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服務組合及生產力：來自會計師事務所的實證研究

Service Mix and Productivity: Evidence from Accounting Firms

張錫惠 / Professor, LeBow College of Business, Drexel University
Hsi-Hui Chang, Professor, LeBow College of Business, Drexel University

蔡曉林 / Associate Professor, LeBow College of Business, Drexel University
Hiu-Lam Choy, Associate Professor, LeBow College of Business, Drexel University

William W. Cooper, Professor Emeritus, Red McCombs School of Business, University of Texas at Austin

林美花 / 國立政治大學會計系教授
Mei-Hwa Lin, Professor, Department of Accounting, National Chengchi University

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摘 要

本研究探討會計師事務所提供之何種專業服務最能有效使用人力資源來創造收入。實證結果顯示，在給定的人力資源規模下，管理諮詢服務對事務所的收入貢獻最大。這種型態在沙賓法案對會計師事務所提供之管理諮詢服務加以限制之後，仍然存在。本研究並發現，在該法案實施後，因為加強對審計及內部控制評估的要求，會計師事務所員工具有會計師資格者成為事務所生產力的重要驅動因素。

【關鍵字】會計師事務所、生產力、沙賓法案

Abstract

This paper examines which type of professional services provided by accounting firms can most effectively utilize human resources in generating revenues. Results indicate that for a given level of human resources, management advisory services (MAS) contribute the most to an accounting firm's revenues. This pattern continues to hold after the passage of the Sarbanes-Oxley Act (Act) despite the restriction on MAS imposed by the Act. In addition, with the increasing emphasis on auditing and certification of internal control services in the post-Act period, accounting firms' employees with CPA designations become significant drivers of accounting firms' productivity.

【Keywords】accounting firms, productivity, Sarbanes-Oxley Act

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1. Introduction

Accounting firms today do not limit their services to the traditional auditing and tax services. Many accounting firms provide consulting or management advisory services (MAS) employing various specialists in assorted fields such as information systems and human resource management. For many firms, the consultant service is the fastest growing segment and contributes to a significant portion of accounting firms' revenues. Unlike the "standardized" auditing and taxation services, MAS offer opportunities for specialized services. Accounting firms can offer customized MAS and transactional environment to better meet individual customer's needs (Thirumalai and Sinha, 2009; Srinivasan, Anderson, and Ponnavolu, 2002). This customization for non-standardized products or services also helps accounting firms increase their customer satisfaction and retention (Thirumalai and Sinha, 2009; Komiak and Benbasat, 2006). However, whether customized MAS indeed result in greater productivity in revenue generation for an accounting firm is an interesting empirical question that has received little attention in prior research. Therefore, the first objective of this paper is to investigate the contribution of the three different types of services offered by accounting firms — accounting, auditing and assurance (A&A), taxation (TAX), and MAS — to accounting firms' productivity.

With a series of accounting scandals and fraudulent business reporting practices involving both corporate America and their auditors — Enron, WorldCom, Arthur Andersen, PricewaterhouseCoopers, Ernst & Young, and so forth, led to a drop in investors' confidence in financial reports filed by publicly-listed companies (Ulich, 2002), Congress passed the Sarbanes-Oxley Act in 2002 in order to strengthen corporate governance. The Act aims to improve the accuracy of financial reports of public companies through reforms in the public accounting industry and corporate governance. One main focus of the Act is to improve the independence of auditors by restricting the consulting services they can offer. In addition, the Act requires the client firms' management to certify and the auditors to assess the effectiveness of the internal control systems. Thus, the second objective of this paper is to examine if these restrictions and requirements have any impact on the contribution of the three types of services to accounting firms' productivity from the pre- to the post-Act periods. Last but not least, we investigate if the constituent of accounting firms' employee can affect its productivity. With the increasing emphasis on auditing and certification of internal control services, we expect that accounting firms' employees with CPA (Certified Public Accountant) designation play a more important role in accounting firms' productivity after the passage of the Act.

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In this paper, we examine the effect of various types of services offered by accounting firms on their performances from the perspective of revenue generation productivity (hereafter referred to as productivity). Specifically, we focus on the contribution of A&A, TAX and MAS services to the overall productivity of accounting firms where productivity is defined as the dollar amount of service revenues generated from given levels of human resources in accounting firms. Due to the difference in the nature of services, standardized vs. non-standardized, coupled with the difference in skill sets and knowledge required to accomplish each kind of service, we expect differential contributions from the various types of services to the overall firm productivity.

The contribution of the various services can change after the passage of the Act. Specifically, Section 201 restricts the kinds of services that accounting firms can provide to their audit clients, whereas Section 404 requires auditors to evaluate the internal control systems of their clients and attest in their audit reports to the management's assessment of the systems (Congress of the United States of America, 2002). Since the Act affects more than one type of service of accounting firms, we expect that the productivity of these various services can change with the passage of the Sarbanes-Oxley Act. Therefore, we estimate and compare the productivity of the various kinds of services offered by accounting firms in the post-Act period with that in the pre-Act period. This comparison allows us not only to evaluate the productivity of the various services offered by accounting firms but also provides information on how a change in legislation can affect the productivity of these services. This information can be invaluable to accounting firms in designing their optimal service mix.

Section 201 of the Act prohibits the auditor of a firm from providing non-audit services that can compromise auditor objectivity and independence.[1] This can be expected to have a major effect on the revenues of accounting firms since the productivity of the accounting firms has been sustained in recent years (i.e., pre-Act) largely by a significant growth in MAS (Banker, Chang, and Natarajan, 2005). With the restriction on MAS that accounting firms can provide to their audit clients, one would expect a significant change in the product mix of accounting firms and a significant drop in their productivity. In fact, in anticipation of the potential adverse effects on their productivity and audit quality (e.g., better audit efficiency and effectiveness due to knowledge spillover from non-audit services), the Big 5

1 Details on the services prohibited by the Act are provided in Section 2 of the present paper.

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and the American Institute of Certified Public Accountants (AICPA) had sharply increased their political donations and spending on lobbying against any government intervention on their consulting operations (Levitt, 2002; Labaton, 2002). However, the unraveling of the accounting scandals we referred to above led the U.S. Congress to decide in favor of regulating these and other services that might compromise auditor independence.

In contrast to the negative effects of the restriction on MAS we just noted, Section 404 of the Act can potentially enhance accounting firms' productivity by increasing the demand for their assurance services. For instance, it requires management to assess the effectiveness of internal control systems of their firms and the auditors to evaluate and attest to these management assessments in their audit reports. These additional audit steps and testing requirements can increase the productivity of accounting firms. A survey published by Financial Executive International (2005) indicates that companies with revenues of at least five billion dollars faced, on average, a 57% increase in their audit fees in order to comply with the Act.

