Overall Statistics for Testing Window 2022 Q-4

Jurisdiction	Count Candidate	Count Sections	FT Sections	RE Sections	Average Pass Rate	Average Score	Average Age
Alabama	276	348	73	275	54.60%	71.37	27.03
Alaska	1,220	1,569	351	1,213	49.71%	71.32	31.58
Arizona	438	568	162	405	47.54%	70.52	29.71
Arkansas	221	274	76	196	48.91%	71.09	29.10
California	4,215	5,420	1,464	3,934	50.00%	70.65	30.22
Colorado	516	659	136	518	50.68%	71.90	29.78
Connecticut	357	466	94	371	44.42%	69.09	27.84
Delaware	79	94	20	73	41.49%	67.83	33.30
District of Columbia	74	91	29	61	52.75%	69.53	28.12
Florida	1,214	1,580	340	1,232	52.47%	71.94	30.21
Georgia	875	1,168	278	885	47.43%	70.66	29.58
Guam	1,249	1,577	435	1,140	50.35%	70.75	30.30
Hawaii	92	119	24	95	50.42%	69.50	31.14
Idaho	143	200	58	142	44.50%	71.74	30.27
Illinois	1,448	1,918	435	1,481	51.20%	71.21	27.85
Indiana	430	584	153	427	50.34%	70.97	28.57
Iowa	271	362	100	259	51.10%	71.73	26.33
Kansas	111	147	34	112	55.78%	73.63	28.84
Kentucky	281	340	79	260	55.00%	71.84	28.79

Jurisdiction	Count Candidate	Count Sections	FT Sections	RE Sections	Average Pass Rate	Average Score	Average Age
Louisiana	286	362	71	291	42.27%	68.86	29.50
Maine	368	539	129	409	47.68%	70.37	32.91
Maryland	397	526	90	436	45.63%	70.17	30.64
Massachusetts	887	1,160	290	868	54.14%	72.07	26.54
Michigan	743	951	221	729	52.05%	72.48	27.56
Minnesota	510	665	187	477	54.59%	71.74	26.88
Mississippi	137	176	50	126	35.80%	66.16	30.28
Missouri	473	625	158	467	50.08%	71.69	27.70
Montana	562	732	246	484	55.87%	73.42	30.44
Nebraska	133	184	34	149	58.70%	75.29	26.82
Nevada	189	258	56	199	46.51%	70.21	29.07
New Hampshire	325	425	59	366	42.59%	69.44	32.74
New Jersey	818	1,075	204	865	44.09%	68.82	28.78
New Mexico	84	106	15	90	46.23%	68.73	34.91
New York	3,662	4,830	1,017	3,800	47.81%	70.37	28.38
North Carolina	713	947	330	613	51.85%	71.62	27.92
North Dakota	222	268	84	184	47.76%	69.76	29.38
Ohio	892	1,195	325	869	47.95%	70.35	27.70
Oklahoma	235	325	63	260	49.23%	71.12	30.33
Oregon	246	319	118	200	54.23%	71.71	30.36

Jurisdiction	Count Candidate	Count Sections	FT Sections	RE Sections	Average Pass Rate	Average Score	Average Age
Pennsylvania	1,171	1,521	371	1,146	46.15%	69.71	28.26
Puerto Rico	233	314	64	250	34.39%	64.19	29.18
Rhode Island	71	92	15	77	42.39%	70.60	28.33
South Carolina	197	242	67	174	48.35%	70.88	29.72
South Dakota	58	72	15	57	54.17%	71.86	26.83
Tennessee	576	750	158	590	48.27%	70.98	28.86
Texas	2,177	2,916	319	2,590	50.51%	71.49	30.51
Utah	330	432	154	278	62.96%	74.92	28.90
Vermont	67	93	22	70	54.84%	69.35	29.68
Virginia	881	1,153	284	866	53.17%	72.21	30.27
Washington	1,225	1,546	431	1,105	54.40%	72.39	32.01
West Virginia	71	82	24	58	45.12%	66.80	28.33
Wisconsin	414	538	117	419	57.25%	73.19	26.97
Wyoming	28	33	6	27	57.58%	72.91	31.99

February 7, 2023

Dear State Board Chair/President and Executive Director:

This letter will officially communicate information regarding candidate fees for the Uniform CPA Examination ("Examination") during 2023 and 2024.

Prometric Fees

As announced in last year's February 15, 2022 fee letter, the Prometric hourly fee remains at $21.21 through December 31, 2023. Commencing January 1, 2024, the bi-annual COLA adjustment, in conjunction with the requirements of the Agreement, will go into effect. As such, the Prometric hourly fee will increase from $21.21 to $22.06 and the Prometric security fee per exam section will increase from $6.31 to $6.56 on January 1, 2024.

AICPA Fees

As also announced in the fee letter of February 15, 2022, the AICPA fee per examination section increased from $110.00 to $120.00 per section beginning January 1, 2023. The AICPA per section fee will be increased from $120.00 to $130.00 on January 1, 2024, due primarily to inflationary operational costs and decreased candidate volumes.

NASBA Fees

The NASBA fee per examination section increased from $25.00 to $27.00 beginning January 1, 2023, as also announced in the February 15, 2022 fee letter. The NASBA per section fee will be increased from $27.00 to $30.00 on January 1, 2024, due primarily to decreased candidate volumes.

Implementation Schedule

The following table summarizes the current 2023 fees and the 2024 fees.

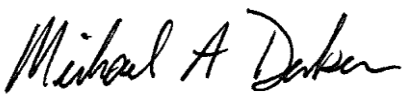
Fee Schedule	NASBA Section Fee	AICPA Section Fee	Prometric Hourly Fee	Prometric Security Fee
2023	$27.00	$120.00	$21.21	$6.31
2024	$30.00	$130.00	$22.06	$6.56

The candidate cost per section (AUD, BEC, FAR and REG) is $238.15 in 2023. The candidate cost per section (AUD, FAR, REG, BAR, ISC and TCP) will be $254.80 in 2024. The listed costs are for standard seat

time. As a reminder, the cost per section will be the same for all core and discipline sections when we convert to CPA Evolution, as all sections are four hours in length.

Patricia Hartman, Director, Client Services at NASBA will provide information on the implementation of the new fee schedule in March 2023.

Sincerely,



Michael Decker
AICPA Vice President,
Examinations and Pipeline

Missy Pydo
Prometric Vice President, Growth
Leader North America

Colleen K. Conrad
NASBA Executive Vice
President & Chief Operating
Officer

National Association of State Boards of Accountancy

February 15, 2023

TO: State Boards of Accountancy and other interested parties

FROM: Nicola Neilon, Chair – NASBA Uniform Accountancy Act Committee

As approved by the NASBA Board of Directors, we are releasing for a 60-day comment period, a revised exposure draft incorporating additional proposed amendments to the Uniform Accountancy Act's Model Rules that pertain to the examination. The original amendments were developed by the NASBA CBT Administration Committee and reviewed by the NASBA Uniform Accountancy Act Committee, which recommended them to the NASBA Board for public comment at its October 11, 2022, meeting.

At its January 2023, meeting, NASBA's Board of Directors voted unanimously to support further amendments to Rule 5-7 that would increase the length of conditional credit from 18 months to 24 months and to request a review of the proposed language in Rule 5-7(e) to determine if greater clarity as to a Board's authority to allowing additional time to candidates could be gained by adding descriptive language. In February, NASBA's Uniform Accountancy Act committee met and developed the additional clarifying language. NASBA's Board of Directors approved both additional changes for exposure at its February 14, 2023, meeting.

The changes being proposed cover the granting of credit requirements for sections passed on the Uniform CPA Examination (Exam) for those wishing to enter the CPA profession. The revised exposure draft provides that once a candidate has successfully passed one section of the Exam, all jurisdictions provide candidates with a rolling twenty-four (24) month period to successfully pass the remaining sections of the examination. The date from which credit is calculated varies among the jurisdictions. In addition, recent revisions to the Exam indicate that score delays may occur when updates are made to Exam content and structure. The Committees' recommendation seeks to provide uniformity among the jurisdictions on how the granting of credit is calculated and to address possible future score delays when Exam content or structure changes occur.

As proposed, Rule 5-7 Retake and granting of credit requirements would be deleted and re-written to include:

● Rule 5-7(a) provides that a candidate may take the required Test Sections individually in any order and that credit for any Test Section passed shall be valid for twenty-four (24) months from the date the passing score was released by NASBA to the candidate or the Board.

● Rule 5-7(a)(1) provides a candidate must pass all Test Sections within a rolling twenty-four (24) month period that begins with the date the first passing score(s) are released by NASBA to the candidate or the Board. The rolling window would conclude with the sit date of the final Test Section passed, regardless of when the score is released by NASBA for the final Test

Section. If all Test Sections are not passed within twenty-four (24) months, credit for any Test Section passed outside the twenty-four (24) month period shall expire.

● Rule 5-7(b) is being proposed to prohibit a candidate from taking a failed Test Section until the candidate has been notified of the score for the most recent attempt of that failed Test Section.

● Rule 5-7(c) provides that a candidate is deemed to have passed all required Test Sections in the rolling twenty-four (24) month period.

● Rules 5-7(d) provides a candidate shall retain credit for any and all Test Sections of the examination passed as a candidate of another state if such credit would have been given under then applicable requirements in this State.

● Rule 5-7(e) provides that the period of time to pass all Test Sections of the examination may be extended by the Board upon a showing that the credit was lost by reason of individual hardship including, but not limited to, health; military service; a disruption at the local, regional, or national level impacting the candidate; or other circumstances beyond the candidate's control.

We believe these changes will provide guidance for State Boards and candidates in the years ahead. We encourage the State Boards and other interested parties to consider these proposed changes and send any comments or recommendations to the UAA Committee via uaacomments@nasba.org by April 17, 2023.

Sincerely,

Nicola Neilon

Nicola Neilon, CPA
Chair, NASBA Uniform Accountancy Act Committee

Uniform Accountancy Act Model Rules – Conditional Credit

Rule 5-7 – Retake and granting of credit requirements.

~~**(a) A Candidate may take the required Test Sections individually and in any order. Credit for any Test Section(s) passed shall be valid for a period of eighteen (18) months and be calculated from the actual date the Candidate took that Test Section, without having to attain a minimum score on any failed Test Section(s) and without regard to whether the Candidate has taken other Test Sections.**~~

~~**(1) Candidates must pass all Test Sections of the examination within a rolling eighteen (18) month period, which begins on the date that the first Test Section(s) passed is taken.**~~

~~**(2) (A) Subject to subsection 7(a)(2)(B), Candidates cannot retake a failed Test Section(s) in the same testing window. A testing window is equal to a calendar quarter (January-March, April-June, July-September, October-December). Candidates will be able to test no less than two (2) months out of each testing window.**~~

~~**(B) If the Board determines that the examination system changes necessary to eliminate the test window limitations have been implemented, subsection (A) will no longer be effective, and a Candidate can retake a Test Section once their grade for a n y previous attempt of that same Test Section has been released.**~~

~~**(3) In the event all Test Sections of the examination are not passed within the rolling eighteen (18) month period, credit for any Test Section(s) passed outside the eighteen (18) month period will expire and that Test Section(s) must be retaken.**~~

~~(b) A Candidate shall retain credit for any and all Test Sections of the examination passed as a candidate of another state if such credit would have been given under then applicable requirements in this State.~~

~~(c) A Candidate shall be deemed to have passed the examination once the Candidate holds at the same time valid credit for passing each of the Test Sections of the examination. For purposes of this section, credit for passing a Test Section of the examination is valid from the actual date of the Testing Event for that Test Section, regardless of the date the Candidate actually receives notice of the passing grade.~~

~~(d) Notwithstanding subsection (a) of this Rule, the Board may in particular cases extend the term of credit validity upon a showing that the credit was lost by reason of circumstances beyond the Candidate's control.~~

(a) A Candidate may take the required Test Sections individually and in any order. Credit for passing any Test Section shall be valid for that Test Section for twenty-four (24) months from the date the passing score for such Test Section is released by NASBA to the Candidate or the Board, as the case may be, regardless of the number of Test Sections taken or having to attain a minimum score on any failed section(s).

(1) A Candidate shall pass all required Test Sections within a rolling twenty-four (24) month period. The rolling twenty-four (24) month period begins on the date the first passing score(s) are released by NASBA to the Candidate or the Board, as the case may be. The rolling twenty-four (24) month period concludes on the date the Candidate sits for the final Test Section passed, regardless of when the score is released by NASBA for the final Test Section.

(2) A Candidate who earns initial credit on one or more Test Section(s) of the CPA examination must sit for and complete the remaining required Test Section(s) of the examination by midnight local time at the Board's main office on the last day of the twenty-four (24) month period.

(3) **If all required Test Sections are not passed within this initial twenty-four (24) month period, credit for the first Test Section(s) passed shall expire and a new rolling twenty-four (24) month period shall begin on the date the second passing score(s) were released by NASBA to the Candidate or the Board, as the case may be, and continue for twenty-four (24) months from that date. If all required Test Section(s) are not passed within this next rolling twenty-four (24) month period, credit for the second Test Section(s) passed shall expire and a new rolling twenty-four (24) month period will begin on the date the next Test Section passing score, if any, was released by NASBA to the Candidate or the Board, as the case may be, and this cycle of twenty-four (24) month rolling periods and Test Section credit expirations will continue until all Test Sections are passed within one twenty-four (24) month rolling period. Notwithstanding the foregoing, if a Candidate stops testing for a twenty-four (24) month period, then all credit for previously passed Test Sections will expire.**

(b) **A Candidate shall not retake a failed Test Section until the Candidate has been notified of the score for the most recent attempt of that failed Test Section.**

(c) **A Candidate shall be deemed to have passed the examination if the Candidate obtains credit for passing all required Test Sections in one rolling twenty-four (24) month period.**

(d) **A Candidate shall retain credit for any and all required Test Sections of the examination passed as a Candidate of another state if such credit would have been given under then applicable requirements in this State.**

(e) **Notwithstanding subsections (a), (b), and (c) of this Rule, the period of time in which to pass all required Test Sections of the examination may be extended by the Board upon a showing that the credit was lost by reason of individual hardship including, but not limited to, health; military service; a disruption at a local, regional, or national level impacting the Candidate; or other circumstances beyond the Candidate's control.**

Peer Review Program

RAB Observation Report

March 15, 2023

To the CPA on Staff and Peer Review Committee Chair of the Nevada Society of CPAs:

On February 27, 2023, we observed the procedures followed by the Nevada Society of CPAs Peer Review Committee's Report Acceptance Body (RAB) in the evaluation and acceptance of reviews. The primary objectives of RAB observations are to determine whether:

- Reviews are conducted and reported on in accordance with the standards.
- Results of reviews are evaluated on a consistent basis within an administering entity (AE) and in all jurisdictions.
- Administrative procedures established by the AICPA Peer Review Board are being followed.
- Administrators, technical reviewers, committee/RAB members, and the CPA on staff are complying with applicable benchmarks monitored through RAB observations.

Preparation

On February 17, 2023, documents for 20 reviews to be evaluated by the RAB were provided to the observer.

Evaluation

We observed the evaluation of peer reviews by the RAB, which consisted of seven members. We selected four peer reviews from the population for our sample. We observed the RAB's acceptance process and offered comments at the close of discussions.

Appropriate decisions were made in the acceptance process including evaluating captain performance.

Administrative Procedures

We also reviewed certain administrative procedures to evaluate compliance with guidance established by the AICPA Peer Review Board.

Knowledgeable and experienced committee members, technical reviewers, administrators, and CPAs on staff are critical to achieving the goals of the AICPA Peer Review Program. We thank you for your time and commitment to the program.

Oversight Task Force
AICPA Peer Review Board

cc: Kim D. Meyer, Chair – Oversight Task Force
AICPA Peer Review Board

DRAFT 8-POINT PLAN TO ADDRESS THE CPA PIPELINE
EXECUTIVE SUMMARY

Introduction

An intentional and consistent effort is required to encourage many talented people to become CPAs. Ensuring that the pipeline of students is robust enough to meet market needs requires a collective effort to address systemic hurdles to entry, including attractiveness, cost, time, and reward.

What follows is a draft package of initiatives designed to better position students and the system for success. This draft plan will continue to grow and evolve through this phase of discussion and will become even more impactful through input from key stakeholders.

Initiatives outlined in brief here will align with the ongoing profession-wide, multi-stakeholder efforts to attract students to the accounting profession, educate and prepare them for licensure, and ready them for careers in accounting.

1. Integrated Education and Experience Program

- The Integrated Education and Experience Program (IEEP) is an AICPA and NASBA sponsored program that would provide university students on a CPA career pathway an opportunity to work at a firm and gain a mix of work experience, study time, and affordable college credit hours after a bachelor's degree is earned and before 150 credit hours of education has been achieved.
- The program is designed to be one of many ways to bridge the gap between education and practice. (Other ways include traditional internships, advance placement high school credits, dual credit high/school college programs, CLEP, community college courses)
- IEEP is a cost-effective, flexible, and scalable alternative route for the student/employee to earn up to 30 hours of academic credit.
- The program is being developed by AICPA and NASBA with input from firms, students, young professionals, academics, state CPA societies, and state boards of accountancy.
- IEEP will increase accessibility to and affordability of entry into the profession for a diverse pool of candidates. The program will benefit both candidates and firms by recruiting more students into the pipeline and helping them reach their CPA licenses.
- Success will mean a pilot program by the Fall 2023.

2. 30-hour Communication Campaign

- While prescriptive guidance on the additional educational hours required for licensure would diminish flexibility students often need, powerful examples of how to achieve 150 hours could eliminate uncertainties among students and further align candidate coursework with firm and employer needs in their new hires.
- This effort will focus on showcasing students using their 30 hours in creative ways that help with career readiness.
- Content for students and their influencers will include presentations, talking points, and other deliverables, informed by survey data from firms on desired skills.
- Success will mean content released at the start of Q2 2023.

3. Extending the 18-month Exam Window for Candidates

- Given the increased work demands on CPA candidates by firms amid other social and external pressures on the candidates, the 18-month window for a CPA candidate to pass all 4 sections of the CPA Exam is viewed as being too restrictive. Greater flexibility is needed to provide additional time for candidates to complete the Exam process.
- We will increase our efforts to work with NASBA and state boards to extend the 18-month window for candidates.
- Work has been done already as part of the launch of the CPA Evolution CPA Exam. CPA Evolution provides an opportunity to pilot this program on January 1, 2024, and NASBA and the state boards are already studying the impact on expanding the testing window post launch of CPA Evolution.
- Adjusting the 18-month period should focus on "high-potential" candidates that have completed over half of the CPA journey, ensuring an additional 1,000 – 3,000 or more licensed CPAs annually.
- Success will mean both an increase in the number of newly licensed CPAs annually and potentially an increase in the percentage of candidates staying in the pipeline through CPA licensure.

4. Consider and Address Jurisdictional Barriers to Initial Licensure

- For decades the profession has worked on uniformity across state lines through the mobility and substantial equivalency provisions contained in the Uniform Accountancy Act (UAA).
- To further advance uniformity and eliminate state specific challenges CPA candidates experience when applying for the CPA Exam and initial licensure, we will work with NASBA and state boards to address the challenges to the licensure path in states that confuse and frustrate CPA candidates, leading to eventual departure.
- This effort will examine how we can streamline and align the regulatory and legal environments and their impact on the journey to the CPA license.
- Success will mean significant reduction in state-by-state regulatory and legal barriers to entry, providing a more transparent and efficient route to the CPA across the U.S.

5. High School and College Strategies

- The AICPA will explore, develop, and execute numerous inter-related strategies to strengthen the pipeline at the high school and college levels.
- At the high school level, the work includes promotion of dual-credit curricula and programs and assessing whether and how to develop an Advanced Placement (AP) course that will provide college credit.
- At the college level, efforts include promotion of dual-credit curricula and programs, customized strategies for online universities, and a prioritized focus on minority serving institutions and HBCUs.
- Success will mean an increase in the 66,000 annual bachelor's and master's graduates in accounting and a return (followed by an increase) to 50% of accounting graduates, or 33,000, becoming first-time CPA candidates.

6. STEM Recognition

- Accounting curricula, particularly at the college and university level, have evolved to reflect the profession's role as a technology driver. Recognition of accounting as a STEM field will reflect how accounting has changed in recent years.
- Legislation introduced in 2021 would allow STEM K-12 grant funding to be used for accounting awareness and education, with a focus on increasing access to underrepresented groups. Further, AICPA nominated accounting and five other curricula (Classification of Instructional Program codes) to be designated as STEM by the Department of Homeland Security.
- In addition to seeking this federal legislation and direct designation of accounting as a STEM field, we are working with colleges and universities to expand their accounting curricula to include additional technology-focused courses to meet the profession's current and future needs.
- Success will mean passage of federal STEM legislation in 2023, designation of one or more accounting curricula fields as STEM by DHS, and greater adoption of STEM curricula and existing STEM CIP codes by college and university accounting programs.

7. Endowment / The AICPA Foundation

- The AICPA Foundation is shifting its strategy to a laser focus on accepting donor contributions and funding students and CPA candidates in financial need in their journey to the CPA or CPA-PhD. The renewed strategy of the Foundation has been approved by the Board of Trustees and 2023 is the transition year.
- In addition to providing financial support, we are in a unique position to work with firms to provide students with access to internships, fellowship, mentorship, and financial scholarships.
- Success will mean growth both in assets and in the number and amount of focused scholarships and internship placements.

8. Stakeholder Calls to Action

- The CPA pipeline is being adversely impacted by a variety of factors. While the rigors of entry into a profession necessarily include certain hurdles – education, exam, and experience – the challenges extend into the broader ecosystem around these three areas.
- We will address the system of attractiveness, cost, time, and reward as a barrier to entry into the profession.
- In this spirit, we will assess and call for changes in the broader ecosystem that result in meaningful and comprehensive solutions to the CPA pipeline concerns. This includes CPA firms, universities, and the regulatory community.
- Success will mean developing dialogue on the broader issues impacting the attractiveness of the CPA profession and creating positive and measurable change across these fronts.

https://www.wsj.com/articles/accountants-have-to-go-to-college-for-five-years-minnesota-is-rethinking-that-cfd056b0

U.S.EDUCATION

Accountants Have to Go to College for Five Years. Some Are Rethinking That.

Accountant shortage prompts Minnesota and other states to consider alternative paths to becoming a licensed CPA

PricewaterhouseCoopers and Saint Peter's University are testing a pilot program that substitutes a year of work for the traditional fifth year of college coursework.

PHOTO: RICHARD B. LEVINE/LEVINE ROBERTS/ZUMA PRESS

By Lindsay Ellis Follow

March 6, 2023 8:00 am ET

Accounting, a profession focused on numbers, is vexed by this one: the 150 college credit hours required to become a certified public accountant.

The shortage of accountants in the U.S. has firms boosting salaries and sending work abroad. The cost of accounting work has been rising and some firms are turning away audit work because they can't find enough CPAs. Efforts to recruit more students into the field have become a near-constant conversation now nationwide among CPAs and industry groups.

One sticking point, some in the profession say, is the fact that would-be CPAs need to attend college for five years to amass the 150 hours of college credit required to get their license. That

high standard gained traction in the 1990s as states boosted education requirements from a traditional 120-hour, four-year bachelor's degree. Some in the industry say the extra time in school and the expense are keeping students from entering the field. Accounting or financial courses aren't required during the fifth year, and many students take unrelated classes, from liberal-arts electives to earning a minor, accountants say.

For that reason, legislators in Minnesota are considering bills that would reduce credit hours needed for getting a CPA license. The move has sparked debate among national CPA groups that say states need to meet the national standard for accountants to be able to service clients around the U.S., and others who say the profession needs to be more flexible. In addition to schooling, CPA licenses require work experience and passing a test.

