Team Composition and Labor Allocation in Audit Teams:
A Descriptive Note

Abstract

Purpose

The purpose of this descriptive paper is to describe, illustrate, and provide a deeper understanding of team composition and labour allocation in audit teams by quantifying the exact value of resources at different levels of the audit production. Audit teams have been considered as a black box in audit research. Therefore, we report descriptive statistics on (levels and proportions of) hours and costs allocated to auditor ranks (and the number and value, i.e., billing rates, of auditors for different ranks and the entire team) to shed new insights on audit teams.

Design/methodology

This study utilizes a proprietary dataset containing disaggregated information on hours, costs, and billing rates for each team member in each of 908 audit engagements. The data is provided by a Swedish Big 4 audit firm. We use a purely descriptive approach and categorize auditors into seven ranks. As size and the publicly listed status are very important determinants of audit production, we split engagements in public and private companies and report statistics for size quartiles of both public and private clients.

Findings

The paper provides descriptive statistics for (1) client size, (2) audit team members, (3) audit hours, (4) audit costs, (5) proportion of audit hours, (6) proportion of audit costs, (7) billing rates, and (8) variation of billing rates. Results show that compared to private clients, the audit firm allocates higher effort from auditors in higher ranks and lower effort from auditors in lower ranks to public clients. Another finding is that allocation varies with client size for private clients, but less so for public clients.

Originality/value

In an area with sparse literature, this descriptive study serves as a first step to improve our understanding and guide future research. It provides concrete support for previously known theory.

Key words: audit teams, labor allocation, team composition, audit costs, audit hours, billing rates.

1. Introduction

Audit teams have been described as one of the most important determinants of audit quality in recent audit frameworks (Francis, 2011; Knechel *et al.* 2013). Complex tasks involved in audit work require the use of different competencies and perspectives that go beyond those possessed by an individual (Detillo 2012; Cameran *et al.* 2017). The IAASB provides general guidelines about which audit inputs, processes, and contexts can influence audit quality, and it specifically states that engagement teams should be "properly structured" (IAASB, 2013). While there has been research investigating audit labor allocation and audit production (e.g., O'Keefe *et al.* 1994; Hackenbrack and Knechel 1997; Dopuch *et al.* 2003; Bell *et al.* 2008; Schelleman and Knechel 2010) and more recently on the association between audit team attributes and audit quality (Cameran *et al.* 2017),[1] far more research is needed to build up a knowledge base on audit teams.

Our dataset contains information on audit costs (i.e., audit hours*billing rates) and audit hours at the *individual team member* level.[2] Billing rate is the unit audit price, and we derive the billing rate for *each team member in each team*.[3] Another unique aspect of this dataset is that it consists of detailed ranks, i.e., the ranks of partners, directors, senior managers, managers, assistant managers, senior associates, associates, and others.[4] This detailed information on audit costs, hours, and billing rates enables us to provide new insights about composition and labor allocation in audit teams. Some prior studies have gained access to audit hours (e.g., O'Keefe

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[1] O`Keefe (1994), Bell (2008) and Schelleman and Knechel (2010) use proportietary data to study allocation of audit hours (audit effort) by higher and lower auditor ranks in both public and private audit clients

[2] Audit cost is the production of the number of audit hours with the unit audit price (or billing rate). Hence, audit cost is the production cost for the audit client, and the aggregated audit costs at the team level serve as the benchmark for billing audit clients.

[3] We focus on audit costs associated with audit production, but do not consider billing policies that are related to audit fees. Billing rate refers to the unit audit price used internally in the audit firm.

[4] Director is a term not much used in the audit literature. A director is an experienced auditor in a rank between partners and senior managers. The rank "others" includes secretaries and other temporary staff, and usually has a low proportion of audit hours and audit costs in audit teams.

et al. 2004, Bell et al. 2008, Schelleman and Knechel 2010) but they have been unable to study audit costs and billing rates and do not have detailed information at the auditor level.

The purpose of this study is *not* to investigate whether or how audit teams are related to audit effort and audit quality. Instead, this paper is purely descriptive, and does not intend to i) refer to any specific theories, ii) develop hypotheses, or iii) provide formal statistical tests. It aims to advance our understanding of the structure composition of audit teams by quantifying the exact amount of hours and costs allocated to audit team members (divided into specific ranks) and in different types of audit engagements (public and private clients divided into size quartiles). More specifically, we report descriptive statistics on, for each rank (and each team if applicable), the number of team members (team size), the amount of audit hours, audit costs, proportion of audit hours, and proportion of audit costs.

While descriptive research is by no means the norm in this subject area, there are several examples of such studies in the literature; for example, Bishop, Hermanson, and Houston (2013) on PCAOB inspections; Wolk *et al.* (2001) on auditor concentration in the US; Peel (1997) on UK auditor concentration; Pong (2004) on audit pricing; and Beattie and Fearnley (1994) on the UK audit market.

Descriptive studies "often represent the *first* scientific toe in the water in new areas of inquiry" (Grimes and Schulz, 2002, p. 145). Descriptive research involves gathering data for events, persons, and situations and then organizing, tabulating, depicting, and describing the data (Glass and Hopkins, 1984; Saunders *et al.* 2016). In an under-investigated research area such as audit teams (Francis 2011), this rich descriptive study can serve as a reference point for future research by providing detailed knowledge of team composition and resource allocation based on statistics from actual audit team engagements.. Therefore, we respond calls for a better understanding of audit teams with a purely descriptive study design (Francis, 2011; Rich *et al.* 1997).

There is evidence that audit teams outperform individual auditors in audit engagements (Solomon, 1982; Trotman and Yetton, 1985). For example, work performed by an audit team results in a more effective audit than a combination of work performed by individual auditors due to face-to-face interactions (Solomon, 1982), interactions via group support system technology (Bamber *et al*. 1996), and hierarchical review systems (Ismail and Trotman, 1995; Owhoso *et al*. 2002). These interactions facilitate group process gains such as knowledge pooling and error correction. This indicates the importance of gaining a better understanding of audit teams, e.g., how teams are composed, team size, the distribution of work across different ranks, and how team size and work distribution differ for clients with different levels of risk and size.

As client size and public/private status are very important determinants of audit production (e.g., Hay *et al*. 2006; DeFond and Zhang, 2014), we split the sample based on these two dimensions. Specifically, we sort public and private clients into quartiles based on total assets. Auditors in different ranks have heterogeneous levels of experience and take different responsibilities within the teams, and information on their absolute and relative degree of involvement in the engagement helps us understand how the audit firm prioritizes allocation of resources. By using data on audit costs and billing rates of *each team member* and *many* ranks, we provide extensive information that has not been previously reported in the audit literature.

While little is known about audit costs and billing rates in the literature, relatively more has been explored with regard to audit hours. For example, several studies have examined the determinants of audit effort measured by audit hours (e.g., O'Keefe *et al*., 1994; Simunic and Stein, 1996; Schelleman and Knechel 2010). Bae *et al*. (2016) relate audit hours to industry specialist auditors and proxy average billing rate by dividing total audit fees by total audit hours. The average billing rate at the team level is however not very informative about allocation decision-making given the large variations in billing rates between ranks of auditors. Prior

literature has not provided detailed breakdowns (overviews) of hours and costs allocated to multiple ranks of auditors of different sized public and private clients.

Although this study provides a great deal of detailed information due to the nature of descriptive studies, we only briefly highlight a few interesting findings here. For example, the proportion of audit hours allotted to each rank is little affected by client size for the segment of public clients, but is significantly affected by the size of private clients. For private clients, the proportion of hours allocated to auditors in higher ranks (e.g., partners and senior managers) positively correlates with client size, while proportion of hours assigned to lower ranked auditors correlates negatively with client size. In contrast, except for the rank of directors and senior managers, the proportion of hours for the largest and smallest size quartiles of public clients is statistically insignificant. These results suggest that audit firms apply relatively similar allocation strategies when working with public clients, independent of their size, but not with private clients. A potential explanation is that (Big 4) audit firms deliver high (or similar) quality to different sized public clients as public clients generally expose (Big 4) audit firms to high risks. Furthermore, the statistics of billing rates provide consistent stories. While billing rates of auditors of all ranks except partners are quite similar for the four size quartiles of public clients, billing rates of auditors in all seven ranks are statistically higher for the largest private clients than for small private clients.

This paper has several contributions. First, the findings of this study support what, theoretically, has been expected all along, that is, audit firms devote more resources to audits that are perceived to be more risky than audits of less risky companies; However, prior studies had been unable to *quantify* the value of the resources at different levels of the audit production processes. In contrast to prior literature, this paper devotes its attention on demonstrating how audit firms generally deploy more resource – audit hours, audit costs, experienced staff, etc. to (1) audits of public companies than private companies and (2) larger companies than smaller

companies. Hence, it contributes to the literature by shedding more light on the nature and value of the audit resources being allocated to different types of audit clients by partners, directors, senior managers, and audit staff.

Second, this paper reveals interesting patterns from the detailed statistics. For example, while the allocation of resources, especially highly ranked auditors (e.g., partners), varies a lot for different sized private clients, it is relatively more similar for different sized public clients. We believe that this is an interesting finding and it has not been shown in prior literature. Another example is about billing rates. In contrast to the few previous studies that examine average billing rates at the team level (Bae, et al., 2016), our access of unique data on billing rates *at the auditor level* reveals large variations of billing rates within the same rank and also overlaps among different ranks. These observations could render guidance for future research.

Third, this study generates new and unique insights into the internal structure of audit teams. Until now, internal information on how audit firms compose their teams and how they allocate labour resources between multiple ranks of auditors to clients of various sizes and risk exposures (e.g., public versus private) has been little understood by academics or stakeholders outside audit firms.

Fourth, this study may bring some important insights to standard-setters because the way audit engagement teams are structured plays a crucial role in audit conduc and ultimately in determining the quality of the audit service delivered (PCAOB 2013, p. 6; IAASB 2013). For example, the allocation of similar amount of partners to different sized public clients may indicate that (Big 4) audit firms allocate sufficient resources for all public clients, no matter their size.

Finally, based on the rich descriptive statistics presented, we identify certain areas and aspects that are relevant and promising for researchers to pursue in future research (see details

in section 4.9). At a more general level, this paper contributes towards building up the knowledge base on audit teams.

This paper is subject to caveats. As the data concerns one Big 4 audit firm from one single country, there are limitations with regard to generalizability. However, because Big 4 firms have international networks and often implement similar policies worldwide, the evidence in this paper is likely to be generalizable to other countries. Another caveat is that this paper is only descriptive and does not investigate, e.g., the effect of audit teams on audit quality.

The rest of the paper is structured as follows. Section 2 provides a brief discussion of the institutional setting in Sweden. Section 3 describes the data. All the statistics are presented in Section 4 and Section 5 concludes the paper.

2. Institutional setting

There are 720 listed (i.e., public) companies in Sweden (as of 31 December, 2016). Among them, 299 are listed in major market places (NASDAQ OMX Stockholm, large, mid or small cap), and the rest are listed on smaller lists such as Firth North, Aktietorget, NGM Equity, and NGM Nordic MTF. [5] In addition to the general rules and requirements applicable to all companies, public companies are required to follow constraints issued by the stock exchange while auditors are required to follow the EU directives regarding audits of Public Interest Entities (EU, No 537/2014). There are slightly fewer than 440,000 unlisted (i.e., private) limited liability companies in Sweden, of which a vast majority are small. Only the very smallest entities are currently exempt from the statutory audit requirement.

The Swedish audit market consists of over 900 audit firms but is dominated by the Big 4 firms, especially in the market of public companies. The Big 4 audit firms employ about 50%

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[5] The main market place NASDAQ OMX Stockholm divides the listed companies into three groups based on market value (large, mid, and small cap). The reasons are not explicitly stated but it can be assumed to guide investors in distinguishing between and selecting companies.

of certified auditors in Sweden. The vast majority of audit firms are small and do not have an international network. International Standards on Auditing (ISA) are applicable to all statutory audits in Sweden.

The number of certified auditors in Sweden is 3,391 (as of 31 December, 2016). These auditors are (formally) allowed to sign audit reports in both private and public companies. However, in practice, all engagements with public companies are signed by an audit partner (i.e., owner). This is not the case for audits of private companies where it is common that the signing auditor is not a partner. The signing auditor may have the role of senior manager or director. About 30% of certified auditors working in the Big 4 audit firms in Sweden are audit partners.

