WHY CERTIFY? EXAMINING THE CONSEQUENCES OF OCCUPATIONAL CERTIFICATION FOR INDIVIDUALS AND PROFESSIONAL ASSOCIATIONS

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WHY CERTIFY? EXAMINING THE CONSEQUENCES OF OCCUPATIONAL CERTIFICATION FOR INDIVIDUALS AND PROFESSIONAL ASSOCIATIONS

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This dissertation asks why individuals earn occupational certifications, which I define as voluntary, competency-based credentials offered by trade, professional, and industry associations. To answer this question, I examine the phenomenon of certification from the perspective of both individuals seeking certification and organizations offering certification, drawing upon data from national labor force surveys and qualitative inquiry. By analyzing the characteristics of individuals seeking certification, the labor market rewards associated with certification, and the factors that led an increasing number of associations to launch certification programs in recent years, I develop a nuanced explanation for the adoption of certification as the result of a variety of actors pursuing their own perceived self-interest.

The first empirical chapter, on who earns occupational certifications, asks whether certain subpopulations are more or less likely to hold certification with a focus on whether certifications tend to be held by individuals characterized by socioeconomic advantage or disadvantage. While data limitations prevent this study from inferring the motivations of individuals in seeking certification, I am able to analyze whether overall patterns of certification attainment fit with a narrative of individuals seeking certification as a substitute for or a supplement to formal higher education. I find that certifications are most commonly earned by individuals with high levels of education and whose demographic characteristics are normally associated with labor market advantages, but that there is also evidence that certification density is heavier among those who have experienced bouts of unemployment.

The second empirical chapter of this dissertation tackles the interrelated questions of whether there is a wage premium associated with certification and, if so, who earns such a premium. An individual wage premium associated with certification, whether a direct result of certification or a result of improved job-related competency, is commonly cited by certification organizations as a major reason for individuals to consider certification. Evidence of a wage premium would point toward real labor market benefits as a major factor underlying the certification boom. I find that certification is indeed associated with higher incomes for young workers, and that this association is not merely a product of intellectual, demographic and behavioral differences measured prior to labor market entry.

The final chapter draws on qualitative data to assess why occupational associations offer certification and what predicts the character of their certifications. I find that the leaders of associations offering certification are influenced by changes affecting the entire field of nonprofit membership associations, some of which are linked to broad social and technological phenomena. These findings contradict the expectations of theories of occupational closure. Rather than a rung on a ladder of professionalization, my research suggests that certification organizations use certification as a means of generating revenue to support other functions.

BIOGRAPHICAL SKETCH

Kyle Albert holds a Bachelor of Arts in sociology and political science from the University of Washington and a Master of Arts from Cornell University, where his research was supported by a National Science Foundation Graduate Research Fellowship. His program of research examines how institutions, such as professional associations and labor unions, represent the political and economic interests of workers. Kyle is also the co-author of the entry "Occupations and Professions" in *Oxford Bibliographies Online: Sociology*. He will be a postdoctoral fellow at the Harvard University Center for Population and Development Studies beginning in September 2016.

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One consequence of the many rounds of revision that this dissertation went through is the slow but steady adoption of a more parsimonious writing style. As such, I will do my best to keep my personal acknowledgements to a minimum. However, no dissertation is complete without acknowledging the critical support provided by family and friends through this process. My family – which doubled in size midway through this project – provided more support and encouragement than I can possibly describe here. I should be sure to note my gratitude to my parents, Kim and Steve Albert, who supported my decision to travel across the country to start this doctorate and stayed with me in spirit every step of the way. Similarly, I must offer my dearest thanks to parents-in-law Firooz Hassanzadeh Nemati and Jamile Talebzadeh, whose presence brightened dark Istanbul winter days and inspired some of my best work. I will avoid naming names of the friends I've come to rely upon along the way knowing that I would almost certainly leave out deserving individuals, but I will be sure to thank everyone in person in due course. Above all, however, I offer

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Introduction

Employers have traditionally relied on educational credentials, such as high school diplomas and college degrees, as indicators of the competence and qualifications of prospective workers. However, educational institutions and employers alike have been adapting to the rapid growth in recent years of another category of credentials, occupational certifications, that share some characteristics with degrees issued by the higher education system, but unlike degrees can be earned without ever stepping foot in a classroom. Occupational certifications, which are voluntary, competency-based credentials offered by trade, professional, and industry associations (as well as some corporations), have become increasingly prevalent across the American workforce, simultaneously creating new, streamlined pathways into some occupations and representing new hurdles for prospective entrants to others.

This dissertation analyzes occupational certification in the United States from the perspective of both the individuals earning certifications and the organizations offering them. From the individual perspective, I focus on indicators of certification attainment and labor market outcomes to gauge the value of certifications for the median American worker. Using new data from the Survey of Income and Program Participation, I first assess the distribution of certifications across all workers in the US labor force with the goal of identifying key demographic and social attributes of certificants relative to non-certificants. I then test claims about the value of certification for workers: do certified workers earn higher wages, and if so, is it simply a selection effect whereby workers of higher quality are choosing to earn certifications?

In the final section of the dissertation, I use qualitative data to assess the value of certification from the perspective of the organizations that provide certification. The emergence of trade and professional associations as major players in the business of credentialing in recent decades

is virtually unprecedented (but see May 1966), representing a new function for associations traditionally thought to function primarily as institutions to promote the socialization of members and political advocacy on behalf of occupational interests. Why have so many organizations established certification programs? How do the motivations to establish certification vary across organizations? Whose demands are certification programs being crafted in response to?

The overarching goal is to assess the emergence of a comparatively new set of organizational actors (certifying organizations) and their "products" (certifications) in the world of work. It is important to know whether certifications are creating value in labor markets from both a scholarly and a policy standpoint. Scholars have paid considerable attention to evaluating the value of other labor market institutions, such as labor unions and the higher education system, for workers, with the aim of understanding whether such institutions promote or impede the prospects of disadvantaged groups of workers. Certification, sharing some characteristics with these more established institutions but differing in important respects (e.g., through its emphasis on gauging competency), deserves consideration as a potential means through which workers achieve labor market advantage. Ultimately, establishing the value of certifications in the labor market and understanding under what circumstances certification organizations will create the most value is necessary to help policymakers decide whether to pursue various policies that encourage certification as an alternative to existing means of training, credentialing, and competency assurance.

Defining Occupational Certification

Occupational certifications, as I define them here, are credentials that signify that an individual is competent in a particular set of tasks or skills as defined the certifying organization. Certifications are typically awarded on the basis of an examination of the requisite competencies that have been identified through a job-task analysis of a given occupation. Certifications are issued by organizations that are not traditionally thought of as higher education providers, such as trade,

professional, and industry associations. Some corporations, such as Microsoft, Google, and Toyota, also offer competency based certifications that verify the competence of individual practitioners in the use or maintenance of their products or services. Certifications differ from credentials offered by the formal higher education system in large part because they are based primarily on the assessment of competency in a single high stakes exam without a required number of contact hours in a classroom setting. While there is nothing stopping formal institutions of higher education from launching competency based certifications on their own, very few have offered certificates or degrees that do not require some form of classroom or distance learning in addition to assessment. In this dissertation I rely on definitions crafted by the US Department of Education and the US Census Bureau (US Department of Education 2013) to identify bonafide occupational certifications and to develop the datasets that I analyze in this dissertation project. The exact definitions and methodologies are discussed in detail in the methods sections accompanying each empirical chapter.

Certification can refer, variously, to products, firms, or services, sometimes leading to definitional challenges. A substantial body of scholarly work on certification is focused on products, where certification refers to the verification by an independent entity, usually on the grounds of an assessment or examination by that independent entity, that the product meets some prescribed standards for quality. Institutional theory scholars sometimes refer to "certification contests" as a more abstract concept, to include awards and favorable positions in rankings published by trade and consumer-affairs publications (e.g., Rao 1994). Occupational certifications differ from product and firm certifications insofar as they are generally awarded directly to individuals, although there are a few examples of certification programs that offer both occupational and product certifications (e.g., the Leadership in Environmental Energy and Design program, which designates both LEED-certified architects and LEED-certified buildings) and certification organizations that provide special accreditations to firms with a certain proportion of employees holding a given certification (e.g., the Automotive Service Excellence "ASE" program).

Certifications are an indicator of human capital insofar as they confirm that an individual has demonstrated a given level of competency, some of which may have been acquired by the individual as part of the process of preparing for certification. Certifications may also function as signals in the labor market insofar as they confirm that an individual is committed enough to a given occupation to spend time and money becoming certified and that an individual values professional development and training. Furthermore, certification may be a signal of status within an occupational community, especially if the examination process is geared toward high status individuals (Trice 1993). The value of certification in the labor market, whether related to signaling or actual human capital, is uneven across occupations and across certification programs within occupations due to variability in the rigor of examinations and uncertainty on the part of employers about the standards employed by individual certification programs.

It is important to differentiate occupational certifications from other types of credentials that have become common in many industries. Certifications, as I define them here, differ from certificates issued by community colleges and university extension schools in recognition of completion of formal coursework (described as "educational certificates" in federal nomenclature; US Department of Education 2014), in that occupational certification does not require attendance at a particular course. When training is offered as part of the certification it typically emphasize self-study rather than instruction by an expert. Certifications also differ from educational certificates in that they are not offered by organizations that are themselves subject to centralized accreditation. Likewise, certifications are not occupational licenses, which by definition are mandated by local, state, or federal law. Note, however, that some credentials blur the lines between certifications and licenses, especially when a state licensing board recognizes a given certification as partially fulfilling licensure requirements.

Nevertheless, certifications are inherently voluntary, whereas occupational licenses are not (at least if the worker wants to practice the occupation legally). This distinction is critical for two

reasons: enforceability and accountability. First, licensure is enforced by the state, with full legal authority to penalize practitioners who violate standards of competence or ethics, whereas certification is not. Second, licensing agencies are, at least in theory, accountable to legislative and executive branches of government and taxpayers, whereas certifying organizations have no such responsibilities in their charters. The voluntary nature of certifications may affect who pursues them and what they are looking for out of their certifications. Certification can be a mark of distinction within an occupation and a milestone in one's career precisely because not all workers within an occupation will attain certification. Therefore, we should expect certificants to enjoy rewards relative to their within-occupation peers if certification proves to add labor market value, regardless of whether those benefits come from competency gained through the process of acquiring the certification or the signaling value of a certification.

Why do Certification Programs Exist?

In both the scholarly and practitioner-oriented literature on certification, three justifications for the existence of certification programs are offered (see, for example, Schoon and Smith 2000; Knapp and Knapp 2002; Rops 2011; Weeden 1999): demand from individual workers, demand from employers, and the interests of the certification organization itself. Individual workers tend to be interested in the direct effects of certification on their own employability, though professional pride can also be a motivating factor. Employers are attracted to certification due to its signaling properties that may be leveraged to convince clients to consume certified services, as well as the promise that certified workers will be more competent and thus productive than uncertified peers. Certification organizations seek the economic benefits that may come from selling certification as a product to their members and workers in the occupations they serve. Despite these common justifications, no two certification programs are alike in the specific set of benefits that stakeholders expect it to deliver.

Some certification programs are designed to defend employers and professionals from claims of incompetent service, both by signaling that a service provider delivers high quality service and by offering a tangible benchmark to which lower quality providers can aspire. These certification programs demonstrate that certified workers have the knowledge and skills that should help them to either avoid making errors in the first place or, at a minimum, limit the organization's legal liability for a worker's mistake (such as an incorrect prescription or error during surgery) if it can be shown that the worker had sufficient training to do the task on which he or she erred (Jaffeson 2005; Schoon and Smith 2000).

Certifications can also derive some of their value from being a component of either the employing firm's or the solo practitioner's marketing strategy (Weeden 2002). Certifications are touted in marketing materials as evidence of a firm or practitioner's service quality and integrity, even though such information is often presented without significant context about how selective the certification is or what criteria was used in selecting the certificant. These sales-oriented certification programs tend to pop up in fields where there are many solo practitioners and little interest in erecting barriers to entry among established practitioners, such as pet care, life coaching, and personal fitness training. Certification organizations that perceive such quality assurance as a principal component of their mission may invest more than organizations with other priorities in creating tangible emblems that certificants can use in their interactions with the public, such as seals, business card-sized logos, badges, patches, car decals, and lapel pins.

For a subset of organizations that prioritize quality signaling, a secondary goal is to assure the public that the certified practitioners exercise better judgment than non-certified workers and can be trusted to make recommendations on behalf of the client's interests, even in the face of compelling business interests to the contrary. For example, the Building Performance Institute's Building Analyst certification, which trains workers in the building trades to perform residential energy use audits, helps small business owners and their workers make sales to homeowners. The

certification offers energy auditors a means of conveying the legitimacy and integrity of their practices as they recommend costly upgrades to homes that are often performed by the same firm that is performing the audit, providing some assurance that they will exercise professional judgement in the face of a conflict of interest. Financial planning credentials also show signs of a "sales pitch," and are marketed to convince wealth management clients that the products being recommended to them are in their best interests even as the firm employing the advisor is positioned to take a commission (Cohen 1996). To bolster certificants' claim of providing unbiased service, certificants are often required to sign a code of ethics, though enforcement of the codes is rare. More rigorous certification programs in the field of financial planning consequently face an uphill battle in attempting to convince the consumers of the quality of their respective credentials. This problem is compounded by the similarity of many of the titles and acronyms of less rigorous programs to those characterized by higher levels of rigor (Consumer Financial Protection Bureau 2013).

Another justification often given for the creation of certification programs is to raise funds for membership organizations. A certification professional I interviewed described a mentality among nonprofits in which certification is seen as a cash cow. In her words, "a lot of not for profit organizations think, 'Oh, we need to make more non-dues revenue. Certification makes a lot of money. Let's do certification'" (Interview 6; see appendix 3). Yet, certifying bodies differ in whether they prioritize revenue generation as an objective of their certification programs. Some explicitly seek to generate surplus income for the sponsoring organization and treat revenue generation as the primary mission of certification, while others strive to maintain their certification programs on a revenue-neutral basis and reinvest any surplus fees collected above and beyond the cost of delivering the certification into the certification program, either by lowering fees for future certificants or investing in the quality and integrity of the certification itself. They may also emphasize the accumulation of continuing education units through engagement with the association's conferences and educational activities, using the renewal of the certification as a carrot

and a stick to drive engagement with the association (and the payment of registration fees to the association).

Certification programs can also emerge in response to demands within an occupation to improve standards of practice and recognize excellence. For example, the manager of a program in an environmental field described how his occupation evolved from "tree folks" who often had little knowledge of best practices to a highly trained workforce due to certification (Interview 15). Some of these certifications are relatively informal in that they lack detailed policies, full time support staff, or psychometric validation. Such programs often have relatively few members at first, especially if the organization offering the certification does not make arrangements to proctor through a national network of testing centers or an online testing platform– forcing certification exams to be administered in person at national conventions, in hotel conference rooms, or via online at-home proctoring. Certifications of this nature can have avocational elements, or attract individuals seeking personal distinction in recreational activities that some also do for profit – such as horseback riding and model railroading. Others are in fields that are small but recognized occupational niches, but attract many solo practitioners and individuals who have a significant personal interest in the field, such as pet sitting and motivational speaking. Yet even large certification programs can have stated objectives of "increasing self-esteem" and "providing a sense of accomplishment," which some scholars argue is associated with nursing certification (Sechrist, Valentine, and Berlin 2006). This sense of accomplishment may be seen as a positive aspect of certification for employers, who see certification as a means of giving employees a career ladder that may discourage turnover without offering substantive promotions (Weber 2006; National Retail Federation 2015).

Yet another motivation for occupations to self-regulate through certification is fear of government regulation. Certification programs sometimes arise when government attempts to impose some form of regulation on an area of practice. By self-regulating, certification organizations believe that they can avoid costly regulatory compliance processes, and set standards at a level more

attainable than government standards might be - a phenomenon seen in both professional certification and the certification of products (Pearson and Seyfang 2001). Industry and professional organizations can point to certification as evidence that at least some measures have been put in place to protect the public, sometimes representing a negotiated "settlement" between the interests of the public in quality service and the service providers' profit motive (Bartley 2007). By putting such a certification program in place, organizations are trying to preempt government regulation that presumably would impose greater compliance costs on service providers. Even in fields characterized by lower consequences associated with error, consumers can benefit alongside firms from more competent service.

Finally, sociologists of occupations and professions treat certification as a possible stepping stone toward licensure and, more broadly, as an attempt to more effectively compete for work against other occupational specialties and restrict the supply of labor at the occupational, rather than the individual or firm, level. Certification is not as strong of a barrier to entry as licensure as it does not carry the legal weight of the state, though certification boards can work to generate strong enough of a consumer or employer preference for certified services that uncertified practitioners will have difficulty finding work. For this reason, certification may be preferred over licensure by employers who want prospective workers to take responsibility for their own training, but do not want to run the risk of labor shortages resulting from too few individuals obtaining necessary credentials (Bloor, Sampson, and Gekara 2014). Certification may be a satisfactory form of closure for organizations that prefer to maintain control over their own affairs, though it comes with the trade-off of being a less effective barrier to entry.

How Common is Certification?

Before launching into a discussion of why certification is growing and who is benefiting, it is necessary to establish that certification is widespread enough of a labor market phenomenon to be

worthy of study. Certification has become a four to six billion dollar industry in the United States, and encompasses a wide and diverse range of employing organizations, occupations and industries that are served by an intricate network of professional associations and accreditation bodies (Flynn 2013). Observers of the field note an expansion in the number of certification programs, the number of occupations covered by those programs, and the growth of an industry or "ecosystem" to support the needs of certification organizations over the last two decades (Schoon and Smith 2000; Carter 2005; Jaffeson 2005; Rops 2011; Flynn 2013).

In the meantime, we can examine scattered data points for clues as to how many certification programs are out there and how fast is certification expanding. One study that attempted to count the number of certification programs in selected industries found a 165% increase in the number of certification programs offered by American occupational associations between 2000 and 2003 (Carter 2005: 43).[1] The only rigorous attempt by a sociologist to survey the entire universe of certification programs to date, relying on a census of occupational associations identified through organizational directories and a now-defunct directory of national accreditation programs, found 1,908 certificate programs in existence (Weeden 2002). Contrasting this figure with the 3,071 certification programs listed in the 2012 *National Trade and Professional Associations of the United States* directory[2] (Anders et al 2012) and the 5,028 certifications in the Department of Labor's Career

[1] I hesitate to cite Carter's study, despite its publication in a respected peer-reviewed journal, on account of a number of issues with her research design. She wrote shortly after the peak of the "dot-com" bubble, and the bulk of the "new" private sector certificates she found in 2003 were IT vendor certificates. More troubling, however, is her failure to explain her methodology in defining the universe of occupational certification programs or speculate on why she finds far fewer programs (219 in 2000 and 584 in 2003) than Weeden found a few years earlier. I also find it troubling that she claims that her findings demonstrate that the number of certificants is growing when her study did not collect data on program enrollment or the conferral of certificates. However, her study is one of the very few attempts to survey the entire landscape of occupational certification programs in the academic literature, and for that it deserves mention.

[2] My tabulation, arrived at by counting the number of certification programs on the first page of the certification index and multiplying by the number of full pages, plus the number of programs on the last page.

OneStop database as of January 2013[3] suggests robust growth in the number of certification programs in the first decade of the 21st century, though it does not help us chart the (presumed) growth in the proportion of the population earning certifications. Indeed, substantial differences in various authors' definition of what constitutes a certificate (e.g., whether IT vendor certificates are counted, as is the case with the Career OneStop database, and how to deal with programs that are a hybrid of occupational association and established higher education institution) must be kept in mind in any comparison across data sources. Yet, knowing the distribution of certification programs across occupational categories does not tell us much about whether the size of certification programs is changing, nor does it tell us anything about whether certifications are becoming more institutionalized (e.g., through more rigorous exams or more stringent requirements) or are gaining legitimacy in the labor market.

