

# **Is leadership ability rewarded by the auditing profession?**

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Today's business world calls for leaders, and the auditing profession is no exception. Informed by the emerging research on individual auditors, we investigate here whether leadership ability—an attribute that the auditing profession has emphasized—is rewarded by the auditing labor market. Using unique Swedish register data, we present strong evidence that leadership ability is indeed positively associated with auditors' job-related income. In terms of career development, we find that leadership ability predicts the likelihood of both joining a Big 4 audit firm and promotion to partnership within such a firm. Our findings contribute to the growing body of knowledge about the role of individual auditors in shaping the audit market. The implications of our findings should be of interest to audit firms in terms of recruitment and designing staff development schemes.

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## 1. Introduction

In one of the largest surveys of human capital to date, Deloitte in 2014 surveyed 2,532 businesses and HR leaders in 94 countries around the world.<sup>2</sup> The main talent issue facing organizations is *leadership*, with 85% of companies describing the concept as “urgent” or “important.” When it comes to auditing, the Big 4 accounting firms no longer scrutinize their job candidates’ grades in intermediate accounting. Instead, they provide summer leadership programs, even for those in their second year of college. Thus, for example, on its “Careers” page, PwC lists *leadership* as its top “professional attributes.”<sup>3</sup> Likewise, a recent search for “accounting leadership program” on the popular job website *indeed.com* revealed nearly 20,000 jobs. The competition for leadership talent is fierce, as is reflected in PwC’s “Leadership Summit,” KPMG’s “Leadership Edge,” and EY’s “Emerging Leaders Program.” The professional accounting bodies also acknowledge the importance of leadership. Thus, for example, the Association of Chartered Certified Accountants incorporated “*Strategic Business Leader*” into the “Essentials” module of its advanced exam syllabus for 2018.

Relatively little, however, is known about the consequences of the auditing industry’s pursuit of leadership through these and similar initiatives. Workers’ personality traits affect their job performance (Schmitt 2014), and recent audit literature suggest that a wide range of personal characteristics influence audit outcomes (e.g., Lennox and Wu 2017). Yet little is known about whether leadership ability—which is apparently highly prized by the profession and the business community as a whole—is actually rewarded by the auditing labor market and how this trait shapes

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<sup>2</sup> The full report can be accessed at <https://www2.deloitte.com/global/en/pages/human-capital/articles/leaders-at-all-levels.html>

<sup>3</sup> PwC’s “Careers” page can be accessed at <https://www.pwc.com/us/en/careers/why-pwc/pwc-professional.html>

auditors' careers. In this paper, we address these issues, thereby responding to the call by Cameran et al. (2018) and for leadership research that sheds light on inter-partner variation in audit outcomes.

One key characteristic of public accounting firms is that human capital serves as their main factor input (Lennox and Wu 2017). This notion is supported by the growing number of studies on individual auditors, showing of significant variation among auditors (partners) with respect to audit quality, style, and compensation.<sup>4</sup> Nelson and Tan (2005) are among the researchers who have noted that auditors' personal attributes can influence the outcome of an audit. The PCAOB's recent adoption of rules requiring disclosure of the names of engagement partners likewise acknowledges the heterogeneity of auditors' work. Our focus on leadership in this paper is, therefore, motivated by the large investment that the Big 4 firms are making in leadership in the context of their recruitment processes.<sup>5</sup>

The modern notion of the “born leader”—and, therefore, of the “born follower”—originates with Thomas Carlyle (1840) and has been taken up in recent empirical research in economics and finance (Bertrand and Schoar 2003; Bertrand 2009; Edmans and Gabaix 2016; Adams, Keloharju, and Knüpfer 2018)). While there in fact exists little support for the theory of the born leader, research in psychology has long suggested that effective leaders differ from other individuals in certain important respects that contribute significantly to their success (Kirkpatrick and Locke 1991).<sup>6</sup> In terms of the so-called “big five” personality traits (openness to experience, conscientious, extraversion, agreeableness, and neuroticism), research suggests that extraversion

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<sup>4</sup> See Lennox and Wu (2017) for a comprehensive review on this topic.

<sup>5</sup> KPMG's annual summer leadership conference, for example, focuses on “preparing high-achieving diverse students to be the business leaders of tomorrow”; successful students can win scholarships worth up to \$6,000 (see [https://kpmg-campus.com/campus/ourOpportunities#leadership\\_edge](https://kpmg-campus.com/campus/ourOpportunities#leadership_edge)). Deloitte's career page states that “we look for students who will become tomorrow's business leaders” (<https://www2.deloitte.com/us/en/careers/students.html>), and the firm's \$300 million Leadership and Learning Centre is devoted to leadership.

<sup>6</sup> Trait-based leadership theory identifies integrated patterns of personal characteristics that reflect a range of individual differences and are considered to foster consistent effectiveness in leadership across a variety of group and organizational situations (Zaccaro et al. 2004).

and conscientiousness are, in that order, the ones most often associated with leadership (Judge et al. 2002; Borghans et al. 2008). Labor economists have shown that leadership ability is a strong predictor of future wages (Kuhn and Weinberger 2005). Here we investigate the emphasis that the auditing profession places on leadership by examining the extent to which the market rewards this attribute and the potential factors explaining such a reward mechanism.

In our investigation, we make use of registry data from the Swedish Conscription Agency, which includes a unique measure of leadership ability that includes virtually all Swedish male citizens through 2010, at which point military service ceased to be compulsory. The enlistment evaluation for the Swedish Armed Forces (*Försvarsmakten*), which took into account conscripts' health and certain physical, cognitive, and noncognitive characteristics in evaluating whether they were physically and mentally fit to serve in the military, included an assessment of leadership ability.<sup>7</sup> In this two-day evaluation, psychologists used results from an IQ test, a survey, and one-on-one semi-structured interviews, together with family characteristics, to assess whether candidates showed promise as military leaders. The assessment instruments were based on research collected during the Korean War and successively refined and validated, as described by (Kyaga et al. 2015). They evaluated social maturity, intensity, psychological energy, and emotional stability and assigned a final leadership score on a nine-point stanine scale. Motivation for military service was not considered in this part of the evaluation. The scores awarded in the interview increased in proportion to willingness to assume responsibility as well as in proportion to independence and display of an outgoing character, persistence, emotional stability, and initiative

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<sup>7</sup> While the leadership score is intended to capture an individual's potential in military contexts, we consider this measure to be relevant in the business domain as well. Indeed, the business world is often described using military metaphors (thus, for example, a search in March 2019 of the words "warfare and business" generated 8,610,000 Google hits). Moreover, research by Benmelech and Frydman (2015) indicates that US military officers who go on to serve as CEOs tend to manage their companies in distinct ways.

(Kyaga et al. 2015). Semi-structured interviews of the type used in the Swedish enlistment procedure have high validity, for which reason they remain in use in the country's military and other governmental agencies (Kyaga et al. 2015). Thanks to access to this valid measure of leadership ability, we are able to go beyond such readily available partner demographics and variables as gender and experience that have been used in prior studies to explain labor market returns on leadership ability (e.g., Ittonen, Vähämaa, and Vähämaa 2013; Cahan and Sun 2015).

In answering our research questions, we first investigate whether leadership ability is valued by the labor market. Our main tests regress auditors' income and career outcomes on leadership ability while controlling for various other characteristics. First, we find that auditors' income—that is, earnings from audit work in the form of either salary or dividends from the partnership—is positively associated with their leadership scores. Even after adding control variables, such as height and physical capacity, for which leadership might be acting as a proxy, our results remain largely the same. To ensure that we are not capturing the effect of cognitive ability, which could correlate with leadership skill, each group of auditors at the same IQ level is tested separately. Our results indicate that our leadership score is in fact capturing an ability distinct from cognitive ability. We also take into account the variations in compensation schemes across the Big 4 audit firms documented in Knechel et al. (2013) by narrowing our sample to auditors from those firms and examining the interaction effects between leadership ability and audit firm indicators. Our results in this case, however, do not indicate that variation occurs across Big 4 firms in how they reward leadership. Overall, our finding is consistent with that of Kuhn and Weinberger (2005) that, in the US, men who occupied leadership positions in high school earn more as adults. Our measure of leadership is, however, more reliable than theirs because it has been evaluated by a trained psychologist with the Swedish army. To the best of our knowledge,

ours is the first large-scale archival study of the relationship between leadership ability and personal income in the context of the auditing profession.

