GHENT UNIVERSITY

FACULTY OF ECONOMICS
AND BUSINESS ADMINISTRATION

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CONCENTRATION ON
THE AUDIT MARKET

Master dissertation to obtain the degree of
Master in Applied Economics

Charlotte Dubaere
under the direction of
Prof. Dr. I. De Beelde
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PERMISSION

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Charlotte Dubaere
Acknowledgement

In those four university years, many things have changed. Without some important persons, today would probably look differently. I would like to seize this thesis as an opportunity to thank family and friends for their ongoing support.

I thank my parents on who I can always rely. For many years they have been motivating me in my studies and they have given me wonderful opportunities to encounter new life and study experiences. They have been important in leading me to where I stand today.

During these last years, I met some great friends and I tightened the bond with some old friends. I am grateful for helping me realising that I was making the right choices and I hope to spend many more nice moments with them. Special thanks go to one particular friend, who has been supporting and guiding me in many situations.

This last year has been somewhat special. Writing this thesis required much time and patience. This final dissertation is not based on a solely one-man based thinking. My promoter Prof. Dr. Ignace De Beelde has always been prepared to share his knowledge and expertise and improved the thesis content with some important critical suggestions. His contribution has formed, beyond any doubt, a major incentive to complete this dissertation.

Charlotte Dubaere
Ghent, 20 May 2008
Abstract

This thesis provides an empirical description of the complete Belgian audit market and the evolution of the audit market concentration over the time period 1999-2005.

In contrast with previous literature, the entire Belgian audit population was evaluated, using the IBR auditor membership lists and the Belfirst database. These data enable the calculation of both the audit firm market share and the auditor concentration before and after the collapse of Arthur Andersen.

The findings are reported for the overall audit market, on industry level and for the listed companies segment. In general, the market share and concentration results are lower than in other countries. The concentration ratios and Herfindahl indices (measured by number of clients, number of auditors and clients’ sales) indicate a slightly increasing concentration level. The concentration level is found to be different for the three auditor groups (B4, mid-tier, small). There is no substantial increase in the overall Big four market share. The mid-tier audit firms, however, are becoming increasingly important market players, especially after the collapse of Andersen. The analysis of the results points out that the audit market concentration is influenced by the client characteristics, the auditor choice by the client, the number of audit firms and their relative size.

Key words: audit firm concentration, audit firm market share, Big four
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Abbreviations

AA  Arthur Andersen
B4   Big Four: PwC, KPMG, Ernst & Young, Deloitte
B5   Big Five: PwC, KPMG, Ernst & Young, Deloitte, Arthur Andersen
B5/4 Big Five or Four (to talk about the top when an audit firm recently fell out)
B6   Big Six: Price Waterhouse, Coopers & Lybrand, KPMG, Ernst & Young, Deloitte, Arthur Andersen
C&L  Coopers & Lybrand
C_n  Concentration ratio, n being the number of largest firms
DIFF Difference between the actual and minimum level of auditor concentration
EC   European Commission
E&Y  Ernst & Young
G    Gini coefficient
GT   Grant Thornton
HI   (Hirschman-) Herfindahl index
IBR  Instituut van de Bedrijfsrevisoren (the Belgian Institute of company auditors)
KPMG Klynveld Peat Marwick Goerdeler
NACE Nomenclature générale des Activités Économiques dans les Communautés Européennes
PW   Price Waterhouse
PwC  PricewaterhouseCoopers
SCP  Structure-Conduct-Performance theory
SIC  Standard Industrial Classification (Statistical classification for defining the economical activity in U.S.)
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**Introduction**

These last few years, the unhealthy audit market concentration of the so called ‘Big 4’ has been drawing more and more attention from worldwide authors. Despite the existence of a large number of smaller audit firms, Deloitte, KPMG, PricewaterhouseCoopers and Ernst & Young dominate a large amount of the audit clients, particularly the public listed companies. Today, over 24,000 Belgian companies depend on an auditor to make an statement about the correctness of the representation of their annual report.

Concentration determines the behaviour of large audit firms and is therefore a major factor in market competition (Moizer & Turley, 1989). Smaller audit firms and governments fear that excessive concentration on the top will result in increasing audit prices, decreasing auditor independence and lower audit quality. Especially after the collapse of Arthur Andersen (2002), authorities are more interested in research about the influence of concentration than ever before. In view of the probability on high concentration and its consequences, governments can set measures to prevent negative market structures, and thereby protect customers and new entrants of the audit market. Since concentration seems to be so important, I was interested in studying in depth the topic of "audit concentration".

In order to find out if in Belgium too the audit market is dominated by the B4, this thesis is conceived as a concentration study. Market shares, measured by multiple proxies, have helped to calculate the concentration. As audit fees were not available on the Belgian audit market during the period of research, other acceptable proxies for market share have been chosen. The market shares were placed as independent variable in the two most frequently used concentration formulas (concentration ratio and Herfindahl index). The calculation was made for the whole Belgian audit population and then repeated for the NACE sectors and the listed segment in order to discover the degree of auditor specialisation.

By using previously set bounds, a conclusion was made about the size of the concentration outcome. The interpretation of the results and the comparison with other (inter)national studies had to be done carefully, since the different choices of proxy and sample size influence the concentration outcome.

With this study, my scope is to try to contribute to the barely available knowledge about concentration on the Belgian audit market, especially after the collapse of Andersen (2002).
Another surplus is the use of the whole Belfirst population, containing clients from many industries, both listed and non-listed. The reason for taking the whole population and not a sample was to reduce the error made by using proxies, instead of audit fees. Because some proxies of audit fees over- or underestimate the power of big audit firms, concentration will be calculated by multiple measurements.

On the other hand, the data are limited to a period between 1999 and 2005. To reach the conclusion whether the Belgian concentration evolution is large, results of previous Belgian studies had to be taken in account in order to set up a time graph. The comparison with other studies was all but evident, since results after the year 2000 are very sparse and they used, in addition, different sample sizes, sample structures and measures of market shares.

The first chapter describes the theoretical framework of auditor concentration. The importance of the industrial organisation theory, the relevant market structures and prior concentration studies are explained. Special attention is given to the audit situation in Belgium.

The second part formulates six hypotheses related to auditor concentration.

Chapter three explains the methods used for assessing the market concentration. There is an overview of the different proxies which have helped to calculate the market shares, and of the major concentration calculation methods.

The next chapter discusses the data. The population and used data collection procedures are illustrated. Some attention is given to the period of research.

The fifth part gives the results of the empirical study. The calculated market shares and auditor concentration levels are given for the overall market, on industry level and for the listed segment. There are cross-study comparisons with results from other periods and other countries. The part mentions the discovered market structure.

The thesis concludes in a last chapter with the main findings, where we also highlight the limitations of this study and some suggestions for future research.
1 Theoretical framework

Before measuring the audit market concentration, it is important to gather knowledge about the theories related to auditor concentration and the findings of previous studies.

1.1 Theories related to the auditor concentration

1.1.1 Industrial Organisation Theory

Naïve view

<table>
<thead>
<tr>
<th>Structure</th>
<th>Conduct</th>
<th>Performance</th>
</tr>
</thead>
</table>

The Structure-Conduct-Performance paradigm (SCP) of the industrial organization theory (Manson, 1939) states that the market structure influences the market conduct and is therefore the most important determinant for the economical performance (Beattie & Fearnley, 1994). Market conduct is meant to be the behaviour of companies in advertising and pricing and it thereby expresses the level of market power.

In market structures with high concentration, leading firms will increase their market power and are able to collude. Because of that low competition level, top firms will charge higher audit fees and attain higher profits. (Schaen & Maijoor, 1997; Beattie & Fearnley, 1994; Abidin, Beattie, & Goodacre, 2006) Effective competition is only possible if the market counts of a sufficient number of suppliers of equal size. Only a low concentrated market can benefit customers. (Beattie & Fearnley, 1994)

Feldman (2006) confirms the SCP paradigm. He found that the big market power of the very few leading firms in the U.S. indeed disadvantages audit clients, especially since the collapse of Andersen in 2002.

New industrial economics

New industrial economics are convinced that there is no single one-direction relationship between concentration and performance, but a feedback between those two parameters. The
existing link between market structure and performance is thought to be indirect because they are determined by the underlying cost and demand parameters. (Beattie, Goodacre, & Fearnley, 2003; Buijink, Maijoor & Meuwissen, 1998; Peel, 1997)

- On the demand side, Beattie and Fearnley (1994) explain high concentration by the voluntary realignments of clients who choose top auditors because of their good reputation or because of the dissatisfaction about their old auditor.
- The cost parameter, economies of scale, motivates audit firms to merger, which increases concentration.

This new industrial view implies that high concentration does not necessarily lead to low competition (and to higher prices). Beattie et al. (2003) point out that the effect of the B8 mergers on the competition level was quasi nihil. Thavapalan, Moroney and Simnett (2002) even contradict the original industrial theory. They found that the higher concentration due to the PwC merger led to more competition because more clients went to smaller audit suppliers. Pearson and Trompeter (1994) claim that in highly concentrated markets, fees will decrease: fewer competitors in the market and lower human resource cost create the opportunity for top firms to develop more industry expertise. More specialization makes it possible to ask lower prices (economies of scale).

For the Belgian audit market, Schaen and Maijoor (1997) confirm that the original industrial organization theory is no valid explanation for the concentration. Pearson & Trompeter (1994, pp. 129) suggest it would be better to just search ‘a relationship between concentration and price competition rather than focusing on concentration as a measure of competition’. Concentration does not seem to be an appropriate measurement for price competition because it neglects the possibility of intense competition for clients among the market leaders itself.

1.1.2 Characteristics of relevant audit market structures

Oligopoly

Today, most of the audit markets around the world are oligopolistic. Three or less audit firms dominate over 50% of the market, or five or less audit firms have more than 2/3 of the market shares (Bigus & Zimmermann, 2007).

Tight oligopoly prevails when the market has fewer rivals, stable market shares, medium-to-high entry barriers, high possibility on collusion and higher concentration. The market share of the top four firms exceeds 60%. Loose oligopoly has more rivals, more fluctuating market shares, lower
barriers to enter, lower concentration, good chance on economies of scale and the top four has less than 40% of the market shares (Pong, 1999; Abidin et al., 2006, Shepherd, 1997; Schaen & Maijoor, 1997)

Oligopoly is a dangerous market structure, because the temptation of the top firms to collude is high. Leading firms can collect their market power, diminish rivalry on the top and protect themselves by setting entry barriers (Choi & Zeghal, 1999). This brings price fixing arrangements, increased profits for the top auditors and less auditor choice for the clients (Pong, 1999; Mansfield, 1979).

**Dominant firm**

According to some studies, the audit market is heading towards dominant firm. In that case, one firm owns 40% to 99% of the market shares (Beattie & Fearnley, 1994). The dominant firm can raise prices and often gains extremely high profits. Its policy is generally price discriminating (Shepherd, 1997).

### 1.2 Empirical studies about auditor concentration

There has already been a lot of research on auditor concentration in time, in different industries and across countries. Also closely related topics such as the distribution of audit clients, the market shares and market structures have been studied in detail. A summary is given in the following paragraphs, ending with some specific findings about Belgium.

#### 1.2.1 The clients of the B4

Clients choose an auditor not because of the audit fee, but because of reputation, audit quality, staff quality, sector expertise, international coverage and value added services (Beattie et al., 2003; Oxera, 2006). Yet, if audit fees of the current auditor rise, the client may switch supplier as long as the switching costs do not exceed the increase of fee (Feldman, 2006).

The general trend seems to point out that big clients employ big auditors:
- Clients planning to go internationally (or clients already operating on a global basis) want to have the same audit company in every country for controlling their annual report and therefore address large audit firms with a global network (Schaen & Maijoor, 1997; Beattie et al., 2003).
- Big auditors are better experts in complex accounting rules (Schaen & Maijoor, 1997).
Some companies need a specialized auditor. Only big auditors have the financial and human capital to invest in expertise in order to supply the expected audit service (Oxera, 2006). Therefore, the bigger the auditor, the more in house specialisation (Bigus & Zimmermann, 2007).

The auditor on the other hand sets some restrictions on accepting a client. Since the SOX\(^1\) regulation, which dictates that accounting firms can be punished for fraudulent behaviour, audit firms avoid newly listed and risky clients. The B4 mainly choose listed companies and clients who pay a good audit fee (Abidin et al., 2006; Feldman, 2006). Mid-tier audit firms take only big clients if they have the expertise and if that company is not too complex to audit so that the client would not absorb a too large proportion of audit firms resources (Oxera, 2006).

The B4 has the biggest power towards their clients in sectors where the auditor choice is small. Nevertheless, it seems that mid-tier auditors and the B4 are taking over each others market share. Recently, the B4 have become more active in the middle market and mid-tier auditors have shown up more regularly in the regulated industry (Bruce, 1996; Beattie et al., 2003).

### 1.2.2 Market share and concentration

**Definition**

Market share reflects market power which helps the supplier to raise prices above marginal cost (Schaen & Maijoor, 1997). It indicates the competition level: high audit firm entry and exit and high market share mobility indicate strong competition. (Buijink, Maijoor & Meuwissen, 1998)

Concentration is ‘the combined market share of leading firms and indicates the degree of oligopoly’ (Schaen & Maijoor, 1997). It is calculated by a formula\(^2\) with the market share as an independent variable. The bigger the size of the suppliers and the smaller their number of presence on the market, the higher the concentration level. Strong concentration indicates oligopoly. Low concentration points out that the market is divided equally under a big number of suppliers.

---

\(^1\) Sarbanes Oxley Act (Mai, 2002; as an answer to a number of corporate and accounting scandals): This American law regulates corporate governance and sets conditions for the board and the preparation of financial statements. It should enlarge the integrity of the board, the independence of commissioners and external accounts and the financial transparency (Feldman, 2006; www.ing.com)

\(^2\) See chapter 4 Research methodology
Results auditor market share

One of the oldest studies (Danos & Eichenseher, 1986) reports that when US clients switched auditor, the distribution of those clients across small and large audit firms was fairly stable. More recent studies indicate that the average size of the leading audit firms increased during the last years, resulting in higher market shares on the top. Especially in the European markets, the largest firms have become more dominant (Choi & Zeghal, 1999). The auditors with the highest probability of being the biggest growing firm in an industry are the ones which are already the most represented in that industry (Beattie et al., 2003).

The cross-study comparison of audit firm market shares and ranking are difficult, as studies use different proxies.

Results concentration

Auditor concentration in time

Most studies report that over the last twenty years, concentration has reached high levels, especially after the PwC merger (1998) and the collapse of Arthur Andersen (2002). Moreover, the audit firm mergers in the 1980s and 1990s pushed concentration among the big auditors upwards (Feldman, 2006). All authors agree in saying that the increase is at diminishing rate (Abidin et al., 2006; Maijoor et al., 1995). Only Pearson and Trompeter (1994) are convinced that for unregulated industries concentration declined and Pong (1999) reports a slight concentration decrease in 1994 and 1995.

This trend in concentration is supported by all concentration formulas. The fact that some recent studies report stable concentration levels can be explained by the very short research period (two or more years). These studies are no good basis to compare concentration outcome (Dopuch & Simunc, 1980; Gilling & Stanton, 1978; Tomczyck & Read, 1989). Not only different research periods but also sample sizes and objects make it difficult for concentration studies to be compared.