With the large-scale implementation of Section 404 and the pressure to meet its compliance deadline, a significant increase in revenues generated by Section 404 compliance services can be expected for accounting firms. However, as previously noted, Section 201 reduces the scope of non-audit services accounting firms can provide to their publicly-listed audit clients. Thus, there can be a shift of demand from the MAS to the A&A services after the passage of the Act. How will this shift affect the productivity of the various services and hence the overall productivity of accounting firms remains an empirical question. This study attempts to provide empirical evidence that helps to resolve the question.

We use a sample of 57 large U.S. accounting firms from 2000-2005 to estimate the relationship between fee revenues and human resource inputs of accounting firms. We find that among the three types of professional services offered by accounting firms, MAS have the highest productivity. Although the Act imposes a series of restrictions on the consulting services accounting firms can provide to their clients, these restrictions do not have any significant impact on the contribution of MAS to accounting firms' productivity. MAS continue to be the top contributor to the firms' productivity. Similarly, while we observe an increase in the percentage of revenues generated from A&A services in the post-Act period with the implementation of Section 404, A&A services still trail behind MAS in terms of contribution to accounting firms' productivity.

Chen, Hwang, and Shao (2005) claim that various inputs can contribute differently to a firm's productivity. With the banning of MAS and the emphasis on the internal control and

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auditing services (part of A&A services), the importance of employees specialized in these areas, especially those with CPA designation, likely increases in the post-Act period. We test this hypothesis and observe that there is a significant improvement in CPA employees' productivity, relative to non-CPA employees, in the post-Act period.

This paper contributes to the literature by providing evidence on the contribution of the three different types of services to accounting firms' productivity. We also document that the dominant role of MAS in accounting firms' productivity continues in the post-Act period despite the various restrictions imposed on the provision of MAS. In addition, we observe that with an increase in the demand for assurance services (e.g., certification of internal control system) after the passage of the Act, there is a significant improvement in the productivity of employees with CPA designation relative to other employees in accounting firms.

The rest of the paper is organized as follows. Section 2 briefly describes the background of the Sarbanes-Oxley Act and its implications for accounting firms to motivate our research hypotheses. Section 3 describes the sample, the data collection, and the variables used in this study. Section 4 describes the research design and discusses the empirical results. Section 5 discusses additional analyses performed. Section 6 concludes the paper.

2. Background and Hypothesis Development

2.1 Services Offered by Accounting Firms

The requirement that all publicly traded companies have an annual audit of financial statements by an independent CPA has undoubtedly been the single biggest contributor to accounting firms' revenues over the last 75 years. Historically, the second largest contributor to accounting firms' revenues has been the complexity of the Internal Revenue Code. However, in the past two decades, the sector that has provided the fastest growth in accounting firms' revenues is consulting or MAS. The increased complexity of the competitive global economy and information technology in intensive business environments has spurred the growth in the MAS area. It is more economical for a company to use the experts provided by the accounting firm to solve a problem than to employ such specialists as full-time staff.

Most firms cited a client's preference for "one-stop shopping" as the main reason that prompted them to offer the consulting services. Michael I. Daszkal, managing partner of Daszkal Bolton LLP, states that without the advisory services offered, accounting firms will

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eventually lose all its clients. Accounting firms offer their clients litigation support, bankruptcy consultation, financial and investment planning, general management advice, business valuation, compensation design, accounting system, and risk assessment. Certain firms even help their clients with the succession plan of their CEOs. These various services offer a more efficient organization and a better prospective planning of their companies.

Articles in the popular press actually claimed that consulting was the cash cow of the public accounting industry (McDonald, 1997). It is far more profitable than the assurance services. One reason the MAS are so profitable is that these services can differ significantly from one another and each service can be tailored to meet the specific needs of individual clients. For example, the business research and development and the compensation programs have to be custom-made to meet the specific business needs of the client. The litigation support services in particular can vary widely from case to case. Thus, accounting firms can differentiate themselves with expertise in different areas and are able to charge a premium for MAS. Taken together, with the advent of a global information economy, specialized MAS services are believed to be more productive than standardized auditing or tax services in revenue generation. Consequently, we specify the following hypotheses in alternate forms:

H1a: Ceteris paribus, MAS are more productive in generating revenues than TAX services in the pre-Act period.

H1b: Ceteris paribus, MAS are more productive in generating revenues than A&A services in the pre-Act period.

The Sarbanes-Oxley Act imposes new rules and restrictions on the services provided by public accounting firms. For instance, Section 201 of the Act prohibits an auditor from providing eight types of services to the clients: (i) bookkeeping, (ii) financial information systems design and implementation, (iii) appraisals or valuation, (iv) actuarial, (v) internal audit outsourcing, (vi) management and human resources, (vii) broker/dealer and investment banking, and (viii) legal or expert services unrelated to audit services (Section 201 identifies these services as outside the scope of practice of auditors). For non-audit services other than those listed above (e.g., tax services), an approval by the audit committee is required. Since most of these banned services are in the consulting category, it changes the potential service mix accounting firms can offer. Such a restriction on MAS can lead to a drop in the accounting firms' revenue generation productivity. However, this potential negative impact of SEC's restriction can be partially offset by the increase in revenue if the bundled services — audit and MAS — are offered to the audit clients at a discount in the pre-Act period and

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now are offered separately at the full price (to different clients). Therefore, the net effect of the Act on the relative productivity of MAS, A&A, and TAX services of accounting firms remains an empirical issue.

On the other hand, Section 404 of the Act requires the auditor to evaluate the internal control system and in its audit report to attest to management's assessment of the system. This is to be done as part of an overall audit engagement, with the audit report required to disclose significant defects or material non-compliances. These new requirements create opportunities for accounting firms to generate incremental revenues from additional audit procedures and accounting/consulting services. On the audit service side, auditors are likely to pass the costs of these additional audit steps to their clients. On the accounting service side, many companies now hire accounting firms, other than their own auditors, to document or update and test their internal control systems as required by Section 404 of the Act.[2] These and similar services can potentially increase the accounting/consulting service revenues of accounting firms.

The requirement of Section 404 has tremendously increased the amount of work for accounting firms. Prior to the Act, accounting firms were off their peak season from March 31, when a substantial portion of the corporate annual reports were released, until year end. Quarterly reports and semiannual reports require only reviews and do not use a lot of time from accounting firms and their staff. However, additional work due to Section 404 attestation makes it possible for accounting firms to fully utilize their existing staffing levels in the off season and thereby improve productivity. Hence, Section 404 creates opportunities for accounting firms to improve their productivity along with increased prices (i.e., greater price realization rates) for their services on Section 404 compliance work. Such an increase can significantly improve the productivity of A&A services. A survey by Financial Executives International (2005) on 217 firms with revenues of at least $5 billion, reports that the sample firms spent an average of $4.36 million in 2004 to comply with Section 404. An average of $1.34 million was spent internally and another $1.72 million was spent on external consulting and software fees to get the internal control system in line with the provisions of Section 404. The remaining $1.3 million was spent on additional audit fees for

2 If the auditor concludes that management has not fulfilled the responsibilities of assessing internal controls as required by the Act, the auditor has to issue an adverse or a disclaimed opinion that might adversely affect share price of its client (Martinek, 2005).