If leadership ability is a crucial attribute of auditors, this fact should be reflected in the processes through which they are hired and promoted. We accordingly address the question posed by Carter and Spence (2014), “who makes partner in the Big 4?” Having interviewed 32 accounting professionals in the UK and Canada, they report that audit partners serve in leadership roles and set an example for their younger colleagues. Building on this finding, we use the archival data to test the impact of leadership ability on an auditor’s career success after controlling for cognitive ability, height, age, and physical capacity. We find that our leadership measure predicts the likelihood that an auditor will become a partner in a Big 4. More specifically, the average marginal effect of leadership ability on the probability of becoming a Big 4 partner is about 4%. As discussed in Lennox and Wu (2019), little is known about what determines partner promotions. Our result on the importance of leadership ability for promotions helps to shed some light on this issue

Further, testing whether auditors with high leadership ability are especially likely to be hired by a Big 4 firm, we first find that auditors in our sample who have been hired at least once by a Big 4 firm have higher leadership ability scores than those who have not. Further, our logit model shows the average marginal effect of leadership ability on being hired by Big 4 is about 2%. Overall, our results indicate that leadership is crucial for an individual auditor’s success and is highly valued by the profession.

Our study makes several contributions to the accounting literature. First, we provide what is apparently the first large-scale archival study of the significance of leadership for the auditing profession, which has been embracing the concept for years. Second, the unique data that we employ provide us with a credible measure of leadership ability. As a consequence, whereas

previous studies from other fields have relied on self-assessment, surveys, or proxies for leadership skill and on relatively small samples, we adopt a more valid measure, one that fairly accurately represents the entire Swedish adult male population through 2010. Our findings further represent a contribution to the literature on labor, economics, and psychology by demonstrating the clean effect of leadership on personal outcomes, for our rich data set enables us to distinguish the incremental effect of leadership from cognitive ability and other innate characteristics. In addition, we avoid much of the endogeneity problem that is inherent in this line of research (Judge, Piccolo, and Kosalka 2009) because our leadership measure is obtained for individuals before they enter the labor market. From an organizational point of view, our findings provide the first archival evidence of the benefits of leadership ability for organizations as well as for individuals climbing the career ladder. Our findings may also be of assistance to audit firms in formulating their recruitment and staff development schemes.

In what follows, the next section surveys the relevant literature; section 3 describes the Swedish institutional setting, data source, construction of the sample, and descriptive statistics used in the study; the key findings are presented in section 4; and conclusions are offered in section 5.

## **2. Survey of the literature**

In the discussion here, we first review previous research on individual auditors' effects, and then discuss the significance of leadership for auditors.

### ***Why should the individual auditor matter?***

Auditing research in recent years has witnessed a shift of focus from the level of the firm to that of the office and individual audit partner. This shift follows a trend in finance literature that begins with Bertrand and Schoar (2003) toward documenting individual executives' influence over

a broad range of corporate behaviors and over performance. The accounting literature has also in recent years investigated manager fixed effects. Dyreng et al. (2010), for example, find that individual executives have significant incremental effects on their firms' tax avoidance behavior, and Ge et al. (2011) document the influence of individual CFOs on firms' accounting choices. Building on upper echelons theory (Hambrick and Mason 1984), this line of research has shed light on the importance of individual managers in corporate decision-making.

Audit partners, as both employees and owners, work predominantly, and indeed by definition, in the context of partnerships. The resulting agency problem, unlike in the case of corporations (Lennox and Wu 2017), causes each partner to exert a distinct level of effort, since the cost of doing the audit work is borne by the signing partner while the benefit is shared by all of the firm's partners. In this situation, shirking can take many forms, such as inattention to training of staff, to winning new clients (Lennox and Wu 2017), or even to the actual audit work (Huddart and Liang 2005). Gilson and Mnookin (1984) describe another kind of agency problem, which they have termed "grabbing and leaving," in which a "grabbing" partner seeks to extract a larger-than-agreed portion of the profits by threatening to leave the firm while a "leaving" partner takes clients away from the firm. In order to deal with such agency problems, audit firms must design their internal rewarding systems so as to motivate their partners to deliver the desired levels of effort and quality. Nevertheless, because the partners' abilities differ, highly capable ones may not want to share their firm's profits equally. In the case of performance-based reward systems, a further problem arises owing to the difficulty of measuring a partner's performance with precision (Huddart and Liang 2003). Given that the effort, diligence, and quality that go into an audit are quite difficult quantities to observe, a given compensation scheme will unavoidably motivate individuals in distinct ways. Some analytical studies also explicitly assume that audit partners



differ in terms of their innate characteristics; the model proposed by Huddart and Liang (2003), for example, assumes that each individual is endowed with a distinct type of human capital and distinct preferences.

Recent empirical studies have documented the heterogeneity of audit partners. Gul et al. (2013) use the auditor fixed effect approach to separate the effects of individual auditors on audit quality from those of clients, audit firms, and audit offices and find that individual effects not only exist but also vary in magnitude. Auditor individual effects have been found in large and small audit firms alike. In another study, Cameran et al. (2018) distinguish audit firm control mechanisms at the organizational, office, and partner levels and attempt to clarify the interrelationships among and relative importance of these layers. They find that audit firm, office, and partner fixed effects are all significant, but the largest effect is inter-partner variation. The auditor individual effect impacts the capital market. Aobdia et al. (2015) employ the methodology of Bertrand and Schoar (2003) to document a positive association between the quality of an individual partner's audit quality and clients' earnings response coefficients. The market also reacts positively when an audit client switches from a lower quality partner to a higher quality one. Numerous archival studies of audit partner heterogeneity have also looked at various styles and characteristics of auditors. Knechel et al. (2015) report that a conservative or aggressive reporting style persists for individual partners over time. Other characteristics found to be associated with audit outcomes are auditors' age (Goodwin and Wu 2016; Sundgren and Svanström 2014), gender (Ittonen et al. 2013), expertise (Zerni 2012; Goodwin and Wu 2014), risk tolerance (Amir, Kallunki, and Nilsson 2014), and cognitive ability (Kallunki et al. 2016).

### ***Why should an individual auditor's leadership ability matter?***

Auditors need certain talents to succeed. Besides technical competence, a leading auditor must communicate with subordinates to delegate, to guide, and to convey knowledge. Leading auditors also need to assemble teams of competent colleagues who are dedicated to their work. In return, the productivity and careers of subordinate auditors are enhanced when they follow good leading auditors. Auditors must go outside the firm to meet with prospective clients and convince them of the quality of their audits and persuade them to purchase their services.

Two prior qualitative studies of leaders in Big 4 accounting firms are particularly relevant to our work here. First, Kornberger et al. (2011) provide a rich ethnographic analysis of the space of managers at a Big 4 firm, framing the partnership as an entrepreneurial activity within the firm that undergoes continuous reinvention in order to provide innovative revenue-generating services. Managers, who occupy the space between trainees and partners, are responsible for “a complex network of clients, partners, and juniors” (Kornberger et al. 2011, p.520). The emotional and occasionally overwhelming space that managers occupy is stressful and demanding as they deal with structuring a team, planning, resources, assessing motivations, providing critical feedback, and delegating tasks, and they must trust their subordinates. In managing client relations, a pivotal skill involves forging and coordinating relationships across multiple levels of their clients' companies, where they are seen as a “necessary evil” (Kornberger et al. 2011, p.526).

The other especially relevant paper is by Carter and Spence (2014), who explore the professional dispositions of Big 4 partners. They quote one auditor asserting that a partner must be “a hunter, a killer, and a skinner . . . you have got to be able to go out, get the new work in, identify the opportunities, secure them, and . . . be able to do the work” (Carter and Spence 2014, p.967). They conclude that a Big 4 audit partner is a multidimensional, “well-rounded business

person” who does much more than simply convey technical knowledge. Corroborating previous work, they find that the commercial emphasis of the accounting profession means that a Big 4 partner must be able to lead the firm to growth.

The research presented in both of these papers highlights the importance of leadership ability in the context of accounting firms. Yet, however, only a handful of qualitative/experimental studies have examined leadership behavior in an audit context. Among these, seminal papers by Jamie Pratt and James Jiambalvo show that certain types of behavior on the part of leaders impact the performance of audit teams (Pratt and Jiambalvo 1981) and that this impact is contingent upon assistant auditors’ perceptions of the complexity of the task at hand (Pratt and Jiambalvo 1982). Looking beyond leadership behavior *per se*, Pratt and Jiambalvo (1982) identify three determinants of leadership behavior, namely the aforementioned relationship between the perceptions of the complexity of their work on the part of the auditors in charge and their assistants, the assistants’ intolerance of ambiguity, and the personality dominance of the auditor in charge. More recently, Otley and Pierce (1995), focusing on the behavior of leaders, examine how supervisors’ behavior influences subordinates’ reactions to control systems in accounting firms and find dysfunctional behavior to be associated with a “high structure and low consideration” leadership style and to be moderated by perceptions of environmental uncertainty. Still more recently, Nelson et al. (2016) find that a team-oriented leadership style has a positive effect on team members’ willingness to raise issues during audits, thereby providing further evidence that the behavior of leading auditors impacts the effectiveness and efficiency of their audits.

