of the ARCH and GARCH effects present in the original series.

5 Summary and Conclusion

This research uses the DVECH model to identify the magnitude of volatility spillovers across four sample countries, namely Australia, Canada, the UK and the US and the CCC model to evaluate the cross-country conditional correlations. We employ a general vector stochastic process of GDP growth rates to find any discernable pattern in cross-country mean spillovers. Our results indicate that: (1) there is a significant amount of spillover and a high degree of volatility persistence in GDP growth rates across these four countries; (2) the significant positive GDP growth spillovers from the UK affect the other three countries; (3) based on the results of the DVECH model, both domestic and external shocks give rise to volatility in individual countries.

We found convincing evidence that that both own-country volatility and cross-country volatility increase the future volatilities within and across countries. However, the unanticipated country-specific shocks are generally lower than the country-specific volatilities in each of these countries. According to the results from the CCC model, the cross-country conditional correlation between the US and Canada is higher than the other pair-wise cross-country conditional correlations. Finally, we find that the significant positive cross-mean spillovers effects originating in the UK and the US can affect both Australia and Canada, leading to our final conclusion that positive spillover effects from larger economies can influence the GDP growth rates of relatively smaller economies.

Although this study identifies the shocks and volatility spillovers of GDP growth rates across Australia, Canada, the UK and the US, one can argue that these shocks and volatility spillovers cannot be transmitted and recorded through GDP growth alone. Therefore, in terms of an agenda for future research, it would be interesting to evaluate various sources of financial shocks by including additional variables and splitting the periods corresponding to financial and economic crises. However, given the number of countries, the inclusion of more financial variables increases the number of estimated parameters geometrically in the mean, variance and covariance equations, and complicates the interpretations of the results. Thus, due to the nature of the multivariate GARCH modelling framework, these points cannot be implemented, but could serve as interesting topics for research using alternative modelling methodologies such as simultaneous equation systems.

[11] These results have not been reported in this paper; they are available from the authors upon request.

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Appendix A: Diagnostic Test Results for Standardised System Residual

Table A1:
Portmanteau test results for autocorrelations obtained from the DEVEC(1,1) model

Autocorrelation coefficients	Conditional Correlation Orthogonalisation		Conditional Covariance Orthogonalisation	
	Q-Statistic	Adjusted Q-Statistic	Q-Statistic	Adjusted Q-Statistic
Q(1)	8.1660 (0.94)	8.2092 (0.94)	8.2258 (0.94)	8.2693 (0.94)
Q(2)	24.7176 (0.823)	24.9370 (0.81)	24.9874 (0.81)	25.2093 (0.80)
Q(3)	43.6295 (0.65)	44.1522 (0.63)	44.0363 (0.64)	44.5637 (0.61)
Q(4)	73.7992 (0.19)	74.9707 (0.16)	74.0370 (0.18)	75.2096 (0.16)
Q(5)	87.3663 (0.27)	88.9044 (0.23)	87.7628 (0.26)	89.3063 (0.22)
Q(6)	99.9951 (0.37)	101.9451 (0.32)	100.1297 (0.37)	102.0766 (0.32)
Q(7)	113.2711 (0.45)	115.7289 (0.38)	113.4535 (0.44)	115.9100 (0.38)
Q(8)	134.1034 (0.34)	137.4769 (0.26)	134.3003 (0.33)	137.6731 (0.26)

Note: Q(n) is the n^{th} lag Ljung-Box test statistics.

Table A2:
Portmanteau test results for autocorrelations obtained from the CCC(1,1) model

Autocorrelation coefficients	Conditional Correlation Orthogonalisation		Conditional Covariance Orthogonalisation	
	Q-Statistic	Adjusted Q-Statistic	Q-Statistic	Adjusted Q-Statistic
Q(1)	10.1716 (0.86)	10.2257 (0.85)	10.2348 (0.85)	10.2893 (0.85)
Q(2)	23.6941 (0.86)	23.8928 (0.85)	23.7892 (0.85)	23.9887 (0.84)
Q(3)	36.4312 (0.88)	36.8354 (0.88)	36.4445 (0.89)	36.8481 (0.88)
Q(4)	69.2361 (0.31)	70.3495 (0.27)	69.1065 (0.31)	70.2162 (0.28)
Q(5)	82.3226 (0.41)	83.7917 (0.36)	82.2234 (0.41)	83.6895 (0.37)
Q(6)	93.6163 (0.55)	95.4557 (0.50)	93.4044 (0.56)	95.2372 (0.50)
Q(7)	106.5193 (0.63)	108.8550 (0.57)	106.3296 (0.63)	108.6595 (0.57)
Q(8)	129.5399 (0.45)	132.8931 (0.37)	129.4114 (0.45)	132.7615 (0.37)

Notes: See Table A1.

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Stock Market Reaction to Terrorist Attacks: Empirical Evidence from a Front Line State

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Keywords

Terrorism, EGARCH, asymmetry, stock returns, Karachi Stock Exchange

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Keywords: Terrorism, EGARCH, asymmetry, stock returns, Karachi Stock Exchange

JEL Classification: G15

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1. Introduction

Financial markets have reacted in a highly meaningful pattern to September 11, 2001, the hijacked airliner attacks in the United States, the suicide blasts at nightclubs in Bali in 2002 and the Madrid and London train bombings of 2004 and 2005 and a series of blast and continuous series of attacks and blasts in Pakistan. The inside story provides a base of learning to the investors and risk managers about the drastic nature and fallacy of such events. Firstly, the initial market impact from terror attacks is likely to be overdone and to unwind over subsequent days. Second, once the initial panic eases, investors take a more rational look at the medium-term economic impact. Thirdly, the micro impact of attacks can be more serious than the macro. Finally, the extent to which attacks have a long-term market impact on industries and countries depends on whether they cause investors to re-evaluate their long-term risk assessments.

Frey and Kucher (2000) studied the impact of events during World War II on prices of government bonds of several countries traded in Zurich and Sweden, respectively. Although the economic causes and consequences of armed conflict have received widespread attention in the scientific study of war (e.g. Barbieri 2002; Mansfield & Pollins 2003; Schneider, Barbieri & Gleditsch 2003), we know relatively little about the costs of war despite some recent comparative studies (Collier 1999; Cranna 1994; Murdoch & Sandler 2002). We have not found much research on the impact of terrorism on the stock market. More recently, the war in Iraq has stirred interest in the consequences of war on financial markets. Rigobon and Sack (2005) studied the impact of war risk on several financial variables. They found that in the ten weeks before the start of the war with Iraq, the risk of war explained between 13 and 63 percent of the change in financial variables such as the S&P 500, oil prices, gold prices and the US dollar. Karolyi and Martell (2005) examined the impact of terrorist attack on stock prices by using an official list of terrorism related incidents. They identified 75 attacks between 1995 and 2002 in which publicly traded firms were targeted. They used event study analysis and found evidence of a statistically significant negative stock price reaction of -0.83%, which corresponds to an average loss per firm per attack of $401 million in firm market capitalisation. Furthermore, cross sectional analysis of the abnormal returns specified that the impact of terrorist attacks differs from firm to firm depending upon the firm and the incident occurrence.

Recent research has shown the market behaviour in response to the terrorist events. Ahmed and Farooq (2008) studied the effects of the terrorist attacks of September 11, 2001 and its impact on the stock market volatility. They used daily returns data from Karachi Stock Exchange and analysed the impact of 9/11 attacks by studying the returns in the pre 9/11 period and post 9/11 period. They found that the asymmetric response of the conditional variance to innovations, have changed during the post 9/11 period in comparison to these characteristics during the pre 9/11 period. In addition they also found that the volatility behaviour changed significantly after the terrorist attacks of 9/11. They also discuss that this sudden shift in the volatility behaviour cannot be explained by the implementation of regulatory reforms. One of the most considerable impacts is the timing of the attacks and blasts and their ultimate impact on the behaviour of the stock market. However, it is very difficult to measure the critical sensitivity about the issue on the day or next working day or how the series of capital flight reacts to these phenomena.

Terrorism has greatly affected foreign investment in Pakistan. Foreign investment had turned down to $910.20 Million from $1.4 Billion in the financial year 2008-09. Poverty level pushed to 41.4% from 37.5% in 2008-09. Similarly, terrorism increases the expenses of the defence forces to meet their requirements to fight against terrorism. Pakistan has obtained total compensation of $11,998 Million from the US under the Coalition Support Fund (CSF),

out of this amount $3,129 Million was economic related aid and security related aid amounted to $8,869 Million. In addition, the risk to the investors increase as more troop deployment by US in Afghanistan saw a rise in the risk of investors to invest in Pakistan which caused a serious downfall of deposits in the banking sector. Deposits fell from Rs.3.77 Trillion to Rs3.17 trillion in September 2009. In 2002, Karachi stock exchange (KSE) was awarded "The best performing stock market of the world for the year 2002". Similarly, On December 2007, KSE closed at index of 14,127 points with capitalisation of Rs.4.57 trillion. After war was declared by the government within Pakistan its index dropped to 4,675 points with a market capitalisation of Rs.1.58 trillion, a loss of over 65% from its capitalisation in 2007. [2]

The primary purpose and focus of this study is to examine the impact of terrorist attacks on stock exchange behaviour. This paper analyses the consequences of terrorist attacks on the stock market returns and volatility. For this purpose we used news related to terrorist attacks. We used the daily data from Karachi Stock Exchange to observe the effect of terrorist attacks on the stock market. Furthermore, we examined the returns of different sectors to determine whether or not they are also affected by the terrorist attacks. Additionally this helped us to identify which sector responds more to the political news. We used the univariate asymmetric GARCH model, to gauge the impact of terrorist attack news on the returns and volatility.