Auditor concentration in industries

The high concentration and the tendency to tight oligopoly are worrying political authorities. The concern is on the overall level (national, European and American), but not industry specific (Danos & Eichenseher, 1981). Some industries are more concentrated than others: auditors are specialized, which leaves less choice for clients to employ a capable auditor.

3 Appendix A. Auditor ranking in US, UK, Australia, Germany, Switzerland and Belgium
4 The measurement ratios for concentration are C∞, HI and the Gini-coefficient. See chapter four
There are many drives why auditors invest in expertise:

- Audit standards require audit companies to develop more expertise and technological innovation. It is necessary as clients get more complex (e.g. companies form a combined group, clients go internationally, naturally complex sectors such as banking, insurance, high-tech, media, retailing, tobacco (Oxera, 2006)).
- Expertise leads to better audit performances and more auditor independence.
- It brings more economies of scale: investing in specialization lowers the audit costs which enables the audit firm to ask lower fees and, so doing, to attract more clients. (Beattie et al., 2003; Quick & Wolz, 1999; Danos & Eichenseher, 1981 & 1982; Gramling & Stone, 2001; Bigus & Zimmermann, 2007; Oxera, 2006)

Yet, expertise also creates threats.

- It makes it harder for smaller audit firms to enter the market. They must follow more standards and possess good risk-based technology so as to keep up with the big firms (Gramling & Stone, 2001).
- It also might cause a duopoly or monopoly which results in higher fees and lower quality. (Bigus & Zimmermann, 2007)

Especially top firms try, as much as possible, to gain expertise when auditing the listed companies (Beattie et al, 2003). This makes concentration the highest in regulated, in fast growing and in low risk industries (Pearson & Trompeter, 1994; Beattie et al, 2003; Oxera, 2006)

**Auditor concentration in countries**

Also the concentration between countries differs\(^5\).

- Compared to the European market, the US audit market is less concentrated (Choi & Zeghal, 1999), with PwC leading the market (Bigus & Zimmermann, 2007). After the mega mergers (1980s and 1990s), the US concentration measures HI\(_4\) and HI\(_6\) declined (Choi & Zeghal, 1999). Since then market shares have become more equally distributed among the top firms, encouraging competition (Minyard & Tabor, 1991; Wootton et al., 1994).
- The Dutch audit concentration evolved to a high concentration level. Compared to the German audit market, it is only half as big, more pro-competitive regulated, more concentrated and has higher market share mobility, due to higher entry and exit rates (Buijink, Maijoor and Meuwissen, 1998).

\(^5\) Appendix B. Overview of the most important numerical studies
- The German audit market is an oligopoly with, in some industries, duopolistic or monopolistic structures. PwC leads the market. The leading firms have a stronger position than in the UK and US, but are less concentrated than in Switzerland (Bigus & Zimmermann, 2007).

- Since the collapse of Andersen (2002), the UK market is a tight oligopoly with PwC as market leader. According to some authors, PwC is heading for a dominant firm position (Bigus & Zimmermann, 2007; Abidin et al., 2006).

Bandyopadhyay and Kao (2004) remark that it is sometimes better to analyze concentration on a local level instead of a national level, since an audit office competes with other local offices of the same neighbourhood. If a certain office has more strongly qualified staff than his local competitors, than that office will dominate the auditing of that area. Nevertheless, audit firms that dominate the national market are also local major players. (Bandyopadhyay & Kao, 2004)

**Causes of auditor concentration**

The three principal factors which cause a change in auditor concentration are voluntary realignment of clients (auditor switching), changes in the set of customers and changes in the set of suppliers.

a. **Clients switch** to big auditors because they expect to need specialized auditors in the near future (Peel, 1997), because they want better audit services, because they are unsatisfied with their current auditors performance or with the audit fee. Changes in the company’s top management, company mergers or takeovers may lead a change of auditor (Beattie & Fearnley, 1998). Beattie & Fearnley (1994) remark that in switching cases, the top are mostly chosen as the new auditor.

b. **Changes in the set of buyers** occur because audit clients enter the market, exit, merger, have difficulties in their management (Beattie et al., 2003) or delist (Abidin et al., 2006). It seems that the B5/4 failed in acquiring more newly listed clients. However, they gained market share because the leaving clients were mainly from smaller auditors (Abidin et al., 2006).

c. **Changes in the set of suppliers** are caused by auditors entering, collapsing, merging or growing. Auditor mergers are the most important factor for concentration in many countries, followed by voluntary realignment (Pong, 1999; Choi & Zeghal, 1999). The effect of mergers is the clearest when measured with $C_n$ (Wootton, Tonge, Wolk, 1994). Other factors which may impact the auditor concentration is the power of the big audit firms. They can influence the government in setting up stronger regulations in the demand to audit
services, to the detriment of small auditors. Besides, they made expertise a necessary requirement, which means that small non-specialised audit firms have no chance to survive on the market. (Dopuch & Simunic, 1980; DeAngelo, 1981; Peel, 1997; Pong, 1999; Oxera, 2006; Willekens & Achmadi, 2003; Danos & Eichenseher, 1981, 1986; Bandyopadhyay & Kao, 2004; Maijoor et al., 1995)

**Consequences of concentration**

Pong (1999) concludes that in highly concentrated markets, the chance of collusion with (high) price fixing arrangements is very likely, auditor choice is restricted and conflicts of interest are possible. Because of this, concentration seems to be unfavourable both for the clients and smaller audit firms (Abidin et al., 2006).

**Audit fees as the most import measure of market share**

The industrial organization theory\(^6\) shows that concentration influences competition and audit fees. Because of this relationship, many authors agree that audit fees is the best measure to calculate market share (measure in C\(_n\) and HI).

Audit fees have increased in time, more in Europe than in the US, especially after the demise of Andersen (Choi & Zeghal, 1999). Feldman (2006) explains a part of the fee incline after Andersen by a decrease in the B4 capacity (some former Andersen staff members did not go to another B4). Another part of the increase is influenced by the SOX\(^7\) Act (complying with the SOX required higher costs and assumed higher audit risks) (Feldman, 2006).

It is remarkable that the smaller auditors have a bigger relative fee increase, but their absolute fee is still lower than the B4 fees. (Abidin et al., 2006; Bandyopadhyay & Kao, 2004; Pong, 1999; Danos & Eichenseher, 1981). Even between the B4 audit firms, there are price differences in the industries (Oxera, 2006).

More reasons why audit fees increased the last years: inflation, new international accounting standards, market concentration, market share, market power of B4 and client influence (Abidin et al., 2006; Oxera, 2006; Bandyopadhyay & Kao, 2004). As size, complexity and risk of the client grow, audit fees increase (Pong, 1999).

Bandyopadhyay and Kao (2004) found a positive relation between concentration and audit fees of non-B6 local offices after admitting ‘effect of economies of scale’. They did not find a relation with B6 audit fees.

\(^6\) See 2.1 Theories related to the auditor concentration (Industrial Organization Theory)

\(^7\) See footnote 1


1.2.3 Market structure

*Competition in the market*

The market structure ‘indicates the size distribution of firms within the market and can be expected to influence the effectiveness of competition’ (Schaeen & Maijoor, 1997, p153). It enables to discover possible collusion or dominant firms (Beattie and Fearnley, 1994).

An effective competition needs a sufficient number of market suppliers and a reasonable degree of parity among them (Schaeen & Maijoor, 1997; Bresnahan & Reiss, 1991). Competition can be improved by new entrants who create more auditor choice (Oxera, 2006). Yet, in a market with three, four or five big audit firms, a new entering auditor has but little effect on the competition (Bresnahan & Reiss, 1991).

In the 1980s, competitive pressures increased due to the changing environment: auditor registration and monitoring, guidelines concerning application and advertising, and low capacity of audit suppliers. Companies reacted to these changes by adjusting their pricing and merger strategy (Beattie and Fearnley, 1994). Especially among B8 firms, there was more competition (Pearson, 1994).

The relationship between concentration and competition is not unequivocal. Some studies say that the B8 mergers ‘may have had little, if any, impact on competition’ (Beattie et al, 2003, p 5). Choi & Zeghal (1999) set up a regression analysis which proves the negative relation between concentration and competition.

*Influence of mergers on the market*

Audit firms merge because the merging creates economics of scale, a better development of industry expertise, more resources to serve the client, more technology and knowledge, greater efficiency and for the leading firms, it strengthens their top position and reputation (Choi & Zeghal, 1999; Beattie & Fearnley, 1994; GAO, 2003; Pong & Burnett, 2006).

A few authors are convinced that top audit firms misuse their merged (stronger) position to raise audit fees (Thavapalan, Moroney, and Simnett, 2002).

Further impact of mergers on competition is not unambiguous: In Europe, the top audit firms dominated the audit market before the big mergers of 1989 and strengthened their positions after the merger events and could have had a bad influence on competition (Wolk, Michelson, & Wootton, 2001).

- In the US however, the mergers seem to have caused more competition in the top (Choi & Zeghal, 1999).
- Tonge and Wooton (1991) minimize the impact of mergers on auditor competition. In the last years, successful mergers are not necessarily between big auditors but also between top firms and smaller or mid-tier firms.

**Evolution in the market structure**

*From B8 to B6 (1989): Merger Ernst & Whinney with Arthur Young (Ernst & Young)  
Merger Deloitte, Haskins & Sells with Touche Ross (Deloitte & Touche)*

Authorities accepted the mega mergers because they expected no significant impact on the competition level (Goddard, 1998; Thavapalan et al., 2002).

The accumulated market shares and factor costs of the merged firms declined, compared to other big auditors. The competitive pressures have become more moderate (Beattie et al., 2003).

*From B6 to B5 (July 1998): Merger PriceWaterhouse with Coopers & Lybrand (PwC)*

The EC approved the request of merging because it found no evidence that the merger would lead to an oligopolistic or duopolistic dominance (EC, 1998). Yet, concerned about the concentration, the EC warned that further reduction in number of top firms would be unacceptable for the market (Abidin et al., 2006).

The new audit firm became the market leader in many countries and in some sectors, even if their aggregated market share was lower than the post-merger market shares (Pong & Burnett, 2006).

The concentration after the merger did indeed increase because their former clients remained loyal and new clients employed them (Oxera, 2006). Pong and Burnett (2006) report no significant price increase.

**Abandoned merger between Ernst & Young and KPMG (1997-1998)**

This proposed merger received no approval form the EC because of its possible negative impact on competition. Merger plans were already put aside before staff could make a recommendation (Feldman E.R., 2006).

The disapproval by the EC was necessary because the coordination and strategy of the merged firm would be disadvantageous for clients and smaller competitors (Kwoka, 2004)

---

*Appendix C. History of the Belgian audit market. The appendix shows in blue the big international mergers.*
From B5 to B4 (August 2002): Collapse Arthur Andersen

Following the Enron scandal in the U.S., Andersen collapsed. Deloitte and Ernst & Young took over most of the clients and together with the other two remaining top firms, they increased their market share and the (already high) concentration. The B4 used this market power to raise audit fees (Abidin et al., 2006; Beattie et al., 2003; Feldman, 2006).

Beattie et al. (2003) state that the collapse also resulted in a major loss of confidence in auditing. Therefore, many new regulations have been set up to protect the audit product even more (e.g. SOX⁹).

The EC (2002) concluded that the collapse would not result in a dominant position, since Deloitte&Touche (who took over most of the clients) was one of the smallest of the B5. Feldman (2006) claims that the demise had the same effect as in the hypothesis the Andersen's share was acquired by the other top firms.

B4: Present market structure

Today most countries have a loose oligopolistic audit market in which no firm explicitly dominates the others. (The UK is a tight oligopoly (Abidin et al., 2006); Germany is an oligopoly with duopolistic structures and in some industries a quasi monopoly (Bigus & Zimmermann, 2007).)

Beattie et al. (2003) report no harmful competition level (in the UK), although the concern for a possible collusion between the leading firms still exists (Abidin et al., 2006). If auditors would compete only based on audit fees, concentration would become more optimal.

From B4 to B3: Possible scenario?

Further evolution of the market can lead towards dominant firm or collective dominance. Many economists think that a shift from B4 to B3 is possible. An audit firm can voluntary leave the market, forfeit its license, or exit the market because his reputation is lost (e.g. Arthur Andersen) (Oxera, 2006).

The two latter are probably the most dangerous exits, because there is not only less auditor choice but also the public confidence in audit quality will decrease. Investors are no longer sure that the annual report of the company they want to invest in, is correct. Therefore, the remaining big audit firms cannot afford new scandals in the audit market and try to accept only low risk clients.

⁹ See footnote 1
Other evolutions we expect to occur, that however do not change according to the research of Oxera (2006), are the price - concentration relation and the position of mid-tier audit firms.

- The report agrees that price and concentration will increase further after the reduction, but not to the same extent as the last few years.
- Despite the fact that the top has declined, audit clients will not consider some mid-tiers as new top firms. They keep asking the same service and put a huge pressure on the mid-tiers. Oxera (2006) tells that the authorities would not know what to do if another top firm fell out. The best way is to prevent a B4/3 scenario to occur (Financial Reporting Council, 2006):
  - Audit choice can be expanded by stimulating big clients to go to smaller auditors and top auditors to accept small (more risky) clients.
  - Auditors must get enough resources to produce good audit quality.
  - Make a rescue plan for audit firms if needed, and assist them in following it.
  - Actions to reduce the entry barriers (high entry costs, long investment period before the auditor can work on full capacity, difficulty to get a loan for start-up, business risks when competing against the top auditors, reputation, geographical network, auditor independence rules, human and financial resources and sector expertise) (Feldman, 2006; Oxera, 2006; EC,2002, Ernst & Young / Andersen Germany; GAO, 2003)

To achieve this, regulatory bodies need to set up new regulatory framework and reform company law.

1.2.4 Findings specifically for Belgium

There are some studies which give insight in the Belgian situation, but only a small number of studies include clear numerical facts.

**Laws and rules in Belgium**

Article 64 §2 of the Company Law prescribes that companies shall take an auditor if they are obligated to set up annual accounts in full scheme.

If there was no auditing obligation, less small companies would employ an auditor. They do not see the benefit in having an auditor, but see him as an extra cost. Therefore they now choose the cheapest audit firm. This might explain why the Belgian concentration is relatively low compared to other countries (Willekens & Achmadi, 2003).

To calculate the market share, audit fees are the best measure. In Belgium, before the modifications introduced by Company Law of July 20th 2006 to article 134 of the code of Companies, companies were not obligated to publish their audit and non audit fees. As this thesis
used data published up to 2005, it had no numbers about audit fees. Therefore other (less correct) proxies are used for calculating the market share and the concentration.

**Auditor concentration**

Belgian concentration ratios are smaller than elsewhere. This might be explained by the characteristics of the Belgian audit market or by the fact that previous authors used smaller samples.

Willekens and Achmadi (2003) conclude that the Belgian audit market is not concentrated (in 1989 and 1997), but that concentration has increased.


Weets (2000) reports for this merger period an increase in concentration, just like for the other researched years (1989-1995). However, the biggest increase was in 1991, with 3 mergers on Belgian level\(^{10}\). She remarks that nonetheless, the impact of the mid-tiers should not be neglected. (Particularly in 1989 and 1990, the mid-tiers had a significant influence on the market.)

The Belgian concentration is influenced by the ‘economic characteristics of the underlying buying market’ (Schaen & Maijoor, 1997, p152): client industry concentration and capital market activity.