In the studies just discussed, the focus is on leaders’ behavior. Our research, however, focuses on leadership ability, which is the attribute that the leading firms in the industry is emphasizing heavily. In leadership research, the leader trait perspective is perhaps the most

venerable one (Judge et al. 2009). Dating back to the year 1840, Thomas Carlyle's "great man" theory stated that "The history of the world is but the biography of great men" (Carlyle 1840, p.1). Albeit its intuitive appeal, the leader trait perspective has encountered hard times when it comes to empirical evidence, which is perhaps the reason why there is a lack of such research in the field of auditing. In their survey article, Judge et al. (2009) point out that the critics of the trait theory of leadership remain prevalent. As Andersen (2006, page 1078) observes, "Management and leadership in formal organizations are not about possessing special traits. It is about acting." Kaiser et al. (2008, page 102) similarly affirm that "leadership research often focuses on how leaders are regarded and tells us little about leading effective teams." One important reason for the lack of research on the effectiveness of leaders is that measures of it are "often easily contaminated by extraneous influences, and often present causal inference problems" (Judge et al. 2009, p.856).

Recent research in Economics and Finance however, have advanced our knowledge in leader traits and the importance leadership ability in different settings. Adams et al. (2018) find that CEOs differ from other high-skill professionals most in noncognitive ability, and that the median large-company CEO belongs to the top 5% of the population in the combination of the three traits: cognitive ability, noncognitive ability, and height. Focusing on Swedish politicians, Dal Bó et al. (2017) document that politicians are on average significantly smarter and better leaders than the population they represent. Military majors, for example, have the same average leadership scores (6.5) as CEOs in companies with 25-250 employees, whereas Parliamentarians exhibit higher score of 6.8, similar to CEOs in companies with more than 250 employees. The average leadership score for the Swedish population is, by comparison, 5.3. Motivated by this line of emerging research, we investigate the implication of leadership ability for the auditing profession. Our study, then, appears to represent the first attempt to examine the role of leadership

ability in the context of labour market outcomes in the audit industry. It further contributes to the management literature by providing a new perspective on leader trait theory.

### **3. Institutional setting, data, and methods**

#### ***The institutional setting in Sweden***

Sweden is a European Union (EU) member country and as such follows EU Directives as well as ISA Standards on auditing. The audit regulation is implemented mainly through the Accounting Act and the Auditing Act, with the Professional Institute for Certified Auditors and other Accounting Professionals (FAR) providing supplementary standards. As a member of the International Federation of Accountants (IFAC), FAR adopts the ISA Standards and the IFAC's Code of Ethics.

Prior to 2010, nearly all limited liability companies in Sweden had to be audited. The change in 2010 followed the EU's Fourth Council Directive, which allowed small companies to opt out of mandatory auditing. However, the size threshold for mandatory audit was set substantially lower in Sweden than in other EU countries.<sup>8</sup> During the sample period, mandatory audit firm/partner rotation was not in place for Sweden. There was in place at this time a two-tier qualification system for public accountants, who were classified as either approved (*godkänd*) or authorized (*auktoriserad*)<sup>9</sup>. Approved auditors held a bachelor's degree, had passed a professional competency exam, and had accrued at least three years of practical experience. The higher standards for authorized auditors included a master's degree in accounting, at least five years'

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<sup>8</sup> The Swedish size thresholds were set so that companies exceeding two of the following three thresholds for the two consecutive years are subject to mandatory audit (the EU Maxima thresholds that prevailed in 2010 are reported in parentheses):

1. annual total sales of SEK 3 million / c.a. EUR 310 thousand (EUR 8 million);
2. annual total assets of SEK 1.5 million / c.a. EUR 155 thousand (EUR 4 million); and
3. three full-time employees (annual average) (50 employees).

<sup>9</sup> The two-tier system with approved and authorized auditors was abolished in June 2013

experience, and passing a more challenging exam. The audit certification remained valid for five years, after which application could be made to the supervisory board for renewal. Unlike in the US, where only the name of the audit firm appears in audit reports, audit reports in Sweden are signed by the individual auditors in charge of the audit. Companies are required to report their auditors' information to the Swedish Companies Registration Office (*Bolagsverket*, SCRO) every year, including personal identification numbers and the start and end of the audit service where applicable.

### ***Data sources and sample construction***

Our data come from four sources: Swedish military enlistment records, the Serrano database, the Swedish Tax Agency (*Skatteverket*), and the Swedish Inspectorate of Auditors (SIA; *Revisorsinspektionen*). Regarding the first of these sources, military service was mandatory for Swedish men in the period from 1901 to 2010. The Swedish Conscription agency thus affords us access to a unique measure of leadership ability for a sample of nearly all Swedish men over a period of nearly a century. Conscripts are obliged to take part in an enlistment evaluation that cover their health status and certain physical, cognitive, and noncognitive characteristics in order to gauge their physical and mental fitness to serve in the military. This two-day evaluation include an assessment of suitability for leadership positions in the military—that is, leadership ability. To be more specific, during the evaluations, psychologists combine the results of an IQ test, a survey consisting of 70-80 questions about friends, family, and hobbies, and a 30-minute, one-on-one interviews to determine, among other things, each conscript's leadership potential. A manual stipulate topics to discuss and the grading of responses; though classified, the test is known to have assess conscripts' personalities, with most of the questions relating to behaviors rather than attitudes (Bihagen, Neramo, and Stern 2012).

The results of the evaluations are summed up in terms of four personality traits on which the conscripts were rated using a scale ranging from one to five: (i) social maturity, i.e., extraversion, having friends, taking responsibility, and independence; (ii) psychological energy, i.e., perseverance, the ability to fulfill plans and remain focused; (iii) intensity, i.e., the capacity for self-motivation and the nature and frequency of free-time activities; and (iv) emotional stability, i.e., the ability to control and channel nervousness, tolerance of stress, and disposition to anxiety. These traits are, again as noted earlier, closely related to the well-known “Big 5 personality traits” (Dal Bó et al. 2017). Conscripts’ leadership scores in the interview improve when they exhibit willingness to assume responsibility, independence, an outgoing character, persistence, emotional stability, and initiative (Lindqvist and Vestman 2011). The final outcome of the interview is a leadership score on a nine-point scale.

We consider the results of these evaluations to be reliable owing to the absence of any incentive for conscripts to avoid military service by intentionally performing poorly the tests. There is no such incentive for the simple reason that poor performance on the test did not exempt an individual from conscription—rather, only those who had severe handicaps, who were institutionalized for mental disorders or prison sentences, or who were residing outside Sweden were exempt. The timing of the evaluation of leadership ability also works to our advantage, since ??% of the men included took the test at the age of 18 and ??% at the age of 19, the leadership score was assigned at a point before our future sample auditors had accumulated any substantial leadership experience or training. As for the quality of these assessments, previous research suggests that the validity of semi-structured interviews of the type used in the Swedish enlistment evaluations is relatively good (Carlstedt 2000; Carstedt and Widen 2000). The same type of

interview remains in use in the Swedish military and other governmental agencies (Kyaga et al. 2015).

On average, our initial sample includes around 4,000 registered CPAs working in Sweden in a given year.<sup>10</sup> The total number of Swedish CPAs has been decreasing gradually in recent years, from 4,205 in 2000 to 3,991 in 2010 and 3,572 in 2015. Turning now to the data that we have retrieved from SIA for the period from 2000 to 2014, there are in total 6,701 unique auditors. Since women were not drafted, our sample drawn includes only the leadership scores for men. About 70% of CPAs are male for this period, leaving us with 4,423 male auditors. We also exclude 2,122 auditors whose IQ scores are missing or who were not born between 1950 and 1979, since our military data do not cover them. As mentioned, leadership scores were only assessed for conscripts whose cognitive ability scores exceeded 4, so our final sample also excludes 219 auditors with IQ scores below 5 on the nine-point scale, leaving us with a sample 2,082 auditors, whose clients we then identify using the Serrano database.

The Serrano database combines financial statement data and bankruptcy information for all Swedish companies from the SCRO, the general history of company data from Statistics Sweden, and group data from Bisnode's group register. The SCRO also keeps track of information about each company's auditors, including their personal identity numbers and their tenure with their companies, which is included in Serrano but in a separate data unit that must be requested independently. In the end, we retrieve company-auditor pair match for the period ending in 2014 for all Swedish limited liability companies. In processing the Serrano data, we eliminate companies for which the values of total assets or total revenue for a certain year are missing. For group companies, we retain only the consolidated financial statements in our sample because auditors

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<sup>10</sup> This figure is in line with the study by Sundgren and Svanström (2017, 789) who report that the average number of CPAs in Sweden from 2005 to 2009 was 4,083.



often sign both the financial statement of subsidiary firms and the consolidated statement. The working load or the fee earned, however, is not necessarily proportional to the total asset/revenue value signed by the auditor. Any effect of leadership on audit practice would presumably be manifested more strongly in larger-scale audits, especially group audits. To avoid this kind of double counting, we eliminate from our sample all of the subsidiaries and include for groups only the consolidated financial statements together with the financial statements for independent companies. It is our opinion that this conservative approach to the sample work against finding any leadership effect on client portfolio size.