The organisation of this study is as follows. Section 2 presents the formulation of hypotheses and EGARCH modelling of financial returns and volatility. Section 3 describes the data. Empirical findings are discussed in Section 4. Further research areas and the conclusion are presented in Section 5.

2. Methodology

In the empirical framework, we first analyse the series to check whether they are stationary or non-stationary (random walk) with unit root. The behaviour of a time series naturally revolves around the assumption of stationarity, that is, I(0) and the degree of integration I(d). Robert Engle (1982) in his seminal work on inflation in the UK first introduced the idea of ARCH effect. Later on, Bollerslev (1986) generalised this type of model and introduced the GARCH model. However in this study our main focus is on exponential GARCH model. First of all we have to determine the characteristics of the series (stationary or non-stationary). The most commonly test used to determine the I(1) against I(0) is the Augmented Dickey- Fuller (ADF) test.

2.1 Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey-Fuller (ADF) test is the most common test for the order of integration. This test assumes that the null of the data series is a random walk or an integrated AR model. We assume that x_t is a random walk process, $x_t = x_{t-1} + \varepsilon_t$. The regression model develops as $x_t = \rho x_{t-1} + \varepsilon_t$, where $\rho = 1.0$. We subtract x_{t-1} from both side of the equation to obtain a testable form of Dickey and Fuller test, which is given below

$$\Delta x_t = \alpha + \pi x_{t-1} + \varepsilon_t, \qquad (1)$$

where α (includes constant and a trend) and π are the parameters which are estimated through ordinary least square (OLS) and ε_t is assumed as innovation. The null hypothesis is $H_0 : \pi = 0$ and therefore,$\rho = 1$, of unit root which is tested against the alternative

[2] Statistics are obtained from State Bank of Pakistan and Ministry of Finance Pakistan

hypothesis of $H_1 < 0$ and $\rho < 1$, that is x_t is a level or trend stationary series. The expansion of the equation (1) to ADF test is written as equation 2, assuming that x_t is a AR (p) process, then subtracting x_{t-1} from both sides and adding p lagged differences terms of x_t on right side of equation (1),

$$\Delta x_t = \alpha + \beta t + \pi x_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta x_{t-i} + \varepsilon_t , \qquad (2)$$

where $\pi = (\rho - 1)$, null and alternative hypothesis described the same nature of series as under equation (1) the hypotheses are shown as follow, $H_0: \pi = 0 \; and \; \beta = 0$ and for the alternative is $H_1: \pi \neq 0 \; and \; \beta \neq 0$.

2.2 The Mean Equation

In order to model a variance equation, specifications for the mean equation need to be made. By estimating a mean equation, residuals needed to model the variance equation are retrieved. In this study returns are described by the following AR (p) process:

$$r_t = \Phi_0 + \sum_{i=1}^{p} \Phi_i \, r_{t-i} + \varepsilon_t , \qquad (3)$$

$$\varepsilon_t \sim idN(0, \sigma_t^2)$$

where Φ_0 is a constant, and Φ_i is the parameters, r_t is the return at time t and ε_t is the error term at time t. Equation (3) is an AR (p) model which explains returns as being dependent on previous values of returns. In order to select the order of an AR model for each index and determine which values of p describe the time series the best, different combinations of AR (p) models are being estimated. Estimation is done by using OLS regression (Ordinary Least Squares). The estimated variations of AR models are then compared to each other by observing values of some chosen information criterion. Since the Schwarz information criterion seemed to give consistent results, model selection was done by minimising this information criterion.

2.3 The GARCH Model

The ARCH (q) model was a major development in econometric modelling, however a higher length of q is needed to obtain good results from the data. Few years later after the introduction of the ARCH model by Engle, a model with different, more flexible lag structure was introduced by Bollerslev (1986). The model is a generalised form of ARCH (developed by Engle in 1982). The GARCH was discovered to be a better fit as it dealt well with non-negativity constraints and needed less number of lags to be included in the model. Furthermore, GARCH models differ from ARCH as it allows the conditional variance to be modelled by past values of itself in addition to the past shock. The GARCH model includes an ARCH component and also an element where the variance today can be explained by previous variances. The general GARCH (q, p) model is defined as:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \, \varepsilon_{t-i}^2 + \sum_{j=1}^{p} \beta_j \, \sigma_{t-j}^2, \qquad (4)$$

where p is the order of the GARCH terms and q is the order of the ARCH term. σ_t^2 is the conditional variance at time t, α_0 is the constant, $\alpha_i$and β_j are the parameters, $\boldsymbol{\varepsilon_{t-i}^2}$ is previous squared shocks and σ_{t-j}^2 is previous variances. In most of the studies GARCH (1, 1) is being employed. The GARCH models effectively capture a number of characteristics of

financial time series, such as volatility clustering and thick tailed returns. We can say that the GARCH (1, 1) process is covariance stationary if and only if the sum of alpha and beta are less than one ($\alpha + \beta < 1$). If $\alpha + \beta = 1$ then process is still stationary since the variance is infinite.

2.4 Asymmetric GARCH Models

Although GARCH performs well in explaining the volatility, its underlying assumption about the behaviour of the squared residuals is problematic. The model assume that the magnitude of positive and negative shocks have the same effects on variance. In order to capture the asymmetry evident by the data, a new class of models, in which good news and bad news have different impact on volatility, was introduced. In this study our focus lies only on EGARCH model.

2.4.1 THE EGARCH MODEL

Nelson (1991) introduced the Exponential GARCH which is more useful as compared to GARCH because it allows good news and bad news to have a different impact on volatility and it also allows big news to have greater impact on volatility. This model works in two steps, firstly it considers the means and secondly the variance. One way to define the EGARCH (p, q) model is:

$$log(\sigma_t^2) = \omega + \sum_{i=1}^{p} \alpha_j \left|\frac{\varepsilon_{t-j}}{\sigma_{t-j}}\right| + \sum_{i=1}^{q} \beta_i \, log(\sigma_{t-i}^2) + \sum_{i=i}^{k} \gamma_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}}, \qquad (5)$$

where $\omega, \beta, and\ \gamma$ are parameters for conditional variance estimation. β_i indicates the impact of the last period measures on the conditional variance. If the β_i is positive that means a positive change in stock prices is associated with further positive change and vice versa. α_j is a coefficient which measures the effect of previous period in the information set and explains the past standardised residuals' influence on the current volatility. Furthermore, γ_k signifies the asymmetry effect in the variance, a negative γ_k means that bad news has higher impact on volatility than the good one with the same magnitude. Since EGARCH models the logarithmic time-varying conditional variance, the parameters are allowed to be negative. This means that the model does not require any non-negativity constraints in the parameters. The lack of non-negative restrictions makes the model more attractive than a GARCH and GJR. There is however a necessary constraint regarding the stationarity of the model that needs to be specified. The stationary restriction for an EGARCH (1, 1) model is that beta is less than one ($\beta < 1$). In the case of symmetry, where the magnitudes of positive and negative shocks have equal impact on the variance, γ will be equal to zero. $\gamma < 0$, means that the magnitude of a negative (positive) shock will cause the variance to increase (decrease) and vice versa.

After having measured the return and volatility linkages, we further analyse by measuring the effect of terrorist attacks news on the KSE 100 index and other selected sector indexes. We measure the return and volatility response to terrorist attack news by adding a dummy variable in our univariate EGARCH model that takes the value 1 on news[3] days, otherwise zero. It is important to note that we measure separately the response of each news category, i.e., our model is estimated independently for each news category. More

[3] This is for terrorist attack news.

specifically, the univariate EGARCH model with a dummy variable for stock market indexes is defined as follows:

$$r_{KSE,t} = \phi_0 + \phi_1 r_{KSE,t-1} + \phi_2 Dummy + \varepsilon_{KSE,t} \quad (6)$$

$$\log(\sigma^2_{KSE,t}) = \omega + \alpha_1 g_{KSE,t}(Z_{KSE,t-1}) + \beta \log(\sigma^2_{KSE,t-1}) + \alpha_2 Dummy \quad (7)$$

Where

$$g_{KSE,t}(Z_{KSE,t-1}) = (|Z_{KSE,t-1}| - E|Z_{KSE,t-1}|) + \gamma Z_{KSE,t-1}$$

And, $Z_{KSE,t-1} = \varepsilon_{KSE,t-1} / \sigma_{KSE,t-1}$

Equation (6) is the return equation and equation (7) represents the volatility equation, where dummy variables are 1 at the date of news related to terrorist attacks otherwise zero.

3. Data and Descriptive Statistics

The data used in this study was collected from the Karachi stock exchange and Thomson DataStream. It consists of the KSE-100 index and the three sector indexes of oil and gas, financial and industry. The data consists of daily closing prices, stated in local currency (rupee). For KSE-100 index and sector indexes data ranges from January 2, 2002 to December 31, 2009 and consists of 2088 observations. The software used in the study is E-views. The daily return series was generated as follow,

$$R_{KSE,t} = \ln (KSE_t / KSE_{t-1}) , \quad (8)$$

where $R_{KSE,t}$ is the return on KSE and KSE_t represents the closing value of KSE indexes on the day. It is important to mention here that the series is adjusted neither for dividends nor for risk free rate. We can ignore the dividends and interest rates as it does not create any significant error when we forecast stock market volatility (Nelson 1991). It is important to analyse the characteristics of the series. The variance is a measure of how much the variable deviates from its mean value. Skewness is a measure of the symmetry of the probability distribution curve. Zero skewness means a curve is symmetrical around its mean. The kurtosis describes the peak of the distribution curve. The normal distribution has a zero skewness and kurtosis equal to three. (Watsham & Parramore 1997: 49-63) Summary statistics for our returns series of KSE-100 index, and other sectors are as given in equation (8) are shown in Table 1.