- In industries with almost exclusively large companies, nearly all clients in that sector will employ a top auditor because of its geographical network, its high audit quality and because small auditors have to refuse such clients (due to the strong regulations).
- Sectors with high capital market activity will have high supplier concentration because listed clients need specialized auditors and therefore rely on the service of the leading audit firms. They are also the client group which is capable of paying the expensive fees the big auditors apply.

The influence of the last factor is less important than that of the first factor, since the Belgian capital market is rather limited.

\(^{10}\) Appendix C. History of the Belgian audit market
**Belgian market structure**

A history of the Belgian audit market structure is given in appendix C. The evolution in the market is not only influenced by the collapses and mergers at the top. The changes in the mid-tiers have also imparted in the present market structure.

Schaen and Maijoor (1997) report in their research a loose oligopolistic market structure for most industries and tight oligopoly for gas, electricity, steam and water (NACE 16) and sea transport and coasting shipping (NACE 74).

Willekens and Achmadi, 2003 emphasize that the Belgian market is highly regulated and therefore less competitive is than e.g. the Dutch market.
2 Hypotheses

1. It appears from previous studies worldwide that the audit market concentration increased to a quite high concentration level today. This thesis will investigate if concentration in Belgium follows the same pattern in time and if the present concentration level is indeed high.  
*What is the present level of concentration on the Belgian audit market and is there a pattern in time?*

2. Besides checking the time trend, it is also relevant to compare the Belgian auditor concentration with cross-country results. Of some national markets, it is known that concentration has always been higher than in other countries. If foreign concentration levels are compared with the Belgian levels, it can be discovered if Belgium is naturally highly concentrated.  
*Is there a relation between the Belgian audit seller concentration and other (national) audit markets?*

3. All other countries report that the present size of auditor concentration has led to an oligopolistic audit market. Since market structure has a big impact on clients and small entering suppliers, it is interesting to verify the Belgian audit market structure. Also the position of the market leader is important. Maybe his place in the market has not always been that strong and is again threatened by other auditors. The collapse may have had an important impact on his position.  
*What is the market structure, in view of the level of audit concentration in Belgium, and who is/are the market leader(s)?*

4. Some authors (e.g. Bigus & Zimmermann, 2007) focus on industry concentration. It seems that B4 and non-B4 audit firms are more than ever specialised in certain industries in order to serve their clients even better. With a division of the Belgian audit market in 17 sectors, this thesis will examine if audit firms are specialized in certain industries.  
*Are audit firms specialized in certain client industries?*
5. Since the mega mergers of 1989, previous studies found that concentration deviates from the usual pattern each time the market structure changes. It may be assumed that in Belgium too, joiners, switchers and leavers influence the evolution in audit concentration. For this study, the collapse of Arthur Andersen and its consequences was researched. 

*Does the collapse of Andersen has influence on the (change in) audit concentration?*

6. Schaen & Maijoor (1997) already found that the Industrial Organization Theory is not a correct explanation for the high concentration in Belgium. The question is now, twenty years later, what the causes and consequences of concentration are. 

*What are the (plausible) causes and consequences of concentration?*
3 Research methodology

As a starting point for testing the hypotheses, we need to concretize the audit concentration. The research methodology and data are chosen in a way that they have a maximal contribution to the representativeness of the concentration outcome. To compensate the lack of audit fees, multiple variables and measures are used, which – each in their own way - describe concentration.

Enlightenment about the used proxies is given in the first part. The second subchapter explains the formulas, the bounds and the other calculation methods.

3.1 Variables

In concentration formulas, the market share of the audit firms (independent variable) is needed to measure the audit supplier concentration (dependent variable).

3.1.1 Dependent variable: audit supplier concentration

Audit supplier concentration\(^{11}\) determines the degree of monopolistic market power. It indicates the percentage of economical activity controlled by the biggest audit firms, ranked in order of market shares (Chakravarty, 1995; Tomczyk & Read, 1989).

Audit supplier concentration can be measured by the concentration ratio \(C_n\) and Herfindahl index (HI). Three recent papers\(^{12}\) used a new concentration measure, the Gini coefficient\(^{13}\) and the accessory Lorenz-curve. Still, sufficient useful comparative material is unavailable.

Therefore, this thesis will focus on the \(C_n\) and HI (more information in 4.2).

3.1.2 Independent variable: combined audit supplier market share

The two concentration formulas only require one independent variable: the market shares of the audit firms. According to all authors, the best way to determine the market share is taking the amount of audit fees paid by the audit client. The more audit fees an audit firm receives, the bigger the audit supplier. In Belgium, this information was not available until 2006\(^ {14}\). Therefore, four proxies for audit fees have been selected: number of auditors, number of clients, clients’ sales, square root clients’ sales.

---

\(^{11}\) More information about concentration: see 1.2.2 Market share and concentration (definition)

\(^{12}\) Quick & Wolz, 1999; Abidin et al., 2006; Bigus & Zimmermann, 2007

\(^{13}\) Appendix D. Gini coefficient as concentration measure

\(^{14}\) The research period of this study ends with data of 2005.
The choice and calculation of proxies were based on the available data (official IBR list and Belfirst database) and on the level of representativeness they have according to previous authors. Those four measures were also necessary in order to compare our results across time and countries in other studies, where they are the most frequently used surrogates.

**Number of auditors**

The number of auditors in an audit firm is considered to be number of audit employees and auditor partners. According to Buijink, Maijoor and Meuwissen (1998), it is a valuable proxy since it is a direct measure of the audit firm size. First of all, the employment of auditors makes an audit firm a player in the audit market. Secondly, it is directly linked with the audit fee income, earned in a labour intensive audit market.

Weets (2000) observes that the dominance of the big offices may be underestimated. Using this measure, there is the assumption that for every auditor, the same amount of audit fee is required. In reality, it seems that big clients pay higher fees. And mostly, big clients tend to go to big audit firms.

**Number of clients**

Number of clients was taken because it is, together with the number of auditors, the only proxy for which there were no missing data. Beattie and Fearnley (1994) consider it to be a better proxy than clients’ sales and clients’ assets.

Again, the surrogate is probably underestimating the concentration level, because large clients generally choose a large audit supplier (Moizer & Turley, 1987).

**Clients’ sales**

Clients’ sales was necessary as a measure for market share, because it is the most used proxy in other studies and therefore essential in comparing the results.

This surrogate normally overestimates the domination of large audit firms (Tomczyk & Read, 1989; Danos & Eichenseher, 1981; Weets, 2000).

**Square root clients’ sales**

The overestimating problem of clients’ sales (and other proxies that measure the auditor size only indirectly) can be diminished by taking the square root clients’ sales. The problem of non-squared client size measures is that the relation between that measure and the audit fees is non-linear (Simunic,1979). The square reduces the upwards bias of the large clients (Tomczyk &
Read, 1989). Schaan and Maijoor (1997) report that taking the square root even has an opposite effect and causes underestimation of the real audit fee. It seems however that the underestimation is not significant.

After all, no market share measure is better than audit fees itself. By using the proxies, the Belgian concentration results of this study are probably overestimated, especially the market share of the B4. Yet, the upward bias effect is minimal as the whole population is taken instead of a sample. Moreover, the last two proxies are, according to Bigus and Zimmermann (2007), the best surrogates for audit fees since the correlation for those two measures with audit fees is the highest: 0.995 between square root clients’ sales and audit fees and 0.979 between non-squared clients’ sales and audit fees.

The square root of the clients’ sales has been used when measuring the auditor market share in the listed segment.

Other possible measures for market share are mentioned in appendix E.

### 3.2 Methods for audit market analysis

#### 3.2.1 Market concentration

To measure concentration, the concentration ratio ($C_n$) and the Herfindahl index (HI) are used to like in all previous studies.

**Concentration ratio ($C_n$)**

The $C_n$ measures the auditor concentration in terms of market share by the $n$ largest audit firms (Pong, 1999). It can be calculated for the four, six, eight, twenty,… largest audit suppliers.

$$
C_n = \sum_{i=1}^{n} \frac{S_i}{\sum_{i=1}^{k} S_i}
$$

- $n = \text{number of largest audit firms}$
- $k = \text{total number of audit firms in the market}$
- $S_i = \text{size of audit firm } i \text{ measured by (square root) clients’ sales, number of auditors, number of clients}$

This concentration measure is very popular, for it is easy to calculate and to understand.
On the other hand, this ratio only indicates the part of the market which is dominated by the few giant audit firms, and not the size of the entry barriers, the concentration on the demand side, the product differentiation,…

The concentration ratio varies between 0 and 1. The higher the outcome, the greater market share those leading firms have. (e.g. $C_4 = 20\%$ means that the four leading audit firms audit together 20% of all audit clients.)

Stefani (2006) has set up some bounds for interpreting the $C_n$ outcome:

<table>
<thead>
<tr>
<th>$C_4$</th>
<th>$C_8$</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 – 100 %</td>
<td>90 – 100 %</td>
<td>Very high market concentration</td>
</tr>
<tr>
<td>65 – 75 %</td>
<td>85 - 90 %</td>
<td>High market concentration</td>
</tr>
<tr>
<td>50 – 65 %</td>
<td>70 - 85 %</td>
<td>Medium market concentration</td>
</tr>
<tr>
<td>35 – 50 %</td>
<td>45 - 70 %</td>
<td>Little to medium market concentration</td>
</tr>
</tbody>
</table>

**Herfindahl index (HI)**

$$HI = \frac{\sum_i S_i^2}{\left(\sum_i S_i\right)^2}$$

$k = \text{total number of audit firms in the market}$

$S_i = \text{size of audit firm i measured by (square root) clients’ sales, number of auditors, number of clients}$

The theoretical advantage of calculating with the HI is that this measure is ‘sensitive to the number of audit firms active as well as to the variance in activity level across audit firms’ (Danos & Eichenseher, 1981, pp482). The concentration ratio only measures with the market shares of the n largest audit firms and the ratio does not correctly represent the relative market share of the leading suppliers. By squaring in HI, the importance of the small audit firm is reduced and the contribution of the leading firms to the HI increases (Choi & Zeghal, 1999).

The upper and lower bounds of the HI are 0 and 1. The outcome is 0 when multiple audit firms of equal size are active in the market, and is 1 when only one audit firm dominates the market. HI is rising as the number of variations in firm size increases and as the number of audit firm decreases.

According to Abidin et al. (2006), an increasing HI level presumes a possible decrease in competition.
Stefani, 2006; Department of Justice and the Federal Trade Commission; GAO report (2003); Matthes, Poetzsch and Grashoff, 2005; Oxera, 2006:

<table>
<thead>
<tr>
<th>HI</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 – 100 %</td>
<td>High market concentration</td>
</tr>
<tr>
<td>10 – 18 %</td>
<td>Medium market concentration</td>
</tr>
<tr>
<td>&lt; 10 %</td>
<td>Low to unconcentrated market</td>
</tr>
</tbody>
</table>

**Remarks**

Although most studies agree with the set up bounds, some authors say that interpreting a number is subjective and that it is therefore difficult to say when concentration is high.

Many studies have found that normally the choice of concentration statistic does not affect the interpretation of the auditor concentration number. Danos and Eichenseher (1981) found a correlation of 0.89 when they tested the effect of the choice across 54 industries.

This thesis researches the concentration level of the whole client population audited by over 200 audit firms. For the calculation of HI, the individual market share of all audit firms is needed and it was therefore impossible to use this statistic in measuring the overall and industry concentration.

In the segment of listed companies, less auditors are active. When calculating the supplier concentration in this client group, the H-index could be used. Using the results of this statistic, the DIFF is calculated. This variable expresses the level of auditor concentration which is not influenced by the underlying level of client concentration:

\[
\text{DIFF} = \text{actual level of auditor concentration measured by HI} - \text{Min HI}
\]

\[
\text{Min HI} = \frac{\Sigma \left( \sum \sqrt{Sal_i} \right)^2}{n}
\]

\[\text{with } Min \text{ HI } = \frac{\Sigma \text{ Sal}_i}{n} \text{ (level of auditor concentration that is completely determined by the level of the underlying client concentration)}\]

\[\text{Sal}_i = \text{size of client i measured by (square root) clients’ sales}\]
3.2.2 Auditor market leader

The audit market leader is the auditor with the largest market share. He can be easily found by measuring the $C_1$. This formula shows movements in the top position and indicates the degree of specialism of the leader at industry level. According to Matthes, Poetzsch and Grashoff (2005), an auditor dominates the market when $C_1$ is higher than 33.3%.

3.2.3 Auditor specialisation

The overall market leader may differ from the market leader in the industries. B4 and non-B4 are specializing in sectors for the purpose of offering better audit services for the clients. Some authors have set bounds to identify ‘specialism’.

Craswell et al. (1995) consider an auditor with more than 30 clients in one single industry a specialist. Pong (1999) used two thresholds (> 10% market share and > 30% market share) and advises to look if there is a big difference between them. Beattie et al. (2003) set the border on 15%.
4 Data

4.1 Period of research
This thesis wants to analyse the effect of recent events in the audit market. Because the Belfirst database provides auditor information only for the years following the PwC merger (July 1998), the years 1999, 2001, 2003 and 2005 are analysed.

The years 1999 and 2001 show the audit market before the collapse of Andersen (August 2002). The year 2002 was not reliable to research the demise of Andersen because the effect of a collapse on concentration is not immediately reflected in the market. Instead, the years 2003 and 2005 were taken to continue the timeline.

4.2 Population

Table 1. Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2005</th>
<th>change 01-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of auditors¹⁵</td>
<td>990</td>
<td>973</td>
<td>989</td>
<td></td>
<td></td>
<td>-1</td>
</tr>
<tr>
<td>Number of audit firms¹⁶</td>
<td>245</td>
<td>246</td>
<td>277</td>
<td></td>
<td></td>
<td>+32</td>
</tr>
<tr>
<td>1 person audit firms</td>
<td>154</td>
<td>157</td>
<td>190</td>
<td></td>
<td></td>
<td>+36</td>
</tr>
<tr>
<td>Number of clients (population)</td>
<td>19,184</td>
<td></td>
<td>23,802</td>
<td></td>
<td></td>
<td>+4618</td>
</tr>
<tr>
<td>Listed</td>
<td>143</td>
<td></td>
<td>161</td>
<td></td>
<td></td>
<td>+18</td>
</tr>
<tr>
<td>Non-listed</td>
<td>19,041</td>
<td></td>
<td>23,641</td>
<td></td>
<td></td>
<td>+4,600</td>
</tr>
<tr>
<td>Turnover clients (th. €)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>25,303</td>
<td>30,703</td>
<td>30,449</td>
<td>38,151</td>
<td></td>
<td>+7,448</td>
</tr>
<tr>
<td>Median</td>
<td>5,782</td>
<td>6,325</td>
<td>6,208</td>
<td>6,767</td>
<td></td>
<td>+411</td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Maximum</td>
<td>8,050,051</td>
<td>13,900,216</td>
<td>12,892,509</td>
<td>20,827,868</td>
<td>+6,927,652</td>
<td></td>
</tr>
<tr>
<td>Number of sales missing</td>
<td>5,729</td>
<td>7,722</td>
<td>9,423</td>
<td>9,886</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total assets clients (th. €)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>35,730</td>
<td>55,406</td>
<td>32,417</td>
<td>55,209</td>
<td>-197</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>3,624</td>
<td>4,140</td>
<td>3,464</td>
<td>4,189</td>
<td>+49</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>18,631,355</td>
<td>21,907,401</td>
<td>18,631,355</td>
<td>41,362,313</td>
<td>+19,454,912</td>
<td></td>
</tr>
</tbody>
</table>

¹⁵ Based on official IBR memberlist of 2001, 2002 and 2005
Market share and concentration depend on the sample size. As the sample increases, the concentration level decreases, because a larger number of small audit clients are taken in account, who generally choose for a non-B4. (Pong, 1999; Bigus & Zimmermann, 2007). Therefore, in this research, the whole population is taken.

