

AN EMPIRICAL TEST OF THE RESOURCE-BASED THEORY: STRATEGIC REGULATION IN THE DUTCH AUDIT INDUSTRY

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The resource-based view of the firm is a recent strategic management theory that seeks to identify the resources that may provide firms with a sustainable competitive advantage. This paper has two purposes. First, the paper relates strategic management arguments to parallel lines of reasoning in industrial organization theory and argues that strategic regulation is a major source of sustainable competitive advantage. The second purpose of the paper is to report the results of an empirical test of the resource-based theory on the basis of a longitudinal data set on the postwar history of the Dutch audit industry. A key determinant of this history proves to be strategic regulation, which stimulates demand for audit services and protects rent-producing resources.

INTRODUCTION

For about a decade, the resource-based view of the firm has been promoted as a unifying theory of strategy (starting with Wernerfelt, 1984). It seeks to bridge the gap between theories of internal organizational capabilities on the one hand and external competitive strategy theories on the other hand. From the perspective of theory formulation, the record of the resource-based view is impressive indeed. The question now is whether the theory can stimulate progress on the empirical research agenda, where few systematic studies have been reported. This paper tests key hypotheses from the resource-based theory using a longitudinal data set covering the history of the Dutch industry (with a focus on the 1967–90 period). Because of data limitations, the paper deals with the group and industry level only. The findings appear to support the theory's core predictions. The paper is organized as follows. The second section briefly introduces the theoreti-

cal framework by exploring the complementary nature of the resource-based and industrial organization theories. The third section summarizes the postwar history and a number of essential features of the Dutch audit industry. The fourth section develops two hypotheses and two conjectures. The fifth section reports the results from the empirical tests. The final section is an appraisal, including a number of alternative explanations for the empirical results.

A RESOURCE-BASED THEORY OF THE FIRM, GROUP AND INDUSTRY

The resource-based view of the firm is a mixture of theories. Wernerfelt (1984) concludes his introduction of this 'new' view by arguing that '[t]his paper has attempted to look at firms in terms of their resources rather than in terms of their products. It was conjectured that this perspective would throw a different light on strategic options, especially those open to diversified firms. Resource position barriers were defined as partially analogous to entry barriers' (Wernerfelt, 1984: 179). So far, this view has focused on two

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issues in particular (Barney, 1991; Grant, 1991; Connor, 1991; Mahoney and Pandian, 1992; Amit and Schoemaker, 1993; Peteraf, 1993): (i) what features underlie rent-producing resources? and (ii) how is the resource-based view rooted in and related to established theories of strategy?

Resources are defined as 'those (tangible and intangible) assets that are tied semipermanently to the firm (see Caves, 1980). Examples of resources are: brand names, in-house knowledge of technology, employment of skilled personnel, trade contracts, machinery, efficient procedures, capital, etc.' (Wernerfelt, 1984: 173). Since resources are located or produced *inside* the firm, theories of organizational behavior and structure point to major sources of sustainable competitive advantage (Powell, 1992). One of the most influential lists of the conditions that underlie *sustainable* competitive advantages was provided by Barney (1986a), who names four conditions: resources derive their sustainable competitive potential from being (i) valuable, (ii) rare, (iii) imperfectly imitable and (iv) imperfectly substitutable. These characteristics follow from a number of underlying mechanisms such as unique historicity, causal ambiguity, social complexity, tacit knowledge, future uncertainty and variable rationality (Lippman and Rumelt, 1982; Barney, 1986a, 1986b; Dierickx and Cool, 1989; and Schoemaker, 1990). The key argument is that factor markets, the actual or imaginary places where resources are traded, are imperfect (Barney, 1986a; Dierickx and Cool, 1989; Peteraf, 1993) so that the associated resources operate as 'isolating mechanisms' (Rumelt, 1984; Mahoney and Pandian, 1992). That is, a firm is able to *monopolize* rent-producing resources without the immediate threat of being outflanked, so retaining a sustainable competitive advantage.

The resource-based theory of the firm complements and integrates contributions from many perspectives, notably industrial organization and transaction cost theory (Connor, 1991; Mahoney and Pandian, 1992; Peteraf, 1993). With hindsight, the resource-based theory of the firm is said to encompass well-established theories of firms' growth and profit, implying that a long list of classic contributions to economic and strategy research—such as Ricardo (1817), Schumpeter (1934), Penrose (1959), Ansoff (1965) and Andrews (1971)—can be claimed to reflect resource-based arguments *avant la lettre*. What differentiates

the resource-based view from industrial organization theory is the focal level of analysis: the resource-based approach emphasizes the *firm* level, where industrial organization theory focuses on the *industry* or market. The resource-based and industrial organization theories are Siamese twins, as *both* factor and product market imperfections are crucial and *both* the firm and the industry level of analysis are important. Additionally, both the strategic management and the industrial organization traditions deal with an intermediate level of aggregation: the (strategic) *group* (Caves and Porter, 1977; Gilbert, 1989; Tallman, 1991; Cool and Dierickx, 1993). Combining the distinction between factor and product markets with the distinction between the levels of firm, group and industry produces a *resource-based theory of the firm, group and industry*, or the 'resource-based theory of competitive advantage' for short (Figure 1).

The key concept is resources, and the key question is which resources generate a sustainable rent potential at the level of the firm, group or industry. This can be illustrated on the basis of Barney's (1986a) four rent-producing resource characteristics and Wernerfelt's (1984) barrier concept. To have a rent-producing potential, a resource has to be valuable and scarce in the first place, whatever the level of analysis. This indicates a product market imperfection. However, if there was perfect imitability and/or perfect substitutability, the competitive advantage would not be sustainable. A resource is rent-producing at a *firm* level if the associated resource is imperfectly imitable and substitutable by all other firms. This resource reflects Wernerfelt's (resource) positioning barrier (1984). A resource produces a rent at the level of a strategic *group* if it cannot be easily imitated or substituted by competing firms outside the group. This resource underlies Caves and Porter's (1977) mobility barrier. An *industry* rent-producing resource is difficult to imitate or substitute by outside firms (potential entrants—be they new or from (related or unrelated) industries). This resource erects Bain's (1956) entry barrier.

A BRIEF HISTORY OF THE DUTCH AUDIT INDUSTRY

There are three main reasons for selecting the Dutch audit industry to illustrate the resource-

