Mandatory auditor rotation and retention: impact on market share

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Abstract

Purpose – To explore the effects of mandatory auditor rotation and retention on the long-term market shares of the accounting firms that audit the members of the Standard and Poor's (S&P) 500.

Design/methodology/approach – A Markov model is constructed that depicts the movements of S&P 500 firms in the period 1995 to 1999 among Big 5 accounting firms. Auditor rotation and retention are reflected in the transition probabilities. The impacts of mandatory auditor rotation and retention policies are evaluated by examining the state probabilities after two, five, and nine years.

Findings – The paper finds that mandatory auditor rotation will have substantial effects on long-term market shares, whereas mandatory auditor retention will have very small effects. It shows that a firm's ability to attract new clients, as opposed to retaining current clients, will be the primary factor in determining the firm's long-term market share under mandatory auditor rotation.

Research limitations/implications – The paper assumes that S&P 500 firms will continue their reliance on Big 5 firms and that the estimated transition probabilities will remain stable over time.

Practical implications – Excessive market share concentration resulting from such policies should not be a concern of regulators. The paper conjectures that, under mandatory rotation, accounting firms will reallocate resources to attract new clients rather than retain existing clients. This may result in lower audit quality.

Originality/value – Interestingly, over the past 25 years, several bodies have considered mandatory auditor rotation and retention. Surprisingly, the authors have found no studies of the effects of mandatory auditor rotation and retention on audit market share.

Keywords Auditors, Operations management, Retention, Market share, Freedom

Paper type Research paper

Introduction and literature review

In the fall of 2001, the accounting scandals focused attention on auditor independence and ways to ensure accuracy and to restore confidence in financial reporting. Among the many responses to the scandals was the passage of the *Public Company Accounting Reform and Investor Protection Act of 2002* (Sarbanes-Oxley Act of 2002). One of its provisions (Section 207) is the requirement that the "Comptroller General of the United States shall conduct a study and review of the potential effects of requiring the mandatory rotation of registered public accounting firms".

Interestingly, from time to time over the past 25 years, several concerned bodies have considered both mandatory auditor rotation and mandatory auditor retention as a method to improve auditor independence. Mandatory auditor rotation would require that a client firm retain an auditor for no more than a specified number of years. The idea is that auditors will have less incentive to seek future economic gain from a

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specific client and will therefore be less likely to bias reports in favor of management. Mandatory auditor retention, another related policy intervention, would require that a client firm retain an auditor for at least a specified number of years. The idea is that auditors will face no risk of dismissal within the retention period and thus they will be more independent of management.

The United States Senate's Metcalf Subcommittee (United States Senate Subcommittee on Reports, Accounting, and Management of the Committee on Government Operations, 1976), the AICPA's Cohen Commission (AICPA, 1978), the Treadway Commission (National Commission on Fraudulent Financial Reporting, 1987), the SEC Office of the Chief Accountant (United States Securities and Exchange Commission, 1994), the Senate Commerce Committee (United States Senate Subcommittee on Reports, Accounting, and Management of the Committee on Government Operations, 1976), the AICPA Kirk Panel (AICPA, 1994), the General Accounting Office (1996), and COSO (2000) all considered requirements that would regulate the duration of the client-auditor relationship. In 1999, the SEC and the AAA sponsored a joint conference in which mandatory auditor rotation and retention was a cited as a major issue facing the SEC.

Each investigation found that mandatory auditor rotation and retention are not advisable policies, citing a wide variety of reasons. These reasons include:

- costs exceed benefits;
- financial fraud is associated with a recent change in auditors;
- loss of client-specific audit knowledge and experience may lead to reduced audit quality;
- appropriate safeguards (rotation of engagement partners, second partner review, peer reviews) are already in place; and
- changes in audit team and client management composition occur normally.

On the other hand, some (but not all) researchers have found positive effects associated with mandatory auditor rotation and retention. Gietzmann and Sen (2001) used game theory to study the effects of mandatory auditor rotation on auditor independence. They showed that, although mandatory auditor rotation is costly, the resulting improvements in auditor independence outweigh the costs in markets with relatively few large clients. Dopuch *et al.* (2001) used Bayes' Theorem in an experimental context to study the joint effects of mandatory auditor rotation and retention on auditor independence. They found that rotation either alone or in combination with retention decreased the tendency of auditor subjects to issue biased reports. Catanach and Walker (1999) developed a theoretical model that connects mandatory auditor rotation with audit quality, but they provided no empirical data to test any hypotheses.