4.3 Data collection method

Two kinds of databases were used in order to obtain correct information: the official IBR lists of 2001, 2002 and 2005 and the Belfirst databases of September 2002 and September 2007.

Official IBR lists

Concentration can be measured by number of auditors. The official IBR membership list shows the associates and directors of each audit firm. When calculating the number of auditors, all associates and directors were taken into account. Some of these auditors in an audit firm are a legal body itself. In this case, the associates and directors of this ‘linked’ legal body were calculated in the big ‘head’ audit firm. If many firms were linked, the name of the ‘head’ firm was chosen based on having the largest number of auditors of all the linked companies separately or based on the official name on the IBR website. After having grouped some audit firms under one general name, the linked audit firm(s) was(were) neglected in further calculations.

Number of auditors is also the basis to distinguish three groups\footnote{Appendix F. Final audit firm name of audit firms grouped together}: B4 (or B5), mid-tier audit firms (firm with five or more auditors) and small audit firms (less than five auditors). There was no clear natural boarder line between the mid-tier and small firms, but finally the number of five auditors was chosen, because from that number of auditors on, an audit firm becomes quite important on a small market like Belgium.

The total number of auditors is the number of natural persons given on top of the list.

The information of this database is sure to be correct and complete.

The counting was done with three lists for the three years 2001, 2002 and 2005.

Belfirst

The Belfirst database provides some exclusive (non-)financial information about audit clients and their audit firms. The following useful variables were exported to excel for calculation:

\footnote{Appendix G. Number of auditors per audit firm}
- The auditor database: number of auditors, auditor firm name, BvD ID number, postal code, date of incorporation, status, merger date, merger event, linked company, Turnover 1999, Turnover 2001, Turnover 2003, Turnover 2005, Total assets 1999, Total assets 2001, Total assets 2003, Total assets 2005


Audit fees is an important concentration variable that is not available in the Belfirst. For some clients, more than one auditor was given. Taking a sample\textsuperscript{19}, it was confirmed that the first auditor mentioned, is the most important one for the client. Therefore, in calculating, only the first auditor was taken because working in shares of partnership would be too complicated.

Because in the client file of the cd-rom, only the auditor(s) of the last year is(are) given, information had to be taken from two Belfirst versions in order to verify the effect of Andersen. In the 2002 cd-rom, the clients’ auditor mentioned is for the year 2001. This means that PwC has already merged (1998) and that Andersen still exists (collapse in 2002). Using these data, the concentration of 1999 and 2001 could be calculated.

In the cd-rom of 2007, the mentioned auditor is the one for the year 2005. Andersen was deleted due to its collapse in 2002. Here, information of 2003 and 2005 was taken to analyse the impact of Andersen's demise, and to find the present concentration.

For 1999 (resp. 2003) is was assumed that the clients had the same auditor as in 2001 (resp. 2005).

The impact of the PwC merger (1998) could not be estimated because Belfirst versions prior to this event did not yet gather information about the auditors.

Besides the fact that the Belfirst gathers a lot of valuable information, the exportation to excel had to be done four times before all information was fully loaded to excel. The previous times, around 2000 of the 23.800 companies were missing.

As mentioned in the previous subchapter, some turnovers for some clients are missing. In the client file, the column with the auditor name had to be corrected. Sometimes the audit firm name was given (e.g. PwC), sometimes the name of the auditor within that audit firm (e.g.

\textsuperscript{19} Appendix H. Sample first auditor
‘Lieven Adams’ who works for PwC). Therefore, of the twentieth largest audit firms (based on number of auditors), the names of the audit firm members were looked up and substituted by the audit firm name. For the 2002 Belfirst version (Andersen present), the official IBR-list of 2001 (Andersen present) was used to search the corresponding names of the audit firm- members. For the 2007 version, the 2005 list was used (Andersen absent). The decision as to which auditor member names had to be substituted by their audit firm name was taken in the same way as for the calculation of the number of auditors. For the auditor members with the same last name (and first name), the postal code of that auditor member and the audit firm were compared in order to avoid that those auditors were induly allocated to a big or middle audit firm.

During this procedure, it was noticed that auditors with the same last names were sometimes mixed up and that some names are not correctly written, which makes the correction process even more difficult.

Due to these shortcomings, the finally used Belfirst database is probably not 100% correct, although efforts have been made to have it as correct as possible.

To make a timeline of Belgian concentration and to compare with other countries, concentration outcome of other authors was used.

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20 See 4.3 Data collection method (Official IBR list)
5 Empirical results

5.1 Auditor market share

5.1.1 Overall auditor market share

The market share of the audit firm will be measured by three proxies: number of clients, number of auditors and clients’ sales. Because the numerical outcomes of the proxies differ so much, the results for each them will be discussed separately and will not be compared. Only outcomes within the same single proxy may be compared in order to get correct and representative conclusions.

For all proxy-calculations, we consider three big auditor groups: B5/4, mid-tier (audit firms with five or more auditors) and the small audit firms.

A. By number of audit clients

- The Belfirst cd-rom of the time before the PwC merger did not contain auditor information, so market shares could not be counted for this period. Weets\textsuperscript{21} (1999) reports that in the B6-years, one third of the audit clients employed a Big 6, one third another audit firm and one third an auditor that was not affiliated with other auditors.

- Since 2001 (three years after the merger), the clients are no longer equally divided between those three auditor groups (table 2). The B5 audited more than one third and kept that market share fairly stable for the following years (in 2001 B5: 41.79% and in 2005 B4: 40.73%). The small difference in B4 market share (-1.06%) went to the non-B4. Their market share also remained stable. It is remarkable that between the two non-B4 groups (small and mid-tier) a major shift occurred. In these four years the small audit firms lost 8.35%. The mid-tiers made the best progress in owning shares. They doubled their number of clients in those four years (from 14.43% to 23.84%).

\textsuperscript{21} Weets V., 1999, Who will be the new auditor?, Working paper, University of Ghent
Table 2. Market share ranking by number of clients

<table>
<thead>
<tr>
<th>Audit firm</th>
<th>2001 Absolute</th>
<th>2001 Relative</th>
<th>2005 Absolute</th>
<th>2005 Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4/5</td>
<td>8,017</td>
<td>41.79 %</td>
<td>9,694</td>
<td>40.73 %</td>
</tr>
<tr>
<td>Ernst &amp; Young</td>
<td>1,950</td>
<td>10.16 %</td>
<td>2,798</td>
<td>11.76 %</td>
</tr>
<tr>
<td>PwC</td>
<td>1,749</td>
<td>9.12 %</td>
<td>2,208</td>
<td>9.28 %</td>
</tr>
<tr>
<td>KPMG</td>
<td>1,678</td>
<td>8.75 %</td>
<td>2,123</td>
<td>8.92 %</td>
</tr>
<tr>
<td>Deloitte</td>
<td>1,652</td>
<td>8.61 %</td>
<td>2,565</td>
<td>10.78 %</td>
</tr>
<tr>
<td>Arthur Andersen</td>
<td>988</td>
<td>5.15 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mid-tier</td>
<td>2,769</td>
<td>14.43 %</td>
<td>5,675</td>
<td>23.84 %</td>
</tr>
<tr>
<td>BDO</td>
<td>442</td>
<td>2.30 %</td>
<td>859</td>
<td>3.61 %</td>
</tr>
<tr>
<td>DDC</td>
<td>327</td>
<td>1.70 %</td>
<td>243</td>
<td>1.02 %</td>
</tr>
<tr>
<td>Grant Thornton, Lippens, Rabaey &amp; Co</td>
<td>318</td>
<td>1.66 %</td>
<td>449</td>
<td>1.89 %</td>
</tr>
<tr>
<td>Dupont, Ghyoot, Koevoets, Peeters, Rosier &amp; Co</td>
<td>296</td>
<td>1.54 %</td>
<td>356</td>
<td>1.50 %</td>
</tr>
<tr>
<td>Hermant, Dodemont &amp; Co</td>
<td>239</td>
<td>1.25 %</td>
<td>301</td>
<td>1.26 %</td>
</tr>
<tr>
<td>Callens, Guevar, Van Impe &amp; Co</td>
<td>212</td>
<td>1.12 %</td>
<td>487</td>
<td>2.05 %</td>
</tr>
<tr>
<td>TCLM</td>
<td>204</td>
<td>1.06 %</td>
<td>392</td>
<td>1.647 %</td>
</tr>
<tr>
<td>Mazars &amp; Guerard</td>
<td>198</td>
<td>1.03 %</td>
<td>402</td>
<td>1.69 %</td>
</tr>
<tr>
<td>VGD, Van Geet, Derick &amp; Co²⁶</td>
<td>194</td>
<td>1.01 %</td>
<td>98</td>
<td>0.41 %</td>
</tr>
<tr>
<td>Van Havermaet</td>
<td>162</td>
<td>0.84 %</td>
<td>219</td>
<td>0.92 %</td>
</tr>
<tr>
<td>PKF, Van der Steen, Riske, De Weerdt, Lefebvre &amp; Partners²⁷</td>
<td>115</td>
<td>0.60 %</td>
<td>270</td>
<td>1.13 %</td>
</tr>
<tr>
<td>PVMD</td>
<td>62</td>
<td>0.32 %</td>
<td>77</td>
<td>0.32 %</td>
</tr>
<tr>
<td>Vander Donckt – Roobrouck – Christiaens</td>
<td>393</td>
<td>1.651 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westen, François &amp; Co</td>
<td>243</td>
<td>1.02 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delvaux, Fronville, Servais and partners</td>
<td>242</td>
<td>1.016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JWB/ Baker Tilly²⁸</td>
<td>179</td>
<td>0.75 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Wolf, Ostyn, Caluwaerts, De Ridder &amp; Co</td>
<td>163</td>
<td>0.685 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DST</td>
<td>162</td>
<td>0.681 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fallon, Chainiaux, Cludts, Garny &amp; Co</td>
<td>140</td>
<td>0.588 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All small audit firms</td>
<td>8,398</td>
<td>43.78 %</td>
<td>8,433</td>
<td>35.43 %</td>
</tr>
<tr>
<td>Total</td>
<td>19,184</td>
<td>100 %</td>
<td>23,802</td>
<td>100 %</td>
</tr>
</tbody>
</table>

²² Blanco firm numbers mean that those audit firms where in that period counted within the small firms
²³ Authors of Arthur Andersen were after the collapse in 2002 taken over by Deloitte & Touche and got the new name ‘Deloitte & Partners’. Today, Deloitte & Touche and Deloitte & Partners are called ‘Deloitte’
²⁴ According to the IBR-list of 2001 and 2002, DDC and Delvaux, Fronville, Servais and partners were associated. In 2005, they are not linked anymore.
²⁶ Van Geet, Derick & Co got in 2005 the new name: VGD
²⁷ PKF Van der Steen, Riske, De Weerdt, Lefebvre & Partners was in 2005 simply called PKF.
²⁸ Press 24/11/2005 (http://www.bakertillybelgium.be): New name of JWB is Baker Tilly JWB. There also exists another Baker Tilly: Baker Tilly Dorthu and those 2 are grouped together under Baker Tilly
Possible explanation of market share evolution

- The reason the market share of the mid-tier increased that much is probably due to the way small and mid-tier audit firms were classified (five auditors limit). Between 2001 and 2005, some small audit firms expanded their auditors' staff by taking (an) extra auditor(s) or by forming an alliance with another audit firm. In this thesis, this caused a reclassification of that small audit firm to a mid-tier auditor. Due to the fact that there were more mid-tiers in 2005, it is logical that their market share increased at the expense of the small auditors. Without the new mid-tiers, the market share of this auditor group would have increased with only 3.02% (from 14.43% to 17.45%)

- It is possible that, in reality, the market shares of the B4 and non-B4 differ from the calculations above. In some cases, big audit firms pass their clients on to a mid-tier or even small firm for fulfilling the audit mandate. This leaves space for the B4 to provide the client with other services which are more important for that client and incompatible with the mandate (e.g. assistance in future take-overs, due diligence,…). In this case, the mandate is not performed by the B4 office, but they still are B4 clients. It is not clear in what way the Belfirst database took this into account.

Auditor market leader

In both years, Ernst & Young was the market leader. They took respectively 10.16% of the clients (2001) and 11.76% (2005). This means that they increased their number of clients from 2001 with 43%, which is more than what the average B4 was able to do (21%). Despite the fact that Ernst & Young is the market leader, Deloitte has the biggest increase in new clients (+55% against + 43% of Ernst & Young)

Who did the new audit clients choose for?

Between 2001 and 2005, the amount of audit clients rose with 4,618.

Possible reasons why the total amount of audit clients increased:

- Investors have more confidence in audited firms. The fact that the annual account is reviewed by an external professional gives them certainty for safe investment.
- Some Belgian companies have been growing those past years and have now reached the size where the law obligates them to have their accounts audited.
- Many businesses start to realize the advantages, irrespective of the costs. During their mandate, auditors often give accounting tips which stimulates the economical activity of that company.
- The Big (5/4) audit firms gained 1,677 extra audit clients, which increased their number of clients of 2001 by 21%. Apparently, the collapse of Andersen did not slow down the client growth in this auditor group.

- The mid-tiers raised their number of clients by 98% and the small audit firms by only 1.5%. It is difficult to compare the growth of these two non-B4 groups, because of the earlier stated reason about the reclassification of some small firms to the mid-tier group. That is why it is more useful to compare the auditor growth (by number of clients) between only two groups: B4 and non-B4. The non-B4 gained 2,941 of the new audit buyers, representing 26% extra clients compared to 2001.

- The 21% increase of the B4 compared to the 26% increase of the non-B4 leads to the conclusion that the non-B4 attracted relatively more of the new audit clients by the year 2005.

To confirm these findings, it was checked for former Andersen clients and new entering clients what new auditor they had chosen. After 2002, 988 Andersen clients and 4,618 new clients searched a suitable auditor. Of those 5,606 clients, only 1,677 (29.9%) went to the B4. This illustrates that the non-B4 is considered as more attractive. This could be explained by the loss of confidence in the big audit firms after the collapse of Andersen.

It has to be noticed that the increase in audit clients per auditor group (big, mid, small) is not necessarily caused by new clients using an auditor for the first time. The increase of client number per auditor group is determined by companies which enter the audit market for the first time and by clients switching between auditor groups.

A second remark is that the client numbers are the balance of clients exiting and entering the market.

Take-overs or mergers also influenced the total number of clients in the Belfirst.

**What about the former Andersen clients?**

It was not easy to find out where the Andersen clients went to immediately after the collapse (2002). Because of the problems with the data conversion of 2002, the year 2005 was checked (see figure 1). In the 2005 database, only 551 of the original 988 Andersen clients were still registered in the list (remaining 437 former Andersen clients not anymore in the 2005 Belfirst). Of those 551 Andersen clients, 50% went to Deloitte. 8.6% went to a non-B4.