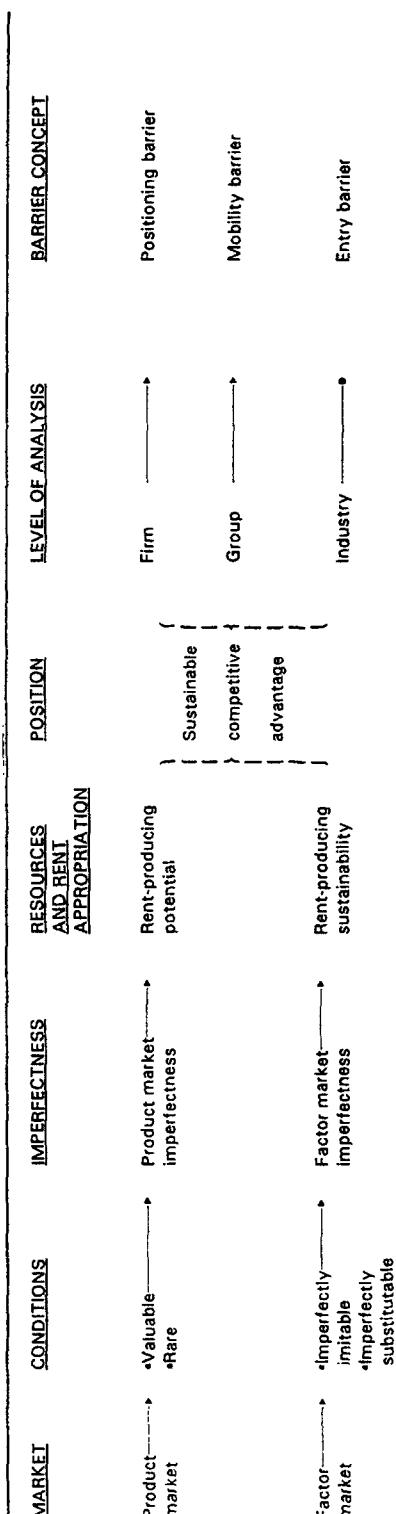


Figure 1. A resource-based framework of competitive advantage

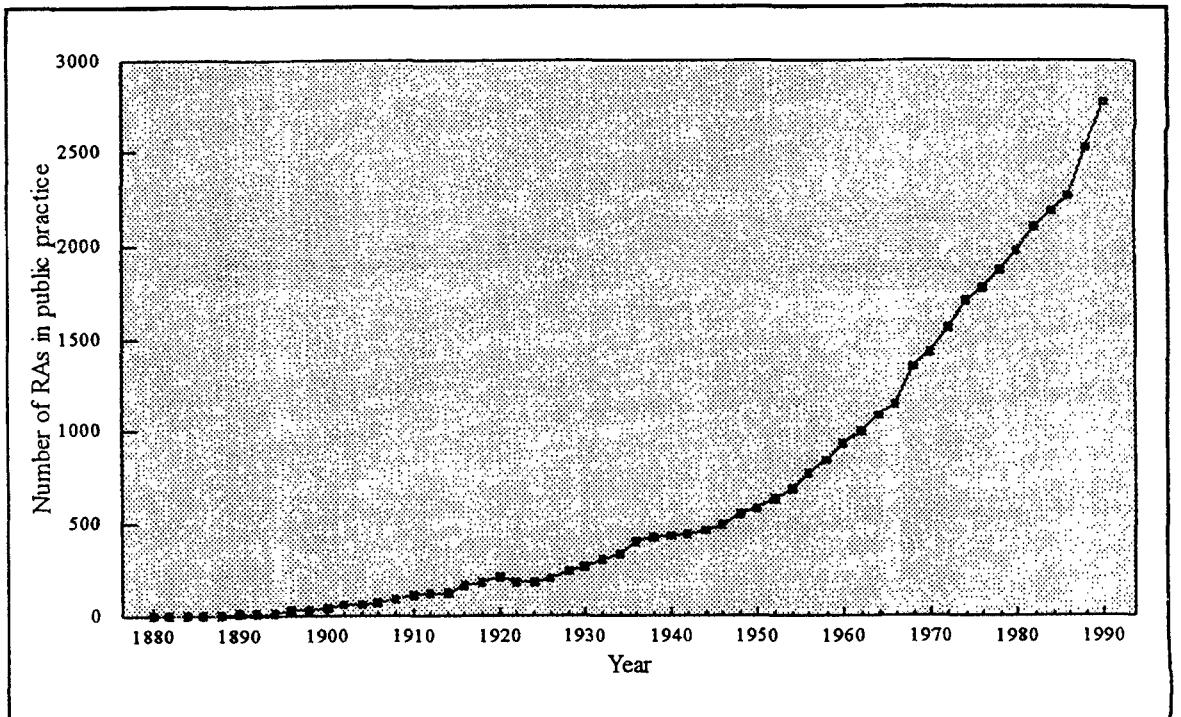


Figure 2a. The Dutch audit market 1880–1990. Total number of RAs in public practice

based theory. Firstly, the audit industry is a well-defined market, since both the supply and demand side can be identified without much difficulty. There are no services offered outside this market that can easily substitute for audit services. The demand side of the audit market, in an unregulated environment, consists mainly of (listed) companies, and in a regulated environment it is defined by law. Secondly, the audit industry is well documented. Auditors' professional organizations publish detailed information on members, audit firms and rules of conduct. Thirdly, after a long period without any substantial regulation, about three decades ago extensive regulations were established for the Dutch audit market. This is an opportunity to study the effects of a change from a virtually unregulated market to an extensively regulated market.

Density and concentration

The Dutch audit industry has a history of about 110 years (de Vries, 1985). The total number of auditors in public practice has increased exponentially, to 2885 in 1990 (Maijor *et al.*, 1995). This is clear from Figure 2a. From 1967 to 1990, the

classification of auditors is perfect: *one* professional organization—NIvRA (Nederlands Instituut van Register Accountants)—registered *all* professionals with a legally protected 'RA licence' (where RA denotes Register Accountant, with the Dutch RA being akin to the American CPA). By and large, an RA can either be in public practice—as an employee or partner of an audit firm—or can serve in a public or private limited liability company (henceforth denoted by 'public' or 'private' company, respectively) or government body. Figure 2b reveals the number of audit firms (density), and Figure 2c the market share of the Big Four firms (C_4) over the 1880–1990 period.¹

Demand and supply regulation

Until 1967, there was hardly any regulation requiring firms to demand audit services, and also

¹ Two comments are worth making. First, the C_4 ratio and the Herfindahl–Hirschman index of the Dutch audit market have very similar patterns (Maijor *et al.*, 1995). Second, audit firm size is measured by the number of RAs, which correlates almost perfectly with alternative size proxies. Meuwissen (1992) calculates correlations above 0.97 with both total fee income and audit fee income in 1986, 1988 and 1990.

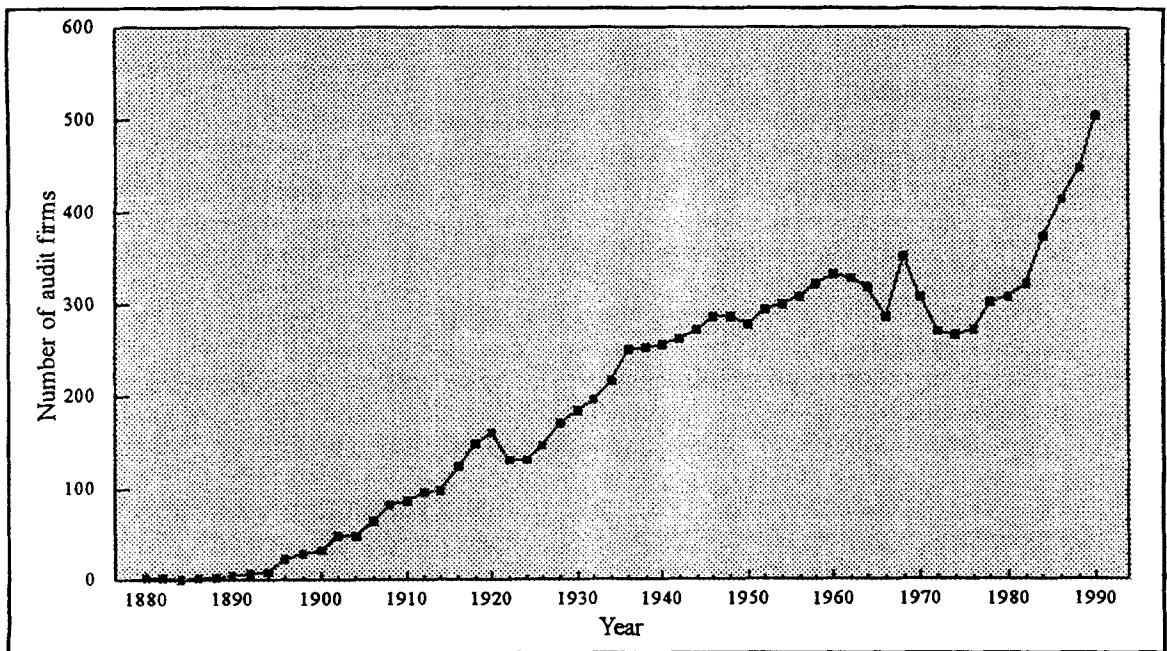
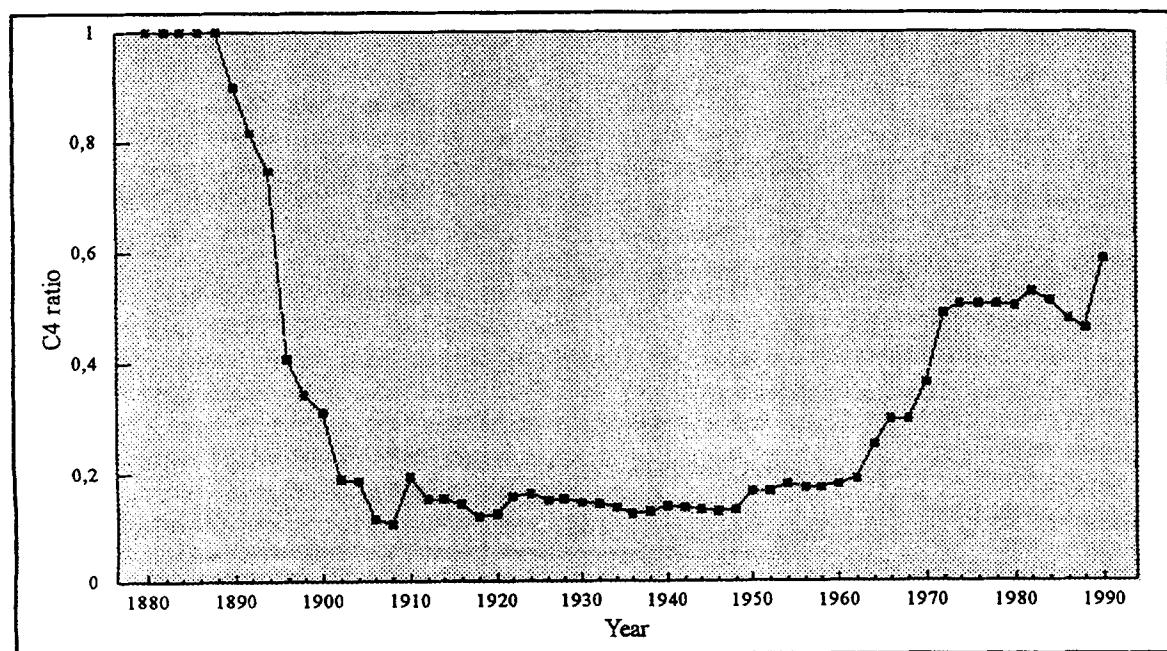