We then merge the processed Serrano data with the military enlistment data on the 2,082 male auditors with available leadership and IQ score to arrive at a dataset that includes the financial information of each Swedish limited liability company together with its auditor's military record data. In this step, we lose a further 162 auditors.

Since our study focuses on the impact of leadership ability on auditors' future income and on organizational promotions, we access two more data sources. One has already been mentioned, namely the SIA, which provides each auditor's job affiliation at the beginning of each year as well as the office's postcode. Using this data, we are also able to identify the working location of each auditor in a certain year. We obtained as well from the SIA information about sanctions against auditors (to be described more in detail). Our fourth and last source of data is the Swedish Tax Agency (STA), from which we retrieved auditors' income from salary, capital, and income businesses from 2007 through 2014. Since dividends from partnership in a firm are taxed as capital income in Sweden, we follow the approach of Knechel et al. (2013) and add employment income and capital income to serve as the measure of an auditor's compensation in relation to work. Overall, then, our main sample spans the years from 2000 to 2014. When we use work

compensation as our outcome variable, the sample period begins in 2007 with the availability of the STA data.

To summarize, our main sample consists of 1,920 male auditors and their audit clients for the period from 2000 to 2014, for a total of 736,119 firm-year observations. With regard to income, the sample narrows to 1,715 auditors for the years 2007 to 2014. This latter subsample includes 11,708 auditor-year observations.

### ***Research method***

#### *Leadership and personal income*

We formulate our first model for the association between leadership and personal income as follows:

$$INCOME_{i,t} = \alpha + \beta LEADERSHIP_i + \theta \mathbf{X}_{i,t} + \varepsilon \quad (1)$$

in which  $i$  denotes individual auditors and  $t$  denotes year, the dependent variable  $INCOME_{i,t}$  is the natural log of the salary of auditor  $i$  plus capital income for year  $t$ , and the test variable  $LEADERSHIP$  is the standardized value (mean of 0 and standard deviation of 1) of the leadership score.<sup>11</sup> The vector  $\mathbf{X}$  includes a comprehensive set of control variables, as follows.

**Cognitive ability (IQ)** There is experimental research that link auditors' cognitive ability to audit outcomes (e.g. Abdolmohammadi and Shanteau 1992; Bonner and Lewis 1990; Libby and Tan 1994; and McKnight and Wright 2011). For instance, Abdolmohammadi and Shanteau (1992) report that intelligence is among the most important attributes of an audit partner, thereby highlighting the importance of auditors' cognitive skills. Moreover, in a study based on archival data, Kallunki et al. (2019) show that audit partners' IQ scores are positively associated with going-

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<sup>11</sup> The standardized value of military test scores have been used by, for example, Lindqvist (2011) and Lindqvist and Vestman, 2011.

concern audit reporting accuracy and audit fee premiums. We therefore include the auditors IQ to control for potential confounding effects of cognitive ability on income and leadership.

**Size of client portfolio** Knechel et al. (2013) point out that the size of an auditor's clientele represents revenue-generating opportunities for his firm and that auditors are rewarded with higher compensation in proportion to the size of their client portfolio. To measure the size of auditors' clientele, we construct a variable *PTF\_SIZE*, which is the natural logarithm of total client assets for auditor *i* in year *t*. In robustness checks, we also use clientele size measured by the natural logarithm of total client revenue as the *Y* variable.

**CPA license status** As mentioned, Sweden until recently had a two-tier system for CPA licenses, with authorized (*Auktoriserad*) status requiring more on-the-job experience and education. We use an indicator variable *ATH\_AUD* that is set to 1 if an auditor's CPA license is "authorized" for the year and to 0 if it is "approved."

**Industry expertise** Audit research has shifted with respect to the level at which the analysis is commonly performed from the firm to the office (e.g., Basioudis and Francis (2007) and individual partner (Goodwin and Wu 2014) levels following the seminal work of Francis et al. (1999) and Reynolds and Francis (2000). In this paper, we follow the approach by Goodwin and Wu (2014) and define three levels of industry expertise as follows:

**LEAD\_AUD** = 1 if the auditor is the first-ranked by market share of audited total client assets for a given industry in the region of his office, and zero otherwise;

**LEAD\_REG** = 1 if the audit office is the first-ranked by market share of total client assets for a given industry in the region of the office, and zero otherwise; and

**LEAD\_NAT** = 1 if the audit firm is the first-ranked by market share of total client assets for a given industry in Sweden, and zero otherwise.

Unlike Goodwin and Wu (2014) who use data from Australia, however, we replace city level with region level in constructing our variable because cities and towns in Sweden are more dispersed than is the case in Australia which is dominated by a few large cities. We classify each industry using a two-digit SIC code. We control for industry expertise at these three levels because we seek to capture the effect of leadership ability rather than knowledge or soft skills that individuals may acquire after joining the labor market. Likewise, it is thanks to reputations built over time that audit offices and firms attract clients and command high fees, but such effects would be manifested in the individual auditor's income and/or clientele. Reputable offices and firms also have strict quality control systems that enhance audit quality. When investigating the association between leadership skill and audit quality at the firm-year level, we include the above three indicators. For other tests, in which we perform auditor-year-level analysis, however, we are unable to do so because an auditor (with an office or firm) could be a leader in more than one industry. We accordingly set the value to unity for an auditor (or office or firm) who (that) is the leader for at least one industry at the corresponding regional or country level. We use *LEAD\_ONE\_AUD* (*LEAD\_ONE\_REG/LEAD\_ONE\_NAT*) to denote this measure.

**Disciplinary sanction** Sanctions serve as an essential tool of the oversight body to enhance the quality of audits as well as the reputation of the auditing profession. A sanction on one audit client could negatively impact both the audit firm and other clients of the same firm owing to a spillover effect (Dee, Lulseged, and Zhang 2011). At the level of the individual auditor, Sundgren and Svanström (2017) find, using Swedish data, that salaries at Big 4 auditors tend to decrease following a sanction from the Supervisory Board of Public Accountants. We therefore include the dummy variable *SANC\_WR*, which is set to the value of 1 if an auditor has received a sanction in the form of either a warning or loss of a CPA license in a given year.

**Big 4 firm** As many previous studies have shown, Big 4 firms differ significantly from other auditing firms. Thus the former are thought to provide higher quality audits because, being beholden to no one client, they seem less likely to compromise their independence (DeAngelo 1981) and because they have established reputations to protect (Dopuch and Simunic 1980). Auditors working at large firms also benefit from access to extensive resources, quality on-the-job training, and various types of clients (Lawrence, Minutti-Meza, and Zhang 2011; Francis and Yu 2009). Since, then, auditors of the same ability may experience very different career outcomes depending on whether they join a Big 4 firm, we include a Big 4 indicator (*BIG4*) as a control variable in the model. Further, as Knechel et al. (2013) demonstrate, “there is significant variation in the implicit determinants that are associated with compensation across the Big 4.” Because we are interested in variation within Big 4 firms in terms of rewarding leaders, we narrow our dataset to auditors at these firms and examine the interaction term between the leadership score and firm indicator.

**Height and physical capacity** Alternatively, our results for leadership skill might be explained by some other unobserved determinants such as physical characteristics. In the psychology test, for example, individuals who are tall may receive higher scores for that reason alone. Researchers in the fields of psychology and economics have presented evidence that workplace promotion and height are positively correlated (e.g., Lindqvist 2012; (Melamed and Bozionelos 1992; Lindqvist 2012), and, since this effect could account for our results, we control for auditors’ height (*HEIGHT*) in our tests. The height data also come from the military records and, as with the leadership scores, the value is assessed on a nine-point scale.

Another unobserved determinant that could explain the leadership effect on income is the physical capacity of auditors. Thus physically stronger children may have been assigned positions

of leadership during their school years before joining the army and, because of this experience, earned disproportionately high scores on the leadership evaluations. Physical capacity is also an important in workplace success; as Loehr and Schwartz (2001) note, high performance in the face of ever-increasing pressure and rapid change demands not only a keen intellect but also physical strength. We control for physical capacity (*PHYS\_CAP*) by using the test score from the drafting process. The value is likewise assessed on a nine-point scale.