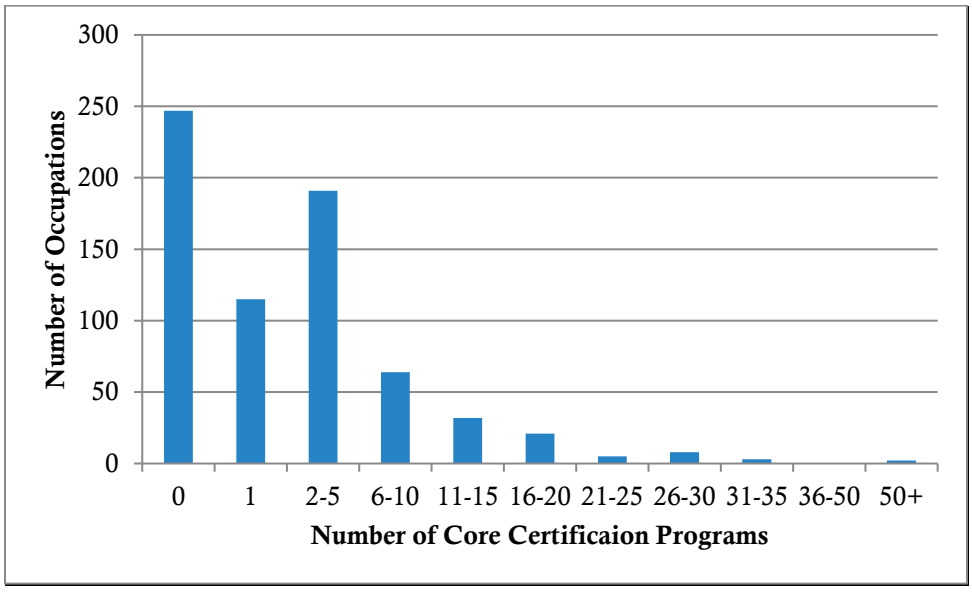
We can get some idea of the distribution of certification programs, keeping in mind the caveats above, from Career OneStop data. The top five occupations ranked by total number of core certification programs[4] are fitness trainers, building inspectors, computer network architects, information security analysts, and computer systems analysts. These fields are partly characterized by high program density simply because they encompass a wide variety of specializations that have their own certification programs. However, they are also relatively new occupations that have not yet developed licensure, and that have not successfully embedded occupation-specific knowledge in

[3] According to an email exchange with the manager of the Career OneStop certification database for the Department of Labor.

[4] "Core" is a designation used by the Career OneStop database to distinguish certifications that test the "core" knowledge required to practice in an occupation. In other words, these are entry-level certifications, to be distinguished from "advanced" and "specialty" certifications, as well as vendor-issued certificates. However, I believe that some of the certifications classified as "core" by Career OneStop are actually quite specialized in the context of a given occupation; for example, while a Pilates Method Alliance certification may be core in that it is all that one needs to become a Pilates teacher, Pilates is clearly just one specialty within the world of fitness training and would not qualify one to teach most other types of fitness classes. Thus, one man's "core" certificate may be another's "specialty" credential.

the formal educational system (e.g., Wilensky 1964; Abbott 1988; Friedson 2001; Morrison et al 1992).

Figure 1.1. Histogram of All Occupations Arranged by Number of "Core" Certification Programs, as Defined by Career OneStop.



My own quantitative research on the topic of "who gets certified," presented as the first empirical study of this dissertation, offers an overview of the proportion of certified workers by major occupation, and estimates that 5.75% of American workers holds a certification.[5] This estimate is plausible in the context of what published research exists on the topic. US Census Bureau statisticians estimated that, as of 2012, 21.8 percent of the adult population held either a certification or a license, but did not differentiate between the two categories of credentials (Ewert and Koiminski 2014). However, a tabulation of data from the Survey of Income and Program Participation suggests that licensure is more prevalent than certification,[6] and thus we should expect a combined estimate to be substantially higher than the actual number of certified workers. These data are roughly consistent with a tabulation of information from association directories and a direct survey of

[5] This should be interpreted as a lower-bound estimate for reasons I discuss in the chapter on predictors of certification attainment.

[6] Specifically, according to my tabulations using the weighted SIPP, 15.46% of American workers hold a license. Two other forms of credentialing, namely, labor union membership and certificates issued by the formal education system, are also more prevalent than certification (11.64% and 8.38% density, respectively).

certification program administrators conducted in the late-1990s estimated that, once all American workers are assigned to a single occupation on the basis of their primary job, the percentage of individuals holding certifications ranged from 25% in technical occupations to less than 1% in transport and manual labor occupations (Weeden 1999).

Dissertation Outline and Research Questions

My research on occupational certification is motivated by an overarching question of why individuals choose to become certified. Each of the specific empirical questions addresses some dimension of why individuals may be seeking certification in the absence of direct survey data on the motivations of individual certificants. The first empirical chapter, on who earns occupational certifications, asks whether certain subpopulations are more or less likely to hold certifications with a focus on whether certifications tend to be held by individuals characterized by socioeconomic advantage or disadvantage. I analyze whether overall patterns of certification attainment fit with a narrative of individuals seeking certification as a substitute for or a supplement to formal higher education. I find that certifications are most common among individuals with high levels of education and whose demographic characteristic are normally associated with labor market advantages, but that there is also evidence that certification density is heavier among those who have experienced bouts of unemployment.

The second empirical chapter of this dissertation tackles the interrelated questions of whether there is a wage premium associated with certification and, if so, who earns such a premium. An individual wage premium associated with certification, whether a direct result of certification or a result of improved job-related competency, is commonly cited by certification organizations as a major reason for individuals to consider certification, so evidence of a wage premium would point toward real labor market benefits as a major factor underlying the certification boom. I find that certification is indeed associated with higher incomes for young workers, and that this association is

not merely a product of intellectual, demographic and behavioral differences measured prior to labor market entry.

Finally, the last chapter draws on qualitative data to assess why occupational associations offer certification and what predicts the character of their certifications. I find that the leaders of associations offering certification are influenced by changes affecting the entire field of nonprofit membership associations, some of which are linked to broad social and technological phenomena. These findings contrast with the expectations of theories of occupational closure. I find that, rather than a rung on a ladder of professionalization, certification organizations often seek to use certification as a means of generating revenue to support other functions – though actual certification revenue disappoints many organizations with ambitious expectations. Together, these three chapters enable a nuanced analysis of the certification movement, and challenge commonly held assumptions about the value and mission of certification programs.

Chapter 1. Who Earns Certifications?

Several major economic and social trends affected the landscape of the global higher education system over recent decades. For-profit business models became widespread in many countries, through the emergence of both colleges incorporated as profit-making enterprises and a market logic creeping into many established private and state institutions (Hoxby 2009). Higher education became accessible to and sought by a wider range of individuals with diverse socioeconomic backgrounds, yet costs also escalated faster than inflation at most institutions (Kamenetz 2010; Selingo 2013). And, college students became more instrumental in their choice of institutions and fields of study, increasingly choosing professional and vocational degrees over the liberal arts. While many of these changes were well-documented by scholars and commentators on the state of higher education in the United States and other industrialized countries (Baker 2011; Hansen 2011; Hoxby 2009; Kamenetz 2010; Selingo 2013), the emergence of occupational certification over this period has gone mostly unnoticed. But who is this emerging system of credentialing reaching? Which types of workers are most likely to obtain certification?

These questions have important implications for labor market inequality, given that substantial evidence suggests that certification attainment is associated with positive career outcomes in a range of occupations (e.g., Arman and Shackman 2011; Sechrist, Valentine, and Berlin 2006). Initial research on the wage premium associated with certification across the entire US labor market suggests that certificants tend to earn about eight percent more than noncertificants, but that the wage premium is highest for those on the low end of the earnings distribution (Gittleman, Klee, and Kleiner 2014).[7] We know that employers place tremendous value certification in some occupations and industries, especially in information technology (Global Knowledge 2014) and other white-

[7] I reference the wage premium associated with certification here to establish the importance of certification as a labor market phenomena worthy of study, and present my own analysis of the effect of certification on earnings, which include wages, later in this dissertation.

collar fields. And, while there is a concentration of certification programs in high-technology areas that tend to be associated with high wages, certifications are also commonly found and thought to be associated with benefits in fields not known for high wages or characterized by below-average levels of formal education (Bartlett et al 2005; Mishra 2006; Weber 2006; Weeden 2002).

The demographics of the certified population should also be of interest to policymakers because, if valuable certifications are not reaching workers in certain occupations or industries, there are steps that associations can take to make them more accessible – much like colleges and universities attempt to improve access to postsecondary education through outreach programs and financial assistance to disadvantaged students. For example, certification boards could lower fees and invest in promoting the value of certification to uncertified workers. Policy interventions would also be available to force certification organizations to take their impact on socioeconomic inequality more seriously, such as the provision of direct grant support to certification organizations to develop more inclusive certifications or challenging the tax-exempt status of certification organizations that fail to reach disadvantaged workers.

In this paper, I assess two conflicting theoretical predictions about which American workers earn certifications. The first prediction stems from "cumulative advantage," the idea that those who are initially advantaged are better positioned to accrue further advantages (see, e.g., Merton 1968). For example, those who achieve higher grades and/or learn more in their undergraduate programs of study may be able to secure better jobs after graduation than their peers, which may make them better prepared to finance graduate study later in their careers. Or, perhaps, their academic achievements may make them better qualified for graduate study and scholarships without even venturing into the labor market. We could expect a similar process to affect the probability of earning a certification: those with more education and income are better prepared to sit for and eventually pass a certification exam. From this perspective, occupational certification is an

additional layer of credentialing, offering a means for the advantaged to further differentiate themselves from other potential competitors.

The second prediction, by contrast, assumes that obtaining an occupational certification is a "compensatory credentialing" strategy by those who are otherwise disadvantaged in their educational attainment or other predictors of success in the labor market, such as employment history. Individuals may be motivated to seek certifications if they see them as a shortcut to a credential that offers some of the benefits of a college degree. Individuals might "settle" for a certification if they lack the time, money, and other resources necessary to be successful in higher education. By validating knowledge and competence that a worker may already possess, certification may be an attractive option for disadvantaged individuals.

This paper draws on nationally representative data of the US labor force to identify the individual-level correlates of certification attainment, thereby allowing for the assessment of whether certification tends to be associated with cumulative advantage or compensatory credentialing. I find that the certified population differs from the general labor market in that certificants are more likely to be male, US-born, ethnically white or Asian, higher educated and higher paid. My findings point toward a nuanced view of the effects of certification: although I find evidence that certificants are concentrated in specific types of occupations – a pattern of association that may be either a cause or a consequence of certification – I also find evidence that certifications are being used as a compensatory credentialing strategy among those who have tenuous labor force attachment, such as recent spells of unemployment.

Compensatory Credentialing: Why we Might See Certification among the Socioeconomically Disadvantaged

The question of whether we would expect certification attainment to reflect a sort of cumulative advantage for those with existing advantages or an attempt to compensate for

disadvantages depends on how we perceive the nature of certification. Certifications require resources to attain, and may provide more economic benefits for individuals in occupations requiring high levels of education or skill – who also tend to be of high socioeconomic status and holders of high levels of educational attainment. If certification is understood as an outcome of cumulative economic advantage, we would expect individuals with certification to be characterized by relatively stronger socioeconomic indicators. On a broader level, such a finding would prompt consideration of whether certification may be a factor contributing to socioeconomic inequality.

The relative ease of acquiring certification and certification's portability between firms relative to proprietary, firm-specific employee training programs may make it especially attractive to people without advanced educational credentials (e.g., Carnevale 2012; Kuczera and Field 2013; White, Dresser, and Rogers 2010). Because certifications do not generally require as much investment - both in direct costs and in opportunity costs - as college degrees do, they may be especially attractive to people without resources at their disposal. Certifications can typically be earned without sacrificing full time employment; independent self-study and knowledge gained through work experience and onsite training often provide the knowledge and skills needed to pass certification exams. Thus, resource-poor individuals may be more inclined to demand and seek certifications.

Certification as Cumulative Advantage?

Scholars working in the sociology of professions have traditionally seen certification as a component of social closure, reflecting efforts to maintain and elevate the market standing of incumbents in an occupation. Professional associations like the Court of Master Sommeliers that restrict entry to a small percentage of individuals working in the field are rare, but work experience requirements are common and organizations vary widely in their philosophies with respect to examination rigor. Certification is one of the tools that occupational associations can deploy if they

wish to erect barriers to entry that keep newcomers out of their niche in the labor market – especially if they can craft a certification program that is strong enough to be demanded by employers as the de facto credential for a given position (Weeden 2002). By making it more difficult for newcomers to enter the profession, the market position of incumbents is improved. Thus, we would expect elite members of a given occupation, such as those with the highest levels of formal education, to covet and guard access to certification. Of course, it is an uphill battle for many professional associations to gain widespread enough recognition of their credentials that they are effective in limiting entry. And, many associations today view closure as, at most, a secondary benefit of certification, emphasizing public responsibility and employer demand as more common motivations for launching a certification program (Schoon and Smith 2000). Though a closure-minded organization may have good reasons for not speaking publicly of its motives, the industry average pass rate mentioned by a representative of a psychometric firm at a tradeshow -- 80% -- suggests that, when looking across the occupational landscape, certification tends not to be intended to function as a barrier to entry. Yet, even if one discounts the effectiveness of certification as an instrument of closure, there are other reasons that certification may tend to be attained by advantaged individuals.

Even though certifications may seem like an obvious credentialing option for the resource-poor, it is far from clear that disadvantaged individuals will actually be the ones to be most inclined to acquire certification. The accumulation of educational credentials has long been understood as a process of cumulative advantage (Rigney 2010). Those with initial advantages build on those advantages through successive educational junctures, while those who start out disadvantaged accumulate further disadvantages at each decision point. Therefore, we would expect past experiences in the educational system and labor market to affect one's capacity for future outcomes (DiPrete and Eirich 2005). Although most studies of cumulative advantage focus on the formal educational system (e.g., Ceci and Papierno 2005; Stanovich 1986; Walberg and Tsai 1983), cumulative advantage is also observed in processes of career mobility and asset accumulation

(Bosswell, Zimmerman, and Swider 2012; Oliver and Shapiro 2006). Moreover, advantages in one domain, such as education, often spill over into other domains, such as careers. For example, an outstanding student who is well prepared by her educational institutions for a job search may enjoy a ripple effect throughout her career owing to the quality of her first job (Yang and Gysbers 2007).

We can imagine how formal educational attainment provides an edge for individuals pursuing certification. Because certifications are competency-based, individuals with extensive knowledge or skills gained through prior education in a particular occupational sphere through formal education may be better prepared than their less-educated colleagues to pass certification exams. If higher levels of education result in a more stable or successful career trajectory, such individuals may also be better prepared to make the time and financial investments necessary to become certified. Indeed, to the extent that educational degrees tend to pay dividends in the form of higher wages and other forms of compensation, we should expect income to in turn be related to certification attainment. Thus, certification attainment may be expected to follow the general patterns of inequality seen with other types of credentials: higher levels of education contribute to the accumulation of even more credentials, aided by the attainment of income.

Educationally disadvantaged individuals may find themselves without adequate resources – be they financial or simply in terms of free time – to prepare and sit for certification exams. On a broader level, however, such individuals may not perceive the same value in certification as their peers on a more stable occupational trajectory. Occupational commitment was noted as a robust predictor of certification attainment in a couple of single-occupation studies, though it is difficult to generalize from these limited samples to the predictors of certification attainment in general (Blau 2006; Sechrist, Valentine, and Berlin 2006). Individuals in such situations may have lower levels of occupational commitment because they spend less time in the practice of their vocation, or because they occupy niches of the labor market where occupational commitment is less common. Furthermore, certification attainment is also strongly associated with self-esteem and other

interpersonal benefits, like respect among peers and a sense of accomplishment (Byrne, Valentine, and Carter 2004; Cray 2001; Gaberson et al 2003; Sechrist, Valentine, and Berlin 2006). Certification boards often strive to build a sense of emotional attachment to their brands as markers of membership in occupational communities, giving certification symbolic significance not unlike the badges worn with pride in some public safety occupations (Trice 1993; see Ryan 2009 for an example).[8] To be sure, a desire for professional pride and accomplishment is not limited to those occupations requiring a college degree (see, for example, Fine 2008 and Hodson 2001). However, certification motivated by internal factors and a desire to advance the profession as a whole may be less likely to be sought by those looking for a shortcut into an occupation relative to those who have already engaged in more advanced levels of study.

Rather than simply being a direct, straightforward alternative to time-consuming credit hours and degrees in the formal education system, certification also has a signaling quality (see, e.g., Weeden 2002). Certification not only represents actual skills and abilities, but broadcasts that individuals were motivated to spend the time and energy necessary to earn a credential focused on a specific content area. But who is most likely to value and seek out such signals of occupational commitment? Scattered evidence suggests that blue-collar employers are generally poor at differentiating between certifications and other types of credentials, (Bills 1988) though they can improve with time as they gain experience employing certificants (Bartlett 2012). Recruiters in higher-skill and technical occupations tend to have a clearer idea of which certifications are associated with higher-quality workers and hence worth paying a premium for (Barley and Kunda 2004; Cappelli 2012). Thus, certifications may be a very powerful set of signals for some employers,

[8] This effort on the part of certification organizations was underscored in a keynote speech at a recent tradeshow by Scott Deming, a professional motivational speaker, who urged certification organizations to emulate "cult" brands such as Starbucks and Apple to do more to build certificant loyalty.

particularly in occupational fields characterized by higher skill and education levels with respect to technical skill and ability, but less so for others.

In addition to signaling that a certificant reaches a certain level of quality in terms of subject matter expertise, holding certification also identifies a practitioner as someone involved and committed to his or her occupation. Offering this extra signal on top of the assurance that one is competent should help individuals stand out among peers with similar levels of educational attainment. And, earning certification may simply be easier for individuals who have extensive training in a field of study closely aligned with their occupation. For example, a recent college graduate with a major in Human Resources may be more likely to earn one of the Human Resource Certification Institute's designations than a colleague without recent formal education simply because there is less new material to learn. Given the nature of certification as a test of competence and relatively high pass rates on certification exams (the industry average pass rate is around 80%; see Jaffeson 2005), well-educated individuals are likely to pass certification exams with little extra preparation if they align closely with the higher education curriculum. Because of these cumulative advantages and incentives for the well-educated to add certification to their portfolio of credentials, it is reasonable to expect certification to be on balance associated with high levels of formal education.

Studies of cumulative advantage emphasize not only the ripple effect of educational achievements, but also how early career events affect the trajectory of individuals' earning potential later in life. Similarly, remaining continuously employed is seen as a positive attribute by many recruiters and hiring managers. Research on the long-term unemployed suggests that the predicted probability of finding a job of comparable quality to one's last positon begins to decline precipitously after six months out of the labor market (Sharone 2013). Thus, continuous employment in and of itself is a form of advantage, and the dividends it brings in the form of income and fringe benefits (e.g., employer-provided education allowances that could be used to pay for certification exams)

likely lead to other beneficial socioeconomic outcomes. Voluntary career mobility may also be associated with certification to the extent that those who actively manage their careers and try to maximize their position in the labor market may disproportionately invest in credentials and training provided by parties other than their employer to maximize portability across firms (Tolbert 2001). Unemployment, on the other hand, may lead to deleterious outcomes that affect many aspects of life, such as the accumulation of consumer debt. A pattern of part-time work may also lead to cumulative disadvantages on one's career path, as it becomes difficult to be promoted into higher-level positions. Conversely, we would therefore expect working more hours would, in general, make one more equipped to successfully attain and hold certification to the extent that those who work more may be more invested in their careers and have more financial resources to spend on certification.

Additionally, various measurable factors may be associated with, or even contribute to cumulative advantage in credential attainment. For example, older individuals may be overrepresented in the certified population, given that they have naturally had more time to earn certification than younger workers, and are more likely to have reached a stage in their careers where certifications are necessary for advancement and/or they can afford (or have employers who can afford) to pay for personal credentials. If individuals are aided in their pursuit of certifications through individual characteristics, individual certificants should come from demographic groups that have been disproportionately advantaged in the labor market. Though it is difficult to say that women face great across-the-board disadvantages in the American labor market today, they may be more likely to attain certification if traditional patterns of disadvantage hold, as would ethnic minorities and individuals born outside the United States.

Structural Sources of Heterogeneity in Certification Prevalence

Occupational certification is a phenomenon that is not equally distributed across jobs, occupations, and employers (see, e.g., Weeden 2002). Some occupations are characterized by far higher levels of certification density than others for reasons related to the nature of their work: for example, nursing and medical professions tend to have more certifications because, in part, hospitals and insurance companies use employee certifications as a shield against allegations of malpractice (Knapp and Knapp 2002; Schoon and Smith 2000). Other occupations have a high level of certification density because they are characterized by rapid technological change, such as computer programming, or because certification can be used as a signal of quality in marketing materials, such as financial planning and real estate brokerage (Schoon and Smith 2000).

Employers differ across occupations and industries in whether they require their workers, even those in the same occupation, to be certified (Thomas 2013). Employers can push certification on to workers when they want to create a route into an occupation that does not involve higher education, or want to shift some responsibility for training onto their employees (Weber 2006; Knapp & Knapp 2014; Rops 1998). Lower status individuals may find that they are more likely to be forced to earn certification as a condition of holding a position, as is often the case for entry level positions in green building occupations (Tucker et al 2012) and information technology (Adelman, 2000). Thus, it may be that lower status individuals – who are likely to have lower levels of education and income – are more likely to hold certifications of a non-voluntary nature than more-advantaged peers. In addition to considering the factors predicting certification attainment, therefore, we should also look for evidence of *why* certification was attained, before we attribute any pattern of certification attainment among the disadvantaged to an attempt to compensate for disadvantages relative to within-occupation peers.