Figure 2b. Density (number of audit firms)

Figure 2c. Concentration (C_4 ratio)

no regulation of the supply side of the market. A number of professional organizations offered memberships to practicing auditors. Between 1967 and 1990, four key regulatory measures were implemented (Frieling and de Heer, 1985; Zeff, van der Wel, and Camfferman, 1992):

1. The *Law on Registered Accountants* of 1967 introduced four major changes. First, the NIvRA was granted a monopoly to organize the Dutch audit profession. Second, the NIvRA obtained the sole right to set disciplinary rules for RAs: if the actions of an RA are 'harmful to the profession,' a number of disciplinary measures can be taken—including deletion from the register. Third, the right to attest financial accounts was, with a few exceptions, limited to RAs. Fourth, the NIvRA obtained a very strong influence on the setting of educational requirements for qualification as an RA as the major final examinations are under the control of the NIvRA.
2. Before the *Act on Annual Accounts of Companies* of 1970 came into effect, there were only prescriptions for the annual accounts of a particular group of public companies, namely 'open' public companies ('open naamloze vennootschappen'). Nearly all 'open' public companies were listed on the Amsterdam Stock Exchange. They accounted for only about 1.5 percent of the total number of public companies. The pre-1970 prescriptions included only instructions for the compilation of the asset side of the balance sheet. The 1970 change in the law obliged all public companies, large private companies and large cooperative societies to disclose audited annual accounts—public companies and cooperative societies from 1971 and private companies from 1973. The disclosure requirements of the annual accounts were intensified, with prescriptions for both sides of the balance sheet, the profit and loss account and the explanatory notes.
3. Four rules in the *Professional Code of Registered Auditors* of 1972 may dampen competition. First, advertising by RAs was forbidden until 1987, and is permitted after 1987 if in accordance with 'the sense of good taste.' Second, offering unsolicited audit services and practicing low-balling are forbidden. Third, an audit firm is required to inform the existing auditor of a potential new client if this client is planning to accept a switching offer. Fourth, an RA is not allowed to provide a judgment on another RA without hearing the latter.
4. Under *Title 8 of Book 2 of the Civil Code* of 1983 all public companies, private companies and cooperative societies are obliged to disclose annual accounts. Small and medium-sized firms are allowed to submit abridged annual accounts. All large and medium-sized firms are required to have their annual accounts audited. As a temporary provision, medium-sized firms could postpone obligatory auditing until 1989. The 1983 legislation contains detailed requirements for the content of annual accounts with respect to (i) the information conveyed in the notes, (ii) the presentation and format of the balance sheet and profit and loss account, (iii) the measurement rules for profit and (iv) the creation and disbursement of the revaluation reserve.

It should be noted that the four regulatory measures can be grouped into demand regulation (measures 2 and 4) and supply regulation (measures 1 and 3).

Lobbying for regulation

Both demand and supply regulation are believed to be in the economic interest of auditors. Demand regulation requires companies to buy services from auditors, and supply regulation restricts entry and limits competition (Watts and Zimmerman, 1986; Young, 1991). The dominant policy issue for Dutch auditors' organizations has been the legal protection of their activities and an audit requirement for companies (de Vries, 1985: Section II-3). For example, the minutes of NIvA, by far the largest predecessor of the NIvRA, stated that 'the organization will act in the interest of its members.' One of the means of achieving this objective was 'striving for legal regulation of the profession.' The NIvRA and its predecessors succeeded in participating in the actual drafting of financial accounting and auditing regulations. For example, Kraayenhof, one of the founders of the leading Dutch audit firm KPMG, played a very important role in the committee preparing the 1970 regulation.

Economic theory recognizes that private interest groups may lobby for rent-producing inter-

ventions by government bodies (Buchanan and Tullock, 1965; Olson, 1965; Stigler, 1971). The key argument is that private agents can pursue rent-seeking strategies that aim at exploiting the profit opportunities offered by government interventions which they have themselves prompted. A case in point is protection of incumbent firms by government intervention in the form of raising artificial entry barriers (Ordover and Saloner, 1989; Laffont and Tirole, 1991), thus increasing potential rivals' costs (Salop and Scheffman, 1983). In the strategy literature, the message is that firms may achieve (or protect) a competitive advantage with the help of regulatory agencies (Murray, 1978; Reger, Duhaime, and Stimpert, 1992). Empirical studies on this issue are fruitful but scarce (Reger *et al.*, 1992: 201).

What needs to be explained is why Dutch auditors were so successful in the political process. The group characteristics of audit firms and client firms suggest that the former would be expected to be more successful in shaping the policy-making process than the latter. Four group characteristics illustrate that the net benefits of lobbying activities of audit firms are high compared to client firms' net benefits of lobbying:

1. *Size of groups.* Small groups are more likely to lobby than large groups (Olson, 1965). The group of (large) audit firms is small, which makes it easy to originate collective action (Lindahl, 1987). Until 1989, the number of RAs who were partners in an audit firm had never been higher than 1295, many of whom worked in one of the larger audit firms. At least 4602 client firms were affected by the 1970 regulation requiring disclosure of audited annual accounts (see Figure 4a). After the implementation of the 1983 regulation in 1985–89, up to 140,000 client firms had to disclose annual accounts (see Figure 4b).
2. *Consequences for groups.* The incentive to lobby for a regulation depends on the magnitude of the expected effects for individual wealth (Downs, 1957). For auditors the disclosure and auditing of accounting information concerns their main source of income (Sutton, 1984). By contrast, for client firms the costs of disclosing audited accounting information are only a minor category of production costs. Two studies with Dutch data reveal that the costs of audit fees as a percentage of sales

varies from 1.3 percent for very small companies to 0.04 percent for larger companies (see Bollen, 1990).