Table 1 shows that the mean value of the KSE100's return is 0.000992 and the median is 0.00000. The standard deviation is about 1.60%. This is a quite high value, with respect to the mean return, indicating that the returns often deviate from the mean. The skewness in this case is nearly -0.32 which indicates a negative skewness and shows that the curve is more concentrated on the left hand side. Indexes usually have a weak negative skewness since the stock prices in the long range tend to increase with time. The kurtosis is around 5.22, which is high and explains that the curve has a high peak. There is, thus, excess kurtosis in the index suggesting that the distributions are leptokurtic. As noted earlier, a standard normal distribution should have a skewness of zero and a kurtosis of three. Based on these values we conclude that the data does not follow a normal distribution.

One way to confirm whether the data follows a normal distribution is to look at the Jarque-Bera. In this case, with respect to Table 1, the JB is 6243.621 with a p-value of 0, and

hence the H_0- hypothesis is rejected which means that the data is not normally distributed. According to the central limit theorem the lack of the normal distribution should not cause any problems here since the theorem states that the OLS regression is approximately normally distributed for large samples. (Luetkepohl, Kraetzig & Phillips 2004). Table 1 shows details of the descriptive statistics of the selected sector's indexes as oil and gas, financials and industry. All mean returns are positive. The skewness of the series indicates that all the series have a negative skewness and excess kurtosis. This is not surprising as financial return's distribution have a tendency of being leptokurtic due to volatility clustering. After studying the characteristics of the series, the next step is to check the correlogram of the returns to check if return series are correlated, hence leaving ground for being predictable and dependent. The correlogram reveals that there are no linear dependencies in either of the return series, thus these are white noise process.

Table 1
Descriptive Statistics

	KSE100	Oil & Gas	Financial	Industries
Mean	0.000992	0.001085	0.001160	2.40e-05
Maximum	0.085071	0.094033	0.091825	0.095296
Minimum	- 0.077414	- 0.107255	- 0.085842	- 0.160551
Std. Dev.	0.015971	0.020200	0.019774	0.017705
Skewness	- 0.324413	- 0.081043	- 0.17917	- 0.80707
Kurtosis	5.226069	4.869859	4.504617	9.033224
Jarque-Bera*	441.0856	306.1765	208.0097	3390.209
Probability	0.000000	0.000000	0.000000	0.000000
AC return	0.058	0.062	0.036	0.040
AC Sq. return	0.255	0.248	0.156	0.20
Observation	2088	2088	2088	2088

*Note. The Jarque-Bera statistics is computed from the following equation;

$$JB = \frac{n}{6}(S^2 + \frac{(K-3)^2}{4})$$

Where *n* is the number of observations, *S* the skewness and *K* the kurtosis.
The hypotheses for the JB-test are:
H_0 = normal distribution
H_1 = no normal distribution

In order to see the non-linear dependencies which are often found in financial returns, the correlogram of standardised squared residuals is analysed. We reported the Autocorrelation coefficients for simple and squared returns at first lag in Table 1.The first order return autocorrelation coefficient displays a significantly positive serial correlation for most of the return series. In addition, coefficients measuring the serial correlation in squared returns indicate a presence of volatility clustering effects for all sectors including the KSE 100 index. Thus, we can use GARCH models to capture these characteristics of asset returns. Furthermore all the series reject the H_0- hypothesis for JB test confirming that these are not normally distributed. Appendix I shows the return series of the data for KSE 100 and other

sectors for all the periods since January 2002 to December 2009. From the figures it appears that there are stretches of time where the volatility is high and at some time volatility is low.

3.1 News Data

On December 2007, KSE closed at index of 14,127 points with capitalisation of Rs.4.57 trillion. However, after war was declared by the government within Pakistan its index dropped to 4,675 points with a market capitalisation of Rs.1.58 trillion, a loss of over 65% from its capitalisation in 2007. In this paper we use terrorist attack news to test the impact on stock market returns and volatility. We collected news related to terrorist attacks from January 1, 2002 to December 2009[4]. Furthermore, we used the news in this paper which are more severe in comparison with each other. We also include almost all the news from large cities (Karachi, Lahore, Islamabad, Peshawar and Quetta) as it can affect the investor's decision about future investments more. We also find that there were only two terrorist attacks in 2002, however this number increased every year and the worst was in 2009 which was 130 incidents. Appendix II shows graphically the number of terrorist news incidents each year and also includes the attack list with respect to each city.

4. Empirical Results

Thissection demonstrates the empirical results of the stationarity test and those from the impact of good news and bad political news on returns and volatility.

4.1 Results from Unit Root Test

The first check for return series is to see if it is random walk. One of the implications of being random is that the series never returns to its mean value. We run the unit root test to analyses the distribution properties of the return series. Table 2 illustrates the testing results of the Augmented Dickey-Fuller (ADF) test and the critical values at 1%, 5% and 10% respectively. The result of KSE100 and sector for ADF test rejects the unit root at 1% significant level. This means that all the series are stationary by using the first order difference and we can implement models on the available series. The lag difference is 2, and is based on the minimum values of AIC and SBC.

Table 2
Unit Root Test

	Unit Root Test		**Critical Values**	
	ADF Test	1%	5%	10%
KSE 100	-23.20429***	-3.962716	-3.412095	-3.127963
Oil & Gas	-23.57175***	-3.962453	-3.411967	-3.127887
Financial	-23.55973***	-3.962453	-3.411967	-3.127887
Industry	-25.04381***	-3.962453	-3.411967	-3.127887

Note. The critical values are MacKinnon critical values, *** means significance at 1%.

[4] The main sources are: Dawn newspaper and Wikipedia.

4.2 Results from EGARCH

We justify the selection of EGARCH models by utilising the linear models on KSE 100 and other selected sectors with different lags and investigate the best fit model for the data according to Akaike information criterion (AIC) and Schwarz information criterion (SIC). We find the AR(1) model is the best fit model in most of the series in order to capture the first movement

4.2.1 IMPACT OF TERRORIST ATTACKS

In this section we test the impact of terrorist attack news on the stock returns and volatility. Generally speaking, these type of news items decrease the returns and increase the volatility. The empirical results from Univariate EGARCH model (6) & (7) are reported in Table 3. As it is perceived from Table 3, that the dummy ϕ_2 for terrorist attacks is statistically significant at 1% and has a significantly negative effect (- 0.00883***) on the returns of the KSE 100 index. We also reported the results of the sector indexes with respect to terrorist attack news. The financial sector shows more negative results (-0.013923***) with respect to other sectors. In addition we find statistical significant results (-0.008678*** and -0.003066***) to the terrorist attacks on oil and gas and industry sector respectively. Concentrating on the impact of news on volatility we find motivating results. Table 3 also divulges the coefficient of dummy α_2 in the volatility equation (6). Results show that terrorist attacks increase the volatility of the KSE100 index, and the financial sector index This type of news has more impact on the volatility of the financial sector (0.226618***) as compared to other sectors. However, we did not find significant statistical evidence of the impact of the terrorist attack news on oil and gas (-0.054457) and industry (-0.034857). Table 3 also reports the volatility asymmetry, which is negative in all of the sectors including KSE100 confirming leverage effect. Moreover negative asymmetry implies that the variance goes up more after negative shocks than after positive shocks. Furthermore, persistence parameter β is very large in most of the sectors including KSE 100 which indicates that the variance moves slowly through time.

The time period required for shocks to reduce to one half of the original size defined as $\ln(0.50) / \ln(\beta)$ is approximately 5.34 days for KSE100 index and 4.37 days for financial sector index. This is an indication that the shock persist is 5.34 and 4.37 days for KSE100 and financial sector index respectively. A shorter lasting persistence of shocks in the conditional variance implies more volatility. However, persistence of the shock is higher in the oil and gas sector and industry sector (7.37 and 5.74) as both these sectors are not statistically significant with respect to the terrorist attack news. The extent to which negative innovations increase volatility more than positive innovation, defined as $|-1+\gamma| / (1+\gamma)$ is about 1.27 times for KSE100 index, 1.25 times for financial sector index, 1.09 times and 1.16 times for oil and gas sector and industry sector respectively. Asymmetry effect of 1.27 means that the negative impact is 1.13 times more than the positive impact on the KSE100 index. Residual autocorrelation coefficients at 12th lag for both simple and squared standardised residuals are also reported in Table 3. The statistic of autocorrelation in residual and squared residual shows the absence of correlation.

In summary these results indicate that terrorist attacks have significantly negative effect on the returns of the KSE 100 index, oil and gas, financial and industry index sectors. Moreover terrorist attacks have increased the volatility of the KSE100 index, and financial sector index as well. Such types of news have more impact on the volatility of financial sector as compare to other sectors. However, we did not find significant statistical evidence regarding the impact of the terrorist attacks news on oil and gas and industry.