Finally, labor union membership may be associated with certification attainment, although it is not clear whether this association fits within either the narrative of cumulative advantage or the narrative of compensatory credentialing. On one hand, the types of occupations in which unionization is most prevalent also tend to be occupations with relatively low educational requirements, especially in the traditional union strongholds of manual occupations and the more recent expansion of unions into service occupations. All else equal, this anticipates a negative association between union membership and certification, at least before conditioning on occupation. On the other hand, unions facilitate the procurement of occupation-relevant training, which may indirectly lead to competency-based occupational certification. Similarly, it could be that certified individuals are more likely to obtain sought-after unionized positions by virtue of their certification. In both cases, we should anticipate a positive association between union membership and certification at the individual level.

Data and Methods

The goal of the empirical analysis is to assess the relationship between various demographic, educational, and labor force experience variables and occupational certification, with the overarching goal of identifying whether certifications are, on average, earned by advantaged or disadvantaged individuals. Although data on the motivations of individuals who earn certification is beyond the reach of available data sources, I take advantage of data on the characteristics of the certified population and consider whether patterns of certification attainment are consistent with the predictions of the cumulative advantage and compensatory credentialing arguments. Data on the prevalence of certification come from the Fall 2012 wave (Wave 13) of the Survey of Income and Program Participation's (SIPP) 2008 panel, a longitudinal study conducted by the US Census Bureau in which respondents were surveyed four times per year from 2008 through 2013.

The sampling frame for the SIPP is defined by the US Postal Service's Master Address File, from which respondents are selected among residents of a sample of 351 counties or sets of contagious counties. Individuals are not selected at random; households in selected counties are placed into two strata on the basis of their income, and the Census Bureau samples about 44% more households from the lower income strata to ensure sampling a robust number of respondents who are eligible for means-tested welfare programs. Thus, sample sizes are larger in subpopulations associated with lower household income – for example, the SIPP contains more unskilled workers, as well as more individuals with lower levels of educational attainment. Even after the inclusion of person-level weights (discussed below), the SIPP may therefore provide more reliable estimates of the proportion of individuals from disadvantaged households with certification.

In Wave 13 of this survey, administered in 2012, 76,034 respondents were asked the "core" SIPP questions about their demographic characteristics, circumstances of employment, income and public welfare program participation and "topical module" questions about their attainment of occupational certifications and licenses, including some basic characteristics of their most recently earned credentials. Of these respondents, 29,121 reported that they were in the labor market through employment, and thus constitute the population analyzed in this paper. While some individuals outside of the labor market may hold certifications, either because they retain certification from prior employment or because they gained a certification through recreational pursuits, such certifications are not likely to affect employment-related outcomes and are thus excluded from these analyses.[9] The topical module does not contain information on the date the most recent credential was attained, making it impossible to identify the attributes and labor market experiences of workers before they obtained a certification or license. The SIPP nevertheless represents the richest source of

[9] Furthermore, individuals not in the labor force are by definition not practicing an occupation, forcing them to be excluded from any analysis that considers occupation-level effects.

data to date on the characteristics of certificants that is currently available, given the absence of certification attainment measures on other nationally-representative labor market surveys.

The Wave 13 SIPP topical module includes two questions from which I create an indicator for whether or not the respondent has an occupational certification. The first question asks about the most recent non-degree credential, which could be either a certification or a license. A follow-up question asks the respondent to identify the organization that issued the certification. To isolate voluntary certifications, the focus of this analysis, I exclude non-degree credentials issued by the federal or state governments (which are occupational licenses by definition in nearly every case) and retain credentials issued by trade, professional and industry associations and by corporate product vendors. The focus of the SIPP topical module on the most recent credential means that individuals who hold both a license and a certification and whose most recent credential was a license cannot be differentiated from those who only hold a license. Thus, it is possible that the count of certification holders estimated from the SIPP understates the true proportion of individuals who hold a certification. It will also underestimate the total number of certifications held, given that an individual who holds multiple certifications will only contribute one data point to the analysis. The Interagency Working Group on Expanded Measures of Enrollment and Attainment, which led the effort to use the SIPP to measure certification attainment, has given consideration to such measurement issues and determined that, in light of the newness of certification as a widespread phenomenon, the disadvantages of such a parsimonious certification item (i.e., failing to account for individuals with multiple credentials) need to be weighed against the dangers of underreporting should respondents be asked to provide greater detail about their credentials (Boivin and O'Rear 2012).

The focal dependent variable is a binary measure of whether an individual self-reports a certification. There is some risk that an individual may inaccurately perceive himself or herself to have a certification when none exists, though research on the validity of this survey item found that

Americans with certifications are good at differentiating certifications from other credentials (American Institutes for Research 2013). While this measure does not control for variability in the attributes of certification programs in terms of rigor or scope, it is the best possible measure of certification attainment available in a nationally representative dataset.

I also estimate the association between the predictors of certification (discussed below) and whether a certification is earned voluntarily or involuntarily, where the latter is defined as a certificate obtained in response to an employer mandate or a formal prerequisite listed as a job requirement, conditional on holding a certification. The measure of whether a certification is earned voluntarily derives from an item in the SIPP topical module that asks if the respondent's certification is required for one's job. (I assume that it is relatively rare that a SIPP respondent was required to earn a certification by a past employer, but is no longer working in that same position.) The analytic sample in the core analysis consists of all individuals who are in the civilian workforce (n=29,897), and the sample in the follow-up analysis is limited to the respondents who hold certifications (n=1,647, or 5.8% of all working SIPP respondents). 16.9% of SIPP respondents in the labor force skipped or otherwise did not respond to the certification item, and thus were excluded from analysis.

For each dependent variable – whether the individual holds a certification or whether it is voluntary – I run three models. The first model estimates the effect of the individual demographic predictors, including gender, race, and educational attainment (see below). The second model adds covariates pertaining to individual's labor market experiences, including the characteristics of the individual's current job and past employment history, allowing me to better isolate whether certifications are more likely among those with marginal attachments to the labor force (consistent with the compensatory narrative) or less likely (consistent with the cumulative advantage/complementary narrative). A full set of descriptive statistics for the variables used in these models is provided in Table 1.1.

The third model fits a full set of occupation dummies using major-level occupation groupings, under the assumption that some of the association between the other covariates and certification is due to the uneven distribution of certification programs across occupations (see, e.g., Weeden 2002). This model allows me to estimate the average within-occupation association between the other covariates and the likelihood of being certified. It should be noted, however, that occupation may be endogenous to certification, and the "true" association between the non-occupation predictors and certification will be underestimated in models that condition on occupation.

Each table presenting regression results shows the estimated marginal effect of certification – that is, the change in the probability of being certified that is associated with a one standard deviation change in a continuous predictor or, in the case of a binary predictor, a shift from a "no" to "yes" response. Standard errors are given in parentheses. For details on statistical significance, refer to a table of logistic regression coefficients provided in Appendix A. All models are weighted by a person-level longitudinal panel weight variable provided by the Census Bureau. This variable adjusts for differences in individuals' probability of being selected to participate in the survey, as well as adjusting for nonresponse. I selected this weight over a household-level weight given that certification is an individual-level phenomenon. In the SIPP, missing data for individual respondents is imputed on the basis of a "hot deck" procedure wherein values are assigned to fields left blank on the basis of responses supplied by demographically similar individuals (US Census Bureau, 2014). Even with weighting, however, SIPP estimates are still affected by non-negligible levels of attrition over the course of the panel (Shafer 2013), and the individuals surveyed in the late-panel wave I draw upon in this chapter may be younger, healthier, and otherwise easier for the Census Bureau to locate and survey on average than the initial waves of the 2008 panel. Survivors, then, may have some of the characteristics that might be associated with differential self-selection into certification, which I discuss in greater detail in the second chapter of this dissertation.

The predictors in these models are summarized in Table 1. Many items are straightforward binary indicators of demographic and labor market status, including labor union membership, gender, and birth in the United States. I also include an "underrepresented minority" variable that is coded 1 if the individual is not white or Asian, and includes multiracial individuals. Unfortunately, the small number of individuals with certifications in the SIPP in individual ethnic minority groups complicates a finer-grained analysis.

To measure educational attainment, I categorize each SIPP respondent into an educational category based on their highest degree or grade level completed, ranging from less than a high school diploma to a professional or doctoral degree, and then treat each level of educational attainment as a categorical variable. I also compute the average level of educational attainment within each occupational category using a scale adapted form Jaeger (2003) and create a binary variable to indicate whether an individual's level of educational attainment is higher than his or her occupation's average level.

Table 1.1. Descriptive Statistics.

Variable	Mean	Std. Dev.	Min	Max
Has a Certification?	0.055	0.228	0	1
N of Months in SIPP Workforce	69.123	25.212	0	88
N of Voluntary Quits	0.458	1.558	0	20
N of Occupation Changes	2.643	1.027	1	12
N of Months Unemployed	2.090	5.261	0	48
N of Months Part-Time	7.191	12.517	0	88
Hours Worked Weekly	38.442	11.824	1	99
Union Member? (1=Y)	0.113	0.317	0	1
Underrepresented Minority? (1=Y)	0.145	0.352	0	1
Sex (1=F)	0.497	0.500	0	1
Ed Level: High School Dropout	0.074	0.262	0	1
Ed Level: High School Graduate	0.251	0.434	0	1
Ed Level: Some College	0.256	0.436	0	1
Ed Level: AA/AS Degree	0.094	0.292	0	1
Ed Level: BA/BS Degree	0.210	0.406	0	1
Ed Level: MA/MS Degree	0.085	0.279	0	1
Ed Level: Professional or Doctoral	0.029	0.169	0	1
Age	42.581	13.959	15	88
US-born? (1=Y)	0.852	0.355	0	1
Above Occupation Mean Ed? (1=Y)	0.507	0.500	0	1
Monthly Income	3451.49	3670.11	0	42000

N= 29,121

I also construct measures that capture the respondent's recent labor force experiences, including spells of unemployment or being "not in the labor force." These covariates allow me to assess the association between certification and labor force marginality, although as noted above, I cannot identify the order in which labor force events (e.g., unemployment) occurred relative to obtaining a certification. These measures of labor force experience are based on data linked from Wave 13 (2012) to all prior waves in the SIPP panel. From these linked data, I construct indicators of the number of voluntary job switches, number of occupation changes, number of months unemployed but seeking employment, and number of months working less than full time (i.e, 35

hours per week) between 2008 and 2012. Because individuals may also leave the workforce for full-time educational enrollment, disability, and retirement, I also condition on the number of months that the Wave 13 respondent has been engaged with the labor market – i.e., looking for work, working full time or working part time – between 2008 and 2012.

Results

How does the Population of Certified Workers Differ from the Population of Uncertified Workers?

Table 1.2 contrasts the characteristics of certified and uncertified workers in the SIPP sample. Certified workers are more likely to be white, male, and US-born than their uncertified counterparts. They are also more likely to have post-baccalaureate degrees, and are less likely to be union members. They earn almost $1,200 more each month, on average, than uncertified workers, and although their unemployment risk is about the same, they have less experience with part-time employment than uncertified individuals do. In short, certification appears to be associated with many indicators of labor market advantage. These differences in the certified and uncertified populations suggest that certifications are far from equally distributed across the labor market. I address whether these differences are partially attributable to differences in the distribution of individuals across jobs and occupations in the following analyses.

Table 1.2. Comparison of Certified and Uncertified Samples.

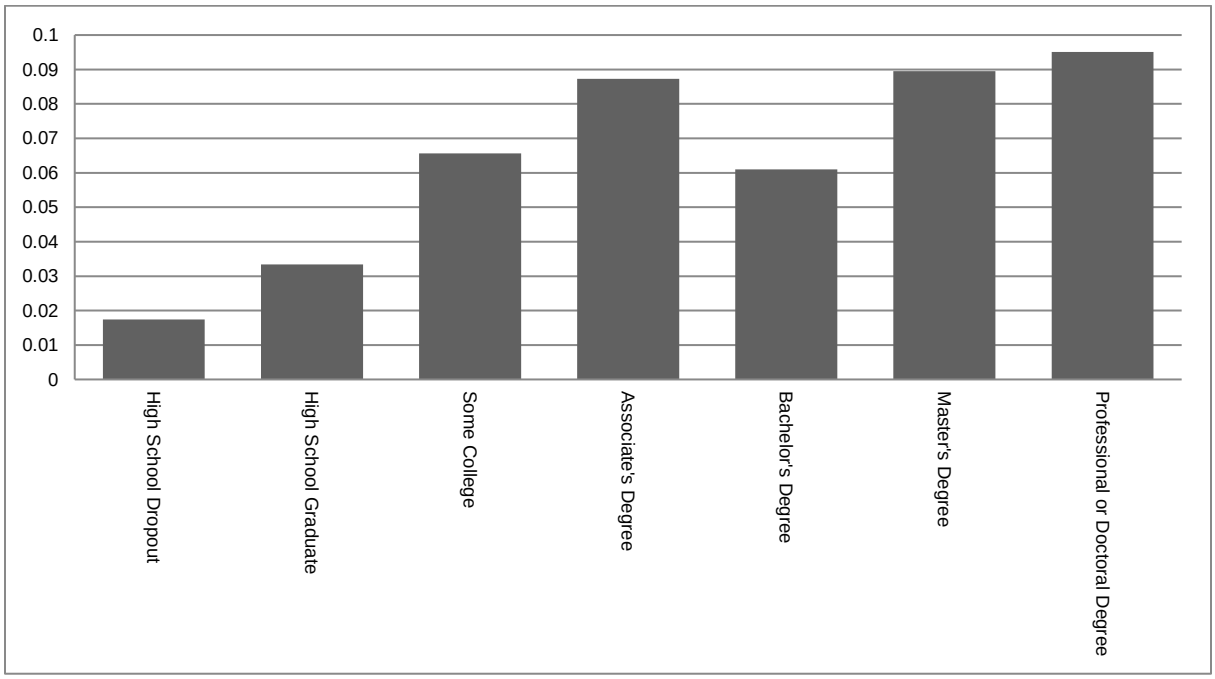
	Uncertified		Certified	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Has a Certification? (1=Y)	0.000		1.000	
N of Months in SIPP Workforce	68.879	25.385	73.250	21.656
N of Voluntary Quits	0.455	1.555	0.504	1.617
N of Occupation Changes	2.645	1.028	2.625	1.006
N of Months Unemployed	2.093	5.260	2.033	5.273
N of Months Part-Time	7.270	12.561	5.852	11.661
Hours Worked Weekly	38.318	11.826	40.575	11.583
Underrepresented Minority? (1=Y)	0.146		0.118	
Sex (1=F)	0.501		0.429	
Ed Level: High School Dropout	0.077		0.027	
Ed Level: High School Graduate	0.257		0.155	
Ed Level: Some College	0.254		0.285	
Ed Level: AA/AS Degree	0.092		0.134	
Ed Level: BA/BS Degree	0.209		0.219	
Ed Level: MA/MS Degree	0.083		0.130	
Ed Level: Professional or Doctoral	0.028		0.050	
Age	42.518	14.041	43.670	12.410
Union Member? (1=Y)	0.150		0.120	
US-born? (1=Y)	0.113		0.115	
Above Occupation Mean Ed? (1=Y)	0.502		0.594	
Monthly Income	3,387.90	3,587.13	4,542.19	4,749.11

Note: standard errors reported for continuous variables only. Uncertified N = 27,474. Certified N = 1,647.

What Factors Predict Certification Attainment?

Figure 1.2 shows a strong association between formal educational attainment and certification (see Model 1), measuring educational attainment categories against the baseline effect of being a professional or doctoral degree holder on certification attainment. Individuals with higher levels of educational attainment have higher predicted probabilities of holding certification. While the relationship between one's highest level of formal educational attainment and the attainment of certification is far from linear, it is clear that individuals are most likely to be certified if they also hold an advanced degree. Conversely, those with a high school diploma or less are at a substantial disadvantage in terms of attaining a certification. Per the estimated marginal effects calculated in Table 1.3, the effect of being a high school dropout is a 4.8 percentage point lower certification propensity relative to those in the highest category of educational attainment, while the effect is 4.4 percentage points lower for high school graduates, and 1.9 percentage points lower for those whose college careers cumulated in less than an associate's degrees.

Figure 1.2. Predicted Probability of Certification, by Educational Attainment.



I also consider the effects of various covariates on the predicted probability of holding a certification aside from educational attainment in Table 1.3. The results show that certifications are unevenly distributed across workers with different demographic characteristics. A baseline model shows that certifications are disproportionately concentrated among the US-born, males, and older individuals. (See Table 1.3, Model 1).

Model 2 adds in covariates pertaining to prior work experience. Notably, the association between the demographic characteristics and certification become weaker in Model 2, suggesting that work experience may be mediating some of the relationship between demographic factors and certification. Model 2 shows only weak support for the hypothesis that certification is a compensatory strategy pursued by workers who have labor force disadvantages, again considering labor force experiences in the past four years. Effect sizes are small, both in absolute terms and as multiples of their standard errors, in comparison to the effect of other covariates. The point estimates suggest that certification is more common among workers with an extensive history of

unemployment, which we did not see in the bivariate data. A one standard deviation change in the number of months worked part-time (equivalent to about 5 months) makes one 2.5 percentage points less likely to be certified. The frequency with which one switches between jobs voluntarily has only a very small effect on the probability of being certified, indicating a weak relationship between certification is related to voluntary career mobility. Model 2 also shows a negative association between the probability of certification and an individual's education level relative to within-occupation peers: workers who are better educated than the modal education level in the occupation category are less likely to be certified than those who are at or below the modal education level in their occupation.

Table 1.3. Estimated Marginal Effects on Having a Certification.

	Model 1		Model 2		Model 3	
	Est. Marginal Effect	SE	Est. Marginal Effect	SE	Est. Marginal Effect	SE
Respondent's gender (1=F)	-0.017	(0.003)	-0.011	(0.003)	-0.007	(0.003)
Respondent is a URM (1=Y)	-0.005	(0.004)	-0.004	(0.004)	-0.003	(0.004)
Respondent above occupation mean ed (1=Y)	-0.002	(0.003)	-0.001	(0.004)	-0.0002	(0.004)
Respondent's age*	0.000	(0.001)	0.0004	(0.001)	0.001	(0.001)
Respondent born in the US? (1=Y)	0.007	(0.004)	0.007	(0.004)	0.008	(0.004)
Ed Level: High School Dropout	-0.049	(0.003)	-0.042	(0.004)	-0.038	(0.005)
Ed Level: High School Graduate	-0.042	(0.005)	-0.030	(0.006)	-0.026	(0.007)
Ed Level: Some College	-0.020	(0.006)	-0.006	(0.007)	-0.006	(0.008)
Ed Level: AA/AS Degree	-0.006	(0.007)	0.006	(0.009)	0.001	(0.008)
Ed Level: BA/BS Degree	-0.021	(0.006)	-0.013	(0.006)	-0.011	(0.006)
Ed Level: MA/MS Degree	-0.006	(0.007)	0.001	(0.007)	0.003	(0.008)
N of months employed or looking for work since 2008*			0.004	(0.002)	0.003	(0.001)
N of voluntary quits*			-0.0004	(0.001)	0.0008	(0.002)
N of occupation changes*			-0.0001	(0.002)	0.0001	(0.002)
N of months unemployed since 2008*			0.002	(0.001)	0.002	(0.001)
N of months worked part time since 2008*			-0.025	(0.035)	-0.002	(0.002)
N of hours worked per week*			0.059	(0.032)	0.002	(0.001)
Union member? (1=Y)			-0.005	(0.004)	-0.002	(0.004)
Income*			0.004	(0.000)	0.004	(0.000)
Occupation-Level Fixed Effects	Omitted		Omitted		Included	

**Indicates variable measured in terms of one standard deviation change, rather than one unit change.*
Professional and doctoral degrees are the reference group for educational attainment variables

Model 3 adjusts for occupation. The association between the demographic factors and certification weakens when conditioning on occupation. This likely reflects the well-known segregation by race and gender in the US labor market coupled with evidence of an uneven distribution of certification across occupations (see, e.g., Weeden 2002; see also Figure 1.3). Notably, the estimated marginal effect of being a woman on certification attainment is more than halved when occupation-level factors are controlled for: in the unadjusted model, women are 1.7 percentage points less likely than men to be certified; in the occupation-adjusted model, this gap shrinks to 0.7 percentage points. Conversely, the effect of being a racial minority is more consistent across model specification, suggesting that there is a small but persistent race gap in certification attainment even when between-occupation differences in certification are parsed out. The effect of age is also quite consistent across models, with a one standard deviation increase in a worker's age yielding a small but positive increase in his or her propensity to hold certification in nearly all models.