"We don't have enough students coming in. We have to be able to solve that problem," said Robert Cedergren, incoming board chair at the Minnesota Society of Certified Public Accountants. His group helped draft the legislation, introduced by a bipartisan group of lawmakers last month.

The bills, which are in committee in the state Senate and House of Representatives, seek to allow graduates to skip the fifth year. Instead, four-year degree holders could take one of two paths: get two years of professional experience and take the CPA exam or get one year of work experience, take 120 hours of professional-education courses, and take the CPA test. (They could also complete the current path of 150 hours of college credit.)

The bills face staunch opposition from national industry groups, including the Association of International Certified Professional Accountants, a trade organization. The group says that adjusting the requirements would mean CPAs licensed in Minnesota couldn't practice outside the state. Big accounting firms, some industry groups say, need accountants who can practice nationally because they have clients from coast to coast.

Support for the 150-hour rule grew in the 1980s and means CPAs are better prepared to enter the field when they graduate, said Susan Coffey, chief executive of public accounting for AICPA.

"It's clearly a hurdle of entry into our profession, but it's a purposeful hurdle," Ms. Coffey said.

Many practicing accountants who graduated decades ago have four-year degrees, not five-year degrees, and do quality work, said David Knoble, the incoming chair of the South Carolina Association of CPAs.

In addition to Minnesota, three other states have alternatives to the 150-hour requirement or are looking to change their rules.

Ohio law has for decades allowed CPAs to get licensed without 150 hours, said Scott Wiley, president and chief executive of the Ohio Society of CPAs. In Ohio, people can obtain a license with 120 hours of college credits, four years of work experience, a score of 670 or higher on the Graduate Management Admission Test and passing the CPA exam, he said, and Ohio accountants have had no barriers to practicing nationally.

A South Carolina task force is evaluating whether the state could approve CPAs from other places to practice locally, even if those accountants have fewer than 150 college credit hours. In New Jersey, a pilot program is under way that substitutes a year's work for the traditional fifth year of course work; students would earn college credit hours on the job.

Saint Peter's University, based in Jersey City, N.J., and PricewaterhouseCoopers LLP are testing that program. The company is covering students' tuition for 30 credit hours at Saint Peter's while they work for the accounting firm.

The extra year of university is pushing Triston McKay, 21 years old, away from accounting and toward computer science classes at Salem University in West Virginia. He is wary of the costs of a fifth year of school and says that in recent years jobs in the tech sector have paid more than accounting.

"It's not a burden I would like to put on my parents," he said of an extra year of tuition and fees.

Write to Lindsay Ellis at lindsay.ellis@wsj.com

Appeared in the March 7, 2023, print edition as 'State Weighs New CPA Paths'.

Occupational Licensing and Accountant Quality: Evidence from the 150-Hour Rule

John M. Barrios*

University of Chicago Booth School of Business

February 25, 2019

Abstract

I examine the effects of occupational licensing on the quality of Certified Public Accountants (CPAs). I exploit the staggered adoption of the 150-hour rule, which increased the educational requirements for a CPA license. My analysis shows that the rule reduces the number of entrants into the profession and increases their wage premium. The same premium is enjoyed by grandfathered accountants, suggesting it is not a return to higher quality. Labor market proxies for quality find no difference between 150-hour rule CPAs and the rest. These findings are consistent with the theoretical argument that the rule reduced the supply of new CPAs and increased rents to the profession with little impact on quality.

Keywords: The 150-Hour Rule, Occupational Licensure, CPA Licensure, Screening, Human Capital, Labor Market Outcomes, Hazard Rate Model.
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1. Introduction

Certified public accountants (CPAs) play a central role in assuring the accuracy and completeness of the financial reports of public companies. For this reason, it is essential to understand how the audit profession can attract and select high-quality CPA candidates (DeFond and Zhang 2014). One of the most commonly used ways to enhance quality in a profession is to introduce a licensing requirement, requiring some minimum years of education (Kleiner (2000); Leland (1979)). Thus, the emergence of occupational licensing requirements (e.g., the CPA exam and educational and experience requirements) for auditors is not surprising.[1] However, this approach has been harshly criticized by Friedman (1962), who saw licensing standards as a way for professions to restrict entry and extract rents, with little or no improvement in quality. In this study, I use a change in the educational requirement for the licensing of CPAs to test these alternative theories.

Historically, the minimum educational requirement for CPA licensure was 120 semester hours of college coursework, typically completed in four years. Approximately four decades ago, the accounting profession began considering a requirement of 150 semester hours. The stated objective was to enhance the quality of work performed by CPAs by enhancing their training and attracting better candidates (Elam (1996)).[2] The first state to mandate the 150-hour requirement was Florida in 1987. By 2016, all 54 U.S. jurisdictions had done so. The staggered nature of the introduction provides a unique opportunity to study the effect of increased educational requirements on the supply of CPAs and individuals' labor market outcomes.

[1]The licensing of CPAs is justified, in part, as protecting investors, who must rely on the accuracy of financial information produced and verified by accountants, who are neither selected by nor accountable to investors. Licensing is meant to help avoid negative third-party effects that may result from incompetent practitioners.

[2] The AICPA asserted that the requirement was meant to "improve the overall quality of work performed by CPAs" and "ensure the quality of future audits" by improving the quality of audit staff and those entering the profession (AICPA (2003)).

I begin my analysis by examining changes in the supply of CPA candidates, using an extensive panel dataset of first-time CPA test takers from the National Association of State Boards of Accountancy (NASBA). In a difference-in-differences specification, I find a 15% reduction in the number of first-time candidates taking the exam, following the rule's enactment, which is consistent with the findings of Jacob and Murray (2006). However, the decrease does not come solely from a reduction in the number of low-ability candidates (those who fail all four sections of the exam in a sitting) but also from a reduction in the number of high-ability candidates (those who pass all four sections in a sitting).[3] The reduction in both groups of candidates renders inferences regarding the quality of individuals inconclusive.[4]

Given the supply effect, I next examine the association between the rule and wages, using data from the current population survey (CPS). Specifically, I explore whether accountants in states that adopted the 150-hour rule enjoy higher wages (controlling for education), compared to accountants in states that did not adopt the rule. I document a 9% earnings premium for CPAs in rule states, relative to equally educated CPAs elsewhere. This premium, however, can arise either as a result of an increase in quality, because of more human capital and better screening of candidates (Kleiner (2000); Leland (1979)), or because of rents generated by the rule's supply restriction (as predicted by Friedman (1962)). To distinguish between the two hypotheses, I differentiate between accountants who complied with the rule and accountants who obtained their CPA license before the rule was initiated (grandfathered). I find that the rule wage premium is not statistically different between the two groups, suggesting that most of the premium is due to

[3] The extra year of education appears to be costly for high-ability candidates, potentially due to their higher opportunity cost of time, which leads to fewer of them taking the exam.

[4] Furthermore, it is not clear that reductions in the number of low types taking the exam should be seen as increasing quality in the labor market, as these individuals fail the exam and as a result do not enter the market in the first place. Moreover, like every study that uses NASBA data, I cannot observe exam scores but rather whether individuals passed the 70% requirement on each of the four sections of the exam. If I had exam scores, this would help tease out the quality of the passers before and after the rule's implementation.

supply restrictions and not to the higher quality of accountants in rule states after the rule's enactment.

To further investigate the quality implications of the rule, I examine proxies for individual auditor quality. While it may seem natural to use audit outcomes to directly measure the quality of the audit engagement, these measures also capture various attributes related to the firms' operating environments, managerial incentives, and legal liability, all of which may prevent them from capturing changes in the individual auditor's quality.[5] Therefore, I examine CPAs' long-run labor market outcomes as proxies for individuals' quality.[6] If the rule increased the average quality of CPAs, I expect to see some sign of this in the career path of auditors in rule states.

To examine the labor market outcomes, I construct a new comprehensive panel dataset of career paths for more than 10,000 CPAs from 11 states who post their résumés on a major professional networking website. My sample spans the past four decades and provides a unique overview of the individual CPAs' employment and educational histories. The two labor market outcomes I measure—time to promotion and tenure at a firm—are well established proxies for employee quality in the labor economics literature (Topel (1991); Baker, Gibbs and, Holmstrom (1994); Neal (1999); Gibbs and Hendricks (2004); Gibbs, Ierulli, and Milgrom (2002); Devaro and Waldman (2012)). Furthermore, I demonstrate that both measures are positively and significantly correlated with various audit outcomes at the state level. Additionally, I further refine the measures for auditors by specifically examining time to partner and time at a Big N firm in addition to the broader measures. These measures should more closely proxy for the

[5] Nevertheless, in Online Appendix 4 I provide an analysis of the Rule's effects on three proxies for audit outcomes. The results support the view that the Rule had a negligible effect on audit outcomes.

[6] An individual accountant's quality captures the factors that make the individual productive both within the firm at his or her specific job and outside the firm. These factors can include education and training, innate ability, motivation, and fit at the firm.

granularity of individual ability, as reflected by the labor market, and can thus increase the power to capture career variations resulting from the rule.

The labor market tests fail to find any significant improvement in career outcomes: specifically, I find no significant difference in the time to promotion for rule individuals. Comparing the subset of rule audit partners to nonrule audit partners, I again fail to find any difference in their time to partner. There is also no significant difference between rule and nonrule individuals' tenure at firms. This result continues to hold when I focus on auditors' tenure at large multinational accounting firms.[7]

A possible explanation for these results is that the breadth of options through which the educational requirement can be fulfilled (e.g., a master's degree or separate courses) allows low-ability CPAs to opt for less rigorous nondegree programs, thus rendering the additional education requirement moot.[8] At the same time, the increased time needed to satisfy the requirement may create incentives for high-quality candidates to pursue other careers. To address potential concerns that data quality issues drive the labor market outcome results in the résumé data, I further validate my measures by examining differences between master's and nonmaster's degree holders, finding that the former are promoted faster. Overall, my tests of career outcomes fail to detect any evidence that the rule produced better careers for CPAs.

This study is subject to several important caveats. Some of my inferences on quality rely on proxies that may contain measurement error. My individual quality measures are based on résumé data that may be biased by the voluntary nature of the reporting. That said, the extensive

[7] The literature documents that Big N audit firms produce better audits (DeFond and Zhang 2014). They should also provide more desirable employment, at least as long as an auditor stays at an audit firms and does not move to become CFO of a publicly traded firm. Thus, the longer the time spent at these firms by individuals, the better the quality of audits in the market.

[8] Additionally, the potential dilution of curriculums by universities to expand educational programs to five years could have reduced any human capital effects from the rule.

use of these résumés for networking and job searches provides some assurance as to their integrity. The individual quality proxies also rely on competitive labor markets and standards in firm promotions. Despite the theoretical appeal of the measures, the absence of a quality effect in the various tests should be interpreted with these caveats in mind. That said, the positive relation between audit outcomes and career outcomes should alleviate some of the concern that measurement errors drive the results. Furthermore, the absence of an effect may not signal a lack of an effect, as there could be other improvements in the profession that are not captured in the analysis. For this reason, these results should be viewed as a starting point for further examination of the general role of licensing in accounting.

This paper makes several contributions to the literature. First, it comprehensively examines the 150-hour rule's effect on the accounting labor market.[9] All public audits must be conducted by a licensed CPA, yet the role of licensing in this market has received little attention. Moreover, even though all 54 U.S. jurisdictions have adopted the 150-hour rule, no researcher has analyzed its long-run effect on CPA candidates. My findings provide no support for the argument, offered to justify the rule, that increasing the licensing requirements for CPAs translates into better audits or better career outcomes. In contrast, the results suggest that increasing the licensing requirements increases wages by restricting the supply of CPAs.

Second, the paper illustrates a promising approach for capturing differences in the quality of individuals auditors, using measures motivated by the labor economics literature and new data sources. While audit quality is considered to be a function of the audit process and personnel (Francis (2011)), there is limited research distinguishing between process and personnel effects

[9] Previous studies have for the most part focused on supply and exam outcomes (Jacob and Murray (2006). One exception is Allen and Woodland (2010) who examine audit fees and find that in a 4-year sample of firms, audits in rule states experience higher fees than non-rule states.

(e.g., DeAngelo (1981); Ferguson et al. (2003); Carey and Simnett (2006); Francis and Yu 2009; Choi et al. (2010); Ghosh and Moon (2005)). The role of audit personnel is of particular importance, given that auditors critically influence the process.[10] Despite this, questions, such as "what role do audit personnel play in impacting audit quality?," remain mostly unanswered, in part due to the unavailability of data.[11] For example, recent studies examining the role of auditor human capital rely on indirect aggregate measures from the general population. Beck et al. (2017) study the effects of audit personnel's human capital on audit outcomes, using the average workforce education level in the metropolitan statistical area of an audit-firm office. However, aggregate measures like this make inferences on the role of auditors' human capital difficult, as they could also reflect the human capital of the clients' employees, rather than that of the auditors (Call et al., (2017)).[12] Thus more direct measures of employee ability are needed to separate the effects of auditor human capital from that of firm employees. This paper's use of CPAs' individual résumés and labor market measures of individual career outcomes represent a path forward for this stream of research. In this sense, the study responds to a recent call for more work examining auditors and their competencies (i.e., human capital) (Francis 2011; DeFond and Zhang 2014). Finally, the paper's descriptive evidence on career outcomes is compelling in its own right as it should help stimulate future research. For example, the rate of individuals entering the Big-N seems to have changed over time, which prompts questions about how the emergence of alternative career options for auditors could impact the audit market.

[10] This importance is highlighted in a recent report in which PwC notes that "Our reputation depends on hiring talented professionals and our reputation for quality enables us to attract the best candidates" (PwC 2017, p. 9).
[11] Recent studies have started to examine the incentives of audit personnel (Hoopes et. al. (2018)).
[12] Call et al., (2017) use the average workforce education level in the MSAs where the firm operates as a proxy for employee quality. They find that firms with a high-quality workforce exhibit higher financial reporting quality.

The remainder of the paper is structured as follows. Section 2 provides the rule's institutional background and the economic framework. Section 3 presents my data sources and sample selection procedure and describes the data. Section 4 presents the empirical analysis and results. Section 5 concludes.

2. Institutional Background and Economic Framework

2.1. Licensing of Accountants and the 150-Hour Rule

Occupational licensing specifies the requirements that must be fulfilled to be permitted to perform certain services. It governs more than 1,000 occupations (Brinegar (2006)) or nearly 30% of the U.S. workforce. Over the past several decades, both the number of occupations and the percentage of the workforce covered by licensing have increased dramatically (Kleiner and Krueger (2013)).

In accounting, a CPA license entitles its holder to audit the financial statements of public companies and attest to their compliance with generally accepted accounting principles (Jacob and Murray (2006)).[13] Only CPAs can legally do this. Currently, educational, experiential, ethical, and national-examination requirements, instituted and overseen by state boards of accountancy, must be satisfied for accountants to practice legally as CPAs. While all applicants must pass the national CPA examination, set by the American Institute of Certified Public Accountants (AICPA), the rule required that applicants complete 30 semester hours of additional education prior to obtaining their license.

The threat of congressional scrutiny, with regard to new federal regulation on the accounting profession, led the AICPA in the mid-1980s to implement reforms in the name of "self-regulation" (Madison and Meonske (1991)).[14] One of the main reforms was to require new

[13] These individuals also enjoy various privileges before the Internal Revenue Service.
[14] The savings and loan crisis of the 1980s led to a series of congressional hearings regarding the role of auditors in

AICPA members to have 150-semester hours of college education prior to receiving membership (Committee (1986)). In 1988, at its annual meeting in New York City, 84% of the AICPA's voting members backed the proposal, effective for the year 2000. While the AICPA required the rule, the state boards of accountancy had to adopt it for it to be legally required for licensure. States like Florida and Hawaii did so as early as 1979. However, most state boards began passing it only after the AICPA's action. In the year 2000 alone, 14 states did so.[15]

Even before the adoption, most jurisdictions specified a minimum number of hours of coursework in business and accounting.[16] Most states did not change these requirements with the adoption of the rule.[17] This freedom was granted to allow four-year colleges, which do not have the authority to grant master's degrees, the ability to offer programs that could meet the rule's requirement (Jacob and Murray (2006)).[18] As a result, candidates for the CPA exam could accumulate the additional hours of education through courses associated with a graduate degree (an MBA with an accounting concentration or a master's in accounting), courses from another upper-level undergraduate option (a second major), or courses from no specified program of study at all.[19] As of July 2018, the rule has been enacted in all 54 U.S. licensing jurisdictions, with the states of New Hampshire, California, and Vermont beginning enforcement in 2014 and Colorado in 2015.

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the crisis. The hearings examined how several prominent public companies, ranging from the Penn Square Bank in Oklahoma to E.S.M. Securities in Florida, failed soon after receiving clean audit opinions (Berg (1988)).

[15] See Appendix A for details on the rule's years of adoption and enactment.

[16] The AICPA pushed for the extra 30 credit hours to be composed of more liberal-arts and general-business courses, rather than pure accounting ones (Collins (1989)).

[17] The rule was worded to provide flexibility to colleges and universities in designing their programs. In this regard, it has been criticized for allowing CPA candidates to be licensed with no more hours in business and accounting than were required previously.

[18] The political economy of the rule can be seen in Oklahoma, where the original bill that required graduate courses to fulfill the rule was not passed after lobbying by four-year universities. The bill eventually passed when the wording was changed to allow 30 additional hours of higher-level education.

[19] See Online Appendix 1 for a list of the current educational requirements by state.

2.2. An Economic Framework for Analyzing the Rule

Though occupational licensing covers 30% of the U.S. workforce, its effects are still intensely debated (Kleiner and Krueger (2013)). Traditional theories assert that licensing protects consumers in markets with asymmetric information (Shapiro (1986)). Theoretical work claims that credence goods, such as attestation, demand regulation to protect uninformed consumers (Leland (1979) and Shapiro (1986)). Licensing is thus seen as an administrative means by which regulators (i.e., state boards) control the supply of labor. The regulator uses licensing to maintain a minimum level of human capital, which in turn ensures a certain level of quality.[20] The imposition of licensing may, in effect, shift the quality-adjusted demand curve upward, improving consumer welfare and increasing the supply of high-quality services by ensuring the competency of practitioners (Adams III. et al. (2003)).

The rule's requirement for an extra year of education can be viewed as an additional investment by individuals in their human capital that will lead to increases in their competence as auditors (Becker (1962), Becker (1993)). Additionally, as education may be less costly for high-type individuals, the willingness to undertake the additional 30 semester hours of coursework should also be correlated with high ability and could increase the number of high-quality CPAs (Spence (1973)). Overall, these theories predict that the rule will lower the overall supply of CPAs and increase their average quality.

In contrast, a significant stream of literature in regulatory economics describes licensing requirements as a means for members of a profession to discourage new entrants and extract monopoly rents irrespective of quality effects (Friedman (1962); Stigler (1971); Maurizi (1974); Shepard (1978); Carroll and Gaston (1981)). These theories predict that the rule's additional 30-

[20] This could either be through increasing the human capital of individuals through educational requirements or screening new entrants to bar those whose skills or character traits suggest low quality (Gittleman and Kleiner (2013)).

credit hour requirement will increase the marginal cost of becoming a CPA and reduce the number of new CPAs but that the average quality of candidates will not change. Moreover, the temporal component of the rule—the approximate increase of one year to complete the educational requirement—could lead to adverse selection. High-ability candidates, who have a higher opportunity cost of time, might be motivated to pursue other jobs (Akerlof (1970)).[21] This would, in turn, lead to a decrease in the average quality of CPAs after the rule's implementation.[22] Finally, theories of the private benefits of licensing predict that licensing requirements will lead to an increase in rents extracted by those already in the profession. By restricting the supply of CPAs, the rule allows the grandfathered CPAs to increase their wages, as they need not make the additional investment (Kleiner (2006); Kleiner and Krueger (2013)). As a result, we should observe reductions in supply and increases in wages, which may not be accompanied by increases in quality.

To determine which these two views is more likely to be accurate, I examine the rule's effect on the supply of CPAs, their wages, and quality effects in the accounting market, using individuals' career outcomes. While both theories of licensing predict average decreases in supply and increases in wages, the public interest view would suggest that these effects would be accompanied by increase in quality (i.e. better career outcomes), while Friedman's view would suggest no increase in quality.

3. Data

[21] If the rule's main impact is that high-quality candidates must forego a year of paid work and they have higher pay potential, then the rule would actually be costlier for them.

[22] Along this line of reasoning, Lee et al. (1999) analytically incorporate auditors' education and audit effort as joint inputs of audit quality in a Dye (1993) and Dye (1995) model to evaluate the effects of the rule on the audit market. They show that the audit fees are higher, making grandfathered CPAs better off and audit clients worse off, as a result of the rule's compositional supply changes.

My empirical analysis relies on information from three different sources: (i) data on CPA exam outcomes, (ii) wage data, and (iii) data on CPA education and employment histories. The data on CPA exam outcomes comes from NASBA. The wage data comes from the Current Population Survey (CPS). Finally, I rely on data from a leading professional networking website, which includes self-reported résumés, to construct a comprehensive sample of educational and employment histories.

3.1. Samples

NASBA: My CPA supply analysis relies on data from NASBA. NASBA provides data on the number of first-time candidates by exam period and jurisdiction and covers the period from 1984–2014. At the university level, NASBA provides data on the total number of first-time test takers as well as the number of individuals who pass all four sections in one sitting and the number who fail all four sections in a sitting.

CPS: My tests for the rule's wage effects rely on data from the CPS. The CPS has collected employment and demographic data from 57,000 households, which represent the whole nation, on a yearly basis starting in 1988. Employment information for survey participants is provided by their occupation and industry. I select individuals listed under the Occupation Code 023, Accountants and Auditors, and Industry Code 089, Professional Services. Additionally, I drop from the sample participants who did not report positive earnings, which results in a final sample of 6,994 accounting-related individuals. Finally, since the data is collected over multiple years, earnings are converted to 2010 dollars, using the Bureau of Labor Statistics implicit-price deflator.

Business Networking Website Data: I use the world's largest online professional networking and recruiting site to construct my labor market tests sample. The website began as a

networking site for technology and financial industry employees and has grown tremendously since. It covers a wide range of industries and has members at all levels of experience, from college students to senior executives. For example, as of 2014, it includes executives from all of the Fortune 500 companies. Additionally, membership spans all age groups: 46% of members are between the ages of 25 and 44, while 35% are between the ages of 45 and 64. The website lists over 656,000 CPAs in the continental United States, which is roughly 60% of the number of individuals in the occupational category of "accounting," as estimated by the Bureau of Labor Statistics (Bureau of Labor Statistics (2018)). The breadth of coverage suggests that the website is a comprehensive data source for information on CPAs.

Due to computational restrictions on the data collection process, I limit my sample to individuals drawn from 11 prominent states. These states are chosen based on their relative importance in terms of the number of accountants, their contribution to the national GDP, and their relative timing in the enactment of the rule. Appendix B provides an overview of the characteristics of the states analyzed.

I begin the dataset construction by searching for members who self-report "CPA" or "Certified Public Accountant" in their profiles.[23] For each state, I draw individuals who entered the labor market (i.e., obtained their CPA) around the enactment of the rule. To estimate the appropriate sample size, I perform several power calculation tests. The goal of these tests is to identify sample sizes required to detect a pre-specified treatment effect (minimum detectable effect) at specified levels of power and statistical significance. In line with common practice, I consider sample sizes for a specified power of 0.8 and a statistical significance of 0.05. The results of the power test indicate that, if I can obtain 1,200–1,500 individuals in both the treatment and

[23] The website search is neither restricted by geographical proximity nor by the personal connections of the account used to search.

control groups, I likely can detect an effect that represents between a 10%–25% change from the baseline rate of the control group. The large minimum detectable effect also considers the potential for crossover (i.e., the possibility that I misclassify treated rule CPAs as controls) of approximately 15%. Thus, to ensure sufficient power in my tests, I collect an initial sample of 2,500 individuals per state.