**Other fixed effects** The Swedish economy is not evenly distributed across the country<sup>12</sup>. We therefore include the indicator *Region* in the regression to control for this effect, dividing Sweden into the following nine geographical regions:<sup>13</sup> 1 = Stockholm, 2: Skåne, 3 = South East, 4 = South West, 5 = South Central, 6 = East, 7 = North Central, 8 = Southern Norrland, and 9 = Northern Norrland. The city of Gothenburg belongs to the South West and Malmö to the Skåne.

Age is another important factor in relation to an individual's professional development, as auditors accumulate experience as well as a client base over the years. For this reason, we include a birth year cohort indicator in our analysis. On the other hand, career opportunities may decrease as an auditor ages (Holmström 1999); Goodwin and Wu (2016), for example, show that the quality of audits appears to decline as the age of auditors increases. We therefore group the auditors in the sample into six birth cohorts and add the indicator Birth Cohort (*BirthCoh*) as a control variable. Thus Birth Cohort 1, for example, corresponds to individuals born in the period

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<sup>12</sup> Sweden, with a population of 10.2 million, is in area the third-largest country in the European Union, covering 450,295 square kilometers. Its population is concentrated in the south, while the north is heavily forested. Economic development varies across Sweden's geographical regions and municipalities, as Edvinsson et al. (2011) show. Thus the citizens of Stockholm (the capital and largest city), Gothenburg, and Malmö have the highest disposable income levels (up to 343,000 SEK per year) and those living in the north the lowest (as low as 126,000 SEK per year).

<sup>13</sup> This division follows the classification scheme of the Swedish Post (*Posten*).

from 1950 to 1954, and Birth Cohort 6 corresponds to those born from 1975 to 1979. Year fixed effects are also included in the model, and robust standard errors are reported.

### *Leadership and career outcomes*

The second part of our empirical tests examines the association between auditors' leadership ability and career outcomes. First, we examine whether Big 4 partners possess greater leadership ability than other auditors. To answer this question, we first identify an auditor as a Big 4 partner if he has audited at least one listed company in the period from 2000 to 2014<sup>14</sup> by running the following logit model:

$$PARTNER_i = \alpha + \beta LEADERSHIP_i + \theta \mathbf{X}_i + \varepsilon \quad (2)$$

in which the outcome variable *PARTNER* is set to 1 if an auditor is identified as a Big 4 partner and 0 otherwise. Vector  $\mathbf{X}$  control for such time-invariant characteristics of individual auditors as height, physical capacity, IQ, and birth year cohort. Our sample is narrowed to the auditor level for this set of tests.

We also test whether auditors hired by Big 4 audit firms possess relatively greater leadership ability. From the main sample of 1,920 auditors, we identify 1,117 auditors who have been hired at least once by a Big 4 firm in the annual data from the SIA. For this part of the analysis, we run model (3) as follows:

$$Big4\_Hire_i = \alpha + \beta LEADERSHIP_i + \theta \mathbf{X}_i + \varepsilon \quad (3)$$

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<sup>14</sup> We acknowledge that not all Big 4 partners have audited a listed client, but this will bias down the estimate of the leadership effect.

Here the outcome variable (*Big4\_Hire*) is an indicator set to 1 if the auditor has worked for a Big 4 firm in the sample period and 0 otherwise. As with model (2), vector  $\mathbf{X}$  controls for such time-invariant characteristics of individual auditors as height, physical capacity, IQ, and birth year cohort. We narrow the sample to the auditor level for this set of tests.

### *Descriptive statistics*

Table 2, Panel A reports the summary statistics of the *raw* military test scores used in our analyses for the 1,920 auditors in the main sample. The mean value of the raw leadership score is 5.834, which is higher than that of the Swedish population as a whole of 5.3 reported by Dal Bó et al. (2017). Overall, the military test scores approximate a normal distribution. We also tabulate the birth cohorts and regions of these auditors (which are not presented here for reasons of brevity), we observe, as expected, a disproportionate number of senior auditors in the sample. Thus the youngest cohort occupies only 9% of the sample and the oldest nearly 22%. Concerning the Region variable, we expect large numbers of auditors to work in the regions in which Sweden's largest cities are located, and indeed we find the largest number of auditors (26%) working in Stockholm and large numbers also in the Skåne region, which includes Malmö, and in the South West, which includes Gothenburg (around 15% each), with some 10% the remaining auditors working in each of the other regions.

Again, for the first set of tests, which assess auditors' leadership ability and work income, our sample is restricted to 1,715 auditors in the period from 2007 to 2014. We first examine the summary statistics for the income of this subsample of auditors. Panel B of Table 2 summarizes their *raw* income. As has been seen, we measure auditors' income from work (*INCOME\_TOTAL*) by combining their salary (*SALARY*) and dividend income (*CAP\_INC*). The median annual salary for an auditor is 556,510 SEK and the mean value 592,741 SEK. Total compensation is right-



skewed, with an average of 916,856 SEK annually and a median of 673,928 SEK, possibly owing to the large dividends earned by Big 4 audit partners. Panel C of Table 2 reports the summary statistics for variables used the leadership–income regression. The leadership score (*LEADERSHIP*) is normalized to a mean of 0 and standard deviation of 1. Some 65% of auditors obtained the “authorized” (*ATH\_AUD*) status, and about 1% are sanctioned (*SANC\_WR*) annually.

We also conduct a univariate test as a first exploration of the association of leadership ability with our outcome variables, dividing auditors into high (scores over 5) and low (scores up through 5) leadership groups. Table 3, Panel A indicates whether the mean income (*INCOME*), client portfolio size in total assets (*PTF\_SIZE*), and client portfolio size in total revenue (*PTF\_SIZE\_REV*) differ significantly between the two groups. Our results show that auditors with higher leadership scores do, on average, earn more and manage a larger portfolio of clients than those with lower leadership scores. We also test the difference in leadership score between Big 4 audit partners and others in Panel B of Table 3. The average score of Big 4 audit partners was 6.3 and that of other auditors 5.8, a difference significant at 1% level. Both set of tests indicate that leadership ability predicts auditors’ income and career success. In the same vein, as shown in Panel C of Table 3, we compare the mean leadership scores of auditors hired at least once by a Big 4 firm with those who never worked at a Big 4 firm in the sample period. The mean leadership score for the former group (*Big4\_Hire*) is also statistically higher than that for the latter group (*Non-Big4\_Hire*).

We present correlations between key variables in Table 4. Panel A is based on the 1,920 auditors in the main sample. As expected, the correlation between IQ and leadership ability is relatively high at 0.29. Interestingly, leadership ability and the likelihood of becoming a Big 4 partner is 0.12 correlated (significant at 1%), whereas IQ is only 0.07 correlated with this outcome,

indicating that leadership is the more important quality at the Big 4 firms. In Panel B, we report the correlation matrix at the auditor/firm-year level. Auditors' income, portfolio size, and the Big 4 indicator all correlate significantly with leadership ability at 1% level. An interesting finding here is that the correlation between IQ and all three of these variables is lower than that for leadership ability.

#### **4. Empirical Results**

##### *Leadership and personal income*

Table 5 presents our analysis of the relationship between leadership and income for the 1,715 auditors with available income data for the period from 2007 to 2014. Column 1 shows the regression of the natural log of total income (*INCOME*) on the standardized leadership score, controlling only for year fixed effects, region, and birth cohort. The coefficient on *LEADERSHIP* indicates that an increase of one standard deviation in leadership ability is associated with almost 10% higher income. In column 2, we include cognitive ability, client portfolio size, and other factors that relate to auditors' professional knowledge and experience, such as CPA license status, industry expertise, and the sanction indicator. R-squared more than triples (from 12.6% to 39.7%) after addition of these variables, while the estimates on *LEADERSHIP* decrease (from 0.095 to 0.066) but remain statistically and economically significant. To ensure that the effect of our leadership measure cannot be explained by other determinants for which leadership acts as a proxy, we run a regression as in column 2 but with height and physical capacity added, as shown in column 3, where it is clear that these two variables capture something that affects earnings. The estimated leadership effect (0.065) is, however, almost the same as in column 2 (0.066).

Further, in order to ensure that the leadership score is not simply a noisy measure of cognitive ability, which is a key and permanent component of a person's overall capacity, we run

the same regression as the one represented in column 3 of Table 5 separately for auditors with the same IQ scores. The results are not tabulated for the sake of brevity but, holding cognitive ability constant for each group, we find that the leadership ability effect remains largely the same in each subgroup, apart from the auditors with the highest IQ scores, for whom leadership ability does not seem to have a statistically significant effect on income. However, the number of observations is also substantially lower in this regression, as only 6% of auditors in our sample scored 9 on the IQ test. Overall, we conclude that cognitive ability cannot account for the robustness of the leadership effect that we observe.