The association between education and certification is also attenuated in Model 3. The predicted probability of being certified declines by 20 to 70% in education categories below the MA, suggesting that a sizeable chunk of the effect of educational attainment is associated with the distribution of workers across occupations. Of course, these are blunt groupings of educational attainment that masks within-category variance. For example, while this analysis lumps together doctoral degrees with professional degrees (e.g., J.D., M.D.), there are likely substantial differences in certification attainment between those with professional degrees, who often have certifications from medical specialty boards, and those with purely academic degrees. Unfortunately, the limited sample size offered by the SIPP does not permit a more nuanced analysis.

The marginal probability of certification for those who have more education than their peers observed in Model 2 persists in Model 3, but in attenuated form: the marginal probability changes

from -0.1 to -0.02., or roughly 80% of the Model 2 effect. The conclusion is that much of the effect of being above or below one's occupational peers is attributable to the fact that certification is a more prevalent feature of some occupations than others.

The association between other demographic and labor force experiences covariates and certification is likewise affected by the uneven distribution of people (and certifications) across occupations. Union members are less likely to be certified than non-union members, but the association between membership and certification declines by 50% in Model 3. Regardless of whether occupation is considered, individuals who work more hours per week are less likely to be certified than individuals who work less. Similarly, higher income makes one more likely to be certified regardless of model specification: a one standard deviation increase in personal income is associated with a 0.4% percentage point increase in the probability of being certified. Therefore, to summarize, many indicators of advantage, including higher levels of educational attainment, income, and stability in employment, are related to certification attainment – though the results are somewhat varied.

Does it Matter if a Certification was Earned Voluntarily?

The preceding analysis does not differentiate between certifications obtained voluntarily and those that are obtained involuntarily, perhaps in response to an employer's mandate. It is possible that the distribution of these two types of certifications varies across employee attributes. We might, for example, expect that workers with more tenuous labor force experience will be more likely to seek voluntary certifications as a way to compensate for their lack of education relative to within-occupation peers and holes in their labor force experience. Conversely, workers with more stable labor market histories may be more likely to be on the receiving end of employer mandates to obtain certification.

Table 1.4. Estimated Marginal Effects of Demographic and Economic Variables on Voluntarily Earning a Certification.

	Model 1		Model 2		Model 3	
	Est. Marginal Effect	SE	Est. Marginal Effect	SE	Est. Marginal Effect	SE
Respondent's gender (1=F)	0.032	(0.027)	0.045	(0.028)	-0.007	(0.032)
Respondent is a URM (1=Y)	0.009	(0.044)	0.021	(0.043)	-0.006	(0.044)
Respondent above occupation mean ed (1=Y)	0.013	(0.036)	0.017	(0.037)	-0.008	(0.042)
Respondent's age*	0.0004	(0.015)	-0.006	(0.015)	0.006	(0.016)
Respondent born in the US? (1=Y)	-0.021	(0.039)	-0.019	(0.039)	0.004	(0.039)
Ed Level: High School Dropout	0.132	(0.094)	0.136	(0.093)	-0.144	(0.092)
Ed Level: High School Graduate	-0.097	(0.091)	-0.114	(0.098)	0.061	(0.105)
Ed Level: Some College	-0.231	(0.080)	-0.239	(0.086)	0.192	(0.097)
Ed Level: AA/AS Degree	-0.206	(0.087)	-0.214	(0.092)	0.185	(0.100)
Ed Level: BA/BS Degree	-0.217	(0.080)	-0.224	(0.082)	0.162	(0.087)
Ed Level: MA/MS Degree	-0.280	(0.084)	-0.291	(0.084)	0.217	(0.093)
N of months employed or looking for work since 2008*			0.012	(0.017)	-0.023	(0.017)
N of voluntary quits*			-0.010	(0.013)	0.016	(0.013)
N of occupation changes*			-0.002	(0.014)	-0.008	(0.014)
N of months unemployed since 2008*			-0.030	(0.014)	0.036	(0.014)
N of months worked part time since 2008*			-0.026	(0.015)	0.034	(0.016)
N of hours worked per week*			-0.002	(0.015)	-0.002	(0.001)
Union member? (1=Y)			0.110	(0.036)	-0.080	(0.043)
Income*			-0.005	(0.000)	0.007	(0.000)
Occupation-Level Fixed Effects	Omitted		Omitted		Included	

**Indicates variable measured in terms of one standard deviation change, rather than one unit change*
Professional and doctoral degrees are the reference group for educational attainment variables.

As shown in Table 1.4, I find only modest variation in the association between the predictors of certification and the type of certification obtained among the certified sub-population. One notable difference is that highly educated workers are more likely to receive voluntary certifications than involuntary certifications (see Model 3, Table 4): highly educated individuals are not only more likely to be certified, but they are also more likely to earn their certifications as a personal choice, especially so when occupation controls are incorporated. Similarly, individuals who have more than the modal educational degree among their occupational peers are more likely to obtain voluntary certification than employer-mandated certification in two of the three models presented in Table 1.4.

A possible implication of this pattern of attainment is that the better educated see more value in certification. It is also possible that certification is more likely to be a voluntary choice at higher levels simply because such individuals have advantages (e.g., higher income, more flexibility on the job) that facilitate their acquisition of certification. Alternatively, we would observe the same pattern of results if lower-education individuals are more likely to work for employers who mandate certification in their workforces (e.g. a hotel that requires its housekeeping staff to obtain the Certified Guestroom Attendant certification). Such use of certification is consistent with the argument that "discursive resources of professionalism," like credentials, are used as a disciplinary mechanism that encourages workers to regulate their own behavior (Fournier 1999).

At the same time, some of the results in Table 1.4 lend support for the compensatory strategy claim. For example, prior unemployment, part time employment, and voluntary job turnover are positively associated with earning a certification voluntarily rather than involuntarily. This suggests that the disadvantaged are disproportionately investing in certification as a personal choice above and beyond job requirements, though it is impossible to say so definitively without knowing how relevant their certifications are to their actual duties at work.

Occupational Variation in Certification Attainment

The prior analyses focus on individual correlates of certification, in some cases in models that condition on occupation. These results show, quite clearly, that there is a strong association between occupation and certification probabilities. But in which regions of the labor market has certification become a common form of credentialing? As noted earlier in this paper, some occupations have taken to certification as an integral part of their credentialing system and a means of restricting entry, while others take a more open approach to certification (and, in cases where certification is sponsored by employers with an interest in lower labor costs, an easily-attained certification program may even be used as a means of bringing new entrants into occupations).

Figure 1.3. Proportion of Workers Holding One or More Certification, by Major Occupational Field.

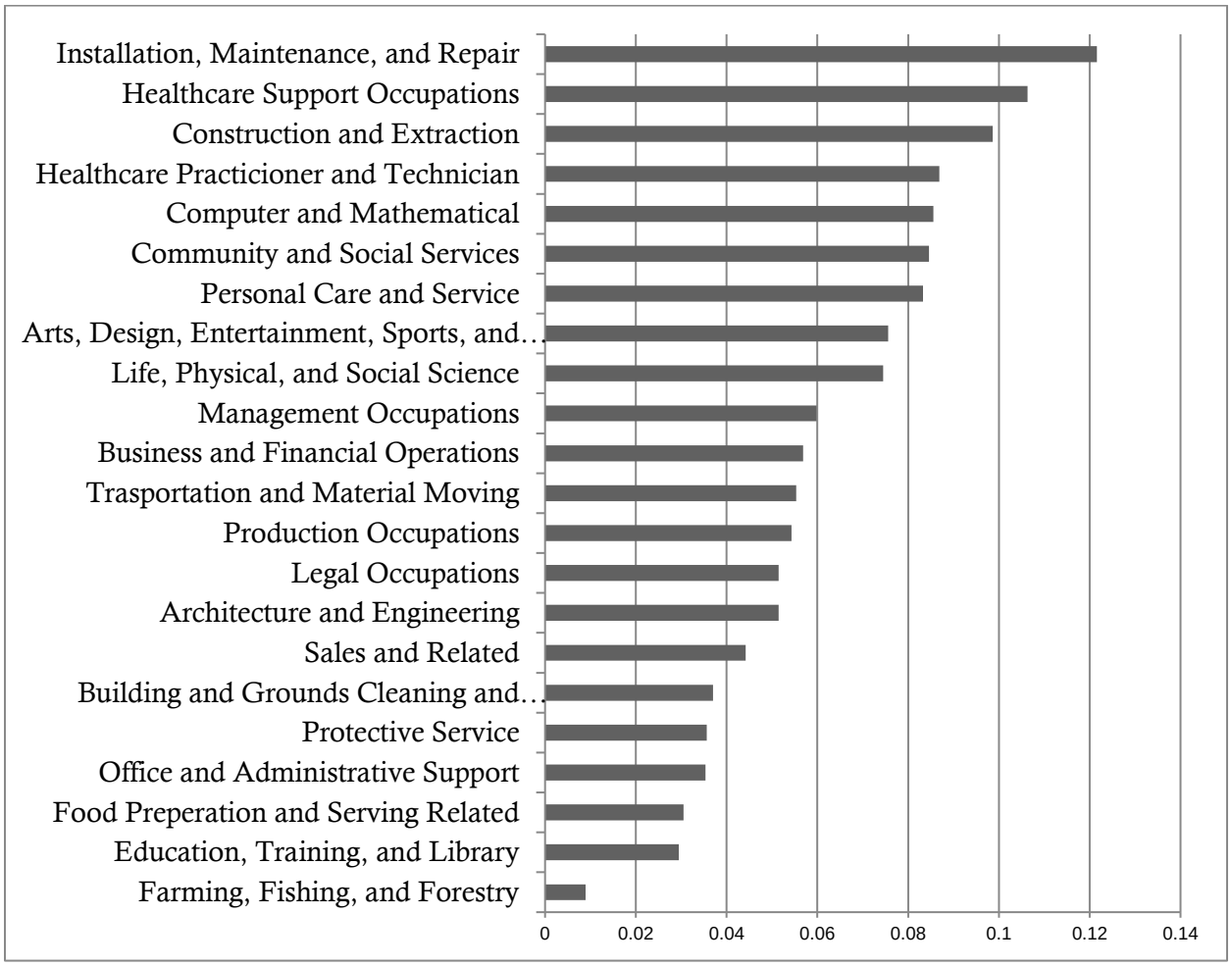


Figure 1.3 shows 22 major occupational groups arranged by the probability that a member of that occupation will hold certification controlling for individual factors and occupation. Installation, maintenance, and repair workers have an approximately 12% chance of being certified, conditioning on individual attributes, whereas agricultural workers have only a 0.8% chance of being certified. Figure 1.3 suggests that relatively high certification density can be found in more technical occupations as well as skilled trades, while lower skilled occupations in the service sector tend to be associated with a lower propensity to be certified.

However, even starker intra-occupational differences may lie beneath these aggregate figures. Occupations vary in the extent to which their typical certification programs are focused on niche or generalist topics and in the extent to which they are designed to be competitive or rigorous in nature. In computer programming and other IT related fields, for example, it is common for individuals to have a wide range of complementary certifications on particular topics, such as systems administration, IT security or particular programming languages. Holding multiple certifications is commonplace, and in some organizations may be the norm (Barley and Kunda 2004). In contrast, it is less common for individuals to pursue multiple certifications in nursing, where the certification that one earns is largely determined by one's topical specialization. (See Appendix D for further evidence that holders of multiple certificants may be skewing data.) Competition between certification programs for particular occupational niches appears to be less common, as hospitals and insurers insist that nurses earn certifications from particular programs that meet a legally defensible standard of rigor as a means of defending themselves against possible claims of malpractice. Such certification-level factors may influence who gets certified as much as individual demographic characteristics, and suggest a need to collect data on the attributes of certification program themselves.[10] If some occupations are characterized by high quality certification programs while others are characterized by lower quality certifications, the certification movement may be contributing more to between-occupation inequality than inequality between otherwise comparable workers. Although I cannot test this claim with the data at hand, it is an important area for future research.

[10] Indeed, a lack of data on individual certification programs is one of the biggest obstacles to research on occupational certification at the moment. The US Department of Labor attempted to collect information from employers on perceptions of the most valuable certifications in specified industries at one time, but found that the process was subject to politicization and did not produce usable data.

Discussion

The findings reported in this study force a closer examination of how occupational certification affects workers. Why are certifications so concentrated among those with high levels of education, typically considered a form of advantage in the labor market, yet also disproportionately common among those with a history of recent unemployment? Part of the reason for the overrepresentation of highly educated individuals in the certified population is related to the demands of employers and regulators in professions requiring advanced degrees. Aside from academia, some business management specialties, fine arts, and some scientific fields, the recipients of professional, master's-level, and doctoral degrees are prepared to work in fields where state licensure requirements are in effect. Though licensure can sometimes be attained without certification, holding a certification typically either helps one fulfill licensure requirements or can easily be attained by one who already possesses the necessary level of competence to be licensed. State licensure requirements tend to emerge in occupations in which high risks to public safety of welfare are possible if incompetent service is delivered. Licensed occupations, therefore, tend to be ones in which employers and consumers demand that practitioners hold advanced credentials (Schoon and Smith 2000). Thus, it is unsurprising that there is a very strong association between certification attainment and the highest levels of educational attainment.

Differences in legal requirements and employer preferences for certification in the occupations in which highly educated workers can be found may also account for the finding of a positive association between certification attainment and three other demographic attributes typically associated with advantage: namely, being older, male, and born in the United States. One interpretation is that demographically advantaged individuals may be using their advantages to locate certification programs and complete the requirements for certifications. However, the unequal distribution of advantaged workers across occupations and employers likely plays some role in explaining the finding of advantage in certification attainment I report here.

The finding of higher rates of certification among individuals with a history of unemployment is less readily explained by occupational heterogeneity in the availability of certification. However, aspects of the unemployment experience might promote certification. In particular, contact with the Career OneStop system that is typically required to obtain unemployment insurance benefits may make individuals much more likely to enroll in certification programs offering preparation for entry-level jobs in in-demand occupations, such as green building and information technology (Soss, Fording, and Schram 2011). In Wave 13 of the 2008 SIPP panel, the dataset used throughout this chapter, 3 out of 17 individuals reporting that they are unemployed and undergoing job retraining claim that they are required to do so in order to receive public benefits. The 14 individuals reporting that their participation is voluntary may, of course, also be doing so to avoid being forced into preparation for certification or a similar credential in the future. Such certifications are likely earned on an accelerated basis relative to individuals seeking advancement within full time occupations, given the pressure to push such individuals off of public assistance quickly (Soss, Fording, and Schram 2011). Quite aside from the small number of cases, the SIPP data lack necessary variables to differentiate mandatory from voluntary certification, but from a policy perspective this is an important avenue for future research.

A second further limitation of the SIPP data is the lack of detail differentiating high quality certifications from those that might be less powerful signals of competence in the eyes of employers and consumers of certified services. Available data does not permit one to say whether there are qualitative differences between the types of certifications that the previously unemployed are earning relative to peers with more stable career trajectories, but such data collection in the future may provide context for the finding of disproportionate levels of certification among the previously unemployed.

Conclusions

Occupational certification is an increasingly prominent and important feature of the training landscape. This chapter presents the most comprehensive overview to date of who gets certified. The orienting question is whether certification is a compensatory strategy used by those who are disadvantaged, or a complement to existing labor market advantages. The evidence is mixed: consistent with a cumulative advantage interpretation, certification is concentrated among highly educated workers and older workers; at the same time certification is also more likely among those who have experienced unemployment spells, which could be consistent with the view of certification as a means of compensating for disadvantage.

As the certification movement evolves into a mature system of credentialing operating in the shadows of higher education, its effects will not be distributed equally across the US population. Certification attainment will only be a mechanism through which inequality is maintained or grows if certifications have genuine labor market value. Such value may encourage disadvantaged workers, such as the previously unemployed, to seek certification – though traditional views of certification as a form of closure suggest that certification boards should set policies that limit rather than discourage such individuals' pursuit of certification. Yet, this interpretation of the motivations for certification attainment rests on the assumption informed by a modest body of literature claiming that certification programs create labor market value across the entire labor market. If certification does not add value in the form of actual human capital or the signaling thereof, certification may simply be a mere indicator of advantage rather than a mechanism through which advantage accumulates. Further research on the reasons individuals identify for earning certification is necessary to understand the extent to which certification is an advantage in and of itself.

The "parallel" credentialing system of certification constructed by associations and corporations is characterized by many of the same inequalities seen in the formal education system

in countries throughout the world. Certified individuals are far from equally distributed across occupations, and significant differences exist between certificants and noncertificants. Whether certifications are simply a marker of deeper differences between advantaged and disadvantaged workers, or a mechanism through which advantage accumulates depends on the extent to which employers and employees alike place value in them. However, to the extent that certifications can be expected to generate benefits for those who earn them, these benefits of certification are primarily flowing to those who start from positions of advantage – casting doubt on their potential as a means of improving the efficiency and fairness of the labor market. Certifications may be a mechanism through which workers around the world are, on balance, locking in pre-existing labor market advantages and reproducing labor market inequality. Of course, the extent of these advantages depends on the value that workers obtain from their certifications, which I explore in depth for a subset of the American workforce in the next chapter.

Chapter 2. Certification and Earnings

As with other types of credentials, occupational certifications are often touted by their proponents as offering returns in the form of higher wages. Returns accrue to occupations with certification programs because the certificates signal professional status. Returns accrue to individual certification holders (certificants) through improved labor market prospects (US Department of Veterans Affairs 2016; Lane 2014). At the same time, there is reason to question whether occupational certifications live up to their billing, given that certifications are entirely voluntary and carry value in the labor market only insofar as employers believe that they signal skills or attributes that are associated with greater marginal productivity. Therefore, this chapter focuses on the empirical question of whether certification is associated with an earnings premium, and if so, the extent of that premium and the identification of subpopulations that disproportionately benefit from certification.

To date there has been little critical evaluation of the economic benefits to certification or the extent to which these benefits are distributed across the occupational structure (notable exceptions including Gittleman, Klee, and Kleiner 2014 and Weeden 2002). What little evidence exists is either limited to the occupational level (e.g., Weeden 2002), consists of single occupation case studies, or does not consider sources of variance in types of workers who might choose to earn certification (i.e, Gittleman, Klee, and Kleiner 2014). My research improves on these studies by using a sample of young workers that is not constrained to specific occupations, using a rich set of control variables to obtain a rough estimate of the extent of the certification premium that might be attributable to intellectual, behavioral, and other personal characteristics. Moreover, in contrast to Weeden (2002), I consider the effect of certification attainment on income at the individual, not occupational, level. In this article, I use nationally representative, longitudinal data on a recent cohort of labor market entrants to assess whether and how certification affects early career outcomes. Although certification

could affect many outcomes (e.g., employment prospects, whether a job is found in the desired field), I focus on early labor market earnings from employment as an indicator of the benefit that certificants receive from their certifications. Aside from its measurability, employment income is perhaps especially appropriate as an indicator of the return on individuals' investment in becoming certified because certification boards often claim, but have limited evidence to prove, that certification attainment may be related to higher incomes.

Assessing the advantages or disadvantages associated with certification, like efforts to identify a causal effect of schooling (e.g., Brand and Xie 2010), is often complicated by differential selection into certification, which is presumably made both on personal attributes (e.g., aspirations, prior achievement, unemployment history) and occupational attributes (certification is more common in some occupations than others). To address this, I use a comprehensive set of adjustment variables measured prior to labor market entry as well as models that allow me to estimate the magnitude and direction of the certification "effect" on income after adjusting for individual-level characteristics. My results suggest that there is a strong and positive association between holding a certification and early career income, even after adjusting for background characteristics and occupation. I also consider whether certification may yield a stronger or weaker earnings premium for those workers who have experienced difficulty in transitioning to stable employment in the initial years after secondary education, as measured through months of unemployment and the number of prior employers.

Do Certified Workers Earn More?

Although published government data indicate that certified workers earn more on average when compared directly to the population of noncertified workers in the absence of any effort to control for differences in the certified and noncertified populations (Ewert and Koiminski 2014), evidence of a consistent earnings premium attributable to the effect of certification itself is still

elusive. An earnings premium could materialize through several mechanisms. Employers might offer a direct benefit codified in HR policy manuals – for example, some hospitals offer a set increase in hourly pay or a one-time bonus to nursing certificants in order to encourage certification attainment, especially if a hospital perceives that an employee's certification will reduce malpractice risk or reassure customers of service quality (Trossman 2002). Employers might also increase pay on a case by case basis, especially if the market value of an individual employee rises as a result of his or her certification. Pay may also increase if a certification enables an individual to obtain a more desirable position within his or her organization. Or, if an individual leaves and seeks a new position, he or she might enjoy the ability to command a higher market wage from another employer as a result of certification. Certification, then, should be an activity that is generally good for an employee's prospects for wage and income growth, regardless of whether that growth materializes within his or her current organization in the short term or by moving to a new employer in the middle-to-long run.