Using the selected profiles, I collect workers' information, focusing on the career history of each person. For each position, I collect the job title, the start and end dates for the job, and the company name. The titles and descriptions for a given position allow me to classify jobs, based on seniority, to distinguish promotions versus lateral changes. I determine the chronological order of the positions using their arrangement and start dates on the profile page. I also collect data on the user's gender and current location. To ensure data quality, I clean the data by using an individual's unique identifier to remove duplicates that may arise, due to the automated collection of the profiles. This procedure allows me to transform résumé data into a panel dataset with an individual's employment history over time.[24]

A common issue with résumé-based data is that some individuals may list more than two positions over the same period on their résumé. While I track all positions for all the individuals in the sample, I limit my analysis to individuals who list a maximum of two simultaneous jobs in a year to reduce any problems from unclear résumés. These resulting set of résumés accounts for more than 90% of my original sample. To deal with missing job spells or holes in the résumé, I classify an individual as unemployed if there is a one- or two-year time gap between job (or education) spells.

To estimate an individual's age, I assume that individuals complete their bachelor's

[24] See Online Appendix 2 for an example of how a profile is transformed into machine readable data.

degrees at the age of 22. I consider three-year college degrees (typically from international institutions) to be equivalent to bachelor's degrees. Subsequently, I add the number of years passed since the graduation date. In the case of a profile missing the year of undergraduate graduation, I infer an individual's age based on the first year of her first job, also setting the age to 22.[25]

Finally, for a profile to be included in the sample, I require that it contain information on the university attended, degree obtained, graduation year, or a combination of these. These details allow me to distinguish between the following graduate degrees: master's degree, juris doctor (JD), master of business administration (MBA), master of accounting, and doctorate. I also require a complete career history with job titles and dates. Appendix B provides a descriptive table on the data requirements and changes in the sample. The resulting sample contains over 10,000 CPAs with data on work experience and 8,793 individuals with complete educational data.[26]

The procedure described above ensures that my sample represents an accurate collection of CPAs. I should acknowledge, however, that, despite efforts to collect, clean, and validate the data, I cannot identify all individuals who should be included in my sample. This is the result of three different issues: (1) some individuals do not register their résumés on the professional networking website, (2) some may omit or inaccurately list information on their profile (preventing me from accurately pairing them to years, identifying work experience, or capturing their education and training), and (3) I may have made errors in my collection and parsing of the profiles. Inferences based on résumé data in general face these concerns, given the voluntary

[25] The use of graduation dates to determine age leads me to indirectly control for an individuals' age when I control for the year the individual entered the labor market, using cohort fixed effects in my specifications.
[26] Changes in the sample of individuals by state given the data requirements is presented in Appendix C.

nature of the profiles. Yet the pervasive use of the website by individuals, for credible networking as well as job searching, provides some assurance of the integrity of the data. Moreover, unlike false claims on a résumé, which only a prospective employer can see and cannot easily verify, the public nature one's profile and the public accountability that comes with that discourages individuals from lying about their employment. This distinguishes my setting from traditional résumé data. Nevertheless, my inferences should be interpreted with the above caveats in mind.

3.2. Descriptive Statistics

3.2.1. NASBA Sample

Descriptive statistics for the NASBA sample are reported in Table 1. The table reports the mean and median number of first-time CPA candidates at the university level for the years 1984–2004. In addition to the total number of test takers, the table includes the number of candidates passing all (Pass All) and failing all (Pass None) four sections of the CPA exam as well as their percentages in brackets.[27] Descriptive statistics are provided for the rule and nonrule subsamples. The average number of candidates per sitting is 20 at the university level. Out of these candidates, 3.5 individuals or 16% of test-takers, on average, pass all four sections of the exam, and 10.9 individuals or 56% of test-takers, on average, fail all four. A comparison of the rule and nonrule subsamples indicates a decrease in the total number of candidates sitting for the exam. The average number of test takers drops from 21 in the nonruled period to 15 in the rule period (a 30% decrease). While this decline is reflected in the Pass None number, which drops from 11 to, on

[27] I am forced to use the Pass All and Pass None as proxies for candidate type as the NASBA data is at the university level. The data contains the number of individuals at the university that passed all four sections, some of the four sections, and none of the four sections. The Pass All measure is also an inadequate measure of quality, as it only reflects obtaining more than 70% on a section. I do not have the actual exam scores. Moreover, I am not given any demographics or individual information about the test takers. All these limitations further motivate the use of labor-market outcome proxies and sample.

average, seven individuals (a 36% decrease), it is also evident in the Pass All number, which drops from 3.75 to 2.87 individuals, on average (a 23% decrease).

In percentage terms, the percentage of Pass All increases in post-rule periods (going from 16% to 17%). This increase comes from the larger decrease in the Pass None, which is contained in the denominator (total test-takers), as the number of high types who take the exam also declines in post-rule periods. Moreover, the percentage increase does not necessarily have quality implications, as the Pass None candidates were not entering the CPA labor market in the pre-rule periods, as they had failed the test. The decline in the number of Pass All candidates seems more pertinent to quality, as it signals that high types also found the rule costly. This drop will be formally analyzed when I examine the treatment effect of the rule on the supply of CPAs below.

3.2.2. Current Population Survey Sample

Descriptive statistics for the CPS sample data are presented in Table 2. The table provides a summary profile of accountants engaged in professional services over the period of 1985–2015. The individuals are, on average, 38 years old and have approximately 16 years of education. The sample is predominantly white, 90%, and male, 57%. As can be expected, the average earnings of $47,684 are above the U.S. population average. More than 68% of individuals in the sample are married. Finally, 63% of the sample individuals work in states-years with the rule in effect.

3.2.3. Professional Networking CPA Sample

In Table 3, Panel A, I provide descriptive statistics for the CPA sample, which consists of 8,793 CPAs; these statistics show demographics, career outcomes, and educational background. Sixty-one percent of the sample is male. On average, individuals have 5.3 jobs during their careers, averaging four years per job. I find that 63% of them are employed at a Big 4 public accounting firm at some point; 21% have worked in taxation. The mean graduation year is 1997.

More than 50% of the sample have master's degrees, with 25% of the degrees being in accounting. In addition to the sample averages, I also report differences in the means between the nonrule and rule subsamples. A direct comparison of rule to nonrule individuals presents a challenge, given vast differences in the year of graduation between the two subsamples (with rule individuals graduating on average 13 years later than their nonrule counterparts). Thus, the differences between the two groups comingle differences in age, business environments, and any possible effect of the rule. To address this issue, I match individuals based on gender and the year they enter the labor market.[28]

In Panel B, I account for differences in age and gender between the two subsamples documented in Panel A. I match rule and nonrule CPAs on the year of labor market entry and gender. The number of rule CPAs decreases, as I require each rule CPA to have at least one matched nonrule counterpart. For the matched sample, the differences in means between the two groups' year of graduation diminishes. Panel B indicates that rule individuals are more likely to work in a Big 4 firm (68% versus 62%), more likely to specialize in tax, and have more degrees. At the same time, the two groups have no significant differences in the number of jobs held.

By matching on year of labor market entry, I control for the effects of the economic conditions that prevail when the individuals entered the labor force as well as the individual's age, given that their age is a function of their graduation year.[29] As a result of the difference documented above and the benefits of the matched sample, I use the matched sample for my labor

[28] In essence, this enables me to compare, say, a male in Miami (rule individual), who began his first job in 2000, with a male in Atlanta (nonrule), who also started in that year. An individual's age is being indirectly controlled by using the year of graduation (market entry) to match individuals.

[29] Note that the rule mechanically forces an individual to delay market entry for one year (the additional 30-credit requirement). As a result, the comparison is to examine an individual who enters the market with an extra year of schooling versus those who enter the market without the extra year. The additional year and extra age should be attributable to the rule and considered part of the rule's effect.

market tests. Moreover, I use cohort fixed effects in my analysis to control for the year an individual enters the labor market, which also technically controls for age.[30]

4. Results

The discussion of the results is split into four sections. First, I estimate the impact of the rule on the supply of CPAs by examining its impact on the high- and low-quality candidates (based on the NASBA sample). Second, I evaluate the rule's effect on wages to examine potential quality effects by examining wage differentials between individuals who complied with the rule and those of incumbent CPAs who did not (based on the CPS sample). Third, I evaluate the effects of the rule on career outcomes to assess the quality effects on individual auditors (based on the sample from the networking website). Finally, I provide a validation test of the career outcomes data.

4.1. The Rule's Effect on Supply

I measure the effect of the rule on the supply of CPAs using a difference-in-differences framework, based on the NASBA sample of first-time test takers. The analysis is at the university level and covers the period of 1984–2004. Studies examining the supply effects of the rule find a reduction in the number of candidates sitting for the exam, following the rule (Jacob and Murray (2006); Allen and Woodland (2006)). These reductions, however, do not provide direct evidence of the rule's quality effects, given the limitations in the data and their focus on average pass rates. Decreases in the number of low types sitting for the exam need not translate into increases in quality, as all these individuals would have failed the exam, even in the absence of the rule, and would not have entered the market. On the other hand, decreases in the number of high types would suggest a deterioration in quality, as these individuals would have become CPAs, absent the rule. This view motivates my focus on reductions in the number of candidates by type.

[30] This allows for more precision in estimating the effects of the rule on the labor market outcomes by using only within cohorts variation.

The staggered adoption of the rule allows me to construct nonrule counterfactuals by using variation from the time series (i.e., before and after the rule) and the cross-section of states (i.e., states that have yet to adopt the rule in a given year). I analyze the marginal effect of the rule on the total number of test takers, the number of test takers who pass all four sections in one sitting, and the number of test takers who fail all four sections in a sitting, using the following fixed-effects specification.

$$Y_{u,m,v} = \beta_1\left(Rule_{u,m,y}\right) + \beta_2\left(Year\ Before\ Rule_{u,m,y}\right) + \beta_3\left(May\ Sitting_{u,m,y}\right) + Year\ FE + University\ FE + University\ FE * Year + c_{it}, \quad (1)$$

where $Y_{u,m,y}$ is either the log number of candidates, the log number of candidates passing all four sections, or the log number failing all four sections in university u in sitting m and year y. $Year\ FE$ is a vector of year identifiers that takes the value of one when the observation is for year y and zero otherwise. The year fixed effects are used to control for macroeconomic factors and shocks that may affect all universities in a given year. $University\ FE$ is a vector of university identifiers that takes the value of one when the observation is from university u and zero otherwise. The university fixed effects are introduced to control for shocks in educational quality at the university level. By using university-level data, I reduce the noise that aggregation at the state level is causing, thereby increasing the power of my tests. $University\ FE * Year$ is a university-specific linear time trend that allows each university to have its own time trend with respect to the outcome variable. $Year\ Before\ Rule$ is an indicator variable set to one the year before the rule is implemented and is used to capture any surge in the supply. $May\ Sitting_{u,m,y}$ is an indicator variable set to one for sittings of the exam in the month of May. It is used to pick up differences in May testing, relative to November. Finally, $Rule_{u,m,y}$ is a binary indicator

variable that takes the value of one in jurisdiction years in which the rule is in effect and zero otherwise. Thus β_1 provides the marginal change in the number of test takers driven by the rule.

Table 4 reports the results for three different specifications. Model 1 indicates that the rule reduces the number of test takers by roughly 15%, after controlling for year, university fixed effects, and university-specific time trends. Consistent with an anticipation of the implementation of the rule, the year before the rule takes effect is associated with a 21% increase in the number of test takers. The May Sitting identifier controls for the fact that fewer candidates take the exam in May. While a reduction in the overall number of test takers has been used as evidence of an increase in the quality of candidates, I use Models 2 and 3 to examine which part of the distribution of candidate quality the rule's supply reduction comes from.

Model 2 examines the number of high types, that is, candidates who pass all sections in one sitting (Pass All). I find that the rule leads to a 10% reduction in the number of high-type test takers. This reduction is inconsistent with the theories suggesting no change (or an increase) in the number of high types following implementation. The additional year of education appears costly to high-ability candidates, potentially due to their higher opportunity cost of time. This, in turn, leads to fewer of them taking the exam. Model 3 also indicates a 14% reduction in the number of low types (Pass None). This effect is not significantly different from the one in Model 2, as an F-test fails to find a significant difference between the two coefficients. Model 3 estimates also confirm an increase in the number of low-type candidates taking the exam in the year before the rule takes effect and a reduction in the number of candidates in May sittings. A reduction in the number of low types is not necessarily related to an increase the in quality of CPAs in the labor market, as these individuals would have failed the exam, even absent the rule and would not have

entered the CPA labor market.[31] Thus the reductions in *both* high- and low-type candidates and the fact that candidates failing the exam cannot enter the market requires an examination of actual labor market outcomes to determine quality effects.

4.2. The Rule's Effect on Wages

In this section, I examine the rule's effect on wages. The fact that the rule reduced the supply of CPAs means it should naturally raise wages of accountants in rule states. Moreover, to the extent that the rule's additional year of education increased human capital, one would also expect an increase in the wages of individuals who complied with the rule. However, private-interest theories of licensing suggest that, by restricting supply, the rule would lead to increases in the wages of incumbents, i.e., grandfathered CPAs who do not invest in any additional training (Friedman (1962); Stigler (1971)). Thus, to the extent that the rule increased the quality of individuals, one would expect to see a relatively greater increase in wages for individuals who undertook the education, as compared to grandfathered incumbents.

I test these predictions empirically using earnings from a sample of 6,994 accounting-related individuals from the CPS. Models of the determinants of workers' earnings have a long history in labor economics (Mincer (1958); Card (1999)). The most common specification, derived from Mincer (1974), specifies that an individual's log earnings are a linear combination of explanatory variables, such as age, gender, education, and a random error term. I modify the Mincer specification to capture the effect of the rule on earnings by including an indicator variable for the presence of the rule in a given state year. If the rule had any rent-extraction effects on wages, the indicator should load positive and significant, while, if the rule

[31] It is this very fact that makes dividing the number of test takers that passed by the total misleading. The reduction in this percentage is driven by both changes in the numerator and the denominator, where changes in the number of low types (reductions) may make it appear we have a higher percentage of high types in the market, when in reality there were fewer than before.

worked mainly through screening and human capital effects, the increase in wages should be explained solely through the schooling variable, rather than the rule indicator. To isolate the potential quality effects, I examine grandfathered CPAs. An increase in the wages of grandfathered CPAs should solely stem from a supply restriction in the market. In contrast, wages of the individuals who complied with the rule should reflect a human capital premium, in addition to the supply restriction premium. I implement the Mincer specification by regressing the log earnings on various determinants. In addition to the rule indicator, I follow previous studies and include age, age squared, race, education, and marital status as determinants of wages in the following model.

$$\text{Log}\, E_i = \beta_1 Age_i + \beta_2 Age_i^2 + \beta_3 Male_i + \beta_4 White_i + \beta_5 Education_i + \beta_6 Married_i + \beta_7 Rule_i + Year\ FE + State\ FE + c_i. \quad (2)$$

Table 5 reports the result of the earnings regressions.[32] Consistent with previous studies, I find that age is positively associated with earnings but at a decreasing rate, as indicated by the negative coefficient on age squared. Education (measured as the number of years of schooling) also has a positive and significant association with earnings: each year of schooling is associated with a 10% increase in one's earnings.

Model 2 indicates a significant 9% increase in earnings of individuals in rule states, after controlling for both year and state fixed effects. This 9% premium is above what an individual's years of schooling can explain. However, this premium can reflect both the quality of the candidates and the restricted supply of them. To disentangle these forces, I examine grandfathered CPAs in Model 3. Here, I find a statistically significant 12% increase

[32] Results are robust to using nonlinear years of schooling fixed effects, rather than the linear number of school years.

in their wages, relative to rule accountants. Grandfathered CPAs obtained their licenses before the requirement and, as a result, enjoy a wage premium solely from the supply restriction, as they did not make any additional investment in education. This 12% premium is statistically indistinguishable from the 9% increase of rule individuals who completed the educational requirements. This suggests that the magnitude of the human capital effect of the rule seems limited.

4.3. The Rule's Effect on Career Outcomes

While differentials in the wages of rule and grandfathered CPAs suggest limited quality effects from the rule, labor market frictions in wages or measurement issues in the data could have led to a null effect. In this section, I focus on measures of individual quality. Specifically, I use an individual's time to promotion and tenure in an accounting firm as proxies for individual quality.

I define the quality of accounting individuals as the set of factors that make an individual productive both within the firm at his or her specific job and outside the firm. These factors include education, training, motivation, and innate ability. The unobservable nature and high dimensionality of this construct make it challenging to quantify.[33] My approach to measuring accountant quality is instead based on the long-term labor market outcomes of individuals. Specifically, if the rule had any meaningful impact on individual quality, this effect should eventually materialize in the career success of rule individuals, compared to their nonrule peers—including how long it takes for them to receive promotions and their tenure at a given firm. [34] My

[33] Traditionally, information like university attended have been used to proxy for quality. In the current setting, in which firms optimize over candidates in hiring, educational proxies like this become ineffective measures of quality. Large accounting firms already screen on quality at each office. As a result of this screening, there would be no compositional change in the universities attended by individuals who may get hired before and after the rule.

[34] One way to measure accountant quality would be to gain access to time-series data on the internal performance evaluations of CPAs at audit firms. These assessments contain, for example, the supervisors' assessments of an

labor market proxies of individual quality are motivated by empirical and theoretical literature in labor economics (Topel (1991); Baker, Gibbs and, Holmstrom (1994); Gibbs, Ierulli, and Milgrom (2002)). There are two primary reasons for why these proxies are likely to capture the quality of individuals in the accounting profession.

First, promotions provide key incentives (Lazear 1992, McCue 1996) and help screen for ability (Medoff and Abraham (1980); Medoff and Abraham (1981); Bernhardt and Scoones (1993); Gibbs 2008), especially in hierarchical white-collar firms. Accounting firms are known for requiring young professionals to work long hours and for instituting up-or-out promotion systems.[35] The purpose of these arrangements is to identify capable, diligent professionals, who will likely become partners in the future (Barlevy and Neal (2018)).[36] In fact, variation in the time to promotion has been shown to relate to individual ability and quality.[37] Specifically, Baker, Gibbs, and Holmstrom (1994) document that fast-track promotions identify individuals who are more likely to have successful careers.[38]

An important concern with using time to promotion as a proxy for individual quality is that it may fail to capture variation in quality in the presence of a fixed promotion timeline.[39] While this concern would be pertinent in some organizations (e.g., government or state-sponsored

individual's quality, such as assessments of productivity, professionalism, motivation, etc. Such proxies, however, are rarely available from accounting firms. Moreover, they is not without limitations, as supervisors' may not observe all the relevant dimensions (e.g., ability) and their ratings are subject to behavioral biases.

[35] Barlevy and Neal (2018) model the longstanding differences between the labor market for professional services and other markets for well-educated workers.

[36] Firms can identify more professionals who can function effectively as partners when they require new associates to perform more tasks. And when they replace experienced associates with new workers, they gain opportunities to identify talented professionals who will have long careers as partners.

[37] If the purpose of a promotion is to sort employees by ability, then the best performance measure for promotion decisions would be the one that is most correlated with ability, rather than effort. My reliance on time to promotion is based on changes in timing reflecting changes in the makeup of individual ability.

[38] This finding has been replicated in various firms, industries, and countries (Chan (1996); Seltzer and Merrett (2000); Treble, et. al. (2001); Gibbs and Hendricks (2004); DeVaro and Waldman (2012)).

[39] Descriptive evidence in the data shows that there is wide heterogeneity in time to promotion for similar positions, even within the same firm.

organizations) or if one were to examine only within-firm promotions, this concern is unlikely to be a first-order issue in my setting. First, in my setting, there is an active labor market for talent. If talented individuals are not being promoted, they can find lucrative opportunities elsewhere. Second, I define time to promotion with respect to both within- and between-firm promotions. As a result, the proxy will capture an individual's quality, even if a given firm has a fixed timeline for promotion, as it will be reflected in outside opportunities. Nevertheless, I acknowledge that the proxies are not perfect and may be correlated with other factors, such as monitoring, risk, and the accuracy of the supervisor's assessment. I take care, in my empirical specification, to control for these other determinants of labor market outcomes when analyzing the rule's effect on promotion speed.

Second, employees spend a significant fraction of their careers with the same employer (Doeringer and Piore (1971); Gibbs et al. 2002). Most job search models feature employees searching for the right match with an employer, and this match determines tenure and the likelihood of promotion (Doeringer and Piore (1971); Topel (1991); Neal (1999)). Consistent with the theoretical arguments, empirical studies find that increases in human capital improve the match quality and lead to lower employee turnover. For example, Acemoglu and Pischke (1999) argue that an increase in human capital improves firm productivity and leads to acquisition of firm-specific skills and longer tenure. Additionally, from an informational perspective, firms tend to have better information about the worker's quality than the external labor market, since it observes his or her work directly and in detail over time. Moreover, firms have an incentive to use this private information advantage strategically, including retaining those it observes to be higher quality, and vice versa for those who are lower quality. This interaction leads to a positive association between quality and tenure (Gibbons and Walden (1999)). Finally, from an overall

audit quality perspective, we can also think of lower turnover at the firm leading to higher quality in the work product.

To complement the theoretical motivation for using labor market outcomes as proxies for individuals' quality, I empirically correlate the two measures with several proxies of audit quality. The labor market proxies should correlate positively with audit quality to the extent that they capture the quality of individuals, as higher quality audit employees should translate into better audits.[40] I proxy for audit quality using three prominent measures from the auditing literature: Big N audits, (2) absolute discretionary working capital accruals, and (3) the likelihood of an accounting restatement (DeFond and Zhang (2014)).

In Figure 1, I plot the labor market measures, average tenure at the firm (Panel A) and average time to promotion (Panel B), against the three audit quality proxies.[41] Panel A shows that states where the average duration at firms is higher are also those with a higher proportion of Big N audits, lower levels of absolute discretionary accruals, and lower restatement likelihood. This pattern is consistent with longer tenure at firms and thus lower turnover leading to better coordination among individuals in conducting audits and thus higher audit quality. In contrast, time to promotion has a negative association with the audit quality measures (i.e., longer times to promotion relate to lower audit quality values). Thus states with average lower times to promotion have a higher percentage of Big N audits, lower average levels of absolute discretionary accruals, and a lower percentage of restatements by firms in the state. These patterns are consistent with lower times to promotion signaling higher ability individuals and thus better audits. The overall

[40] This exercise is in a similar spirit to previous tests run on proxies of accounting quality to justify their construct validity in the literature (Dechow and Dichev (2002), Francis et al. (2005)).
[41] A description of the construction of the aggregate state measure is provided in Online Appendix 3.

positive association between the labor-market and audit-quality measures suggests that the labor market measures capture some attributes of individual CPA quality and audit quality.