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29 B5/4: 21% = 1677 new clients / 8017 clients in 2001
This result is similar to the situation in the UK, where former clients switched immediately after the collapse to Deloitte (Abidin et al., 2006).

![Figure 1. Auditor of former Andersen clients in 2005](image)

**B. By number of auditors**

Not only clients can switch audit firms; also the associates and partners of the audit firm may switch employer. The composition of some individual firms changed during 2001, 2002, 2005. The official IBR lists of those three years were used to allocate the auditors to the correct audit firm. A lot of attention has been given to making a final list which gives an overview of the (temporary/definitive) partnerships between audit offices (appendix F).

After contact with Prof. Dr. V. Weets, it seemed that the preparation of the auditor data was done in the same way. This means that the results of this thesis may be compared with that study.

In the following paragraphs, ‘audit firms’ must be considered as the audit firms as a legal corporation, while the ‘auditor’ must be seen as an auditor member (being an audit director or partner in the audit firm).

- According to Weets (2000), the number of auditors has increased during 1989-1995. One third of the auditors worked in a B6 (Weets, 2000).

- Between 2001 and 2005, the total number of auditors remained stable (table 3). In 2002, after the collapse of Andersen, the number of auditors decreased in the B4 and the small firms, yet increased in the mid-tier. This seems to be a result of the damaged reputation of the B4 after the collapse. An increasing number of auditors preferred to work for the mid-tiers, believing that a major amount of clients will choose those audit firms. After the scandal, the trend continued in 2005. The number of auditors in the B4 still decreased to the advantage of the non-B4. Besides PwC, all B4 audit firms had less auditors. This shifting is probably due to the fact that some B4

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30 See 4.3 Data collection method (Official IBR lists)
auditors were headhunted by the mid-tier for their expertise. Moreover, auditors dreaming of a top position in an audit firm had more chances within a non-B4.

When looking closer at the market share, the mid-tier gained more market share in the whole period (2001-2002: +2.66%; 2002-2005:+3.27%). The B4 market share only varied between 2002 and 2005 (-2.48%).

Table 3. Market share ranking by number of auditors

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Big 4/5</td>
<td>219</td>
<td>22.12%</td>
<td>211</td>
<td>21.69%</td>
<td>190</td>
<td>19.21%</td>
</tr>
<tr>
<td>Deloitte</td>
<td>61</td>
<td>6.16%</td>
<td>79</td>
<td>8.12%</td>
<td>63</td>
<td>6.37%</td>
</tr>
<tr>
<td>PwC</td>
<td>57</td>
<td>5.76%</td>
<td>53</td>
<td>5.45%</td>
<td>58</td>
<td>5.86%</td>
</tr>
<tr>
<td>Ernst &amp; Young</td>
<td>44</td>
<td>4.44%</td>
<td>45</td>
<td>4.62%</td>
<td>37</td>
<td>3.74%</td>
</tr>
<tr>
<td>KPMG</td>
<td>37</td>
<td>3.74%</td>
<td>34</td>
<td>3.49%</td>
<td>32</td>
<td>3.24%</td>
</tr>
<tr>
<td>Arthur Andersen</td>
<td>20</td>
<td>2.02%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mid-tier</td>
<td>111</td>
<td>11.21%</td>
<td>135</td>
<td>13.87%</td>
<td>174</td>
<td>17.59%</td>
</tr>
<tr>
<td>BDO</td>
<td>17</td>
<td>1.72%</td>
<td>18</td>
<td>1.85%</td>
<td>22</td>
<td>2.22%</td>
</tr>
<tr>
<td>DDC</td>
<td>14</td>
<td>1.41%</td>
<td>14</td>
<td>1.44%</td>
<td>8</td>
<td>0.81%</td>
</tr>
<tr>
<td>Callens, Guevar, Van Impe &amp; Co</td>
<td>12</td>
<td>1.21%</td>
<td>15</td>
<td>1.54%</td>
<td>22</td>
<td>2.22%</td>
</tr>
<tr>
<td>Dupont, Ghyoot, Koevoets, Peeters, Rosier &amp; Co</td>
<td>12</td>
<td>1.21%</td>
<td>11</td>
<td>1.13%</td>
<td>12</td>
<td>1.21%</td>
</tr>
<tr>
<td>TCLM</td>
<td>11</td>
<td>1.11%</td>
<td>12</td>
<td>1.23%</td>
<td>15</td>
<td>1.52%</td>
</tr>
<tr>
<td>PKF, Van der Steen, Riske, De Weerdt, Lefebvre &amp; Partners</td>
<td>8</td>
<td>0.81%</td>
<td>11</td>
<td>1.13%</td>
<td>10</td>
<td>1.01%</td>
</tr>
<tr>
<td>Mazars &amp; Guerard</td>
<td>8</td>
<td>0.81%</td>
<td>8</td>
<td>0.82%</td>
<td>9</td>
<td>0.91%</td>
</tr>
<tr>
<td>Hermant, Dodemont &amp; Co</td>
<td>7</td>
<td>0.71%</td>
<td>7</td>
<td>0.72%</td>
<td>8</td>
<td>0.81%</td>
</tr>
<tr>
<td>VGD Van Geet, Derick &amp; Co</td>
<td>6</td>
<td>0.61%</td>
<td>6</td>
<td>0.62%</td>
<td>7</td>
<td>0.71%</td>
</tr>
<tr>
<td>PVMD</td>
<td>6</td>
<td>0.61%</td>
<td>6</td>
<td>0.62%</td>
<td>6</td>
<td>0.61%</td>
</tr>
<tr>
<td>Van Havermaet</td>
<td>5</td>
<td>0.51%</td>
<td>5</td>
<td>0.51%</td>
<td>6</td>
<td>0.61%</td>
</tr>
<tr>
<td>Grant Thornton, Lippens, Rabaey &amp; Co</td>
<td>5</td>
<td>0.51%</td>
<td>5</td>
<td>0.51%</td>
<td>5</td>
<td>0.51%</td>
</tr>
<tr>
<td>DST</td>
<td>6</td>
<td>0.62%</td>
<td>5</td>
<td>0.51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JWB/ Baker Tilly</td>
<td>6</td>
<td>0.62%</td>
<td>9</td>
<td>0.91%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fallon, Chainiaux, Cludts, Garny &amp; Co</td>
<td>5</td>
<td>0.51%</td>
<td>5</td>
<td>0.51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Wolf, Ostyn, Caluwaerts, De Ridder &amp; Co</td>
<td>8</td>
<td>0.81%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delvaux, Fronville, Servais and partners</td>
<td>7</td>
<td>0.71%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westen, François &amp; Co</td>
<td>5</td>
<td>0.51%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vander Donckt – Roobrouck – Christiaens</td>
<td>5</td>
<td>0.51%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All small audit firms</td>
<td>660</td>
<td>66.67%</td>
<td>627</td>
<td>64.44%</td>
<td>625</td>
<td>63.20%</td>
</tr>
<tr>
<td>Total</td>
<td>990</td>
<td>100%</td>
<td>973</td>
<td>100%</td>
<td>989</td>
<td>100%</td>
</tr>
</tbody>
</table>

32 Same footnote remarks as for table 2.
What about the former Andersen auditors?
The collapse of Andersen in 2002 had no effect on the evolution in the B4 when measured by number of auditors. All its former auditors went to Deloitte. A new division ‘Deloitte & Partners’ was created with all the 20 former Andersen auditors. In 2005, Deloitte & Touche and Deloitte & Partners fused under the new name ‘Deloitte’. Therefore, the collapse of Andersen has a similar effect as if the audit firm had been taken over.

In 2002, Deloitte increased its number of auditors only due to the incorporation of the Andersen auditors. However, the market share of Deloitte in 2002 is smaller than the aggregated market shares form Deloitte and Andersen in 2001.

It was remarkable that in 2005 Deloitte lost a lot of auditors.

Audit market leader
Deloitte remained the market leader during all the years. However, its position is threatened by PwC, the only B4 to grow after 2002.

C. By clients’ sales
This market share measure is the most commonly used measure in other studies. Since only results from the same proxy can be compared, it was necessary to calculate market share by clients’ sales. The data in this thesis have, however, a lot of missing clients’ sales, which could question the correctness of the numerical results. There is no explanation why some sales are missing, as they seem to be missing by ad random basis. As for every B4 audit firm the same percentage of data were missing (2001: 38% and 2005: 36%), we assumed that this would give no distorted image of the evolution of the market share by clients’ sales.

For 1999 (resp. 2003) it was assumed that clients had the same auditor as in 2001 (resp. 2005).

The total clients’ sales have grown during the six years (see table 3). Two possible reasons:
- More audit clients have entered (19,184 in 2001 to 23,802 in 2005)
- Existing audit clients have grown.
  - For the B4 clients, one third decreased in turnover between 2003-2005 and two thirds increased. The net change clients’ sales (2003-2005) was positive for every B4.
  - For the clients of the total audit market, a mean client turnover was measured, which

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33 See appendix I. Sample missing clients’ sales
34 See table 1. Descriptive statistics
grows in time, except from 2001 to 2003 (from 30,703 th. € to 30,449 th. €). The decline between those years is probably due to a different amount of missing sales. The observed trend in the clients’ sales is probably underestimated due to the missing turnovers. If all clients’ sales had been available, the increase would have been even more significant.

Between 1999 and 2005, the overall market share increased for the B4 (+3.2%) and mid-tier (+4.5%), but decreased for the small audit firms (-7.7%). It is remarkable that between the years 2001 and 2003, there is a big shift of market shares within the non-B4. The mid-tier increased with 4.9% at the expense of the small auditors (-5.6%). Again, this shows the growing trust in the mid-tiers after the collapse of Andersen and the reclassification of the mid-tiers.

Between 1999 and 2001 and between 2003 and 2005, the market share for all three auditor groups has remained fairly stable.

**Auditor market leader**

After the collapse of Andersen, the market leader changed. Until 2003, PwC was the top auditor. Despite its continuing growth, KPMG chased PwC from the first place after a huge rise of 6%.

**Big clients go to big auditors**

An analysis is made of the size of B4 clients (table 4). The range in size of B4 clients is large (min-max). The B4 and the overall market have nearly the same median. The B4 mean however, is nearly the double of the mean of the market and around 14% of the B4 audit clients have their sales above this B4 mean, indicating that big auditors have the biggest clients of the market. That big clients go to big auditors was tested in a second way for two B4’s. For Deloitte, new clients in 2005 were growing clients coming from a non-B4. KPMG had a larger amount of new clients coming from B4 and non-B4. The former non-B4 clients were again growing clients.

<table>
<thead>
<tr>
<th>Auditor</th>
<th>Median Clients’ sales</th>
<th>Mean Clients’ sales</th>
<th>Minimum Clients’ sales</th>
<th>Maximum Clients’ sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4</td>
<td>6,945</td>
<td>61,678</td>
<td>0</td>
<td>20,827,868</td>
</tr>
<tr>
<td>KPMG</td>
<td>7,918</td>
<td>78,287</td>
<td>0</td>
<td>17,326,772</td>
</tr>
<tr>
<td>PwC</td>
<td>7,576</td>
<td>73,200</td>
<td>1</td>
<td>17,572,850</td>
</tr>
<tr>
<td>Deloitte</td>
<td>7,479</td>
<td>53,327</td>
<td>3</td>
<td>8,643,627</td>
</tr>
<tr>
<td>E&amp;Y</td>
<td>5,534</td>
<td>41,899</td>
<td>1</td>
<td>20,827,868</td>
</tr>
<tr>
<td>All auditors</td>
<td>6,767</td>
<td>38,151</td>
<td>0</td>
<td>20,827,868</td>
</tr>
</tbody>
</table>

Table 4. Big clients go to big auditors (2005)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Big 4/5</td>
<td>229,171,334</td>
<td>67.4%</td>
<td>240,158,513</td>
<td>68.4%</td>
<td>302,412,107</td>
<td>69.1%</td>
<td>374,338,574</td>
<td>70.6%</td>
</tr>
<tr>
<td>PwC</td>
<td>57,835,187</td>
<td>17.0%</td>
<td>64,305,503</td>
<td>18.3%</td>
<td>83,464,102</td>
<td>19.1%</td>
<td>105,553,895</td>
<td>19.9%</td>
</tr>
<tr>
<td>Deloitte</td>
<td>52,666,550</td>
<td>15.5%</td>
<td>57,599,082</td>
<td>16.4%</td>
<td>72,738,201</td>
<td>16.6%</td>
<td>84,204,112</td>
<td>15.9%</td>
</tr>
<tr>
<td>KPMG</td>
<td>45,113,290</td>
<td>13.3%</td>
<td>46,774,986</td>
<td>13.3%</td>
<td>85,296,103</td>
<td>19.5%</td>
<td>109,288,512</td>
<td>20.6%</td>
</tr>
<tr>
<td>Ernst &amp; Young</td>
<td>43,285,688</td>
<td>12.7%</td>
<td>36,423,372</td>
<td>10.4%</td>
<td>60,913,701</td>
<td>13.9%</td>
<td>75,292,055</td>
<td>14.2%</td>
</tr>
<tr>
<td>Arthur Andersen</td>
<td>30,270,619</td>
<td>8.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-tier</td>
<td>35,182,920</td>
<td>10.3%</td>
<td>36,241,609</td>
<td>10.2%</td>
<td>66,667,569</td>
<td>15.1%</td>
<td>77,327,119</td>
<td>14.8%</td>
</tr>
<tr>
<td>DDC</td>
<td>6,618,518</td>
<td>1.9%</td>
<td>7,084,133</td>
<td>2.0%</td>
<td>6,156,255</td>
<td>1.4%</td>
<td>8,170,062</td>
<td>1.5%</td>
</tr>
<tr>
<td>Callens, Guevar, Van Impe &amp; co</td>
<td>5,370,655</td>
<td>1.6%</td>
<td>5,788,459</td>
<td>1.6%</td>
<td>5,031,769</td>
<td>1.1%</td>
<td>5,297,653</td>
<td>1.0%</td>
</tr>
<tr>
<td>BDO</td>
<td>4,042,875</td>
<td>1.2%</td>
<td>3,992,959</td>
<td>1.1%</td>
<td>8,540,973</td>
<td>2.0%</td>
<td>9,395,308</td>
<td>1.8%</td>
</tr>
<tr>
<td>Hermant, Dodemont &amp; co</td>
<td>3,189,740</td>
<td>0.9%</td>
<td>3,656,205</td>
<td>1.0%</td>
<td>3,417,039</td>
<td>0.8%</td>
<td>3,633,572</td>
<td>0.7%</td>
</tr>
<tr>
<td>Grant Thornton, Lippens, Rabaey &amp; Co</td>
<td>3,201,145</td>
<td>0.9%</td>
<td>3,160,538</td>
<td>0.9%</td>
<td>5,685,297</td>
<td>1.3%</td>
<td>6,634,037</td>
<td>1.3%</td>
</tr>
<tr>
<td>Dupont, Ghycot, Koevoets, Peeters, Rosier &amp; Co</td>
<td>3,313,252</td>
<td>1.0%</td>
<td>2,908,676</td>
<td>0.8%</td>
<td>3,731,907</td>
<td>0.9%</td>
<td>4,190,231</td>
<td>0.8%</td>
</tr>
<tr>
<td>TCLM</td>
<td>3,097,366</td>
<td>0.9%</td>
<td>2,555,501</td>
<td>0.7%</td>
<td>5,013,341</td>
<td>1.1%</td>
<td>5,648,090</td>
<td>1.1%</td>
</tr>
<tr>
<td>VGD Van Geet, Derick &amp; Co</td>
<td>1,999,158</td>
<td>0.6%</td>
<td>2,296,822</td>
<td>0.7%</td>
<td>549,460</td>
<td>0.1%</td>
<td>950,716</td>
<td>0.2%</td>
</tr>
<tr>
<td>Mazars &amp; Guerard</td>
<td>1,922,954</td>
<td>0.6%</td>
<td>1,994,604</td>
<td>0.6%</td>
<td>7,852,244</td>
<td>1.8%</td>
<td>8,637,477</td>
<td>1.6%</td>
</tr>
<tr>
<td>Van Havermacht</td>
<td>1,159,891</td>
<td>0.3%</td>
<td>1,519,568</td>
<td>0.4%</td>
<td>1,414,245</td>
<td>0.3%</td>
<td>1,610,416</td>
<td>0.3%</td>
</tr>
<tr>
<td>PKF Van der Steen, Rishe, De Weerdt, Lefebvre</td>
<td>949,132</td>
<td>0.3%</td>
<td>1,002,228</td>
<td>0.3%</td>
<td>1,905,116</td>
<td>0.4%</td>
<td>2,144,110</td>
<td>0.4%</td>
</tr>
<tr>
<td>PVMD</td>
<td>318,234</td>
<td>0.1%</td>
<td>281,916</td>
<td>0.1%</td>
<td>653,403</td>
<td>0.1%</td>
<td>787,927</td>
<td>0.2%</td>
</tr>
<tr>
<td>Westen, François &amp; Co</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5,328,858</td>
<td>1.2%</td>
<td>7,295,868</td>
<td>1.4%</td>
</tr>
<tr>
<td>Vander Donckt – Roobrouck – Christiaens</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,793,276</td>
<td>0.9%</td>
<td>4,275,567</td>
<td>0.8%</td>
</tr>
<tr>
<td>Delvaux, Fronville, Servais and Partners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,688,698</td>
<td>0.8%</td>
<td>4,216,646</td>
<td>0.8%</td>
</tr>
<tr>
<td>JWB/ Baker Tilly</td>
<td>1,368,223</td>
<td>0.3%</td>
<td>1,135,568</td>
<td>0.3%</td>
<td>1,319,176</td>
<td>0.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Wolf, Ostyn, Caluwaerts, De Ridder &amp; Co</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>808,927</td>
<td>0.2%</td>
<td>956,579</td>
<td>0.2%</td>
</tr>
<tr>
<td>Fallon, Chainaux, Cludts, Garny &amp; Co</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>592,970</td>
<td>0.1%</td>
<td>694,705</td>
<td>0.1%</td>
</tr>
<tr>
<td>All small audit firms</td>
<td>76,103,627</td>
<td>22.3%</td>
<td>75,516,936</td>
<td>21.4%</td>
<td>68,752,062</td>
<td>15.8%</td>
<td>79,238,726</td>
<td>14.6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>340,457,881</strong></td>
<td><strong>100%</strong></td>
<td><strong>351,917,058</strong></td>
<td><strong>100%</strong></td>
<td><strong>437,831,738</strong></td>
<td><strong>100%</strong></td>
<td><strong>530,904,419</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
5.1.2 Auditor market share in different client industries