The literature on returns to occupational certification can be divided into two groups: studies of perceived benefits and studies of actual benefits, though most studies in the latter category are limited to the aggregate occupational level or single occupations. With respect to the former category, students in the information technology field report high degrees of confidence that certification will improve employment prospects (Hunsinger and Smith 2008), but that confidence did not translate into better employment outcomes. A study of fine dining servers finds that most servers believed that earning a Certified Dining Room Professional certification would improve their opportunities for advancement and compensation, yet, curiously, restaurant managers are less likely than servers themselves to believe that certification improves servers' economic prospects (Weber 2006). Likewise, nurses report more confidence that certification increases their own salaries than hospital administrators do (Sechrist, Valentine, and Berlin 2006). Managers in both information technology human resources generally do not perceive tangible rewards for certified employees,

though they suggest that certification may help a new candidate get his or her foot in the door – especially if the hiring manager holds a certificate himself or herself (Bartlett et al 2005; Lester, Fertig, and Dwyer 2011).

While these studies provide some evidence to suggest that labor market actors *believe* there is an economic benefit associated with certification in some circumstances, they do not, of course, provide direct evidence that these economic benefits exist in practice. Indeed, remarkably little scholarly research exists on the effect of certification on wages. There are a few items summarizing salary surveys in the trade literature, though such articles tend to simply compare the self-reported wages of certified and non-certified individuals and make claims like "there is no doubt why more than half [of survey respondents] invested personally… in certification," inferring that higher wages earned by certified individuals are a result of certification itself (Gabelhouse 2002: 34). Weeden (2002) finds an association between the percentage of workers in an occupation who are certified and that occupation's mean income (adjusting for individual-level human capital, occupational licensure and educational credentialing), but she lacked necessary data to estimate whether there is an individual-level effect of certification. Using a within-occupation design, Arman and Shackman (2012) show higher self-reported income for certified financial planners compared to uncertified financial planners, but did not consider the possible causes of that income premium. Gittleman, Klee and Kleiner (2014) used Wave 13 of the 2008 Survey of Income and Program Participation, the same dataset used in the first chapter of this dissertation, and found evidence that certified workers earn more and are more likely to hold employer-provided health insurance, on average, than non-certified workers, especially if they have lower-than-average incomes. Gittleman, Klee, and Kleiner also examined the effect of both certification and licensure at different points in the income distribution, and found that the benefits of certification and licensure are strongest for those with relatively low incomes. However, Gittleman, Klee and Kleiner lack detailed control variables to consider pre-certification differences in the certified and non-certified populations. Indeed, my

research differs from Gittleman, Klee, and Kleiener's focus on observed differences between the certified and uncertified populations by attempting to control for individual level characteristics that likely affect the probability that an individual will be certified. Thus, while prior research suggests that there may be a certification wage premium, it is unclear whether it is anything but a result of self-selection into certification on the part of higher achieving workers.

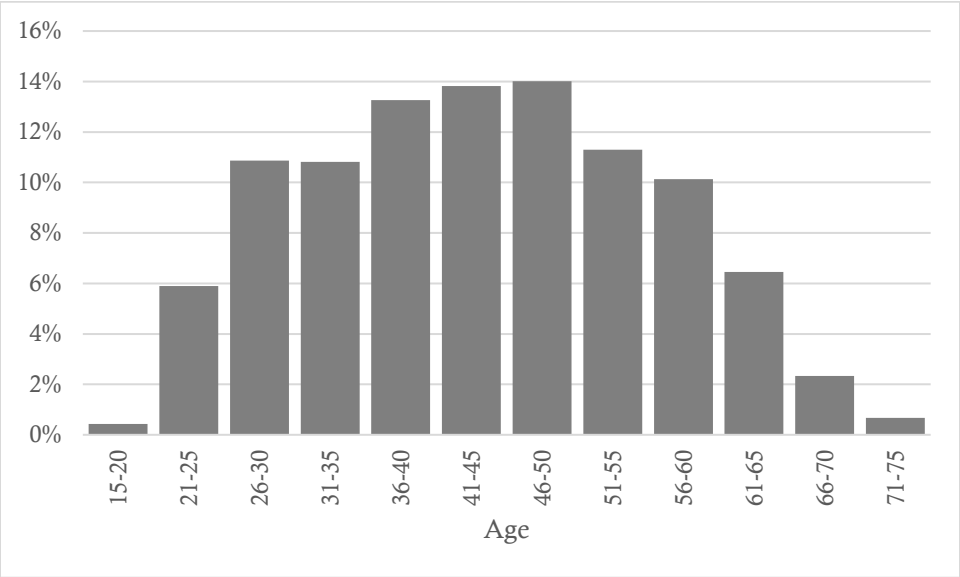
Why Occupational Certifications May Boost Income

In order for a certification to lead to higher income or otherwise improve the labor market prospects of the certificant, employers (or, for solo practitioners and freelancers, clients) must perceive value in certification. On one level, certifications are a manifestation of human capital (Kerckhoff and Bell 1998; Schultz 1961). Certification exams typically require some individual study and preparation, and entire cottage industries have emerged around the process of preparation for certain well-known exams such as the LEED designation for green architects and PMP designation for project managers. Though the rigor associated with certification varies widely from program to program, the mere fact that employers appear to demand specific certifications for certain positons suggests that there is some agreement that certifications have occupation-specific value, similar to the value that might be attained through a college degree in a relevant subject, either as a signal of motivation or an indicator of actual skill. Thus, certifications can ease some of the hesitations that employers might have about hiring otherwise untested workers and help less established workers compete in the labor market with more seasoned peers. The potential reasons for certification to boost income are numerous, including the predictions of theories of human capital, signaling, and occupational closure, as well as possible selection effects.

Certification is not as commonly held by younger workers relative to older peers. Less than 20 percent of all occupational certifications in circulation are held by individuals under the age of 30 (see Figure 2.1). The tendency for certifications to be held by older workers is understandable, given

that they tend to be earned after the completion of formal educational credentials and entry into an occupation – a sequence of events that is mandated by some certification boards that impose work experience requirements on those applying for certification. However, the relative rarity of certifications in this subpopulation should not be interpreted as a sign that they are any less valuable for younger workers. Certifications require far less investment of time than other credentialing options for those who possess the requisite knowledge to pass a certification exam without additional study. Even certification fees that may appear high at first glance -- figures discussed in a session at a credentialing industry tradeshow suggest that the average certification costs around $400 -- are quickly dwarfed by tuition at a public vocational college, even for instruction-based certificates issued by educational institutions. Thus, certification may be earned with greater efficiency than other credentials available to young people, especially those in a formal higher education system that demand seat time and tuition dollars. The accessibility of certifications is likely to be a particularly strong selling point for young people who may want to enter fields less commonly served by the formal education system, such as entry-level occupations in hospitality (Morrison et al 1992) and newly emerging specialties in information technology (Adelman 2000), which might otherwise only be accessible to individuals with extensive work experience rising through entry level jobs.

Figure 2.1. Distribution of Occupational Certifications in the US Labor Force by Age Bracket.



Author's calculations. Data source: 2008 Survey of Income Participation, Wave 13 Topical Module

Certification's value for younger workers also comes from its ability to smooth the transition between the educational system and the workplace in a manner similar to related labor market institutions that emphasize the acquisition of competency without formal classroom instruction, such as apprenticeships and internships. Much of that value comes from the fact that competency-based credentials like certification signal to possible employers that the worker has acquired competency, made an investment in a career in a given occupation, and shown that he or she has the initiative and ability to complete an examination. Indeed, like apprenticeships and internships, certifications are notable for their vocational specificity. Rather than signal an ability to think deeply or work on complex problems in general as liberal arts degrees do, certifications demonstrate competency with material directly related to the occupation at hand. Occupational specificity (i.e., the direct applicability of training to a single occupation) is a trait of national credentialing regimes that is typically associated with a successful school to work transition (Breen 2005; Quintini 2007;

Wolbers 2007), even though its value varies across occupations (DiPrete et al 2015). Like college extracurricular activities that are most valued by employers when directly related to vocational aspirations (Richards 1984), the vocational specificity of a credential should contribute to its market value by signaling commitment and alignment of personal values with the employer (Brown 2001; Spence 1973). And, even relative to many (though certainly not all) bachelor's degree programs, certifications are especially focused on the demands of specific occupations and specializations within occupations. Thus, one of the reasons that we may expect certified workers to earn more is that they show employers that they are capable and committed to an occupation, hinting at higher productivity and lower turnover.

The value of any signaling of competence through certification, of course, is predicated on an assumption that the training and competence signified by a certification does actually translate into human capital. Though certification exams are often prepared for through self-study that is difficult to quantify relative to credit hours in a higher education setting, the skills that individuals acquire as a result of preparing for certification enable individuals to perform their jobs better, resulting in productivity gains that may lead to higher pay (Bartlett 2012; Cary 2001). Alternately, certified individuals may be able to take advantage of their human capital to change jobs and find a higher paying position than they held prior to certification. For young workers needing to overcome skepticism on the part of employers about their competence and level of preparation for a job, having a credential issued outside the formal education system may be an invaluable means of demonstrating skills employers that employers seek (Borman 1991), and thus the certification earnings premium is likely derived in part from actual improvements in skill and competence.

Yet, certifications are more than just evidence of accumulated human capital – they are also symbols indicating membership in an established occupation and a mechanism through which workers can distinguish themselves from others in a given occupational space. Some young workers will want to attain certifications precisely because they mark the boundaries of an occupational

community (Trice 1993) and are a means of occupational closure (Weeden 2002) when certifications effectively limit the supply of workers entering an occupation. For those certification programs that are a genuine signal of quality or status, placing oneself inside the labor market "enclosure" created by certification will greatly improve one's earnings potential. Indeed, scholars have long viewed the goals of occupational associations as promoting "collective social mobility" through barriers to entry – with such motivations, we would expect certification programs to be designed more for the benefit of certificants than the fulfillment of any broader social goal (Abbott 1988; Freidson 2001; Wilensky 1964). Certification is considered a weaker form of occupational closure than those methods that result in a legally-enforced barrier to entry, such as occupational licensing and involuntary labor union membership requirements (Weeden 1999). Nonetheless, if certification boards are successful at motivating customers to prefer certified service or employers to prefer certified employees, as seems to be a priority of many certification organizations (Schoon and Smith 2000; Rops 2011), certification should improve equilibrium wages and earnings in occupations where most practitioners are certified.

By demonstrating occupational membership at an early age, young workers may position themselves to benefit from later occupational closure. Of course, not all certification programs are designed to be effective instruments of closure - some certifications with low standards have more in common with diploma mills than gatekeeper institutions – but enough are of substantial value that they should increase demand for a certified worker's services. Combined with the signaling effect of certification and the human capital that often accompanies the acquisition of certification, there is clearly reason to expect a certification earnings premium. Thus, for young workers, certifications may simultaneously be a powerful tool for some to enter and become established in the labor market and a source of inequality between those on a stable and prosperous career track and less-advantaged peers.

While the above theories give ample reason to believe that a wage or earnings premium may be a product of certification itself, regardless of whether it comes from human capital attained through certification, the closure power of certification, or a signaling effect conveyed by the certified title, there are also reasons to believe that the certification wage premium reported in initial research on certification and wages (e.g., Gittleman, Klee, and Kleiner 2014) is merely a product of the self-selection into certification of individuals who would be high earners even without being certified. Because certification is not legally required to practice in a given occupation, there are likely to be individual differences in who earns certifications. Indeed, many certification organizations market certification as an investment in oneself and advancement in one's career (Knapp and Knapp 2002), implying that those who choose to pursue certification will be those who are committed to professional growth. Moreover, aside from those personality and character traits that may propel one toward certification, more intelligent or capable individuals may be able to acquire certification more easily than their peers. Both commitment to professional growth and the intellectual capacity to acquire credentials are likely to be simultaneously related to certification attainment and income. This means that such selection factors must be measured and controlled for if one is attempting to identify the likely effect of earning a certification for an average worker within a given subpopulation.

Certification is also not evenly distributed across occupations. Part of the reason for differences in the prevalence of certification across occupations can be traced to the different levels to which different occupations have sought occupational closure. Certification may also be related to the nature of work in different occupations. For example, certification may be more prevalent in healthcare occupations because the risks associated with incompetent or unqualified service are perceived to be higher (Schoon and Smith 2000). Certifications may be more common in occupational settings where individual workers have contact with clients or customers who rely on certifications as a signal of quality. Employers are also not equal in the extent to which they have

pushed their workers or prospective hires to attain certification. Employers in fields such as information technology have been particularly aggressive about seeking employees who arrive on the job on day one with a certification in hand, alleviating the need for the employer to provide training post-hiring (Cappelli 2012). These inequities in the occupational distribution of certification are likely correspond to pay disparities across occupations, with many of the certifications characterized by high certification density also characterized by higher than average earnings for the some of the same underlying reasons – such high levels of technical skill and malpractice risk. Thus, it is essential to control for the effect of occupational categories when analyzing returns to certification.

Selection effects are not limited to characteristics and events occurring prior to labor market entry. Experiences in the labor market influenced by macroeconomic phenomena and the cumulative effect of one's prior work experiences may affect both the likelihood that one is certified and their wages; therefore, it is important to both adjust for one's career stability in determining whether there is a certification earnings premium and to consider the possibility that returns to certification may be higher among those with more stable careers. Indeed, a general theme in much of the literature on school to work transition is that, despite higher-than-average unemployment rates in general among young adults, new workers tend to experience better labor market outcomes if they have a smoother transition into the labor market with less "churning" between jobs or instability in employment patterns in general (Gardecki and Neumark 1998; Neumark 2002). Younger workers who have been employed in more places, and suffered lengthier and more intense bouts of unemployment, may simultaneously be less likely to attain certification and experience lower incomes. However, for those who are disadvantaged in the labor market that do manage to attain certification, the relative rewards they may reap from their certifications may be greater than other certificants - especially if certification tends to produce a set income premium for workers in a given field, as workers with a lower starting income would therefore experience a greater percentage

increase in their income. Therefore, I anticipate that the interactions between certification attainment, the duration of unemployment over one's career, and the frequency of turnover may positively predict income.

Data and Methods

The Education Longitudinal Study (ELS)

Data for this paper come from the Educational Longitudinal Study (ELS), a survey of 15,362 students (and their parents, teachers, and school administrators) in 750 schools who were high school sophomores in 2002 (National Center for Education Statistics [NCES]). A 10-year follow up to this survey in 2012 asked about respondents' attainment of alternative educational credentials, including licenses, educational certificates, and occupational certifications. The 2002 ELS also offers rich data on respondents' pre-labor market demographic and scholastic attributes as well as their early career labor market outcomes. By adjusting for these pre-labor market attributes, the fitted models will better pinpoint the association between certification and income. This ability to identify and control for attributes prior to labor market entry is an important advantage of the ELS over other datasets with certification items, such as the Survey of Income and Program Participation (as noted by Gittleman, Klee, and Kleiner 2014). After considering these factors, however, there will still be the possibility that other unobservables could be affecting the certification earnings premium. While I cannot control for unobservable factors, the inclusion of factors exogenous to the process of certification attainment itself offers some clues about how much of the premium is genuinely related to the certification.

A few unique features of the ELS must be kept in mind when interpreting the results. First, members of the ELS cohort are about 26 years old in 2012. Although most students will have finished their baccalaureate degrees by then, if they plan to complete one, a non-random subset of students will not have completed either their baccalaureate or post-baccalaureate schooling by 2012. In particular, students who entered a professional post-baccalaureate degree program (e.g., law

school, medical school, graduate school) are unlikely to have entered the labor market by 2012 and are thus excluded from analysis; as a result, the certification estimates will primarily be driven by certifications held by respondents in occupations other than the traditional professions. In my analysis, I include only workers who have employment income to report in the year 2011, thus excluding all individuals who did not work at all for pay during the year. Second, respondents who attended college full-time will have less employment and unemployment experience than those who entered the labor force straight out of high school. Third, the ELS does not provide information on the timing of the certification, so it is impossible to know whether respondents received their certifications during their schooling, during an unemployment spell, or after entering the paid labor force. And, finally, the ELS cohort was transitioning into the labor market shortly before – or, if enrolling in a four year college directly after high school, right in the midst of – a major economic recession characterized by lower than normal starting wages and higher than normal unemployment rates. Even with these caveats in mind, the ELS offers a unique opportunity to assess the relationship between certification and early career income (specifically, for this study, logged 2011 annual individual employment-related income), and in so doing gain insight on the effect of certification on income for at least one cohort of American workers.

Variables

The dependent variable of interest is logged employment-related income. In the ELS, income is measured in terms of total dollars earned by the respondent in the prior calendar year (2011). Of course, some workers may not work for the entire year or may not work full time. The ELS, therefore, provides measures of hours worked per week and weeks worked per year (as recalled by the respondent) that I incorporate as control variables in each model, adjusting for the fact that some individuals may be in my sample for having employment income that was only earned part time or over some portion of the year. A full table of descriptive statistics for the ELS variables used in this study is presented in Table 2.1.

Certification

The core predictor of interest, the measure of certification, is based on an item in the 2012 wave of the ELS. Respondents were asked to indicate whether they held at least one credential of a given type from a list. Of the three possible responses (state government, professional associations, and "industry" organizations including corporations), only professional associations and industry are treated as indicators of having a certification, given that a credential offered by state government is by definition an occupational license. As professional and industry organizations do not have the independent authority to issue licenses, credentials issued by them are bonafide occupational certifications; while in uncommon circumstances such a credential might be considered as a prerequisite for obtaining a state license, it is still a certification when it stands alone. Research commissioned by the Department of Education, in preparation for the inclusion of certification on this and other studies, found that individual workers are generally well aware of the type of credential they hold and the nature of the organization that issued it, suggesting that the risk that individuals might misidentify a license as a certification or vice versa is low (American Institutes for Research 2013). Unfortunately, the ELS dataset is inherently limited insofar as it does not permit distinguishing individuals with a single certification from those with multiple certifications, nor does it allow for the disaggregation of certifications on the basis of the rigor of their examinations or the level of investment they require (either in time or in financial cost). I include certifications from all occupational categories, as there is no way to distinguish the level of relevance of a particular occupation to one's current positon. In so doing, I assume that most certifications will be occupationally-relevant, as occupation-switchers typically do not renew (and thus would not report in this survey) certifications from prior occupations.

Background Characteristics

A host of individual-level human capital, demographic, and social psychological attributes (e.g., ambition, "drive") may predict both certification and earnings. For example, young adults with greater cognitive ability may be better equipped to pass certification tests, and also more

productive in their jobs. Similarly, the individual drive, motivation, and discipline necessary to obtain an occupational certification (or educational degree) may also predict labor market success (Borman 1991). Therefore, I incorporate individual demographic characteristics (e.g., sex, race, and whether an individual is a native English speaker), educational attainment, socioeconomic background, and measures of high school achievement and commitment as control variables in my models to adjust for the impact that they may have on the certification earnings premium. I use the composite measures provided by the ELS of standardized test achievement, high school persistence and effort, and high school instrumental motivation to gauge pre-labor market motivation, imitative, and ability, each of which are derived from respondents' scores (measured in high school) on a variety of psychometric attributes. (See Appendix A for details on the construction of these indicators.)

Career Stability

I also adjust for the effect of two aspects of individual employment histories, which may be both factors that predict whether an individual will attain certification and consequences of becoming certified. Therefore, I use two ELS variables, measuring the number of past employers that a respondent has had since 2006 and the number of months that an individual has been unemployed since 2009, as control variables. I also include interaction terms for each of these variables and the effect of having a certification to identify whether individuals who have had more employers or have been unemployed for longer periods of time enjoy a smaller or greater earnings premium.

Occupation

As I discussed earlier in this paper, certifications are unevenly distributed across occupations that, for reasons unrelated to certification, also offer higher or lower pay (see, e.g., Weeden 2002). In the information technology field, for example, certifications are unusually common and well-respected by employers (Adelman 2000; Barley and Kunda 2004). Similarly, certifications are also common in healthcare occupations, perhaps because hospital administrators believe that

certification will mitigate the risk of malpractice lawsuits (Schoon and Smith 2000), or because knowledge is highly specialized and formal educational degrees in health care (e.g., nursing) do not necessarily impart the specialized knowledge. More generally, occupations that have not embedded their specialized knowledge in the formal educational system have more space open for certification, not only because there is less competition with universities but also because employers may seek additional information in in the absence of other signals of worker quality (Morrison, et al 1992; Mishra 2006). And, employers may place greater emphasis and value on certification in fields where service quality is highly observable, in hopes that customers and clients may be attracted by the promise of quality service associated with a certified workforce (Weeden 1999). While consideration of the attributes of individual occupations that lead to different levels of certification density is beyond the scope of this paper due to data limitations, these factors highlight the need to consider the clustering of certification in high-earning occupations as a possible spurious factor contributing to the certification earnings premium.