3. *Identification costs.* The four regulations are clear examples of low identification costs for 'winners' and high identification costs for 'losers.' The 'winners,' partners in public practice, are relatively easy to identify. Intuitively, it is obvious that regulations which require more disclosure, more auditing and restrictive entry to the profession will have beneficial effects for individual auditors. However, the identification of 'losers' is difficult. It is not clear which party within the client firm actually pays for the costs of these regulations. Do managers get a lower salary or bonus as a result of these regulations, or are the regulatory costs passed on in the prices of the client firm's products?
4. *Representative organizations.* Auditors have been organized in professional associations for many decades. These organizations make it possible to restrict the benefits of lobbying to those who pay for it. The interests of client firms are represented by a large number of different organizations, entailing a free-rider problem with respect to lobbying efforts.

REGULATION AND PROMOTION

Human capital

A key question is which resources are potentially rent-producing in the (Dutch) audit industry. Since the audit industry produces a professional service, human capital is the prime candidate. In terms of Wernerfelt (1984: 173) this reflects 'in-house knowledge of technology' (audit technology) and 'employment of skilled personnel' (RAs). The importance of human capital in the audit industry can hardly be overestimated. To qualify as an RA, one has to obtain knowledge of complicated audit techniques (such as statistical sampling, risk analysis and analytical review) and extensive knowledge of financial accounting (measurement methods, regulations and standards). During the years covered by our study, the nominal duration of the programs to qualify as an RA was about 6–8 years after completing high school. Applying Barney's (1986a) four rent-producing conditions in combi-

nation with the notion of (factor and product) market imperfections (Figure 1) may reveal the competitive potential of this human capital in the audit market.

Product market: Value and scarcity

The first conditions for potential rent appropriation is product market imperfections: the resource(s) should be potentially valuable and scarce. A demand-side imperfection follows immediately from demand regulation. We predict that both the 1970 and 1983 financial accounting regulations have increased the *forced* demand for audit services, which would *ceteris paribus* increase the value and scarcity of the human capital resource of RAs. Because more firms were subjected to a disclosure and audit requirement as a result of the two regulations, we expect demand for audit services to have increased. As regards supply-side imperfections, a key issue is concentration. High degrees of concentration are a well-established manifestation of product market imperfection.

Hypothesis 1: Following the implementation of the 1970 and 1983 changes in financial accounting regulation, (a) demand for audit services increased, (b) without an accompanying fall in the degrees of concentration.

Hypothesis 1(a) is not trivial as regulation may not expand but standardize existing practice (see Easterbrook and Fischel, 1984). A number of companies already disclosed audited financial statements before the regulations, or audited their financial statements for internal management reasons. Also, there is evidence that many Dutch companies avoided the regulation by changing legal form, or by simply not complying with the new regulation. Hypothesis 1 involves three variables: (i) changes in financial accounting regulation, (ii) demand for audit services, and (iii) degrees of concentration. It is easy to measure law changes (as a dummy) and degrees of concentration (concentration indices such as C_4 and Herfindahl-Hirschman). There are two proxies for demand for audit services: first, the number of annual accounts disclosed by public companies, private companies and cooperatives; and, second, the number of professionals (NIvRA stu-

dents and RA licensees) in audit practice. Of course, high degrees of concentration alone are indicative of, but not sufficient evidence for, imperfect product market competition. The *conduct* of the players in a limited-number setting is crucial. Firms in an oligopoly market may choose to either compete or cooperate (Shapiro, 1989). Therefore, evidence on the RA profession's conduct is also presented below.

Factor market: Imperfectly imitable and substitutable

A second prerequisite for resources to be rent-producing is that the factor market is imperfect. At the level of the audit industry this implies that appropriately skilled labor—as the key factor of production—must be imperfectly mobile, and so imperfectly imitable and substitutable. It is here that the legally enforced regulation of the supply side of the market is crucial. First, the law prohibits any substitution, since only RAs were allowed to provide audit services during the period of our study. Substitution by adjacent professions, such as bookkeepers, was institutionally blocked. Second, imitation could be regulated by the professional body NIvRA by opening and closing the gates to the RA profession. In response to the increased demand for audit services the profession, through the then monopolist NIvRA, could restrict entry into the profession in order to artificially sustain excess demand, which would permit audit firms to set high prices. However, as demand for auditing is legally enforced, the profession is more or less *obliged* to supply the required services or face conflict with the government and the judiciary.

Hence, a more plausible strategy is not to limit entry into the profession. Audit firm partners, the owners of audit firms, need employees to carry out the increased work induced by regulations (Benston, 1985: 46–47). Still, the established professionals could limit entry into the *partnerships* of large audit firms. In that way the rent potential would be exploited by a *group* within the industry: large audit firms and their RA partners. So, a mobility barrier is complemented with a *promotion barrier*. A promotion barrier protects the rent-appropriating capacity of the owners of the firm.

Hypothesis 2: In response to the increase

in the demand for audit services after the implementation of the 1970 and 1983 changes in financial accounting regulation, the ratio of RA employees plus independent RAs to RA partners increased.

Hypothesis 2 requires the variable 'number of auditors' to be differentiated according to the auditors' status in the firm. The data set enables us to distinguish between employees, independent practitioners and partners (all RA licensees).

Rent appropriation: Strategic groups and stratified promotion

The argument underlying Hypothesis 2 assumes that to be a partner of a large audit firm is preferable to being an employee or independent RA. Since conclusive evidence cannot be obtained, due to lack of data, we prefer to phrase our predictions on this issue as conjectures rather than hypotheses.

Conjecture 1: After the implementation of the 1970 and 1983 regulations, RA partners were able to appropriate the associated rent.

Additionally, conventional wisdom in the accounting literature suggests that audit markets are characterized by a dual market structure—with a leading Big Four, Big Five or Big Eight versus a large number of small following firms. A partnership in, say, a Big Five firm is considered to be arrival in *Walhalla*.

Conjecture 2: The audit market is (a) composed of two groups, a (relatively) attractive leading segment of large firms and a (relatively) unattractive follower niche of small firms, and (b) the composition of the leading segment is stable over time.

Conjectures 1 and 2 relate to two additional variables: (i) the income of RA partners; and (ii) (changes in) the top ranking of audit firms. There are no data on profits, apart from limited partner income figures for 1961, 1966 and 1972. The rankings of the top firms for 14 years in the 1964–90 period will be used to provide evidence on Conjecture 2. Basically, Conjectures 1 and 2, like Hypothesis 2, predict that a group within the industry—the partners of large audit firms—can

exploit a sustainable competitive advantage. The argument in support of this prediction comes in two steps.

The first step is to argue that the audit market is segmented. Eichenseher and Danos (1981) point out that economies of scale in the audit market may increase for two reasons: financial accounting regulation and client concentration. On the one hand, increased regulatory complexity of the audit process would require a substantial investment in expertise. Below a minimum level of expertise, probably embodied in a *team* of RAs, the required audit services cannot be provided. In the Dutch audit industry, the law changes in 1970 and 1983 have indeed complicated the required audit services.

It could also be argued that larger client companies can only be serviced efficiently and with high quality by large audit firms (DeAngelo, 1981; Benston, 1985). This follows not only from the number of hours that have to be put into auditing several branches of a large company, but also from the danger that an audit firm which is largely dependent upon a specific client could not resist client pressure and maintain its independence. High independence indicates high quality of the audit firm. Hence, a large company—looking for high-quality services—automatically demands services from a large audit firm. Increasing client concentration as a result of mergers and acquisitions has made this mechanism even more important. Mergers and acquisitions result in a reduction of the number of clients and an increase of the average client size. This clearly favors large audit firms. The resource-based theory would suggest that large audit firms could also benefit from rent-producing *group* resources in the form of scale economies and higher (perceived) quality.

The second step in the argument is to claim that the large audit firm segment is more profitable than the small firm niche. Three observations can illustrate this argument. First, a number of studies report evidence that the Big Eight firms charge significantly higher audit fees than firms in the non-Big Eight segment in the U.S.A. (Palmrose, 1986) and Australia (Francis and Stokes, 1986). Second, anecdotal evidence on the claim that being a partner of a large firm is attractive abounds: for example, Bhamornsiri and Guinn (1991: 9) point out that '[one] of the highest professional achievements for those who

choose public accounting as their career is to be admitted as a partner to one of the "Big Six" firms.' Third, in line with agency theory, evidence from many other industries indicates that managers in large companies receive higher salaries than those in smaller firms (Jensen and Murphy, 1990; Lambert, Larcker, and Weigelt, 1991). In professional service industries, a low partner-to-associate ratio is said to indicate high partner incomes (see, for example, Nelson, 1981, on law firms). Large professional service firms tend to have lower partner-to-associate ratios.