4.3.1. Time to Promotion Analysis

I begin the analysis of the rule's effect on individuals' career outcomes by studying the time elapsed before promotion. To do this, I perform a duration analysis. I use the CPA profiles to obtain the start and end dates for each position and calculate the time spent at each.[42] I then classify these positions with respect to their seniority to perform the promotion tests. To construct the seniority ranking, I take all job titles in the dataset and match them (based on similarity scores) to the titles in the seniority/prestige classifications from the Department of Labor (as well as several online job search engines). The seniority levels are meant to capture variation in the levels of responsibility (and wage rates) for the jobs in my sample.[43] This use allows me to distinguish between promotions and lateral job changes.[44] Importantly, based on the professional networking website's profiles, I can identify promotions, even if an individual takes a more senior position in a different firm. These external promotions could occur if a firm has only a fixed number of open slots and an oversupply of qualified individuals. In this case, an active labor market will allow individuals to move to other firms.[45]

To examine differences in time to promotion, I use a Cox proportional hazard model. The Cox model is a semi-parametric method for analyzing the effects of different covariates on the hazard function (Cox (1972) and Wooldridge (2010)).[46] To examine the duration of the

[42] This is outflow sampling, which implies that my tests are free of censoring concerns, which are one of the most prevalent issues in duration analysis.
[43] The use of job levels stems from my inability to observe wages or a systematic classification of job types with respect to seniority/prestige in the website.
[44] Sample titles and descriptions of classified positions are provided in Appendix D.
[45] Thus, active labor markets allow promotion speed to vary, even if a firm may have a fixed promotion schedule, and allow the proxy to reflect the quality of these individuals.
[46] In Appendix E examines mean differences for matched sample of rule and non-rule individuals along the lines of average tenure at a position and time to promotion.

individuals at their position, I estimate the following model.

$$Number\ of\ Years_i = \beta_1 Rule_i + \beta_2 Male_i + Cohort\ FE + State\ FE, \quad (4)$$

where *Number of Years*$_i$ is the number of years until individual i is promoted, *Rule*$_i$ is an indicator of the individual being subject to the rule, *Male*$_i$ is an indicator variable set to one if the individual is male and zero otherwise, *Cohort_FE* are set to one in the year the individual entered the job market, and *State_FE* are state fixed effects to capture state economic conditions.[47]

Table 6 examines the differences in the average time to promotion to each of the seniority levels between rule and nonrule individuals. The analysis is performed on a sample of rule individuals matched to nonrule individuals on gender and the year they entered the labor market. In Panel A, I estimate a Cox model on the time to promotion on the matched sample. This approach allows me to control for time effects and more accurately measure and isolate the difference between the two groups. The results for the level-two seniority positions are on the left, while the level-three seniority results are on the right. I control for time effects and age using cohort fixed effects in all models. I include state fixed effects in the second and fourth models to capture economic conditions in the state of employment. When I control for the year in which individuals enter the labor market via cohort, the hazard rates (slope coefficients) for the rule in both promotion levels (Models 1 and 2) are close to one and are statistically insignificant. This implies that the rule had no effect on time to promotion. The results are similar when I control for the economic conditions of the state in Models 2 and 4.

[47] A reported hazard rate of one would indicate no difference and a zero effect.

While the duration analysis of the overall time to promotion showed no evidence of a statistical or economic difference between rule and nonrule individuals, some may claim that the result could be driven by noise in the seniority classification scheme used by the networking website sample. As a result, I re-estimate the Cox model on a sample of individuals who become public accounting partners in Models 5 to 7. The use of this subsample, in which the career seniority is more comparable for the two groups, allows for a cleaner test of promotion outcomes. Moreover, it allows me to focus on individuals specifically related to public accounting. The analysis again finds no significant difference in the time to partner between the two groups. Additionally, I re-estimate the model after partitioning the sample into Big N and non-Big N.[48] Consistent with the main results, I continue to find no effect of the rule on time to partner in either of the samples. Overall, the analysis of overall time to promotion and time to partner shows no significant difference between rule and nonrule individuals. In line with prior tests, this also casts doubt on the rule's effects on the career outcomes of individual CPAs.

4.3.2. Tenure at the Firm

To test the rule's effect on firm-employee match quality, I regress firm tenure and the number of firms an individual has worked in over his or her career on the rule indicator and several determinants of firm match quality. To isolate the rule's effect, I control for the gender and whether an individual's career began at a Big N firm. The inclusion of the *Began Career at Big N* indicator into the model captures differences in career tracks that initial Big N placements could cause.[49] I

[48] This subsample partition of partners is done to further ease concerns that rigidity and differences in business models in Big N partnerships would reduce the ability of time to promotion to capture quality differences and lead to a null result.

[49] I add *Began Career at Big N* since descriptive statistics show a general trend in accounting toward starting one's career at a Big N firm, and I want to untangle that effect from the rule's effect.

control for age and the total number of years an individual was employed by using cohort fixed effects.[50] Cohort fixed effects are set to one in the year an individual entered the job market (i.e., the year that an individual begins his or her first full-time job after college). I control for variation in state economic characteristics by using state fixed effects.

$$Outcome = \beta_1 Rule_i + \beta_2 Male_i + \beta_2 Began\ Career\ at\ BigN_i + Cohort\ FE + State\ FE + c_i. \quad (5)$$

I estimate the above model based on both ordinary least squares and a negative binomial regression, which accounts for the count nature when the outcome measure is *Number of Firms*. If the rule influenced mobility between firms, we should expect to see a significant coefficient β_1.

Table 6, Panel B, reports the results of the firm-tenure test. Controlling for individual cohort fixed effects and state economic environment, Model 1 indicates that the rule had no significant incremental effect on the average firm tenure. Model 2 shows that the same result holds when the log of the number of firms is used as an outcome variable. Model 3 reports the results from the negative binomial regression and also confirms that the rule does not incrementally explain firm tenure. Descriptively, males tend to have shorter tenures, on average, at firms and work in 3% more firms over their careers. Individuals starting their careers at a Big N firm tend to work in 2% fewer firms over their careers, all else constant.

To focus on auditors, I go on to examine the time spent at Big N by individuals in the sample in columns (4) and (5). The literature documents that Big N firms produce higher quality audits (DeFond and Zhang 2014), and they should also provide more desirable employment, at least as long as an auditor stays at an audit firms and does not move to become CFO of a publicly

[50] When I control for the year the individual entered the labor market (cohort fixed effects), I am technically also controlling for individuals' ages, as these are a function of their graduation year. (I assume an age of 22, as this is a typical age for college graduation).

traded firm. Thus the longer time spent, the better the quality of audits in the market. In column (4) I run a Cox hazard model on the tenure at a Big N firm, while in column (5), I estimate an OLS with the log tenure at a Big N as my outcome variable. I again fail to find a substantial economic or statistical difference in the rule individual's tenure at a Big N firm. Model 5 allows me to determine with 95% confidence that tenure at the Big N for did not increase more than 0.002% as a result of the rule. Overall, these results, along with the time to promotion results, suggest that the rule failed to change the career outcomes of individuals entering the profession.

4.4. Robustness Test

Master's versus Nonmaster's Degrees: I evaluate the ability of time to promotion to pick up variations in quality by examining differences between master's degree CPAs and nonmaster's CPAs. I run these tests on the sample of CPAs obtained from the website. An examination of master's degree holders also allows for testing whether the promotion findings can be driven by noise in the résumé data. The presence of noise would lead to a null result, driven by a lack of power. The benefits of a master's degree are well documented in the literature in labor economics (Arrow (1973); Spence (1973); Card (1999); Dupray (2001)). The concept of private returns to a college degree, including a master's degree, is drawn from human capital theory, which states that the earned income of individuals is a function of labor productivity, derived from investments in education (Becker (1993)). With regard to benefits, researchers note that trends in college enrollment generally mirror trends in the college earnings premium (i.e., the gap in earnings between college and high school graduates) (Becker (1993); Ellwood et al. (2000)).

If there is noise in the résumé data or the time to promotion is a bad proxy for quality, I would not expect to find a difference between these individuals. In Table 7, I re-estimate my

tests on master's degree holders versus CPAs without that degree by matching individuals in the two groups by year of graduation and gender. In Panel A, I find that individuals with master's degrees are more likely to be employed at Big N firms and specialize in taxation. Additionally, they spend less time at each position, have more jobs, and are promoted more quickly. The promotion results are consistent with prior work on the value of a master's degree. In Table 9, Panel B, I re-estimate the Cox hazard model on the masters' sample and find that degree holders tend to be promoted faster. In columns 3 and 6, I examine whether the rule affected the speed of promotion for these degree holders. I find that they are not significantly better off after the rule, as measured by a decrease in the time to promotion. These findings help alleviate issues of noise in the résumé data and further confirm the ability of my proxy (time to promotion) to capture differences in individual quality, where these differences are expected to exist.

5. Conclusion

While all U.S. jurisdictions now require the equivalent of an extra year of education for CPAs, there is little evidence on the long-run effects of this policy change. In this paper I empirically examine the effects on the audit market of requiring this extra year of education. I find a 15% reduction in the number of first-time candidates taking the CPA exam following the rule's enactment. This reduction does not come solely from low-ability candidates but also from high-ability ones (those who pass all four sections in a sitting), raising a question on the overall impact on the quality of the pool. This supply reduction is accompanied by a 9% earnings premium for CPAs in rule states, relative to equally educated CPAs in nonrule states. Moreover, this premium is equally enjoyed by new accountants, who complied with the rule, and older

accountants, who were grandfathered and did not, suggesting that it is more likely due to reductions in the number of accountants, rather increases in their quality.

When I compare the labor market outcomes of rule individuals with a matched sample of individuals who are not subject to the rule, I find no economical or statistical difference in outcomes. Specifically, when I use time to promotion and duration of employment, especially at Big N firms, as measures of quality of accountants. Overall, these results raise questions about the effectiveness of additional educational requirements as a way to attract better candidates to the auditing profession.

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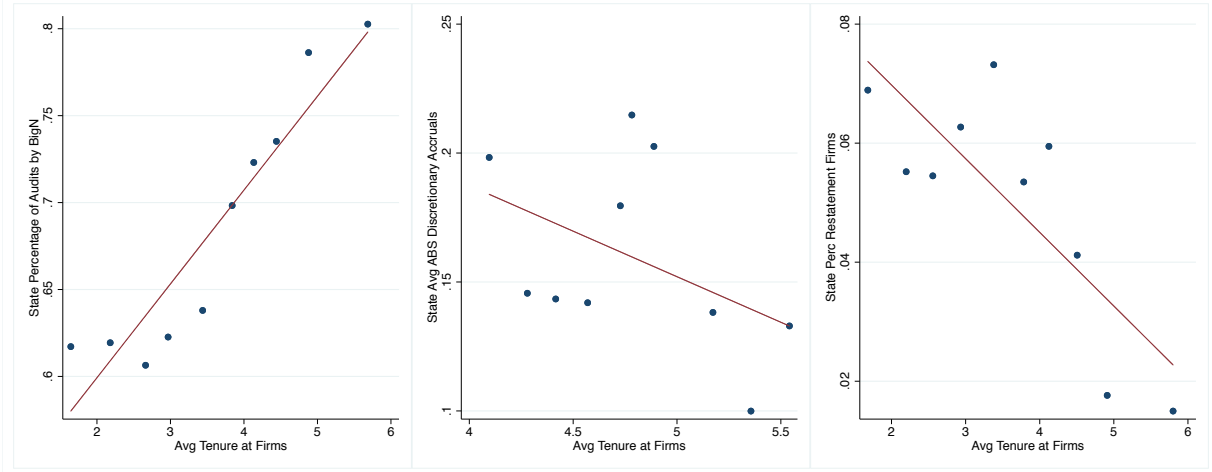
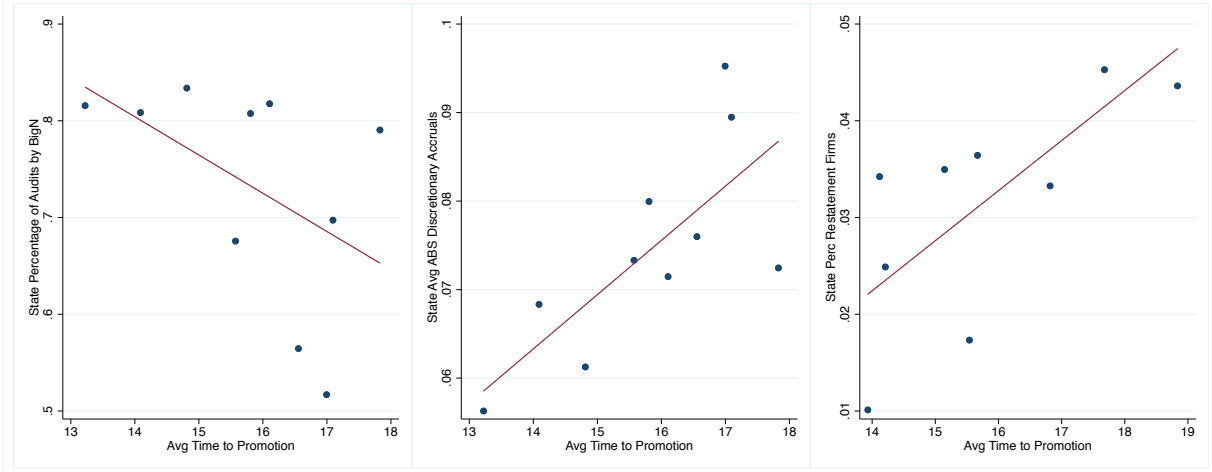
Figure 1: Labor Market Outcomes and Audit Quality

Panel A: Tenure at Firms



Panel B: Time to Promotion



The figure above graphs the relation between the labor market quality measures and three audit quality proxies for the 11 states used in the labor market tests. The labor market measures Tenure at the Firm (Panel A) and Time to Promotion (Panel B) are averaged up to the state level and then over the years 1995-2015 of the sample. The audit quality measures (BigN Audit, Absolute Discretionary Accruals, and Restatements) are constructed using data from Compustat and Audit Analytics. The sample includes firms with financial data to generate discretionary accruals and information on the auditor signing the annual report. The audit quality measures are aggregated up to the state level based on the firm's auditor state; these state-level measures are then averaged over the 20 years of the sample. Thus, BigN Audits is the percentage of firms in the state audited by a BigN auditor averaged over the sample; average absolute discretionary accruals are the weighted average absolute discretionary accruals of firms in the state averaged over the sample years, and percent restatements is the percent of firms in the state restating averaged over the sample years.

Table 1: University-Level CPA Exam Descriptive Statistics

	Full Sample Mean/ Median	Non-Rule Mean / Median	Rule Mean / Median
Number of Candidates	20	21	15
	(12.00)	(13.00)	(10.00)
Passed All	3.57	3.75	2.87
	[16%]	[16%]	[17%]
	(2.00)	(2.00)	(1.01)
Passed None	10.97	11.77	7.79
	[56%]	[57%]	[54%]
	(7.00)	(7.00)	(5.00)
Observations	18,875	15,095	3,780

This table presents the descriptive statistics on the number of candidates taking the CPA exam. The sample consists of observations at the university level from test sittings from the years 1984 to 2004. Number of Candidates is the number of first-time test takers in the specific sitting from the university. Passed All is the number of first-time test takers who passed all four sections of the exam in a sitting. Passed None is the number of first-time test takers who fail all four sections of the exam in a sitting. The observations have been split between the pre- and post-periods of states implementing the Rule. The average percentages for Passed All and None are reported in brackets. Observations from states without observations in either the pre-period or post-period have been deleted from the descriptive table.

Table 2: CPS Descriptive Statistics

	Obs.	Mean	Std.Dev	25%	Median	75%
Earnings	6,996	47,684	60,727	18,000	34,000	57,000
Age	6,996	38.8	12.5	28	37	47
White	6,996	.90	.299	1	1	1
Male	6,996	.57	.495	0	1	1
Married	6,996	.68	.466	0	1	1
Years of Schooling	6,996	15.9	1.48	16	16	16
Rule	6,996	.64	.481	0	1	1

The sample includes observations of individuals from the Current Population Survey who are in the accounting profession. The table presents the number of observations, sample average, standard deviation, 25th percentile, median, and 75th percentile for each variable. The variables reported are: Earnings is the annual wage and salary reported by an individual stated in 2009 real dollars; Age is the age in years of the individual at the time of the survey; White is an indicator variable set to one if the individual identifies as white caucasian; Male is an indicator variable set to one if the individual is male and zero otherwise; Married is an indicator variable set to one if the individual is married and zero otherwise; Years of Schooling is the number of years an individual has been in school; Rule is an indicator variable that is set to one if an individual is in a Rule state while the Rule is being implemented and zero otherwise.

Table 3: CPA Sample: Career and Education Descriptives

Panel A: Full Sample

	Full Sample				Non-Rule				Rule				Diff in Means
	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.	Rule-Non
Male	8,793	0.610	1	0.488	5,593	0.632	1	0.482	3,200	0.571	1	0.495	-0.061***
Number of Jobs	8,793	5.296	5	2.958	5,593	5.885	5	3.101	3,200	4.267	4	2.358	-1.618***
Years per Job	8,793	4.350	3.083	4.467	5,593	5.167	3.633	5.092	3,200	2.922	2.250	2.516	-2.244***
Big N	8,793	0.637	1	0.481	5,593	0.619	1	0.486	3,200	0.667	1	0.471	0.048***
Tax	8,793	0.212	0	0.409	5,593	0.201	0	0.401	3,200	0.231	0	0.422	0.030***
Year Graduated	8,793	1997	1999	11.193	5,593	1992.880	1993	10.061	3,200	2006.714	2008	6.754	13.834***
Number of Degrees	8,793	1.546	1	0.638	5,593	1.516	1	0.625	3,200	1.600	2	0.656	0.084***
Master's Degree	8,793	0.504	1	0.500	5,593	0.476	0	0.499	3,200	0.553	1	0.497	0.078***
Non-Accounting Master's	8,793	0.259	0	0.438	5,593	0.285	0	0.452	3,200	0.213	0	0.410	-0.072***
Accounting Master's	8,793	0.245	0	0.430	5,593	0.190	0	0.393	3,200	0.340	0	0.474	0.150***

Panel B: Rule Matched Sample Based on Age & Gender

	Full Sample				Non-Rule				Rule				Diff in Means
	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.	Rule-Non
Male	5,818	0.576	1	0.494	2,909	0.576	1	0.494	2,909	0.576	0	0.494	0.000
Number of Positions	5,818	4.387	4	2.329	2,909	4.412	4	2.313	2,909	4.362	4	2.345	-0.050
Years Per Job	5,818	3.017	2.306	2.614	2,909	3.001	2.259	2.657	2,909	3.033	2.347	2.570	0.033
Big N	5,818	0.656	1	0.475	2,909	0.627	1	0.484	2,909	0.684	1	0.465	0.057***
Tax	5,818	0.196	0	0.397	2,909	0.160	0	0.366	2,909	0.232	0	0.422	0.072***
Year Graduated	5,818	2005	2007	6.395	2,909	2005	2007	6.395	2,909	2005.802	2007	6.395	0.000
Number of Degrees	5,818	1.529	1	0.637	2,909	1.455	1	0.606	2,909	1.604	2	0.657	0.149***
Master's Degree	5,818	0.490	0	0.500	2,909	0.423	0	0.494	2,909	0.557	1	0.497	0.134***
Non-Accounting Master	5,818	0.203	0	0.403	2,909	0.193	0	0.395	2,909	0.214	0	0.410	0.021
Accounting Master	5,818	0.287	0	0.452	2,909	0.230	0	0.421	2,909	0.343	0	0.475	0.113***

This table presents the descriptive statistics on the demographics, career outcomes, and educational choices for the sample of certified public accountants drawn from the professional networking website. Apart from providing the number of observations, sample average, median, and standard deviation for each variable in the full sample, I also provide descriptive statistics for the subsample of Rule and non-Rule individuals. Differences in means between the Rule and non-Rule samples are also provided. The significance of the difference is evaluated parametrically using student t-tests, reported in parentheses, and non-parametrically, using the Wilcoxon rank-sum test, reported in brackets. Panel A provides the descriptives for the full sample while Panel B provides descriptives for a matched sample, where Rule individuals are matched to Non-Rule individuals based on the year they enter the labor market and gender. The variables reported are the following: Male is an indicator variable set to one if the individual is male and zero otherwise; Number of Positions is a count of the number of positions that the individuals have held in their career, as reported in their profile; Years per Job is the length of time spent at each position for each individual; Big N is an indicator variable set to one if the individual has worked at an international accounting firm such as Deloitte, PWC, E&Y, KPMG, or Arthur Andersen; Tax is an indicator variable set to one if the individual has worked in the area of tax as designated by his position or firm; Year Graduated, is the year in which the individual received his degree before entering the labor market; Number of Degrees, is the total number of degrees above the high school degree that the individual reports; Master's Degree is an indicator variable set to one if the individual reports any postgraduate degree; Non-Accounting Masters is an indicator variable set to one if the individual reports a non-accounting-specific master's such as an MBA; Accounting Masters is an indicator variable set to one if the individual reports an accounting specific master's such as MACC or MST. The final three columns of each panel provide differences in means between the groups as well as the significance of the difference using student t-tests and nonparametric Wilcoxon rank-sum tests. Significance levels are indicated by: * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 4: The Rule's Effect on the Supply of CPAs

	(1) Num Cand β / t-stat	(2) Pass All β / t-stat	(3) Pass None β / t-stat
Rule	-0.151**	-0.106**	-0.147**
	(-2.621)	(-2.486)	(-2.214)
Year Before Adoption	0.213***	0.005	0.279***
	(5.176)	(0.208)	(5.779)
May Sitting	-0.086***	-0.092***	-0.049**
	(-2.990)	(-3.556)	(-2.157)
Year Fixed Effect	Yes	Yes	Yes
University Fixed Effect	Yes	Yes	Yes
University Specific Time Trend	Yes	Yes	Yes
Adjusted R-squared	0.465	0.581	0.344
N	25,768	25,768	25,333
F-Test Rule(All)=Rule(None)		0.56	

The sample consists of observations of first-time test takers at the university level for test sittings from the years 1984 to 2004. The dependent variables are: the log number of candidates (Column 1), the log number of test takers passing all four sections of the exam (Column 2) and the log number of test takers failing all four sections of the exam (Column 3). The variable of interest Rule, is an indicator variable set to one for state years in which the Rule is in effect and zero otherwise. Year Before Adoption, controls for any run-up in the exam and is an indicator variable equal to one in the year before the Rule is implemented and zero otherwise. Additionally, I control for the month of the sitting by using May Sitting, which is an indicator variable set to one if the sitting is in May and zero otherwise. Finally, each model includes year and university fixed effects to control for unobservable invariant variation within years and universities and include university specific time trends. An F-test is conducted on the statistical difference between the coefficients on Rule in the Pass All and Pass None specifications. Standard errors are clustered at the university level. Significance levels are indicated by: * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 5: The Rule's Effect on Accountants' Earnings

	(1) Log Earnings β / t-stat	(2) Log Earnings β / t-stat	(3) Log Earnings β / t-stat
Age	0.080***	0.080***	0.080***
	(15.706)	(15.645)	(15.415)
Age Squared	-0.001***	-0.001***	-0.001***
	(-13.990)	(-13.971)	(-13.780)
Male	0.365***	0.363***	0.364***
	(13.360)	(13.227)	(13.279)
White	0.062**	0.066**	0.066**
	(2.223)	(2.421)	(2.408)
Schooling	0.103***	0.103***	0.103***
	(10.731)	(10.770)	(10.705)
Married	0.185***	0.186***	0.186***
	(7.752)	(7.811)	(7.685)
Rule		0.098**	0.096*
		(2.433)	(1.589)
Grandfathered			0.124***
			(3.602)
Cohort Fixed Effects	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes
Adjusted R-squared	0.376	0.377	0.377
N	6,994	6,994	6,994
			Rule=GrandFather
F-test			2.562
Prob > F			0.116

The sample includes observations of individuals from the Current Population Survey who are in the accounting profession. This table reports the parameter estimates of log-earnings models. The dependent variable is the log earnings of accountants. Age is the age in years of the individual at the time of the survey; White is an indicator variable set to one if the individual identifies as white caucasian; Male is an indicator variable set to one if the individual is male and zero otherwise; Married is an indicator variable set to one if the individual is married and zero otherwise; Years of Schooling is the number of years an individual has been in school; Rule is an indicator variable that is set to one if an individual is in a Rule state while the Rule is being implemented and zero otherwise. Column 1 reports the baseline model with year and state fixed effects, while Column 2 introduces the Rule. Column 3 separates CPAs who are not subject to the Rule's education requirement (Grandfathered) and compares their wage increase to those who complied with the rule. Standard errors are clustered at the state level and the t-statistic is reported in parentheses. Significance levels are indicated by: * p $\leq$ 0.10, ** p $\leq$ 0.05, *** p $\leq$ 0.01. Robust F-statistics in parentheses.