Methods

To isolate the effect of certification attainment on employment income and estimate the impact of various covariates on the certification effect, I use a series of nested regression models in which the dependent variable is logged income. Each of the four models controls for the effect of background characteristics alongside the effect of certification on income. Model 2 adds indicators of career stability to background characteristics, which are replaced with occupation in Model 3. All covariates are included simultaneously in Model 4. One trade-off involved in choosing the ELS as a dataset is that, while the NCES collected a wealth of information about respondents and their educational contexts, many items of relevance for matching students prior to labor market entry are characterized by a non-negligible level of missing data. I therefore use multiple imputation to fill in missing values for the covariates related to labor market outcomes for which data is incomplete. All models are also adjusted by a person-level weighting variable included in the public-use version of

the dataset to adjust for an individual student's likelihood of being sampled relative to the typical US high school sophomore in 2002.

Table 2.1. ELS Descriptive Statistics.

	Mean	Std. Dev.	Min	Max
Has a certification? (1=Y)	.17	.38	.00	1.00
Natural log of 2011 employment income	9.93	1.04	4.61	12.43
N of weeks employed in 2011	43.94	13.31	.00	52.00
N of hours on average per week in 2011	40.11	12.52	1.00	90.00
Scale of Family Socioeconomic Status	.10	.75	-2.11	1.98
Standardized Test Composite Score	51.81	9.70	21.50	81.04
Scale of Effort and Persistence	.06	.98	-2.42	1.70
Scale of Instrumental Motivation	.07	1.00	-1.99	1.58
Number of jobs held since 2006	3.55	2.06	1.00	11.00
Number of months unemployed since 2009	7.64	6.98	1.00	48.00
Speak English at home? (1=Y)	.85	.36	.00	1.00
Sex (1=F)	.52	.50	.00	1.00
Race (for each below, 1=Y)				
Native American	.01	.09	.00	1.00
Asian, Hawaiian, Pacific Islander	.09	.28	.00	1.00
Black	.12	.33	.00	1.00
Hispanic, no race specified	.06	.24	.00	1.00
Hispanic, race specified	.07	.26	.00	1.00
More than one race	.05	.21	.00	1.00
White	.60	.49	.00	1.00

Educational Attainment				
High School or Below	.12	.32	.00	1.00
Some College - Associate's Degree	.48	.50	.00	1.00
Bachelor's Degree or Above	.40	.49	.00	1.00

Post-Imputation N for all variables: 11,122

Results

What Affects the Certification Premium?

Table 2.2. Predictors of 2011 Personal Income.

	Model 1 (Background)	Model 2 (Background + Career Stability)	Model 3 (Background + Occupation)	Model 4 (Background + Career Stability + Occupation)
Background Characteristics				
Has a Certification? (1=Y)	0.190**	0.245**	0.136**	0.183**
	(0.024)	(0.061)	(0.025)	(0.061)
Weeks Worked in 2011	0.029**	0.025**	0.028**	0.024**
	(0.001)	(0.001)	(0.001)	(0.001)
Average Hours per Week	0.025**	0.024**	0.024**	0.023**
	(0.001)	(0.001)	(0.001)	(0.001)
Native American	-0.139	-0.0895	-0.151	-0.105
	(0.092)	(0.092)	(0.093)	(0.092)
Black	-0.154**	-0.143*	-0.150**	-0.142*
	(0.055)	(0.056)	(0.055)	(0.055)
Hispanic, No Race Specified	-0.101	-0.103+	-0.093	-0.097
	(0.062)	(0.060)	(0.060)	(0.059)
Hispanic, Race Specified	-0.046	-0.034	-0.041	-0.031
	(0.055)	(0.054)	(0.053)	(0.053)
More Than One Race	-0.018	0.032	-0.026	0.021
	(0.068)	(0.067)	(0.066)	(0.065)

White	0.009	0.007	0.005	0.003
	(0.047)	(0.048)	(0.046)	(0.046)
Sex (1=F)	-0.181**	-0.182**	-0.134**	-0.135**
	(0.020)	(0.020)	(0.022)	(0.022)
Some College or Associate's Degree	0.085*	0.101**	0.062+	0.078*
	(0.035)	(0.034)	(0.035)	(0.034)
Bachelor's Degree or Above	0.349**	0.352**	0.290**	0.296**
	(0.038)	(0.037)	(0.039)	(0.038)
Speaks English at Home? (1=Y)	-0.091*	-0.077+	-0.067+	-0.056
	(0.041)	(0.040)	(0.041)	(0.040)
Composite Socioeconomic Status Score	0.002	0.008	0.001	0.006
	(0.016)	(0.016)	(0.016)	(0.016)
Test Scores Composite	0.008**	0.008**	0.007**	0.007**
	(0.001)	(0.001)	(0.001)	(0.001)
Scale of Effort and Persistence	0.016	0.009	0.021	0.014
	(0.016)	(0.017)	(0.016)	(0.017)
Scale of Instrumental Motivation	0.030*	0.030*	0.020	0.020
	(0.015)	(0.015)	(0.016)	(0.015)
Career Stability				
N Employers Since 2006		-0.047**		-0.041**
		(0.006)		(0.006)
N Months Unemployed Since 2009		-0.017**		-0.017**
		(0.003)		(0.003)
		-0.011		-0.007

Interaction: Certification # N Employers	(0.013)		(0.013)
Interaction: Certification # N Months Unemployed	-0.003		-0.003
	(0.006)		(0.006)
Occupations			
Business and Finance		0.153	0.151
		(0.112)	(0.118)
Computer and Mathematical		0.173	0.198+
		(0.114)	(0.119)
Architecture and Engineering		0.338**	0.344**
		(0.114)	(0.118)
Life, Physical, Social Sciences		-0.0378	-0.0292
		(0.119)	(0.128)
Community and Social Services		-0.126	-0.0992
		(0.119)	(0.121)
Legal		-0.137	-0.148
		(0.137)	(0.138)
Education, Training, and Library		-0.116	-0.0934
		(0.113)	(0.119)
Arts, Design, and Entertainment		-0.112	-0.0643
		(0.122)	(0.129)
Healthcare Practitioners		0.187	0.177
		(0.115)	(0.121)
Healthcare Support Staff		-0.102	-0.0846
		(0.118)	(0.121)

Protective Services	0.0770	0.103
	(0.120)	(0.130)
Food Prep and Serving	-0.298**	-0.250*
	(0.114)	(0.121)
Building/Grounds Cleaning	-0.376**	-0.344*
	(0.139)	(0.143)
Personal Care and Service	-0.252*	-0.225+
	(0.121)	(0.130)
Sales	-0.179	-0.157
	(0.114)	(0.119)
Office/Admin	-0.0862	-0.0597
	(0.109)	(0.116)
Farming, Fishing, Forestry	-0.168	-0.146
	(0.181)	(0.177)
Construction and Extraction	0.137	0.143
	(0.119)	(0.125)
Installation and Maintenance	0.0751	0.0755
	(0.121)	(0.128)
Production	-0.0925	-0.0516
	(0.117)	(0.123)
Transportation and Material Moving	-0.0665	-0.0374
	(0.124)	(0.128)
Military Specific	-0.0407	0.0288
	(0.136)	(0.136)

Constant	7.230**	7.670**	7.431**	7.820**
	(0.102)	(0.110)	(0.152)	(0.158)
N	11,122	11,122	11,122	11,122
F-statistic	145.66	120.74	75.73	71.71
P > F	.000	.000	.000	.000

*Standard errors in parentheses; *** indicates p<.01; ** indicates p<.05; * indicates p<.10. Reference category for race: Asian. Reference category for educational attainment: high school diploma or below.*

The first and perhaps most striking finding of this analysis is that under all four model specifications certification is a positive and significant predictor of logged employment income. The coefficient for certification in Model 1 is equivalent to $5,664.30 – a robust effect that suggests that earning a certification would offer a strong return on investment in terms of direct fees and monetary costs for the median certificant. The effect of certification is strong relative to other predictor variables in all models, though it is at its weakest in Model 3 in which occupational control variables are introduced and variables related to individual employment histories are excluded. Thus, certification appears to have an effect on income that is independent of the various background characteristics that may be related to who self-selects into a certification program, employment history characteristics that may push or pull individuals toward or away from certification, and the non-random distribution of certifications into occupations that might be expected to yield higher pay.

Indeed, the effect of certification on earnings is stronger than the effect of many background variables that one might expect to be related to earnings. In all four models, the effect of certification falls between the effect of completing a two year degree and the effect of completing a bachelor's degree. While this does not necessarily mean that a certification would yield strong labor market returns if it was earned as a substitute for degrees earned in the formal educational system, it does point to the substantial value that certifications may provide for workers. Moreover, the effect of certification is substantially greater than all of the individual traits and measures of ability that would be expected to be associated with self-selection, including instrumental motivation, effort and persistence scales, and standardized test scores.

The hypothesized interactions between employment history characteristics and certification attainment are not statistically significant and modest relative to other variables, suggesting that individuals who have experienced significant bouts of unemployment or who have moved between multiple employers do not necessarily get more or less value out of their certifications. This finding,

like all others, must be interpreted in the context of the constraints of the ELS sample, which consists of young adults just entering the workforce, and is therefore not conclusive evidence that certifications are more or less valuable to individuals who have experienced bouts of unemployment or moved rapidly between jobs, though it does indicate that the effect of certifications is not significant for those just entering the workforce.

Discussion and Conclusions

This study offers evidence that there is a positive effect of certification for the average worker that cannot be readily explained as solely the effect of individual self-selection into certification, confirming the generalizability of single-occupation case studies of perceived value (Arman and Shackman 2011; Bartlett et al 2005; Sechrist, Valentine, and Berlin 2006; Weber 2006). Those returns appear to be higher than the earnings premia some researchers have associated with credentials earned in the higher education system (Becker 2009; Altonji and Mansfield 2011), though they are undoubtedly uneven across occupations and employment settings. Unfortunately, we cannot infer from this sample of young adults whether the certification earnings premium generalizes to the broader adult population. Yet, at least for this segment of the American workforce, certifications seem to have labor market value that extends beyond a mere proxy for individual characteristics external to the certification itself. Coupled with the studies already mentioned of benefits for certified workers in specific occupations and reports of employers valuing certification in their hiring, promotion, and compensation decisions, a picture is emerging of certification as a phenomenon that has widespread value in the labor market beyond the age range of the ELS cohort, though that value is certainly uneven across individuals, occupations and employers - and may still depend to some extent on personal and employment-related characteristics.

Unfortunately, the nature of the ELS sample, capturing a cohort that was between 25 and 27 years of age in 2012, precludes a serious analysis of some of the subpopulations that we might expect

to be disproportionately rewarded by certification. For example, it is difficult to use the ELS to determine whether individuals with bachelors' or post-graduate degrees are more likely to be certified because even bachelor's recipients who completed their degrees within four years of high school graduation will only have two to four years of work experience under their belts, which is not even enough work experience to qualify to sit for a certification exam according to some certification organizations' guidelines. However, the ELS remains the best data source currently available to examine the effect of certification on earnings given the ability to incorporate those individual-level characteristics measured prior to labor market entry that are likely to be associated with both certification and future income potential, confirming that the findings of a wage premium in earlier studies (e.g., Gittleman, Klee, and Kleiner 2014) are not merely a result of more capable or advantaged individuals self-selecting into certification.

To be sure, there are factors related to certification but independent of the effect of the credential itself that could affect the income of certified individuals, such as the broader professional network or upgraded occupation-specific skills that may have been acquired through training courses taken to prepare for the certification exam. These effects could be achieved through other means from a workforce development policy standpoint, such as the provision of self-study materials, creation of networking events or development of training programs that do not result in certification. Yet, even as a head-to-head comparison of certification versus other means of occupational socialization, training, and credentialing remains limited by available data, the argument in this paper is that there is a unique value proposition in certification. And, there is some evidence for a positive effect of applying a "certified" label to a product or service from the literature on product certifications and "quality seals" that emerged out of home economics and consumer sciences in decades past on perceived product quality (Laric and Sarel 1981; Parkinson 1975). If such a value-added effect of the "certified" title may account for some of the certification wage premium, workers who are receiving training and upgrading their skills without accompanying credentials may be

shortchanging themselves in the labor market. Whatever the precise reasons, certified young workers earn more than their uncertified peers, and while the exact estimate will depend on how one measures, the effect under all matching procedures is an increase in income greater than 20%. While these findings may appear at first glance to be surprisingly strong for a type of credential that can be obtained relatively easily for many workers, they are comparable to some extent with prior research on the effect of working in a licensed occupation on earnings in other countries; for example, a study of the effects of certification and licensure in Canada found a 21.9% increase in earnings for immigrants employed in regulated occupations and a 16.4% premium for nonimmigrants (Gomez et al 2015). Similarly, research on the UK labor market suggests that workers in licensed occupations enjoy a wage premium of 8.7 to 19.1%, depending on the specific occupation (Koumenta et al 2014).

It is important to remember that there are barriers to certification attainment among disadvantaged young workers is the challenge of obtaining accurate and relevant information about which certifications will help workers reach their career goals. Research on college degree attainment suggests that students at less prestigious high schools and students from backgrounds typically associated with socioeconomic disadvantage tend to be less informed about financial aid options and have a less realistic idea of their possible options for higher education (Rosa 2006; Grodsky and Jones 2007). While some efforts have been successful at improving knowledge of college access and affordability, the availability of quality knowledge about labor market conditions and assistance with deciding upon a personal credentialing strategy is minimal in American high schools (and even non-elite colleges) relative to international peers (Mortimer and Kruger 2000; Osterman 1994; Rosenbaum et al 1990), and even with quality information students are prone to making economically irrational decisions (Desjardins and Toutkoushain 2005). Certification boards may have a role to play by engaging in greater outreach efforts, but overall awareness of credentialing options and their value for post-formal-education careers will need to improve for

Americans to take the same advantage of opportunities outside the higher education system that youths in other countries enjoy (Heinz 2002).

Another major factor influencing the certification earnings premium that is unaccounted for in this study is the substantial variance between certification programs themselves. Literature on higher education often examines the aggregate returns to college degrees as a general category, though the expectation of a earnings premium associated with college education varies substantially across different institutions and the ambiguity created by differentiation among institutions seems to diminish the overall labor market value of degrees (Smyth and McCoy 2011). The gap between the average earnings premium associated with an Ivy League management degree and a liberal arts degree from a public comprehensive college is quite vast. Similarly, not all certifications are created equal. While some certifications seem designed to be effective instruments of closure, others are easily enough attained that they do not restrict entry into the labor market (see Weeden 2002 for a similar argument) – and the distribution of such programs does not appear to be random across occupations. Occupations vary in the extent to which they can muster an effective certification program that restricts entry by creating a public or employer preference for certified individuals: certification in some fields, such as retail, tends to be driven by industry associations with few individual workers as members while other fields host certification programs that reflect a greater grassroots effort on the part of individual practitioners aiming to enact a project of "collective social mobility" (Larson 1984). Thus, further research on the attributes of certification programs that generate value would be beneficial for understanding the factors lying beneath the earnings premia figures presented here. For the certification movement to broaden the supply of credentials to underserved groups, it must strike a balance between being exclusive enough that a certification is a genuine mark of distinction that carries tangible value, and being accessible enough that it reaches populations not already well served by credentials in the formal education system.

Chapter 3. Explaining the Growth of Occupational Certification and Variation in Program Goals

As discussed in the introduction to this dissertation, there is widespread agreement that certification programs are becoming more widespread, yet few scholars are exploring why such growth is occurring. The rapid growth of occupational certification programs – in terms of the number of certifications available to workers, the number of organizations offering certifications, the number of occupations in which certification is available, and the number of individuals seeking certification – is not only a labor market phenomenon deserving of attention from policymakers, but also puzzling from a sociological standpoint. Scholars of such institutions as professional associations, higher education, and occupational regulation must reconcile the emergence of certification as a labor market institution beginning to fill many of the roles previously fulfilled by these organizations. This chapter considers the certification phenomenon from the perspective of one of the institutional fields that facilitated the emergence of certification: professional, trade, and industry associations that entered and grew the business of issuing certifications in recent years.

The United States is unique among industrialized countries in the extent to which trade, professional, and industry associations go beyond consulting with educational institutions and licensure boards to issue their own credentials – primarily taking the form of the competency-based certification programs studied in this dissertation. Many in the credentialing field argue that membership associations face an inherent conflict of interest when they develop credentials that they intend to administer to their own members (see, for example, Hamm and Early 1994; Jaffeson 2005). Certification programs are costly to administer, and given the non-profit status of most trade, industry, and professional associations, the programs are likely to be significant drains on the resources of associations. Therefore, one of the two research questions motivating this chapter is what is motivating the growth of certification programs from the supply side – that is, why have so

many trade, professional, and industry associations launched new certification programs, especially over the last thirty years?

Undoubtedly, part of the answer to this question is that members demand it – an assumption long held in the certification community, which seems to be on solid ground in light of the finding of a robust earnings premium associated with certification in the second chapter of this dissertation. But, there are other ways in which professional associations can meet member demand for credentials, such as launching certificate programs, working with higher education to increase the supply of relevant college degrees, petitioning state regulatory authorities to implement licensure requirements, developing and distributing training materials, to name a few. What led so many associations to bring certifications to occupations where no such programs existed previously?

This chapter also addresses a second, more focused research question about the nature of the new certification programs that emerged in recent years. What determines whether certification organizations will pursue a standards-setting strategy consistent with the theoretical expectations of the sociological literature on occupational closure? Or, in other words, why are some certification programs designed with high standards to perform a gatekeeper function, while others aim to be inclusive and set low standards?

Scholars of occupations and professions argue that certification programs are forms of occupational closure (e.g., Freidson 2001; Weeden 1999, 2002; Wilensky 1964). Certification programs are seen as a first rung on a ladder of professionalization that culminates in more restrictive barriers to entry through the passage of licensure regulations and the embedding of occupational knowledge in the formal system of higher education (Kleiner 2013). The closure literature assumes that occupational associations are in tune with the economic interests of their members and dedicated to advancing their collective status when creating certification programs,

regardless of the implications of such advancement for the association's bottom line; thus, it is important to consider why substantial variation is observed in practice.

Qualitative Data and Methods

This research is exploratory in nature, with the goal of identifying macrosocial processes that may be influencing not-for-profit trade, industry, and professional associations in the direction of establishing certification programs and determining their character in relation to the theoretical expectations of professions scholars. This aim of this research is not to be a standalone study in and of itself, but rather to inform future scholarly inquiry on the causes and consequences of the certification boom as well as unresolved theoretical questions in the sociology of organizations and occupations. Therefore, data collection covered source materials and interview subjects with expertise in a wide range of topics related to certification and touched upon topics that at first seemed tangential to the research questions at hand, but ultimately proved helpful for understanding the broad social context in which certifying organizations operate.

My primary research strategy was conducting 20 interviews with the managers of certification organizations in a variety of fields, as well as the managers of accreditation services for the two major organizations accrediting occupational certification programs in the United States. Interviews followed a standard set of questions focused on the research topics of interest, including the aims and stakeholders of each interviewee's respective certification organization (and, where applicable, past organizations that the interviewee worked for), their philosophy with respect to standards-setting, and how they view certification relative to other forms of occupational closure (e.g., licensure). However, these questions were only a starting point; some interviews evolved into other topics such as the relationship between certification organizations and higher education, depending on the respective interests of the interviewee. Each interviewee was also asked to suggest

other individuals who might be useful to talk to for my research. I provide an anonymized table describing the positions of each interview subject in an appendix.

In addition to these interviews, I attended three tradeshows for certification program officers and executives, as well as two conference calls in which stakeholders discussed plans for new certification programs, also summarized in an appendix. At these events, I listened and took field notes, focusing on not only the content of what was said, but also the institutional affiliations of who was speaking and the visual materials seen by attendees, such as the promotional items and displays provided by vendors sponsoring the meeting of the Institute for Credentialing Excellence. I also participated in networking events at each of the in-person meetings; while some attendees peppered me with questions about my own research, I used these breaks to pose questions similar to those that I presented in my interviews in an informal setting.