It is assumed that the big clients choose a B4 for its expertise. Some industries ask for more specialized auditors than other sectors. The question is, within the B4, which audit firm is specialized in which industry? For that reason, the market was divided in 17 industries based on the NACE\textsuperscript{35} codes and the market shares were measured by number of clients (figure 2). As there were multiple industries for some companies, this thesis only considered the main industry activity.

The small auditors are the only audit suppliers in the household activity (100%). They have more than 50% of the clients in health & social work and in administration, defence & social security. On the contrary, the B4 is very weak in health & social work. They are very active in finance, construction, transport, storage & communication (>50% of the clients). The mid-tier is highly represented in fishing.

Within the B4, KPMG is not really specialized in any sector. PwC is strong in extra territorial organisations and bodies, alongside with Ernst & Young. Moreover, Ernst & Young is very active in the construction industry and in transport, storage & communication. Deloitte is specialized in agriculture and electricity, gas & water supply and in administration, defence & social security.

To conclude, sectors requiring a lot of specialization address the B4 (e.g. finance, transport,…). Industries not requiring that amount of expertise (e.g. households, health & social work,…) employ a smaller auditor, as they are the audit group with the biggest difficulty in attracting specialized staff.

It was impossible to evaluate industry concentration in time, in default of recent data to compare with. Therefore, it was impossible to evaluate whether small and mid-tier auditors try to achieve more expertise.

\textsuperscript{35} See Appendix J. NACE codes (2005)
Figuur 2. Market share per industry (2005)
5.1.3 Auditor market share for segment of listed clients

A. By number of listed audit clients

Over the period 2001-2005, the B4 and small audit firms had a stable number of listed clients (table 6). All the newly listed clients chose for a mid-tier as their auditor. Especially BDO spectacularly increased its number of listed clients (2001: 2 and 2005: 13). Still, the B4 seemed for most of the listed clients to be the best auditor choice as those clients prefer an international auditor. Within the top tier, only Deloitte attracted more listed clients, but this was only due to having taken over the former Andersen clients. (Small auditors had no more than 1 listed client). When looking to the relative percentage of market shares, the mid-tier significantly increased at the expense of the B4.

In the non listed segment, the importance of the mid-tier auditors had grown a lot. However, the proportion listed – non listed clients had decreased in 2005. Of all the new clients (4618), only 18 were listed. Therefore, in the total market share of each auditor, the representation of listed clients to total clients had decreased.

Table 6. Market share of listed and non-listed clients by number of clients (2001, 2005)

<table>
<thead>
<tr>
<th></th>
<th>Listed</th>
<th></th>
<th></th>
<th>Non listed</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolute</td>
<td>Relative</td>
<td>Absolute</td>
<td>Relative</td>
<td>Absolute</td>
<td>Relative</td>
</tr>
<tr>
<td>B4 or B5</td>
<td>88</td>
<td>61.6%</td>
<td>88</td>
<td>54.7%</td>
<td>7929</td>
<td>41.5%</td>
</tr>
<tr>
<td>Deloitte</td>
<td>25</td>
<td>17.5%</td>
<td>38</td>
<td>23.6%</td>
<td>1627</td>
<td>8.5%</td>
</tr>
<tr>
<td>PwC</td>
<td>13</td>
<td>9.1%</td>
<td>17</td>
<td>10.6%</td>
<td>1736</td>
<td>9.1%</td>
</tr>
<tr>
<td>Ernst &amp; Young</td>
<td>19</td>
<td>13.3%</td>
<td>17</td>
<td>10.6%</td>
<td>1931</td>
<td>10.1%</td>
</tr>
<tr>
<td>KPMG</td>
<td>15</td>
<td>10.5%</td>
<td>16</td>
<td>9.9%</td>
<td>1663</td>
<td>8.7%</td>
</tr>
<tr>
<td>Arthur Andersen</td>
<td>16</td>
<td>11.2%</td>
<td>-</td>
<td>-</td>
<td>972</td>
<td>5.1%</td>
</tr>
<tr>
<td>Mid-tier</td>
<td>24</td>
<td>16.8%</td>
<td>41</td>
<td>25.5%</td>
<td>2835</td>
<td>14.9%</td>
</tr>
<tr>
<td>Small</td>
<td>31</td>
<td>21.7%</td>
<td>32</td>
<td>19.9%</td>
<td>8277</td>
<td>43.5%</td>
</tr>
<tr>
<td>Total</td>
<td>143 clients</td>
<td>100%</td>
<td>161 clients</td>
<td>100%</td>
<td>19,041 clients</td>
<td>100%</td>
</tr>
</tbody>
</table>

B. By listed clients’ sales and square root listed clients’ sales

The market share of listed clients by clients’ sales has stayed fairly stable in time for all three auditor groups (no more than 1.6% difference between 2001 and 2005) (table 7, part 1). Within the B4, the strong decrease of Deloitte and the increase of Ernst & Young and KPMG is
remarkable. Particularly the listed clients’ sales of KPMG\(^{36}\) raised spectacularly (from 2.7% to 24%). Two of their new clients (Agfa-Gevaert & Colruyt) represented already two thirds of the clients’ sales in 2005. Another special finding is that the third market place in 2001 was for DDC\(^ {37}\). In 2005 DDC lost however its ranking position due to an internal separation in two audit firms (DDC – Delvaux, Fronville, Servais & Partners\(^ {38}\)).

The second part of the table 7 (market share by square root clients’ sales) confirms the trends in the results of the clients’ sales. The square root only reduces the size and range of the numbers.

However, the results probably do not show the reality. While 2001 lacks only 9 of the 143 clients’ sales, 2005 has 43 of the 161 sales missing. This explains the decrease in total listed sales which should normally increase, since in 2005 there are more listed clients and the clients’ sales of overall market are also rising (see table 5).

| Table 7. Market share of listed clients by (square root) clients’ sales (2001, 2005) |
|---|---|---|---|---|---|---|
| | Clients sales | √ Clients sales |
| | Absolute | Relative | Absolute | Relative | Absolute | Relative |
| B4/5 | 30,677,901 | 87.9% | 27789794 | 88.5% | 10,135 | 59.5% | 10,195 | 61.8% |
| Deloitte | 23,336,060 | 66.9% | 12,352,485 | 39.3% | 4,831 | 28.3% | 3,515 | 21.3% |
| PwC | 2,945,019 | 8.4% | 2,828,485 | 9.0% | 1,716 | 10.1% | 1,682 | 10.2% |
| Ernst & Young | 1,443,690 | 4.1% | 5,086,830 | 16.2% | 1,202 | 7.1% | 2,255 | 13.7% |
| KPMG | 925,874 | 2.7% | 7,521,994 | 24.0% | 962 | 5.6% | 2,743 | 16.6% |
| Arthur Andersen | 2,027,258 | 5.8% | - | - | 1,424 | 8.4% | - | - |
| Mid | 2,700,204 | 7.7% | 2,755,074 | 8.8% | 3,102 | 18.2% | 3,564 | 21.6% |
| Small | 1,515,414 | 4.3% | 855,377 | 2.7% | 3,810 | 22.3% | 2,760 | 16.7% |
| Total | 34,893,519 | 100% | 31,400,245 | 100% | 17,047 | 100% | 16,519 | 100% |

5.2 Auditor concentration

Concentration depends on the number of audit firms on the market and their relative size. The size (market share) is measured by the multiple proxies in the 5.1 Auditor market share.

Remarks:

- To measure the \(C_{20}\), the number of auditors, number of clients and clients’ sales were calculated for each B5/4, each mid-tier, and each biggest of the small auditors, because in ranking per proxy, sometimes a small auditor is bigger than several mid-tiers.

\(^{36}\) Appendix K. Market share ranking in the listed segment by (square root) clients’ sales
\(^{37}\) Appendix K. Market share ranking in the listed segment by (square root) clients’ sales
\(^{38}\) Appendix F. Final audit firm name of audit firms grouped together
- To measure the HI, the individual market share for each audit firm is needed. This was impossible for all the small audit firms. The HI is only used when measuring concentration in the listed segment.

5.2.1 Concentration in time (for all clients)

Concentration in time needs to be examined in order to see if past mergers and collapses have possibly lead to a dominance of audit firm(s), if any. This would create a dangerous situation and governments would have to intervene.

A. By number of auditors

The concentration results from the 1990’s show a continue concentration increase (table 8 & figure 3). In order to work on a time line base, the results of this thesis (year 2001, 2002, 2005) are linked to the results of the study of Weets (2000). It is remarkable that at the transition between 1997-2001, the concentration ratios show a decrease and the HI shows an increase despite the same way of preparing the data. According to the concentration bounds, the market is not concentrated according to the C\textsubscript{n} and lowly concentrated according to the HI.

The increase (by C\textsubscript{n} and HI) between 2001 and 2002 is probably due, to a large extent, to the absorption of Andersen by the other B4. The more audit firms are used to calculate the C\textsubscript{n}, the less the effect of Andersen is noticeable (net change: C\textsubscript{4}: +1.6%; C\textsubscript{15}: +1.1%). The C\textsubscript{n} and HI show a concentration decrease between 2002 and 2005, which points out a shift from certain auditors from the B4 to the mid-tier (in the C\textsubscript{15}) (net change: C\textsubscript{4}: -2.5%; C\textsubscript{15}: -1%). The mid-tier becomes an increasingly important auditor player.

![Figure 3. Overall concentration in time by number of auditors](image)

39 Weets V., 2000, Aspecten van de Auditmarkt in België: Concentratie, Differentiatie en Revisorkeuze, pp35
40 See 3.2.1 Market concentration (concentration ratio)
Table 8. Overall concentration in time by number of auditors

<table>
<thead>
<tr>
<th>Year</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C15</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>21%</td>
<td>25%</td>
<td>29%</td>
<td>0.017</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>22%</td>
<td>27%</td>
<td>31%</td>
<td>0.019</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>31%</td>
<td>35%</td>
<td>38%</td>
<td>0.030</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>28%</td>
<td>33%</td>
<td>36%</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>28%</td>
<td>33%</td>
<td>36%</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>26%</td>
<td>31%</td>
<td>35%</td>
<td>0.023</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>26%</td>
<td>31%</td>
<td>34%</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>27%</td>
<td>32%</td>
<td>36%</td>
<td>0.023</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C15</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>20.1%</td>
<td>23.8%</td>
<td>26.5%</td>
<td>32.3%</td>
<td>0.0274</td>
</tr>
<tr>
<td>2002</td>
<td>21.7%</td>
<td>25.1%</td>
<td>27.7%</td>
<td>33.4%</td>
<td>0.0316</td>
</tr>
<tr>
<td>2005</td>
<td>19.2%</td>
<td>23.7%</td>
<td>26.4%</td>
<td>32.4%</td>
<td>0.0266</td>
</tr>
</tbody>
</table>

| Net change '01-'02 | +1.6% | +1.3% | +1.2% | +1.1% |
| Net change '02-'05 | -2.5% | -1.4% | -1.3% | -1% |
| Net change '01-'05 | -0.9% | -0.1% | -0.1% | +0.1% | -0.008 |

B. By number of audit clients

The values of the Cn measured by number of audit clients are higher than the values of the Cn measured by number of auditors (table 9). Here, the concentration ratios show a medium market concentration. It is also remarkable that the net change of the Cn has an opposite evolution (Cn number of auditors: negative net change; number of clients: positive net change). This phenomenon creates the impression that fewer auditors in the B4 handle more audit clients. The high net change in every Cn shows whether that number of auditors gains extra clients from 2001 to 2005. During the four years, the four biggest audit firms increased their number of clients with 4.09%. A big part of the increase is however due to the absorption of Andersen by Deloitte. The concentration growth in C6 (+2.29%) is smaller. This net change stayed positive due to the stronger position of the first, second, third and fourth auditor. Auditors seven and eight have no significant change in their market share (+0.21%), but the C20 shows the growing power of the following 12 auditors in the ranking (+3.03%). This is again a confirmation that more clients start to choose for a mid-tier and that the B4 grows slower than the mid-tier.