Table 6: The Rule's Effect on Career Outcomes

Panel A: The Effect of the Rule on Time to Promotion

	Time until Promotion				Time to Partner		
	Level-2		Level-3		Full Sample	Big N	Non-Big N
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rule	1.032	1.034	0.947	1.018	1.218	1.057	1.162
	(0.87)	(1.49)	(-1.04)	(0.16)	(1.29)	(1.68)	(0.95)
Male	1.285***	1.206***	0.834***	0.892*	1.107	0.513	1.119
	(6.75)	(4.99)	(-3.35)	(-2.00)	(1.19)	(-1.27)	(1.27)
Cohort Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	No	Yes	No	Yes	Yes	Yes	Yes
LR Chi2	321.87***	305.47***	204.60***	155.02***	92.12***	5.60	87.86****
N	3209	3209	1467	1467	803	52	751

Panel B: The Rule's Effect on Firm Tenure

	Firm Tenure			Tenure at Big N	
	Log Avg Tenure β / t-stat	Log Firms β / t-stat	Num Firms β / t-stat	Time in Big N hazard rate / t-stat	Log Time Big N β / t-stat
	(1)	(2)	(3)	(4)	(5)
Effected by 150	-0.011	0.006	-0.004	0.991	-0.008
	(-0.523)	(0.299)	(-0.218)	(0.037)	(0.034)
Male	0.000	0.025**	0.026**	0.986	0.004
	(0.037)	(2.238)	(2.520)	(0.029)	(0.032)
Big N First	0.029**	-0.112***	-0.084***		
	(2.575)	(-9.917)	(-8.074)		
Cohort Fixed Effects	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.347	0.208	0.055	0.299	0.266
N	9,932	9,932	9,932	5,550	5,081

The sample consists of observations of CPAs from the networking website. Panel A examines time to promotion. The panel reports the estimates from Cox proportional hazard models on the effect of the rule on the time to promotion in Columns 1 - 4 and the time to partner in Columns 5 - 7. The variable of interest Rule is an indicator for an individual subject to the Rule. Male, is an indicator variable that is one if the individual is a male and zero otherwise. All models include state fixed effects and cohort fixed effects. The dependent variables are: the number of years to promotion to level-2 seniority (Columns 1 and 2) and the number of years to promotion to level-3 seniority positions (Column 3 and 4). The dependent variable becomes the number of year to promotion to partner for an individual in Columns 5 - 7. The time to partner model is estimated separately on Big N and non-Big N partner samples in Columns 6 and 7. In Panel B, the effects of the Rule on firm matching is analyzed. Column (1) to (3) include the full observations of firm tenure's, and Column (5) to (7) include the subsample of the individuals' at Big N tenure. The dependent variables are: Log Avg Tenure (Column 1) which is an individual's log average tenure at the various firms they have worked in, Log Firms (Column 2) which is the log number of firms, and Num Firms (Column 3) which is the number of unique firms an individual has worked in during their career. The variable of interest is Rule which is an indicator for an individual being subject to the Rule. Gender, is an indicator variable that is one if the individual is a male and zero otherwise. Began Career at Big N is an indicator variable that is one for individuals whose first employment is at a Big N public accounting firm and zero otherwise. Each model includes state fixed effects to control for time-invariant state economic effects. Finally, cohort fixed effects are used to control for the year individuals entered the market. Columns 1 and 2 are estimated using OLS, Column 3 is estimated as a negative binomial regression to take into account the count nature of the dependent variable Number of Firms, Column 4 is estimated as a Cox proportional hazard regression, and Column 5 is estimated using OLS. in the case of Cox Hazard models, the coefficients are exponentiated for ease of interpretation and Z statistics are reported in parentheses. In the case of OLS models, I report the coefficient and t-statistics in parentheses. Standard errors are clustered at the individual level. Significance levels are indicated by: * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Table 7: Master's vs. Undergraduate Degree Analysis

Panel A: Descriptives and Average Tenure per Position for Master's vs. Undergraduate Degree Holders

	Descriptives					Average Tenure at each Position		
	Total	Undergrad	Master's	Diff-Mean		Undergrad	Master's	Diff_Mean
Num of Jobs	4.976	5.011	4.942	-0.068	**Position 1**	4.460	4.060	-0.401***
	[2.740]	[2.768]	[2.711]	[-0.802]		[4.973]	[4.229]	[-2.787]
Avg Years per Job	3.872	4.017	3.727	-0.290**	**Position 2**	3.695	3.534	-0.161
	[3.838]	[4.059]	[3.598]	[-2.424]		[4.396]	[4.332]	[-1.146]
Big N	0.646	0.639	0.653	0.014	**Position 3**	3.424	3.152	-0.273**
	[0.478]	[0.481]	[0.476]	[0.944]		[4.197]	[3.454]	[-2.069]
Tax Specialist	0.213	0.211	0.216	0.005	**Position 4**	3.083	2.903	-0.180
	[0.410]	[0.408]	[0.412]	[0.418]		[3.422]	[3.105]	[-1.450]
Grad Year	2000.420	2000.420	2000.420	0.000	**Position 5**	2.860	2.876	0.017
	[10.187]	[10.189]	[10.189]	[0.000]		[3.139]	[3.116]	[0.121]
Num Degrees	1.684	1.420	1.949	0.528***				
	[0.663]	[0.607]	[0.609]	[27.883]				

Panel B: Cox Proportional Hazard Model for the Effects of a Master's Degree on Promotion (Matched Sample)

	Level-2 Seniority Promotions			Level-3 Seniority Promotions		
Master's Degree	1.136**	1.134**	1.139*	1.185**	1.185**	1.169*
	(3.02)	(2.97)	(2.21)	(3.21)	(3.20)	(2.45)
Male		1.029	1.027		1.010	1.007
		(0.66)	(0.62)		(0.18)	(0.12)
Rule			1.076			1.033
			(0.83)			(0.37)
Masters × Rule			0.991			1.043
			(-0.10)			(0.37)
Cohort Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
LR Chi2	617.02***	617.45***	618.25***	155.01***	155.04***	155.55***
N	2,331	2,331	2331	1,497	1,497	1497

The sample consists of observations of CPAs from the networking website. Panel A reports the descriptive statistics on the demographics, career outcomes, and educational choices for the sample of masters and undergraduate certified public accountants drawn from the professional networking website. Apart from providing the number of observations, sample average, median, and standard deviation for each variable in the full sample, I also provide descriptive statistics for the subsample of masters and undergraduate individuals. In the second sub-panel the average and median tenure at the first five positions for individuals with just an undergraduate or a master's degree are reported. The final column reports differences in means. The significance of the difference is judged using a student t-test. Panel B reports estimates from a Cox proportional hazard model on the effects of the Master's degree on the time to promotion. The dependant variables are: the number of year to promotion to level-two seniority (Models 1, 2, and 3) and the number of years to promotion to level-three seniority positions (Models 4, 5, and 6). The variable of interest Master is an indicator for an individual having a master's degree. Male, is an indicator variable that is one if the individual is a male and zero otherwise. Rule is an indicator for an individual being exposed to the Rule. Master*Rule is an indicator variable that is one for Rule CPAs who have a master's degree. All models include state fixed effects and cohort fixed effects. The coefficients are exponentiated for ease of interpretation and Z statistics are reported in parentheses. Standard errors are clustered at the individual level. Significance levels are indicated by: * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

A 150-Hour Rule Jurisdiction Adoption List

Jurisdiction	Effective Date	Adoption Rank	Jurisdiction	Effective Date	Adoption Rank
Florida	8/1/83	1	**West Virginia**	2/15/00	27
Tennessee	4/14/93	2	**Guam**	6/1/00	28
Utah	7/1/94	3	**Idaho**	7/1/00	29
Alabama	1/1/95	4	**New Jersey**	7/1/00	30
Mississippi	2/1/95	5	**Washington**	7/1/00	31
Louisiana	12/31/96	6	**Hawaii**	12/31/00	32
Kansas	6/30/97	7	**Alaska**	1/1/01	33
Montana	7/1/97	8	**Illinois**	1/1/01	34
South Carolina	7/1/97	9	**Iowa**	1/1/01	35
Texas	8/31/97	10	**Nevada**	1/1/01	36
Arkansas	1/1/98	11	**North Carolina**	1/1/01	37
Georgia	1/1/98	12	**Wisconsin**	1/1/01	38
Nebraska	1/1/98	13	**Massachusetts**	7/1/02	39
South Dakota	1/1/98	14	**Maine**	5/1/03	40
Missouri	6/30/99	15	**Michigan**	7/1/03	41
Maryland	7/1/99	16	**Oklahoma**	7/1/03	42
Rhode Island	7/1/99	17	**Arizona**	6/30/04	43
Connecticut	1/1/00	18	**New Mexico**	7/1/04	44
Indiana	1/1/00	19	**Minnesota**	6/1/06	45
Kentucky	1/1/00	20	**Virginia**	7/1/06	46
North Dakota	1/1/00	21	**New York**	8/1/09	47
Ohio	1/1/00	22	**Pennsylvania**	1/1/11	48
Oregon	1/1/00	23	**Delaware**	8/1/12	49
Puerto Rico	1/1/00	24	**California**	1/1/14	50
Wyoming	1/1/00	25	**New Hampshire**	7/1/14	51
District of Colombia	1/2/00	26	**Vermont**	7/1/14	52
			Colorado	7/1/15	53

This table reports the year in which the Rule became effective (Effective Date) in each jurisdiction. Additionally, the order of adoption is reported in the Adoption Rank column.

B Professional Networking Sample States' Descriptives

State	Effective Date	Initial Profiles	Clean Profiles	16-yr. Avg. Num of Accountants	Rank of State	16-yr. Avg. % Contribution of State to U.S. GDP	Rank of State
Florida	8/1/83	2,500	2,264	61,523	4	5.13%	4
Texas	8/31/97	2,500	2,278	77,239	3	7.99%	2
Georgia	1/1/98	2,500	2,285	26,824	12	2.88%	10
Connecticut	1/1/00	2,500	2,292	15,836	23	1.57%	23
Pennsylvania	1/1/00	2,500	2,313	43,044	6	3.93%	6
Illinois	1/1/01	2,500	2,288	46,916	5	4.61%	5
Massachusetts	7/1/02	2,500	2,303	29,146	11	2.63%	13
Michigan	7/1/03	2,500	2,288	30,426	10	2.95%	9
New York	8/1/09	2,500	2,412	86,478	2	7.77%	3
California	1/1/14	2,500	2,338	114,859	1	13.13%	1
Colorado	7/1/15	2,500	2,292	22,872	13	1.74%	21

This appendix provides the adoption dates of the 150-Hour Rule for the eleven selected states. Additionally, descriptive data is provided with regard to the average number of accountants in the state, the state's rank in terms of accountants, the state's 16-year average contribution to national Gross Domestic Product as well as the rank of each state in each of the categories.

C Sample Selection and Screens

	Initial Sample Downloaded Resumes				Sample with Clean Work Experience				Reports Education			
State	**Non-Rule**	**Rule**	**Total**	**%**	**Non-Rule**	**Rule**	**Total**	**%**	**Non-Rule**	**Rule**	**Total**	**%**
CALIFORNIA	2,181	157	2,338	9.22	924	45	969	9.63	777	41	818	9.30
COLORADO	2,227	65	2,292	9.04	879	16	895	8.89	790	15	805	9.16
CONNECTICUT	1,118	1,169	2,287	9.02	530	475	1,005	9.99	469	432	901	10.25
FLORIDA	190	2,074	2,264	8.93	90	754	844	8.39	78	637	715	8.13
GEORGIA	926	1,359	2,285	9.01	380	465	845	8.40	333	411	744	8.46
ILLINOIS	1,146	1,142	2,288	9.03	436	349	785	7.80	385	305	690	7.85
MASSACHUSETTS	1,214	,1089	2,303	9.09	567	409	976	9.70	497	357	854	9.71
MICHIGAN	1,198	1,090	2,289	9.03	598	373	971	9.65	537	344	881	10.02
NEW YORK	1,914	498	2,412	9.52	876	146	1,022	10.16	764	120	884	10.05
PENNSYLVANIA	1,821	492	2,313	9.12	747	119	866	8.60	631	84	715	8.13
TEXAS	887	1391	2,278	8.99	368	518	886	8.80	332	454	786	8.94
Total	14,822	10,526	25,348	100	6,395	3,669	10,064	100	5,593	3,200	8,793	100

This appendix reports the sampling procedure for the sample of CPA resume. It displays how the sample is reduced given the requirements for each individual to report their work experience and educational histories.

D Seniority Classification Scheme

Panel A: List of Titles included in Each Seniority Level

Level-1: Low Seniority	%	Level-2: Medium Seniority	%	Level-3: High Seniority	%
Staff Accountant	11.35	Senior Accountant	3.49	Controller	11.95
Associate	3.66	Senior Auditor	2.38	Chief Financial Officer	6.36
Audit Associate	3.27	Manager	2.20	CFO	4.57
Auditor	3.26	Tax Manager	2.02	Assistant Controller	3.13
Accountant	3.17	Senior Associate	1.80	Corporate Controller	2.65
Tax Associate	2.68	Audit Manager	1.79	Partner	2.12
Internal Auditor	2.28	Senior Manager	1.75	President	1.93
Staff Auditor	2.10	Accounting Manager	1.70	Owner	1.67
Assurance Associate	1.85	Consultant	1.56	Vice President	1.48
Administrative Staff	1.61	Audit Senior	1.24	Financial Controller	0.88
Bookkeeper	1.15	Financial Analyst	1.10	VP Finance	0.62
Accounting Assistant	1.02	Director	0.99	Vice President of Finance	0.52
Tax Accountant	1.02	Senior Financial Analyst	0.95	Assistant Corporate Controller	0.49
Audit Staff	0.62	Director of Finance	0.82	CEO	0.47
Accounting Clerk	0.60	Finance Manager	0.76	Managing Partner	0.45

Panel B: Descriptives

Full Sample

		Obs	Mean	Median	Std. Deviation
Low Seniority	**Time to Promotion**	7,167	3.058	0.833	6.270
	Job Order	7,167	2.252	2.000	1.776
Medium Seniority	**Time to Promotion**	23,493	9.061	6.583	9.347
	Job Order	23,493	3.965	3.000	2.673
High Seniority	**Time to Promotion**	10,995	15.533	13.750	12.117
	Job Order	10,995	5.206	5.000	2.916

This appendix provides examples of job titles that have been classified as belonging to one of the three seniority groups. High seniority positions contain jobs titles that make reference to top-level corporate officers in corporations or partners in public accounting firms. The medium seniority group contains job titles that refer to middle-management positions as well as senior positions at firms. Finally, the low seniority group contains job titles of entry-level positions at the firm. Panel A provides examples of titles that have been classified into each of the seniority levels. Panel B provides descriptive statistics on the average rank order position of titles in individuals careers as well as the average time spent in each level (for the high seniority it is the time individuals take to get to these positions).

E Career Outcomes Descriptive Sample Statistics

Panel A: Average Tenure per Position for Matched Sample Based on Age and Gender

	Full Sample		Rule		Non-Rule		Diff in Means
	Obs.	**Mean**	**Obs.**	**Mean**	**Obs**	**Mean**	**Rule-Non**
1st Position Tenure	5,818	3.695	2,909	3.531	2,909	3.859	-0.328*
2nd Position Tenure	5,322	2.584	2,700	2.665	2,622	2.501	0.164
3rd Position Tenure	4,549	2.359	2,289	2.468	2,260	2.248	0.220**
4th Position Tenure	3,527	2.400	1,723	2.330	1,804	2.468	-0.138
5th Position Tenure	2,538	2.204	1,196	2.147	1,342	2.254	-0.107

Panel B: Matched Sample – Promotion Times

	Full Sample		Rule		Non-Rule		Diff in Means
	Obs.	Mean	Obs.	Mean	Obs.	Mean	Rule-Non
Low Seniority	3,598	3.444	1,799	3.481	1,799	3.407	0.074
Medium Seniority	2,910	5.647	1,455	5.671	1,455	5.623	0.048
High Seniority	840	5.426	420	5.404	420	5.448	-0.043

This appendix examines the difference between rule and non-rule individuals along the lines of tenure and time to promotion. It uses a matched sample of Rule individuals matched to non-Rule individuals based on year of graduation and gender from the networking website. Panel A reports the average and median tenures at the first five positions for individuals in the sample for Rule and non-Rule individuals. The last column reports the differences in means between the Rule and the non-Rule groups. Panel B provides the average, median, and standard deviation for time to promotion for low, medium, and high seniority positions for the full sample and the Rule and non-Rule sub-samples. The difference in means between the Rule and non-Rule samples are reported in the final column. The significance of the difference in means in both panels is evaluated parametrically using a student t-test. Significance levels are indicated by: * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

F Variable Definitions

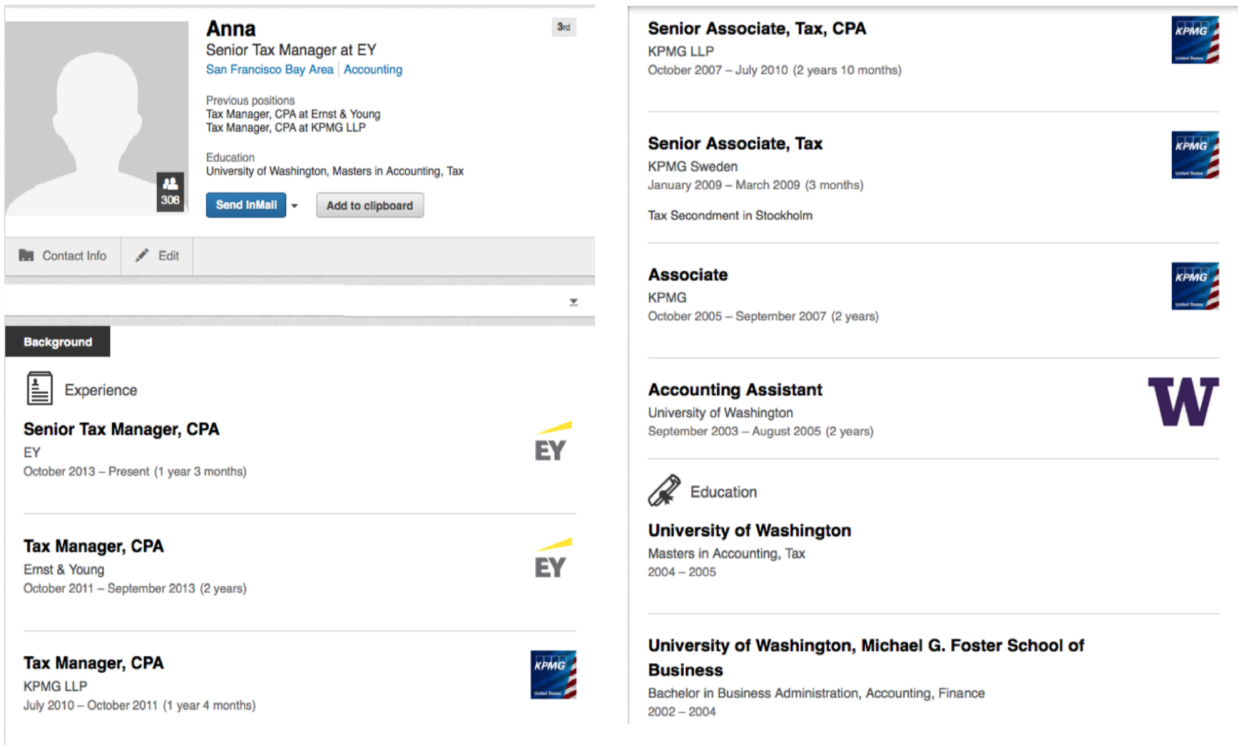
Variable	Definition
	Supply Test
Number of Candidate	The number of candidates
Passed All	The number of first-time test takers who passed all four sections of the exam in a sitting
Passed None	The number of first-time test takers who fail all four sections of the exam in a sitting
Rule	An indicator variable set to one in state years in which the Rule is in effect and zero otherwise
Year before Adoption	An indicator variable equal to one in the year before the Rule is implemented and zero otherwise
May Sitting	An indicator variable set to one if the sitting is in May and zero otherwise
	Wage Test
Earnings	The annual wage and salary reported by an individual stated in 2009 real dollars
Age	The age in years of the individual at the time of the survey
White	An indicator variable set to one if the individual identifies as white Caucasian
Male	An indicator variable set to one if the individual is male and zero otherwise
Married	An indicator variable set to one if the individual is married and zero otherwise
Years of Schooling	The number of years an individual has been in school
Grandfathered	CPAs in rule states who are not subject to the Rule's education requirement because they obtained their license before its enactment
	Career Outcome
Number of Jobs	A count of the number of jobs that the individuals have held in their career, as reported in their profile
Years per Job	The length of time spent at each position for each individual
Tax	An indicator variable set to one if the individual has worked in the area of tax as designated by his position or firm
Years Graduated	The year in which the individual received his degree before entering the labor market
Number of Degrees	The total number of degrees above the high school degree that the individual reports
Master's Degree	An indicator variable set to one if the individual reports any postgraduate degree
Non-Accounting Master's	An indicator variable set to one if the individual reports a non-accounting-specific master's such as an MBA
Accounting Master's	An indicator variable set to one if the individual reports an accounting specific master's such as MACC or MST
Number of Positions	A count of the number of positions that the individuals have held in their career, as reported in their profile

	Career Outcome Continued
Log Avg Tenure	Logarithm of an individual's average tenure at the various firms they have worked in
Log Firms	Logarithm of the number of unique firms an individual has worked in during their career
Num Firms	The number of unique firms an individual has worked in during their career
Master's Degree	An indicator for an individual having a master's degree
Masters × Rule	An indicator variable that is one for Rule CPAs who have a master's degree
Level-2 Seniority Promotions	The number of year to promotion to level-two seniority
Level-3 Seniority Promotions	The number of years to promotion to level-three seniority positions

Online Appendix

Online Appendix 2: Example of Data Processing of the Resume

This online appendix displays how the raw profile pages of the professional networking website are converted into machine-readable data. Below is a fictitious example of a raw resume.



The profile contains a section of an individual's career experience as well as an educational section. These sections are parsed to generate two datasets like the ones below. The experience section is processed by giving each job position a unique job id and then extracting the firm name, the position title as well as start and end dates. The educational information is then processed by assigning each degree a unique degree id and then extracting the university name, degree, and start and end dates.

Processed (Machine Readable) Data

Job_ID	Firm	Title	Start	End
1	KPMG	Associate	Oct-05	Sep-07
2	KPMG Sweden	Senior Associate, Tax	Jan-09	Mar-09
3	KPMG LLP	Senior Associate, Tax, CPA	Oct-07	Jul-10
4	KPMG LLP	Tax Manager, CPA	Jul-10	Oct-11
5	Ernst & Young	Tax Manager, CPA	Oct-11	Sep-13
6	EY	Senior Tax Manager, CPA	Oct-13	.