Next, we narrow our analysis to the Big 4 firms. Column 4 in Table 5 shows that, in these firms, the leadership effect on personal income (0.068) is slightly larger than that for the pooled sample (0.065). Our further investigation of whether Big 4 firms reward leadership differently from each other is presented in column 5. The interaction terms between the leadership score and Big 4 indicators suggest that the leadership effect on auditors' income is about the same across the Big 4 firms.

Other control variables in this set of analyses also have interesting implications. To begin with, authorized auditors and industry leaders have substantially higher incomes. Working in an office (or firm) that is the leader in at least one industry at the regional (or national) level also seems to bring higher income to the individual auditor. This finding suggests that audit offices or firms that retain expertise in a certain industry are more profitable and thus able to pay higher salaries and dividends to their auditors than firms that lack such specific expertise. As expected, younger auditors earn less compared with the oldest cohort, that is, those born in the period from 1950 to 1954 (the estimated coefficients are not reported here for the sake of brevity). Further, auditors working in other regions of Sweden earn substantially less than those working in

Stockholm (the estimated coefficients are not reported for the sake of brevity). Height correlates positively with income in our sample, a result consistent with the evidence from psychology that taller individuals are promoted more rapidly than shorter ones (Melamed and Bozionelos 1992). The effect of physical capacity is not consistent across all of the regression specifications but appears to have a greater effect on personal income more at Big 4 auditors than at other firms.

Our tests relating to the association between personal income and leadership ability thus appear to demonstrate convincingly that male auditors who were assessed as having relatively high leadership ability at the age of 18 or 19 tend to have relatively high salaries as adults. In the following section, we consider whether leadership ability is rewarded in terms of auditors' career development.

### ***Leadership and career outcomes***

In assessing the relationship between leadership ability and career outcomes, we first consider, using the logit regression specified in model 2, whether auditors with greater leadership ability are more likely to become partners at a Big 4 firm. We identify an auditor as a partner at a Big 4 firm if he audited at least one listed client during the sample period of 2000 to 2014. Of the 1,920 auditors in the main sample, 239 are Big 4 partners thus defined. Table 6, column 1 presents the logit regression, first with leadership ability as the only independent variable. As can be seen in column 2, when we add physical capacity, height, IQ, and birth cohort as control variables, our research variable, *LEADERSHIP*, remains statistically significant. We next provide insight into the economic significance of the results by calculating average marginal effects of leadership on the probability that an auditor becomes a Big 4 partner. The average marginal effect of leadership ability is about 4% in the model of column (2). After leadership ability, age seems to be the second most important factor in becoming a Big 4 partner. Therefore, as shown in column 3, we run the

test only for auditors born before 1970, which yields a slightly higher estimated coefficient on *LEADERSHIP* (0.396). Interestingly, the estimated effect for IQ does not seem to load in any of the specifications, though we refrain from commenting on the results relating to IQ because the sample auditors have an IQ score above 5. To further test whether IQ has any confounding effect, we again run the regression separately for the higher and lower IQ groups (columns 4 and 5, respectively) and find that the leadership effect seems to be greater for the former group, but nevertheless remain economically and statistically significant for both tests. The estimated average marginal effects of leadership ability on becoming a Big 4 partner is around 4% in each of the models in columns (3) – (5).

In terms of the relation between leadership ability and the possibility of joining a Big 4 firm, we extend the univariate analysis reported in Table 3 Panel C by reporting results from logit regression model (3) in Table 7. As can be seen in Table 7, column 1, in the absence of other control variables, *LEADERSHIP* is a statistically significant predictor of being hired by a Big 4 firm. When other personal characteristics are added, however, the estimated coefficient on *LEADERSHIP* decreases from 0.116 to 0.087, and IQ seems to have a stronger effect than leadership. Again owing to the fact that our sample auditors' IQ scores are all above 5, it is difficult to interpret the findings when both IQ and leadership are included in the regression. Therefore, as shown in columns 3 and 4 of Table 7, we once more run the test separately for the lower (scores of 5-6) and higher (scores of 7-9) IQ groups and find that, for the former group, leadership ability is a much better predictor of being hired by a Big 4 firm than is the case for the higher IQ group. The estimated average marginal effects of leadership ability on being hired by a Big 4 firm is around 2% in each of the models in columns (1) – (4).

## 5. Conclusions

The 2014 Deloitte Global Human Capital Trends survey identified leadership as the largest “readiness gap” facing businesses worldwide. Thus, while 86% of respondents rated leadership as “urgent” or “important,” only 13% said that businesses were doing an excellent job of developing leaders at all levels. In the case of the auditing profession, for which human capital is the main input factor, leadership likewise seems to be highly valued by the dominant firms. Analysis of this “unobserved ability,” as the labor economists (Kuhn and Weinberger 2005) refer to leadership, is, however, limited in the auditing literature, though the recent proliferation of studies at the level of the individual auditor attests to the significance of personal characteristics for audit outcomes. The present study builds on this work by investigating whether auditors’ leadership ability, as estimated early in life, is associated with compensation, job opportunities and partner promotion. Our empirical results show that leadership is indeed rewarded by the market: leadership ability in auditors is associated with higher income, hiring by a leading firm, and promotion to partner in such a firm.

Our study has important implications for the auditing profession as a whole. In particular, we draw attention to the significance of leadership by presenting evidence of its positive effect on the performance of auditors. Thus greater focus on leadership issues has the potential to address such concerns as high staff turnover (Chi et al. 2013) that can compromise audit quality owing to the ongoing need to hire, train, and replace experienced staff. Audit firms might accordingly find it useful to devote more effort to leadership development and talent selection. Future research should investigate whether audit firms are able to keep their best leadership talents.

Appendix 1. Variables used in the analyses

Variable	Description	Data source
<b><u>Panel A: Auditor level variables</u></b>		
<i>LEADERSHIP</i>	Normalized leadership test score (1-9) with zero mean and unit variance.	The Swedish Military Forces
<i>IQ</i>	Cognitive test score, ranging from 1 (lowest) to 9 (highest)	The Swedish Military Forces
<i>PHYS_CAP</i>	Physical capacity test score, ranging from 1 (lowest) to 9 (highest)	The Swedish Military Forces
<i>HEIGHT</i>	Height score, ranging from 1 (lowest) to 9 (highest)	The Swedish Military Forces
<i>PARTNER</i>	Indicator variable, set to 1 if the auditor audited at least 1 listed client in the sample period, 0 otherwise	Serrano
<i>Big4_Hire</i>	Indicator variable, set to 1 if the auditor is at least hired once by a Big 4 firm in the annual data from the Swedish Inspectorate of Auditors, 0 otherwise	RI
<b><u>Panel B: Auditor - year level variables</u></b>		
<i>PTF_SIZE</i>	Natural logarithm of the total asset value of auditor <i>i</i> 's client portfolio firms in year <i>t</i>	Serrano
<i>PTF_SIZE_REV</i>	Natural logarithm of the total revenue of auditor <i>i</i> 's client portfolio firms in year <i>t</i>	Serrano
<i>LN(#CLIENT)</i>	Natural logarithm of the total number of clients for auditor <i>i</i> in year <i>t</i>	Serrano
<i>ATH_AUD</i>	Indicator variable equal to 1 if the auditor is an <i>authorized</i> auditor in year <i>t</i> , equal to 0 if the auditor is an <i>approved</i> auditor in year <i>t</i> .	RI
<i>LEAD_ONE_Aud</i>	Indicator variable equal to 1 if auditor <i>i</i> in year <i>t</i> is the leader for at least 1 industry in the region of his audit office.	Serrano
<i>LEAD_ONE_Reg</i>	Indicator variable equal to 1 if the audit office of auditor <i>i</i> in year <i>t</i> is the leader for at least 1 industry in the region.	Serrano
<i>LEAD_ONE_Nat</i>	Indicator variable equal to 1 if the audit firm of auditor <i>i</i> in year <i>t</i> is the leader for at least 1 industry in the whole Sweden.	Serrano
<i>SANC_WR</i>	Indicator equal to 1 if auditor <i>i</i> received disciplinary sanction in the form of a warning or revoking CPA license in year <i>t</i> , zero otherwise	RI

Appendix 1. Variables used in the analyses (continued)