Table 3
Estimation results from AR - EGARCH with Terrorist Attack news

	KSE100		Oil and Gas		Financial		Industry	
	Coefficient	*Significance*	*Coefficient*	*Significance*	*Coefficient*	*Significance*	*Coefficient*	*Significance*
ϕ_0	0.002150***	0.0000	0.002115***	0.0000	0.002748***	0.0000	0.001157***	0.0001
ϕ_1	0.073084***	0.0021	0.020315	0.3637	0.124766***	0.0000	0.017588	0.4663
ϕ_2	- 0.00883***	0.0000	-0.008678***	0.0000	-0.013923***	0.0000	-0.003066***	0.0037
ω	-1.344694***	0.0000	-0.961682***	0.0000	-1.443023***	0.0000	-1.215171***	0.0000
α_1	0.390790***	0.0000	0.327618***	0.0000	0.322769***	0.0000	0.390792***	0.0000
γ	-0.119606***	0.0000	-0.044131***	0.0021	-0.110357***	0.0000	-0.078002***	0.0000
β	0.878311***	0.0000	0.910333***	0.0000	0.853255***	0.0000	0.886329***	0.0000
α_2	0.084505**	0.0180	-0.054457	0.1587	0.226618***	0.0000	-0.034857	0.3705
	AC (10) Residual							
	0.048		0.032		0.010		0.009	
	AC (10) Squared Residual							
	0.007		0.020		0.001		-0.006	

Notes: This table reports the estimates from the following AR - EGARCH model:

$$r_{KSE,t} = \phi_0 + \phi_1 r_{KSE,t-1} + \phi_2 \text{Dummy} + \varepsilon_{KSE,t}$$

$$\log(\sigma^2_{KSE,t}) = \omega + \alpha_1 g_{KSE,t}(Z_{KSE,t-1}) + \beta \log(\sigma^2_{KSE,t-1}) + \alpha_2 \, Dummy$$

We report the estimates for ARMA - EGARCH return and volatility for KSE 100 index and other selected indexes. The coefficients measuring the effect of dummy variable used as a proxy for the terrorist attacks on Karachi stock markets' returns and volatilities are also reported. Significant coefficients are denoted with***, **, * on 1%, 5 %, and 10 % significance level respectively. Residual autocorrelation coefficients at 12th lag AC (12) for both simple and squared standardised residuals are also reported.

5. Conclusion

Since the hijacked airliner attacks in the United States on Sept.11, 2001, to the suicide blasts at nightclubs in Bali in 2002 and the Madrid and London train bombings of 2004 and 2005 and a series of blasts and attacks in Pakistan, markets have reacted in a highly consistent pattern. Terrorism has greatly affected the foreign investment in Pakistan. Foreign investment has declined to $910.20 Million from $1.4 Billion in the financial year 2008-09. Poverty has reached 41.4% from 37.5% in 2008-09. Similarly, terrorism increases the cost of the forces to meet their needs to fight against terrorism. In 2002, Karachi stock exchange (KSE) was awarded "The best performing stock market of the world for the year 2002". Similarly, on December 2007, KSE closed at index of 14,127 points with capitalisation of Rs.4.57 trillion. But after war was declared by the government within Pakistan its index dropped to 4,675 points with a market capitalisation of Rs.1.58 trillion, a loss of over 65% from its capitalisation in 2007.

This study examined the impact of terrorist attack on the Karachi stock exchange. We studied the effect of terrorist attack news on the stock market returns and volatility. We used the daily data from the Karachi Stock Exchange to see the affect of terrorist attack news on the stock market. We also observed the returns of different sectors to test whether or not they are also affected by these types of news stories. Additionally this helped us to identify which sector responds more to the political news. We used the univariate asymmetric GARCH model, to gauge the impact of terrorist news on the returns and volatility. Our results demonstrate that terrorist attacks have significantly negative effect on the returns of the KSE 100 index, oil and gas, financial and industry index sectors. In addition, terrorist attacks increase the volatility of the KSE100 index and the financial sector index. These kinds of news stories have more impact on the volatility of financial sector as compared to other sectors. However, we did not find significant statistical evidence of the impact of the terrorist attack news on oil and gas and industry. Moreover, volatility asymmetry is negative in all of the sectors including KSE100 confirming leverage effect. Furthermore, persistence parameterβ is very large in most of the sectors including KSE 100 which indicates that the variance moves slowly through time.

This study could be extended by including more news such as economic, military and neighbouring countries. Additionally, we could include more sectors in the data to analyse the impact on each sector. We could also use more countries in our data such as South Asian countries and test the impact of terrorist attack news on the other countries. For this we may employ multivariate EGARCH model for studying the volatility.

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Appendix I. Graph of Daily Returns

Figure 1 KSE 100

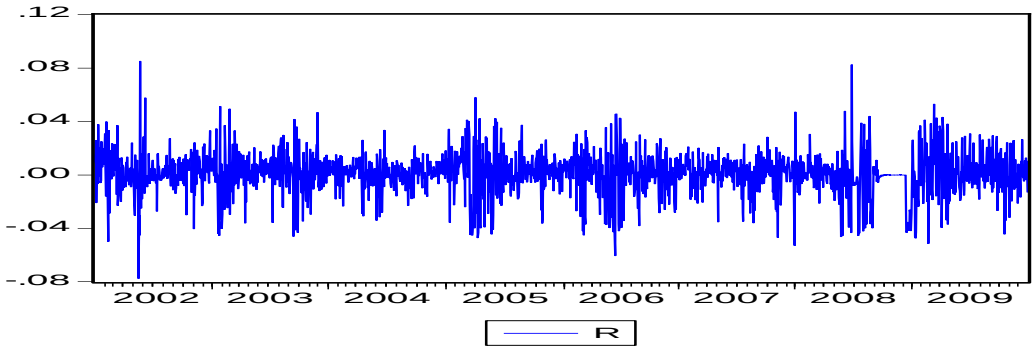


Figure 2 Oil and Gas

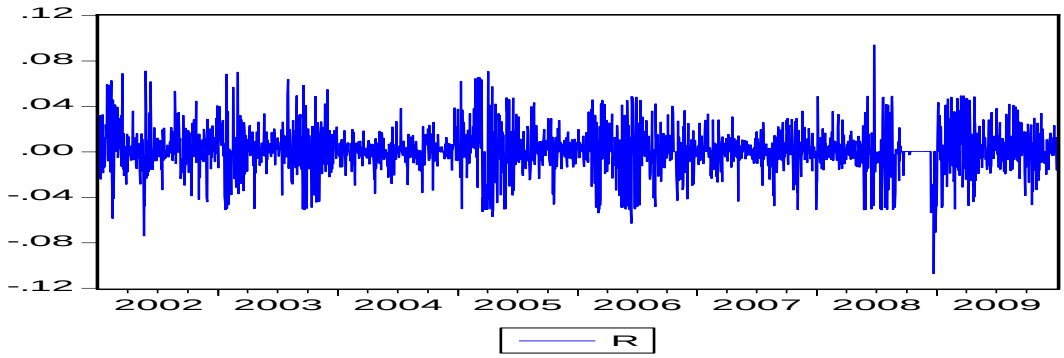


Figure 3 Financial

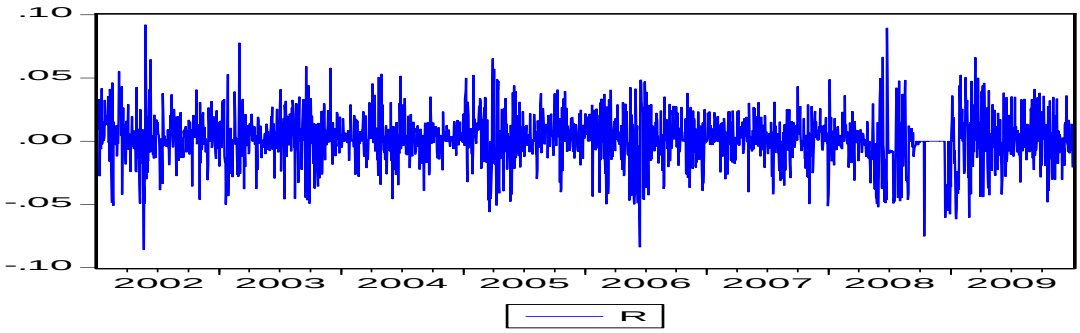
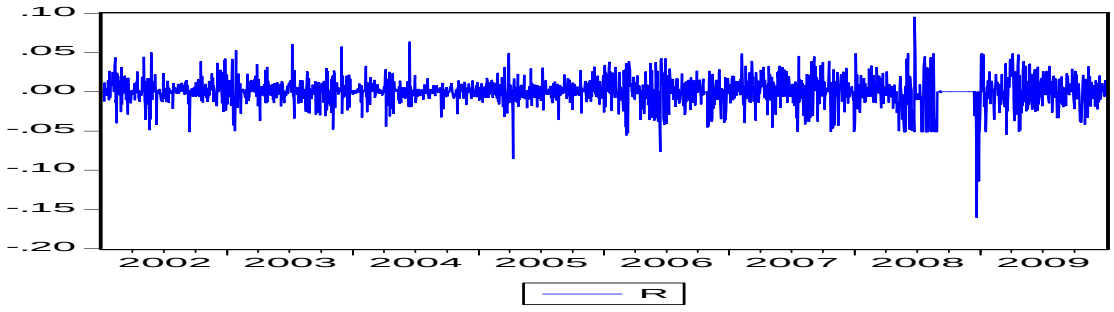
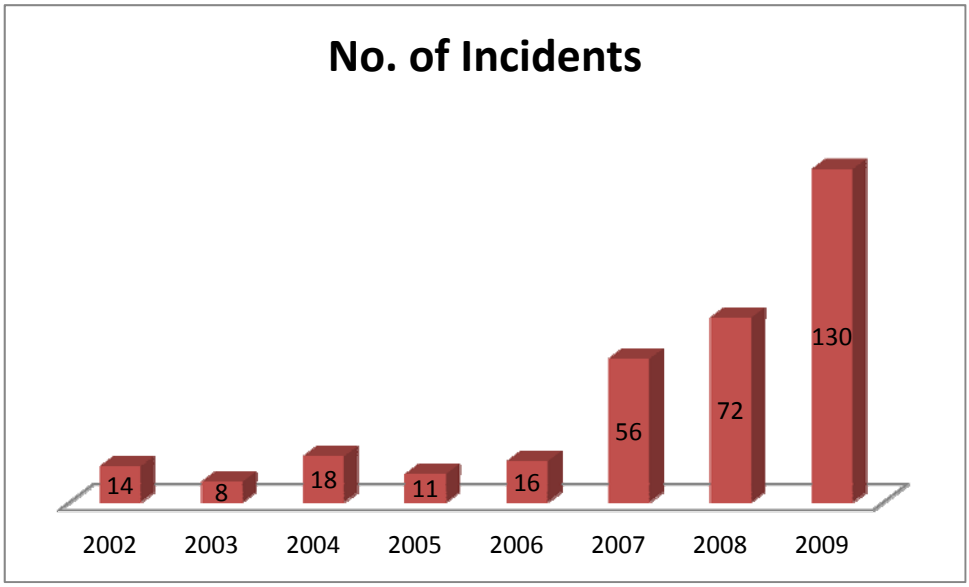