Degree_ID	University	Degree	Start	End
1	University of Washington	Bachelor in Business Administration, Accounting, Finance	2002	2004
2	University of Washington, Michael G. Foster School of Business	Masters in Accounting, Tax	2004	2005

The graduation (in 2004) from her undergraduate degree allows me to define her age at graduation as 22. In the case of matching this individual, I would do it on the year they entered the labor market: 2005.

Online Appendix 3: Description of State Level Construction of Audit Quality Measures

In this online appendix, I describe the construction of the state level measures of audit quality I use to validate my labor market measures. I focus on three widely used measures of audit quality: 1) BigN Audits, 2) Absolute Discretionary Accruals, and 3) Restatements as these have been commonly used in the prior literature as proxies for audit quality (Defond and Zhnag 2014).

The sample to generate the audit quality measures is obtained from the intersection of Compustat industrial and research files and Audit Analytics. The sample is restricted to firms with complete data on assets, earnings, cash flow from operations, changes in accounts receivable, and changes in inventory between the years 1995 and 2015. I further require auditor information to construct the BigN audit measure. Given that the inability to match individual auditors to public firms I generate state-level measures for both the labor market measures and the audit outcome measures. I construct the state-level audit outcome measures by assigning firms to the state in which the audit firm signing the annual report is located. I then take a state average for the measures and further average over the years (1995-2015) to take care of any time-series issues at the state level.

The first measure of audit quality, BigN [1] Audits is calculated as the 10 year average state percentage of public firm audits conducted by the BigN. The literature views BigN as higher quality and thus to the extent that the measures of employee quality reflect quality we should expect to see a larger percentage of BigN audits in the states with higher employee outcome measures. The second audit quality measure is state average absolute discretionary accruals, these are calculated as the 20-year average level of absolute discretionary accruals in the state using a Jones expectation model. Thus, to the extent that the labor proxies capture high ability CPAs, we should see lower levels of absolute discretionary accruals. Finally, I use restatements as the third measure of audit quality. I measure restatements as sample period average percentage of firms in the state that have disclosed a material misstatement. If the labor market proxies capture individual quality, then we should expect lower restatements in states with higher quality labor market measures.

[1] I use BigN as the sample period includes years in which Arthur Anderson was also present thus it captures audits by the Big5 as well as the Big4 after the demise of Arthur Anderson.

Online Appendix 4: The 150-hour Rule and Audit Outcomes

In this appendix, I assess the rule's impact on various proxies for audit quality. To the extent that the rule changed the competency of CPAs entering the profession, we should expect to see changes in the quality of the audits conducted by these individuals. Conceptually, audit quality can be viewed as a function of accounting processes (e.g., accounting systems, internal controls, economic transactions, and regulations) and the personnel employed by both audit firms and clients to carry out these processes (e.g., auditors, accountants, and managers) (Francis 2011). Thus, the extra education and screening prompted by the rule can lead to increases in human capital, which should lead to better audits. Moreover, any improvements in the match quality of individuals and audit firms, as a result of the rule, should lead to lower turnover at audit firms which, could also improve audit quality by reducing turnover costs.

I proxy for audit quality using three prominent measures from the auditing literature: (1) discretionary (absolute discretionary) working capital accruals, (2) the likelihood of an accounting restatement, and (3) delays in producing the audit report (DeFond and Zhang (2014)). Discretionary accruals and their absolute levels have been widely used as earnings quality measures (Dechow et al. (2003)), and the assumption underlying it is that high-quality auditing constrains opportunistic earnings management. To focus on more direct measures of auditors' influences, I examine restatements and audit report lags. Restatements have been motivated as a reliable indicator of poor audit quality, as they represent instances where the auditor issued an unqualified opinion on misstated financial statements (e.g., Christensen et al. (2015); Aobdia (2016)). Finally, the auditing literature supports the notion that audit report lags, defined as the number of days between a fiscal year-end and the date of the audit report, relates to the work performed in an audit (Bamber et al., (1993); Knechel and Payne (2001)). The consensus is that the shorter the lag, the better the reporting system and quality of the audit.

My tests for the rule's effects on audit outcomes rely on data for U.S. public companies from Compustat North America and Audit Analytics. I limit observations to those in which I can calculate the various audit outcome (discretionary accruals, restatements, and audit report lag) and my control variables. The control variables include return on assets(ROA), operating cash flows(CFO)the natural log of the market value of equity (SIZE), leverage (LEV), and the market-to-book ratio(MTB).[1] Discretionary accruals are estimated using the performance-adjusted modified Jones model (Dechow et al., (1995) and Kothari et al., (2005)). The resulting sample consists of 114,464 observations, with all variables winsorized at the first and 99th percentiles by year. For specifications that require restatements, audit report lags, or auditor fixed effects, the sample is limited to observations at the intersection of Compustat and Audit Analytics, as Audit Analytics provides these variables as well as the unique identifier for each audit firm which are used in specifications with auditor fixed effects.

Online Appendix Table 1 presents descriptive statistics for the audit outcome measures and control variables used in the audit quality specifications. In addition to the audit outcome measures, each specification includes controls similar to those used in the literature as determinants for these outcomes—a large international audit-firm identifier (Big N), return

[1]See table in the end of the appendix for detailed variable descriptions.

Table A1: Audit Quality Sample

	N	Mean	Std.Dev	25%	Median	75%
Big N	116,235	0.720	0.449	0	1	1
Size	116,235	5.163	2.495	3.386	5.123	6.893
Leverage	116,235	0.284	0.466	0.022	0.191	0.371
MTB	116,235	2.784	7.257	0.959	1.809	3.397
ROA	116,235	-0.178	0.862	-0.114	0.020	0.074
CFO	116,235	-0.025	0.423	-0.029	0.066	0.133
Disc Accruals	116,235	-2.62e-11	0.391	-0.033	0.033	0.085
Abs Disc Accruals	116,235	0.157	0.359	0.033	0.068	0.135
Restatement	87,861	0.054	0.226	0	0	0
Log Audit Report Lag	62,772	4.354	0.343	4.127	4.331	4.500

The sample includes firm-year observations from COMPUSTAT and Audit Analytics databases with fiscal year-ends between 1995 and 2015. The table presents the number of observations, sample average, standard deviation, 25th percentile, median, and 75th percentile for each variable. The variables reported are: Big N is an indicator variable equal to one for firm-years with a Big-N auditor (i.e., if the value for Compustat's auditor variable is between one and eight); Size is the natural log of the market value of equity (CSHO × PRCC F); Leverage is total long-term debt (DLTT) plus total debt in current liabilities (DLC) scaled by total assets (AT); MTB is market value of equity (CSHO × PRCC F) divided by total stockholders' equity (SEQ); ROA is income before extraordinary items (IB) scaled by lagged total assets (AT); CFO is operating cash flows (OANCF) scaled by lagged total assets (AT); Disc Accruals is the value of discretionary accruals derived using the modified Jones model (see Dechow, Sloan, and Sweeney [1995]). Abs Disc Accruals is the absolute value of disc accruals. Restatement is an indicator variable equal to 1 if the current year financial statements are restated in the future and 0 otherwise. Classification is based on restatement data available in Audit Analytics. Restatements related to option backdating and leases are classified as non-restatements for purposes of variable construction. For purposes of aggregation at the state level, the variable represents the percentage of clients that experience a future restatement of the current year financial statements in the state; Log Audit Report is the natural logarithm of audit report lag, days between a firm's fiscal year-end and the audit report date.

on assets (ROA), operating cash flows (CFO), the natural log of the market value of equity (SIZE), leverage (LEV), and the market-to-book ratio (MTB). Consistent with the literature, discretionary accruals are on average close to zero in the cross-section, while absolute discretionary accruals are on average 15% of assets. In addition, 5.4% of firm-years contain a restatement, while the average log audit report lag is 4.35. Finally, 72% of the firm-years have a Big N auditor.

To empirically examine these relations, I conduct a difference-in-differences specification, using firms audited in rule periods versus nonrule periods. I use the staggered adoption dates of the rule to provide cross-sectional and time-series variation. A firm is assigned a state based on the city of the firm's headquarter. In more than 97% of the cases, the auditor is in the same state as the firm's headquarter.[2] Formally, I run the following fixed effect specification.

$$AuditQuality_{f,s,t} = \beta_1(Rule_{f,s,t}) + Controls + FixedEffects + c_{f,s,t}. \quad (1)$$

The variable of interest is Rule, which takes on a value of one in firm-state-years in which the rule is in place and zero otherwise. To further isolate the effects of the rule, I include

[2]The use of the auditor office is based on the fact that licensing is at the state level and auditors in a specific state are subject to the state's requirement. In untabulated tests, when I use the location of the office of the auditor signing the annual report to assign states my results remain quantitatively and statistically similar.

a number of control variables that the literature has shown to indicate audit outcomes. I include LNASSETS and Market to Book to control for the client's size and LOSS and ROA to control for financial performance. I control for Big N auditor, as the consensus from the literature is that firms with a Big N auditor have lower discretionary accruals (DeFond and Zhang (2014)). The sample I use to estimate the equation above is comprised of firm-year observations from the Compustat and Audit Analytics databases with fiscal year-ends between 1995 and 2015.[3] To help isolate the effect of the rule, I control for a number of additional factors using various fixed effects. First, I include year fixed effects to account for annual variations that can affect the various audit outcomes. The inclusion of state fixed effects capture state-invariant characteristics that can affect audit outcomes. To increase the precision of my estimates, in some specifications, I include firm fixed effects to account for time-invariant, firm-level factors that may impact audit outcomes and auditor fixed effects to account for auditor-specific effects on audit outcomes.

Online Appendix Table 2 provides the results for each of the audit quality proxies. Panel A presents the results for discretionary and absolute discretionary accruals under various fixed effect specifications. I document that the rule does not economically change the quality of the audits being conducted, with the coefficient on the rule being economically zero and statistically indistinguishable from zero, when controlling of either state or firm fixed effects. When auditor fixed effects are included (columns 3 and 4 and 7 and 8), the coefficient becomes positive, indicating that, if anything, there may be a slight deterioration in audit outcomes. (This effect becomes statistically significant when controlling for both client and auditor fixed effects.) With a 95% confidence interval, the models can reject that discretionary accruals went down by more than 0.4%, while absolute discretionary accruals changes were bounded to at least a 0.3% increase.[4] In Panel B, when more direct measures, such as restatements and audit report lag, are examined, I again fail to find any economic nor statistical significance of the rule's effect. For example, the coefficient of the Rule in the case of restatements is more than three standard deviations from the average level of restatements in the sample (using the estimate from column 2), implying that the result is not merely driven by measurement error.

[3]The sample for the audit fees and restatements begins in 2004, as this is when the information for the dependent variables is available in Audit Analytics. To maintain consistency with prior research, the sample excludes financial firms (single-digit SIC code equal to 6) and observations without sufficient data to calculate all the regression variables.

[4]These estimates where obtained by using the 95% confidence intervals around the estimate of the rule's effect from Columns 3 and 6 from Panel A.

Table A2: The Rule's Effect on Audit Outcomes

Panel A: Discretionary Accruals and Absolute Discretionary Accruals

	Disc Accruals				Abs Disc Accruals			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post Rule	0.001	0.000	0.008	0.008**	0.004	0.003	0.016**	0.007
	(0.253)	(0.057)	(1.257)	(2.114)	(0.996)	(0.667)	(2.485)	(1.294)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	No	Yes	No	Yes	No	Yes	No
Auditor FE	No	No	Yes	Yes	No	No	Yes	Yes
Adjusted R-squared	0.626	0.751	0.698	0.817	0.566	0.642	0.633	0.708
N	87,861	86,394	49,117	48,180	87,861	86,394	49,117	48,180

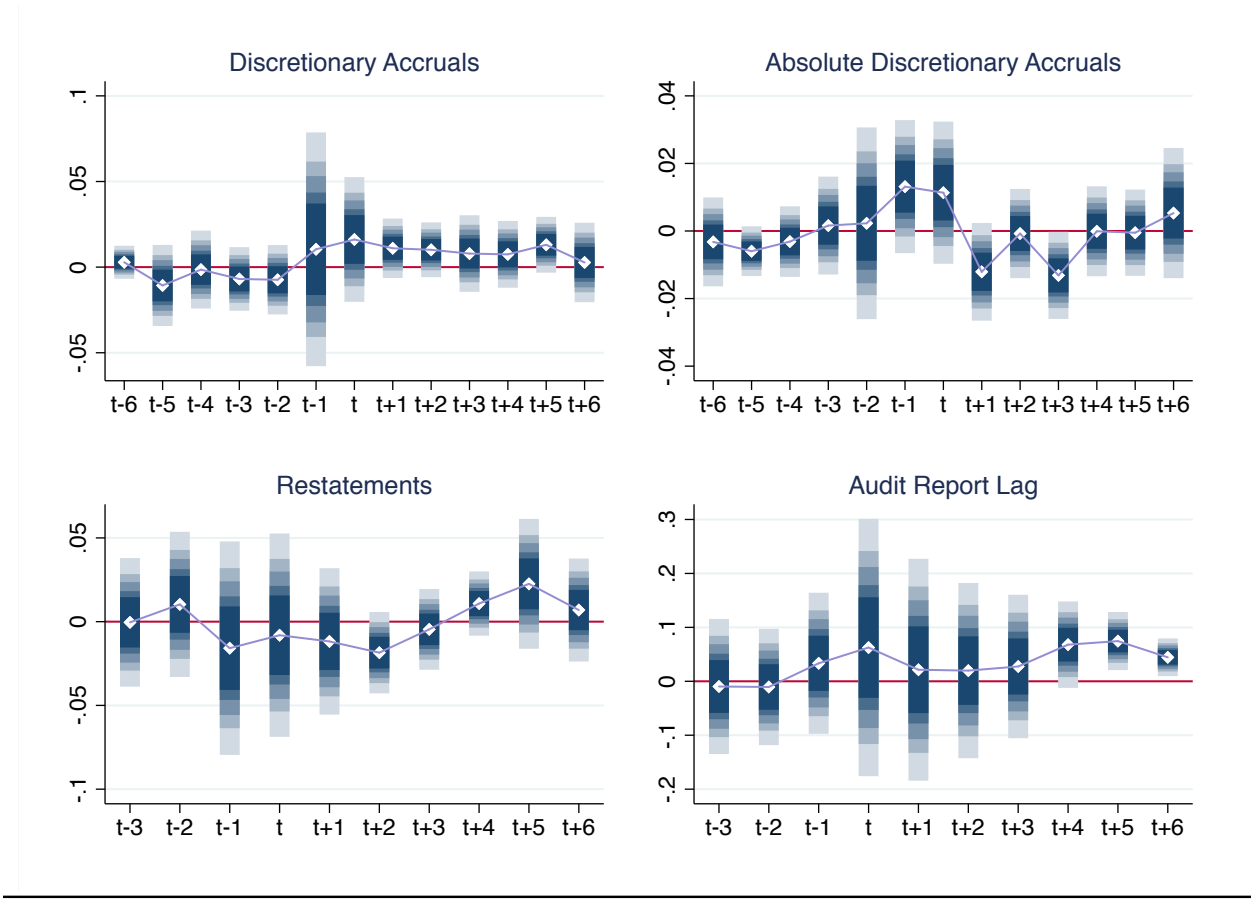
Panel B: Accounting Restatements and Audit Report Lag

	Restatement				Log Audit Report Lag			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post Rule	-0.003	-0.002	0.002	-0.004	0.000	0.000	-0.001	-0.003
	(-1.197)	(-0.744)	(0.329)	(-0.713)	(0.002)	(0.008)	(-0.243)	(-0.437)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	No	Yes	No	Yes	No	Yes	No
Auditor FE	No	No	Yes	Yes	No	No	Yes	Yes
Adjusted R-squared	0.032	0.054	0.024	0.064	0.413	0.544	0.426	0.566
N	87,861	86,394	49,117	48,180	62,771	61,416	48,158	47,228

The sample includes firm-year observations from the Compustat and Audit Analytics database. Each specification examines the rule's effect on audit outcomes. Panel A shows the results for discretionary accruals and absolute discretionary accruals while panel B displays the results for restatements and audit report lag. The sample excludes financial firms (single digit SIC code equal to 6) and observations without sufficient data to calculate all the regression variables. Each model run with covariates to control for determinants of audit outcomes. The control variables are: log Assets, Market to Book, an indicator for LOSS years, ROA to control for financial performance, and an indicator for Big N auditor. For each of the outcome measures (Disc Accruals, Abs Disc Accruals, Restatement, and Log Audit Report Lag), the last two columns have a reduced sample size because they only include firm-years that have an auditor identifier from Audit Analytics in order to run auditor fixed effects. Each model is run with year fixed effects either state or firm fixed effects and auditor fixed effects in order to control for unobservable invariant variation within firms, years, states and auditors. Standard errors are clustered at the state level and the t-statistic is reported in parentheses. Significance levels are indicated by: * $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

While the empirical specifications in Online Appendix Table 2 pools all the rule periods to determine the effect, there may be a delay in the rule's effect on audit outcomes, as it requires the new CPAs to rise to positions in their firms in which they can actually affect the quality of the audit. To examine this temporal variation, I break out the rule in event time for each of the audit outcome specifications. I construct indicators for the six years leading to the rule's enactment (this also helps assess trends in the pre-period between groups) as well as for the first six years after the rule. Online Appendix Figure A1 graphs these rule indicators for the various outcomes. Again, consistent with the results from above, there is a persistent zero effect on the various measures, with some evidence of a slight decrease in audit outcomes as seen by the spike in restatements around year 5 and the elevated levels of discretionary accruals in the later years. (These increases are statistically insignificant and economically small.) Overall, the tests on audit outcomes fail to find an economically significant effect of the rule on audit quality.

Figure A1: Rule's Effect on Audit Outcomes over Event Time



The figure above graphs the OLS coefficient estimates and confidence intervals based on standard errors clustered by state. The sample includes firm-year observations from 50 states over the period from 1985 to 2015 from the COMPUSTAT and Audit Analytics database. The sample includes firms with financial data to generate discretionary accruals and information on the auditor signing the annual report. I include the full set of control variables in Table 7 as well as firm and year fixed effects. To map out the pattern in audit outcomes, I include, in one regression, indicators for every year in the sample (except event year t-7) defined in event time. The pre-period is limited to t-3 pre-periods for restatement and audit lags given the data for these measures start post-2000.

Reducing a Barrier to Entry: The 120/150 CPA Licensing Rule*

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Abstract

In the United States, one of the most common state-level occupational licensing requirements is education. Education requirements for certified public accountants (CPAs) in many states have increased over the past few decades, but recently a few states have reduced their educational requirement to sit for the CPA exam. Using data from 2006 to 2016, we examine the effect of these changes on the number of first-time candidates sitting for the CPA exam and on candidate performance. Our results indicate that a reduction in the number of credit hours required to sit for the CPA exam increases the number of candidates, while an increase in the number of prerequisite hours reduces the number of candidates (the latter effect is sensitive to the inclusion of control variables). We also find no relationship between changes in CPA exam requirements and pass rates or scores. Hence, requiring 150 hours instead of 120 acts as a barrier to entry for potential CPAs with no accompanying increase in candidate quality.

Introduction

With nearly one-third of US jobs now requiring a government-granted license (Kleiner and Krueger 2010), it is not surprising that research has increasingly focused on the effects of licensing requirements. Occupations examined include barbers (Timmons and Thornton 2010; Hall and Pokharel 2016), radiologic technologists (Timmons and Thornton 2008), nurse practitioners (Kleiner et al. 2016), dentists (Kleiner and Kudrle 2000), security guards (Meehan 2015), and certified public accountants (Carpenter and Stephenson 2006; Jackson 2006), the topic of this paper.

The economics of occupational licensing are straightforward. Licensure may be justified as a means to ensure that providers have appropriate knowledge, skills, or experience for their jobs, thereby improving the quality of goods or services produced by the licensed occupation. On the other hand, licensing requirements such as additional education or fees may act as barriers to entry, thereby reducing the number of licensed providers and raising provider remuneration. Because licensure requirements can have both quality effects and barrier-to-entry effects, more stringent licensing requirements can be proposed out of genuine concern for quality assurance or out of cynical motives of reducing competition for incumbent providers.[1]

A complete review of occupational licensing research is beyond the scope of this paper, but it is worth noting that existing research on occupational licensure and quality assurance is mixed. Leland (1979) demonstrates that minimum quality standards (licensing standards) may improve welfare in some circumstances but notes that standards set by a profession itself will likely be too high. Papers such as Law and Kim (2005), Hotz and Xiao (2011), and Anderson et al. (2016) find that licensure enhances output quality, while papers such as Carroll and Gaston (1981), Kleiner and Kudrle (2000), and Kleiner and Todd (2009) find no evidence that more stringent licensure enhances quality. The evidence on licensure as a barrier to entry is less mixed. Many papers, including Kleiner and Kudrle (2000), Carpenter and Stephenson (2006), and Blair and Chung (2019), Thornton and Timmons (2013), find that more stringent licensure reduces entry, though Thornton and Timmons (2013) present mixed evidence of licensing effects on massage therapists and Law and Marks (2009) find that Progressive Era physician and teacher licensing laws did not reduce minority representation in those professions.. Farronato et al. (2020) examine both quality and provider supply simultaneously in an online market for residential services. They find that whether a provider is licensed is less important than reviews and prices, and they find that licensing is associated with higher prices and less competition.

In the occupational licensing literature, one of the most-studied occupations is certified public accounting (CPA). More than a dozen papers including Boone and Coe (2002), Allen and Woodland (2006), Carpenter and Stephenson (2006), Jackson (2006), and Jacob and Murray (2006), examine increased educational requirements for CPA licensure. Several factors likely contribute to the high level of research interest in CPA licensure. One is that CPA licensure requires passing an exam that is uniform across all 50 states. A second is that data from that exam, including the number of candidates and their pass rate, are published by the National Association of State Boards of Accountancy (NASBA), thereby making useful data readily available for analysis. A third is that educational requirements for accounting licensure vary across states. Yet another is the existence of accounting faculty members, many of whom are licensed CPAs, who do research on their profession as part of their scholarly activities at colleges and universities.

Because of ongoing changes in state educational requirements, this paper returns to the topic of CPA licensure. In recent years, many states have moved to a bifurcated regime in which aspiring CPAs must have 120 credit hours of college education to sit for the CPA exam but 150 credit hours to be licensed as a CPA. This paper uses panel data and synthetic control methods and 2006–2016 data on first-time CPA exam candidates, CPA exam pass rates, and average CPA exams scores to examine the effects of states

1 For more on the possible use of licensing as a way for incumbent providers to generate monopoly rents, see Friedman (1962) and Meehan and Benson (2015).

moving to the 120/150 requirement. The results indicate that moving from 150 hours to 120 hours to sit for the exam increases the number of first-time candidates, suggesting that requiring 150 hours to sit for the exam acts as a barrier to entry. The paper finds no relationship between moving to 120/150 and first-time CPA exam candidates' pass rates or average scores, which implies that requiring candidates to complete 150 hours before attempting the exam does not improve candidates' performance.

A Brief Overview of the CPA Exam and Educational Requirements

CPA licensure requires passing the Uniform CPA Exam, which is written by the American Institute of Certified Public Accountants and administered by NASBA. The exam consists of four parts: Auditing and Attestation, Business Environment and Concepts (BEC), Financial Accounting and Reporting, and Regulation. The content is occasionally updated; for example, the names of sections and the time allowed to take the exam have changed over time. Likewise, all sections of the exam used to contain written communication elements, but since 2011, only BEC has a graded written communication component. Prior to 2004, the exam was given using pencil and paper over two days. Since 2004, the exam has been administered via computer in designated testing centers. Candidates failing sections may retake those sections without losing credit for any sections they passed; however, all sections must be passed within an 18-month window following the initial passage of one or more sections, or credit for those sections is lost.