Summary

Figure 3 summarizes the application of the resource-based theory to the Dutch audit industry in terms of the framework of Figure 1.

The new element in Figure 3, promotion barrier, applies the resource-based argument to the *internal* organization by referring to the isolating mechanisms that protect the rent-appropriating capacity of the *owners* of the firm. Table 1 summarizes the predictions of the impact of the two changes in financial accounting legislation (in 1970 and 1983) on the key variables.

The next section reports on an empirical test of Hypotheses 1 and 2, and tentative evidence supporting Conjectures 1 and 2. An account of the data collection and measurement issues is contained in the Appendix. Note that much of the data set is not a sample: in terms of the number and size of firms plus the number of RAs the data set covers the *complete* Dutch audit market in the 1967–90 period.²

EVIDENCE

Hypothesis 1

The first issue is the imperfection of the product market for audit services. Hypothesis 1(a) states that the 1970 and 1983 changes in financial

accounting legislation are expected to have increased the demand for audit services. A first estimate of this demand change is based on the number of annual accounts disclosed.³ The estimates for the total number of disclosed annual accounts are reported in Figure 4.

The total number of disclosed annual accounts is estimated to have increased from 1671 in 1971 to 4602 in 1973. It should be noted that annual accounts for the fiscal year 1970 are disclosed in 1971. The results indicate that demand nearly tripled after the 1970 regulation came into effect in the fiscal years 1971–73. From 1974 to 1980—a period without a material change in financial accounting regulation—the estimated number of disclosed annual accounts is about constant at a level of 4000 per year. After the implementation of the 1983 regulations, the estimated number of disclosed annual accounts increased dramatically to 69,892 in 1987 and 161,602 in 1990. Hence, the data clearly confirm Hypothesis 1(a).

The second proxy of the demand for audit services is the number of professional employees in public practice (NIVRA students plus RA licensees). The expectation is that changes in the number of chargeable hours traded in the audit market would be reflected in the number of professional employees in public practice.⁴ Table 2 shows the estimates of annual changes in the number of professional employees (aggregated and per category) for years affected by regulatory changes and for years unaffected by changes.

Years in which a change in the size of the audit market would be expected because of the 1970 and 1983 changes in legislation are classified as 'regulatory years.' Four variant groupings (A–D) of regulatory and nonregulatory years were distinguished, because it is difficult to predict precisely which years will be affected by the regulations. Hypothesis 1(a) predicts larger annual changes in market size in regulatory years. To test for a significant difference in the means in the nonregulatory and regulatory periods, a

² This is achieved by consulting the (approximately) biannual membership lists of the NIVRA, which implies that *all* RAs—including the audit firm they are affiliated with—are in the data set (Maijor *et al.*, 1995). The fact that data are used from the complete *population* rather than a *sample* affects the interpretation of the results of the empirical tests. Significance only provides an indication of the strength of a relationship. A lack of significance does not invalidate a finding, it only indicates that the finding is not strong.

³ This measure does not take notice of changes in the average number of chargeable hours per audit. Since the disclosure requirements have been intensified over time, this proxy may underestimate the increase in the demand for audit services.

⁴ This measure ignores changes in auditing technology and efficiency differentials over employees and over time.