I supplemented my interviews and in-person observations with insights from archival research. I searched the entire archive of the trade journal *Association Management* for mentions of certification between 1976 and 2005, yielding 111 articles that covered some aspect of the educational, legal, or business dimensions of certification programs. I supplemented this with searches of other trade journals that may be read by those in the certification field, including *Training + Development, Certification Communication,* and *Test Publisher*, and materials appearing on the websites of vendors in the certification field – namely the blogs of Plexus Consulting, Knapp and Associates, and Micki Rops Consulting, and with careful reading of books written for certification program executives. Some of these sources reflect obvious biases on the part of their authors, and care was taken to interpret such sources not at face value, but rather as indicators of what these organizations and authors wanted to convey to the outside world. By blending these written materials which are targeted to varying degrees to certification professionals and the association management field at large with more candid insights observed through direct communication with

certification professionals, I gained insight about those areas in which certification professionals "practice what they preach" and those in which formally stated positions about credentialing differ from what is informally acknowledged in the field.

I analyzed my source material by coding those documents that could be imported into a qualitative data analysis software package (MaxQDA) for key themes, using an inductive methodology to identify which issues came up with greatest frequency in my documents. Not all could be imported for textual coding in MaxQDA, however: 29 of the 111 articles identified in *Association Management* (those published before 1991) were found via library microfiche, and *Certification Communication, Test Publisher,* and other book and blog sources had to be analyzed on paper. Eight of the interviews – those that I deemed to be most relevant to the themes of this chapter – were transcribed and coded, though I integrate insights from the remaining interviews throughout this chapter. As I analyzed my data, I recognized that many items only tangentially touched on certification-related themes or otherwise had little analytic value; such documents were not coded, but remained in my searchable MaxQDA dataset for reference. The process of coding and reviewing my field notes allowed me to identify and focus on key themes of interest to my research questions, and formulate additional questions to pose in subsequent interviews.

Why Have so Many Associations Launched Certification in Recent Years?

The dramatic growth in certifications programs in recent decades can be attributed to several factors, as identified in my field and archival research and review of the secondary literature. The overarching challenge that association faced was a decline in revenues and membership, and certification programs offered an attractive solution. The momentum for program growth was driven by four key factors: association's drive for new sources of revenue, the role of technology vendors and consultants in pushing their products, a normative or ideological shift in associations, and the professionalization of association. To be sure, association professionals remain for the most part

committed to advancing their professions: 100% of the attendees polled at an executive education session for certification executives said that they would prioritize the interests of their respective professions over the stability of their organizations. However, the factors discussed below undoubtedly shaped the association management field and subtlety facilitated the emergence of certification in a variety of occupational contexts where it did not previously exist.

Revenue Generation

Professional membership associations are struggling to retain members as associations fight the broad decline in social capital in the United States documented by scholars such as Putnam (2000) and Skocpol (1999). The effect of such macrosocial phenomenon is definitely discernable in the association management sphere: in a conference session full of association CEOs and credentialing program managers, three quarters of those in attendance raised their hands in agreement with the observation that it is becoming more difficult to engage and retain members over time. Indeed, the leader of a professional association that offers certifications to many individuals working in the association management and credentialing sectors noted in an informal discussion at a conference that many smaller professional associations folded in the 1980's as membership, and the dues revenue paid by members, failed to cover administrative costs.

The decline of social capital in America comes alongside technological changes, such as the free distribution of information once delivered through association-controlled channels limited to dues paying members via the Internet and generational changes in the demographic composition of the workforce. New niche organizations, in contrast to the more established generalist organizations serving large occupations, found technology to greatly reduce startup and administrative costs, offering viable alternatives to the members of established behemoths like the Society for Human Resource Management and the National Association for Realtors. Association mangers perceived that a less than hospitable environment for the recruitment and retention of members persisted well

into the 21st century, as summarized in a book published by the American Society of Association Executives:

> "The dominance that associations once celebrated is now crumbling. Membership has lost its meaning amid an audience that no longer wants or needs to be members, partly because of technology and partly because of differing values shared by young generations. In other words, technology and demographic shifts are rendering associations irrelevant" (Sladek 2011: 4).

In the wake of such challenges, many nonprofits found the pursuit of non-dues revenue to be an essential component of their survival strategy (Knapp and Gallery 2003), consistent with the predictions of resource dependence theorists such as Pfeffer and Salancik (1978) that organizations will seek new sources of income to adjust to changes in their environment.

Certification programs appear to offer an easy solution for organizations that perceive a need to supplement revenue from traditional sources. Organizations looking for ways to remedy falling revenue can easily look to the well-known examples of organizations that have used certification to supplement revenues from traditional sources. Certification can appear to be an attractive benefit to membership that may stimulate engagement with the association over the course of a practitioner's career – giving associations a tangible product to offer those new to a profession who might benefit less than seasoned peers from the broader profession-building and political advocacy activities of professional associations (Spillman 2012). Managers of certification organizations I talked to readily named organizations that appear to be bringing in substantial revenues from certification, such as Project Management Institute and the Human Resource Certification Institute, which in fact have used certification revenues for activities that contribute to the overall advancement of their respective professions. Examples abound of certification programs that brought in transformative levels of revenue. In the words of the ex-CEO of a professional association in the environmental field, "what that [launching a certification program] did for the whole organization was it made it flush with money, so much so that it almost tore the association apart… they had a hard time keeping up with it… there was just a huge, obscene amount of money coming in" (Interview 15, November 2014).

Multiple certification professionals at conferences said that the 2015 launch of a new certification program by the Society for Human Resource Management appears to be oriented toward the generation of revenue, and that the Society likely expects revenue from certification to eventually support a variety of functions. Indeed, certification is now a big business, with an estimated overall value of six billion dollars in the United States alone (Flynn 2013). Clearly, certification offers a tempting route toward organizational reinvestment and renewal for associations struggling to adjust to environmental challenges.

Yet, the promise of certification is easy to oversell. The highly visible success stories of associations launching revenue-positive certification programs obscure the reality that many certification programs fail to build a sufficient following to generate enough revenue to compensate for the substantial investments that associations must make in staffing, marketing, test development, exam delivery, psychometric validation and scoring, and records maintenance, among other costs, to deliver a certification program. In the words of the owner of a consulting firm working with certifications organizations, "certification is a field in which the success stories are highly visible and the failures are hidden"(Interview 6, April 2014). Even the American Society of Association Executives published a warning to associations thinking about launching certification programs in its trade journal:

> "A common mistake is to overestimate the financial benefits of a certification program. While these programs do generate revenue from application, examination, and record-maintenance fees… most programs take several years to break even and may still require financial support for years to come. While the occasional certification program generates more revenue than all other association services combined, no one familiar with the financial demands of these programs would call them 'cash cows.'"(Knapp and Gallery 2003).

Thus, many of the certification programs to emerge in the period of dramatic growth for the certification sector did not become a source of easy revenue. The dramatic growth in the number of organizations offering certifications to American workers therefore demands a closer evaluation of why organizations expected benefits that often never materialized.

The Role of Vendors and Consultants

Certification organizations are not the only institutions with a financial stake in the provision of credentials. Even if many certification programs themselves are not profitable, certification remains a $6 billion dollar industry in the United States, and many certification professionals are remain convinced that certification is a means of raising non-dues revenue and improving the value proposition inherent in participation in occupational membership associations. My research suggests that a large portion of the industry's revenues accrue to the vendors or subcontractors to certification organizations, who, in fact, play a substantial role in promoting the spread of certification programs. Indeed, one interviewee who worked as the CEO of one of the largest specialist certification boards in nursing summarized the revenue situation in the certification by observing that "there is plenty of money to be made in certification, but all of the money is made by vendors, not by certification organizations" (Interview 17, May 2016). Nearly every service that an association may need to assemble a certification program can be purchased from one or more vendors. At least two large multinational corporations (Pearson, a diversified education and publishing conglomerate best known for textbook publishing, and Prometric, a for-profit corporation owned by the not-for-profit Educational Testing Service that also administers various college entrance examinations) offer a comprehensive suite of services including the delivery of examinations through computerized walk-in testing centers located around the world. Many other vendors are able to contract directly with privately owned or university affiliated testing centers to create an ad-hoc network of proctoring locations to make certifications available to practitioners around the world. Other vendors offer more specialized services, such as psychometric services, market research, recordkeeping, and test item development.

The depth of the role for vendors in some certification organizations is difficult to understate. Even suppliers of lapel pins and diploma frames compete for business at the annual meeting of the Institute for Credentialing Excellence, suggesting that entrepreneurs in many fields see serving the

needs of certification organizations as a lucrative business opportunity – an opportunity underscored by a rumor reported at a recent event for certification professionals that Deloitte Consulting is preparing to launch a certification practice. The most extreme cases of outsourcing certification functions are associations and credentialing organizations that contract with association management companies (AMCs) to operate all business and administrative functions of the association, with members of the occupation participating in the administration of their respective associations solely in voluntary governance roles. Large association management companies, such as Smith Bucklin and Associates, argue that their ability to provide economies of scale by assigning administrators to service multiple associations simultaneously yields better member and certificants service for lower cost. A senior official in one of the professional organizations serving the certification community recalled that the use of AMCs became widespread in the early 1980s, and suggested that their use may have led, in part, to the adoption of a more profit-oriented ethos in the management of professional associations.

Shifting Norms?

Norms change over time in all institutional fields, yet a change in the philosophies and underlying assumptions of nonprofit membership association leaders since the early 1980's appears especially pronounced. Not only are business topics more commonly discussed over time, but there is also evidence that the architects and leaders of certification programs internalized a shift in norms with respect to the nature of certification. A vivid example of such a shift came from the former manager of a national non-profit with a recently launched certification program, who recalled in a conference session being told by a superior that "non-profit is a tax status, not a state of mind." At another conference, the opening keynote speech focused on how certification organizations could learn marketing lessons from the for-profit sector, suggesting that certification organizations needed to emulate the marketing of luxury goods and create emotional connections with customers. Indeed, at least some certification program managers believe that association members and certificants want

to see their organizations behave in a more business-like fashion. One interviewee mentioned that he thought that the way in which he sees the Project Management Institute running itself like a business is a net plus for the professional project of project management, which benefits from having a single organization building a brand around the profession and being financially invested in the overall success of the profession. Indeed, in a tradeshow session on the marketing of certification programs a certification administrator argued that investments in marketing a certification to potential certificants may simultaneously build a certification's profile among employers – thus, certificants should actually benefit to some degree from what may appear to be the commercialization of a certification program.

In my review of the archives of *Association Management,* I found more articles discussing the promise of certification as a means of generating revenue for nonprofit organizations in the 1980's than in the years for which I obtained archives in the 1970's, suggesting that there was indeed a shift in norms in the association management field. One particularly notable article urged associations to take a "cafeteria approach" to generate non-dues income, observing that the core association activities of legislative advocacy and "advancing the profession" will never generate substantial revenues in and of themselves and require associations to turn to their "profit centers" (Hartsock 1982). The need for associations to think about themselves as a business was not a temporary shift, however; well into the twenty-first century the acceptance of a business-oriented view of association management persisted and arguably even grew; indicators of such a viewpoint include the publication of a book tilted *Certify Like Your Business Depends On It* (Flynn 2012), in which it the author assumed that certification organizations would naturally see themselves as businesses, and the persistence of "the business of certification" as a common title for tradeshow sessions and even a daylong executive education event on the annual calendar of the Institute for Credentialing Excellence.

The shift to a revenue orientation and the adoption of a business logic in the operation of certification programs coincided with the embrace of competence-based certification throughout the association management field as a best practice for the provision of training and credentialing. Competence-based certification came to be seen by association managers as a superior option to other means through which associations could potentially address the need for their members to acquire and validate skills, such as training programs, standalone courses, certificate programs issued by (or in partnership with) colleges and universities, registries, licenses, and the accreditation of programs in the higher education system. Indeed, one certification program manager I interviewed declared that certificate programs are "scary to me," explaining that certificate programs are "not certification programs. You go online, take three modules and they give you a "certification." No, they don't. They give you a certificate. You took an online course. I [speaking from the employer's perspective] don't want that being the third party validation when I'm trying to hire somebody in the field" (Interview 3, December 2013).

The fact that certificate programs by in large did not catch on among professional associations to the extent that certification did may reflect some level of antagonism between certification and higher education: a keynote speaker at a tradeshow attended by many certification program officers and vendors described how higher education is becoming increasingly irrelevant and does a poor job of delivering value to students, pointing to high-profile financial struggles of liberal arts colleges and profligate spending on student services and "lazy rivers." While certification professionals themselves value credentials earned through the higher education system, in my interviews they were eager to note the superiority of competency based certification – repeating that certifications are, in the words of the former manager of a certification program serving the human resources field, "defensible and credible and trusted," unlike certificates that can be attained through putting in "seat time" (Interview 5, February 2014). There is some discussion in how-to guides for certification organizations of

the need to evaluate whether a certificate or other type of credential may be more appropriate for a given organization's aims in starting a certification program (e.g., Knapp and Knapp 2002), but the spread of competency based certification into lower-stakes occupations such as retail attests to the extent to which organizations have come to see certification as a superior method of credentialing.

The Professionalization of Association Management?

What caused these norms to diffuse across the landscape of certification organizations? My research points to two factors that likely contributed to the spread of certification: the emergence of professional institutions for networking, which were indirectly facilitated by the sponsorship of vendors seeking to influence and grow the market for certification, and the emergence of a career path for association managers across organizations. Five organizations offer annual conferences for certification program administrators, namely the Institute for Credentialing Excellence, the American Society of Association Executives, the Certification Networking Group, the Association of Test Publishers, and the Council on Licensure, Enforcement, and Regulation. These organizations, through events, newsletters, and online content, provide a conduit for the exchange of information across certification organizations.

While each of these organizations encourage the participation of leaders and employees of certification organizations, they also depend heavily on vendors' support and sponsorship. The role of vendors is visible through the prominence of their names and logos on conference programs and the professionally designed displays and giveaway items they bring to conferences. These outward displays on the part of vendors and the financial contributions to professional institutions that come with them ensure a forum for the diffusion of norms among certification organizations, but vendors also use these forums to diffuse norms subtly through activities broadly labeled as "thought leadership." Every book I located in my research that provided practical advice on how to build a certification program is written by a consultant offering services to the certification community, as

are most blog posts that appear in web searches on general issues related to certification and many articles published in *Association Management* promoting the benefits of certification. Representatives of vendors are also engaged in voluntary committee appointments in the Institute for Credentialing Excellence, the Certification Networking Group, and the Association of Test Publishers. It is not surprising that vendors are more likely to be involved in such positions than the median certification program manager, given that they benefit from using such positions to convince others of their thought leadership.

Another finding is that it is common for certification professionals to move between associations serving very different occupations and industries. Some interview subjects reported having worked for as many as four different certification organizations over the course of their careers. By moving across different certification organizations, they effectively cross-pollinated ideas from different occupations and industries throughout the association management profession. Moreover, senior leaders find substantial opportunities to move between certification organizations and vendors, bringing contacts and beliefs in tow. The movement of individuals between certification programs mirrors developments in the labor movement, where, over the course of the 1970's and 80's, individuals began to pursue careers as union organizers in which it would be common to move from union to union, often representing workers in very different occupations and industries, and consequently developed an affinity with the labor movement as a whole rather than workers in a given field (Clark 1992). Clark argues that this professionalization of labor improved the flow of some practices across organizational boundaries, though the ultimate effect of such professionalization on the overall landscape of the industry remains unexamined.

The professionalization of association management itself was not an accident, but rather a deliberate effort on the part of professional associations, especially the American Society of Association Executives. Very few academic options exist that prepare individuals specifically for

careers in association management. A professional masters' degree in association management existed at George Washington University for several years in the 1990's and early 2000's, but otherwise there are very few courses on membership associations, professional associations, or certification in degree programs in public or nonprofit administration. Rather than push for more degrees, the ASAE decided to build and nurture its own certification program as the principal credential in the association management field. Certification was an integral component of the ASAE's efforts to professionalize and build a career path for association managers. About 20% of all articles matching keyword queries for "certification" in *Association Management* discuss the value of the Certified Association Executive program, most in a very favorable light. Individuals are urged to consider the career benefits of earning the CAE credential; indeed, some articles are essentially testimonials to the value of the CAE certification (e.g., Warner 2005). The CAE program came up in several of my interviews, and all respondents agreed that the CAE greatly expanded association professionals' familiarity with the concept of certification. The CAE itself requires extensive work experience, however, and there is therefore no credential specifically geared toward individuals seeking to break into association management. Indeed, most interviewees report having "fallen into" association management and deciding to pursue the CAE later in their careers, after learning about it through various institutions of professional socialization. Thus, the professionalization of association and certification managers themselves most likely played some role in spreading certification-friendly norms throughout the association management field in the United States.

Thus, the growth of certification was consistent with the perceived self-interests of multiple stakeholders. Individuals and employers sought certification in pursuit of gains validated in Chapter 2 of this dissertation, but the leaders of nonprofits themselves perceived that substantial value would accrue to their respective organizations. Vendors encouraged this perception, seeking new lines of business through the expansion of the market for certification services and the pursuit of status within the certification field as the providers of "thought leadership" that was generally favorable to

certification. The professionalization of association management through certification further contributed to norms favorable to certification, creating an environment in which certification became a logical activity for associations to engage in.

Why do Certification Programs Vary, Especially with Respect to Occupational Closure?

Given the broad set of stakeholder interests at play in promoting the certification movement in the U.S., it is understandable that certification programs vary widely in the content of their programs, the standards they require, their business strategies and even their fundamental goals. This variation raises questions about a dominant assumption in the sociological literature that certification programs exist to primarily to enact occupational closure. The qualitative research for this dissertation suggests that there is much more variation in the goals and strategies of associations that have developed these programs, with some certification programs taking on the character of a "gatekeeper" and others going to great lengths to facilitate entry into their respective occupations. Particularly salient are variations in the extent to which certification programs are attentive to the economic interests of members of an occupation relative to the interests of employers and the extent to which members are engaged with organizations involved in the creation and administration of certification programs.

Variation in Mission and Function

The wide variation in the backgrounds of individuals working in the field of association management is mirrored in the extreme variation in the mission of certification organizations. The introduction to this dissertation summarized some of the common reasons one would find on the website of a typical certification program, such as increasing the competence of services provided in a given occupation and signaling service quality. However, occupational closure is the theoretical perspective most commonly cited by sociologists studying the division of labor across occupations, and also characterizes most of the economic work on certification in which certification is treated as

a "cousin" of the primary form of regulation that occupations are presumed to aspire to, licensure (e.g., Kleiner 2013; Koumenta et al 2014). Licensure is seen as the ultimate objective of a "professional project" (Freidson 1986, 2001) because it is backed by the enforcement powers of the state, effectively preventing outsiders from attaining it – a much stronger barrier than certification, which is voluntary from a legal standpoint and is limited to "wishful thinking" in its power to completely bar outsiders from a line of work (Weeden 1999). Thus, the lack of interest in licensure on the part of many certification organizations is a puzzling departure from the "order of professionalization" predicted by professions scholars (e.g., Abbott 1991) to reflect a broad-based interest in pursuing closure across all occupational specialties, regardless of the extent to which they apply "autonomous expertise and the service ideal" (Wilensky 1964: 137).

Based on my field research, I found considerable variation in the extent to which associations were focused on standards-setting and occupational closure. Some organizations spend aggressively on marketing efforts to convince consumers to choose certified services: representatives of certification organizations on a conference panel on certification marketing said that they believed that they had been at least partially successful at convincing members of the public to select certified service providers. Indeed, certification program managers I talked to in fields such as the environment, human resources, and healthcare argued that certification is a means of raising standards field-wide once employers and clients can be persuaded to choose certified services – consistent with the predictions of occupational closure theorists that certification can play a role in occupation-wide projects of "collective social mobility" (Larson 1977).

Yet, other occupational associations and certification bodies in my study said very little about professionalization in their mission statements or when discussing their motivations for offering certification – giving the appearance of being more focused on revenue generation and sales growth than the creation of value for members, consistent with the trend toward prioritizing revenue generation in nonprofits noted above. Some examples of associations that came up in my interviews

when discussing examples of organizations less committed to raising the standards of their respective occupations include the American Council on Exercise, which aggressively advertises its certifications on the basis of their low cost relative to other credentialing options for personal trainers; the American College of Forensic Examiners, which was featured on a 2012 episode of *PBS Frontline* that alleged that its examinations were far too easy to adequately credential expert trial witnesses; and the myriad emerging certification programs in the field of life coaching, which defend themselves against allegations of low standards by claiming that their field is inherently subjective (George 2013).