Table 9. Overall concentration by number of clients

<table>
<thead>
<tr>
<th>Year</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C20</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>36.64%</td>
<td>44.09%</td>
<td>47.46%</td>
<td>57.72%</td>
</tr>
<tr>
<td>2005</td>
<td>40.73%</td>
<td>46.38%</td>
<td>49.96%</td>
<td>63.25%</td>
</tr>
</tbody>
</table>

| Net change ‘01-‘05 | +4.09% | +2.29% | +2.50% | +5.53% | +0.21% | +3.03% |
C. By clients’ sales

Just like when measured with other proxies, there is a small increase in concentration between 1999 - 2001 and between 2003 – 2005 (see table 10 & figure 4). The growth is small, close to 0-1%. Again, between 2001-2003, the increase is bigger as a result of the absorption of Andersen. The rise in power of the B4 and the mid-tier auditors in the ranking between 9 and 20 is expressed by C_4 and C_20. These auditors did not only grow because of their climbing number of clients (see previous paragraph (B)), but also because their clients have grown (rising clients sales).

The 2005 level in C_4 implies a highly concentrated market, while the C_8 level refers to medium concentration. The level of the C_4 by clients’ sales is higher than the C_4’s measured by other proxies. This is because the largest companies go to the biggest auditors (B4). The same amount of clients in another auditor group (C_8, C_20) generates less client sales. This also means that the growth in the C_20 is not unimportant.

<table>
<thead>
<tr>
<th>Year</th>
<th>C_4</th>
<th>C_6</th>
<th>C_8</th>
<th>C_20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>41%</td>
<td>53%</td>
<td>59%</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>43%</td>
<td>54%</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>53%</td>
<td>66%</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>56%</td>
<td>70%</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>58.42%</td>
<td>69.26%</td>
<td>72.02%</td>
<td>78.62%</td>
</tr>
<tr>
<td>2001</td>
<td>58.28%</td>
<td>70.26%</td>
<td>73.04%</td>
<td>79.51%</td>
</tr>
<tr>
<td>2003</td>
<td>69.07%</td>
<td>72.81%</td>
<td>75.52%</td>
<td>83.93%</td>
</tr>
<tr>
<td>2005</td>
<td>70.51%</td>
<td>73.91%</td>
<td>76.82%</td>
<td>84.65%</td>
</tr>
<tr>
<td>Net change ‘99-‘05</td>
<td>+12.09%</td>
<td>+4.65%</td>
<td>+4.8%</td>
<td>+6.03%</td>
</tr>
</tbody>
</table>

Figure 4. Overall concentration in time by clients' sales
5.2.2 Concentration for listed clients

A. Number of clients

Between 2001 and 2005, the market was medium concentrated (C_4 and C_8). The C_4 slightly increased for the listed segment, but for the C_8, the concentration starts to decrease. The market share from the twenty largest audit firms even decreases with almost 5%. The increasing HI proves that the audit market is less equally divided under its suppliers in 2005 (low concentration).

Given the high market concentration and the restricted choice of industry specialized auditors, public listed companies have a limited choice in auditors. The small percentage of non-B4 market share proves possible entry barriers for smaller audit firms.

<table>
<thead>
<tr>
<th>Year</th>
<th>C_4</th>
<th>C_6</th>
<th>C_8</th>
<th>C_20</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>52.45</td>
<td>66.43</td>
<td>73.43</td>
<td>91.91</td>
<td>0.08895</td>
</tr>
<tr>
<td>2005</td>
<td>54.66</td>
<td>66.46</td>
<td>72.05</td>
<td>86.96</td>
<td>0.10027</td>
</tr>
</tbody>
</table>

B. By (square root) clients’ sales

The results of the two proxies over the level of concentration are different. C_4, C_8 and HI measured by client sales indicate a very highly concentrated market. The square root clients’ sales ratios point on a medium concentrated market. This is because the square reduces the impact of the biggest auditors.

During the four years, the C_4 and C_6 keep slightly increasing when measured by clients’ sales and square root clients’ sales. Only the C_8 calculated with client sales remained nearly stable.

It is remarkable that in 2001 the top four auditors are not the B4. DDC is the third biggest auditor for listed clients. In 2005, after an internal split, DDC lowered in ranking. Also the position of KPMG is different in both years (from the sixth to the second place)\(^\text{41}\).

The decrease in HI assumes that the listed market is not going closer to oligopoly.

<table>
<thead>
<tr>
<th>Year</th>
<th>C_4</th>
<th>C_6</th>
<th>C_8</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>87.13</td>
<td>93.92</td>
<td>96.93</td>
<td>0.4645</td>
</tr>
<tr>
<td>2005</td>
<td>88.50</td>
<td>96.00</td>
<td>96.80</td>
<td>0.2515</td>
</tr>
</tbody>
</table>

\(^{41}\) Appendix K. Market share ranking in the listed segment by (square root) clients’ sales
Table 13. Concentration of the listed clients’ by square root clients' sales (2001, 2005)

<table>
<thead>
<tr>
<th></th>
<th>C₄</th>
<th>C₆</th>
<th>C₈</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>55.25 %</td>
<td>67.95 %</td>
<td>76.18 %</td>
<td>0.1201</td>
</tr>
<tr>
<td>2005</td>
<td>61.72 %</td>
<td>73.21 %</td>
<td>77.41 %</td>
<td>0.1151</td>
</tr>
</tbody>
</table>

C. DIFF

It may be assumed that the auditor concentration depends on the client concentration. The DIFF expresses the part of the auditor concentration which is not influenced by the client concentration.

For the proxies (square root) clients’ sales, the decrease of the Min HI between 2001 and 2005 confirms that the auditor concentration is less influenced by the client. Therefore, the HI of 2005 is more ‘representative’ for the auditor concentration level than the one from 2001 because she is less influenced by the client.

Table 14. DIFF for the listed segment by (square root) clients' sales

<table>
<thead>
<tr>
<th>Clients’ sales</th>
<th>HI</th>
<th>Min HI</th>
<th>DIFF= HI - Min HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>0.4645</td>
<td>0.0344</td>
<td>0.4300</td>
</tr>
<tr>
<td>2005</td>
<td>0.2515</td>
<td>0.026</td>
<td>0.2255</td>
</tr>
<tr>
<td>Square root clients’ sales</td>
<td>2001</td>
<td>0.1201</td>
<td>0.0140</td>
</tr>
<tr>
<td>2005</td>
<td>0.1151</td>
<td>0.0123</td>
<td>0.1028</td>
</tr>
</tbody>
</table>

5.2.3 Concentration compared to other countries

The comparison of the Belgian concentration is limited to the UK\(^\text{42}\) in 2001 and Germany\(^\text{43}\) in 2005, since a comparison requires the same proxy (clients’ sales), the same year and the same population sample (the German and British studies only considered listed companies). The Belgian concentration numbers for the listed segment were calculated in 5.2.2.

The UK has a very concentrated audit market. In 2001, the British B4 possesses already 93.1% of the market (and their share kept rising to 98.6% in 2003). Compared to this country, the Belgian B4 has a smaller position (87.1%). In the UK, the sixth largest audit firms possess already whole audit market (98.8%), but in Belgium other auditors still have 6.1% of the listed clients.

\(^{42}\) Abidin S., V. Beattie, and A. Goodacre, 2006, Audit Market Concentration and Auditor Choice in the UK, [https://dspace.stir.ac.uk/](https://dspace.stir.ac.uk/) (University of Stirling); pp58

\(^{43}\) Bigus J., and R.-C. Zimmermann, 2007, Market Leaders and Concentration on the German Audit Market, [http://www.iuc.unibe.ch/](http://www.iuc.unibe.ch/) (University Bern); pp22
The German and Belgian concentration level is more similar. For both concentration ratios ($C_4$ and $C_6$), there is a difference of only 2% between the two countries. The ratio-levels show that in both countries, big clients (listed) go to big auditors.

5.2.4 Concentration in industry

There is one industry (households) were one auditor has a monopoly. There is a very high concentration (100%) in extraterritorial organizations and bodies and in fishing. The B4 has a lot from the finance industry (67%: high concentration). Medium ($50%<C_4<65%$) concentrated industries are construction, transport, storage and communication. There is very little concentration in mining, manufacturing, trade, health and social work. Other industries are hardly concentrated.
Concentration is high in some industries because for each service clients require from an auditor (mandate, take-over, tax advice,...), they prefer a different auditor. This reduces the auditor choice left for fulfilling the mandate. Moreover, big clients operating internationally prefer auditors with an international network (B4) and industry expertise. This means that for some industries, only a few auditors are available to serve these clients.

High concentration is sometimes also caused by the low number of clients active in that industry. (Industries with less than 0.4% of the total audit clients: fishing and extra territorial organizations and bodies)

In this thesis, concentration was not compared in time because no recent Belgian ratios are available and the NACE codes have changed.

Figure 7. Industry concentration by number of clients (2005)
5.3 Market structure

The present market structure is the result of a long process of audit firms entering and exiting the market, growing and merging. However, some international firms have always had higher ranked positions than other audit firms.

Between 2001 and 2005, according to the official IBR lists, the number of audit firms increased from 381 to 465 (+84). The real number of individual audit firms is lower because some audit firms (unipersonal audit firms and subordinate firms) are in fact incorporated in bigger audit firms. In reality, there were 245 audit firms in 2001 and 277 firms in 2005. This increase did, however, not extend the auditor choice because it is only due to a restructuring of the audit market (partnership, splitting in multiple audit firms, changes in firm name, unipersonal audit firms).

Due to the fact that the number of unipersonal audit firms has increased, there are probably low entry barriers on the Belgian audit market.

During the evaluated years, the Belgian market structure remained stable in time, also after the collapse of Andersen. Appendix G shows that the audit market consists of a lot of unipersonal audit firms and audit firms with two auditors.

On the overall market, the concentration ratio by clients’ sales argument that the Belgian audit market is tight oligopoly (C4>60%). Number of auditors and number of clients estimate the market structure less dominant (C4<40%).

The listed market is more oligopolistic than the overall market. Especially clients’ sales report very high oligopolistic characteristics with Deloitte, having a dominant position in 2001. The other proxies minimize the strong position of the leading firms even more.

In the sectors, there is one industry, households, where the small audit firm Goossens, Gossart & Joos has a monopoly. The finance industry is tightly oligopolistic and for six other industries the market shows a loose oligopoly (agriculture, hunting and forestry; mining and quaring; manufacturing, trade and repair, education; health and social work). The remaining industries are somewhere in between.

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44 Appendix F. Final audit firm name of audit firms grouped together
45 Appendix F. Final audit firm name of audit firms grouped together
46 Number of unipersonal audit firms: table 1. Descriptive statistics & Appendix G. Number of auditors per audit firm
47 1.1.2 Characteristics of relevant audit market structures (Oligopoly)
6 Conclusions, Limitations, Future research

6.1 Conclusion

This thesis has performed concentration measuring on the Belgian audit market which helped analysing the market structure and the position of the B4. The concentration indexes were calculated based on the total population of audit firms and audit clients. The findings confirm generally what other (inter)national studies have found in earlier research periods. The results have to be interpreted with prudence, since the concentration levels differ according to the used concentration proxies. Therefore, the focus was put on finding a tendency and its underlying reasons.

The Belgian audit concentration is lower than in other countries and has increased to a limited extent during the last years. Changes in the audit market were influenced by the collapse of Arthur Andersen, the increase of client number and size, the client switching and the audit market structure (number of audit firms active and their relative size).

The present level of audit concentration indicates that the Belgian audit market structure is not unhealthy. The market is characterized by 3 groups of auditors: the B4 audit firms, the mid-tier auditors and the small auditors. The position of the B4 is stagnating, but permanently strong. All measures report that also in Belgium, the big international audit firms dominate the market and in certain industries and especially for public companies, their power is very high. The major changes, however, are found in the non-B4 where the mid-tier audit firms become more important, at the expense of the small audit firms. Those mid-tiers experienced a growth in number of auditors and clients, partly due to the collapse of Andersen. Their growing expertise has also made them more acceptable auditors for big clients. The interpretation of the evolution of the non B4 groups has to be done carefully because it is also influenced by the classification system of the thesis. However, the classification was useful to show the shifting within the non-B4 group.

The concentration ratios based on number of auditors show a low, stable concentration level. After 2002, the B4 decreased but still employs 20% of the auditors, with Deloitte as market leader. Important is the increase of the mid-tier, probably partly due to the collapse of Andersen.
The number of clients reports a medium concentration that is increasing. Especially some mid-tier auditors realized an important increase in their market share. The market share of B5/4 has not much changed.

The concentration based on clients’ sales has climbed to a very high level, especially for the top four, which confirms the assumption that big clients go to big auditors. Market share by clients’ sales was researched over a long period (1999-2005). In 2001-2003, there is a shift of the market shares within the non-B4.

When looking closer at the industry levels, it is noticed that all B4 auditors are specialized in certain sectors, except KPMG. In finance, transport, storage and communication, the B4 is very strong. They are almost not active in health and social work and totally absent in households and fishing.

This thesis confirms the results of previous studies showing that the B4 and some mid-tiers are dominating the audit market of listed companies. This thesis found out that the B4 experienced a growing competition of the mid-tier. They are the only auditor group with an increasing number of listed clients. Within the B4, there is a remarkable switch in market shares between KPMG and Deloitte.

It has to be remarked that during all concentration measuring, the B4 were always also the four leading firms, except for the listed market in 2001. The overall market leader is difficult to point out, since each proxy gives a different result.

The remaining question is how concentration will evolve in the future. The European Commission will not allow any big merger which could damage a healthy competition level. Therefore, like in the UK, the B4 could start showing interest to takeover some smaller audit firms. After all, the B4 and the government are careful in their actions because the audit market cannot afford any more damage of reputation after the collapse of Andersen.

The audit market structure is also influenced by the behaviour of the clients. The question is whether clients will switch auditors when the audit fees are published. It is expected that large and listed corporations shall remain with the B4 and that small and medium companies shall balance the need for auditor expertise and the audit fee to be paid.
6.2 Limitations of the study

There were some uncertainties during the processing of the database. Incorrect names and numbers and missing data increase the possibility that the results do not always represent full reality.

Due to the absence of audit fees, no statement could be made about the competition level. This thesis could only evaluate the effect of Arthur Andersen and not the PwC merger effect. The lack of available auditor information in the Belfist has limited this study to the research period from 2001-2005.

The interpretation and comparison of the results with other studies was difficult because they evaluated an earlier period (1990’s), used other samples (mostly only listed audit clients) and measured concentration with other proxies which were unavailable or missing in the Belfirst database.

6.3 Suggestions for future research

Now that in Belgium audit fees are available, new studies should use this measure and research the suitability of other proxies. However, audit fees is only a good market share measure provided the research covers all the auditor activities (mandate, take-overs, due diligence, mergers, tax consultancy, …) because it is this audit fee number that is available in the balance sheet.

Another proposal is to use the Gini coefficient, a relatively new measure for concentration. It is interesting to evaluate, for the last years, if the mid-tier auditors expanded their specialization in certain industries and in the listed segment, and if this is at the expense of other auditor groups.

Not only the overall market, but also changes within the B4 are an interesting topic to analyse.
References

Abidin S., V. Beattie, and A. Goodacre, 2006, Audit Market Concentration and Auditor Choice in the UK, <https://dspace.stir.ac.uk/> (University of Stirling)


References


Weets V., 1999, Who will be the new auditor?, Working paper, Universiteit Gent (Faculteit Economie en Bedrijfskunde)

Weets V., 2000, Aspecten van de Auditmarkt in België: Concentratie, Differentiatie en Revisorkeuze, PhD, Faculteit van de Economische, Sociale en Politieke Wetenschappen, Vrije Universiteit Brussel en Managementschool SOLVAY, pp. 4-44.