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the attestation of the system, representing an average increase of 57% over the regular financial statement audit fees (Financial Executives International, 2005).[3]

In order to accommodate these Section 404 compliance service requirements, it is likely that some accounting firms encounter resource constraints and cause them to drop some existing audit clients. However, the clients they drop will tend to be the less profitable ones. This client screening process can again lead to an increase in productivity. Consequently, even if MAS are the most productive among the three types of services accounting firms offered in the pre-Act period, whether these MAS continue to utilize human resources in generating revenues more productively than A&A and TAX services is another interesting empirical research question. We address this question by specifying and testing the following hypotheses in alternate forms:

H2a: MAS remain more productive in generating revenues than TAX services in the post-Act period.

H2b: MAS remain more productive in generating revenues than A&A services in the post-Act period.

The knowledge and skill set required varies across different types of services. For example, audit services require the work to be signed off by CPAs (including employees that are CPAs). With the potential shift in the service mix offered by accounting firms in the post-Act period, one interesting question to ask is how the role of employee with CPA designation has changed in the post-Act period. As described earlier, Chen et al. (2005) suggest that a factor can have different impact on the productivity/efficiency of various inputs. They emphasize that it is important to examine not only a factor's impact on the overall productivity of a firm but also its impact on individual inputs.

To examine the differential impact the Act can have on the inputs of accounting firms, we investigate how the productivity of CPA employees versus non-CPA employees changes in the post-Act period. Firms with a high percentage of CPA employees are likely to be more efficient in performing Section 404 compliance and audit services. The demand for CPA services increases with the attestation of internal control system requirement in the post-Act

3 A survey by Charles River Associates on a sample of ninety of the Fortune 1000 firms (with an average gross revenue of $8.1 billion) shows that the firms spent an average of $7.8 million to comply with Section 404. $1.9 million of this was paid to their auditors for Section 404 attestation (Charles River Associates, 2005).

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period. In addition, many companies also hire accounting firms, other than their own auditors, to document or update and test their internal control systems in order to comply with Section 404 requirements. Thus, the effect of the percentage of CPA employees on accounting firms' productivity likely increases in the post-Act period.[4] Accordingly, we specify the following hypothesis:

H3: Ceteris paribus, the positive association between the percentage of employees that are certified public accountants (CPAs) and CPA firms' productivity increases in the post-Act period.

2.2 Firm Characteristics

Previous research in audit effort has demonstrated that human resource inputs required for clients with public ownership are significantly greater than those for clients with private ownership (Hackenbrack and Knechel, 1997). Hence, service fees charged may depend on the private vs. public status of clients. Public firms tend to be larger than private ones and must comply with listing requirements of the exchange; thus, audits of publicly-listed clients are expected to be more complex and consume more resources than those of private ones. Audits of publicly-listed clients can also increase the exposure of audit firms to the risk of class action lawsuits and result in higher insurance costs. All these factors likely lead to higher service fees for public clients and hence productivity gains. In addition, the effects of Sections 201 and 404 provisions are manifested mainly in public companies; thus, the number of public clients an accounting firm serves likely has an impact on its productivity. Accordingly, we account for the number of public clients of accounting firms' in our study.[5]

Banker, Chang, and Cunningham (2003) report that the productivity of accounting firms is negatively correlated with the number of offices an accounting firm has.[6] Moreover, as will be discussed later in Section 3.2, the number of branch offices of accounting firms is positively correlated with the proportion of revenues generated from MAS in the pre-Act

4 Results using the percentage of CPA partners in the analysis are qualitatively similar to the results reported in Table 3.

5 The demand for Section 404 compliance services by the largest corporations has strained even the Big 4 firm resources, causing accounting firms to drop clients after the Act. Thus, many corporations previously serviced by Big 4 are being forced to seek services from non-Big 4 firms.

6 Banker et al. (2003) argue that given the human resources available, as the number of offices increases, the human resources are spread over a larger number of offices and this increases the communication problem.

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period. Provisions of Section 201, however, constrain accounting firms from offering certain non-audit services to their audit clients and this can cause accounting firms to realign their staffing and office needs in the post-Act period. Hence, we include the number of offices in our analysis as a control variable.

Most prior studies document that the Big 4 accounting firms (i.e., KPMG, Pricewaterhouse Cooper, Deloitte & Touche, and Ernst & Young) charge a premium for their audit services (Palmrose, 1986; Craswell, Francis, and Taylor, 1995; DeFond, Francis, and Wong, 2000). This premium can be attributed either to their reputation or to their market bargaining power. It is well known that the U.S. public accounting is dominated by the Big 4 firms. The Big 4 also charge a premium for the other services they provide. We, therefore, expect that the impact of the Act, if any, on accounting firms' productivity is likely to be larger for the Big 4. We account for this differential impact on the Big 4 in our analyses.

3. Sample Data and Variables

3.1 Sample Selection

The sample of accounting firms included in this study was obtained from *Accounting Today*'s annual surveys of Top 100 accounting firms in the US for the period 2000-2005 (reported in the 2001-2006 issues of *Accounting Today* (F&G, 2001-2006)). *Accounting Today* constructs a list of the top 100 accounting firms, in terms of revenues generated from U.S. operations in the prior year, based on survey information and in-house research. Firms are given an opportunity to comment on the estimates before their publication. This annual survey of the largest firms has become one of the most widely adopted benchmark for comparing the productivity and efficiency in the accounting field (Jerris and Pearson, 1997).

We limit our sample to these top 100 accounting firms since the revenue information of accounting firms is not publicly available. One of the main purposes of this study is to examine what type of professional service utilizes human resources most productively in generating revenues, so accounting firms that do not provide auditing services (e.g., H&R Block, Century Business Services, American Express, etc.) are excluded from the sample.[7] Our final sample consists of 57 firms for which data on service revenues are available for the

7 Section 201 of the Act restricts the MAS that auditors can provide to their clients and Section 404 requires the evaluation and attestation of auditors to the management's evaluation of the internal control system. Both sections' impact is likely to be minimal for these firms.

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six-year period from 2000 to 2005.[8] This provides us with a total of 342 (= 57*6) firm-year observations for the analyses. As the Act got passed in 2002, part of the year is subject to the Act while the other part is not, in order to avoid anticipation effect, we exclude year 2002 from our analyses. Thus, we have a final sample of 285 (= 57*5) observations in our analyses.

The revenue reported in *Accounting Today's* annual surveys is the net revenue after write-ups and write-downs, expense reimbursements, subcontractor fees, and other adjustments. Revenues from the following sources are included: A&A, TAX, and MAS. A&A includes compilations, special reports, and reviews in addition to engagements involving the attest function. TAX consists of tax research, planning and preparation work. MAS comprises consulting, system development, integrating and reselling computer equipment and software, and any other management assistance (Banker et al., 2005).