Audit partners are at the top of the audit team hierarchy. The role of the partner is to plan the audit, monitor the audit process, communicate with the clients, and report the findings in the audit report, among other duties. Directors are experienced auditors who have a supervisory role within audit teams. Assistant audit managers may have relatively limited experience (2-3 years) but they still have significant responsibility in terms of communication with clients and associates and in performing actual audit work. Associates are at the bottom of the hierarchy and undertake mostly routine work. After one or two years, they typically advance to a senior associate position. While job roles may overlap between ranks – between senior associates and assistant managers, for example – advancing from (senior) associate to (assistant) manager is a major shift in terms of responsibility and many find it challenging to take on this new role.[6]

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[6] This paragraph is largely based on information from 11 interviews conducted in various large audit firms. These interviews involved 18 different auditors/audit associates and one tax specialist, from a total of eight different audit teams.

For audits of public companies in Sweden there is a noticeable litigation risk for the audit firm and the signing audit partner. There are recent cases of potential audit failures that have gone to court with substantial claims.[7] These cases have attracted considerable media attention. The litigation risk for audits of private companies in Sweden is very small. In addition to litigations, auditors can suffer reputational loss from receiving disciplinary sanctions issued by the Supervisory Body of Public Accountants (SBPA). The ultimate risk is losing one's license as a certified auditor (the number licenses withdrawn annually in Sweden is about 5-10) but more common sanctions are reprimands or warnings. Investor protection is quite high in Sweden. According to World Bank data on the ease of doing business including the level of investor protection in 190 countries (World Bank 2018), Sweden was ranked 10 overall and 29 in the category of protection of minority shareholders (figures from 1 June, 2017). This ranking indicates that the level of investor protection in Sweden is relatively high, though not at the highest level.

3. Data and methodology

This paper uses a unique dataset including 909 audit teams/engagements in 2016 (covering the full audit cycle from July 2015 to June 2016), provided by a Big 4 audit firm in Sweden based on our requirement of audit teams involving at least three different ranks.[8,9] The data contains disaggregated information on the number of audit hours and the corresponding audit costs for *each* team member in *each* audit engagement. All the auditors are categorized into specific

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[7] There have been recent legal processes against auditors in HQ Bank and Kraft & Kultur. In December 2017, the district court denied the claims of 3.2 billion SEK against KPMG and the responsible audit partner for the audit of HQ Bank. The verdict in the court of appeal regarding the audit of Kraft & Kultur has not yet been announced. The claims directed against Grant Thornton and the responsible audit partner are for 1.8 billion SEK. Furthermore, in August 2013, the court of appeal decided to issue damages of 2 billion SEK (including interest rate) against the audit firm (audit partner) auditing Prosolvia. Later, an off-court settlement of 742.5 million SEK was arranged. 1 SEK = 9.58 EUR as of December 31, 2016.

[8] All companies included in the sample have 31st of December 2015 as their fiscal year end. The audit cycle runs from July 2015 until June 2016. The planning of the audit starts in the autumn of 2015. However, most audit hours are typically spent during the first month of 2016 when the audit evidence is gathered.

[9] While the majority of teams have auditors in at least three ranks, a few teams only involve auditors in two ranks.

ranks: (1) partner, (2) director, (3) senior manager, (4) manager, (5) assistant manager, (6) senior associate, (7) associate, and (8) others. The rank "others" includes secretaries and temporary staff, who are less important for strategic labor allocation and audit quality. The team members in rank "others" usually have low billing rates and a low proportion of audit hours.

We measure audit hours and audit costs for each rank (team) by aggregating audit hours and audit costs of all the team members in the rank (team). Algebraically, we specify audit hours and audit costs for each rank (*HoursRank* and *CostsRank*) and for each team (*HoursTeam* and *CostsTeam*) as follows,

$$(1)\ HoursRank = \sum_{i=1}^{m} Hours_i$$

$$(2)\ HoursTeam = \sum_{i=1}^{n} Hours_i$$

$$(3)\ CostsRank = \sum_{i=1}^{m} Costs_i$$

$$(4)\ CostsTeam = \sum_{i=1}^{n} Costs_i$$

where *i* refers to each individual auditor. There are *m* team members in each rank and *n* team members in each team, and *n>m*.

The proportion of audit hours (*ProH_Rank*) and audit costs (*ProC_Rank*) of each rank is computed below.

$$(5)\ ProH\_Rank = \frac{HoursRank}{HoursTeam}$$

$$(6)\ ProC\_Rank = \frac{CostsRank}{CostsTeam}$$

We compute billing rate (*Billing*) for each auditor i in each team j by using the information on the number of audit hours and the corresponding audit costs, as shown below,

$$(7) \; Billing_{ij} = \frac{Costs_{ij}}{Hours_{ij}}$$

where *Hours*$_{i,j}$ (*Costs*$_{i,j}$) is the amount of audit hours (costs) auditor i spent in audit team j.

The final sample includes teams working with a total of 908 clients (one client was omitted due to data issues). 92 of these clients were public and the rest (816) were private. It is well documented that client size is the most important determinant of audit fees and audit hours (e.g., Hay *et al*., 2006; Causholli *et al*. 2013). Another very important factor affecting audit production cost (e.g., fees) is the publicly listed status of audit clients. This is because publicly listed firms, compared to private firms, expose auditors to much higher risks, such as litigation risk, reputation risk, and regulation risk (DeFond and Zhang, 2014; Knechel *et al*. 2007). Badertscher *et al*. (2014) find evidence that audit pricing is significantly higher for firms with public equity than firms that have private equity but are otherwise similar. To provide insights into how team composition and labor allocation vary when it comes to these two important dimensions (client size and public status), we split audit clients in terms of their public status and client size (i.e., total assets). More specifically, we split the 92 public and 816 private clients into quartiles based on total assets.

4. Results

This section provides descriptive statistics for (1) client size, measured by total assets, (2) the number of audit team members, (3) audit hours, (4) audit costs, (5) the proportion of audit hours, (6) the proportion of audit costs, (7) billing rates, and (8) standard deviation of billing rates. Please note that while the statistics for audit hours and costs are on the *rank* and *team* level,

statistics for billing rates are at the *individual auditor* level. Definitions of all the variables are provided in Appendix A.

4.1 Client size

--Insert Table 1 about here--

Table 1 Panel A presents descriptive statistics on total assets (TA) in million SEK (mSEK) for the full sample (All), public firms (Public), and private firms (Private) in the first three rows. The statistics include the number of audit clients (*N*), mean (*Mean*), standard deviation (*SD*), and the 5th, 25th, 50th, 75th, and 95th percentiles.[10] The last two rows report the difference between the mean of total assets for public and private firms (Diff(Public-Private)) and its t-value. The first row shows that the mean total assets (*Mean*) for the full sample (*All*) is 2,064 mSEK, with a large standard deviation (*SD*) of 7,273 mSEK. The second row shows that the average total assets of public clients is 6,960 mSEK, which is more than four times the average size of all private clients (1,512 mSEK) in the third row. The difference between the mean total assets of public and private clients is 5,448 mSEK, which is statistically significant at the 1 percent level with a t-value of 7.

Panel B (C) reports the descriptive statistics for total assets of each of the four size quartiles of public (private) clients.[11] In both Panels B and C, the first four rows report the statistics on total assets for Q4-Largest, Q3, Q2, and Q1-Smallest, respectively. Panel B shows that there are 23 public clients in each quartile, with a significant variation in total assets among

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[10] Reporting statistics for p25, p50, and p75 gives a good overview of the overall distribution of the data and is often used in the literature. For anonymity reasons, we choose not to report minimum and maximum values. In order to provide more information on the largest and smallest observations, we have added statistics for the 5th and 95th percentiles (p5 and p95). Anonymity is also the reason why we cannot report on which companies in our sample that are Public Interest Entities (PIE).

[11] The purpose of splitting audit clients into size quartiles is to examine how audit production varies according to client size. Other alternatives could be to divide public/private clients into quintiles or deciles. However, given that there are 92 public clients and 816 private clients, splitting firms into quartiles leads to the same number of clients in each quartile for both public and private clients, and a relatively higher number of observations in each quartile, especially for public clients.

the four groups. The largest group, Q4, has a mean TA of 25.57 billion SEK while the mean TA of Q2, Q3, and Q4 is only 1.69, 0.48, and 0.111 billion SEK, respectively. The last two rows present the difference of mean TA between Q4 and Q1 (25.46) and the t-value of the difference (5.3), which is statistically significant at the 1 percent level. Panel C presents similar data for private clients, though the difference between Q4 and Q1 is smaller. The mean TAs of Q4, Q3, Q2, and Q1 are 5.33, 0.53, 0.16, and 0.03 billion SEK, respectively. The difference between the mean TAs for Q4 and Q1 are also significant at the 1 percent level with a t-value of 7.8.

As evidence shows that client size is highly correlated with audit production (e.g., Hay et al., 2006), and the focus of this paper is on audit costs, audit hours, and billing rates, we provide a correlation matrix of total assets (*TA*), the aggregated value of audit costs (*SumCosts*) and audit hours (*SumHours*), and average billing rates (*BillingTeam*) at the team level. *BillingTeam* is the ratio between *SumCosts* and *SumHours*, which measures the average billing rates in each team. Panel D of Table 1 presents the correlation matrix. The correlations between *TA* and *SumCosts* and between *TA* and *SumHours* are high, at 0.60 and 0.57, respectively. The correlation between *SumCosts* and *SumHours* is extremely high, at 0.988, which indicates that billing rates among different teams are quite similar. The last row of Panel D shows that correlations between *BillingTeam* and the three variables *TA*, *SumCosts*, and *SumHours*, which are 0.225, 0.33, and 0.25, respectively, are much lower than the correlations between *TA*, *SumCosts*, and *SumHours*. This panel illustrates that while total assets and aggregated audit costs and hours are highly correlated at the team level, billing rates are less correlated with client size and audit costs and hours.

4.2 The number of team members

Table 2 presents the number of team members in each team (team size). Panel A illustrates team size for all the teams in the full sample. The column "*N*" indicates the number of teams that have at least one member in the specific rank/team. The statistics include mean (*Mean1* and *Mean2*), standard deviation (*SD*), and the 5th, 25th, 50th, 75th, and 95th percentiles. Not all teams have auditors in all the ranks, and we report the mean values for each rank based on the teams that have auditors in that rank (*Mean1*). As the number of teams that include at least one auditor in one specific rank could be different among ranks, the sum of *Mean1* across all seven ranks may not equal the *Mean1* for all the teams. To assist understanding of the composition of audit teams, we also report the mean value (*Mean2*), taking into account all the audit teams in the sample (i.e., 908 observations in the full sample). For example, if one team does not have any partners (*NumMemPart* is 0 for this team), this team is included when computing *Mean2*, but not *Mean1*. Hence, the sum of *Mean2* across all the ranks is equal to *Mean2* for the entire team (*NumAllNumbers* in the first row), but the same is not applicable to *Mean1*. *SD* and other statistics are based on the same sample as the one for *Mean1*.

The first row (*NumAllMembers*) shows that, on average, there are 10 team members per team. The median (*P50*) is 9 team members. The next row (*NumMemPart*) reports the number of partners for each team. 683 of the teams had partners on them, which means that 225 (=908-683) teams did not involve partners (differences between different types of engagements are discussed in Panels B, C, and D below). Among the teams that have partners, there are 1.4 partners on average (*Mean1*), with a median of 1 partner.[12] Note that we do not have information

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[12] Engaging multiple partners is much more common for public clients than for private clients (the average number of partners is 2.72 and 1.21 for public and private firms, reported in Panel B of Table 2). For public clients, multiple partners are often involved in the engagement (the median is 2 partners). Partners can undertake different tasks, e.g., one partner is more involved in the planning and collection of audit evidence while another oversees an

on who was the signing partner and how partners co-operated on teams that involve multiple partners.[13]

The row (*NumMemDir*) presents the number of team members that are directors. 435 of the teams involved directors, slightly less than half the sample. For the 435 teams that had directors, there are 1.35 directors on average (*Mean1*). The next three rows show that the number of teams that had senior managers (*NumMemSenman*), managers (*NumMemManag*), and assistant managers (*NumMemAssman*) is 408 (corresponds to 44.9 % of the engagements), 539 (59.4 %), and 698 (76.9 %), respectively. The average number of members (*Mean1*) for the three ranks is 1.29, 1.47, and 1.87, respectively, conditional on the teams that have at least one member in the specific rank. This suggests that the lower the rank of manager, the greater is the number of managers involved in audits, which is intuitive given the hierarchy of these ranks.