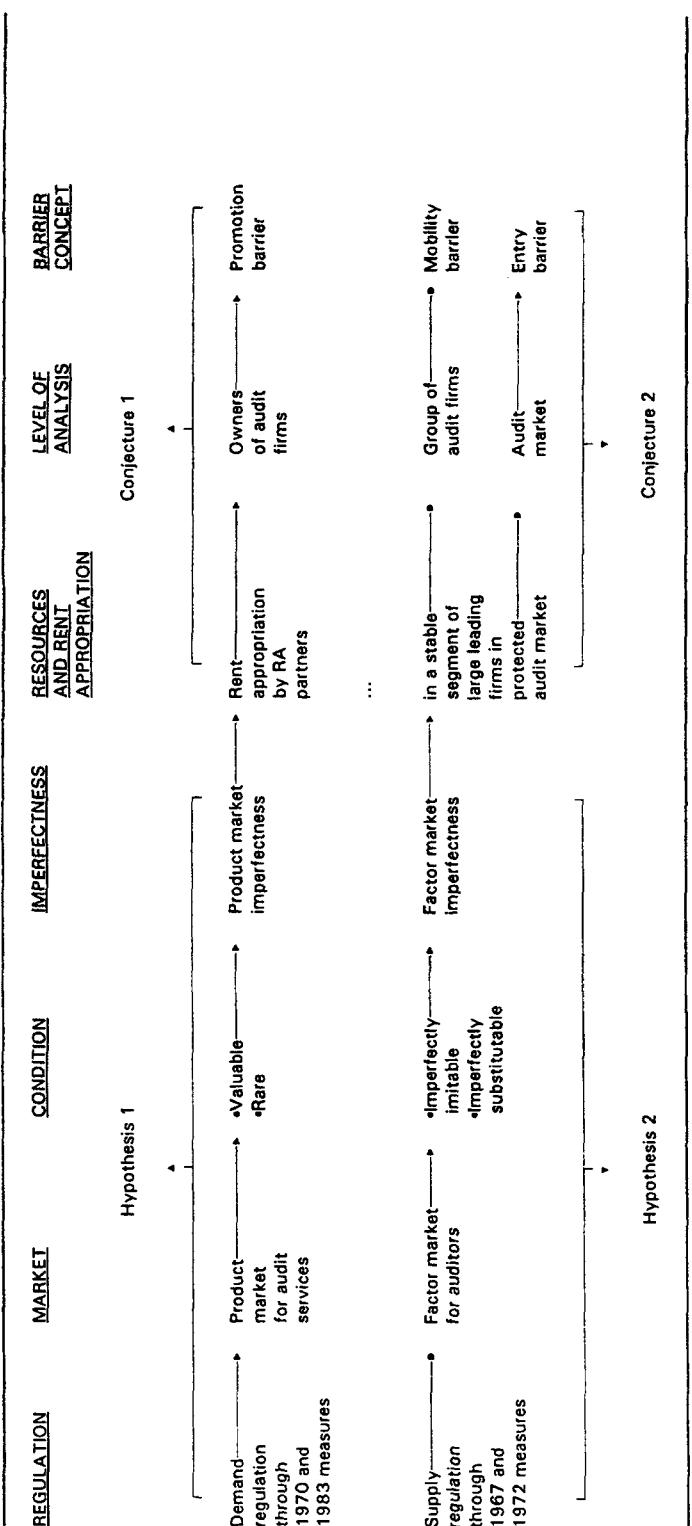


Figure 3. A resource-based theory of the Dutch audit market

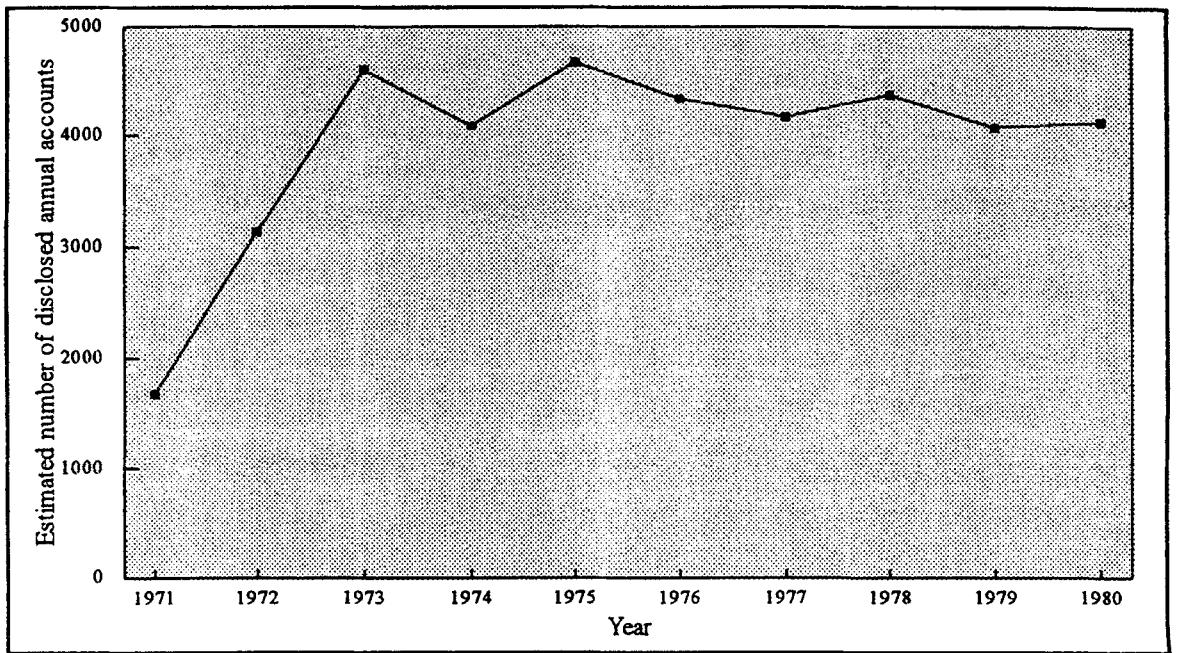


Figure 4a. Estimated number of disclosed annual accounts in 1971-80

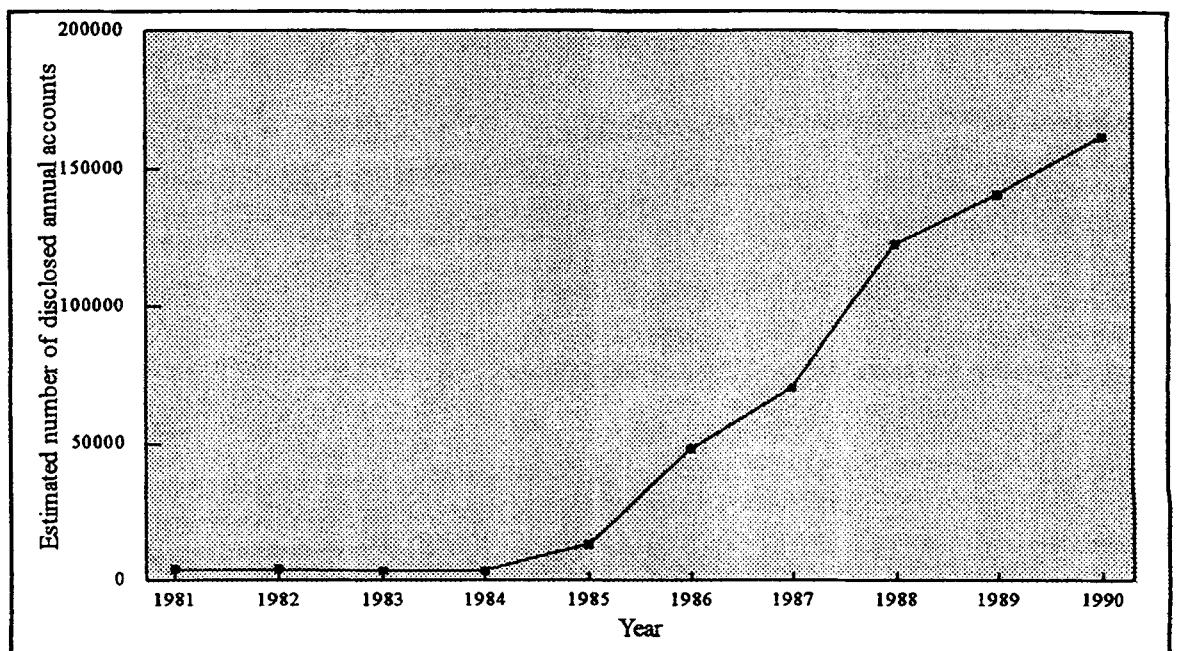


Figure 4b. Estimated number of disclosed annual accounts in 1981-90

Table 1. Hypotheses, conjectures, variables and predictions

Hypotheses and conjectures	Variables	Predictions ^a
<i>Independent variables:</i>		
Law change dummies (1970 and 1983)		
<i>Dependent variables:</i>		
H1(a)	Number of disclosed annual accounts	+
H1(b)	Number of professional employees	+
H2	Concentration (RA employees + independent RAs)/(large firm RA partners)	-
C1	Income of RA partners	+
C2	Number of new firms at the top	-

^aA plus indicates an (absolute or relative) increase and a minus an (absolute or relative) decrease or status quo of the associated variable after the implementation of either law change.

permutation test (or randomization test) was applied.⁵

The results for changes in the total number of employees and changes in the number of NIvRA students clearly support Hypothesis 1(a). The absence of significant differences in terms of the number of RA licensees in regulatory and nonregulatory years is hardly surprising, since a large pool of potential NIvRA students is ready to enter the market, whilst a 6- to 8-year study is needed to obtain an RA license. NIvRA students can be recruited immediately from a very large group of potential candidates (high school graduates). That this group is used as a reservoir of potential RAs is indicated by the fact that, in the decade 1978–88, the annual number of newly registered NIvRA students varied between 429 and 1152.

Hypothesis 1(b) predicts that the observed increase in the demand for audit services is *not* associated with a fall in the degree of concentration. Figure 2c clearly reveals that concentration has *increased* dramatically (from a C₄ of 29.8 percent in 1968 to a C₄ of 58.7 percent in 1990), which suggests that imperfect competition rules the product market. This observation can be confirmed with reference to anecdotal evidence from the enforcement of NIvRA's Professional

Code established in 1972. The NIvRA operates a disciplinary committee that regularly publishes jurisdiction on the basis of cases against RAs who have actually been accused of and convicted for violating the Professional Code. An illuminating example is Case 1990–14 (published in the NIvRA, 'Jurisprudentie tuchtrechtspraak: 1990–14'): an RA is convicted for publishing an ad (in February 1987) in a local newspaper in which he announced fees that are said to be extremely low, given what is common for the services involved.

Hypothesis 2

Imperfect product market competition is a necessary but not sufficient condition for resources to have a sustainable rent-producing potential. A second prerequisite is factor market imperfection. If a demand increase is fully matched by entry by new suppliers of audit services, the rent potential would be competed away. In the Dutch audit market, however, entry to the profession *has* to occur to satisfy the legally enforced need for audit services. What can be done to protect the rent opportunities, however, is to regulate entry into partnerships of the established audit firms. To analyze this process, RA licensees in public practice are divided into employees and partners. The first group can be regarded as potential entrants in the audit market as RA employees have the opportunity to supply audit services independently by starting their own audit firm.

⁵A permutation test takes into account the fact that the data are ratio-scaled, and so is in this case more powerful than the Mann-Whitney test (which can be considered to be a permutation test applied to ranks).

Table 2. Annual changes in the number of professional employees (aggregated and per category) for regulatory and nonregulatory years^a

Regulatory years	RAs plus NIvRA students			NIvRA students			RAs		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
A. 1971 1984	561.0	102.5	0.021*	509.0	39.4	0.016*	52.0	61.5	0.595
B. 1971 1972 1984 1985	423.3	79.6	0.022*	358.5	18.4	0.021*	64.8	59.6	0.344
C. 1971 1972 1973 1984 1985	329.6	87.9	0.066 ^b	269.2	25.5	0.061 ^c	60.4	60.6	0.452
D. 1970 1971 1983 1984	283.8	114.5	0.166	237.0	48.8	0.139	46.8	63.8	0.802

(1) Average annual change in regulatory years (number of observations = 2 ... 5).

(2) Average annual change in nonregulatory years (number of observations = 15 ... 19).

(3) One-tailed *p*.^aOne observation for NIvRA students is missing (1989). The annual change for year 19xx follows from (19xx + 1)–19xx.^bSignificant at a 5% level.^cSignificant at a 10% level.