Several countries have experimented with one or both of these requirements (Buijink *et al.*, 1996). Italy has adopted mandatory auditor rotation, while Brazil has adopted mandatory auditor rotation for financial institutions and Singapore has adopted it for banks. Spain, Slovakia, and Turkey adopted mandatory auditor rotation but have since eliminated their requirements. Ireland considered and rejected a policy of mandatory auditor rotation.

In general, accounting firms oppose mandatory auditor rotation and retention for the reasons cited above. Also underlying their opposition is their legitimate concern for

audit market share. Surprisingly, we have found no studies of the direct or indirect effects of mandatory auditor rotation and retention on audit market share.

In this paper, we study the effects of mandatory auditor rotation and retention on the audit market shares of the accounting firms that audit the firms of the Standard & Poor's (S&P) 500. We view audit market share as a major issue for accounting firms, as it determines their revenue and therefore their profitability. If an accounting firm was to lose significant market share, it might become a takeover target, resulting in increased market concentration for accounting services and higher audit fees. Similarly, if a market share leader was to gain significant market share, it could gain significant monopoly power and thereby control the market for audit services. In both cases, auditor independence and audit quality would likely suffer.

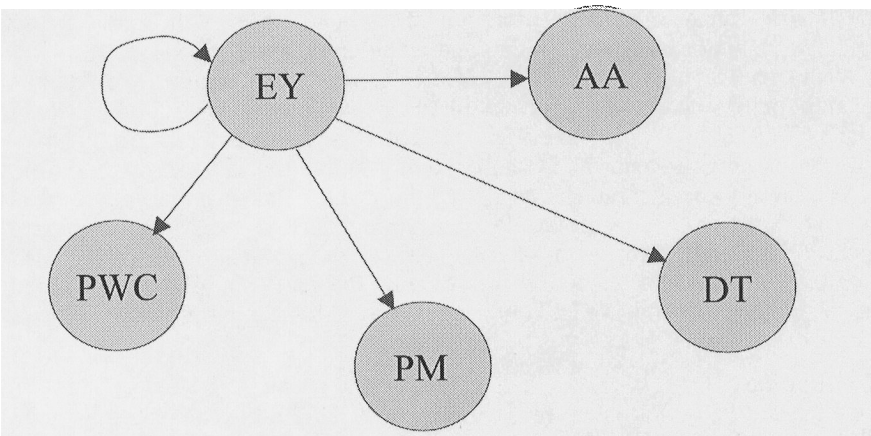
Methodology

We focus on the largest client firms, limiting our data to the companies listed in the S&P 500 in the period 1995 to 1999, during which, almost without exception, these firms used one of the Big 5 accounting firms[1] as their external auditor. We define the audit market share of an accounting firm to be the number of S&P 500 client firms audited by the accounting firm divided by the number of S&P 500 firms audited by one of the Big 5 accounting firms. We recognize that this definition does not reflect the asset value of the client firms, which would provide an alternative definition of audit market share.

Our analysis focuses on the S&P 500 firms because they represent the largest companies in the USA. Indeed, the S&P 500 is one of the most widely used benchmarks of US equity performance. While Big 5 accounting firms provide auditing services to smaller clients, the S&P 500 firms represent significant revenue. Thus, every Big 5 accounting firm must be concerned with its market share among S&P 500 firms. While we restrict our analysis to client firms listed on the S&P 500, the model is equally applicable to any client firm if we expand the state space to include all auditors that the client might retain.

We construct a Markov model that depicts the movements of a client firm among the set of Big 5 accounting firms. A Markov model is most appropriate in a stochastic brand-switching environment in which clients make periodic brand choices in accordance with estimable probabilities. In the present application, a Markov model is preferred to a simpler zero-order stochastic model in which clients select a brand in the next period without regard to the brand they selected in the current period. Clearly, client firms are more likely to remain with their current auditor than they are to select a different auditor each year, as evidenced by the many long-standing client-auditor relationships. An alternative deterministic model, the linear learning model, has the advantage of incorporating more historical observations, but is unreliable when the time between brand-switching decisions is long, such as one year. Thus, we select the Markov model as the best technique for the present application.

We have five states in our model, one for each of the Big 5 accounting firms (see Figure 1). In any given year, the client firm retains one of the accounting firms for audit purposes. Suppose that the selected accounting firm is represented by state i. In the next year, the client may remain with accounting firm i, with transition probability p_{ii}, or may switch to accounting firm j, with transition probability p_{ij}. Consistent with standard Markov model axioms, these transition probabilities represent the average



Notes: In any year, each client firm resides in exactly one of the five states. At the end of each year, the client firm may remain with its current auditor, indicated by a self-loop, or switch to another auditor, indicated by an arrow. The figure shows transitions for EY only for clarity. However, each of the states has an analogous set of five arrows

Figure 1.
The five states of the Markov model representing the Big 5 accounting firms

transition probabilities of all client firms, and we assume that that the averages remain constant over time. Given the one-year period between brand-switching decisions, it is very difficult to detect significant shifts in the transition probabilities over time. In other words, the available data do not support a more complex model that allows for estimated shifts in transition probabilities.