Data on the number of publicly-listed clients (SEC_CLIENTS), the number of business offices (OFFICES), and three human resource input variables: the number of partners (PARTNERS) including owners and shareholders, the number of professionals (PROFESSIONALS) including managers, accountants and other professionals, and the number of other employees (OTHERS) including clerical and support personnel, and the percentage of employees who are CPAs (CPA_EMP%) were hand-collected from annual reports of accounting firms that were filed with the AICPA (2000-2005). The filing of an annual report is part of the peer review process required for AICPA membership. Under the Sarbanes-Oxley Act, any accounting firm that audits financial statements of public companies must register with the Public Company Accounting Oversight Board (PCAOB). One of the requirements for such registration is participation of the firm in the AICPA peer review program. This requirement provides us with access to these accounting firms' annual reports.[9]

3.2 Descriptive Statistics

Table 1 Panel A provides descriptive statistics for data provided by *Accounting Today*'s annual surveys for the period 2000-2005, including different types of revenues, human

8 *Accounting Today*'s survey released in 2006 is based on the accounting firms' operations data in 2005. For the productivity of accounting firms in the pre-2000 period, interested readers can refer to Banker et al. (2003).

9 AICPA no longer makes these data available after 2006.

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resources and publicly-listed clients by year. To account for the effect of inflation, we adjust total revenues reported in the table by the producer price index of the accounting industry to the price level of year 2000.[10]

We include year 2002 in Table 1 in order to show the general trend in our variables of interest. Mean total revenue dropped by about 9% from 2000 to 2001 and by about 13% from 2001 to 2002. However, it rebounded by about 5% from 2002 to 2003, increased another 5% from 2003 to 2004, and increased by about 14% from 2004 to 2005. One potential cause for the revenue drop in 2001 and 2002 was that the Big 4 accounting firms spun off their consulting divisions during this period. For instance, KPMG spun off its consulting division in 2001 and PricewaterhouseCoopers spun off its MAS unit in 2002. In contrast, the increase in total revenues in 2003, 2004 and 2005 could be attributed to the additional service revenues generated by the new Section 404 compliance work in the Act. In any event, 2005 revenues were about 10% higher than revenues in 2001.

The descriptive statistics for the mix of service revenues shows an approximately 3% increase in the percentage of revenues generated by A&A services (i.e., A&A%) from 2000 to 2005. In contrast, the percentage of revenues from MAS (i.e., MAS%) declined from 26% to 23.9% or by about 2% over the six-year period.

The percentage of revenues generated from TAX services (i.e., TAX%) remained at approximately 31% over the six-year period.

Table 1 Panel B provides a comparison of revenues, service mix, offices, and other characteristics of accounting firms in the pre- and post-Act periods. The Wilcoxon Z-statistic shows that there is a decrease in the revenue in the post-Act period. We also observe an increase in the percentage of revenue generated by A&A services from a mean of 42.88% (median of 42.25%) in the pre-Act to 45.56 (median of 45%) in the post-Act period. Both the t-statistic and Wilcoxon Z-statistic are significant. In addition, we observe a significant increase in the percentage of employees with CPA designation, the mean increases from 39.32% to 42% while the median increases from 38.43% to 41.46%.

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10 The results remain qualitatively unchanged when total revenues are deflated by the consumer price index to the level of 2000.

Table 1 Summary Statistics

Panel A: Descriptive Statistics on Revenues and Firm Characteristics					
Variables	Mean	Std Dev	25%	Median	75%
Year: 2000 (No. of obs. = 57)					
REVENUES	$483.5M	$1623.3M	$19.3M	$26.0M	$72.7M
A&A%	43.4	9.4	38.0	43.0	49.0
TAX%	30.6	7.4	25.0	30.0	35.0
MAS%	26.0	11.3	20.0	24.0	31.8
PARTNERS	191.2	513.1	19.0	29.0	73.0
PROFESSIONALS	1549.4	5391.8	85.0	130.0	283.0
OTHERS	593.0	1770.8	41.0	65.0	173.0
SEC_CLIENTS	209.0	682.6	3.0	7.0	17.0
OFFICES	15.3	27.1	2.0	5.0	16.0
Year: 2001 (No. of obs. = 57)					
REVENUES	$438.9M	$1443.2M	$20.7M	$29.2M	$74.9M
A&A%	42.3	9.9	36.2	42.0	48.0
TAX%	30.8	7.2	24.0	31.0	36.0
MAS%	26.8	12.0	19.0	25.0	32.0
PARTNERS	198.4	518.8	21.0	33.0	72.0
PROFESSIONALS	1570.1	5237.3	88.0	135.0	302.0
OTHERS	549.7	1577.6	46.0	70.0	195.0
SEC_CLIENTS	211.9	693.6	3.0	8.0	32.0
OFFICES	15.4	26.2	2.0	5.0	15.0
Year: 2002 (No. of obs. = 57)					
REVENUES	$383.9M	$1183.6M	$22.9M	$28.8M	$72.4M
A&A%	43.5	9.8	37.0	43.0	50.0
TAX%	31.1	7.5	25.0	31.0	37.0
MAS%	25.4	11.8	18.0	25.0	31.0
PARTNERS	210.0	539.6	23.0	36.0	74.0
PROFESSIONALS	1454.3	4506.4	87.0	139.0	353.0
OTHERS	534.1	1519.0	40.0	64.0	186.0
SEC_CLIENTS	164.2	520.4	3.0	10.0	34.0
OFFICES	15.6	25.0	2.0	6.0	16.0

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Table 1 (Continued)

Year: 2003 (No. of obs. = 57)					
REVENUES	$403.1M	$1240.5M	$23.8M	$31.8M	$84.1M
A&A%	44.4	9.6	39.0	44.0	50.0
TAX%	31.5	7.3	26.0	33.0	36.0
MAS%	24.1	11.3	19.0	23.0	31.0
PARTNERS	200.4	497.1	22.0	34.0	90.0
PROFESSIONALS	1333.7	3848.7	88.0	140.0	369.0
OTHERS	496.3	1394.2	36.0	63.0	157.0
SEC_CLIENTS	230.6	760.3	3.0	9.0	41.0
OFFICES	15.8	24.4	2.0	6.0	16.0
Year: 2004 (No. of obs. = 57)					
REVENUES	$421.6M	$1281.0M	$26.6M	$35.6M	$94.3M
A&A%	45.8	9.9	41.0	45.0	53.0
TAX%	30.8	6.7	27.0	30.0	35.0
MAS%	23.4	10.4	18.0	24.0	29.0
PARTNERS	198.4	480.8	24.0	33.0	94.0
PROFESSIONALS	1365.7	3834.3	97.0	160.0	390.0
OTHERS	523.1	1509.4	40.0	64.0	162.0
SEC_CLIENTS	233.9	765.1	4.0	10.0	40.0
OFFICES	15.8	23.8	3.0	6.0	18.0
Year: 2005 (No. of obs. = 57)					
REVENUES	$481.4M	$1432.5M	$29.9M	$42.0M	$105.1M
A&A%	46.5	11.0	40.0	44.0	53.0
TAX%	29.6	7.0	25.0	30.0	34.0
MAS%	23.9	11.7	16.0	23.0	30.0
PARTNERS	218.7	538.9	28.0	40.0	98.0
PROFESSIONALS	1833.7	5503.6	119.0	195.0	519.0
OTHERS	536.4	1496.2	41.0	73.0	195.0
SEC_CLIENTS	216.7	666.8	5.0	12.0	50.0
OFFICES	15.7	22.4	3.0	7.0	18.0