Willekens M., and A. Gaeremynck, Prijszetting in de Belgische Auditmarkt, Instituut der Bedrijfsrevisoren en die Keure, Decembre 2005

Appendix

Appendix A. Audit firm ranking in US, UK, Australia, Germany, Switzerland and Belgium

<table>
<thead>
<tr>
<th>Ranking measure:</th>
<th>US</th>
<th>UK</th>
<th>Australia</th>
<th>Germany</th>
<th>Switzerland</th>
<th>Belgium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of auditors</td>
<td>E&amp;Y</td>
<td>PwC</td>
<td>KPMG</td>
<td>PwC</td>
<td>PwC</td>
<td>KPMG</td>
</tr>
<tr>
<td>Audit fees</td>
<td>PwC</td>
<td>KPMG</td>
<td>PwC</td>
<td>KPMG</td>
<td>E&amp;Y</td>
<td>E&amp;Y</td>
</tr>
<tr>
<td>Audit fees</td>
<td>KPMG</td>
<td>Deloitte</td>
<td>E&amp;Y</td>
<td>E&amp;Y</td>
<td>KPMG</td>
<td>Deloitte</td>
</tr>
<tr>
<td>Audit fees</td>
<td>Deloitte</td>
<td>E&amp;Y</td>
<td>AA</td>
<td>Deloitte</td>
<td>C&amp;L</td>
<td></td>
</tr>
<tr>
<td>Audit fees</td>
<td>BDO</td>
<td>Deloitte</td>
<td>BDO</td>
<td>AA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Client sales</td>
<td>GT</td>
<td>PKF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The results were taken from the most recent available studies in those countries.

Appendix B. Overview of the most important numerical studies

UK: Oxera, 2006
    Abidin S., V. Beattie, and A. Goodacre, 2006
    Moizer P. and S. Turley, 1987
    Pong C. K.M, 1999
    Peel M., 1997
    Beattie V., and S. Fearnley, 1994
    Beattie V., A. Goodacre, and S. Fearnley, 2003

             Maijor S., W. Buijink, and A. Van Witteloostuijn, 1995

         Bigus J., and R.-C. Zimmermann, 2007
        Quick R., and M. Wolz, 1999

    Tomczyk S., and W.J. Read, Fall 1989
    Feldman E.R., 2006

Australia: Thavapalan S., R. Moroney, and R. Simnett, 2002
           Schaein M., and S. Maijor, 1997
           Willekens M., and C. Achmadi, 2003
           Weets V., 2000

Belgium: Weets V., 2000

International market: Choi M., and D. Zeghal, 1999
Appendix C. History Belgian audit market

International history

Big 8   Big 6    Big 5   Big 4
Arthur Andersen   Arthur Andersen   Arthur Andersen dissolved -
Arthur Young & company  Arthur Young & company   Ernst & Young   Ernst & Young   Ernst & Young
Ernst & Whinney   Ernst & Whinney
Touche Ross   Touche Ross    Deloitte & Touche   Deloitte & Touche   Deloitte & Touche
Deloitte Haskins & Sells   Deloitte Haskins & Sells
Price Waterhouse   Price Waterhouse   Price Waterhouse PricewaterhouseCoopers PricewaterhouseCoopers
Coopers & Lybrand   Coopers & Lybrand
Peat Marwick Mitchell(PMI) KPMG KPMG KPMG KPMG
KMG Group

Belgium history

Pourbaix & co  Alderweireld, Tinnemans  Marcel Asselbergs & co  Pauwels en partners
Van de Steen & co  (Touche Ross)  (Arthur Anderson)  Price Waterhouse Belgium
Tinnemans, Pourbaix, Huybrechts, Vaes, Verhaegen, Thirifay, Vandenborre & Partners  Jacobs & Eeckhout
Van der Steen & co  Wodon, Fallon & co  (Deloitte Haskins & Sells)  (Cooper & Lybrand)
(Touche Ross)  Deloitte & Touche Belgium
Coopers & Lybrand Belgium

Colard, Van der Meulen & co  Bertels, Swols, Van Cutsem & co  Marcel Bellen & co  Berger, Block, Kirschen, Schellenkens & co
(Arthur Young)  (Ernst & Whinney)  (Peat Marwick)
Ernst & Young Belgium

KPMG Belgium
Appendix D. Gini coefficient as concentration measure
The Gini coefficient is a new audit concentration measure which calculates ‘the deviation between the actual distribution of cumulative market shares and a hypothetical uniform distribution, which implies equal market shares’ (Bigues & Zimmermann, 2007, pp6). It is closely related to the Lorenz Curve, which is a graph that shows the relationship between the percentage of income recipients and the percentage of income that they did actually receive.

Stefani, 2006

<table>
<thead>
<tr>
<th>G</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 - 100 %</td>
<td>Very high market concentration</td>
</tr>
<tr>
<td>60 - 90 %</td>
<td>High market concentration</td>
</tr>
<tr>
<td>40 - 60 %</td>
<td>Medium market concentration</td>
</tr>
<tr>
<td>&lt; 40 %</td>
<td>Low market concentration</td>
</tr>
</tbody>
</table>

Appendix E. Measures for market share

a. Audit fees
   Audit fee is seen as the best measure for concentration, because it does not make concentration sensitive to population size. They reduce HI and Cn to a smaller, more correct concentration level (Tomczyk & Read, 1989). However, since 2002, audit fees could be influenced by the distortion due to the SOX.

b. Number of auditors

c. Number of principles

d. Number of offices

e. International presence

f. Personnel cost
g. Number of audits
   According to Beattie and Fearnley (1994), this measure underestimates the real concentration because large companies generally choose large audit firms

h. Total revenue of auditor

i. Number of clients

j. Clients’ assets
   According to Bigus & Zimmermann (2007), clients’ sales and clients’ assets normally overestimate the importance of the biggest audit firms and underestimate the market shares of the smaller firms. According to other authors, clients’ sales and clients’ assets are the best replacing proxies for audit fees because they give a good indication of the client size. Of assets and sales, sales is the best concentration measure since it depends on the market influences

k. Square root clients’ assets

l. Clients assets^{3/4}

m. Clients’ sales

n. Square root clients’ sales

o. Client sales^{3/4}
### Appendix F. Final firm name of audit firms grouped together

The first column indicates the name of the ‘head’ audit office. The next columns indicates the incorporated linked audit firms for 2001, 2002 and 2005.

<table>
<thead>
<tr>
<th>Name head office</th>
<th>2001</th>
<th>2002</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Deloitte</td>
<td>25 Deloitte &amp; Touche Bedrijfsrevisoren</td>
<td>25 Deloitte &amp; Touche Bedrijfsrevisoren</td>
<td>25 Deloitte &amp; Touche Bedrijfsrevisoren</td>
</tr>
<tr>
<td>14 Arthur Andersen</td>
<td>14 Arthur Andersen Bedrijfsrevisoren</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9 PWC</td>
<td>260 PricewaterhouseCoopers &amp; partners</td>
<td>260 PricewaterhouseCoopers &amp; partners</td>
<td>260 PricewaterhouseCoopers &amp; partners</td>
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<tr>
<td>160 Ernst &amp; Young</td>
<td>160 Ernst &amp; Young Bedrijfsrevisoren</td>
<td>160 Ernst &amp; Young Bedrijfsrevisoren</td>
<td>160 Ernst &amp; Young Bedrijfsrevisoren</td>
</tr>
<tr>
<td>1 KPMG</td>
<td>1 Klynveld Peat Marwick Goerdeler (253 BVBA Behets &amp; co)</td>
<td>1 Klynveld Peat Marwick Goerdeler (253 BVBA Behets &amp; co)</td>
<td>1 Klynveld Peat Marwick Goerdeler (253 BVBA Behets &amp; co)</td>
</tr>
<tr>
<td>23 BDO</td>
<td>23 BDO Bedrijfsrevisoren</td>
<td>23 BDO Bedrijfsrevisoren</td>
<td>23 BDO Bedrijfsrevisoren</td>
</tr>
<tr>
<td>37 DDC</td>
<td>452 BVBA DDC Bedrijfsrevisoren</td>
<td>452 BVBA DDC Bedrijfsrevisoren</td>
<td>452 BVBA DDC Bedrijfsrevisoren</td>
</tr>
<tr>
<td>33 CV Dupont, Ghyoot, Koevoets, Peeters, Rosier &amp; co</td>
<td>33 Dupont, Ghyoot, Koevoets, Rosier &amp; co</td>
<td>33 Dupont, Ghyoot, Koevoets, Rosier &amp; co</td>
<td></td>
</tr>
<tr>
<td>327 Callens, Guevar, Van Impe &amp; co</td>
<td>3 Callens, Pirenne, Theunissen &amp; co</td>
<td>3 Callens, Pirenne, Theunissen &amp; co</td>
<td></td>
</tr>
<tr>
<td>221 Mazars &amp; Guerard</td>
<td>221 Mazars &amp; Guerard</td>
<td>221 Mazars &amp; Guerard</td>
<td>221 Mazars &amp; Guerard</td>
</tr>
</tbody>
</table>

Appendix pp. 4
| # auditors per firm | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 17 | 18 | 20 | 22 | 24 | 27 | 32 | 34 | 37 | 43 | 45 | 53 | 58 | 61 | 63 | 79 |
|---------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|    |
| 2001                | 154| 46 | 19 | 7  | 3  | 2  | 1  | 2  | 0  | 0   | 1   | 1   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1   |    |
| 2002                | 157| 48 | 15 | 7  | 3  | 4  | 1  | 1  | 0  | 0   | 2   | 1   | 0   | 1   | 1   | 0   | 1   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 2   | 0   | 1   |    |
| 2005                | 190| 38 | 17 | 8  | 5  | 2  | 2  | 3  | 2  | 1   | 0   | 1   | 0   | 0   | 1   | 0   | 0   | 0   | 2   | 1   | 0   | 1   | 0   | 0   | 0   | 0   | 2   | 0   | 1   | 0   | 0   | 0   | 1   | 0   |
Appendix H. Sample first auditor

<table>
<thead>
<tr>
<th>First auditor</th>
<th>Second auditor</th>
<th>Third auditor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Card</td>
<td>PwC</td>
<td>PwC</td>
</tr>
<tr>
<td>Auto distribution belge</td>
<td>PwC</td>
<td>Deloitte</td>
</tr>
<tr>
<td>BCD Traveler Belgium</td>
<td>Pwc</td>
<td>Deloitte</td>
</tr>
<tr>
<td>Beaulieu Group</td>
<td>Boes &amp; Co</td>
<td>Deloitte</td>
</tr>
<tr>
<td>Bio code-Hucel</td>
<td>PwC</td>
<td>De Praetere</td>
</tr>
<tr>
<td>Browning International</td>
<td>Deloitte</td>
<td>DDC</td>
</tr>
<tr>
<td>Burchtdam</td>
<td>Deloitte</td>
<td>Dupont, Ghyoot…</td>
</tr>
<tr>
<td>Business Event Service Team</td>
<td>Brion</td>
<td>KPMG</td>
</tr>
<tr>
<td>Buzzz</td>
<td>Webb &amp; partners</td>
<td>KPMG</td>
</tr>
<tr>
<td>Camfil</td>
<td>Seffer</td>
<td>PwC</td>
</tr>
</tbody>
</table>

For some audit clients, multiple auditors are mentioned in the Belfirst (September 2007). For a sample of ten clients, the name of the auditor was searched in the balance sheet (of 2005) through the website www.nnb.be. All auditors mentioned in that balance sheet are marked in orange and are considered to be the most important auditor of that company. Almost always the first auditor mentioned seems to be the most important one and therefore, for calculating in the Belfirst database, only the first auditor was taken in account.

Appendix I. Sample missing clients' sales

It was noticed that there is no logic in the missing sales. First, it was taught there were missing clients’ sales because those companies report by an annual account in short scheme, and therefore, they are not forced to publish their sales. However, some large companies reporting by full scheme also have missing data. In the 2005 database sales from Agfa-Gevaert International, Arcelor Rodange, Argenta Spaarbank, Axa Belgium, Bekaert Computing, Brouwerij Hoegaerdend were missing. The same company names were researched for the 2001 database, and of the four companies on the cd-rom, all of them missed again the sales for 1999 and 2001. Sometimes small companies, sometimes large companies and sometimes only divisions of international companies did not report their numbers.
Appendix J. NACE codes (2005)

<table>
<thead>
<tr>
<th>NACE section</th>
<th>NACE code</th>
<th>NACE description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>01 – 02</td>
<td>Agriculture, hunting and forestry</td>
</tr>
<tr>
<td>B</td>
<td>05</td>
<td>Fishing</td>
</tr>
<tr>
<td>C</td>
<td>10 – 14</td>
<td>Mining and quarrying</td>
</tr>
<tr>
<td>D</td>
<td>15 – 37</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>E</td>
<td>40 – 41</td>
<td>Electricity, gas and water supply</td>
</tr>
<tr>
<td>F</td>
<td>45</td>
<td>Construction</td>
</tr>
<tr>
<td>G</td>
<td>50 – 52</td>
<td>Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods</td>
</tr>
<tr>
<td>H</td>
<td>55</td>
<td>Hotels and restaurants</td>
</tr>
<tr>
<td>I</td>
<td>60 – 64</td>
<td>Transport, storage and communication</td>
</tr>
<tr>
<td>J</td>
<td>65 – 67</td>
<td>Financial intermediation</td>
</tr>
<tr>
<td>K</td>
<td>70 – 74</td>
<td>Real estate, renting and business activities</td>
</tr>
<tr>
<td>L</td>
<td>75</td>
<td>Public administration and defence; compulsory social security</td>
</tr>
<tr>
<td>M</td>
<td>80</td>
<td>Education</td>
</tr>
<tr>
<td>N</td>
<td>85</td>
<td>Health and social work</td>
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<tr>
<td>O</td>
<td>90 – 93</td>
<td>Other community, social and personal service activities</td>
</tr>
<tr>
<td>P</td>
<td>95</td>
<td>Activities of households</td>
</tr>
<tr>
<td>Q</td>
<td>99</td>
<td>Extra-territorial organizations and bodies</td>
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</table>

Appendix K. Market share ranking in the listed segment by (square root) clients' sales

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Deloitte</td>
<td>Deloitte</td>
</tr>
<tr>
<td>2</td>
<td>PwC</td>
<td>KPMG</td>
</tr>
<tr>
<td>3</td>
<td>DDC</td>
<td>Ernst &amp; Young</td>
</tr>
<tr>
<td>4</td>
<td>Arthur Andersen</td>
<td>PwC</td>
</tr>
<tr>
<td>5</td>
<td>Ernst &amp; Young</td>
<td>Delvaux, Fronville, Servais &amp; partners</td>
</tr>
<tr>
<td>6</td>
<td>KPMG</td>
<td>Grant Thornton, Lippens, Rabaey</td>
</tr>
<tr>
<td>7</td>
<td>Goossens, Gossart, Joos</td>
<td>BDO</td>
</tr>
<tr>
<td>8</td>
<td>VGD</td>
<td>Fallon, Chainiaux, Cludts, Garny &amp; Co</td>
</tr>
</tbody>
</table>