Let $\mathbf{P} = (p_{ij})$ denote the 5×5 matrix of transition probabilities. Clearly, our model is ergodic, meaning that the client firm can move from any accounting firm to any other in a finite number of transitions. Thus, we know that there exists a 1×5 vector $\boldsymbol{\pi} = (\pi_j)$ of steady-state probabilities that are independent of the initial state of the client firm. The steady-state probability π_j is the asymptotic probability that the client firm will retain accounting firm j in any year. Therefore, we can interpret the steady-state probability π_j as the long-term market share of accounting firm j. We compute the steady-state vector $\boldsymbol{\pi}$ as the first row of the matrix $\mathbf{M}^{-1}$, where $\mathbf{M}$ is the matrix $\mathbf{P} - \mathbf{I}$ with the first column replaced by all 1s, and where the matrix $\mathbf{I}$ is the 5×5 identity matrix (Hillier and Lieberman, 1990).

We model the transition probabilities as follows:

$$p_{ij} = \begin{cases} r_i & , \quad i = j \\ \dfrac{(1-r_i)A_j}{\sum_{k \neq i} A_k} & , \quad i \neq j \end{cases} \tag{1}$$

where we define the parameters r_i and A_i as the retention probability and the attractiveness parameter of accounting firm i, respectively. The retention probability of accounting firm i is the likelihood that a client firm will remain with accounting firm i in the next year given that it retained accounting firm i in the current year. The attractiveness parameter of accounting firm i is a measure of its ability to recruit a

client firm from another accounting firm given that the client firm has decided to change accounting firms.

We restrict the attractiveness parameters to sum to 1 so that the denominator of p_{ij} for $i \neq j$ represents the sum of the attractiveness parameters of all accounting firms except i. Thus, the ratio $A_j/(1 - A_i)$ represents the probability that a client firm leaving accounting firm i will move to accounting firm j. Then, for $i \neq j$, p_{ij} equals this conditional probability multiplied by the probability $1 - r_i$ that the client firm leaves accounting firm i.

We collected data from S&P Research Insight. We counted the number of movements of S&P 500 client firms among the Big 5 accounting firms each year from 1995 through 1999. We then aggregated the transition counts across the five years (four transition periods) to produce an overall 5×5 observed transition matrix $\hat{P} = (\hat{p}_{ij})$. We let $\hat{\pi}_j$ represent the steady-state probabilities resulting from the observed transition matrix.

We estimated the retention and attractiveness parameters by determining the values of r_i and A_i that minimize the sum of the squared differences between the observed transition probabilities and the estimated transition probabilities computed using (1). We performed this minimization subject to the constraints that the estimated transition probabilities produced market shares equal to the observed market shares. In addition, we required that the retention probabilities lie between zero and one, and that the attractiveness parameters sum to one. Thus, we used the Solver add-in in Microsoft Excel to solve:

$$\min_{r_i, A_1} \left\{ \sum_{i=1}^{5} \sum_{j=1}^{5} (p_{ij} - \hat{p}_{ij})^2 \mid \pi_j = \hat{\pi}_j, \quad j = 1, \ldots, 5; \right.$$

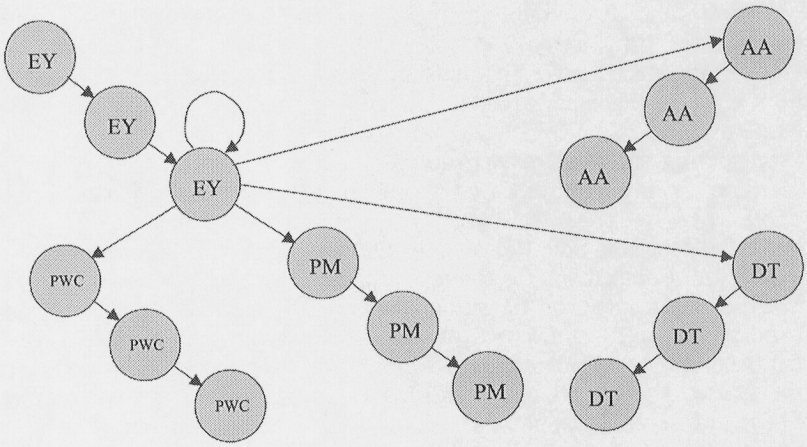
$$\left. 0 \leq r_i \leq 1, \quad i = 1, \ldots, 5; \quad \sum_{j=1}^{5} A_j = 1 \right\}.$$

The resulting retention probabilities and attractiveness parameters thus produce an estimated transition matrix that is as close as possible to the observed transition matrix while producing identical market shares for all five accounting firms.