<b><u>Panel C: Firm-year level variables</u></b>		
<i>TENURE</i>	Tenure of auditor <i>i</i> for firm <i>j</i> in year <i>t</i>	Serrano
<i>INFLUENCE</i>	The natural logarithm of 100 times the ratio of client firm <i>j</i> 's sales divided by the total revenue of auditor <i>i</i> 's clients in year <i>t</i>	
<i>LEAD_AUD</i>	Indicator variable, equal to 1 if the auditor <i>i</i> in year <i>t</i> is the first-ranked by market share of audited total client assets for that industry in the region of his office, zero otherwise.	Serrano
<i>LEAD_REG</i>	Indicator variable, equal to 1 if auditor <i>i</i> in year <i>t</i> 's audit office is the first-ranked by market share of total client assets for that industry in the region of the office, zero otherwise.	Serrano
<i>LEAD_NAT</i>	Indicator variable, equal to 1 if auditor <i>i</i> in year <i>t</i> 's audit firm is the first-ranked by market share of total client assets for that industry in Sweden and zero otherwise.	Serrano
<i>LN_TA</i>	Natural logarithm of firm <i>j</i> 's total assets in year <i>t</i>	Serrano
<i>EXCEPTION</i>	If firm <i>j</i> reported extraordinary income / expense in year <i>t</i>	Serrano
<i>LEVERAGE</i>	The ratio of total debt to total asset for firm <i>j</i> in year <i>t</i>	Serrano
<i>GROWTH</i>	Percentage change in firm <i>j</i> 's total assets from the previous year	Serrano
<i>INVENT</i>	Firm <i>j</i> 's inventory divided by total assets in year <i>t</i>	Serrano
<i>AGE_FIRM</i>	Firm <i>j</i> 's age in year <i>t</i>	Serrano
<i>ROA</i>	Firm <i>j</i> 's net profit scaled by average total assets in year <i>t</i>	Serrano
<i>DA_KOTHARI</i>	Performance matched discretionary accrual for firm <i>j</i> in year <i>t</i> from Kothari (2005) model	Serrano
<i>CURRENT_RATIO</i>	Firm <i>j</i> 's current assets divided by current liabilities in year <i>t</i>	Serrano
<i>LOSS</i>	Indicator equal to 1 if net profit is negative for firm <i>j</i> in year <i>t</i> , 0 otherwise	Serrano



Appendix 1. Variables used in the analyses (continued)

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Panel D: Fixed effects

Birth Cohort	The 1,920 sample auditors are divided into 6 birth cohorts according to their birth year starting from 1950, with 5 year span for each group. Group 1 corresponds to auditors born 1950-1954; group 2: 1955-59; group 3: 1960-64; group 4: 1965-69; group 5: 1970-74; group 6: 1975-79.	Serrano
Region	Sweden is divided into 9 geographical regions numbered 1-9 as the following: 1: Stockholm, 2:Skåne, 3: South East, 4: South West, 5: South Central, 6: East, 7: North Central, 8: Southern Norrland, 9: Northern Norrland. Gothenburg city belongs to the South West region, and Malmö belongs to the Skåne region.	Serrano
Industry	Industry of firm j based on two digit SNI code	Serrano
FirmSizeCTG	Serrano's firm size classification based on the company's number of employees.	Serrano

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## Appendix

### Tables

Table 1. Sample construction

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<b>Number of CPAs in Sweden 2000 - 2014</b>	<b>6,701</b>
Less: females	<u>(2,278)</u>
	4,423
Less: CPAs not born between 1950-1979 and IQ score missing	<u>(2,122)</u>
	2,301
Less: CPAs who has IQ score lower than 5 (leadership score missing)	<u>(219)</u>
	2,082
Less: CPAs whose client cannot be identified in the Serrano database	<u>(162)</u>
<b>Final sample of auditors (2000-2014)</b>	<b><u>1,920</u></b>
Out of which,	
CPAs with available income data between 2007-2014	1,715
CPAs identified as Big 4 partner (those who audited at least 1 listed client)	239
CPAs who were hired by a Big 4 firm at least once during 2000-2014	1,117
<b>Firm-year observations for the final sample of 1,920 auditors between 2000-2014:</b>	<b>736,119</b>
<b>Auditor-year observations for the leadership - income analyses</b>	<b><u>11,708</u></b>

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Table 2: Descriptive statistics

<u>Panel A: Descriptive statistics of the <b>raw value</b> of sample auditors' Leadership Score, IQ score, Physical Capacity, and Height</u>										
VARIABLES	(1) N	(2) mean	(3) sd	(4) p10	(5) p25	(6) p50	(7) p75	(8) p90	(9) min	(10) max
<i>LEADERSHIP</i>	1,920	5.834	1.496	4	5	6	7	8	1	9
<i>IQ</i>	1,920	6.543	1.164	5	6	6	7	8	5	9
<i>PHYS_CAP</i>	1,920	6.836	1.724	5	6	7	9	9	2	9
<i>HEIGHT</i>	1,920	6.452	1.226	5	6	6	7	8	2	9
<u>Panel B: Descriptive statistics of the <b>raw value</b> of sample auditors' income, in thousand SEK</u>										
<i>SALARY</i>	11,708	592.7	205.5	396	468.5	556.5	668.2	829.2	137.2	1,457
<i>CAP_INC</i>	11,708	321.8	602.3	-40.02	-12.92	63.11	377.6	1,056	-100	3,234
<i>INCOME_TOTAL</i>	11,708	916.9	687.6	419.4	516.8	673.9	1,030	1,737	219.2	4,175
<u>Panel C: Descriptive statistics of the auditor-year level variables used in the auditor income regression</u>										
<i>INCOME</i>	11,708	13.54	0.567	12.95	13.16	13.42	13.85	14.37	12.30	15.24
<i>LEADERSHIP</i>	11,708	-0.00677	0.998	-1.241	-0.573	0.0960	0.765	1.433	-3.247	2.102
<i>IQ</i>	11,708	6.524	1.170	5	6	6	7	8	5	9
<i>HEIGHT</i>	11,708	6.437	1.212	5	6	6	7	8	2	9
<i>PHYS_CAP</i>	11,708	6.829	1.730	4	6	7	9	9	2	9
<i>ATH_AUD</i>	11,708	0.654	0.476	0	0	1	1	1	0	1
<i>SANC_WR</i>	11,708	0.00982	0.0986	0	0	0	0	0	0	1
<i>LEAD_ONE_Aud</i>	11,708	0.122	0.327	0	0	0	0	1	0	1
<i>LEAD_ONE_Reg</i>	11,708	0.454	0.498	0	0	0	1	1	0	1
<i>LEAD_ONE_Nat</i>	11,708	0.409	0.492	0	0	0	1	1	0	1

Notes: This table reports descriptive statistics of the variables used in our analyses. Panel A presents the descriptive statistics of *raw value* of the military test scores for the 1,920 male auditors in our main sample from 2000 to 2014 (auditor level). Panel B presents the descriptive statistics of the *raw value* of income for the 1,715 male auditors in the subsample from 2007 to 2014 (auditor-year level). For the same sample, Panel C presents the descriptive statistics of the variables used in the regression analysis for the relation between leadership and income (auditor-year level). For the whole sample from 2000 till 2014.



Table 3 Univariate analysis

<u>Panel A: T test between auditors with High (6-9) and Low (1-5) leadership score</u>					
	(1)	(2)	(3)	(4)	(5)
	High(6-9)	Low(1-5)	Diff.	Std. Error	Obs.
<i>INCOME</i>	13.6241	13.4203	-0.2038***	0.0105	11708
<i>PTF_SIZE</i>	19.3489	19.0012	-0.3477***	0.0231	20599
<i>PTF_SIZE_REV</i>	19.5932	19.3138	-0.2794***	0.0221	20599

  

<u>Panel B: T test of the raw leadership score between Big4 partners and other auditors</u>					
	PARTNER	Non-PARTNER	Diff.	Std. Error	Obs.
<i>LEADERSHIP</i>	6.3138	5.7656	-0.5482***	0.1027	1920

  

<u>Panel C: T test of the raw leadership score between auditors who have been hired at least for one year by a Big 4 firm during sample period and the rest.</u>					
	Big4_Hire	Non-Big4_Hire	Diff.	Std. Error	Obs.
<i>LEADERSHIP</i>	5.906	5.7335	-0.1725**	0.0691	1920

Notes: This table presents the results of univariate analysis to examine whether and auditor's leadership ability is associated with his income, client portfolio size, and the likelihood of becoming a Big 4 partner. Panel A split the 1,920 auditors in the main sample into High (score 6-9) and Low (score 1-5) group based on their leadership score. We test whether the mean value of income (*INCOME*), client portfolio size measured in asset (*PTF\_SIZE*) and revenue (*PTF\_SIZE\_REV*) are significantly different between the High and Low group. Panel B test whether the mean value of the leadership scores are significantly different between auditors who are Big 4 partners (239 auditors) and those who are not Big 4 partners (1,681 auditors). Panel C tests whether the mean value of the leadership scores are significantly different between auditors (1,117 auditors) who have been hired at least for one year during the sample period and those (803 auditors) who have never been hired by a Big 4 firm.