Source: Maijor (1994: 273–275)

Because supply-side adjustment can be expected to take a long time, as the RA license is only obtained after 6- to 8-year study, it was not easy to select a nonregulatory period and a regulatory period. If the supply side of the market does adjust, every year after the passing of new legislation may have been affected. To compare the prechange period with the postchange era, the time series is traced backward to 1946. Panel A of Table 3 provides the data for the nonregulatory (1946–70) and regulatory (1971–89) period in terms of the average annual changes in the number of RA employees and RA partners in public practice.

The average annual change in the total number of RAs is far greater in the 1971–89 period than in the 1946–70 era. A Mann–Whitney test was applied to reveal significant differences, showing that the average annual change is significantly higher in the regulatory period. The result is entirely due to the increased numbers of RA employees in the 1971–89 period. In fact, the average annual change in the number of RA

partners is *lower* (though not significantly so) in this regulatory period.⁶

A final issue relating to Hypothesis 2 is that it might be expected that, if the position of RA partner in an established audit firm (a ‘cooperating partner’) becomes more difficult to reach, the number of RAs starting their own business (independent partners) would increase. Panel B

⁶The data for the first period were reanalyzed to check for a trend within the nonregulatory decades. A comparison was made of the average annual changes in the total number of RA employees and RA partners for the 1946–57 and 1958–70 periods. For RA employees, the mean difference was not significant (the two-tailed *p* is 0.8704). However, for RA partners the 1958–70 average was significantly above the average change in the 1946–57 period (the two-tailed *p* is 0.0387). In fact, the annual changes in the 1946–70 period can be better proxied as a constant annual percentage, rather than as a constant absolute change. If the annual change for RA partners for the whole 1946–89 period is expressed in percentages, the mean for the regulatory era is *significantly lower* than the mean for the nonregulatory decades. Again, the mean differences are not significantly different (now in terms of annual percentages) for the 1946–57 and 1958–70 periods.

Table 3. RA growth in the nonregulatory (1946–1970) and regulatory (1971–1989) period

Panel A: Average annual changes in the number of RA employees and RA partners in public practice in the nonregulatory and regulatory period

	1946–1970		1971–1989		
	Average ^a	Standard deviation	Average ^b	Standard deviation	Two-tailed <i>p</i>
RA employees	16.88	17.97	45.56	36.76	0.0014*
RA partners	21.80	19.31	17.83	13.10	0.7960
Total	38.68	13.45	63.39	38.09	0.0181*

Panel B: Average annual changes in the number of cooperating and independent partners in public practice in the nonregulatory and regulatory period

	1946–1970		1971–1989		
	Average ^a	Standard deviation	Average ^b	Standard deviation	Two-tailed <i>p</i>
Cooperating	23.88	18.56	10.56	18.79	0.0353*
Independent	-2.09	16.82	7.28	9.74	0.0094*

^aAverage annual change in nonregulatory years (number of observations = 25).

^bAverage annual change in regulatory years (number of observations = 18).

*Significant at a 1% level.

*Significant at a 5% level.

Source: Maijor (1994: 273–275)

of Table 3 reveals the annual changes for cooperating and independent partners in the nonregulatory and regulatory period. The difference between the two groups of partners is striking. In the regulatory decades, the number of cooperating partners *decreased* and the number of independent partners *increased* significantly.

In sum, the results clearly support the prediction that the total number of RAs has adjusted to the increased demand, but that entry into partnerships has been limited. The figures in terms of the ratio (average annual change in the number of RA employees)/(average annual change in the number of RA partners) are particularly illuminating: this ratio is 0.77 and 2.56 in the nonregulatory and regulatory period, respectively.

Conjectures 1–2

A final question involves rent appropriation: which party in the audit market benefits from the product and factor market imperfection? Conjectures 1 and 2 predict that the winning party is a stable group of large audit firms and their RA partners. However, the public audit profession has the habit of not revealing profit data. Reliable figures on RA income are only available for RA

partners in the years 1961, 1966 and 1972. From this we construct income change figures for the 1961–66 and 1966–72 periods, where the first period does not and the second period does include a demand-enhancing change in regulation. Panel A of Table 4 shows the median income of RA partners (in Dutch guilders), and changes in their income.

The income growth is 50 percent in the first period and 83 percent in the second. As a benchmark, Panel B of Table 4 reveals 1961–66 and 1966–72 income growth figures of other occupations. The RA partners have the lowest income increase of all groups in the first period. They are far behind the income growth of similar highly educated professionals (e.g., dentists, lawyers, and pharmacists). However, in the second period the case is radically different: RA partners reveal the second-highest income growth, and are very close to the average income increase of comparable professionals.

The next question is whether being an RA partner in a *large* audit firm is attractive. Two pieces of evidence are relevant in this context. First, turnover data suggest that RAs in public practice prefer a partnership in a large audit firm to any alternative affiliation. Maijor and

Table 4. Income of RA partners and other occupations^a

Panel A: (Changes of) the median income of RA partners in 1961, 1966 and 1972

Year	Median income	Growth per period	Growth per year
1961	40.883		
1966	61.250	50%	8.45%
1972	111.800	83%	10.55%

Panel B: Income growth of other occupations in the 1961–1966 and 1966–1972 period

Period	Occupation					
	(1)	(2)	(3)	(4)	(5)	(6)
1961–66	59%	69%	67%	78%	79%	50%
1966–72	78%	75%	76%	70%	84%	83%

- (1) Earned wage growth of employees in manufacturing and services.
 (2) Growth of regulated wages.
 (3) Growth of regulated wages in business.
 (4) Growth of regulated government wages.
 (5) Income growth of professionals (excluding RA partners in public practice).
 (6) Income growth of RA partners in public practice.

^aThe income figures are not corrected for inflation.

Meuwissen (1993) present evidence that the mobility of RAs in public practice is clearly asymmetric: total mobility inside the Big Eight firm segment is low, whereas the reverse is true outside this market segment. Their data also suggest that the large audit firms apply an 'up or out' career policy. A large number of the RAs who are forced to leave a large audit firm move to a smaller audit firm. Hence, small firms can be considered to be a sanctuary for RAs who were not successful in a large audit firm. Second, the employee/independent/partner data presented above reveal that changes in the number of partners lag behind the other two categories. As stated earlier, for professional services, this ratio is considered to be a rough estimate of the profits available for partners, with lower ratios indicating greater profits.⁷

⁷ An alternative explanation for the changing ratio is technological change in the production of audits. However, this is not a likely explanation because most technological changes in the past two decades—such as the use of computers, risk analysis and statistical sampling techniques—reduced the amount of simple clerical work and should have resulted in an increase in the ratio.

To conclude this argument on rent appropriation, it is necessary to test the validity of Conjecture 2 that the audit market has a stable two-group structure. One indicator is that the stability of the Big Five for audit firms, in terms of size and market share, is striking. This is clear from Table 5.

In the 1967–90 period, a small and relatively constant group of five firms have been able to dominate the market. The Big Five succeeded to increase their joint market share. Although the Big Five firms regularly change position, newcomers rarely intrude. The four major mutations can be easily explained: in 1969 Moret and Limpert merged, in 1972 Frese & Hogeweg joined KPMG Klynveld, in 1988 a large number of privatized municipal audit departments formed the new VB firm, and in 1989 van Dien merged with Coopers & Lybrand.

It is standard practice in audit market research to differentiate between large audit firms (Big Five or Big Eight) and small audit firms. Many studies have indeed revealed that the audit industry is composed of two segments. This pattern has been observed in, for example, the U.S.A. (Danos and Eichenseher, 1986), Australia (Francis and Stokes, 1986), Canada (Zind and Zéghal, 1989), the U.K. (Moizer and Turley, 1989) and the Netherlands (Maijor *et al.*, 1995).