The next two rows show that the number of teams that had senior associates (*NumMemSenass*) and associates (*NumMemAssoc*), at 792 and 794, respectively, is higher than that for the different types of managers. The average numbers of senior associates and associates in column "*Mean1*", at 2.44 and 2.69, respectively, are also higher than other ranks. Again, this is not surprising because associates are at the bottom of the hierarchy. The last row indicates that there are 509 teams that have other team members (*NumMemOthers*), and the average number is 2.05. Note that the values in column "*Mean2*" are smaller than the values in "*Mean1*" for all rows except the first one, which is reasonable because the denominator for computing *Mean2* is 908 for all the rows while the denominator for calculating *Mean1* is the numbers in column "*N*" that are lower than 908.

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internal review or monitoring process. Expert partners might also be involved in different stages of the engagement to deal with special issues, e.g., tax, IFRS.

[13] The (private) clients that are not assigned a partner are typically small. In the smallest size quartile (Q1) of private clients (see Panel D in Table 2), there is on average 0.54 partners assigned to the engagement, which indicates that on a large proportion of these engagements there is no partner assigned.

Panel B reports the descriptive statistics of the number of team members for public firms (the first five columns) and private firms (the next five columns), and t-values (*t-value1* and *t-value2*) for the means (*Mean1* and *Mean2*) of the two groups in the last two columns. For all the team members in the first row (*NumAllMembers*), there are 17.5 and 9.41 auditors on average for public and private clients, and the difference is statistically significant at the 1% level with a t-value of 10.7. The second row shows that audit teams for all the 92 public clients have partners, and the mean (*Mean1* and *Mean2*) number of partners is 2.72. For the 591 private firms that have partners, the average number of partners (*Mean1*) is 1.21. The different uses of partners suggest that engagements in public firms are considered more important than engagements in private clients and that partner expertise is more frequently assigned to public clients than to private clients. One potential explanation is that public clients expose audit firms to much higher risks in terms of litigation risk, reputation risk, and regulation risk, among others (DeFond and Zhang 2014). Furthermore, public clients are associated with increased complexity and more formal requirements such as discussions with management, board, audit committee etc., and with reputational concern (stemming from increased risk of litigation, etc.).

The difference in the average number of partners for public and private clients is statistically significant with a t-value of 18.2 (*t-value1*). For all other ranks, the average number of auditors (*Mean1*) is also significantly higher for public clients than for private clients. Note that compared to the rank of partners, the significance level of the differences for the other ranks is relatively weaker. The last column (*t-value2*), which reports the t-statistics for the differences of *Mean2* for private firms and public firms, provides similar results as the column *t-value1*.

Panel C of Table 2 reports the statistics on team members for the size quartiles of public clients. The first two columns present *Mean2* and *SD* for Q4-Largest quartile, and the next six columns for Q3, Q2, and Q1-Smallest quartiles. The last two columns show the difference (*Diff*) between *Mean2* of Q4 and Q1 and its t-value. For all the rows, both for all the members in a

single team (*NumAllMembers*) and for the number of auditors in each rank, the mean is statistically higher for the largest public clients than for the smallest public clients. While this is not surprising as larger clients need more effort and a greater number of auditors, the value of this paper is to provide information on the exact resources allocated to different types of audit clients at both the team and especially rank level. For example, while the average number of partners for Q4 is 4.30, which is 90% (=4.3/2.26-1) higher than the number of partners for Q1, the average number of senior associates (*NumMemSenass*) for Q4 is 211% (=6.22/2.00-1), higher than that for Q1. As the number of partners is relatively high for both small and large public clients, compared to auditors in lower ranks, this indicates that partners are much more highly valued than lower ranked auditors for both large and small public clients. This kind of internal information of audit firms has been little understood by academics and could advance our understanding of audit production.

Panel D of Table 2 is similar to Panel C and the only difference is that Panel D focuses on private clients while Panel C focuses on public clients. Similar to Panel C, the last two columns in Panel D show that the differences between the largest private clients (Q4) and the smallest private clients (Q1) are statistically significant. In sum, Table 2 indicates that the audit firm may have different strategies for allocation of resources for different (types of) engagements. There is a difference in resource allocation of all ranks when comparing small and large companies, and the difference seems to be most noticeable for the highest ranked auditors (i.e., partners).

4.3 The number of audit hours

--Insert Table 3 about here--

Panel A of Table 3 presents the number of audit hours for the full sample of 908 teams. The first row (*HoursTeam*) indicates an average of 439 hours (*Mean1* and *Mean2*) and a median of

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301 hours (*P50*) at the team level. The next two rows show that for the teams that have partners and directors, the average number of hours (*Mean1*) is 53 and 80 for the ranks of partners and directors. The average number of audit hours (*Mean1*) for senior managers (*HoursSenman*), managers (*HoursManag*), and assistant managers (*HoursAssman*) is 82, 103, and 114, respectively. The mean audit hours (*Mean1*) for senior associates (*HoursSenass*) and associates (*HoursAssoc*) are 111 and 79. The two rows next to the last report the total hours of all three ranks of managers (*HoursAllManag*) and both ranks of associates (*HoursAllAssoc*). The column "N" is 861 and 899 for these two rows, which indicates that the majority of teams have at least one rank of managers and at least one rank of associates. The average number of audit hours (*Mean1*) for all managers and all associates is 195 and 168, respectively. Overall, a slightly higher amount of hours is carried out by managers, compared to associates. The last row shows that the average number of hours for rank "Others" is only 17 for the 509 clients.

Panel B presents the statistics on audit hours for public clients (the first 5 columns) and private clients (the next 5 columns), and the t-values of the differences between the means of audit hours (the last two columns). The first row (*HoursTeam*) reports that the average number of total hours is 1016 and 374 for public and private clients, respectively, and the difference is statistically significantly at the 1% level (t=9.5). This indicates that significantly more effort is allocated to public firms than private clients. The rest of this panel shows that the average number of audit hours for all the ranks is statistically higher for public clients than for private clients. While these results are expected because public clients are in general both larger and riskier than private firms, these numbers provide us with much detailed information on audit firms' audit production. For example, unreported statistics suggest that the effort of partners and directors is about 230% (e.g., 134/40-1=2.25 for partners; 202/62-1=2.29 for directors) times more for public clients than private clients, while the number for other (lower) ranks is

in general lower than 150%. This indicates that the audit firm allocates relatively more resources from higher ranks (e.g., partner and director) to public clients, compared to private firms.

Panel C (D) of Table 3 reports *Mean2* and *SD* of audit hours for the size quartiles of public (private) firms. The first two columns report statistics for Q4-Largest, which displays the largest clients in the segment of public (private) clients. The next six columns report *Mean2* and *SD* for Q3, Q2, and Q1-Smallest quartiles. The last two columns report the difference of *Mean2* between Q4 and Q1 and its t-value. Panel C shows that for all the rows except the row for senior managers (*HoursSenman*), the difference between the audit hours for the largest and smallest public clients is statistically significant. The first column in Panel C indicates that the amount of hours from senior managers, which is 159, is much lower than all the other ranks except the rank "others" (*HoursOthers*). One interesting result is that directors are heavily assigned to the largest public clients (*HoursDir*=355), but are less assigned to the smallest public clients (*HoursDir*=21). In contrast, the difference between audit hours of senior managers in Q4 and Q1 is significantly lower, at 159 and 45. This may suggest that, relative to directors, senior managers are much less likely to be assigned to large public clients than to small public clients. These results illustrate that directors are more frequently assigned to large public clients while senior managers are relatively more assigned to small public clients. Panel D shows that audit hours in all the ranks are higher for the largest private clients than for the smallest private clients.

4.4 Audit costs

--Insert Table 4 about here--

We report audit costs (in 1000 SEK) in Table 4. Audit cost refers to the price used internally in the audit firm for allocation of resources to various engagements. It serves as a benchmark for charging fees to the clients. Panel A of Table 4 shows audit costs for the full sample. The first

row (*CostsTeam*) reports the audit costs at the team level, that is, the aggregated audit costs across all the team members in a team. The average audit costs for all the 908 engagements (*Mean1* and *Mean2*) are about 672,000 SEK, and the median (*P50*) is about 431,000 SEK. The next two rows show that, for the teams that have partners and directors, the average costs (*Mean1*) associated with auditors in these two ranks are 181,000 SEK and 205,000 SEK, respectively. These numbers are higher than the average costs of managers and associates in the five rows below when *Mean1* is considered. The two rows next to the last exhibit the aggregated costs for all three ranks of managers (*CostsAllManag*) and the two ranks of associates (*CostsAllAssoc*). The average costs for all managers and all associates are 287,000 SEK and 158,000 SEK, respectively.

Panel B of Table 4 presents the statistics on audit costs for public and private clients, and the t-statistics of the difference between the means for these two groups. The average audit costs for public clients are 1.74 million SEK, which is statistically higher than that for private firms, at 552,000 SEK. Similar to audit hours in Panel B of Table 3, the average total audit costs for public clients are much greater than those for private clients, and the differences are statistically significant for all the ranks.

Panel C (D) of Table 4 reports the statistics on audit costs for the size quartiles of public (private) clients. The first row in Panel C shows that the average costs for the entire team (*CostsTeam*) is 4.38 million SEK for Q4, which includes the largest public clients, while the value is only 539,000 SEK for Q1, which covers the smallest public clients in the sample. In general, Panel C of Table 4 corresponds well with Panel C of Table 3 (about audit hours), which suggests that audit costs and hours are highly correlated for different sizes of public clients. This is not surprising, and implies that billing rates may not differ much for large and small public clients. A similar story applies to private clients in Panel D of Table 4 and Panel D of Table 3.

4.5 Proportion of audit hours

While the levels of audit hours and costs are interesting because they show the exact amount of resources allocated to different ranks and different types of clients (public vs. private and large vs. small), they do not provide information on the labor mix among different ranks within a single team. The proportion of work assigned to juniors, managers, and partners will affect the amount of time spent on managing the relationships with the clients, managing the team, and executing the auditing tasks, and the degree of partner involvement in stages of the audit process may have an impact on audit quality (Maister, 1982; Cameran *et al.* 2018). For example, Cameran *et al.* (2018) find that a higher percentage of audit hours allocated to the groups of leading auditors (i.e., partners and managers) is, on average, associated with lower levels of audit quality, which goes against their prediction because audit quality is expected to improve when the most experienced and qualified auditors are more involved in the various stages of the audit process.

To provide a better understanding of the relative audit labor uses across different ranks, we report the proportion of audit hours (costs) for each rank in Table 5 (6). Proportion of audit hours/costs provides different information than levels because proportion indicates the effort of each rank relative to the whole team, while the level does not reflect effort of other ranks or the whole team. If the proportion of one rank increases, the proportion of another rank (or other ranks) has to decrease.

--Insert Table 5 about here--

Panel A of Table 5 reports descriptive statistics of the proportion of audit hours at the rank level for the full sample. For the teams that have partners and directors (*ProH_Part* and *ProH_Dir*), the average proportions of hours (*Mean1*) of partners and directors are 0.11 and 0.17. The mean value when taking into account all teams (*Mean2*) is much lower, at 0.08 for

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both ranks, because some teams do not have partners and relatively fewer teams have directors. The subsequent five rows show that the average proportion of hours (*Mean1*) is about 0.26 for both assistant manager (*ProH_Assman*) and senior associates (*ProH_Senass*), and around 0.2 for the other ranks of managers and associates. The two rows next to the last indicate that the proportion of hours for all the managers (*ProH_AllManag*) is 0.45, and is 0.4 for all the associates (*ProH_AllAssoc*) when *Mean1* is concerned. Column "*Mean2*" shows that, except for the row "*Others*", which has the lowest proportion of hours (0.02), the proportion of hours for partners, directors, and senior managers is lower than 0.10, while it is highest for senior associates (*ProH_Senass*) and assistant managers (*ProH_Assman*), at over 0.20. These proportions are informative in relation to how audit work is allocated among different ranks and highlight how much of actual audit work in terms of hours assistant managers and senior associates or managers and associates in general undertake.