Analysis of mandatory auditor retention and rotation

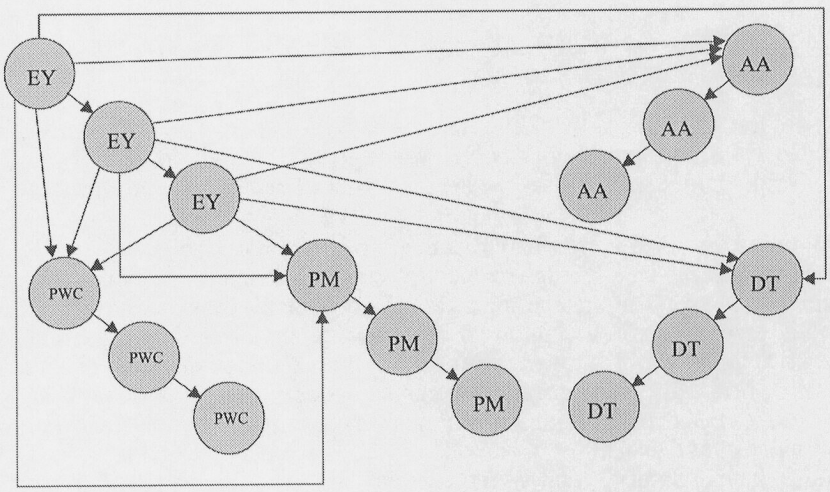
To analyze market share under mandatory auditor retention or rotation, we must expand the state space of the Markov model. We now define the states as ordered pairs (i,y) where i represents the accounting firm retained by the client and y is the number of consecutive years in which the engagement has been active. Thus, if the client selects accounting firm 4 after having engaged another accounting firm in the previous year, then it resides in state (4,1). If it retains the same accounting firm in the following year, then it moves to state (4,2).

Under a mandatory auditor retention policy (see Figure 2) that requires engagements to last at least u years, and with no rotation requirement, we limit y to the values 1, 2, ..., u, where we interpret $y = u$ to mean that the engagement has been going on for at least u years. In the absence of both mandatory auditor retention and rotation, we set $y = 1$, which reduces to the model described earlier. Under a mandatory auditor rotation policy (see Figure 3) that limits engagements to at most v years, and with no retention requirement, we limit y to the values 1, 2, ..., v. If both



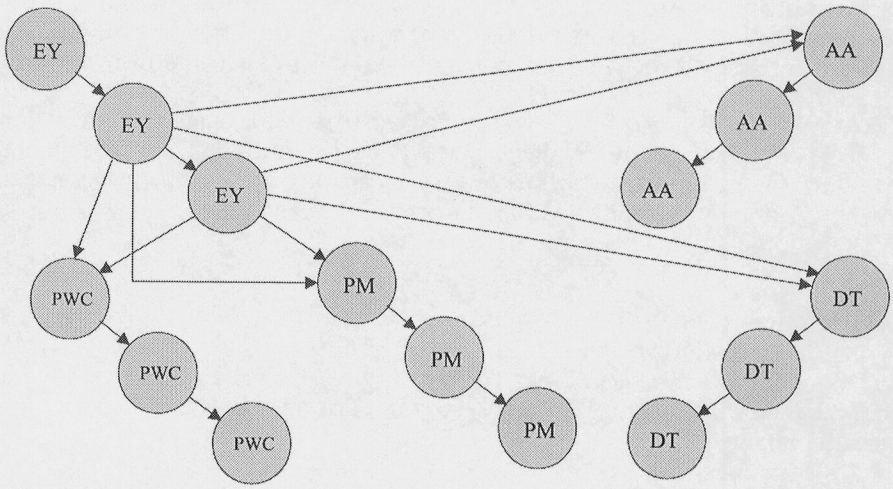
Notes: Under mandatory auditor retention for at least u years, we must expand each of the original five states to u states. This figure illustrates the case for u = 3. The arrows indicate the possible transitions for EY. However, each of the states has an analogous set of five arrows. The client firm must remain with its auditor for at least u = 3 years, after which it may remain with the same auditor or switch to another

Figure 2.