Table 4 Correlation table

<b>Panel A: Auditor level - Leadership, IQ, and becoming partner</b>					
	<i>LEADERSHIP</i>	<i>IQ</i>	<i>PARTNER</i>		
<i>LEADERSHIP</i>	1.00				
<i>IQ</i>	0.294***	1.00			
<i>PARTNER</i>	0.121***	0.0709**	1.00		

  

<b>Panel B: Auditor/Firm year level - Leadership, IQ, and key outcome variables</b>					
	<i>LEADERSHIP</i>	<i>IQ</i>	<i>INCOME</i>	<i>PTF_SIZE</i>	<i>Big4</i>
<i>LEADERSHIP</i>	1.00				
<i>IQ</i>	0.31***	1.00			
<i>INCOME</i>	0.14***	0.05***	1.00		
<i>PTF_SIZE</i>	0.08***	0.04***	0.51***	1.00	
<i>Big4</i>	0.05***	0.04***	0.20***	0.10***	1.00

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01, N=436,434

Notes: This table reports correlation between Leadership ability, IQ, and key outcome variables. Panel A presents correlation between individual auditor's Leadership ability, IQ, and the likelihood of becoming Big 4 partner, using data of the 1,920 individual auditors in the main sample from 2000 to 2014. Panel B presents the correlation between leadership ability, IQ, and they key outcome variables using data at the auditor/firm year level from 2007 to 2014, due to the data restriction on auditors' personal income.

Table 5 Leadership ability and income

	(1)	(2)	(3)	(4)	(5)
	INCOME	INCOME	INCOME	INCOME	INCOME
<i>LEADERSHIP</i>	0.095*** (7.25)	0.066*** (6.37)	0.065*** (6.10)	0.068*** (4.62)	0.074*** (3.58)
<i>IQ</i>		-0.007 (-0.70)	-0.008 (-0.78)	-0.010 (-0.62)	-0.009 (-0.60)
<i>PTF_SIZE</i>		0.146*** (21.19)	0.146*** (21.21)	0.153*** (20.21)	0.152*** (19.36)
<i>ATH_AUD</i>		0.197*** (10.77)	0.195*** (10.69)	0.266*** (9.64)	0.267*** (9.74)
<i>LEAD_ONE_Aud</i>		0.067*** (3.15)	0.065*** (3.08)	0.091*** (3.08)	0.089*** (3.03)
<i>LEAD_ONE_Reg</i>		0.030 (1.60)	0.031* (1.66)	0.152*** (-5.66)	0.157*** (-5.79)
<i>LEAD_ONE_Nat</i>		0.143*** (7.38)	0.143*** (7.37)	-0.063** (-2.14)	0.078*** (-2.61)
<i>SANC_WR</i>		-0.056 (-1.06)	-0.055 (-1.03)	0.244** (2.34)	0.236** (2.29)
<i>HEIGHT</i>			0.014* (1.78)	0.025** (2.19)	0.024** (2.18)
<i>PHYS_CAP</i>			0.003 (0.58)	0.008 (0.95)	0.008 (0.89)
<i>KPMG</i>					-0.041 (-1.01)
<i>Deloitte</i>					0.006 (0.13)
<i>EY</i>					0.021 (0.75)
<i>KPMG x LEADERSHIP</i>					-0.025 (-0.60)
<i>Deloitte x LEADERSHIP</i>					-0.056 (-1.18)
<i>EY x LEADERSHIP</i>					0.018 (0.61)
Observations	11,708	11,708	11,708	5,575	5,575
R-squared	0.126	0.397	0.398	0.540	0.543
Year FE	YES	YES	YES	YES	YES
Region Ctrl	YES	YES	YES	YES	YES
BirthCoh Ctrl	YES	YES	YES	YES	YES
SubSample	--	--	--	Big 4	Big 4

Robust t-statistics in  
parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: This table reports the results of estimating OLS regressions to examine whether and auditor's leadership ability is associated with his future income. The following model (1) is estimated:

$$INCOME_{i,t} = \alpha + \beta LEADERSHIP_i + \theta \mathbf{X}_{i,t} + \varepsilon \quad (1),$$

where  $INCOME_{i,t}$  is the natural logarithm of income for auditor  $i$  in year  $t$ .  $LEADERSHIP_i$  is the normalized value of the leadership test score of auditor  $i$ . We include a set of control variables in vector  $\mathbf{X}_{i,t}$  (refer to Table A1 for variable definitions). For brevity, the coefficient estimates for various fixed effects and the constant term are not tabulated. The sample includes 1,715 male auditors with available data for analyses during years 2007 to 2014. Standard errors are clustered by auditor and region.

Table 6 Leadership and becoming Big 4 partner

	(1)	(2)	(3)	(4)	(5)
	PARTNER	PARTNER	PARTNER	PARTNER	PARTNER
<i>LEADERSHIP</i>	0.382*** (5.26)	0.366*** (4.61)	0.396*** (4.56)	0.335*** (2.70)	0.407*** (3.85)
<i>PHYS_CAP</i>		-0.060 (-1.42)	-0.027 (-0.60)	-0.019 (-0.29)	-0.087 (-1.54)
<i>HEIGHT</i>		0.061 (1.04)	0.057 (0.87)	0.129 (1.47)	0.011 (0.13)
<i>IQ</i>		0.083 (1.31)	0.071 (1.02)		
<i>BirthCoh = 2, BirthYr 1955-59</i>		0.334 (1.58)		0.268 (0.78)	0.339 (1.27)
<i>BirthCoh = 3, BirthYr 1960-64</i>		0.406* (1.83)		0.318 (0.95)	0.462 (1.51)
<i>BirthCoh = 4, BirthYr 1965-69</i>		0.322 (1.40)		-0.018 (-0.05)	0.529* (1.83)
<i>BirthCoh = 5, BirthYr 1970-74</i>		0.175 (0.72)		0.227 (0.66)	-0.000 (-0.00)
<i>BirthCoh = 6, BirthYr 1975-79</i>		-1.130** (-2.54)		-1.685** (-2.22)	-0.758 (-1.37)
Observations	1,920	1,920	1,445	990	930
SubSample	--	--	Born before 1970	IQ<=6	IQ>=7
Pseudo R-squared	0.0200	0.0371	0.0277	0.0370	0.0345

z-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: This table reports the Logit regression estimating the association between leadership ability and the probability that an auditor becomes a Big 4 partner. The following logit model is estimated:

$$PARTNER_i = \alpha + \beta LEADERSHIP_i + \theta X_i + \varepsilon \quad (2)$$

The outcome variable PARTNER takes the value of 1 if the auditor is identified as a Big 4 partner in our sample period (2000-2014), and zero otherwise.  $LEADERSHIP_i$  is the normalized value of the leadership test score of auditor  $i$ . All regressions include a constant (not reported for brevity). The sample includes 1,920 male auditors (239 are identified as Big 4 partners) with available data for analyses during years 2000 to 2014.

Table 7 Leadership and being hired by a Big 4 firm

	(1)	(2)	(3)	(4)
	Big4_Hire	Big4_Hire	Big4_Hire	Big4_Hire
<i>LEADERSHIP</i>	0.116** (2.49)	0.087* (1.72)	0.178** (2.35)	0.024 (0.34)
<i>PHYS_CAP</i>		0.038 (1.33)	0.076* (1.87)	-0.008 (-0.19)
<i>HEIGHT</i>		-0.007 (-0.18)	-0.064 (-1.18)	0.064 (1.13)
<i>IQ</i>		0.092** (2.14)		
<i>BirthCoh = 2, BirthYr 1955-59</i>		0.126 (0.89)	0.099 (0.47)	0.118 (0.61)
<i>BirthCoh = 3, BirthYr 1960-64</i>		0.445*** (2.97)	0.419** (1.99)	0.390* (1.77)
<i>BirthCoh = 4, BirthYr 1965-69</i>		0.386** (2.48)	0.138 (0.60)	0.585*** (2.70)
<i>BirthCoh = 5, BirthYr 1970-74</i>		0.839*** (5.20)	0.786*** (3.54)	0.834*** (3.39)
<i>BirthCoh = 6, BirthYr 1975-79</i>		0.193 (1.06)	0.142 (0.57)	0.195 (0.70)
Observations	1,920	1,920	990	930
SubSample	--	--	IQ<=6	IQ>=7
Pseudo R-squared	0.0200	0.0371	0.0370	0.0277

z-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: This table reports the Logit regression estimating the association between leadership ability and the probability that an auditor is hired by a Big 4 firm at least for one year during our sample period of 2000-2014. The following logit model is estimated:

$$Big4\_Hire_i = \alpha + \beta LEADERSHIP_i + \theta X_i + \varepsilon \quad (3)$$

The outcome variable Big4\_Hire takes the value of 1 if the auditor is hired at least for one year by a Big 4 firm in our sample period (2000-2014), and zero otherwise.  $LEADERSHIP_i$  is the normalized value of the leadership test score of auditor  $i$ . All regressions include a constant (not reported for brevity). The sample includes 1,920 male auditors (1,117 of which are hired once by a Big 4) with available data for analyses during years 2000 to 2014.