Panel B of Table 5 presents the proportion of audit hours allocated to public and private clients, and the t-values (*t-value1* and *t-value2*) of the differences of the means (*Mean1* and *Mean2*) for these two groups. The column *t-value1* shows that the average proportion of audit hours of partners (*ProH_Part*) is significantly higher for public clients than for private clients, with a t-value of 3.4. The *t-value1* in next three rows illustrates that differences of proportion of hours between public and private clients are statistically indifferent for directors (*ProH_Dir*), senior managers (*ProH_Senman*), and managers (*ProH_Manag*). The proportions of hours assistant managers (*ProH_Assman*), senior associates (*ProH_Senass*), and associates (*ProH_Assoc*) spend working with public clients are actually significantly lower than for private clients. The two rows next to the last show that the difference in proportion of hours for all associates (managers) is statistically lower (insignificant) for public clients, compared to private clients. The last column presents the t-value for the difference of *Mean2*, which takes all the teams into account regardless of whether they have auditors in specific ranks. The only

difference between the two t-values is that the difference of *Mean2* for directors and senior managers is significantly higher for public clients than for private clients. In short, Panel B of Table 5 implies that, compared to private clients, the audit firm allocates higher effort from auditors in higher ranks and relatively lower effort from auditors in lower ranks to public clients.

Panel C (D) of Table 5 reports *Mean2* and *SD* of proportion of audit hours at the rank level for size quartiles of public (private) clients. The last column presents the t-value of the difference between Q4-Largest and Q1-Smallest clients. While it is interesting to look at the detailed proportions of various ranks for different sized public and private clients, we focus on the differences in the labor mix for public and private clients of different sizes. The last column (*t-value*) in Panel C and Panel D of Table 5 presents different pictures. The difference of proportion of partner hours (*ProH_Part*) between the largest and smallest public clients in the first row of Panel C is insignificant, with a t-value of 0.5; however, the corresponding number for private clients in Panel D indicates statistical significance with a t-value of 3.7. The second row (*ProH_Dir*) presents a t-value of 2.5, which is significant at the 5% level, for the difference in proportion of directors' hours in the largest and the smallest public clients in Panel C, but gives a t-value of 0.8 for private clients in Panel D. Furthermore, the t-value for *ProH_Senman* in the third row is negatively significant in Panel C, but positively significant in Panel D. The differences for other ranks except *ProH_Others* are insignificant for public clients in Panel C, but are generally significant for private clients in Panel D.

Comparing the proportion of audit hours of each rank for public and private clients in different sizes in Panel C with Panel D reveals very interesting insights. It seems that allocating resources to public clients is not much affected by their size. The proportion of partner hours is quite similar across the quartiles. The only difference is that there are relatively more directors assigned to large public clients than to small public clients, and the opposite is true for senior managers. The proportions of hours in other ranks are also quite similar across different sizes

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of public clients. The story is very different for private clients in Panel D. First, the proportion of partner hours correlates positively with client size. Second, in general, more senior managers and managers are assigned to large private clients, and more senior associates and associates are assigned to small private clients.

These results contribute towards our understanding of audit firms' labor allocation and suggest that the effects of client size on audit firms' decisions differ for public versus private audit engagements. A potential explanation could be that public clients expose audit firms to high risks (e.g., litigation risk) and are subject to strict regulations, which are independent of size, while private clients do not pose such high risks.

4.6 Proportion of audit costs

--Insert Table 6 about here--

Table 6 presents the proportion of audit costs for each rank, which is similar to Table 5, with the difference of using audit costs instead of audit hours. In Panel A of Table 6, the first five rows show that the mean proportion of audit costs (*Mean1*) for partners, directors, and the three ranks of managers is higher than 0.2 when only considering the teams that have at least one member in the specific rank. The proportion of costs for each of the two ranks of associates is 0.19 and 0.12, respectively; lower than that for other ranks. This is intuitive as associates typically have the lowest billing rates.

The two rows next to the last show that the proportions of costs for all the managers (*ProC_AllManag*) and all the associates (*ProC_AllAssoc*) have an average value of 0.43 and 0.27, and the sum of the costs associated with all the managers and associates account for 70% (=0.43+0.27). Because relatively fewer teams have higher-ranked auditors, the column "*Mean2*", which is computed based on all the 908 teams, shows that the proportions of audit

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costs are lower than the values of "*Mean1*" for all ranks. The difference between "*Mean1*" and "*Mean2*" is greater for higher-ranked auditors.

Panel B of Table 6 reports the proportion of audit costs for the private and public firms, and the t-values (*t-value1* and *t-value2*) for the difference of the means (*Mean1* and *Mean2*) for the two portfolios. The next to last column (*t-value1*) shows that the proportion of costs of partners (*ProC_Part*) is significantly higher for public firms than for private firms, which is reasonable as public clients are associated with much higher risks than private clients and therefore need more work of partners, who are generally the most skilled and expensive auditors. However, the relation between proportion of costs in the rank of directors (*ProC_Dir*) and senior managers (*ProC_Senman*) and whether a client is public or private is statistically insignificant. The *t-value1* for the remaining ranks suggests that proportions of costs for ranks including and below managers are lower for public clients than for private clients. The last column (*t-value2*), which reports t-value between the difference of *Mean2*, shows that only the ranks of senior managers and managers have different values from *t-value1*. More specifically, the proportion of senior managers is higher for public than private clients, while the proportion of managers is statistically insignificant across public and private clients. This panel depicts a similar picture to that shown by Panel B of Table 5.

Panel C and Panel D of Table 6 provide *Mean2* and *SD* for proportions of audit costs of size quartiles of public and private clients, respectively. The comparison of the t-values of the differences between the largest and smallest quartile reported in the last column of Panel C and D in Table 6 provides similar stories as proportion of audit hours reported in panel C and D in Table 5. For public clients in Panel C of Table 6, the proportion of partner costs (*ProC_Part*) is quite similar across different sizes of public clients and the difference is statistically insignificant with a t-value of 0.6. For private clients in Panel D of Table 6, the proportion of partner costs is monotonically positively related to client size. The proportion of directors in the

second row is statistically higher for the largest public clients than the smallest public clients in Panel C, but is insignificant for the largest and the smallest private clients in Panel D. While senior managers are comparatively less often assigned to the largest public clients compared to the smallest public clients, as indicated in Panel C, the opposite is true for private clients in Panel D. For the remaining ranks, the proportions of costs are statistically insignificant for large and small public clients in Panel C. Managers are more frequently assigned to the largest private clients and auditors in ranks lower than managers are more frequently assigned to the smallest private clients, as reported in Panel D. In short, labor mix among ranks is less associated with client size for public clients, compared to private clients.

4.7 Billing rates

We present billing rates at the *individual auditor level* for each rank of auditors in Table 7. While a few previous studies have examined billing rates (Bae *et al.* 2016; Bedard and Johnstone 2004), they mostly focus on average billing rates at the team level, which is the ratio between total audit costs/fees and total audit hours. As we have much finer data on billing rates, we chose to take advantage of this information to provide insights into the exact billing rate of each individual auditor in each team set by the audit firm and how billing rates vary for auditors in different ranks and in the same rank. While it is interesting to explore how billing rates are determined, we leave this to future research and this paper only focuses on providing descriptive statistics, which could help provide a fundamental understanding of the different values of audit labor.

--Insert Table 7 about here--

Panel A of Table 7 presents the billing rates for the full sample at the *auditor-team* level. The first column (*N*) reports the number of auditors in all the teams and in each rank. There are 9235 auditors in the 908 teams, among them, 965 are partners, 587 are directors, 522 are senior

managers, etc. For all the observations, the average hourly billing rate is 1379 SEK reported in the first row (*BillingAll*). The 5th percentile (*p5*) and 95th percentile (*p95*) is 500 SEK and 3500 SEK, respectively. The average billing rate is a bit less than 3500 SEK for partners (*BillingPart*), about 2500 SEK for directors (*BillingDir*), close to 1900 SEK for senior managers (*BillingSenman*), slightly more than 1500 SEK for managers (*BillingManag*), about 1300 SEK for assistant managers (*BillingAssman*), about 1000 SEK for senior associates (*BillingSenass*), and finally slightly over 700 SEK for associates (*BillingAssoc*). The billing rates for partners are about 5 times the size of billing rates for associates on average. The standard deviation for each *rank* is less than 20% of the mean value for all the ranks except for associates, where the standard deviation is 25.6% (=188/733), and the rank "Others" (*BillingOthers*), which is due to team members having different experience levels and responsibilities.

Panel B of Table 7 presents billing rates for auditors auditing public and private clients, and the t-statistics for the difference of the means for these two portfolios. Billing rates for the whole team (*BillingAll*), partners (*BillingPart*), and directors (*BillingDir*), which are in the first three rows, are statistically higher for public clients than for private clients. Billing rates for auditors in ranks lower than directors are statistically insignificant when it comes to whether the client is a public or private one. The reason that auditors in higher ranks (e.g., partners) have higher billing rates when auditing public clients than private clients is likely to be that public clients expose audit firms to much higher risks, and therefore require auditors with more expertise, which is likely positively related to billing rates.

Panel C (D) of Table 7 presents the mean and standard deviations of billing rates for auditors in public (private) clients that are sorted into size quartiles. The first two columns report data for Q4-Largest, and the next six columns report the statistics for Q3, Q2, and Q1-Smallest. The last two columns report the difference between Q4 and Q1 and its t-value. Panel C, row 1, shows that billing rates for all the auditors (*BillingAll*) auditing the largest and the smallest

public clients are statistically insignificant. Billing rates for partners (*BillingPart*) are statistically higher for the largest public clients than for the smallest public clients with a t-value of 4.8. Billing rates of directors (*BillingDir*) and assistant managers (*BillingAssman*) differ less between the largest and smallest public clients, which are statistically significant at the 10% and 5% level only, while billing rates for other ranks are similar for large and small public clients. The billing rates of auditors in different sizes of private clients in Panel D present a very different picture. For all the rows except the last one (*BillingOthers*), billing rates for the largest private clients are statistically significant at the 1% level compared to billing rates of auditors for the smallest private clients.

Panel C and Panel D in Table 7 suggest that while the audit firm allocates partners with higher billing rates to the largest public clients, compared to the smallest public clients, auditors in other ranks are quite similar for public clients in different sizes in terms of billing rates. However, this is not the case for different sizes of private clients. For all ranks, billing rates of auditors assigned to the largest private clients are statistically higher than those assigned to the smallest private clients. Consistent with the results in previous tables, Table 7 indicates that the audit firm makes different labor allocation decisions for public and private clients.

4.8 Standard deviation of billing rates

We do not know whether audit firms adjust billing rates when auditors work for different engagements, e.g., engagements with different levels of risk or size. On the one hand, it might be unpractical for audit firms to do so. On the other hand, there is evidence showing that audit firms may increase (average) billing rates for risky engagements (e.g., Bedard and Johnstone, 2004). To investigate this issue, we examine whether the billing rate of the same auditor changes for different clients. For this purpose, we exclude auditors who have only been involved in one audit team in this sample. We then compute standard deviations of billing rates for each unique auditor.

The descriptive statistics of the standard deviations of billing rates for each unique auditor are presented in Table 8. The first column (*N*) indicates that there are 1299 unique auditors who have been involved in at least two teams in our final sample. The first row (*All*) shows that the average of the standard deviations of billing rates (*Mean*) is only 19. Recall that the mean billing rate is 1379 SEK in Panel A of Table 7, meaning that the average standard deviation of 19 corresponds to 1.4% (=19/1379) of variation. More than 50% of the unique auditors have a standard deviation of 0, which shows that they have exactly the same billing rates when working for different audit engagements. The 75th and 95th percentiles are 16 and 99, which are very low compared to the values of billing rates in Table 7.