Figure 4 Industries

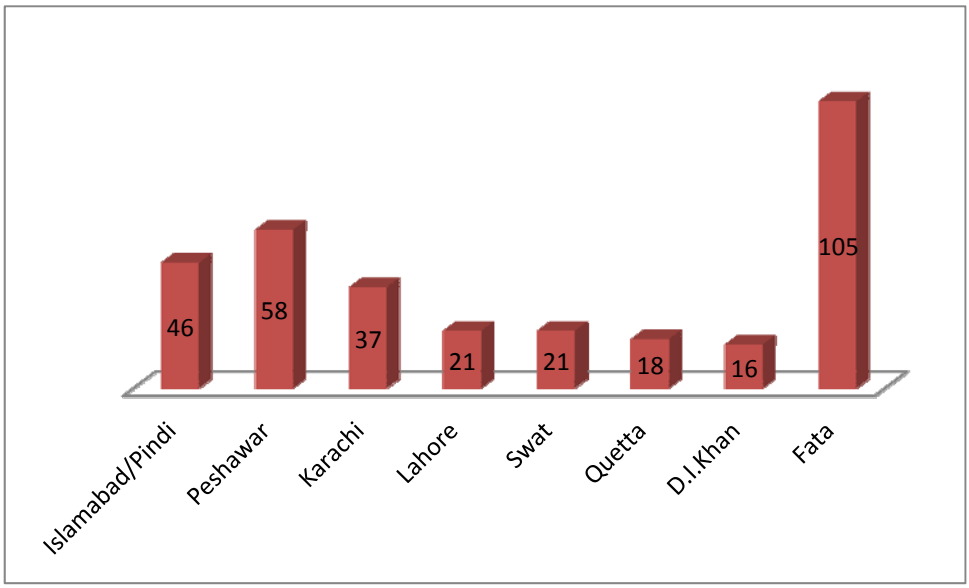


Appendix II. Graphical Representation of Terrorist Attacks

List of Terrorist Attacks from 2002 to 2009



List of Terrorist Attacks in different Cities



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Anybody can do Value at Risk: A Nonparametric Teaching Study

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Anybody can do Value at Risk: A Nonparametric Teaching Study

Abstract

Value at Risk (VaR) has become a benchmark methodology among investors and banks for measuring market risk. Commercially available modelling packages can be both expensive and inflexible, thereby restricting their use by academic researchers and teachers. Using nonparametric methodology, this paper provides a step-by-step teaching study on how to use Excel to construct a VaR spreadsheet for an individual asset as well as for a portfolio. This can benefit financial modelling teachers by providing them with a readily useable teaching study on how to model VaR, as well as benefit researchers by showing them how to construct an inexpensive and flexible VaR model.

Keywords

Financial modelling, value at risk, historical nonparametric value at risk, teaching study, Microsoft Excel

Anybody can do Value at Risk: A Nonparametric Teaching Study

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Abstract

Value at Risk (VaR) has become a benchmark methodology among investors and banks for measuring market risk. Commercially available modelling packages can be both expensive and inflexible, thereby restricting their use by academic researchers and teachers. Using nonparametric methodology, this paper provides a step-by-step teaching study on how to use Excel to construct a VaR spreadsheet for an individual asset as well as for a portfolio. This can benefit financial modelling teachers by providing them with a readily useable teaching study on how to model VaR, as well as benefit researchers by showing them how to construct an inexpensive and flexible VaR model.

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JEL Classification: C14, C88, G10

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Introduction

Value at Risk (VaR) can be defined as an estimated level of loss on an asset or portfolio for a specified probability (confidence level) and time horizon. The estimate is obtained by measuring variability in rates of return thereby following the tradition of using dispersion of possible outcomes as a measure of risk. A relatively loose distribution of returns suggests higher risk while a tighter distribution suggests lower risk.

Measuring VaR in Finance falls into three general categories: Nonparametric (historical simulation) approach, parametric approach, and Monte Carlo simulation approach (see Culp 2001; Jorion 2001; Linsmeier & Pearson 2000). The essence of parametric methods is that they assume a normal distribution, whereas nonparametric methods make no assumption regarding the distribution. The Monte Carlo method simulates multiple random scenarios. Although VaR is conceptually straightforward, some methodology, particularly Monte Carlo simulation, can be computationally challenging. Of course, VaR calculation can be facilitated by the use of commercially available simulation packages. However, such packages are generally costly and inflexible, allowing the researcher limited scope for adapting the models to their specific requirements. This paper is the first of a series of two papers which demonstrate that the calculation of VaR can be performed using the inexpensive and flexible computer power of Microsoft® Excel, starting with a single asset before proceeding to a portfolio. This paper discusses the use of two VaR nonparametric methods, being firstly the historical method and secondly bootstrapping the historical method, hereafter referred to as the 'historical bootstrap method'. The next paper discusses parametric approaches, including the variance-covariance parametric method and a parametric Monte Carlo approach. As far as we know, besides Day (2003), the calculation of VaR has not been introduced at a significant level in any financial modelling or Excel modelling studies. Our detailed instruction is certainly designed to be far more comprehensive in terms of both concept and algorithm, than any previous instruction, as well as providing a practical teaching aid. Covering two methods in this paper, provides researchers and teachers with the choice of using the simple historical option, the more complex historical bootstrapping method, or both.

Applications of VaR

The VaR approach to risk measurement gained a great deal of momentum following the launch of the RiskMetrics Technical document on VaR and subsequent updates (J.P. Morgan & Reuters 1996). In a banking environment, VaR has become the standard market risk measure since adoption by the Basel Committee on Banking Supervision (Bank for International Settlements, 2006) of VaR as the primary measure of market risk for determining bank capital adequacy. The appealing simplicity of the VaR concept has led to its adoption as a standard risk measure not only for financial entities involved in large scale trading operations, but also retail banks, insurance companies, institutional investors, and non-financial enterprises. In addition to the Bank for International Settlements, its use is also encouraged by the American Federal Reserve Bank and the Securities and Exchange Commission. There is extensive literature coverage on VaR. Examples include Beder (1995), Jorion (1996; 2001), J.P. Morgan & Reuters (1994; 1996), Duffie and Pan (1997), Pritsker (1997) and Stambaugh (1996), as well as comprehensive discussion of VaR by more than seventy recognised authors in the VaR Modeling Handbook and the VaR Implementation Handbook (Gregoriou 2009a; 2009b). In the financial literature, VaR is most often applied to share price analysis but has many other applications, for example exchange rates (Mittnik

2000), interest rates (Ferreira & Lopez 2005), portfolio optimisation (Campbell, Husiman & Koedijk 2001), hedge funds (Bali, Gokcan & Liang 2007), credit risk (Allen & Powell 2009; Gupton, Finger & Bhatia 1997) and energy markets (Cabedo & Moya 2003; Chiu, Chang & Lai 2010).

Information Required to Calculate VaR

There are five essential pieces of information required: Amount of exposure, risk factor or factors, risk horizon, data series of the risk factors, and the level of confidence. The first piece of essential information is the amount of exposure, which is the mark-to-market dollar value of the asset or portfolio.

A risk factor is the source of variability of the market value of the asset or portfolio such as a price (e.g., share returns), a reference rate (e.g., changes in an interest or foreign exchange rate) or an index value (e.g., volatility of a market index, such as Standard & Poor's ASX 200). The variability of this risk factor can be handily described by a histogram in the nonparametric methods or a probability distribution function in the parametric methods.

The length of the risk period has to exceed the time needed for an orderly liquidation of the asset or portfolio. Following this vein of thought, the risk period of a non-liquid asset (e.g., a piece of land) far exceeds that of a liquid asset (a share), and the risk period of a thinly traded share far exceeds that of a blue chip stock.

For each risk factor, a sufficiently long data series is required to determine the variability or randomness of the risk factor. There is no single ideal length, as the optimal length depends on the objectives of the researcher or investor. A daily trader would use a shorter length, whereas an investor interested in long term returns whould incorporate enough observations to be representative of all states of the portfolio, encompassing both upturn and downturn economic conditions.