Notes: Under mandatory audit or rotation for at most v years, we must expand each of the original five states to v states. This figure illustrates the case for v = 3. The arrows indicate the possible transitions for EY. However, each of the states has an analogous set of arrows. The client firm must switch auditors after no more than v = 3 years, although it could switch earlier

Figure 3.



Notes: Under mandatory auditor retention for at least u years and mandatory auditor rotation for at most v years, we must expand each of the original five states to v states. This figure illustrates the case for u = 2 and v = 3. The arrows indicate the possible transitions for EY. However, each of the states has an analogous set of arrows

Figure 4.

policies are in effect (see Figure 4), then we must have $u \leq v$ and we again limit y to the values 1, 2, ..., v.

In any case, we sort the states in increasing order of y and then in increasing order of i nested within constant values of y. Thus, we order the states (1,1), (2,1), (3,1), (4,1), (5,1), (1,2), (2,2), (3,2), (4,2), (5,2), ..., (1,l), (2,1), (3,l), (4,l), (5,l), where l equals either 1, u, or v, as appropriate.

Let $\mathbf{P}_{(u,v)}$ be the transition matrix among these states. We will adopt the notation convention to set $u = 1$ if no retention policy is in effect, and $v = \infty$ if no rotation policy is in effect. Thus, $\mathbf{P}_{(u,\infty)}$ corresponds to retention with no rotation, $\mathbf{P}_{(1,v)}$ corresponds to rotation with no retention, $\boldsymbol{P}_{(1,\infty)}(= \boldsymbol{P})$ corresponds to neither retention nor rotation, and $\mathbf{P}_{(u,v)}$ corresponds to both retention and rotation.

Let $\mathbf{R} = \text{diag}(\mathbf{P})$ be the 5×5 diagonal matrix consisting of all zeroes except for on the main diagonal where $r_{ij} = r_i$. Let $\mathbf{M}$ be the 5×5 matrix with zeros on the main diagonal and with off-diagonal elements $m_{ij} = A_j/(1 - A_i)$. We can easily show that $\mathbf{M} = (\mathbf{I} - \mathbf{R})^{-1}(\mathbf{P} - \mathbf{R})$. Let $\mathbf{0}$ be the 5×5 matrix consisting of all zeroes. We may write the transition matrices corresponding to various combinations of mandatory auditor retention and rotation in terms of these matrices. We have, the

$\mathbf{P}_{(u,\infty)} =$

	y = 1	y = 2	y = 3	...	y = u − 1	y = u
y = 1	**0**	**I**	**0**	...	**0**	**0**
y = 2	**0**	**0**	**I**	...	**0**	**0**
y = 3	**0**	**0**	**0**	...	**0**	**0**
...	...	...	...	...	...	...
y = u − 1	**0**	**0**	**0**	...	**0**	**I**
y = u	**P − R**	**0**	**0**	...	**0**	**R**

Figure 5.

partitioned form shown in Figure 5, for mandatory retention with no rotation requirement the form shown in Figure 6, for mandatory rotation with no retention requirement, and for both mandatory retention and rotation the form shown in Figure 7.

We compute the steady-state vectors for each transition matrix. The resulting steady-state probabilities reveal the proportions of client firms that will be retaining a given accounting firm in each year y. We obtain the market share for a given accounting firm by summing its proportions over all years.

Computational results

We use the following notation to denote the Big 5 accounting firms: AA = Arthur Andersen; EY = Ernst & Young; DT = Deloitte & Touche; PM = KPMG Peat Marwick; and PWC = PriceWaterhouseCoopers. The observed transition matrix is shown in Figure 8.

$P_{(1,v)} =$

	y = 1	y = 2	y = 3	...	y = v − 1	y = v
y = 1	P − R	R	0	...	0	0
y = 2	P − R	0	R	...	0	0
y = 3	P − R	0	0	...	0	0
...	...	...	...	...	...	...
y = v − 1	P − R	0	0	...	0	R
y = v	M	0	0	...	0	0

Figure 6.

$P_{(u,v)} =$

	y = 1	y = 2	y = 3	...	y = u − 1	y = u	y = u + 1	y = u + 2	...	y = v − 1	y = v
y = 1	0	I	0	...	0	0	0	0	...	0	0
y = 2	0	0	I	...	0	0	0	0	...	0	0
y = 3	0	0	0	...	0	0	0	0	...	0	0
...	...	...	...	...	...	...	...	...	...	...	...
y = u − 1	0	0	0	...	0	I	0	0	...	0	0
y = u + 1	P − R	0	0	...	0	0	R	0	...	0	0
y = u + 1	P − R	0	0	...	0	0	0	R	...	0	0
y = u + 2	P − R	0	0	...	0	0	0	0	...	0	0
...	...	...	...	...	...	...	...	...	...	...	...
y = v − 1	P − R	0	0	...	0	0	0	0	...	0	R
y = v	M	0	0	...	0	0	0	0	...	0	0

Figure 7.