The average values of standard deviation of billing rates for partners (*Part*), directors (*Dir*), and senior managers (*Senman*) are 35, 24, and 30. The corresponding numbers for the other ranks are below 20. Table 8 indicates that there are very few variations of billing rates for the same auditor when comparing the standard deviation of billing rates with the mean of billing rates in Table 7. This provides some evidence that the audit firm does not seem to adjust billing rates for the same auditor when auditing clients with different characteristics.

4.9 Identifying future research topics

The rich descriptive statistics of this paper provide unique and new insights that have not been documented previously. By linking the detailed values in the tables to the extant literature, we are able to identify a few relevant and potential research ideas.

First, it would be interesting to examine whether audit firms' resource allocation decisions within the public segment are different from those within private clients. While O'Keefe et al. (1994) show that public clients are associated with more audit hours in all auditor ranks, they do not explore resource allocations within public clients and within private clients

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separately. Table 2 indicates that the number of partners, who are most experienced auditors and have the greatest responsibilities, is significantly lower for smaller private clients than for larger private clients; however, it is quite similar for larger and smaller public clients. For example, Table 2, Panel C shows that the number of partners is 2.26, 2.04, and 2.26 for the 3rd, 2nd, and 1st size quartiles of public clients, while Panel D of Table 2 shows that the number of partners is 0.98, 0.78, and 0.55 for these three size quartiles of private clients. This suggests that a client's public/private status is a very important determinant of audit firms' resource allocation decision and that client size has much smaller importance for resource alloction in public clients than in private clients. It is likely that many other determinants also have different effects on resource allocation for public and private segments.

Second, future research may investigate how different types of audit engagements (e.g., public versus private, large versus small, high complexity versus low complexity) are composed and why resources are allocated in that way (rationale for allocation decisions). For example, one team could consist of partners, managers, and senior associates, while another team could include directors, senior managers, and (junior) associates. For relatively smaller clients, senior managers might take a lot of responsibilities and play an especially important role. On the other hand, because partners are typically allocated to large firms, especially public clients, audit firms might allocate less effort of senior managers but more junior staff for these clients to maximize the resource allocation outcome.

The third area could be to investigate how resource allocation and the mix of audit labor is related to audit quality (consequences of allocation decisions). While investigating determinants of resource allocation signals how the audit firm prioritizes engagements with various types of risks and requirements, we need direct tests of how allocation strategies (team composition, team size, number of partners, proportion of work conducted by ranks, specialists etc.) may affect audit quality.

Fourth, future research may investigate how billing (charge out) rates at the individual and rank level are determined. At least two observations can be made from Table 7. First, it shows there are distinct price differences among different ranks, ranging from partners (3 431 SEK) to associates (733 SEK), and as expected, the higher rank, the higher billing rate. However, there are also considerable within rank variations. For example, the average billing rate for partners (directors) is 3 025 SEK (2 313 SEK) at the first quartile in private clients and 3 802 SEK (2 798) for the fourth quartile in public clients. How audit firms determine the value or unit price of auditors (of different ranks) has not been considered in prior research on audit production.Future research may strive to gain an understanding of audit firms' internal policies of determining the value of their auditors within and across ranks.

5. Concluding remarks

This paper advances our understanding of labor uses in audit teams by taking advantage of a unique dataset, provided by a Swedish Big 4 audit firm, which contains disaggregated data on audit hours and audit costs for *each audit team member* for 908 audit engagements. As audits are conducted by audit teams, audit teams are important determinants of audit quality. However, our knowledge about the structure and labor mix of audit teams is very limited and among researchers the audit team is considered a "black box" (Francis, 2011; Rich *et al*. 1997). This paper sheds new light on this "black box".

Audit team members (auditors) are divided into many detailed ranks. This study focuses on the following ranks: partners, directors, senior managers, managers, assistant managers, senior associates, associates, and others. We provide descriptive statistics on the number of team members (team size), audit hours, and audit costs for each team and each rank. We also present information on the proportion of audit hours and proportion of audit costs for each rank. Furthermore, we report billing rates, which are calculated by dividing audit costs by audit hours for each team member, at the individual auditor level.

As size and the publicly listed status of clients are important determinants of audit production, we focus on these two dimensions and split each of the public and private client segments into size quartiles. The descriptive statistics provide very interesting findings. For example, while client size is associated with labor allocation in large and small private clients, it matters much less for large and small public clients. The reason could be that audit firms aim to deliver high audit quality to public clients no matter what the size of the firm, due to high litigation risk and other types of risk associated with public clients. These results shed light on audit firms' labor allocation decisions and could serve as a knowledge base for future research.

This paper is subject to the limitation of generalizability as our data on audit teams comes from one Big 4 audit firm only. It is possible that policies regarding allocation of labor, billing etc. are different in other audit firms. However, as Big 4 audit firms have international networks and often implement similar policies worldwide, the results of this paper may be representative for (at least some) audit firms in other countries. Another caveat is that this paper is purely descriptive, and does not aim to investigate, e.g., how audit teams affect audit quality. Future research could investigate the link between allocation of resources (e.g., audit costs) and audit quality in order to gain knowledge on how audit teams impact audit quality.

Appendix A: Variable definitions

Variable		Variable definition
NumAllMembers	=	The number of all team members in each audit team
NumMemPart	=	The number of team members that are partners in each audit team
NumMemDir	=	The number of team members that are directors in each audit team
NumMemSenman	=	The number of team members that are senior managers in each audit team
NumMemManag	=	The number of team members that are managers in each audit team
NumMemAssman	=	The number of team members that are assistant managers in each audit team
NumMemSenass	=	The number of team members that are senior associates in each audit team
NumMemAssoc	=	The number of team members that are associates in each audit team
NumMemOthers	=	The number of team members that are in other ranks in each audit team
HoursTeam	=	The number of aggregated hours for all the members in each audit team
HoursPart	=	The number of hours for all the partners in each audit team
HoursDir	=	The number of hours for all the directors in each audit team
HoursSenman	=	The number of hours for all the senior managers in each audit team
HoursManag	=	The number of hours for all the managers in each audit team
HoursAssman	=	The number of hours for all the assistant managers in each audit team
HoursSenass	=	The number of hours for all the senior associates in each audit team
HoursAssoc	=	The number of hours for all the associates in each audit team
HoursAllManag	=	The number of hours for all three types of manager in each audit team
HoursAllAssoc	=	The number of hours for both types of associate in each audit team
HoursOthers	=	The number of hours for the team members in other ranks in each audit team
CostsTeam	=	The aggregated audit costs for all the members in each audit
CostsPart	=	The audit costs for all the partners in each audit
CostsDir	=	The audit costs for all the directors in each audit
CostsSenman	=	The audit costs for all the senior managers in each audit
CostsManag	=	The audit costs for all the managers in each audit
CostsAssman	=	The audit costs for all the assistant managers in each audit
CostsSenass	=	The audit costs for all the senior associates in each audit
CostsAssoc	=	The audit costs for all the associates in each audit
CostsAllManag	=	The audit costs for all three types of manager in each audit
CostsAllAssoc	=	The audit costs for both types of associate in each audit
CostsOthers	=	The audit costs for the team members in other ranks in each audit
ProH_Part	=	The proportion of hours spent by the rank of partners to aggregated hours of all the members in each team
ProH_Dir	=	The proportion of hours spent by the rank of directors to aggregated hours of all the members in each team
ProH_Senman	=	The proportion of hours spent by the rank of senior managers to aggregated hours of all the members in each team
ProH_Manag	=	The proportion of hours spent by the rank of managers to aggregated hours of all the members in each team
ProH_Assman	=	The proportion of hours spent by the rank of assistant managers to aggregated hours of all the members in each team
ProH_Senass	=	The proportion of hours spent by the rank of senior associates to aggregated hours of all the members in each team
ProH_Assoc	=	The proportion of hours spent by the rank of associates to aggregated hours of all the members in each team
ProH_AllManag	=	The proportion of hours spent by all three ranks of managers to aggregated hours of all the members in each team
ProH_AllAssoc	=	The proportion of hours spent by both ranks of associates to aggregated hours of all the members in each team
ProH_Others	=	The proportion of hours spent by the team members in other ranks to aggregated hours of all the members in each team

ProC_Part	=	The proportion of costs of the rank of partners to aggregated costs of all the members in each team
ProC_Dir	=	The proportion of costs of the rank of directors to aggregated costs of all the members in each team
ProC_Senman	=	The proportion of costs of the rank of senior managers to aggregated costs of all the members in each team
ProC_Manag	=	The proportion of costs of the rank of managers to the aggregated of all the members in each team
ProC_Assman	=	The proportion of costs of the rank of assistant managers to aggregated costs of all the members in each team
ProC_Senass	=	The proportion of costs of the rank of senior associates to aggregated costs of all the members in each team
ProC_Assoc	=	The proportion of costs of the rank of associates to aggregated costs of all the members in each team
ProC_AllManag	=	The proportion of costs of all three ranks of managers to aggregated costs of all the members in each team
ProC_AllAssoc	=	The proportion of costs of both ranks of associates to aggregated costs of all the members in each team
ProC_Others	=	The proportion of costs of team members in other ranks to aggregated costs of all the members in each team
BillingAll	=	The billing rates for all the team members
BillingPart	=	The billing rates for all the partners
BillingDir	=	The billing rates for all the directors
BillingSenman	=	The billing rates for all the senior managers
BillingManag	=	The billing rates for all the managers
BillingAssman	=	The billing rates for all the assistant managers
BillingSenass	=	The billing rates for all the senior associates
BillingAssoc	=	The billing rates for all the associates
BillingOthers	=	The billing rates for all the team members in other ranks

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Table 1: Descriptive statistics of firm size (total assets)

Panel A: All, public, and private firms

(TA In mSEK)	N	Mean	SD	p5	p25	p50	p75	p95
All	908	2,064	7,273	3	85	305	1,036	8,733
Public	92	6,960	15,619	30	262	742	4,126	47,956
Private	816	1,512	5,349	3	75	266	900	6,706
Diff (Public-Private)		5,448						
t-value		7.0***						

Panel B: Public firms in quartiles

(TA In mSEK)	N	Mean	SD	p5	p25	p50	p75	p95
Q4-Largest	23	25,567	22,894	4,467	7,495	11,867	46,642	59,773
Q3	23	1,685	978	767	910	1,326	2,230	3,696
Q2	23	476	144	294	361	446	581	723
Q1-Smallest	23	111	90	6	34	84	206	254
Diff (Q4-Q1)		25,460						
t-value		5.332***						

Panel C: Private firms in quartiles

(TA In mSEK)	N	Mean	SD	p5	p25	p50	p75	p95
Q4-Largest	204	5,332	9,754	989	1,399	2,250	5,063	18,643
Q3	204	526	186	283	351	507	686	843
Q2	204	164	55	85	119	155	211	256
Q1-Smallest	204	26	25	1	4	13	51	69
Diff (Q4-Q1)		5,306						
t-value		7.769***						

Panel D: Correlation matrix between total assets, audit costs, hours, and billing rates and the team level

	TA	SumCosts	SumHours	BillingTeam
TA	1			
SumCosts	0.6017	1		
SumHours	0.5684	0.9876	1	
BillingTeam	0.2249	0.3299	0.2479	1

Panel A reports the descriptive statistics of total assets (*TA*) for the full sample (*All*) in the first row, and public clients (*Public*) and private clients (*Private*) in the next two rows. The last two rows report the difference of *TA* between public and private firms (*Diff(Public-Private)*) and its t-value. Column "*N*" indicates the number of clients. Mean (*Mean*), standard deviation (*SD*), and the 5th, 25th, 50th, 75th, and 95th percentiles are also reported. 1 SEK = 9.58 EUR as of December 31, 2016.

Panel B (C) reports the descriptive statistics of *TA* for the four size quartiles of public (private) firms. The first row reports the *TA* for the firms with the largest size (*Q4-largest*), the next two rows for the firms in the middle two quartiles (*Q3* and *Q2*), and the fourth row for the smallest firm in the segment (*Q1-Smallest*). The last two rows report the differences of *TA* between the largest and smallest quartiles (*Diff(Q4-Q1)*) and the t-value of this difference. Panel D reports the correlation matrix between *TA*, audit costs, audit hours, and billing rates at the team level (*SumCosts*, *SumHours*, and *BillingTeam*).