The frequency of the data series collected preferably equals the risk horizon. If one is interested in how much one could possibly lose over the next day, one should collect daily data for the risk factor, and so on. Nevertheless, there are practitioners who prefer having frequency shorter than the risk horizon to maximise the amount of information contained in the data.

Whilst, in practice VaR is calculated at a range of confidence levels from 90 - 99.9 percent depending on how confident the user wants to be about the results, the level is most commonly set at either 95 or 99 percent (see Hedricks, 1996). For purposes of illustrating VaR calculation in this paper, the 95 percent level, in line with RiskMetrics (J.P. Morgan & Reuters 1994; 1996) , is used.

Nonparametric Calculation of VaR

Relative to the parametric approach, the nonparametric approach has the major attraction of avoiding the danger of misspecifying the distribution(s) of the risk factor(s), which could lead to under or over estimating VaR. This is especially true when recent history includes periods of non-normal trading, such as financial crises, where the distribution would likely to be left skewed with non-continuous jumps in returns. In these circumstances, the historical probability density function (PDF) is unlikely to follow a parametric distribution. This gives the nonparametric approach a role in calculating VaR measures in an era of frequent financial disturbance. The two nonparametric methods to be discussed allow us to draw conclusions about the characteristics of a population strictly from the sample at hand, rather than by making perhaps unrealistic assumptions about the population.

We discuss two nonparametric methods in this section: Historical method and historical bootstrap method. The historical method is the simplest of all methods of calculating VaR. The historical bootstrap method is a step up from the more basic historical method using the concept of bootstrapping to efficiently estimate the statistics of the underlying unknown population distribution of the risk factor. The statistical procedure of bootstrapping has its merit in providing a good approximation of the PDF of the population of the risk factor, which is not usually normally distributed, provided it is done properly.

Any historical method, by construct, assumes the PDF(s) of the risk factor(s) from which future values are drawn at the end of the risk horizon is identical to the PDF(s) over some specific historical time horizon. That is, the key to any historical method is assuming that history repeats itself, hence its name. In practice, it is impossible to choose the relevant historical time horizon with entire accuracy. The exercise is somehow arbitrary because nobody has the prevision of future events. This means the inclusion of a longer data series is preferable to a shorter data series as the former contains more information and covers more scenarios. There are authors (e.g., Hendricks, 1996) who argue that the use of shorter historical time series better mimics the potential PDF of the risk factor if there is no structural change. If the historical data series collected is a good representation of the near future, the two methods have a good track record. So the performance of the two methods hinges greatly on whether history is a good indicator of the near future or not.

Under the nonparametric assumption, VaR is calculated using only the sample statistics of past asset returns. In the context of market risk, it involves using the historical returns of the asset(s) in question.

The Teaching Study

To illustrate the use of the two methods, the teaching study uses four shares listed on the New York Stock Exchange. These four listed shares are all from different industries and are Coca Cola, Bank of America, Boeing, and Verizon Communication. Coca Cola is used to demonstrate the calculation of VaR of a single asset using the two nonparametric methods. The four shares are then combined to illustrate portfolio VaR. To simplify our discussion, we assume that there is only one underlying risk factor: the price of the share.

In this exercise, to demonstrate VaR for a single asset, an investor's exposure is \$1M (V) worth of Coca Cola shares at time t (any trading day after 3 August 2010). The risk factor is returns on the price of the share (p), risk horizon is one trading day, historical time series is 10 years from 4 August 2001 to 3 August 2010 (a total of 2,513 observations of adjusted closing price), and the level of confidence (α) is 95 per cent. The question of interest is: In 95 out of a 100 times, what would be the worst daily loss one could experience by holding \$1M Coca Cola shares?

To demonstrate VaR for a portfolio of assets (using the same historical period, number of observations, risk horizon and α used for the single asset above) the teaching study assumes an investor has a total portfolio exposure (V) of \$5M comprising 20 percent Coca Cola (\$1M), 30 percent Bank of America (\$1.5M), 30 percent Boeing (\$1.5M) and 20 percent Verizon (\$1M).

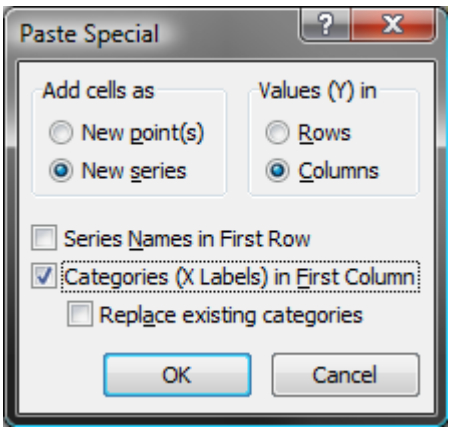
Historical Method for a Single Asset

This section describes how to use Excel 2007 to calculate the (1 - α)-per-cent VaR value, as well as how to graphically display VaR by plotting a histogram for the historical returns and inserting a (1 - α)-per-cent VaR line. Appendix 1 provides Excel screenshots which include details of all formulas.

Assume (as in our teaching study) the frequency of the historical time series matches that of the risk horizon so there is no need for time aggregation. Let there be n observations in the historical data price series, which yields n - 1 returns. To obtain the (1 - α)-per-cent VaR return, use the Excel function PERCENTILE(return series,1 - α). Alternatively, one can multiply the n - 1 returns by 1 – α to get the number of the lower (1 - α) percent observation, then apply the Excel function SMALL(return series, (n - 1)(1 - α)) to arrive at the (1 - α)-per-cent VaR return. This return is then applied to the initial value V to arrive at the (1 - α)-per-cent VaR. For simplicity, brokerage fees have been omitted from the calculation.

To plot the histogram (see Table 2 and Figure 2 in Appendix 1 for further details), calculate an appropriate bin size such that there are at least 20 to 30 bins. Calculate the frequency of each bin using the FREQUENCY(return series, upper bins) function. Construct the frequency distribution, and plot the histogram using a column chart. When the (1 - α) percent VaR line is inserted into the histogram; this turns the chart from a column chart to a combination chart that contains both a column chart and a scatter chart. The procedure for inserting a dynamic (1 - α) percent VaR line which will respond to various values of α, is as follows: Copy the table of data (see Cells I23:J24 in Table 2 of Appendix 1) related to the (1 - α) percent VaR line to be incorporated into the histogram, select the histogram diagram and paste special (see Figure 1). In the paste special dialog box of the Home Ribbon of Excel 2007, select New Series, Values (Y) in Columns, and Category (X Labels) in First Column.

Figure 1
Paste Special Dialog Box



Select the new series and change the chart type from Column series to XY series (specify it as the Scatter with Straight Lines subtype). Excel displays two secondary value axes in the chart. For the new secondary vertical axis, format it from 0 (minimum value) to 1 (maximum value). For the new secondary horizontal axis, format it to match the primary horizontal axis. If the line does not appears on the chart, select the chart and check the "Select Data" entry and re-edit the x-axis and the y-axis entry. For the application of this method to our numerical example, see Appendix 1.

Historical Bootstrap Method for a Single Asset

We can improve the performance of the historical method by bootstrapping, which involves resampling the data with replacement many times in order to generate an empirical estimate of the entire sampling distribution of a statistic. Babu and Singh (1983) showed that the bootstrap sampling distribution resembles that of the population as the number of resamples increases to infinity.

The historical bootstrap method retains the same model structure as the historical data series. It treats the historical data series as if it is the population, and randomly selects historical observations which are then resampled *m* times using the scenario sampling technique taking each observation as a scenario. Since the historical data series contain *n* observations, the *m* bootstrap samples are also of size *n*. Resampling mimics the random process of the system.

We calculate the mean, standard deviation, and 5 percent VaR of each bootstrap sample and then plot the distribution of the *m* statistics. The more *m* bootstrap samples generated, the closer the averages of the three statistics of the samples would be to those of the history data series obtained by the historical method. Excel can handle a large number of resamples (we have used *m* = 1,000 in our example shown in Appendix 2, but only show five resamples on the screenshot in Table 3), but as *m* increases to high numbers such as 1,000, processing times are slowed. It is recommended that for teaching purpose a much smaller number of resamples are used to illustrate the process.

One technical aspect of Excel has to be taken care of before performing the bootstrap exercise. It is to reset the way Excel calculates. Go to Excel Options, select Formulas on the left hand side panel in the Excel Option dialog box. Under the heading of Calculation Options, select the option "Automatic except for data tables" and enable iterative calculation by setting "Maximum Iterations" = 1. Without this crucial step, the bootstrap exercise will run forever as the Excel program keeps recalculating itself. The bootstrap samples can be "recalculated" by pressing the "F9" key once.

Teachers should note that if they wish to use screenshots in the classroom, Excel has a useful screenshot function for displaying row and column numbers. First click on Page Setup under the Page Layout Ribbon, then Sheet, then tick Row and Column Headings, then OK. Highlight the Excel section to be copied, click the arrow below the Paste icon on the Home ribbon, then select As Picture, Copy as Picture, As Shown when Printed, then OK. Then just paste into the required document.

Multiple Asset Portfolio

Historical Portfolio VaR is a relatively simple calculation (as compared to the parametric approach where correlation between the assets is measured and matrix multiplication is used to calculate variance-covariance). The daily total portfolio returns are obtained by calculating the daily weighted average of the returns for each stock as shown in Table 4. As correlations across assets are naturally embedded in the historical time series, they require no separate estimation. The required confidence level (the 95 percentile worst return in our case) is then applied to the weighted average returns in Column C of Table 4, using exactly the same methodology as previously outlined for Coca Cola, and this figure is the portfolio VaR.