REVENUES = Total revenues expressed in million (M) dollars deflated to 2000; A&A% = Proportion of accounting and auditing services (A&A) revenue; TAX% = Proportion of taxation services (TAX) revenue; MAS% = Proportion of management advisory services (MAS) revenue; PARTNERS = Number of partners; PROFESSIONALS = Number of professionals; OTHERS = Number of other employees; SEC_CLIENTS = Number of public-listed clients; and OFFICES = Number of branch offices.

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Table 1 (Continued)

Panel B Comparison of Revenue, Service Mix, and Human Resources in the Pre- & Post-act Periods[+]

	Pre-Act			Post-Act			t-test	Wilcoxon Z-statistic
	Mean	Std Dev	Median	Mean	Std Dev	Median		
REVENUE	461.22	1,529.00	26.55	435.38	1,313.00	35.55	-0.15	3.17***
A&A%	42.88	9.65	42.25	45.56	10.15	45.00	2.26**	2.24**
TAX%	30.71	7.33	30.35	30.63	7.01	31.00	-0.10	-0.06
MAS%	26.41	11.61	25.00	23.81	11.12	24.00	-1.89*	-1.55
SEC_CLIENTS	210.45	685.06	7.00	227.08	727.87	10.00	0.20	1.35
BIG4 (% of sample)	7.02	25.66	0.00	7.02	25.62	0.00	0.00	0.00
OFFICES	15.40	26.51	5.00	15.80	23.41	6.00	0.13	0.68
PARTNERS	195.00	514.00	30.00	206.00	503.00	38.00	0.18	1.92*
PROFESSIONALS	1,560.00	5,292.00	134.00	1,511.00	4,444.00	160.00	0.08	1.33
OTHERS	571.00	1,670.00	70.00	519.00	1,459.00	67.00	0.27	0.10
CPA_EMP%	39.32	9.70	38.43	42.00	9.79	41.46	2.27**	2.15**
N		114 (=57x2)			171 (=57x3)			

[+] Pre-Act = Years 2000-01, Post-Act = Years 2003-05

REVENUES = Total revenues expressed in million (M) dollars deflated to 2000; A&A% = Proportion of accounting and auditing services (A&A) revenue; TAX% = Proportion of taxation services (TAX) revenue; MAS% = Proportion of management advisory services (MAS) revenue; SEC_CLIENTS = Number of public-listed clients; BIG4 =1 if the accounting firms is one of the following 4 firms: KPMG, PricewaterhouseCooper, Deloitte& Touche, and Ernst & Young; OFFICES = Number of branch offices; PARTNERS = Number of partners; PROFESSIONALS = Number of professionals; OTHERS = Number of other employees; CPA_EMP% = Percentage of total number of employees who are CPAs.

Table 2 exhibits the correlation matrix for service mix and firm characteristics. Panel A displays the correlations in the pre-Act period and Panel B shows the correlations in the post-Act period. The Pearson correlations are presented above the diagonal while the Spearman correlations are presented below the diagonal. Since the sample is skewed, we focus our attention on the Spearman rank correlation.

The three service mix variables, A&A%, TAX% and MAS% are all negatively correlated with each other because by construction each represents a share of net revenue.[11] Thus, when one source of income constitutes a larger share of the net revenue, the shares of other revenue sources decline. In both pre- and post-Act periods, we observe that the Big 4 firms have more publicly-listed clients (SEC_CLIENTS) and firms with more publicly-listed clients also tend to have more offices. The number of publicly-listed clients is negatively correlated with the percentage of CPA employees (CPA_EMP%). This seems in contrary to the belief that firms with a higher percentage of CPA employees can better meet the audit and Section 404 compliance requirements of publicly-listed clients (i.e., a positive correlation). However, an alternative view is that publicly-listed clients tend to be larger companies that also purchase other services, which can be performed by employees without a CPA designation, from accounting firms.

In the post-Act period the correlation coefficient between A&A% and BIG4 is significantly positive, the correlation coefficient between MAS% and BIG4 is significantly negative. This suggests that the Big 4 firms rely more on accounting and auditing services than consulting services for generating revenues after passage of the Act. In addition, the correlation between the number of publicly-listed clients and A&A% changes from insignificant to significantly positive in the post-Act period. This change suggests that the publicly-listed clients purchase more A&A services from accounting firms in the post-Act period, probably to comply with the new regulatory requirement.

The number of publicly-listed clients, on the other hand, has a significantly negative correlation with the percentage of revenues from MAS and TAX services in the post-Act period, suggesting that accounting firms generate less revenue from their public clients in the areas of MAS and TAX services after the Act. This result can probably be attributed to the

11 The negative correlations between service mix are all statistically significant, except for the correlation between A&A% and TAX% in the pre-Act period.

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successful implementation of restrictions imposed by Section 201 in deterring accounting firms from offering consulting services to their audit clients. We also observe that Big 4 firms tend to derive more of their revenues from A&A services (a correlation of 0.292) than from MAS (a correlation of -0.240) in the post-Act period. Surprisingly, A&A% and CPA_EMP% are negatively correlated in the post-Act period. This seems to contradict our hypothesis that the productivity of CPA employees increases in the post-Act period as they contribute to the compliance work of Section 404 of the Act. A regression of the revenue generated from A&A services on CPA_EMP% (not tabulated) after controlling for BIG4, number of publicly-listed clients, number of offices, and the human resource input mix suggest that there is a positive correlation between CPA_EMP% and revenue generated from A&A services. Thus, the negative univariate correlation between the two is due to the failure to account for other factors that have an impact on the percentage of revenue generated from A&A services.