Table 2: Number of audit team members

Panel A: All client firms

	N	Mean1	Mean2	SD	Min	p5	p25	p50	p75	p95	Max
NumAllMembers	908	10.22	10.22	7.27	3	3	6	9	12	23	86
NumMemPart	683	1.41	1.06	0.90	1	1	1	1	2	3	10
NumMemDir	435	1.35	0.65	0.82	1	1	1	1	1	3	9
NumMemSenman	408	1.29	0.58	0.71	1	1	1	1	1	2	8
NumMemManag	539	1.47	0.87	1.04	1	1	1	1	2	3	14
NumMemAssman	698	1.87	1.44	1.30	1	1	1	1	2	4	15
NumMemSenass	792	2.44	2.12	1.83	1	1	1	2	3	6	18
NumMemAssoc	794	2.69	2.35	2.10	1	1	1	2	3	7	16
NumMemOthers	509	2.05	1.15	1.40	1	1	1	2	3	5	11

Panel B: Public vs. private firms

	Public firms					Private firms						
	N	Mean1	Mean2	SD	P50	N	Mean1	Mean2	SD	P50	t-value1	t-value2
NumAllMembers	92	17.46	17.46	13.79	13	816	9.41	9.41	5.57	8	10.7***	10.7 ***
NumMemPart	92	2.72	2.72	1.54	2	591	1.21	0.88	0.51	1	18.2 ***	20.4***
NumMemDir	56	1.80	1.10	1.43	1	379	1.28	0.60	0.67	1	4.5 ***	5.2***
NumMemSenman	58	1.62	1.02	1.27	1	350	1.23	0.53	0.55	1	4.0***	5.7***
NumMemManag	66	2.05	1.47	2.19	1	473	1.39	0.81	0.72	1	4.9***	5.7***
NumMemAssman	68	2.41	1.78	2.34	2	630	1.82	1.40	1.12	1	3.6***	2.5**
NumMemSenass	84	3.88	3.54	3.13	3	708	2.26	1.96	1.52	2	8.0***	7.8***
NumMemAssoc	83	3.89	3.51	3.09	3	711	2.55	2.22	1.90	2	5.6***	5.5***
NumMemOthers	71	3.00	2.32	1.99	3	438	1.89	1.02	1.22	1.5	6.4***	8.4***

Panel C: Public firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest			
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
NumAllMembers	30.74	20.17	17.70	8.48	11.61	3.96	9.78	3.13	20.96	4.9***
NumMemPart	4.30	2.10	2.26	0.92	2.04	0.56	2.26	0.86	2.04	4.3***
NumMemDir	2.30	2.05	1.17	0.94	0.57	0.73	0.35	0.57	1.95	4.4***
NumMemSenman	1.78	2.09	0.74	0.75	0.96	0.71	0.61	0.66	1.17	2.6**
NumMemManag	3.13	3.47	1.22	0.95	0.74	0.69	0.78	0.60	2.35	3.2***
NumMemAssman	3.39	3.63	2.00	1.38	0.87	0.81	0.87	1.06	2.52	3.2***
NumMemSenass	6.22	4.42	3.70	2.53	2.26	1.63	2.00	1.31	4.22	4.4***
NumMemAssoc	5.78	4.01	4.13	3.11	2.26	1.71	1.87	1.52	3.91	4.4***
NumMemOthers	3.83	2.61	2.48	2.21	1.91	1.41	1.04	1.15	2.79	4.7***

Panel D: Private firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest			
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
NumAllMembers	13.24	7.03	10.40	4.74	8.09	3.09	5.91	3.67	7.33	13.2 ***
NumMemPart	1.21	0.81	0.98	0.62	0.78	0.60	0.54	0.55	0.67	9.7***
NumMemDir	0.93	1.08	0.56	0.62	0.49	0.62	0.41	0.62	0.52	6.0***
NumMemSenman	0.81	0.91	0.56	0.69	0.47	0.57	0.27	0.47	0.54	7.4***
NumMemManag	1.23	1.10	0.90	0.82	0.70	0.71	0.39	0.57	0.84	9.7***
NumMemAssman	1.86	1.47	1.59	1.33	1.24	0.97	0.92	0.94	0.94	7.8***
NumMemSenass	2.75	2.00	2.20	1.56	1.52	1.10	1.38	1.23	1.37	8.4***
NumMemAssoc	3.04	2.38	2.43	2.10	1.98	1.49	1.44	1.38	1.60	8.3***
NumMemOthers	1.41	1.55	1.18	1.30	0.91	1.17	0.56	0.96	0.85	6.6***

This table presents the total number of team members in each team (*NumAllMembers*) in the first row, and the numbers of team numbers in each rank in the subsequent rows: partners (*NumMemPart*), directors (*NumMemDir*), senior managers (*NumMemSenman*), managers (*NumMemManag*), assistant managers (*NumMemAssman*), senior associates (*NumMemSenass*), associates (*NumMemAssoc*), and others (*NumMemOthers*). All the variable definitions are presented in Appendix A. Panel A reports the descriptive statistics for the full sample. Column "*N*" indicates the number of audit teams that have a team member from the specific rank in each row. The mean value (*Mean1* and *Mean2*), standard deviation (*SD*), the 5th, 25th, 50th, 75th, and 95th percentiles are reported. For each rank, the column "*Mean1*" refers to the mean value for audit teams that have at least one member in the specific rank, while the column "*Mean2*" refers to the mean value for all the audit teams in the sample. For example, if one team does not have any partners (*NumMemPart* is 0 for this team), this team is taken into account when computing *Mean2*, but not when computing *Mean1*. The other statistics are based on the sample used for "*Mean1*".

Panel B reports statistics on the number of members for public firms (in the first 5 columns) and private firms (in the next 5 columns). For both public and private firms, the number of teams (*N*), the means (*Mean1* and *Mean2*), standard deviation (*SD*), and the median (*P50*) are reported. The last two columns present the t-values (*t-value1* and *t-value2*) of the differences between the means (*Mean1* and *Mean2*) of public and private firms. Panel C (D) reports the mean (*Mean*2) and standard deviation (*SD*) for the number of team members in each of the total assets quartiles of public (private) firms. The last two columns report the difference (*Diff*) of *Mean2* between the largest quartile (Q4-Largest) and the smallest quartile (Q1-Smallest) and the t-value of the difference (t-value).

Table 3: Audit Hours

Panel A: All client firms

	N	Mean1	Mean2	SD	p5	p25	p50	p75	p95
HoursTeam	908	439	439	643	20	210	301	480	1,233
HoursPart	683	53	40	101	2	13	27	54	164
HoursDir	435	80	38	139	2	11	43	100	257
HoursSenman	408	82	37	113	1	10	52	115	248
HoursManag	539	103	61	144	1	21	72	131	286
HoursAssman	698	114	87	155	1	26	82	144	307
HoursSenass	792	111	97	171	1	19	77	141	328
HoursAssoc	794	79	69	112	1	15	53	107	240
HoursAllManag	861	195	185	267	0	65	132	223	546
HoursAllAssoc	899	168	166	243	3	47	113	199	466
HoursOthers	509	17	10	40	0	2	5	14	66

Panel B: Public vs. private firms

	Public firms					Private firms						
	N	Mean1	Mean2	SD	P50	N	Mean1	Mean2	SD	P50	t-value1	t-value2
HoursTeam	92	1,016	1,016	1,517	626	816	374	374	401	287	9.5***	9.5***
HoursPart	92	134	134	210	65	591	40	29	61	24	8.7***	11.2***
HoursDir	56	202	123	268	127	379	62	29	96	36	7.4***	8.5***
HoursSenman	58	166	105	215	121	350	68	29	76	47	6.5***	8.3***
HoursManag	66	209	150	304	122	473	88	51	95	69	6.7***	7.6***
HoursAssman	68	199	147	293	125	630	105	81	128	80	4.8***	4.2***
HoursSenass	84	222	203	394	106	708	98	85	114	73	6.4***	6.7 ***
HoursAssoc	83	140	126	191	95	711	72	62	97	50	5.3***	5.4***
HoursAllManag	89	415	402	612	227	772	170	161	178	127	8.6***	8.5***
HoursAllAssoc	91	332	329	533	160	808	149	148	175	109	7.0***	7.0***
HoursOthers	71	38	29	74	10	438	14	7	30	4	4.9***	6.6***

Panel C: Public firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
HoursTeam	2,468	2,506	731	326	516	290	349	189	2,119	4.0***
HoursPart	344	337	81	58	65	40	45	42	298	4.2***
HoursDir	355	361	76	80	39	66	21	50	334	4.4***
HoursSenman	159	319	90	122	125	136	45	64	114	1. 7
HoursManag	359	470	104	115	82	103	54	64	304	3.1***
HoursAssman	356	441	118	118	56	70	56	127	300	3.1***
HoursSenass	540	645	122	113	84	95	65	60	475	3.5***
HoursAssoc	277	297	125	112	44	46	57	63	220	3. 5***
HoursAllManag	874	1,053	312	218	264	211	156	143	718	3.2***
HoursAllAssoc	817	883	247	183	128	101	122	87	695	3.8***
HoursOthers	78	112	15	31	21	39	4	7	73	3.1***

Panel D: Private firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
HoursTeam	641	624	392	235	305	183	156	209	485	10.5***
HoursPart	59	93	28	34	21	27	9	19	50	7.5***
HoursDir	62	124	27	42	17	33	9	32	53	5.9***
HoursSenman	57	92	30	52	23	41	7	22	50	7.6***
HoursManag	80	104	61	91	46	76	16	38	64	8.2***
HoursAssman	132	186	83	89	66	66	42	88	89	6.2***
HoursSenass	133	151	98	109	71	80	38	63	95	8.3***
HoursAssoc	106	148	57	64	55	57	31	53	75	6.8***
HoursAllManag	269	267	174	120	135	95	66	103	203	10.1***
HoursAllAssoc	240	257	155	144	126	105	70	102	170	8.8***
HoursOthers	13	34	7	21	7	19	3	10	10	3.8***

This table presents the number of aggregated audit hours across all the team members in a team (*HoursTeam*) in the first row and in the subsequent rows the number of audit hours for all the members in each of the following ranks: partners (*HoursPart*), directors (*HoursDir*), senior managers (*HoursSenman*), managers (*HoursManag*), assistant managers (*HoursAssman*), senior associates (*HoursSenass*), associates (*HoursAssoc*), and others (*HoursOthers*). All the variable definitions are provided in Appendix A. Panel A reports the descriptive statistics for all the client firms in the full sample. Column '*N*' indicates the number of audit teams that have at least one member in that specific rank in each row. Mean (*Mean1* and *Mean2*), standard deviation (*SD*), and the 5th, 25th, 50th, 75th, and 95th percentiles are reported. For each rank, the column '*Mean1*' refers to the mean value for audit teams that have at least one member in the specific rank, while the column '*Mean2*' refers to the mean value when including all the audit teams in the sample. For example, if one team does not have any partners, this team is taken into account when computing *Mean2*, but not when calculating *Mean1*. The other statistics are based on the sample used for "*Mean1*".

Panel B reports statistics on audit hours for public firms (in the first 5 columns) and private firms (in the next 5 columns). For both public and private firms, the number of teams (*N*), the means (*Mean1* and *Mean2*), standard deviation (*SD*), and the median (*P50*) are reported. The last two columns present the t-values (*t-value1* and *t-value2*) of the differences between the means (*Mean1* and *Mean2*) of public and private clients. Panel C (D) reports the mean (*Mean*2) and standard deviation (*SD*) for the audit hours in each of the total assets quartiles of public (private) firms. The last two columns report the difference (*Diff*) of *Mean2* between the largest quartile (Q4-Largest) and the smallest quartile (Q1-Smallest) and the t-value of the difference (t-value).