Observed P =

	AA	EY	DT	PM	PWC
AA	0.9837	0.0033	0.0065	0.0033	0.0033
EY	0.0048	0.9880	0.0048	0.0024	0.0000
DT	0.0000	0.0000	0.9932	0.0034	0.0034
PM	0.0000	0.0000	0.0044	0.9868	0.0088
PWC	0.0053	0.0053	0.0035	0.0000	0.9858

Figure 8.

From this matrix, we estimated the attractiveness and retention parameters, which we show with the observed retention probabilities and (observed and estimated) current audit market shares, in Table I.

The resulting estimated transition matrix is shown in Figure 9.

Analysis of mandatory auditor rotation

We analyzed three mandatory auditor rotation policies that would limit the duration of the audit engagement to two, five, and nine years, respectively. We show the resulting long-term market shares, with current observed market shares, in Table II.

We observe that the long-term market shares are almost identical for rotation periods up to nine years. Of course, as the rotation period tends toward infinity and the mandatory rotation policy becomes increasingly weak, the steady-state market shares will return to their current levels. We conclude that, for mandatory rotation periods of nine years or less, the rotation period has little impact on market share. However, we

	AA	EY	DT	PM	PWC
Observed retention probability	0.9837	0.9880	0.9932	0.9868	0.9858
Estimated retention probability	0.9841	0.9890	0.9904	0.9863	0.9878
Estimated attractiveness parameter	0.208	0.194	0.107	0.120	0.371
Observed (and estimated) market share	0.1689	0.2307	0.1634	0.1258	0.3113

Notes: Observe that all firms have very high retention probabilities, and that the model estimates of these probabilities closely match the observed values. However, the firms differ considerably with respect to their ability to attract new client firms

Table I.
Observed and estimated retention probabilities, estimated attractiveness parameters, and observed (and estimated) market shares

Estimated P =

	AA	EY	DT	PM	PWC
AA	0.9841	0.0039	0.0022	0.0024	0.0074
EY	0.0028	0.9890	0.0015	0.0016	0.0051
DT	0.0022	0.0021	0.9904	0.0013	0.0040
PM	0.0032	0.0030	0.0017	0.9863	0.0058
PWC	0.0040	0.0038	0.0021	0.0023	0.9878

Figure 9.

	AA	EY	DT	PM	PWC
Current observed market share	*0.1689*	*0.2307*	*0.1634*	*0.1258*	*0.3113*
Two-year mandatory rotation	0.2173	0.2068	0.1269	0.1400	0.3090
Five-year mandatory rotation	0.2163	0.2073	0.1275	0.1397	0.3092
Nine-year mandatory rotation	0.2149	0.2079	0.1283	0.1394	0.3094
Maximum difference	*0.0485*	*− 0.0239*	*− 0.0365*	*0.0141*	*− 0.0023*

Notes: Also shown are the current market shares of each firm and the maximum differences between the current observed market share and the market share under mandatory rotation. AA would experience the largest increase in market share (4.85 percent), while DT would experience the largest decrease (3.65 percent). The effects of mandatory auditor rotation on market share are almost independent of the rotation period

Table II.
Long-term market shares under two-, five-, and nine-year mandatory auditor rotation

see that the existence of a mandatory rotation policy leads to shifts in long-term market share ranging between nearly 0 percent and approximately 5 percent.

Figure 10 shows the relationship between market share and attractiveness under five-year mandatory rotation. We observe that market share is nearly a linear function of attractiveness. The relationship is virtually identical for two- and nine-year mandatory rotation. Thus, under mandatory rotation, we expect that Big 5 accounting firms will increase their efforts to attract audit clients from competitors as they strive to maintain market share. Figure 11 shows the shift in market shares for each of the