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Table 2: Correlation Matrix for Service Mix and Firm Characteristics (P-values in Parentheses)

Panel A: Pre-act Period (2000-01)

	A&A%	TAX%	MAS%	SEC_CLIENTS	OFFICES	BIG4	CPA_EMP%
A&A%	1.000	-0.084	-0.778	-0.057	-0.129	-0.062	-0.017
	---	(0.374)	(0.000)	(0.548)	(0.171)	(0.513)	(0.856)
TAX%	-0.057	1.000	-0.561	-0.156	-0.169	-0.148	0.411
	(0.544)	---	(0.000)	(0.097)	(0.072)	(0.117)	(0.000)
MAS%	-0.779	-0.502	1.000	0.146	0.214	0.145	-0.245
	(0.000)	(0.000)	---	(0.121)	(0.022)	(0.125)	(0.009)
SEC_CLIENTS	0.039	-0.149	0.046	1.000	0.900	0.977	-0.360
	(0.680)	(0.113)	(0.627)	---	(0.000)	(0.000)	(0.000)
OFFICES	-0.234	0.032	0.182	0.637	1.000	0.848	-0.366
	(0.012)	(0.735)	(0.053)	(0.000)	---	(0.000)	(0.000)
BIG4	-0.095	-0.132	0.102	0.443	0.444	1.000	-0.341
	(0.315)	(0.163)	(0.281)	(0.000)	(0.000)	---	(0.000)
CPA_EMP%	0.025	0.383	-0.159	-0.302	-0.189	-0.342	1.000
	(0.792)	(0.000)	(0.091)	(0.001)	(0.045)	(0.000)	---

Pearson correlations are above the diagonal and Spearman correlations are below the diagonal.

A&A% = Proportion of accounting and auditing services (A&A) revenue;

TAX% = Proportion of taxation services (TAX) revenue;

MAS% = Proportion of management advisory services (MAS) revenue;

SEC_CLIENTS = Number of public-listed clients;

OFFICES = Number of branch offices;

BIG4 = 1 if the accounting firms is one of the following 4 firms: KPMG, PricewaterhouseCooper, Deloitte & Touche, and Ernst & Young;

CPA_EMP% = Percentage of total number of employees who are CPAs.

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Table 2 (Continued)

Panel B: Post-act Period (2003-05)							
	A&A%	TAX%	MAS%	SEC_CLIENTS	OFFICES	BIG4	CPA_EMP%
A&A%	1.000	-0.201	-0.786	0.369	0.299	0.415	-0.236
	---	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
TAX%	-0.244	1.000	-0.447	-0.103	-0.032	-0.097	0.315
	(0.001)	---	(0.000)	(0.182)	(0.676)	(0.208)	(0.000)
MAS%	-0.714	-0.422	1.000	-0.272	-0.253	-0.318	0.017
	(0.000)	(0.000)	---	(0.000)	(0.001)	(0.000)	(0.827)
SEC_CLIENTS	0.255	-0.160	-0.187	1.000	0.858	0.972	-0.424
	(0.001)	(0.037)	(0.015)	---	(0.000)	(0.000)	(0.000)
OFFICES	0.045	-0.009	-0.090	0.648	1.000	0.820	-0.295
	(0.559)	(0.909)	(0.240)	(0.000)	---	(0.000)	(0.000)
BIG4	0.292	-0.121	-0.240	0.443	0.440	1.000	-0.422
	(0.000)	(0.115)	(0.002)	(0.000)	(0.000)	---	(0.000)
CPA_EMP%	-0.209	0.404	-0.023	-0.458	-0.296	-0.424	1.000
	(0.006)	(0.000)	(0.767)	(0.000)	(0.000)	(0.000)	---

Pearson correlations are above the diagonal and Spearman correlations are below the diagonal.

A&A% = Proportion of accounting and auditing services (A&A) revenue;

TAX% = Proportion of taxation services (TAX) revenue;

MAS% = Proportion of management advisory services (MAS) revenue;

SEC_CLIENTS = Number of public-listed clients;

OFFICES = Number of branch offices;

BIG4 = 1 if the accounting firms is one of the following 4 firms: KPMG, PricewaterhouseCooper, Deloitte & Touche, and Ernst & Young;

CPA_EMP% = Percentage of total number of employees who are CPAs.

4. Empirical Analysis

4.1 Empirical Model

To evaluate our research hypotheses proposed in Section 2, we follow prior studies on audit fees (Ferguson, Francis, and Stokes, 2003, 2006; Casterella, Francis, Lewis, and Walker, 2004; Huang, Liu, Raghunandan, and Rama, 2007) and specify a Cobb-Douglas function to represent the production correspondence between total revenues and the human resource inputs of accounting firms. In particular, we specify the following stochastic frontier model:

$$REVENUES = f(PARTNERS, PROFESSIONALS, OTHERS; \alpha) * \theta \quad (1)$$

where

$\ln f(.) = \alpha_1 \ln PARTNERS + \alpha_2 \ln PROFESSIONALS + \alpha_3 \ln OTHERS$;

α = unknown parameter vector to be estimated;

$$\ln \theta = \gamma_0 + \gamma_1 \ln SEC_CLIENT + \gamma_2 \ln OFFICES + \gamma_3 BIG4 + \gamma_4 Act + \gamma_5 MAS\% + \gamma_6 MAS\% * Act + \gamma_7 A\&A\% + \gamma_8 A\&A\% * Act + \gamma_9 CPA_EMP\% + \gamma_{10} CPA_EMP\% * Act + \varepsilon$$

γ = unknown parameter vector to be estimated;

Act = a dummy variable taking a value of one if year = 2003, 2004 or 2005 and zero otherwise;

ε = random error term; and.

All other variables are as defined in Section 3.

In Equation (1) above, θ = REVENUES/f(.) measures the productivity of an accounting firm in generating revenues using the available human resources and is expressed as a function of firm characteristics that likely affects a firm's productivity. In our analysis, θ is a function of the number of publicly-listed clients, the number of business offices, MAS%, A&A%, the percentage of CPA employees, etc. (i.e., our variables of interest).

Taking logarithms on both sides of equation (1) and substituting the expressions for ln f (.) and ln θ, we obtain the following log-linear model:

$$\ln REVENUES = \gamma_0 + \alpha_1 \ln PARTNERS + \alpha_2 \ln PROFESSIONALS + \alpha_3 \ln OTHERS + \gamma_1 \ln SEC_CLIENT + \gamma_2 OFFICES + \gamma_3 BIG4 + \gamma_4 Act + \gamma_5 MAS\% + \gamma_6 MAS\% * Act + \gamma_7 A\&A\% + \gamma_8 A\&A\% * Act + \gamma_9 CPA_EMP\% + \gamma_{10} CPA_EMP\% * Act + \varepsilon \quad (2)$$

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4.2 Empirical Results

We report results of the regression and the corresponding statistical tests of the model (Equation 1) in Panels A and B of Table 3, respectively. As the impact of the Act on the Big 4 firms can differ from those of the non-Big 4 firms, in addition to including a Big 4 dummy in the analysis (Columns 4-5 in Panel A; Column 3 in Panel B), we repeat the analysis on a sub-sample without the Big 4 accounting firms (Columns 6-7 in Panel A; Column 4 in Panel B).[12] Further, as discussed earlier, certain Big 4 firms spun off their consulting businesses during the sample period, which may affect our analysis on revenue generation productivity in the pre- and post-Act periods. The exclusion of the Big 4 firms in the sub-sample can help minimize the impact of these spin-offs. Since most of the results are qualitatively similar in the sub-sample and the full sample, the ensuing discussion will focus on results using the full sample of firms.