Table 4: Audit costs

Panel A: All client firms

(In 1000SEK)	N	Mean1	Mean2	SD	p5	p25	p50	p75	p95
CostsTeam	908	672	672	1,118	22	281	431	721	2,024
CostsPart	683	181	136	367	5	41	85	175	585
CostsDir	435	205	98	385	4	26	103	237	674
CostsSenman	408	151	68	216	2	19	92	202	465
CostsManag	539	159	94	222	2	31	108	203	437
CostsAssman	698	143	110	200	1	33	102	176	424
CostsSenass	792	115	100	179	0	19	76	145	346
CostsAssoc	794	65	57	98	0	9	41	85	217
CostsAllManag	861	287	272	407	0	95	188	320	830
CostsAllAssoc	899	158	157	239	2	40	103	188	471
CostsOthers	509	16	9	46	0	1	3	9	83

Panel B: Public vs. private firms

(In 1000SEK)	Public firms					Private firms						
	N	Mean1	Mean2	SD	P50	N	Mean1	Mean2	SD	P50	t-value1	t-value2
CostsTeam	92	1,740	1,740	2,653	989	816	552	552	680	400	10.2***	10.2***
CostsPart	92	478	478	769	236	591	134	97	220	76	8.8***	11.3***
CostsDir	56	536	326	758	346	379	156	72	260	92	7.3***	8.4***
CostsSenman	58	298	188	402	213	350	127	54	154	86	5.8***	7.7***
CostsManag	66	314	225	446	187	473	137	79	157	100	6.3***	7.3***
CostsAssman	68	244	180	356	151	630	132	102	172	101	4.4***	3.9 ***
CostsSenass	84	228	208	397	99	708	101	88	125	73	6.3 ***	6.5***
CostsAssoc	83	115	104	162	72	711	59	51	86	40	5.0***	5.1***
CostsAllManag	89	613	593	910	354	772	250	236	280	178	8.4***	8.3***
CostsAllAssoc	91	315	312	510	155	808	141	139	178	97	6.7***	6.7***
CostsOthers	71	40	30	87	8	438	13	7	34	2	4.7***	6.2***

Panel C: Public firms in size quartiles

(In 1000SEK)	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
CostsTeam	4,383	4,310	1,159	494	879	506	539	300	3,844	4.3***
CostsPart	1,275	1,220	274	178	217	116	146	132	1,129	4.4***
CostsDir	968	1,029	178	185	108	186	51	117	918	4.3***
CostsSenman	296	604	158	212	217	240	82	116	214	1.7
CostsManag	538	684	163	176	120	152	80	92	457	3.2***
CostsAssman	449	532	139	134	66	83	66	142	383	3.3***
CostsSenass	549	645	134	131	86	97	63	62	487	3.6***
CostsAssoc	233	251	98	97	37	40	48	51	186	3.5***
CostsAllManag	1,283	1,576	460	310	403	343	228	180	1,055	3.2***
CostsAllAssoc	783	840	231	190	123	103	111	84	672	3.8***
CostsOthers	74	129	15	45	29	60	4	7	71	2.6**

Panel D: Private firms in size quartiles

(In 1000SEK)	Q4-Largest Mean2	SD	Q3 Mean2	SD	Q2 Mean2	SD	Q1- Smallest Mean2	SD	Q4-Q1 Diff	t-value
CostsTeam	1,016	1,109	559	326	423	278	208	302	808	10.0***
CostsPart	205	339	90	100	65	86	28	67	177	7.3***
CostsDir	161	341	64	97	41	77	23	82	138	5.6***
CostsSenman	108	184	55	102	43	77	13	39	96	7.2***
CostsManag	127	177	95	148	71	117	25	57	102	7.8***
CostsAssman	173	256	104	112	81	82	51	105	121	6.3***
CostsSenass	140	168	99	118	73	87	39	66	101	8.0***
CostsAssoc	89	134	46	54	45	50	26	47	63	6.3***
CostsAllManag	407	434	254	189	194	140	88	135	319	10.0***
CostsAllAssoc	229	264	145	146	118	109	65	101	164	8.3***
CostsOthers	12	39	6	23	6	21	3	11	9	3.3***

This table presents the value of audit costs across all the team members in a team (*CostsTeam*) in the first row and audit costs for all the members in each rank in subsequent rows. All the variable definitions are provided in Appendix A. Panel A reports the descriptive statistics for all the client firms in the full sample. Column "*N*" indicates the number of audit teams that have at least one member in the rank. Mean (*Mean1* and *Mean2*), standard deviation (*SD*), and the 5th, 25th, 50th, 75th, and 95th percentiles are reported. For each rank, the column "*Mean1*" refers to the mean value for audit teams that have at least one member in the specific rank, while the column "*Mean2*" refers to the mean value of all the audit teams in the sample. For example, if one team does not have any partners, this team is taken into account when computing *Mean2*, but is not included when calculating *Mean1*. The other statistics are based on the sample used for "*Mean1*".

Panel B reports statistics on audit costs for public firms (in the first 5 columns) and private firms (in the next 5 columns). For both public and private firms, the number of teams (*N*), the means (*Mean1* and *Mean2*), standard deviation (*SD*), and the median (*P50*) are reported. The last two columns present the t-values (*t-value1* and *t-value2*) of the differences between the means (*Mean1* and *Mean2*) of public and private firms. Panel C (D) reports the mean (*Mean*2) and standard deviation (*SD*) for audit costs in each of the total assets quartiles of public (private) firms. The last two columns report the difference (*Diff*) of *Mean2* between the largest quartile (Q4-Largest) and the smallest quartile (Q1-Smallest) and the t-value of the difference (t-value).

Table 5: Proportion of audit hours

Panel A: All client firms

	N	Mean1	Mean2	SD	p5	p25	p50	p75	p95
ProH_Part	683	0.11	0.08	0.1	0.01	0.04	0.08	0.14	0.28
ProH_Dir	435	0.17	0.08	0.15	0.01	0.05	0.13	0.24	0.44
ProH_Senman	408	0.19	0.08	0.16	0	0.03	0.16	0.28	0.49
ProH_Manag	539	0.22	0.13	0.17	0	0.07	0.21	0.34	0.53
ProH_Assman	698	0.27	0.21	0.2	0.01	0.11	0.26	0.38	0.66
ProH_Senass	792	0.26	0.22	0.19	0	0.1	0.23	0.37	0.62
ProH_Assoc	794	0.20	0.17	0.17	0	0.06	0.17	0.28	0.54
ProH_AllManag	861	0.45	0.43	0.23	0	0.26	0.43	0.59	0.81
ProH_AllAssoc	899	0.40	0.4	0.22	0.04	0.23	0.38	0.54	0.8
ProH_Others	509	0.03	0.02	0.06	0	0.01	0.01	0.04	0.12

Panel B: Public vs. private firms

	Public firms					Private firms						
	N	Mean1	Mean2	SD	P50	N	Mean1	Mean2	SD	P50	t-value1	t-value2
ProH_Part	92	0.14	0.14	0.1	0.12	591	0.10	0.07	0.1	0.07	3.4***	6.3***
ProH_Dir	56	0.17	0.11	0.14	0.15	379	0.16	0.08	0.15	0.13	0.5	2.1**
ProH_Senman	58	0.22	0.14	0.19	0.19	350	0.18	0.08	0.16	0.16	1.5	3.8***
ProH_Manag	66	0.19	0.14	0.14	0.19	473	0.23	0.13	0.17	0.21	-1.5	0.4
ProH_Assman	68	0.19	0.14	0.15	0.17	630	0.28	0.22	0.2	0.27	-3.8***	-3.5***
ProH_Senass	84	0.20	0.18	0.15	0.17	708	0.26	0.23	0.2	0.24	-2.8***	-2.1**
ProH_Assoc	83	0.15	0.13	0.13	0.11	711	0.20	0.18	0.17	0.17	-2.8***	-2.3**
ProH_AllManag	89	0.42	0.41	0.21	0.43	772	0.45	0.43	0.23	0.43	-0.5	-0.5
ProH_AllAssoc	91	0.32	0.32	0.18	0.28	808	0.40	0.40	0.22	0.39	-3.7***	-3.6***
ProH_Others	71	0.03	0.03	0.04	0.02	438	0.03	0.02	0.06	0.01	0.0	1.5

Panel C: Public firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
ProH_Part	0.14	0.08	0.12	0.09	0.15	0.12	0.13	0.1	0.01	0.5
ProH_Dir	0.16	0.11	0.13	0.17	0.07	0.1	0.06	0.15	0.1	2.5**
ProH_Senman	0.05	0.08	0.12	0.16	0.23	0.22	0.15	0.2	-0.1	-2.2**
ProH_Manag	0.12	0.1	0.13	0.15	0.16	0.17	0.14	0.15	-0.02	-0.5
ProH_Assman	0.17	0.15	0.14	0.12	0.11	0.13	0.13	0.19	0.04	0.8
ProH_Senass	0.2	0.12	0.17	0.16	0.16	0.17	0.21	0.18	-0.01	-0.2
ProH_Assoc	0.12	0.11	0.16	0.11	0.09	0.09	0.16	0.19	-0.04	-0.9
ProH_AllManag	0.34	0.16	0.4	0.2	0.5	0.22	0.42	0.22	-0.08	-1.4
ProH_AllAssoc	0.32	0.16	0.33	0.17	0.25	0.18	0.37	0.2	-0.05	-0.9
ProH_Others	0.03	0.04	0.02	0.04	0.03	0.06	0.01	0.02	0.02	2.0*

Panel D: Private firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
ProH_Part	0.09	0.1	0.08	0.09	0.07	0.09	0.06	0.09	0.03	3.7***
ProH_Dir	0.09	0.12	0.08	0.13	0.06	0.1	0.08	0.15	0.01	0.8
ProH_Senman	0.09	0.14	0.08	0.14	0.08	0.13	0.05	0.13	0.04	3.0***
ProH_Manag	0.14	0.16	0.14	0.17	0.15	0.18	0.09	0.18	0.05	2.9***
ProH_Assman	0.2	0.18	0.21	0.2	0.22	0.2	0.23	0.26	-0.03	-1.3
ProH_Senass	0.2	0.17	0.24	0.18	0.22	0.19	0.25	0.27	-0.05	-2.4**
ProH_Assoc	0.16	0.13	0.14	0.12	0.18	0.16	0.22	0.25	-0.06	-2.8***
ProH_AllManag	0.44	0.2	0.44	0.2	0.45	0.22	0.38	0.29	0.06	2.3**
ProH_AllAssoc	0.37	0.18	0.38	0.2	0.4	0.21	0.47	0.28	-0.1	-4.6***
ProH_Others	0.02	0.03	0.02	0.06	0.02	0.05	0.01	0.04	0.01	1.0

This table presents the proportion of audit hours allocated to each rank. All the variable definitions are provided in Appendix A. Panel A reports the descriptive statistics for all the client firms in the full sample. Column "*N*" indicates the number of audit teams that have at least one member in each specific rank. Mean (*Mean1* and *Mean2*), standard deviation (*SD*), and the 5th, 25th, 50th, 75th, and 95th percentiles are reported. For each rank, the column "*Mean1*" refers to the mean value for audit teams that have at least one member in the specific rank, while the column "*Mean2*" refers to the mean value for all the audit teams in the sample. For example, if one team does not have any partners, this team is taken into account when computing *Mean2*, but not for *Mean1*. The other statistics are based on the sample used for "*Mean1*".

Panel B reports statistics on the proportion of audit hours allocated to public firms (in the first 5 columns) and private firms (in the next 5 columns). For both public and private firms, the number of teams (*N*), the means (*Mean1* and *Mean2*), standard deviation (*SD*), and the median (*P50*) are reported. The last two columns present the t-values (*t-value1* and *t-value2*) of the differences between the means (*Mean1* and *Mean2*) of public and private firms. Panel C (D) reports the mean (*Mean2*) and standard deviation (*SD*) for the proportion of audit hours in each of the total assets quartiles of public (private) firms. The last two columns report the difference (*Diff*) of *Mean2* between the largest quartile (Q4-Largest) and the smallest quartile (Q1-Smallest) and the t-value of the difference (t-value).