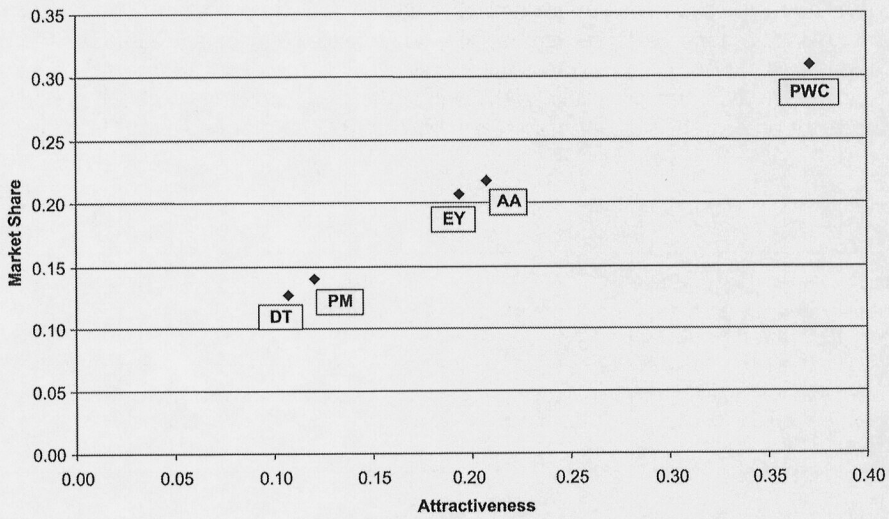


Figure 10.
The relationship between long-term market share and attractiveness under five-year rotation

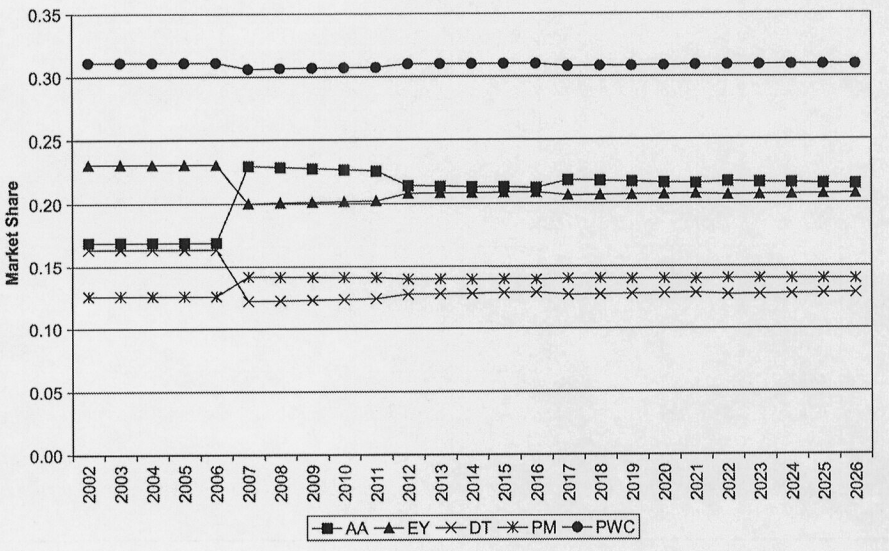


Figure 11.
Market share evolution under five-year mandatory rotation

Big 5 accounting firms under a policy of five-year mandatory rotation during the period 2002-2026 if such a policy were effective in 2002. We observe that market shares remain at their current steady-state levels for five years, after which the market shares converge toward their new steady-state values in an oscillating fashion. Thus, the largest impact on market share will occur at the end of the first rotation period, with smaller adjustments occurring at the ends of each subsequent rotation period.

Analysis of mandatory auditor retention

We analyzed three mandatory auditor retention policies that would require that the duration of the audit engagement be at least two, five, and nine years, respectively. We show the resulting long-term market shares, with current observed market shares, in Table III.

We note that the effects of mandatory retention on market share are much smaller than those associated with mandatory rotation. This is because the retention probabilities of the five accounting firms are very high (all greater than 98.3 percent) so that imposing 100 percent retention for several years is little different from the current situation. Thus, we expect no behavioral changes among the Big 5 accounting firms under mandatory retention. We also observe that, for each accounting firm, the effect of mandatory retention on its market share is in the same direction as the effect of mandatory rotation.

Analysis of combined mandatory auditor rotation and retention

We consider several situations in which we impose both mandatory rotation and mandatory retention. One possibility is that the rotation and retention periods are

	AA	EY	DT	PM	PWC
Current observed market share	*0.1689*	*0.2307*	*0.1634*	*0.1258*	*0.3113*
Two-year mandatory retention	0.1695	0.2304	0.1629	0.1260	0.3112
Five-year mandatory retention	0.1712	0.2296	0.1616	0.1265	0.3111
Nine-year mandatory retention	0.1733	0.2285	0.1601	0.1271	0.3110
Maximum difference	*0.0044*	*− 0.0022*	*− 0.0033*	*0.0013*	*− 0.0002*

Notes: Also shown are the current market shares of each firm and the maximum differences between the curent observed market share and the market share under mandatory retention. Mandatory auditor retention would have very little effect on market shares. AA would experience the largest increase in market share (0.44 percent), while DT would experience the largest decrease (0.33 percent). The effects of mandatory auditor retention on market share are almost independent of the retention period