All the human resource input variables are significantly and positively associated with total service revenues. The coefficient of ln*PARTNERS* is 0.446, that of ln*PROFESSIONALS* is 0.520, and the coefficient of ln*OTHERS* is 0.073. All are statistically significant at the 1% level.

MAS% and A&A% capture the incremental productivity of MAS and A&A services relative to TAX services. That is, we use productivity of TAX services as our benchmark. Coefficient of MAS% (A&A%) captures the productivity of MAS% incremental to that of TAX. Hence, a positive coefficient of MAS% suggests that MAS are more productive than TAX. The Sarbanes-Oxley Act dummy (Act) in the model captures the average difference in the intercept between the post-Act and the pre-Act periods. To examine the effect of the Act on productivity of the three types of services, we include the interaction terms of Act with MAS% and A&A%. The productivity of CPA employees incremental to that of non-CPA employees is captured by the coefficient of CPA_EMP%. The impact of the Act on the relative productivity of CPA employees is captured by the coefficient of the interaction term between CPA_EMP% and Act.

12 Including the Big 4 dummy in the analysis captures the difference in the intercept between the Big 4 and non-Big 4 firms. However, it does not reflect the differences, if any, between the slopes of the two groups. The analysis on the sub-sample without the Big 4 firms allows us to investigate whether the slope effect of the Act differs for non-Big 4 firms.

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Table 3: Regression Analysis of the Sarbanes-Oxley Act's Impact on Accounting Firms' Productivity

$$\ln REVENUES = \gamma_0 + \alpha_1 \ln PARTNERS + \alpha_2 \ln PROFESSIONALS + \alpha_3 \ln OTHERS + \gamma_1 \ln SEC_CLIENT + \gamma_2 OFFICES + \gamma_3 BIG4 + \gamma_4 Act + \gamma_5 MAS\% + \gamma_6 MAS\% * Act + \gamma_7 A\&A\% + \gamma_8 A\&A\% * Act + \gamma_9 CPA_EMP\% + \gamma_{10} CPA_EMP\% * Act + \varepsilon$$

Panel A: Results of Regression

Variables		Pred. Signs	With the Big 4 Firms		Without the Big 4 Firms	
			Coefficients (Std. error)	t-statistics (*p*-values)	Coefficients (Std. error)	t-statistics (*p*-values)
Intercept	α_0	?	-1.212	-4.47	-1.173	-4.15
			(0.271)	(0.001)	(0.282)	(0.001)
lnPARTNERS	α_1	+	0.446	10.31	0.442	9.95
			(0.043)	(0.001)	(0.044)	(0.001)
lnPROFESSIONALS	α_2	+	0.520	13.62	0.531	13.44
			(0.038)	(0.001)	(0.040)	(0.001)
lnOTHERS	α_3	+	0.073	2.82	0.065	2.41
			(0.026)	(0.005)	(0.027)	(0.017)
lnSEC_CLIENTS	γ_1	+	0.015	2.77	0.015	2.59
			(0.005)	(0.006)	(0.006)	(0.010)
lnOFFICES	γ_2	-	-0.090	-5.06	-0.089	-4.89
			(0.018)	(0.001)	(0.018)	(0.000)
BIG4	γ_3	+	0.693	8.78	--	--
			(0.079)	(0.001)		
Act	γ_4	?	-0.378	-1.19	-0.404	-1.21
			(0.318)	(0.235)	(0.334)	(0.228)
MAS%	γ_5	+	0.008	2.83	0.008	2.51
			(0.003)	(0.005)	(0.003)	(0.013)
MAS% * Act	γ_6	?	0.001	0.37	0.002	0.40
			(0.004)	(0.714)	(0.004)	(0.687)
A&A%	γ_7	+	0.001	0.20	0.0003	0.10
			(0.003)	(0.840)	(0.003)	(0.921)
A&A% * Act	γ_8	+	0.004	1.01	0.004	0.99
			(0.004)	(0.311)	(0.004)	(0.321)
CPA_EMP%	γ_9	+	0.003	1.35	0.002	0.95
			(0.002)	(0.179)	(0.002)	(0.344)
CPA_EMP% *Act	γ_{10}	+	0.006	2.26	0.006	2.20
			(0.003)	(0.024)	(0.003)	(0.029)

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Table 3 (Continued)

N	285	265
F-value	1,291.81	433.79
Adj. R^2	0.983	0.952

Panel B: Results of Statistical Tests

Tests*	Hypotheses	With the Big 4 Firms t-statistic (*p*-value)	Without the Big 4 Firms t-statistic (*p*-value)
1. $\gamma_5 > \gamma_7$	H_{1b}	3.63 (0.001)	3.38 (0.001)
2. $\gamma_5 + \gamma_6 > 0$ (Post-Act)	H_{2a}	3.95 (0.001)	3.79 (0.001)
3. $(\gamma_5 + \gamma_6) > (\gamma_7 + \gamma_8)$ (Post-Act)	H_{2b}	2.62 (0.009)	2.44 (0.016)

* All tests are evaluated at sample means.
ln REVENUES = Natural log of total revenues expressed in million ($M) dollars deflated to 2000;
lnPARTNERS = Natural log of number of partners;
lnPROFESSIONALS = Natural log of number of professionals;
lnOTHERS = Natural log of other employees of accounting firms;
lnSEC_CLIENTS = Natural log of the number of publicly-listed clients;
lnOFFICES = Natural log of the number of offices;
BIG4 = A dummy variable that equals one if the firm is one of the big four firms, and 0 otherwise;
Act = A dummy variable that equals one if year = 2003, 2004, 2005 and 0 otherwise;
A&A% = Proportion of accounting and auditing services (A&A) revenue;
A&A%*Act = Interaction term between A&A% and Act;
MAS% = Proportion of management advisory services (MAS) revenue;
MAS%*Act = Interaction term between MAS% and Act;
CPA_EMP% = Percentage of total number of employees who are CPAs; and
CPA_EMP%*Act = Interaction term between CPA_EMP% and Act.

Hypothesis H1a (i.e., MAS are more productive in generating revenues than TAX services) is supported by the positive coefficient of MAS% (coefficient = 0.008, significant at the 1% level). This result holds for the full sample as well as the sample excluding the Big 4 firms, suggesting that MAS are more productive than TAX services not only in the largest accounting firms but also in medium and small firms. Thus, even small CPA firms can benefit by expanding their scope of service from A&A to include the various MAS. A comparison of the productivity of A&A services with that of TAX services (captured by the coefficient of A&A%) suggests that there is no significant difference between the two. However, when we compare the productivity of MAS to that of A&A services, we observe that the coefficient of MAS is significantly greater than that of A&A (as shown in test 1 of

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Table 3 Panel B). Therefore, both H1a and H1b are supported and MAS generate the most revenue for the same level of human resource inputs among all three types of services offered by accounting firms in the pre-Act period.