Of course, the evidence is partial at best. Specifically, the data are not directly related to the hypothesized rent-producing resources of large audit firms: scale economies and (perceived) quality. In this respect, three additional studies are worthy of mention. Leeflang, Boxem, and van Dijk (1992) observe that the market share of the Big Four audit firms in the large (top 100) client segment is impressive indeed, and is still increasing (from 82% in 1985 to 88% in 1989). Apparently, large companies favor large audit firms. Moreover, Langendijk (1990) reveals that large companies seldom switch from one audit firm to the other. The rare cases of switching can generally be explained by institutional changes such as acquisitions or mergers. Finally, Langendijk (1994) provides evidence that 97.76 percent of all listed companies in the Netherlands were audited by a Big Four audit firm in 1990 (1989 mergers reduced the Big Five international audit firms to the Big Four).

Table 5. The Big Five audit firms in the 1964–1990 period^a

Ranking	1964	1966	1968	1970	1972	1974	1975
1	KPMG (9.7%)	KPMG (10.3%)	KPMG (9.8%)	Moret (13.0%)	KPMG (16.1%)	KPMG (16.0%)	KPMG (16.5%)
2	F&H (6.6%)	Moret (7.2%)	Moret (7.2%)	KPMG (9.7%)	Moret (15.0%)	Moret (15.4%)	Moret (15.2%)
3	C&L (4.4%)	F&H (6.2%)	F&H (6.5%)	F&H (6.9%)	C&L (10.8%)	C&L (12.1%)	C&L (11.5%)
4	TRN (4.1%)	TRN (6.1%)	TRN (6.3%)	TRN (6.9%)	TRN (7.1%)	TRN (7.0%)	Dien (7.5%)
5	Moret (3.3%)	Limpeng (5.4%)	C&L (4.6%)	C&L (6.5%)	Dien (6.8%)	Dien (6.7%)	TRN (7.4%)
Ranking	1978	1980	1982	1984	1986	1988	1990
1	Moret (15.7%)	Moret (15.5%)	KPMG (17.5%)	KPMG (16.7%)	KPMG (15.8%)	Moret (15.6%)	Moret (18.9%)
2	KPMG (15.5%)	KPMG (15.0%)	Moret (15.2%)	Moret (15.3%)	Moret (13.9%)	KPMG (13.6%)	C&L (16.5%)
3	C&L (11.2%)	C&L (11.4%)	C&L (11.0%)	C&L (10.3%)	C&L (10.0%)	C&L (9.2%)	KPMG (14.0%)
4	Dien (8.1%)	Dien (8.4%)	Dien (9.0%)	Dien (8.7%)	Dien (8.2%)	Dien (7.9%)	TRN (9.3%)
5	TRN (8.0%)	TRN (8.3%)	TRN (8.3%)	TRN (8.1%)	TRN (7.8%)	TRN (7.0%)	VB (4.3%)

^aFor the sake of brevity, the names of the audit firms are abbreviated (F&H = Frése & Hogeweg and C&L = Coopers & Lybrand). The names of the audit firms are based on the year 1990. The full names, and name changes (mainly as a result of mergers), are indicated in Buijink *et al.* (1993). (Rounded) market share is indicated between parentheses.

APPRAISAL

This paper makes two contributions to the literature on the resource-based theory of strategy. First, the paper develops a resource-based theory of the firm, group and industry. Resources can be rent-producing at all three levels of analysis, and which level matters most depends on the specific characteristics of the case being considered. At any level of analysis, both the factor and product market must be imperfect if resources are to produce sustainable rents. Second, the paper reports the results of an empirical test of the resource-based theory on the basis of a longitudinal data set from the Dutch audit market. The core predictions of the resource-based theory of the group and industry are confirmed. It was particularly interesting to observe that a group within the industry—large audit firms and their RA partners—were able to appropriate the rent from the key resource in the audit market: human capital embodied in RAs. This induced the introduction of the concept of the promotion barrier. The findings also have implications for the issue of regulation. The RA profession protected its rent potential by preserving the imperfection of the factor and product markets through regulating the demand and supply sides of the market. So, this paper argues that such *strategic* regulation may be a major source of sustainable competitive advantage.

Of course, there are alternative explanations for our results, such as (i) scale economies, (ii) switching costs and (iii) reputation. These three issues are undoubtedly important in understanding changes in the size and segmentation of the *audit industry as a whole* from 1970 to 1990, and they have been mentioned, in passing, in our analysis. However, none of these complementary elements is able to explain the striking increase in the nonpartner-to-partner ratio in the audit industry in the period under study.

This paper's key message is that empirical tests can make a fruitful contribution to explorations of the applicability of the resource-based theory. This paper is only a first step. However, it is hoped that this analysis is sufficiently convincing to show that the key concepts of the resource-based theory—the conditions underlying the sustainable rent-producing potential of resources—can be usefully applied in an empirical study of an industry. *Longitudinal* research is particularly

promising. In fact, a long-run perspective is necessary if the resource-based theory's emphasis on the *sustainability* of competitive advantage is to be tested. Of course, a combined cross-sectional and longitudinal design would be extremely powerful, since single-industry studies—such as this paper's focus on the Dutch audit industry—suffer from a lack of generalizability. Although this type of research is time-consuming, it would be worthwhile, because understanding what generates sustainable competitive advantages is crucial in, if not the hard core of, the strategy field.

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APPENDIX

Number of disclosed annual accounts

The estimate of the number of annual accounts disclosed prior to the 1970 change in financial accounting regulation is based on the number of companies listed on the Amsterdam Stock Exchange in 1970. The 1970 fiscal year was the last year not governed by the new regulations. Reports for the 1970 fiscal year were disclosed in 1971. Before the 1970 regulation, only 'open' public companies were subjected to financial accounting regulation. Nearly all 'open' public companies were listed on the Amsterdam Stock Exchange, and about 85 percent of this group audited their accounts voluntarily (Groeneveld, 1965). The number of listed public companies in 1970 (692) is therefore taken as an estimate of the maximum number of audited annual accounts disclosed before the passing of the 1970 Act. No data are available on the number of cooperative societies which disclosed audited annual accounts prior to the 1970 Act. To estimate the increase in the total number of disclosed annual accounts, it is assumed that the passing of the 1970 Act did not reduce the number for cooperatives. Since 1973, the Chamber of Commerce has reported the number of firms that meet the disclosure requirement.

Number of RA students

Two main groups of professional employees can be distinguished in public practice: RA students and RA licensees. Two alternative educational programs are available for RA students: the accountancy program conducted by the NIvRA and the accountancy programs of Dutch universities. NIvRA students study part-time while they are employed by an audit firm. University education is, by and large, full-time. Therefore, the number of RA students working in public practice is proxied by the number of part-time NIvRA students. The number of NIvRA students taking courses in any year is derived from the NIvRA's annual reports.

Concentration measures and top ranking

Calculation of the C_4 ratio is standard (Scherer and Ross, 1990). The data on the number and size of audit firms are derived from membership lists of the NIvRA and its preceding organiza-

tions, which are published approximately biannually (Maijor *et al.*, 1995). The data make it possible to measure firm size for all audit firms, which implies that the top-ranking firms, their size and market shares can be identified.

Number of RA employees and partners

The number of RAs in audit practice in any year is easily derived from the NIvRA membership lists (Maijor *et al.*, 1995). The NIvRA membership lists cover the whole practicing RA population for the 1967–90 period, as the NIvRA register includes (by law) all RAs and their affiliation. Data from the 1946–66 period were collected by consulting the NIvA (Nederlandsch Instituut van Accountants) membership lists. The NIvA was the largest professional organization of RAs before the formation of the NIvRA mo-

nopoly. The NIvA's members account for 81 percent of new entries in the NIvRA register in 1967 and 1968. For the sake of comparison the NIvA time series is adjusted upward by a fixed percentage ($23.13\% \times 81 = 100\%$).

Income of RA partners and other occupations

Data on the average incomes of RA partners and other professionals in 1961 and 1966 have been derived from two reports which an umbrella organization of professionals, the FOIB (Federatie Organisaties Intellectuele Beroepen), published in 1964 and 1968. The data for 1972 are based on a 1981 report by the CBS (Centraal Bureau voor de Statistiek). Income figures for other occupations are reported in a number of CBS publications.