Table 6: Proportion of audit costs

Panel A: All client firms

	N	Mean1	Mean2	SD	p5	p25	p50	p75	p95
ProC_Part	683	0.21	0.16	0.15	0.03	0.1	0.18	0.3	0.49
ProC_Dir	435	0.25	0.12	0.19	0.01	0.1	0.23	0.38	0.6
ProC_Senman	408	0.22	0.1	0.18	0	0.05	0.21	0.34	0.55
ProC_Manag	539	0.24	0.14	0.18	0	0.09	0.22	0.36	0.57
ProC_Assman	698	0.25	0.19	0.19	0.01	0.09	0.22	0.35	0.6
ProC_Senass	792	0.19	0.17	0.16	0	0.07	0.16	0.28	0.52
ProC_Assoc	794	0.12	0.1	0.12	0	0.03	0.09	0.17	0.35
ProC_AllManag	861	0.45	0.43	0.23	0	0.28	0.44	0.59	0.82
ProC_AllAssoc	899	0.27	0.27	0.19	0.02	0.13	0.24	0.37	0.66
ProC_Others	509	0.02	0.01	0.06	0	0	0.01	0.02	0.11

Panel B: Public vs. private firms

	Public firms					Private firms						
	N	Mean1	Mean2	SD	P50	N	Mean1	Mean2	SD	P50	t-value1	t-value2
ProC_Part	92	0.27	0.27	0.14	0.26	591	0.21	0.15	0.15	0.18	3.8***	7.0***
ProC_Dir	56	0.25	0.15	0.17	0.23	379	0.25	0.12	0.19	0.23	0.3	1.6
ProC_Senman	58	0.22	0.14	0.19	0.23	350	0.22	0.1	0.18	0.2	0.0	2.5**
ProC_Manag	66	0.18	0.13	0.13	0.16	473	0.25	0.14	0.19	0.23	-2.9***	0.7
ProC_Assman	68	0.14	0.11	0.11	0.11	630	0.26	0.2	0.19	0.23	-4.8***	-4.4***
ProC_Senass	84	0.13	0.12	0.11	0.1	708	0.2	0.17	0.17	0.17	-3.8***	-3.1***
ProC_Assoc	83	0.08	0.07	0.08	0.05	711	0.12	0.11	0.12	0.09	-3.4***	-2.9***
ProC_AllManag	89	0.39	0.38	0.19	0.4	772	0.47	0.44	0.23	0.44	-2.5**	-2.4**
ProC_AllAssoc	91	0.19	0.19	0.13	0.17	808	0.28	0.28	0.19	0.25	-4.6***	-4.6***
ProC_Others	71	0.02	0.02	0.04	0.01	438	0.02	0.01	0.06	0	-0.2	0.8

Panel C: Public firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
ProC_Part	0.29	0.13	0.24	0.13	0.29	0.16	0.26	0.16	0.03	0.6
ProC_Dir	0.23	0.13	0.18	0.18	0.11	0.16	0.09	0.21	0.14	2.8***
ProC_Senman	0.05	0.08	0.13	0.17	0.23	0.2	0.16	0.21	-0.11	-2.4**
ProC_Manag	0.1	0.08	0.13	0.15	0.13	0.15	0.15	0.15	-0.05	-1.2
ProC_Assman	0.13	0.11	0.11	0.1	0.08	0.09	0.11	0.16	0.02	0.6
ProC_Senass	0.12	0.08	0.11	0.11	0.1	0.12	0.13	0.12	-0.01	-0.3
ProC_Assoc	0.06	0.07	0.08	0.07	0.04	0.04	0.1	0.11	-0.04	-1.2
ProC_AllManag	0.28	0.15	0.37	0.19	0.44	0.2	0.42	0.21	-0.14	-2.5**
ProC_AllAssoc	0.18	0.11	0.2	0.13	0.14	0.13	0.23	0.13	-0.05	-1.2
ProC_Others	0.02	0.02	0.01	0.04	0.03	0.06	0.01	0.02	0.01	1.6

Panel D: Private firms in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean2	SD	Mean2	SD	Mean2	SD	Mean2	SD	Diff	t-value
ProC_Part	0.18	0.16	0.16	0.14	0.14	0.15	0.12	0.17	0.06	3.9***
ProC_Dir	0.14	0.17	0.12	0.18	0.09	0.15	0.12	0.21	0.02	0.8
ProC_Senman	0.11	0.16	0.1	0.17	0.1	0.16	0.07	0.16	0.04	2.3**
ProC_Manag	0.15	0.17	0.16	0.18	0.16	0.2	0.11	0.2	0.04	2.5**
ProC_Assman	0.18	0.16	0.19	0.18	0.2	0.18	0.22	0.25	-0.04	-2.2**
ProC_Senass	0.14	0.13	0.18	0.15	0.17	0.16	0.2	0.22	-0.06	-3.3***
ProC_Assoc	0.09	0.08	0.08	0.08	0.11	0.12	0.14	0.17	-0.05	-3.8***
ProC_AllManag	0.43	0.21	0.45	0.2	0.47	0.22	0.4	0.3	0.03	1.4
ProC_AllAssoc	0.24	0.15	0.26	0.17	0.28	0.19	0.35	0.24	-0.11	-5.6***
ProC_Others	0.01	0.02	0.01	0.04	0.01	0.05	0.01	0.05	0	0.8

This table presents the proportion of audit costs allocated to each rank. All the variable definitions are provided in Appendix A. Panel A reports the descriptive statistics for all the client firms in the full sample. Column "*N*" indicates the number of audit teams that have at least one member in that rank. Mean (*Mean1* and *Mean2*), standard deviation (SD), and the 5th, 25th, 50th, 75th, and 95th percentiles are reported. For each rank, the column "*Mean1*" refers to the mean value for audit teams that have at least one member in the specific rank, while the column "*Mean2*" refers to the mean value for all the audit teams in the sample. For example, if one team does not have any partners, this team is taken into account when computing *Mean2*, but not when computing *Mean1*. The other statistics are based on the sample used for "*Mean1*".

Panel B reports statistics on the proportion of audit costs for public firms (in the first 5 columns) and private firms (in the next 5 columns). For both public and private firms, the number of teams (*N*), the means (*Mean1* and *Mean2*), standard deviation (*SD*), and the median (*P50*) are reported. The last two columns present the t-values (*t-value1* and *t-value2*) of the differences between the means (*Mean1* and *Mean2*) of public and private firms. Panel C (D) reports the mean (*Mean*2) and standard deviation (*SD*) for the proportion of audit costs in each of the total assets quartiles of public (private) firms. The last two columns report the difference (*Diff*) of *Mean2* between the largest quartile (Q4-Largest) and the smallest quartile (Q1-Smallest) and the t-value of the difference (t-value).

Table 7: Billing rates

Panel A: All client firms

	N	Mean	SD	p5	p25	p50	p75	p95
BillingAll	9235	1,379	924	500	800	1,093	1,606	3,500
BillingPart	965	3,431	633	2,400	3,033	3,500	4,000	4,300
BillingDir	587	2,547	473	1,897	2,100	2,600	2,900	3,100
BillingSenman	522	1,869	317	1,450	1,650	1,800	2,000	2,400
BillingManag	786	1,558	219	1,250	1,400	1,500	1,700	2,000
BillingAssman	1296	1,251	173	1,000	1,145	1,250	1,350	1,550
BillingSenAss	1919	961	189	500	900	1,000	1,100	1,250
BillingAssoc	2122	733	188	500	500	798	900	1,000
BillingOthers	1038	685	563	450	500	500	650	1,300

Panel B: Public vs. private firms

	Public firms				Private firms					
	N	Mean	SD	p50	N	Mean	SD	p50	Diff	t-value
BillingAll	1601	1,546	1,103	1,100	7,634	1,344	877	1,074	202	8.0***
BillingPart	250	3,616	578	3,700	715	3,367	640	3,400	250	5.0***
BillingDir	101	2,706	446	2,800	486	2,514	472	2,500	192	2.9***
BillingSenman	92	1,850	272	1,800	430	1,873	325	1,819	-23	-0.9
BillingManag	134	1,542	217	1,500	652	1,561	220	1,500	-19	-0.6
BillingAssman	163	1,257	199	1,200	1,133	1,250	169	1,250	7	0.6
BillingSenAss	325	958	203	1,000	1,594	962	186	1,000	-4	-0.5
BillingAssoc	323	727	197	750	1,799	733	187	800	-6	-0.5
BillingOthers	213	797	755	500	825	656	498	500	141	3.9***

Panel C: Public clients in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Diff	t-value
BillingAll	1,588	1,108	1,409	1,054	1,583	1,139	1,619	1,118	-32	-0.4
BillingPart	3,802	512	3,578	526	3,575	535	3,337	665	465	4.8***
BillingDir	2,798	392	2,564	499	2,746	474	2,506	444	293	1.9*
BillingSenman	1,926	266	1,832	361	1,726	153	1,854	265	72	0.9
BillingManag	1,540	218	1,595	252	1,469	163	1,536	187	4	0.1
BillingAssman	1,292	201	1,237	191	1,239	241	1,184	136	108	2.3**
BillingSenAss	973	190	936	231	955	184	954	208	19	0.6
BillingAssoc	760	189	671	175	760	214	713	220	47	1.4
BillingOthers	757	576	738	790	958	1,006	785	727	-28	-0.2

Panel D: Private clients in size quartiles

	Q4-Largest		Q3		Q2		Q1- Smallest		Q4-Q1	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Diff	t-value
BillingAll	1,404	915	1,323	874	1,336	871	1,259	793	145	4.8***
BillingPart	3,551	561	3,376	603	3,308	677	3,025	666	526	7.7***
BillingDir	2,609	435	2,481	455	2,536	467	2,313	521	296	4.9***
BillingSenman	1,931	333	1,850	334	1,875	295	1,745	298	186	3.7***
BillingManag	1,593	224	1,567	223	1,535	209	1,494	201	100	3.5***
BillingAssman	1,289	169	1,259	162	1,228	153	1,186	176	104	6.7***
BillingSenAss	977	185	961	190	968	182	925	182	52	3.9***
BillingAssoc	760	187	715	186	732	182	711	187	49	3.7***
BillingOthers	664	495	627	501	626	386	742	635	-78	-1.3

This table presents the billing rates at the *individual auditor-team* level. All the variable definitions are provided in Appendix A. Panel A reports the statistics for the full sample. The first line "*BillingAll*" reports the statistics for all the team members and the subsequent rows present the data for each rank. Column "*N*" indicates the number of auditor-team observations. Mean (*Mean*), standard deviation (*SD*), and the 5th, 25th, 50th, 75th, and 95th percentiles are reported.

Panel B reports statistics on billing rates at the *individual auditor-team* level for public firms (in the first 5 columns) and private firms (in the next 5 columns). For both public and private firms, the number of teams (*N*), the means (*Mean1* and *Mean2*), standard deviation (*SD*), and the median (*P50*) are reported. The last two columns present the t-values (*t-value1* and *t-value2*) of the differences between the means (*Mean1* and *Mean2*) of public and private firms. Panel C (D) reports the mean (*Mean2*) and standard deviation (*SD*) for billing rates in each of the total assets quartiles of public (private) firms. The last two columns report the difference (*Diff*) of *Mean2* between the largest quartile (Q4-Largest) and the smallest quartile (Q1-Smallest) and the t-value of the difference (t-value).

Table 8: The variation of billing rates of the same auditors

	N	Mean	SD	Min	P5	P25	P50	P75	P95	Max
All	1299	19	59	0	0	0	0	16	99	988
Part	119	35	118	0	0	0	0	10	220	849
Dir	115	24	108	0	0	0	0	9	101	988
Senman	94	30	59	0	0	0	3	35	201	300
Manag	159	19	48	0	0	0	1	18	93	419
Assman	225	18	31	0	0	0	3	22	81	231
Senass	257	14	24	0	0	0	1	21	71	127
Assoc	229	18	38	0	0	0	0	12	119	176
Others	101	9	31	0	0	0	0	0	68	141

This table reports descriptive statistics on the standard deviation of billing rates at the individual auditor level in the sample. We calculate the standard deviation of billing rates of the same auditor across different engagements. The column "*N*" indicates the number of unique auditors that are involved in at least two teams. Mean (*Mean*), standard deviation (*SD*), minimum (Min), maximum (Max), and the 5th, 25th, 50th, 75th, and 95th percentiles are reported. The first row (*All*) reports the statistics for all the auditors. The other rows report for partners (*Part*), directors (*Dir*), senior managers (*Senman*), managers (*Manag*), assistant managers (*Assman*), senior associates (*Senass*), associates (*Assoc*), and other ranks (*Others*).