Other aspects of licensure vary by state. In 1983, Florida became the first state to increase CPA licensure requirements from a bachelor's degree (roughly 120 credit hours at most colleges) to 150 credit hours of college education. Over the subsequent two decades, more than 30 additional states adopted the 150-hour rule. As noted by Carpenter and Stephenson (2006), requiring 150 hours for licensure could serve as a substantial barrier to becoming a CPA because it requires the equivalent of an additional year of college education. Four-year colleges typically do not provide financial aid for a fifth year, so potential CPAs would incur increased costs of entering the profession unless they are able to obtain an employer reimbursement. Moreover, earning the additional 30 hours of college credit on a full-time basis would probably entail a substantial opportunity cost from forgone earnings. Indeed, Boone and Coe (2002), Allen and Woodland (2006), Carpenter and Stephenson (2006), Jackson (2006), and Jacob and Murray (2006) all find that the increased educational requirement reduced the number of people entering the accounting profession, though the estimated magnitudes vary somewhat because of different sample periods and empirical approaches. Some of the works cited above also identified a temporary spike in candidates sitting for the CPA exam just before the 150-hour rule's effective date since candidates who had initially attempted the exam before the increased education requirement were "grandfathered in" under the old bachelor's degree requirement.

In a more recent paper, Barrios (2019) examines the 150-hour rule's impact on first-time candidates, pass rates, and labor market outcomes post exam in the 1984–2014 period. This analysis finds that the 150-hour rule is associated with a 9 percent increase in the wage premium for CPAs, relative to CPAs in states that had not adopted the 150-hour rule. The 150-hour rule was also associated with a 15 percent reduction in the number of first-time test takers, but it did not have an impact on the quality of service; the latter is measured by examining detailed data of the career paths of CPAs in states with these different rules, while also comparing these career trajectories to those of accountants grandfathered in to the new rule. Barrios (2019) uses data on states transitioning from a 120-hour requirement to a 150-hour requirement for both licensing and sitting for the CPA exam. The present paper examines the impact of states changing to a bifurcated requirement, which allows students to sit for the exam at 120 credit hours and obtain the license at 150 credit hours.

The quality assurance aspects of the 150-hour requirement are less clear. Thirty hours of additional training in accounting or closely related subjects should produce accountants with more expertise. However, in

some, if not all states, the additional 30 hours need not consist of much additional coursework in accounting or other related subjects (Carpenter and Stephenson 2006). The additional 30 hours need not lead to an additional degree, though many candidates choose to obtain Master of Accountancy degrees. To the extent that the additional hours do not consist of courses that are useful to CPA careers, the quality-improvement aspect of the increased educational requirement is diminished. In practice, empirical research on quality improvements associated with the 150-hour rule has examined the pass rate on the CPA exam as an indicator of candidate quality. This approach would give a clear reading on candidate quality if individual-level data were being analyzed. However, to our knowledge, all analyses of pass rates use data aggregated at the state level. Analyzing aggregated data can suggest that candidate quality increased after the 150-hour rule was implemented. However, aggregate data may also be misleading if the barrier-to-entry effect disproportionately deters would-be CPAs with a low probability of passing the exam. In other words, aggregate data on pass rates could indicate improvements in candidate quality but are also vulnerable to changes in candidate composition.[2]

Carpenter and Stephenson (2006) examined data from 1985 to 2002, and the other papers published in 2006 studied similar, though not identical time periods. Since that time, all of the remaining states have adopted the 150-hour rule, thereby increasing their licensing requirements. However, state CPA boards became concerned about the decrease in CPA candidates following their adoption of the 150-hour rule (NASBA 2008). To reduce the impact of the 150-hour rule as a barrier to entry, many states moved to a bifurcated requirement under which 150 hours were still required for licensure, but candidates could sit for the CPA exam with just 120 hours. In recent years, therefore, some states tightened from 120/120 to 120/150 (test and license, respectively), while others relaxed from 150/150 to 120/150. This paper uses data from 2006 to 2016 to analyze the effects of these changes on the number of first-time candidates sitting for the CPA exam and on CPA exam scores and pass rates. Table 1 reports states that changed their educational requirements in the 2006–2016 period.[3]

Allowing candidates to sit with only 120 hours should reduce the barrier to entry because potential CPAs can obtain a better sense of whether they will be able to pass the exam before committing to the additional 30 hours of coursework. The effect of allowing candidates to sit for the exam with only 120 hours could have ambiguous effects on the pass rate. On one hand, weaker candidates might not have been "weeded out" by the barrier-to-entry effect, thereby lowering the pass rate. On the other hand, allowing candidates to take the exam while their undergraduate accounting coursework is still recent might increase pass rates (especially if the additional 30 hours would have little accounting content).

2 Consider a simple example. Suppose initially there are ten candidates for the CPA exam, six of whom pass, two who do not pass but come close, and two who do not pass and do not come close to passing. The pass rate is 60 percent. Now suppose the additional educational requirement is added and the two people who think they are unlikely to pass the exam decide not to obtain the additional 30 hours of education. In this case, the pass rate would increase to 75 percent even if the eight people who still take the exam are no better prepared for it after obtaining the additional 30 hours of schooling.

3 These data were collected from state-level statute and administrative codes, Jacob and Murray (2006), as well as from NASBA (2008) and WICPA (2017).

Table 1. State Changes and Dates

State	Change in requirement	Date of change
Kentucky	Reduction in education hour requirement from 150 for both to 120 exam/150 license	7/2006
Massachusetts	Reduction in education hour requirement from 150 for both to 120 exam/150 license	1/2007
Connecticut	Reduction in education hour requirement from 150 for both to 120 exam/150 license	4/2007
West Virginia	Reduction in education hour requirement from 150 for both to 120 exam/150 license	11/2008
Florida	Reduction in education hour requirement from 150 for both to 120 exam/150 license	12/2008
Virginia	Reduction in education hour requirement from 150 for both to 120 exam/150 license	5/2009
New York	Increase in education hour requirement from 120 for both to 120 exam/150 license	8/2009
Maryland	Reduction in education hour requirement from 150 for both to 120 exam/150 license	10/2011
Delaware	Increase in education hour requirement from 120 for both to 120 exam/150 license	2012
California	Increase in education hour requirement from 120 for both to 120 exam/150 license	1/2014
New Hampshire	Increase in education hour requirement from 120 for both to 120 exam/150 license	6/2014
Vermont	Increase in education hour requirement from 120 for both to 120 exam/150 license	6/2014

Empirical Analysis: Number of First-Time Candidates

We begin by examining the effect of states reducing the number of hours required to sit for the exam from 150 hours to 120 hours, using a framework similar to Carpenter and Stephenson (2006):

$$Ln(Candidates\ Sitting\ For\ CPA\ Exam)_{it} = \beta_1 Reducing\ Requirement\ To120/150_{it} + \gamma_t + \delta_i + X_{it} + \varepsilon_i \quad \textbf{(1)}.$$

$Ln(Candidates\ Sitting\ For\ CPA\ Exam)_{it}$ is the natural log of the number of first-time candidates sitting for the exam in state i in year t.[4] These data are obtained from NASBA's annual *Candidate Performance on the Uniform CPA Examination* reports. Table 2 reports summary statistics for the number of candidates and other variables used in the analysis. The estimation of equation (1) includes only the states that have ever reduced the credit hour requirement from 150/150 to 120/150, and states that kept a 150/150-hour requirement over the entire 2006–2016 period. This subset of the data therefore constitutes the movement in the exam sitting requirement from 150 hours to 120 hours, and a control group consisting of states that kept the exam sitting requirement at 150 hours. The licensing requirement is constant at 150 hours for all states in this subset. A few of the states in the analysis made the switch from a 150-hour requirement for

4 The dependent variable is specified in natural log form in order to obtain estimated coefficients that can be interpreted as percentage changes.

both the exam and license to a 120/150 rule before the data period analyzed here (prior to 2006),[5] but the rule remains constant for these states during the course of the analysis.[6] This subset of the data contains 38 states, giving a total of 418 observations.

Table 2. Summary Statistics

	Mean	Standard deviation
Number of first-time candidates	1014.19	1396.7
First-time candidate exam pass rate	51.56	7.31
First-time candidate average score	71.75	3.2
Population	6,143,829	6,779,774
GDP per capita	47,204.53	8854.57
Fortune 500 companies	9.94	13.77
Total tax returns	4,695,567	5,206,321

As for explanatory variables, the matrix X_{it} includes several variables to control for other factors that might affect the number of first-time CPA candidates in each state. These factors include (the natural log of) population, (the natural log of) GDP per capita, (the natural log of) the number of tax returns filed per 100,000 population, and (the natural log of) the number of Fortune 500 companies headquartered in each state per 100,000 population. Ceteris paribus, states with larger populations would be expected to have more CPA candidates. Similarly, states with more economic activity, larger corporate sectors, and more tax returns filed would presumably have a greater demand for CPAs, hence the inclusion of the GDP, Fortune 500, and tax return variables. The matrix X_{it} also includes dummy variables for a year before the reduction in the number of hours to sit and the year after the reduction of the number of hours required to sit for the exam. The rationale for including the before and after variables is that people might change the timing of their initial CPA exam sitting in anticipation of changing licensure requirements. For example, Carpenter and Stephenson (2006) found a large spike in candidates in the year before the 150-hour rule went into effect, presumably because candidates who took the exam before the higher educational requirement went into effect were "grandfathered in" under the old rules.

The model also includes two-way fixed effects. The variable γ_t is a time fixed effect included to capture any time varying factors common across states over the course of the data period; for example, the severe financial crisis of 2008 might have affected the attractiveness of accounting careers. Similarly, δ_i is a vector of state fixed effects included to capture any time invariant factors causing the number of potential CPAs to vary systematically across states.

Before turning to the results, it is worth briefly discussing some of the differences between our approach and that of Soileau, Usrey, and Webb (2017), which also examines 120/150 policy changes. The main difference is that our analysis includes various measures, including state fixed effects, to control for systematic differences in the number of candidates across states. Regardless of 120/150 policy, one would expect, say, California to have more candidates than Alaska. Soileau, Usrey, and Webb (2017) do include the number of accounting degrees granted in each state in each year as a covariate; this variable might pick up some of the systematic differences across states but is likely endogenous with respect to 120/150 policy (unlike, say, population). That is, a state with the 150-hour rule might have fewer accounting graduates since the

5 States the reduced their requirement from 150/150 to 120/150 before 2006 are: Georgia, Hawaii, Iowa, Idaho, Montana, North Carolina, New Jersey, Pennsylvania, Rohde Island, and South Carolina. See Jacob and Murray (2006) for additional details.

6 These states are included in the treatment pool for the entire data period, while the states that have a straight 150/150 requirement constitute the control group. States that have a 150/150 requirement throughout the data period are: Alabama, Arkansas, Illinois, Indiana, Kansas, Louisiana, Missouri, Mississippi, North Dakota, Nebraska, Nevada, Ohio, Oklahoma, Oregon, South Dakota, Tennessee, Texas, Utah, Washington, and Wyoming.

150-hour rule might deter students from majoring in accounting.[7] Another important difference between our approach and Soileau, Usrey, and Webb (2017) is that our empirical framework also allows for lead and lag effects around the time of policy changes. Other differences include (1) Soileau, Usrey, and Webb's (2017) inclusion of the average age of candidates as an explanatory variable for the number of candidates without a theoretical basis for doing so, and (2) our period, 2006–2016, covering three additional years, a period that includes three additional state policy changes. Lastly, our estimation controls for serial correlation by clustering standard errors by state whereas Soileau, Usrey, and Webb (2017) perform simple OLS estimation without correcting for possible serial correlation.

Results of estimating (1) are reported in the top portion of table 3. The first column estimates the model with the controls in X_{it} omitted, while the second column includes all covariates. The estimated coefficients on the *reducing to 120/150* variable are large and statistically significant in both columns. Reducing the number of required hours to sit for the CPA exam increases the number of first-time candidates by about 25 percent. While this effect is large, it is less than half as large as the 60 percent decrease found by Carpenter and Stephenson (2006). Thus, as one would expect, a 120/150 regime reduces the barrier-to-entry effect relative to requiring 150 for both licensure and sitting for the CPA exam, but there may still remain a barrier to entry associated with requiring 150 hours for licensure. As for the control variables, only the population variable and Fortune 500 variable are statistically significant, and unlike Carpenter and Stephenson (2006), there is no evidence of changes in the year before or after requirement changes.

While many states stayed at 150/150 or moved from 150/150 to 120/150, some states moved from 120/120 to 120/150. Although this is a much smaller subset of the data (12 states totaling 132 observations), we now turn to analyzing the effect associated with states that tightened their requirements between 2006 and 2016. Everything in these specifications is exactly the same as the specifications reported in the top half of table 3, except that the variable of interest is a dummy variable for states that have raised their requirements for licensing from 120/120 to 120/150.

The bottom part of table 3 reports results for states that raised the requirements to sit for the CPA exam. Here the results are sensitive to the inclusion of the control variables. In the first column, the estimated effect of raising requirements is statistically significant and large: a reduction of more than one-half in the number of first-time candidates. As indicated in the second column, including the control variables in X_{it} reduces the estimated magnitude of the coefficient on the increasing requirements variable by about one-half, and it is no longer statistically significant.

7 Since California remained a 120-hour state during the 2006–2013 period covered by the Soileau, Usrey, and Webb (2017) analysis, we suspect this contributes to the very large effect—a roughly 70 percent reduction in candidates—that they find for the 150-hour rule. Since population or other state-specific controls are not included, Soileau, Usrey, and Webb (2017) likely picked up both the effect of the 150-hour rule and population differences of other states relative to California.

Table 3. Analysis of First-Time Candidates

The Effect of States Moving from 150/150 to 120/150		
Variable	(1) Ln(first-time candidates)	(2) Ln(first-time candidates)
Reducing rule to 120/150	0.246** (0.098)	0.233* (0.125)
Ln(total returns per 100k)		0.721 (0.630)
Ln(Fortune 500 per 100k)		0.703* (0.386)
Ln(population)		1.862* (0.927)
Ln(GDP per cap)		-0.186 (0.199)
Yr. before reduction		-0.079 (0.052)
Yr. after reduction		-0.019 (0.052)
R^2	0.759	0.769
N	418	418
The Effect of States Moving from 120/120 to 120/150		
	Ln(first-time candidates)	Ln(first-time candidates)
Increasing rule to 120/150	-0.541* (0.248)	-0.295 (0.199)
Ln(total returns per 100k)		-6.753 (5.091)
Ln(Fortune 500 per 100k)		-6.018 (3.781)
Ln(population)		-3.184 (3.487)
Ln(GDP per cap)		0.217 (1.285)
Yr. before reduction		0.203 (0.149)
Yr. after reduction		-0.083 (0.101)
R^2	0.415	0.511
N	132	132

All models contain state and year fixed effects and have standard errors clustered by state.

Empirical Analysis: First-Time Candidates' Pass Rate and Mean Score

We now turn to the performance of first-time CPA exam candidates. As discussed earlier, CPA exam pass rates are often interpreted as an indicator of candidate quality, though the use of pass rate data aggregated at the state level potentially makes such an interpretation misleading. NASBA also reports state average scores for first-time CPA exam candidates. The mean score of first-time exam takers can also serve as an alternate indicator of candidate quality, again subject to the caveats about aggregate data discussed earlier.

To examine the effect of changing educational requirements on candidate performance, we estimate the following models:

$$(Performance)_{it} = \beta_1 Reducing\ Requirement\ To 120/150_{it} + \gamma_t + \delta_i + \varepsilon_i \qquad \textbf{(2)},$$

$$(Performance)_{it} = \beta_1 Increasing\ Requirement\ To\ 120/150_{it} + \gamma_t + \delta_i + \varepsilon_i \qquad \textbf{(3)}.$$

In both models, performance is either the pass rate of first-time candidates or the average score of first-time candidates. The models include state and year fixed effects and are otherwise similar to the analysis presented in table 3, except that the matrix of control variables X_{it} is omitted because there is no a priori basis for expecting those control variables to be related to candidate performance.[8]

Estimation results for all four models are presented in table 4. The top half of the table contains the estimated effects of reducing requirements to sit for the CPA exam, while the bottom half of the table contains estimated effects of increasing requirements. The left-hand column shows results with the pass rate as the measure of candidate performance; the right-hand column contains results with the average score as the measure of candidate performance. In all four cases, the results indicate the relationship between candidate performance is small and not statistically significant.

Table 4. Analysis of Candidate Performance

The Effect of States Moving from 150/150 to 120/150		
	(1) Ln(pass rate)	(2) Ln(first-time candidate score)
Reducing rule to 120/150	0.033 (0.037)	0.006 (0.101)
R^2	0.399	0.343
N	418	418
The Effect of States Moving from 120/120 to 120/150		
	Ln(pass rate)	Ln(first-time candidate score)
Increasing rule to 120/150	0.113 (0.111)	0.005 (0.012)
R^2	0.067	0.173
N	132	132

All models contain state and year fixed effects and have standard errors clustered by state.

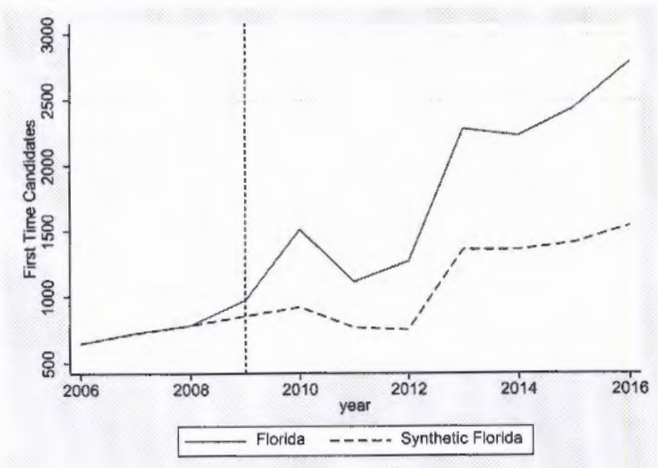
8 Although the theoretical basis for including X_{it} in (2) or (3) is weak, we estimated the models with X_{it} included. The results were nearly identical to those reported below and are available upon request.

Synthetic Control Case Studies

In order to provide additional insight into the impact of these CPA licensing changes over time, we also use a synthetic control model (Abadie, Diamond, and Hainmueller 2010) to view the impact of these changes in individual states. Synthetic control empirical methods provide a mechanism for analyzing comparative case studies. In this case, we analyze individual states that have adopted changes in the accounting education requirements and compare the outcomes to states that did not change these requirements. The 38 states that did not change their CPA education requirements over the 2006–2016 period constitute the donor pool. From this donor pool, synthetic results are constructed that form a counterfactual to the number of candidates and pass rates in each state, absent the CPA education requirement policy change. We conducted this synthetic control analysis for each state that had a policy change over our data period and had at least three years of pre-treatment data.[9]

The synthetic control results in figure 1 are for Florida, which looks to be the best candidate for this synthetic control analysis, given how well the model predicts the number of candidates, pre-rule-change, in 2008 (first year implemented 2009). These figure 1 results suggest a clear divergence between the predicted number of candidates over this time (labeled Synthetic Florida, dashed line) and what acrually happened (solid red line). This divergence suggests that the number of candidates is consistently larger than if the education requirement had not been reduced, and this pattern becomes more prevalent over the course of the data period. Although the pre-treatment fit is good, these results should be interpreted with caution as there are only three pre-treatment periods on which to base post-treatment synthetic predictions.[10]

Figure 1. Synthetic Control Model of Florida Reducing CPA Exam Requirements from 150 to 120 Credit Hours on the Number of First-Time Candidates



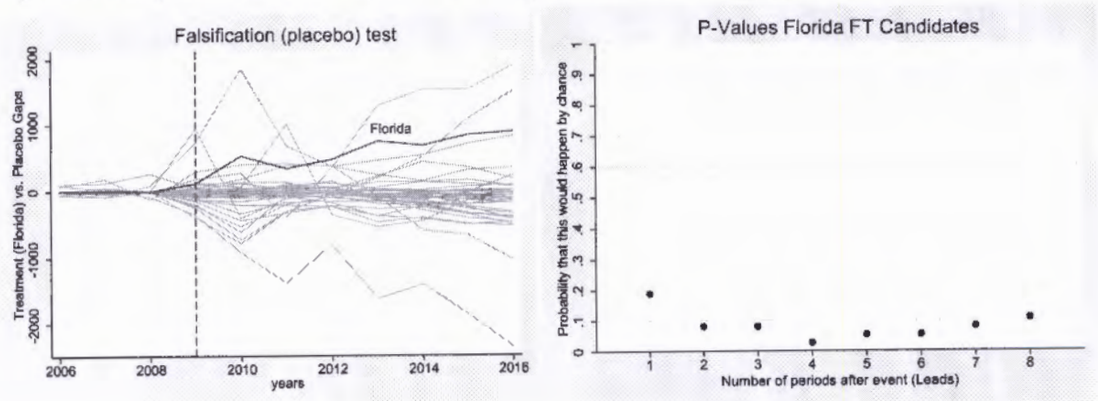
As suggested in Abadie, Diamond, and Hainmueller (2010), we also perform a placebo test for the synthetic control estimation to examine the robustness of these findings. This falsification test applies the same synthetic control estimation procedure to each of the states in the donor pool to see if the prediction gap between the synthetic estimation and the acrual treated outcome is larger than the prediction gap in all 38 other states in the donor pool. The trend line for Florida in figure 1.1 suggests that this gap is positive and larger than the vast majority of states within the donor pool (light grey lines), and this gap persists and even increases as the post-treatment period progresses. Based on the graph of this placebo test, it appears that no state within the donor pool has such a large and persistent gap between the pre-

9 The estimation was performed for New York and California, but optimization procedures did not produce synthetic results for these states.
10 The same is true of Virginia; those results appear in the appendix.

dicted (synthetic) results and the actual outcome. Some states do have larger spikes for single or a few years during the period, but these gaps are very noisy, which indicates that these states may be considered outliers. The vast majority of these prediction gaps are smaller in magnitude than the Florida results, and none are as persistent.

Abadie, Diamond, and Hainmueller (2010, 2015) advise using the placebo test to construct *p* values for the synthetic control results, so these are also included for the Florida CPA candidate estimation. These values, displayed in the right-hand panel of figure 1.1, indicate that it would be unlikely that these impacts are occurring strictly by chance for each post-treatment period examined. Taken together, the *p*-value analysis, the placebo test, and the pre-treatment fit for the data suggest that Florida is the best candidate for the synthetic control analysis among the states that had a change in policy throughout this period. We include the same analysis for New Hampshire because of an interesting pre-treatment bump in candidates and post-treatment drop in candidates. The states for which we could obtain synthetic control results and which had at least three years of pre-treatment data are included in the appendix. We include both the placebo tests and the synthetic estimates for each of these states. Further, for both Florida and New Hampshire we follow Abadie, Diamond, and Hainmueller (2010) in estimating a second placebo simulation only using states that have similar (or better) fit with the pre-treatment prediction. We do this by limiting the states in the placebo sample to states with pre-treatment root mean square prediction error (RMSPE) less than or equal to the treated units (New Hampshire and Florida).[11]

Figure 1.1. Falsification Test and Constructed P *Values for Florida First-Time CPA Exam Candidates*



11 Abadie, Diamond, and Hainmueller (2010) suggest using placebo units with pre-treatment RMSPE's anywhere from 2 to 10 times the treated unit. We elect to use pre-treatment RMSPE's at or below Florida and New Hampshire's. When we use even the 2x threshold, the sample of placebos does not change for New Hampshire. These limited RMSPE placebo results are available upon request for treatments contained in the appendix.