The results for hypothesis H2a (i.e., MAS remain more productive than TAX services in the post-Act period) and hypothesis H2b (i.e., MAS remain more productive than A&A services in the post-Act period) are reported in Panel B of Table 3 (test 2 and test 3, respectively). Evidently, MAS continue to utilize human resources more productively in generating revenues than TAX and A&A services in the post-Act period (t-statistics of 3.95 and 2.62, respectively).

The coefficient of the percentage of CPA employees (*CPA_EMP*%) reported in Panel A of Table 3 is not significant, suggesting that the percentage of CPA employees does not have a significant impact on accounting firms' productivity in the pre-Act period. However, the coefficient of the interaction term between the percentage of CPA employees and the Act dummy is significantly positive (a coefficient of 0.006, significant at the 5% level). This suggests that there is a significant increase in the impact of CPA employees on accounting firms' productivity in the post-Act period. Therefore, hypothesis H3 (i.e., *ceteris paribus*, the positive association between the percentage of CPA employees that are certified public accountants (CPA) and CPA firm's productivity increases in the post-Act period) is confirmed.

Consistent with prior studies, the coefficient estimate of *BIG*4 is significantly positive at the 1% level, indicating that the Big 4 generate more revenues from the same amount of personnel than other firms, possibly due to their reputation and market bargaining power. The coefficient of ln*SEC_CLIENT* is also significantly positive at the 1% level, indicating that CPA firms charge higher premiums for public clients than private clients. This price premium can be attributed to the high realignment costs for large publicly-listed clients (Chaney, Jeter, and Shaw, 1997). Also, large clients are financially capable of paying higher premiums than smaller private clients. Consistent with the findings of Banker et al. (2003), the coefficient of ln*OFFICES* is negative and significant at the 1% level. This suggests that after controlling for human resources and the types of clients and services, the more offices an accounting firm has, the less productive the firm will be due to an increase in communication problems (Banker et al., 2003).

An examination of the sub-sample excluding the Big 4 firms shows that the effect of the Act on Big 4 and non-Big 4 firms are qualitatively the same. As the effect of the spin-off of consulting branches is likely the most significant in the Big 4 firms, results of the sub-sample

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without the Big 4 firms suggest that the differences in the revenue generation productivity and the impact of CPA employees on the revenue generation productivity in the pre- and post-Act periods are not caused solely by the spin-off of consulting divisions by accounting firms.

5. Sensitivity Analyses

5.1 Econometric Considerations

As expected, Belsley, Kuh, and Welsch (1980) diagnostics indicate the presence of multicollinearity between ln*PARTNERS* and ln*PROFESSIONALS* in Equation (1) for the sample. However, no evidence indicates the existence of multicollinearity between firm characteristics. We conducted several econometric tests of our model specification. White (1980) test did not indicate heteroscedasticity for our model. We also employed criteria proposed by Belsley et al. (1980) to identify influential observations. Results from re-estimating the model in Equation (1) after removing two outliers are similar to those reported in Table 3 and hence not reported.

5.2 Model with Year Dummies

Instead of the Act dummy, we rerun our analyses using four year dummy variables, YEAR01, YEAR03, YEAR04, and YEAR05, in Equation (1). We use year 2000 as our benchmark year. While YEAR01 is included to examine whether there is any difference in productivity in the two years in the pre-Act period, YEAR03, YEAR04 and YEAR05 are used instead of the Act dummy to evaluate whether the effect of the Act on the productivity of accounting firms differs in the three years (2003~2005) after the passage of the Act. Results of this regression analysis and those of the statistical tests (not tabulated) suggest that MAS continue to be more productive than both the TAX and A&A services in the post-Act period. And the productivity of CPA employees is positively associated with their firms' productivity in all years in the post-Act period.

6. Conclusions

Accounting firms have rapidly expanded their scope of services to various kinds of consulting and MAS in the past two decades. With the advance in technology, clients' demand for technology consulting in such areas as internet and electronic commerce has been exploding. Offering these "supporting" consulting services helps the accounting firms

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to retain their clients and provides an alternative source of income. Thus, the general belief is that these services are more lucrative than the traditional audit and taxation services offered by accounting firms. In this paper, we compare the revenue generating ability of MAS, A&A, and TAX services for the same level of human resource inputs. Our results indicate that MAS are the most productive among the three.

We then investigate whether this superior revenue generating ability of MAS continues in the post-Act period. The prohibition of eight types of non-audit services by the Act can substantially lower the productivity of MAS. Further, the newly imposed requirement of internal control documentation and the attestation of the effectiveness of internal control systems by auditors can generate substantial A&A service revenues and improve human resource utilization efficiency. Hence, there can be a potential shift in the relative productivity of the three services in the post-Act period. Our results suggest that even with the banning of certain MAS by Section 201 of the Act, MAS continue to be more productive than A&A and TAX services in the post-Act period.

Finally, we find that with the internal control certification and audit requirement of Section 404, the productivity of accounting firms is positively associated with the percentage of their employees with the CPA designation in the post-Act period, indicating that accounting firms' employees with CPA designations have become significant drivers of accounting firms' productivity. However, the usual caveats are in order. For instance, other concurrent confounding events, which we do not control for during our sample period, can affect our results.

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作者簡介

Hsihui Chang

The KPMG Professor of Accounting in the LeBow College of Business of Drexel University. Prior to joining Drexel University, he was a Professor of Joseph I. Lubin School of Accounting of Syracuse University. He earned a Ph.D. from the University of Minnesota, and has published more than 60 articles in academic journals. He has received numerous awards for his research articles and one award for his outstanding teaching. He has also supervised an award-winning doctoral dissertation.

Hiu Lam Choy

An Associate Professor of Accounting in the LeBow College of Business of Drexel University. She obtained her Ph.D. program from the University of Rochester with a major in Accounting and minor in Finance. Her research interests include earnings management, executive compensation, corporate governance and the impact of Sarbanes-Oxley Act.

William. W. Cooper

The Foster Parker Professor of Finance and Management (Emeritus) at the Red McCombs School of Business of the University of Texas at Austin. Author or coauthor of more than 500 scientific professional articles and coauthor or co-editor of 27 books, he holds honorary D.Sc. degrees from Ohio State and Carnegie Mellon Universities in the U.S. and the degree of Doctorado Honoris Causa from the University of Alicante in Spain. A fellow of Econometrics Society and the Operations Research and Management Science Society, he is also in the Accounting Hall of Fame as well as the International Hall of Fame maintained by the International Federation of Operations Research Societies.

***Mei-Hwa Lin**

A full professor of Accounting at the College of Commerce of National Chengchi University, Taiwan. She earned her Ph.D. degree from Drexel University with a major in Accounting and minor in Finance. Her research interests include international accounting, corporate governance and accounting education. She is the author of a Chinese version of Advanced Accounting textbook.

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* E-mail: mwlin@nccu.edu.tw

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