Table III.
Market shares under two-, five-, and nine-year mandatory auditor retention

	AA	EY	DT	PM	PWC
Current observed market share	*0.1689*	*0.2307*	*0.1634*	*0.1258*	*0.3113*
n-year mandatory retention and *n*-year mandatory rotation	0.2177	0.2066	0.1267	0.1400	0.3089

Notes: The market shares are independent of the duration of the common period. Also shown are the current market shares of each firm

Table IV.
Market shares under both mandatory auditor retention and mandatory auditor rotation in which the periods of both policies are the same

equal. For example, we might require that a client firm retain its auditor for five years, after which the client firm must switch to another auditor. In this case, we can easily show that the steady-state market shares are independent of the common duration and are equal to the steady-state probabilities of the matrix **M**. We show the long-term market, with current observed market shares, in Table IV.

We observe that these market shares are virtually identical to those produced by the two-year mandatory rotation policy. For each accounting firm, the shifts in market share produced by the two policies combined is very slightly larger than that produced by the mandatory rotation policy alone.

Finally, we considered three situations in which we impose both mandatory retention and mandatory rotation with the retention period strictly less than the rotation period. We show the resulting long-term market shares, with current observed market shares, in Table V.

Clearly, the resulting long-term market shares are almost equal to those produced under rotation only. This is not surprising given our observation that mandatory retention has a much smaller impact on market share than does mandatory rotation.

Discussion and conclusions

We conclude that mandatory auditor rotation will have tangible effects on the audit market shares of the Big 5 accounting firms in the S&P 500 market. We see that the magnitudes of the effects are virtually the same regardless of the rotation period. Therefore, from a market share viewpoint, regulators need not be concerned with the length of the rotation period. On the other hand, mandatory auditor retention will have negligible impacts on these market shares. This is because the current observed retention probabilities are already very high, each exceeding 98.3 percent. Thus, regulators can be confident that neither mandatory rotation nor retention will create excessive market concentration in any Big 5 accounting firm.

However, while some firms would gain market share under mandatory auditor rotation, others would lose market share. AA would have gained close to 5 percent in market share, rising from approximately 17 percent to roughly 22 percent, and PM would gain close to 1.5 percent, rising from approximately 12.5 percent to 14 percent. Two accounting firms would lose audit market share under mandatory auditor rotation. DT would lose about 3.5 percent, dropping from 16.3 percent to roughly 12.8 percent, while Ernst & Young would lose about 2.4 percent, falling from 23 percent to

Table V.
Market shares under three different combined policies of mandatory auditor retention and mandatory auditor rotation

	AA	EY	DT	PM	PWC
Current observed market share	*0.1689*	*0.2307*	*0.1634*	*0.1258*	*0.3113*
Two-year mandatory retention and five-year mandatory rotation	0.2169	0.2070	0.1272	0.1399	0.3091
Two-year mandatory retention and nine-year mandatory rotation	0.2155	0.2077	0.1279	0.1396	0.3093
Five-year mandatory retention and nine-year mandatory rotation	0.2169	0.2070	0.1271	0.1399	0.3091

Notes: Also shown are the current market shares of each firm. The market shares under both mandatory auditor rotation and retention are almost identical to those shown in Table II, indicating that rotation has much greater influence on market share than does retention

approximately 20.6 percent. Finally, PWC would remain essentially constant at about 31 percent.

We observe that, under mandatory auditor rotation, long-term market share will depend more heavily on a firm's ability to attract new clients than it will on its ability to retain existing clients. Specifically, we have seen that long-term market share will be a nearly linear increasing function of the attractiveness parameter. We expect, therefore, that accounting firms are likely to shift resources to increase attractiveness perhaps at the expense of retention. Put another way, we expect that firms will spend more money on recruiting new audit clients and less money on retaining existing audit clients, leading to pressure on the firm to reduce audit cost and quality. Thus, ironically, policies designed to enhance audit quality by increasing auditor independence may have, in fact, exactly the reverse effect.

The debate about mandatory auditor rotation and retention will certainly continue as regulators and accounting firms seek ways to increase auditor independence. Excessive market share concentration should no longer be a concern, although these policies are likely to change the marketing strategies of accounting firms in ways that might backfire.

Note

1. In 2002, the Big 5 became the Big 4 when Arthur Andersen was prohibited from providing audit services to publicly traded firms. We assume that the overall impact of these policies in a four-firm market will be comparable to that in a five-firm industry. The data demands of our model required us to include enough years to generate reasonably accurate estimates of the transition probabilities, and we opted to include more years even though that implied that we would need to include data from Arthur Andersen.

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