Figure 1.2. Florida Placebo Estimates Limited to States with Pre-treatment Root Mean Square Prediction Error Less than or Equal to Florida

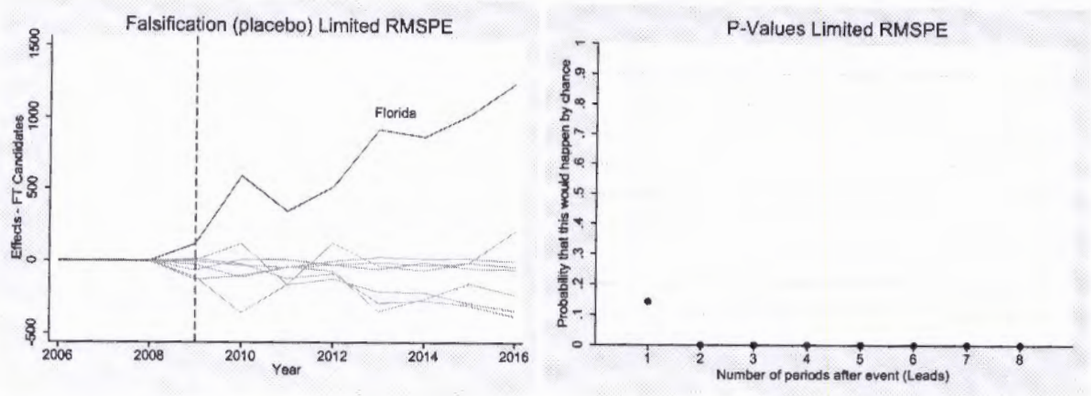


Table 5 includes the states used to construct the synthetic Florida and the estimated values of the predictors used in this estimation compared to the actual numbers in Florida.

Table 5. States Used to Construct Synthetic Florida and Predictor Balance

State used to construct synthetic Florida	Unit weight	Predictor balance	Treated	Synthetic
Alabama	0.206	Population	18,400,000	8,931,321
Georgia	0.016	GDP per cap	42891	42850.63
Indiana	0.563	Fortune 500 companies	13.33	13.32
South Carolina	0.045	FT candidates (2006)	648	648.532
Texas	0.169	FT candidates (2008)	782	781.11
All other donor pool states	0			

Figure 2. Synthetic Control Model of New Hampshire Increasing CPA Licensing Requirements from 120 to 150 Credit Hours on the Number of First-Time Candidates

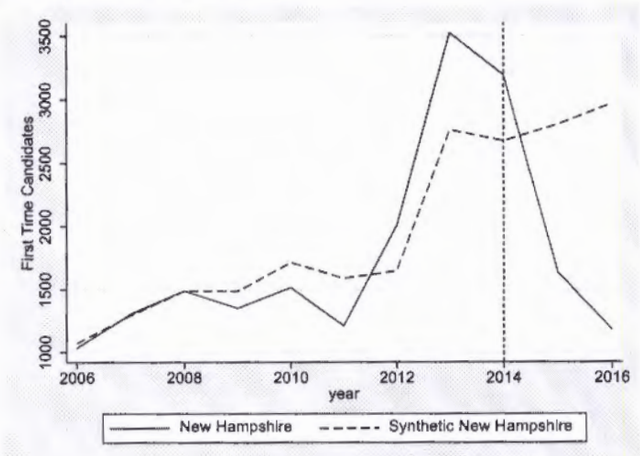


Figure 2.1. Falsification Test and Constructed P *Values for New Hampshire First-Time CPA Exam Candidates*

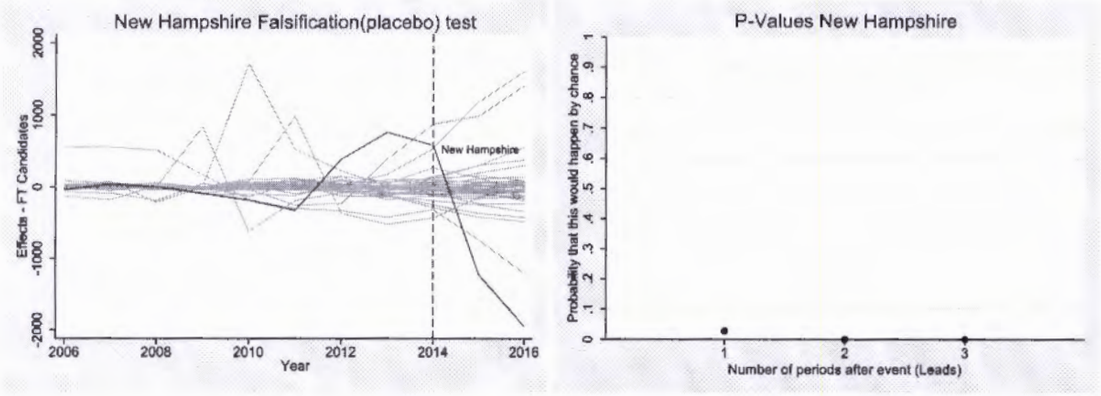


Figure 2.2. New Hampshire Placebo Estimates Limited to States with Pre-treatment Root Mean Square Prediction Error Less than or Equal to New Hampshire

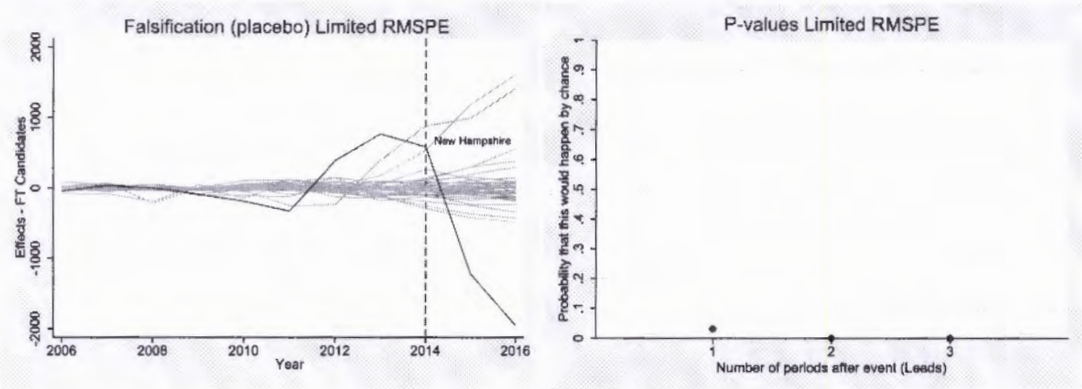


Figure 2, 2.1, and 2.2 present the results from the same synthetic control procedure applied to New Hampshire, which increased the education requirements to sit for the CPA exam in 2014. The New Hampshire pre-policy-change predictions do not coincide with the actual data as well as Florida's do, but the reason for this could be explained by the pre-policy jump in the number of candidates before the policy takes effect. This might be the result of first-time candidates trying to be "grandfathered in" by taking the exam before the increase in education required goes into effect. Information on the policy change was publicly available years before the policy actually went into place, as the state of New Hampshire sent a revised exam and licensing requirement document to CPAs and CPA candidates dated December 8, 2011, which outlines the 2014 change and corresponds to the jump in the number of candidates (NASBA 2011). This helps to explain the observed increase in candidates just before 2012 and the drastic fall right after the policy was in place (see figure 2). If this information is not released in all states, it might explain why this same candidate reaction is not observed in Delaware (see the appendix)—a state which had the same increase in education requirement.[12] If the pre-policy-change information is only available in some states, the corresponding reactions will introduce more noise into the data, which might be why the positive coefficient for the pre-policy-change variable is not significant in table 3. Even with this surge in candidates prior to the change, the post-policy divergence between the predicted (synthetic New Hampshire)

12 The authors searched the NASBA website that contained the New Hampshire pre-policy-change announcement but could not find a similar document for Delaware.

candidates and the actual first-time candidates shows a number much lower than anticipated. As the education requirement increases, it is associated with reductions in the pool of first-time candidates. Both the Florida and New Hampshire synthetic control results are consistent with the regression results in table 3 and table 4. Figure 1.2 and figure 2.2 also both show better fit and a clear divergence of the treated units from the rest of the placebo states, which supports the idea that the rule change did have an impact.

Table 6 presents the states used in the construction of the New Hampshire synthetic estimation and the values for the predictors used in this estimation. Additional synthetic control results are presented in the appendix for both pass rates and the pool of first-time candidates. Results pertaining to pass rates suggest that the policy changes had no discernable impact on pass rates, similar to the table 4 results. The appendix results should be interpreted with caution, however, as the pre-treatment fit and the placebo tests for these states do not appear to support their use in a synthetic control estimation.

Table 6. States Used to Construct Synthetic New Hampshire and Predictor Balance

Predictor balance	Treated	Synthetic	State used to construct synthetic New Hampshire	State weight
Population	1316519	8215286	Alaska	0.362
GDP per cap	48374.63	58039.09	Illinois	0.605
Fortune 500 companies	0.125	19.78763	Washington	0.033
FT candidates (2006)	1032	1074.745	All other donor pool states	0
FT candidates (2008)	1489	1485.65		
FT candidates (2009)	1353	1440.797		

Conclusion

Education requirements to obtain occupational licenses are common across the United States. Proponents argue that these requirements improve the performance and preparedness of the licensee to practice his or her occupation. The education requirements for obtaining a CPA license differ across states and over time. Over the past two decades, many states have moved to require CPA candidates to obtain 150 credit hours of education to obtain a license and sit for the CPA exam. Recently there has been a movement to split the exam requirement from the licensing requirement. Many states have adopted a 120/150 rule that allows candidates to sit for the exam with 120 credit hours completed and obtain a license after completing 150 hours. Our results suggest that this reduction in the education requirement to take the exam is associated with a roughly 25 percent increase in the number of first-time candidates attempting the exam. The results also suggest this loosening of the education requirement led to no change in exam pass rates or scores. This provides evidence that the 150-hour education requirement acts as a barrier to entry and suggests that the additional educational requirement does not enhance candidate quality, though the latter finding should be treated with caution because of potential issues arising from using aggregated data.

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Appendix 1: Synthetic Control Results of Changing Requirement on First-Time Pass Rates

Figure A1.1. Impact on First-Time Pass Rate of Florida Reducing Rule from 150/150 to 120/150

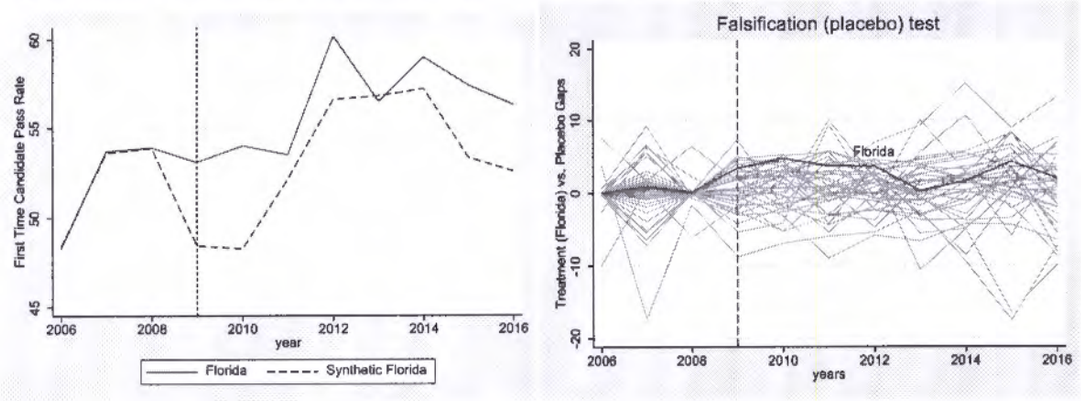


Figure A1.2. Impact on First-Time Pass Rate of Delaware Increasing Rule from 120/120 to 120/150

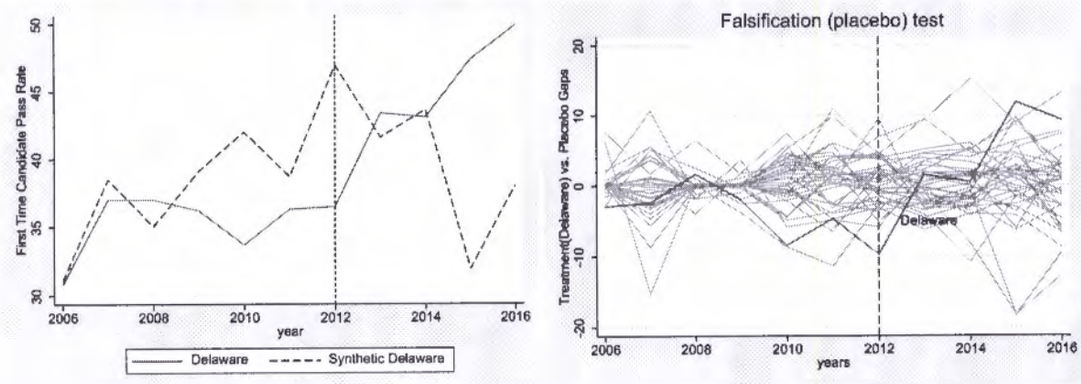


Figure A1.3. Impact on First-Time Pass Rate of Virginia Reducing Rule from 150/150 to 120/150

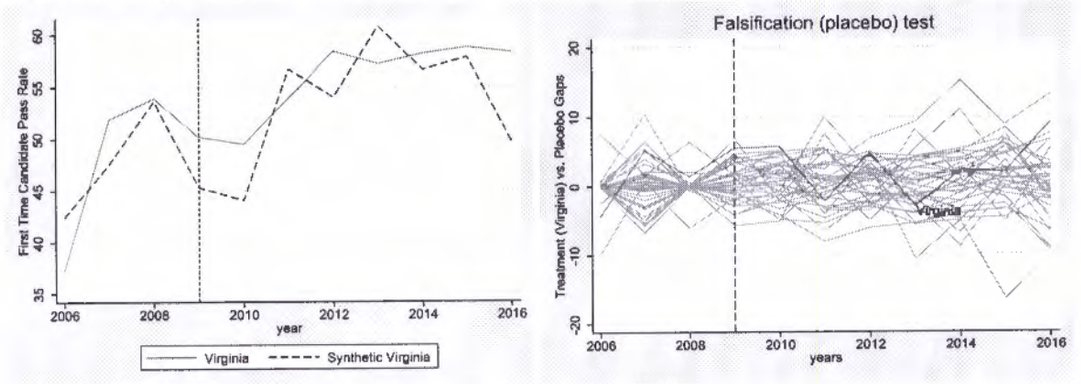


Figure A1.4. Impact on First-Time Pass Rate of New Hampshire Increasing Rule from 120/120 to 120/150

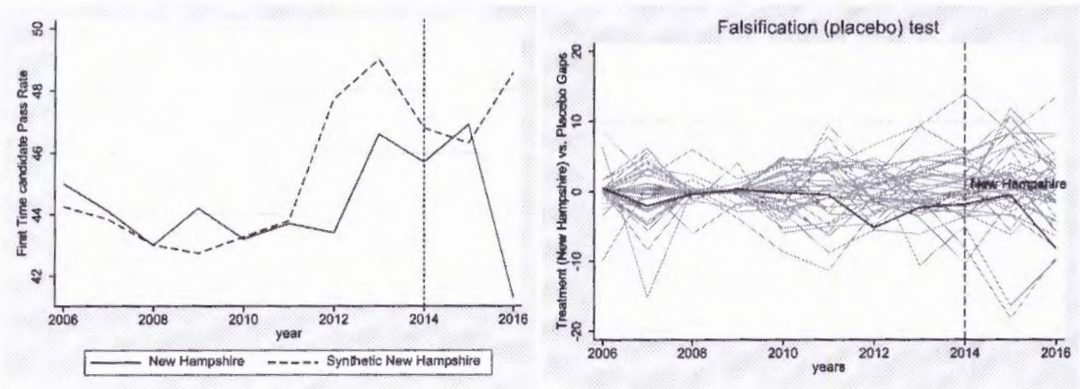


Figure A1.5. Impact on First-Time Pass Rate of Maryland Reducing Rule from 150/150 to 120/150

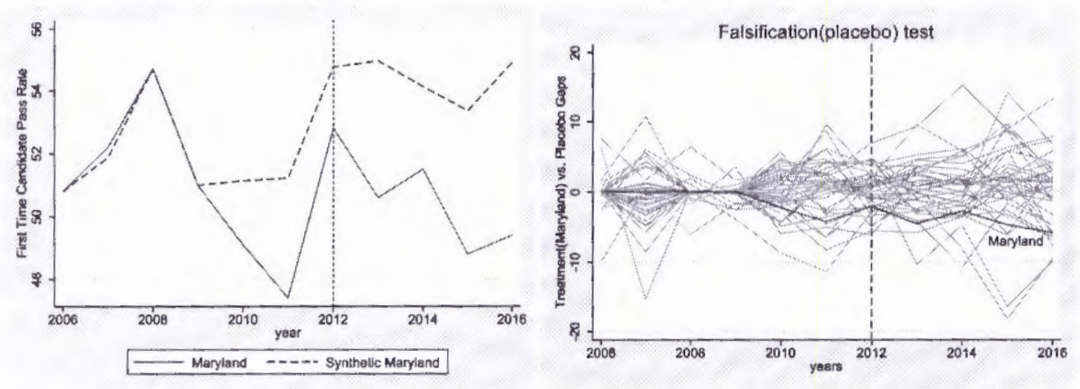
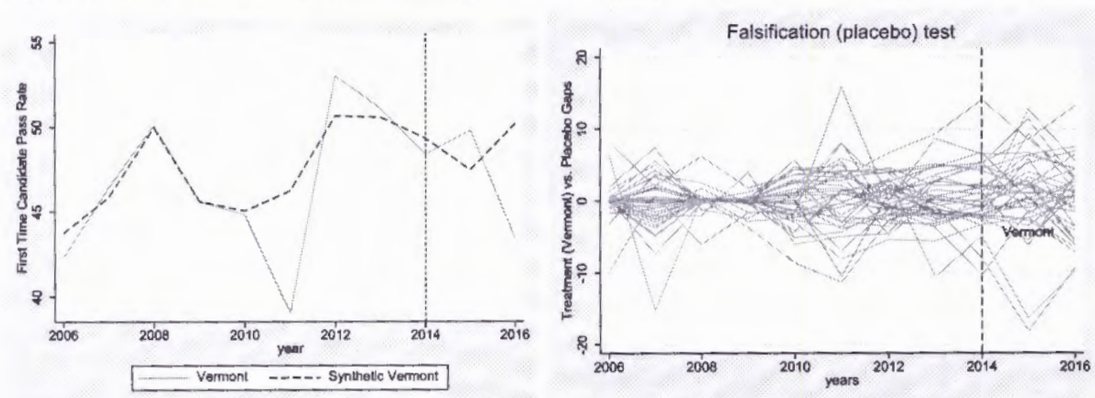


Figure A1.6. Impact on First-Time Pass Rate of Vermont Increasing Rule from 120/120 to 120/150



Appendix 2: Additional Synthetic Control Results of Changing Requirement on First-Time Candidates Sitting for the CPA Exam

Figure A2.1. Impact on Number of First-Time Candidates of Delaware Increasing Rule from 120/120 to 120/150

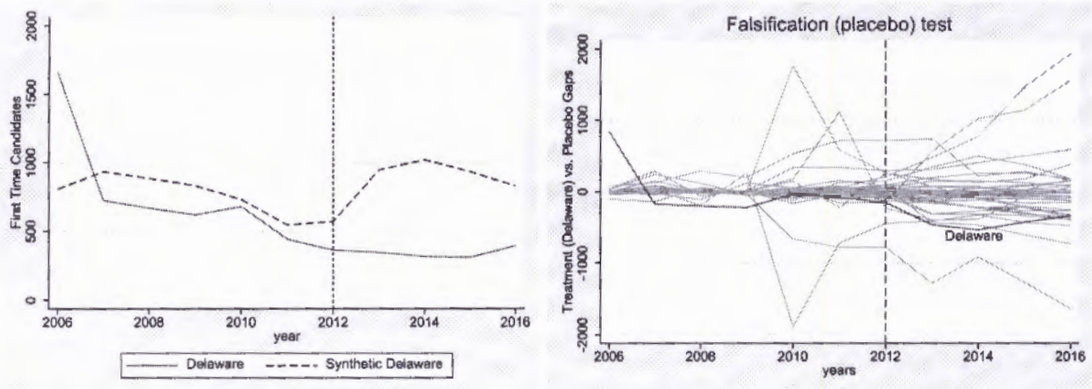


Figure A2.2. Impact on Number of First-Time Candidates of Virginia Decreasing Rule from 150/150 to 120/150

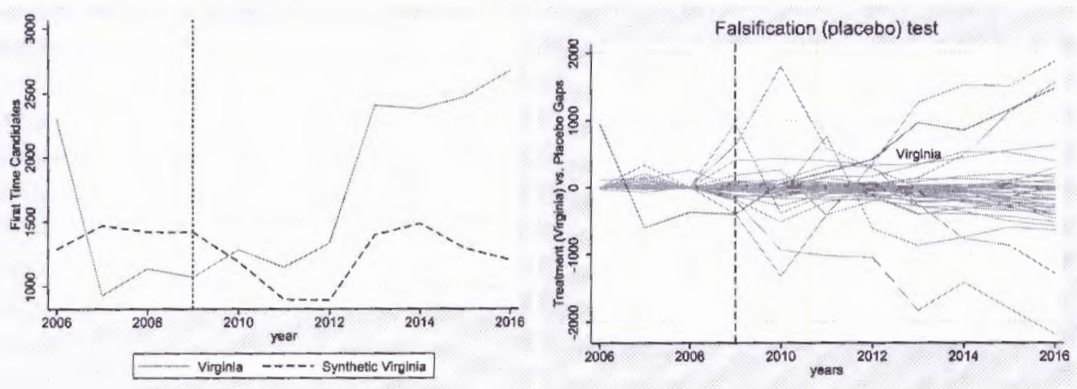


Figure A2.3. Impact on Number of First-Time Candidates of Maryland Decreasing Rule from 150/150 to 120/150

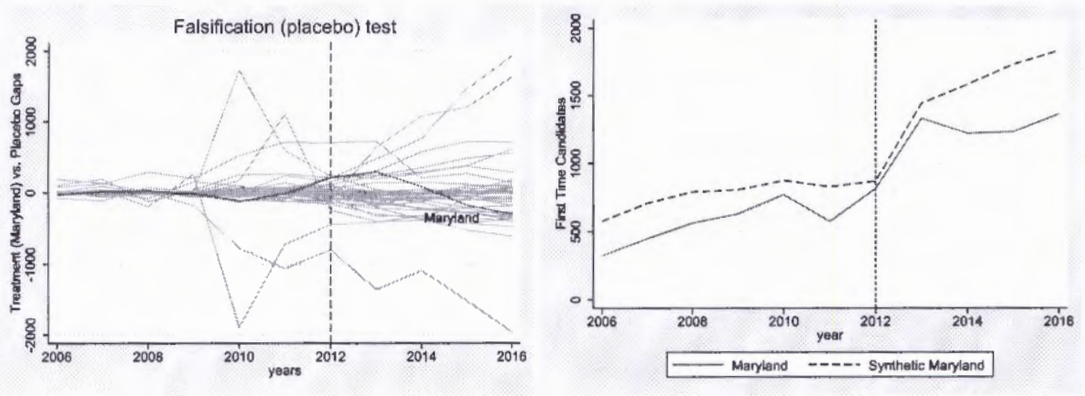


Figure A2.4. Impact on Number of First-Time Candidates of Vermont Increasing Rule from 120/120 to 120/150