A potential problem with the historical approach is that the relative weightings of assets in the portfolio could have been changing over the risk period. To overcome this, a method called historical simulation is used (Choudhry 2004). Suppose a portfolio comprises shares A and B. Where their weights do not vary over the risk period, the end value could be easily calculated. If the weights vary over the risk period, then the initial value of the

portfolio has to be recalculated. Assume at the end of the risk period we have respectively *a* of the portfolio in share *A* and (1-*a*) in share *B*, we will re-weight all the historical prices according to the weights at the end of the risk period. This method makes sense as an investor is interested in potential risk based on their current weighted holdings of a portfolio, as opposed to any prior portfolio mix.

The multiple asset historical bootstrap method works in exactly the same manner as previously described for a single asset, except that the bootstrap samples are derived from the portfolio returns (weighted average returns as calculated in Table 4) as opposed to the returns for a single asset. These bootstrap calculations are shown in Table 5.

Teaching Study Results

Using 10 years of data, 5 percent daily VaR for Coca Cola was calculated in Table 1 to be -2.20 percent ($21,979) of the portfolio value of $1m. This means that an investor investing $1m in this asset could be 95 percent confident of not losing more than this amount on a given future day, based on history repeating itself. The multiple asset approach in Table 4 showed 5 percent VaR to be -2.63 percent ($131,334) of the portfolio of $5m. The historical bootstrapping method finds daily 5 percent VaR's for both Coca Cola and for the four share portfolio to be very similar to the VaR's calculated for the historical method.

Conclusion

The study has demonstrated how two nonparametric VaR calculations can be easily generated using Excel, a readily available modelling package. Excel handles considerable quantities of observations, multiple shares and large resampling numbers, all within one Excel workbook. The methods demonstrated in this paper can be used by researchers or investors to build their own nonparametric VaR models. The techniques shown and teaching study can be used in teaching students the building of VaR models. This could be in the classroom, an elab, or as an assignment whereby students can use the methods shown in this paper to build their own models for a given asset or portfolio.

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Appendices

The Appendices capture six screenshots (Tables 1, 2, 3, 4, 5, and Figure 2) from the teachingstudy spreadsheet to illustrate how the historical and historical bootstrap methods were calculated. Note that for illustrative purposes the tables only show the first few observations, but all 2,512 observations have been included in the determination of VaR.

Appendix 1: INDIVIDUAL ASSET VaR CALCULATION

Table 1
Individual Asset Historical VaR

	A	B	C	D	E	F	G	H	I	J	K
1											
2		**Coca Cola: 5% VaR by Historical Method**									
3											
4		**Data**			**VaR Analysis**						
5			Daily								
6		Obs	Returns		Numer of obs		2,512	Formula: =COUNT(cocadaily1)			
7		1	-1.71%		Min daily return		-12.33%	Formula: =MIN(cocadaily1)			
8		2	1.31%		Max daily return		8.11%	Formula: =MAX(cocadaily1)			
9		3	-3.36%		Average daily return		-0.004%	Formula: =AVERAGE(cocadaily1)			
10		4	0.10%		Range		20.45%	Formula: =G8-G7			
11		5	1.13%		Confidence level		95.00%	Value = 0.95			
12		6	1.93%		Lower 5% of obs		125.00	Formula: =ROUNDDOWN((1-G11)*G6,0)			
13		7	0.10%		5% VaR daily return		-2.20%	Formula: =SMALL(cocadaily1,G12)			
14		8	-1.52%								
15		9	-1.95%		Last opening price		$50.00	Value = 50			
16		10	-1.15%		5% VaR opening price		$48.90	Formula: =G15*(1-ABS(G13))			
17		11	0.42%		Initial value		$1,000,000	Value = 1000000			
18		12	0.10%		5% VaR		-$21,978.91	Formula: =G17*G13			

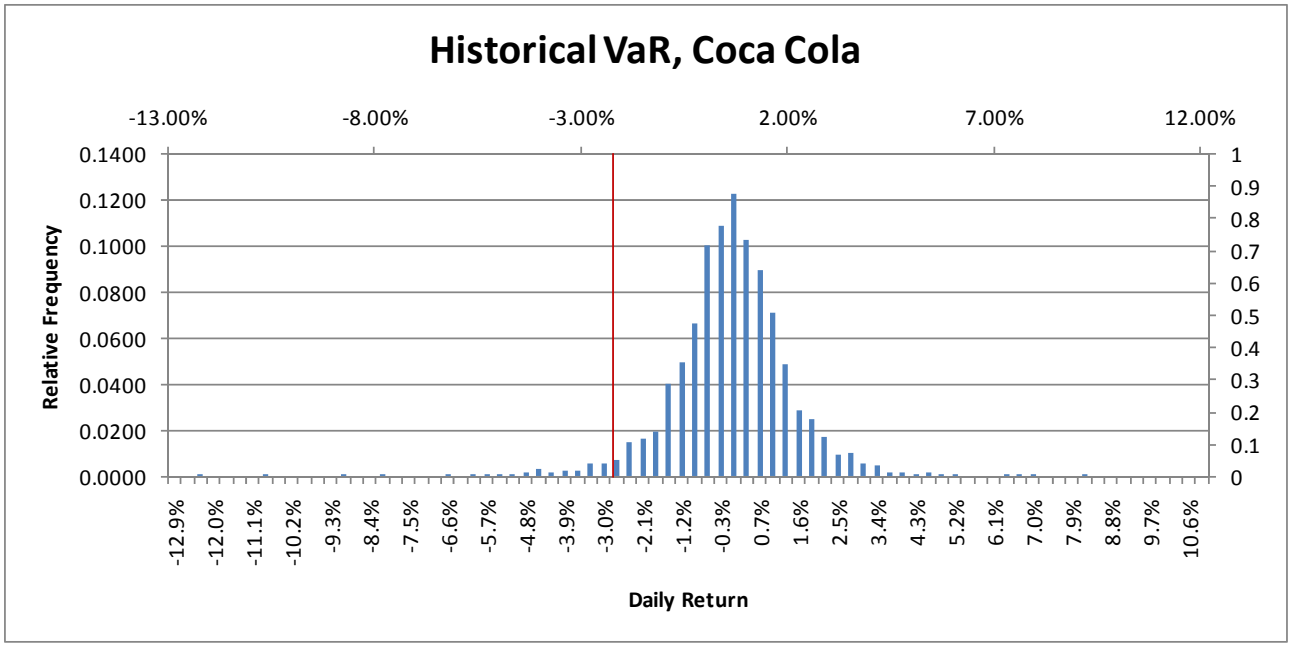
This screenshot shows the Excel functions used to calculate the 5 percent VaR value, as shown in Cell G18. For the functions applied, see Column H of the spreadsheet. Note that "cocadaily1" in the formulas is the name given to the historical data series (C7:C2519). For brevity we only show the first 12 returns. From our calculation with V = \$1M, risk horizon = 1 day, n = 2,512, α = 95 percent, and p = \$50, we find that the 5 percentile return is the 125th lowest observation, 5 percent VaR daily return = -2.20 percent, 5 percent VaR price = \$48.90, and the 5 percent VaR value = -\$21,978.91.

Table 2
VaR Histogram

	E	F	G	H	I	J	K	L	M	N	O	P
20	**Charting**											
21												
22	Bin size		0.30%		5% daily VaR line			Cell(G22) - user to select appropriate bin size				
23	Number of bins		80		-2.20%	0		Cell(G23) - user to select appropriate number of bins				
24	Lowest bin		-13.00%		-2.20%	1		Cell(G24)=ROUNDUP(MIN(cocadaily1),2)				
25	Highest bin		11.00%					Cell(G25)=G24+(G23*G22)				
26								Cells (I23 and I24)=5%VaR as obtained from table 1, Cell(G13)				
27		Lower	Upper	Absolute	Relative	X-axis						
28	0	bin	bin	freq	freq	label						
29	1	-13.00%	-12.70%	0	0.0000	-12.9%		Cell(F29)=G24				
30	2	-12.70%	-12.40%	0	0.0000	-12.6%		Cell(G29)=F29+G22				
31	3	-12.40%	-12.10%	1	0.0004	-12.3%		Cell(H30)=Frequency(cocadaily1,G30:G108)				
32	4	-12.10%	-11.80%	0	0.0000	-12.0%		Cell (I30)=H30/SUM(H:H)				
33	5	-11.80%	-11.50%	0	0.0000	-11.7%		Cell(J30)=AVERAGE(F30:G30)				
34	6	-11.50%	-11.20%	0	0.0000	-11.4%						
35	7	-11.20%	-10.90%	0	0.0000	-11.1%						
36	8	-10.90%	-10.60%	1	0.0004	-10.8%						
37	9	-10.60%	-10.30%	0	0.0000	-10.5%						
38	10	-10.30%	-10.00%	0	0.0000	-10.2%						
39	11	-10.00%	-9.70%	0	0.0000	-9.9%						
40	12	-9.70%	-9.40%	0	0.0000	-9.6%						

This screenshot shows the workings for the histogram. For plotting the histogram, user needs to select the number of bins required (we use 80, but for brevity show only the first 12 bins below). This should start from a point which includes the lowest return (in our case the lowest return per Table 1 is -12.33 percent, so we have started from a return of -13 percent). We have chosen each bin size to be at intervals of 0.3 percent, which based on 80 bins gives a maximum point on the histogram of 11 percent. This covers our maximum return of 8.11 percent per Table 1. The frequencies are calculated as per the formulas in Column L. The relative frequencies are used to plot a bar chart (histogram as per figure 2). A 5 percent daily VaR line is inserted according to the method described in the main body.

Figure 2
Historical one-day 5 percent VaR, Coca Cola



This shows the histogram of the Coca Cola returns to Coca Cola share and its corresponding 5 percent VaR line using the historical method. Construction is as discussed in Table 2 and in the main body.

Table 3
Individual Asset Historical Bootstrap Method

	E	F	G	H	ALP	ALQ	ALR	ALS	ALT	ALU
2	**Coca Cola: 5% VaR by Historical Bootstrap Method**									
3										
4										
5										
6			BS1	BS2	BS3	BS999	BS1000			
7		1	-2.27%	0.94%	2.15%	-0.07%	0.11%			
8		2	0.53%	-0.96%	-2.80%	1.84%	3.40%			
9		3	-2.31%	0.00%	-0.50%	-0.61%	1.97%			
10		4	-1.34%	-0.35%	0.09%	-0.82%	-1.61%			
11		5	-0.80%	2.60%	-0.43%	3.55%	2.78%			
12		6	1.97%	1.39%	-0.27%	1.84%	-0.28%			
2513		2507	0.73%	-0.27%	-0.45%	-0.50%	1.28%			
2514		2508	-0.70%	0.94%	-0.69%	0.09%	1.49%			
2515		2509	2.05%	-0.96%	-0.43%	1.28%	1.56%			
2516		2510	0.55%	0.50%	0.85%	0.10%	0.55%			
2517		2511	-0.67%	1.10%	-0.85%	-1.19%	0.84%			
2518		2512	0.80%	0.54%	-0.32%	1.40%	0.89%	CellALQ2518=VLOOKUP(RANDBETWEEN(1,2512),B:C,2,FALSE)		
2519								(note columns B:C are as per table 1)		
2520										
2521			BS1	BS2	BS3	BS999	BS1000			
2522	Number of obs		2512	2512	2512	2512	2512			
2523	Min daily return		-12.33%	-12.33%	-12.33%	-12.33%	-10.63%	Cell(ALQ2523)=Min(ALQ$7:ALQ$2518)		
2524	Max daily return		8.11%	8.11%	8.11%	8.11%	6.87%	Cell(ALQ2524)=MAX(ALQ$7:ALQ$2518)		
2525	Average daily return		0.01%	0.01%	0.00%	-0.03%	-0.02%	Cell(ALQ2525)=AVERAGE(ALQ$7:ALQ$2518)		
2526	Range		20.44%	20.44%	20.44%	20.44%	17.50%	Cell(ALQ2526)=ALQ2524-ALQ2523		
2527	Confidence level		95%	95%	95%	95%	95%	Cell(ALQ2527)=95%		
2528	Lower 5% of obs		125	125	125	125	125	Cell(ALQ2528)=ROUNDDOWN((1-ALQ2527)*ALQ2522,0)		
2529	5% VaR daily return		-2.18%	-2.20%	-2.14%	-2.25%	-2.16%	Cell(ALQ2529)=SMALL(ALQ$7:ALQ2518,ALQ2528)		
2530										
2531			Bootstrap Method (Averages, Max, and Min of Rows 2520:2529)		Comparison to Historical Method (per Table 3)					
2532	Number of obs			2512		2512				
2533	Min daily return			-12.33%		-12.33%				
2534	Max daily return			8.11%		8.11%				
2535	Average daily return			0.02%		-0.01%				
2536	Range			20.44%		20.44%				
2537	Confidence level			95.00%		95.00%				
2538	Lower 5% of obs			125.00		125.00				
2539	5% VaR daily return			-2.20%		-2.20%				

The following screenshot shows the workings for taking 1,000 bootstrap samples. The 2,512 historical observations of returns are treated as 2,512 scenarios. When resampling, they are randomly selected by using the RANDBETWEEN(1, 2512) function and the corresponding returns are captured by the VLOOKUP( ) function, see the formula printed in Cell ALR2518 in the screenshot. Once the 1,000 bootstrap samples are done, descriptive statistics and 5 percentVaR for each sample is calculated (see rows 2522 to 2529). From the individual 1,000 bootstrap samples, the overall 5 percent VaR is measured as the average of the samples (see Column G, Rows 2532:2539). A comparison to the historical method is provided in Column ALQ. Indeed, the two sets of figures come very close.

Appendix 2: MULTIPLE ASSET Var calculation

Table 4
Four Share Portfolio Historical Approach

Four Shares Portfolio: Weighted Average Returns

Data Obs	Weighted Average	Daily Returns Coca Cola	Daily Returns B of America	Daily Returns Boeing	Daily Returns Verizon
		20.00%	30.00%	30.00%	20.00%
1	0.90%	-1.71%	4.00%	-0.13%	0.40%
2	-1.22%	1.31%	-0.96%	-0.64%	-5.02%
3	-1.95%	-3.36%	-0.24%	0.00%	-6.03%
4	-0.84%	0.10%	2.38%	-2.21%	-4.54%
5	1.41%	1.13%	0.35%	1.95%	2.45%
6	0.96%	1.93%	0.23%	2.29%	-0.91%
7	0.37%	0.10%	2.42%	-2.16%	1.36%
8	-1.51%	-1.52%	-0.80%	-3.54%	0.45%
9	-1.76%	-1.95%	-1.51%	-2.16%	-1.36%
10	-0.88%	-1.15%	-0.47%	0.14%	-2.77%
11	1.98%	0.42%	0.82%	0.00%	8.23%
12	1.05%	0.10%	0.23%	3.87%	-1.01%
13	-0.17%	-1.47%	1.04%	2.33%	-4.45%
14	0.36%	-1.07%	-1.27%	2.77%	0.61%
15	1.24%	-1.62%	-2.35%	6.27%	1.94%
16	0.23%	-0.22%	-1.56%	-0.23%	4.06%
17	-0.26%	-0.88%	0.36%	-0.82%	0.28%

VaR Analysis: Four Shares Portfolio

Numer of obs	2,512
Min daily return	-16.21%
Max daily return	12.70%
Average daily return	-0.01%
Range	28.91%
Confidence level	95.00%
Lower 5% of obs	125.00
5% VaR daily return	-2.63%
Initial Value	$ 5,000,000
5% VaR	-$ 131,334

Note:
Row 3 = weightings
Cell C7 =SUMPRODUCT(D$3:G$3,D7:G7)
Copy formula all the way down Column C

Daily returns for each of the four shares are calculated in the same manner as for Coca Cola in Table 1. Weighted average returns are calculated as per the note in Cells I20:I 23 below. All other formulas are as per Table 1, except they are applied to the weighted average in Column C as opposed to cocadaily1.

Table 5
Four Share Portfolio Historical Bootstrap Method

	D	E	F	G	H	ALP	ALQ	ALR	ALS
2		**Four Shares Portfolio: 5% VaR by Historical Bootstrap Method**							
3									
4									
5									
6			BS1	BS2	BS3	BS999	BS1000		
7		1	-16.21%	0.47%	1.62%	-0.95%	-0.67%		
8		2	-0.57%	0.45%	-0.02%	-0.30%	0.26%		
9		3	0.51%	0.36%	-0.38%	-1.56%	-3.70%		
10		4	0.84%	0.05%	0.08%	-0.37%	0.11%		
11		5	1.01%	1.33%	-1.25%	-0.36%	-0.40%		
12		6	0.29%	0.24%	-0.08%	1.02%	2.43%		
2513		2507	-1.05%	9.18%	-0.43%	-1.36%	-0.17%		
2514		2508	-2.80%	-0.02%	8.62%	-0.80%	1.02%		
2515		2509	1.19%	-3.80%	1.37%	1.14%	-1.34%		
2516		2510	-2.68%	9.17%	0.10%	-1.37%	-5.32%		
2517		2511	-0.13%	-1.25%	-0.19%	-0.41%	-0.87%		
2518		2512	-4.82%	-1.47%	0.60%	1.64%	0.06%		
2519			BS1	BS2	BS3	BS999	BS1000	Bootstrap Method (Averages, Max and Min of Rows 2520:2527)	Comparison to Historical Method (per Table 4)
2520		Number of obs	2512	2512	2512	2512	2512	2512	2512
2521		Min daily return	-16.21%	-15.69%	-16.21%	-16.21%	-15.69%	-16.21%	-16.21%
2522		Max daily return	12.70%	12.70%	12.70%	10.27%	12.70%	12.70%	12.70%
2523		Average daily return	0.03%	0.02%	0.00%	-0.03%	0.00%	0.01%	-0.01%
2524		Range	28.91%	28.40%	28.91%	26.48%	28.40%	28.91%	28.91%
2525		Confidence level	95%	95%	95%	95%	95%	95.00%	95.00%
2526		Lower 5% of obs	125	125	125	125	125	125.00	125.00
2527		5% VaR daily return	-2.63%	-2.61%	-2.72%	-2.68%	-2.61%	-2.63%	-2.63%
2528									

Bootstrap samples (1000) are calculated in the same manner as for Coca Cola in Table 3, except they are applied to the weighted average returns (as calculated in Column C of Table 4) as opposed to cocadaily1. The outcomes for the Bootstrap method are shown in Column ALR and compared to the Historical Method outcomes (as per Table 4) in Column ALS.