Other certification programs may nominally be concerned with advancing their respective professions, but reject the gatekeeper function predicted by scholars of professions. For example, the manager of a professional association for agricultural professionals described to me the need for a certification program in his occupational specialty as a potential means of bringing individuals into the field by raising its visibility. Seeking an earnings premium and other material enhancements to working conditions are only mentioned in passing when describing the benefits of certification in the written communications of his certification committee; they only saw benefits to bringing more individuals into their occupational space, which they hoped would advance the social movement behind their professional project.

Why Variation in Standards Setting?

Several factors help explain why associations vary in the standards they set and whether those standards are meant to bring about occupational closure. These include different levels of employer demand, the role of organizations' strategic choices, varying levels of membership demand and participation, and organizations' desire to avoid what they perceive to be unnecessary regulations. As such factors are often overlooked in the literature on occupations and closure, I examine each here in detail.

Likewise, certifications offered by some large industry associations, such as CompTIA, issuer of the ubiquitous "A+" certification for entry level IT professionals, and the National Retail Federation are targeted as much to employers as they are to individuals. In a tradeshow session describing the promise of certification as a means of lifting the prospects of disadvantaged workers, for example, the NRF noted that they are primarily designing their certification to meet the training needs indicated by employers, whose voices were more influential than those of "rank and file" employees in determining the shape of their certification program. In the NRF case, the stated goal of certification is to expand the size of the qualified workforce that employers can draw upon rather than to be a means of gatekeeping for retail occupations.

While certification programs cannot exist without demand on the part of candidates for certification exams, the value placed on certification by employers is an essential factor driving individuals to seek certification and that value is not evenly distributed across occupations. Employers in some sectors, such as large hospital systems that employ specialist nurses, are known to be more concerned about the quality of certification programs and even demand that certifications be validated through psychometric testing and job task analysis. These employers tend to demand that certifications be accredited by one of the two bodies offering accreditation to certification programs in the United States (the National Organization for Competency Assurance and the American National Standards Institute). Indeed, the executive officer of a nursing certification told me that she believed that maintaining best practices and staying in the good graces of accreditors was so essential that the certification program would collapse unless it could maintain the perception of being at the cutting edge of the field. Similarly, a human resources certification program manager said that maintaining the perception of rigor was essential for persuading employers to require her certification; stimulating employer demand for certified workers was seen as instrumental to grow demand among practitioners for the certification. In contrast, the manager of a certification program for agricultural professionals noted that employers in his field would be unlikely to perceive value in

accreditation and that it would be a challenge to even convince employers that certification would be necessary – and therefore the value of certification would need to be marketed more aggressively to members of the occupation.

Variation in certification programs is also driven by the strategic choices of organizations. Some organizations pursue a strategy of reaching a broad swath of eligible candidates, not unlike the inclusive philosophy underlying some "baseline" eco-friendliness certifications for products in industries where few corporations are seen as wanting to comply with regulation (Cashore, Auld, and Newsom 2004), and others deciding that the goal of certification is to reward exceptionally strong performers (Wise 2013). Organizations with individual members might be more inclined to worry about the labor market value of their credentials, and therefore be more likely to attempt to maximize their value by tightening standards, than industry organizations with firms as members. Organizations with firms as members or stakeholders that offer certification to individuals, in contrast, commonly do so out of concern for alleviating skill shortages, or creating a career ladder that may discourage turnover (Murer 2000; Weber 1996). Both strategies can maximize revenue for the organization offering certification, either by "selling" more certifications or creating enough value associated with certification that individuals will be willing to pay higher fees. However, in situations where the interests of employers who might benefit from a larger qualified labor force are well represented in the design of a certification, as appeared to be the case for the National Retail Federation in its presentation of a planned new certification program at a conference, certifications will take on a less exclusive nature.

Moreover, there are substantial differences in the character of certification programs with respect to the level of member and stakeholder participation. Some occupations simply have a less engaged body of practitioners than others; for example, a former manager of a certification program designed to test basic skills for multiple entry level occupations noted that his organization found that few certificants had an interest in the governance and administration of the certification –

allowing employers and state agencies to be the main stakeholders shaping the program. Such low involvement may be partially related to the same high turnover rates that an organization may want certification to help mitigate, a phenomenon also seen by an organization offering certifications for fine dining servers (Weber 1996). In contrast, in a field that has long struggled to differentiate and distinguish itself from general management, a certification program manager told me that certificants pushed for high standards and want to maintain the signaling value of their certification in the labor market. High member involvement can also provoke a negative response if an organization is seen to be endangering the quality of its certifications, discouraging their respective organizations from compromising on quality. The Society for Human Resource Management encountered a substantial backlash from a vocal subset of its members when it announced the launch of a certification that appeared to be less rigorous than a certification it had previously endorsed, which forced the Society invest heavily in public relations campaign defending the quality of its certifications. Thus, it appears that occupations in which practitioners are more engaged with their associations may tend to have stronger certification programs that perform a gatekeeper function.

Finally, associations vary in the extent to which they wish to maintain self-governance and avoid regulatory oversight, with some associations approaching certification from the standpoint of an opportunity to avoid, rather than progress toward, higher levels of closure. . For example, certification may be sought by some occupational associations specifically because it is not a legally enforced form of closure – that it can be a substitute for state regulation and help an occupation maintain control over its task domain without involving higher education (Interview 4, January 2014). Certification program managers whom I interviewed uniformly said that seeking licensure laws was not the goal of the certification organization, though in some nursing fields it was noted that certification program managers wanted their certifications to be a component of existing licensure requirements.

Certification program administrators raised doubt about whether a licensure authority could do as much to ensure quality as certification organizations do and express philosophical reservations about whether mandatory credentialing is superior to voluntary certification. In the words of the manager of a certification program in human resource management, "You look at the CPA, is that the right way to go? I don't know. You look at the bar, I don't know. Teaching standards, is that – maybe for the pocketbook, it would be great, no doubt. I mean, from a revenue perspective, but philosophically, I'm not sure" (Interview 2, December 2013). Indeed, one certification manager mentioned that self-governance is the hallmark of a true profession, and that certification is a purer form of self-governance than could possibly be provided by a regulatory body administered by the state. Similarly, some in the certification field prefer to keep the higher education system at arms-length by accrediting higher education institutions to provide preparatory coursework for certifications and continuing education units that can be used for credential maintenance, but not encouraging the development of degree programs that could supplement or compete with certification – examples of organizations following this model including Project Management Institute and the Human Resource Certification Institute. Most certification program managers did not say that they were explicitly trying to avoid licensure, but one consultant to many certification organizations claimed that licensure avoidance was a common goal throughout the certification movement, adding that "government agencies prefer certification because certification could be more stringent than licensure… most government regulatory agencies in the States would rather that you'd come in self-regulated" (Interview 4, February 2014).

Chapter Conclusions

In this chapter, I show how institutions in the association management field, broadly defined, facilitated the spread of certification across occupations and associations. National nonprofit membership associations faced numerous actual and perceived threats over the last quarter

of the twentieth century stemming from social and technological change. The widespread adoption of certification was, in part, a consequence of a shift in norms that valued competency-based certification over other formats for training and credentialing and urged organizations to seek new sources of revenue. Certification was and remains a seemingly easy solution for associations seeking an antidote to lagging revenue and declining member participation. Indeed, it is now easier for organizations to make contact with vendors offering pre-packaged options for rapidly implementing a certification program. However, with associations being managed and certifications being launched within an increasingly close-knit occupational community of association managers and credentialing program managers who often have a greater affinity with peers in different professional associations than within the profession served by their association, factors not anticipated in the literature on professions and closure are influencing the adoption and persistence of certification.

This chapter challenges the literature on closure and professions by showing that certification is often not one of the steps that occupations take on a roughly linear progression to professional status, but rather is the highest level of professionalization sought by many newly emerging professional groups. The state-sanctioned monopoly that the ideal-type professions, such as law and medicine, sought for themselves through licensure and the accreditation of professional schools is less attractive to some of the certification organizations now engaging in professionalization, such as human resource management and project management. Though there are clear collective economic benefits to achieving what are traditionally thought of as higher levels of professionalization and closure, such as licensure and the embedding of an occupation's body of knowledge in the curriculum of professional schools, such economic benefits flow primarily to members of associations rather than associations themselves. In and of themselves, such economic benefits do not seem to motivate many associations to push for more regulation and stronger educational requirements.

A major implication of this research is that the close relationship between the interests of professional associations and the occupations they serve, however vaguely defined, may be worthy of reevaluation. With association managers moving between organizations at a rapid pace, facilitated by the widespread acceptance of a common credential and expanding professional networks, it is becoming increasingly easy for association managers to turn to associations in other occupations as benchmarking targets and sources of inspiration about what an ideal credentialing program should look like. Of course, as already noted, association professionals claim to be committed to advancing the interests of the members they serve, and normally make decisions accordingly. However, my research shows that it is now much easier than in the past for association managers to benchmark themselves within the broad field of professional associations and therefore may be exposed to the influence of norms in the association management community.

The widespread adoption of certification is also a case study in the commercialization of the nonprofit sector, a theme that concerns many scholars in the literature on nonprofit management (e.g., Froelich 1999; Hodgkinson 1989; Weisbrod 1998). Though very few certification programs are run by for-profit entities, many associations are de-emphasizing fundraising in favor of generating revenue from members and non-members alike by selling a range of products that include, but are not limited to, certification: evidence of this "cafeteria approach" (Hartsock 1982) to managing nonprofit associations can be seen in revamped efforts to sell other products, such as conferences, networking events, publications, and even affinity-based travel and financial products to members. This research points to the need to consider the effect of macrosocial changes affecting all membership associations, such as declining social capital and emerging communication technology that circumvent traditional roles played by associations, as factors pushing nonprofits to behave in ways that look increasingly revenue-oriented. I showed that association leaders are embedded in an environment in which they are exposed to norms that prioritize organizational interests and ensure their own survival and security in an environment that association managers perceive to be

unfriendly. However, this embeddedness may also sometimes come between associations and their stated goals with respect to professional advancement.

While this chapter is the product of exploratory research, it also lays the groundwork for further empirical research. One potential direction is to retain the qualitative focus on the association management field and delve deeper into the transformation of associations in the United States that has accompanied technological change and declining social capital. Credentialing is just one of many functions performed by associations that have been affected by macrosocial change, others including political advocacy, research, and fundraising; a broader study could connect changes in the management of American professional associations to changing levels of social capital and stratification. Qualitative research can also compare and contrast the development of certification in different fields to better understand the sources of variation between certification programs. Alternately, quantitative data collection could confirm and build upon the findings of this study, potentially looking at how environmental differences between certification organizations (e.g., their occupational contexts and membership characteristics) result in different certification program designs. Further discussion of important directions for research on certification can be found in the conclusions section of this dissertation.

Dissertation Conclusions

This dissertation significantly advances the state of research on the phenomenon of occupational certification in the United States, drawing upon higher quality data than was available to prior researchers. My research considers whether the benefits associated with certification are a product of spurious relationships and examines a broader cross-section of the labor market than scholars have previously considered. I take a broader definition of the value proposition involved in occupational certification than past research, considering effects of certification at the individual, occupational, and organizational level, resulting in findings that should inform both sociological theory on occupations and credentials as well as public policies related to certification.

My research on occupational certification is motivated by a fundamental, overarching question of why individuals choose to become certified. Each of the individual questions posed in the chapters of this dissertation address some dimension of why individuals may be seeking certification in the absence of direct survey data on the motivations of individual certificants. Possible hypotheses were addressed quantitatively by examining characteristics of the certified workforce, potential underlying sources of an earnings premium occurring through certification, and the factors that push organizations to offer certifications.

Findings reported in Chapter 1 point to stark differences in the characteristics of individuals who attain certification relative to the uncertified. Individuals who earn certifications tend to be those who are most advantaged in the labor market with respect to their demographic and educational backgrounds. Though certified individuals experience more months of unemployment than the non-certified, they generally have better experiences in the labor market than the non-unemployed. I find a robust wage premium for young workers in Chapter 2, which suggests that many certificants are enjoying the labor market advantages promised by certification organizations, at least in the subset of the labor force that is sampled by the ELS. The third chapter of this

dissertation reported several findings about the motivations of certification organizations in offering certification: the boom in certification in recent years is not only a product of labor market demand, but also a result of changes in the association management space that prompted organizations to look for nondues revenue. Certification organizations, I find, are influenced both by actors in the occupations they serve (i.e., workers and employers) and by the association management field – which itself is pursuing professional projects that involve certification.

Certification, of course, is a relative newcomer to the milieu of credentials available to American workers. This dissertation does not examine whether certifications provide more or less value than legally mandated competency-based credentials, such as licensure, or credentials that validate training only – such as certificates issued by university extension schools or "digital badges" posed on social media profiles for the completion of open online courses. However, the finding that certification attainment is very robust in the highest education bracket in the ELS suggests substantial overlap between certification and other types of credentials. As discussed in Chapter 1, individuals with high levels of formal education are also disproportionately likely to be licensed, and some state licensure boards require or incentivize the acquisition of certification. Thus, it is difficult to say whether the observed benefits of certification for some workers are actually a reflection of the value of licensure, which accrues to all individuals lawfully practicing an occupation within a given state.

For now, it is necessary to acknowledge that certification, despite its voluntary nature, is sometimes more voluntary than other times – it can be a component of meeting regulatory requirements, or forced upon workers by the mandates of employers (as is commonly the case in healthcare and cybersecurity) or a prerequisite for accessing the resources of a professional community (examples including the exclusion of non-certified real estate brokers from multiple listing services or non-certified divers from dive shops). Thus, while the control variables introduced in Chapter 2 should partially explain differential selection into certification for the cohort of young

workers captured by the ELS, they do not capture all of the various pressures that exist that may lead some to pursue certification while others do not. Further research contrasting the effect of certification alone relative to its effect coupled with other credentials may contribute to our understanding of certification's value.

Why do American Workers Attain Certification?

Reevaluating the fundamental question posed at the beginning of this dissertation of why individuals are choosing to earn certification, my findings suggest that workers are responding to a combination of carrots and sticks. The median young worker reaps an earnings premium, and therefore appears to be justified in pursuing certification from a strictly economic standpoint. Yet, many certifiers entered the business of credentialing for reasons other than strategically boosting their certificants' income. While certifications appear to create value for at least some workers, they also create substantial revenues for credentialing organizations, including some for-profit corporations who have a stake in the certification process. Indeed, the evidence pointing to an influx of new certification programs into the marketplace (see "Basic Parameters" in the introductory section) suggests that there is substantial unmet demand for credentials. Thus, the aggregate value of certification hinges on how those organizations that issue them deliver value to stakeholders.

If workers are earning certification because they believe that it will improve their economic situation, there is danger that they are making the decision to get certified without fully appreciating the nuanced nature of the certification earnings premium. Certain subpopulations are likely to benefit more than others from certification, and it would be unwise for the median worker to assume that any certification will advance their goals. Moreover, the certification premium is affected considerably by factors external to the effect of attaining certification itself, including one's chosen occupation. The savviness of workers about certification and its potential benefits varies substantially across occupations: while workers report having a decent sense of the certification

options available to them in professional and technical occupations (American Institutes for Research 2013), how far that understanding goes outside of such occupations is unclear.

Employers' Perspectives on Certification

This dissertation thoroughly examined the phenomenon of certification from the perspective of individual certificants and organizations offering certifications. Employers, however, are another major stakeholder in the certification process – and one that influences both individuals' decision to become certified and organizations' decisions with respect to launching and designing certifications. On the surface, employers vary tremendously in whether and how much they incentivize certification attainment: the manager of a nursing certification program mentioned that there are some hospitals, mostly in urban areas with savvy customer bases, which offer a direct cash incentive for certification according to a schedule set by their HR departments. In most organizations, however, the benefits are more subtle and difficult for certificants themselves to notice – certification may increase an individual's probability or pace of promotion, result in new responsibilities or otherwise upgrade job quality without a raise, or facilitate finding a higher paying new job. The observed heterogeneity in organizational incentives and rewards associated with certification is a topic deserving of further research: under which circumstances will employers be most likely to reward certification, and when will employers offer the greatest incentives to certified workers?

Some employers want certified workers because their certifications are an effective signal that can demonstrate quality to consumers, even though consumers often know little about what certifications actually measure. Such motivations for certification seem most common in fields where individual practitioners have ample contact with certified workers. Other employers are likely more interested in certification because of the potential for certification to reduce legal liability for errors and malpractice and provide a general impression that proper procedures are being followed. However, scholarship on labor markets focuses mainly on the effect of certification on the supply of

and demand for labor. In Chapter 3, I argued that employers have a particularly strong effect on the character of certification programs offered by industry associations with organizational members, and often demand the creation of certification programs because they can provide new routes of entry into occupations – increasing labor supply and reducing equilibrium wages for competent workers, effectively achieving the opposite of occupational closure. Employers need the certifications held by new workers to be effective validations of skill if they hope to realize any gains in productivity, though. Employers therefore seem to have different reasons for requiring (or not requiring) certification and determining rewards to certification attainment in different occupations and industries, depending on their objectives.

Multiple hypotheses could be tested about the reasons that employers support or oppose certification. Employers should value the signaling aspects of certification to a greater extent in fields where practitioners have a great degree of contact with customers. Employers may express a preference for certified workers, and reward certified employees appropriately, in fields where malpractice risks are high on account of certification's value in documenting adherence to standards and possession of competency. Anecdotally, it appears that employers in the healthcare and security sectors do prefer certifications accredited by one of the two major accreditation bodies because such certifications are more defensible in the event of a legal challenge (Jaffeson 2005). And, employers in fields where there is a direct relationship between worker productivity and profitability should be most attracted to certifications that recognize high levels of proficiency.

Very little prior research focuses on employers' perceptions of certification, suggesting that this may be fertile ground for expanding our understanding of the growth and value of certification for American workers. Aside from direct surveys of individuals who make decisions with respect to the evaluation of workers' or employment candidates' credentials, research could also correlate employer demand and available credentials by culling data from job postings and data on employment reported by certificants themselves. Moreover, as in other subfields of sociology,

experimental vignette or audit studies could be used to identify the value that employers (or study participants standing in for employers) place on different types of certification. Either a survey or experimental research design could be used to contrast what individuals and employers seek from certification and analyze how their respective priorities differ. Such research could go a long way toward addressing the question posed in Chapter 3 of why certification programs often differ in practice from the expectations of theories of occupational closure.

Additional Avenues for Further Research

This dissertation answered two fundamental questions about certification in the United States: who earns certification and who benefits the most from certification in terms of an earnings premium. However, the findings presented are limited to some extent by the quality of available data, and many related questions remain. For example, although wages are the most commonly studied employment-related outcome, others are also relevant to workers' lives and patterns of labor market inequality. Data will soon exist, through the Redesigned SIPP, the National Survey of College Graduates, the National Household Education Study, and the Current Population Survey, to identify the effect of certification on other labor market outcomes, including but not limited to turnover, job satisfaction, mobility between employers and occupations, and competence in executing one's job.

The second major area of research on certification going forward should examine the characteristics of individual certification programs and ask which characteristics of certification programs are associated with meaningful outcomes. In particular, knowing whether certifications offered by membership associations provide the same level of rigor and competency assurance as certifications that are effectively firewalled from membership functions would be a substantial advance in the literature on nonprofits. Such research will be important if the certification movement is to design credentials that will not only have labor market value, but effectively serve their intended

functions as genuine signals of competency and quality in the labor market. Although Tschirhart et al (2014) started to address the persistence of certification programs from an organizational perspective, more research is needed on a broader swath of programs and with more attention paid to qualitative differences between programs.

Finally, there is room for further research on the theme of the interplay between certification, other types of credentials, and the training that often prepares individuals to obtain and retain them. In particular, practitioners and policy-makers presumably would like to know how certification programs compare in efficacy to other modes of training and credentialing. Similarly, continuing education is a prominent feature in certification, but its efficacy and impact on learning outcomes remains unknown. A central challenge for scholars examining the effects of non-traditional educational credentials will be to differentiate the effect of a credential awarded on the basis of demonstrated competency relative to the value of having the same level of competency without a credential. While research on quality seals and labeling has pointed toward the likelihood that there is some baseline value of labeling an item as "certified," it would be a major step forward for the literature on credentials and education at large to identify a consistent earnings premium. The OECD's Survey of Adult Skills and Eurostat's Adult Education Study offer data that may shed some light on this question, though the definitions of certification used in these studies differ substantially from the definition used in US data products.

Implications for Sociology

This dissertation demonstrates that occupational certifications are a labor market and educational phenomena that affects the lives of workers and is worthy of attention on the part of scholars concerned with inequality. Certification programs are a means through which workers are differentiating themselves from each other, even within existing occupational categories. This is not to say that scholars should necessarily divert attention from the study of credentials more commonly

thought of as markers of stratification, such as college degrees. However, the effect of certification on wages demonstrated within this dissertation suggests that credentials issued outside the formal education system deserve more attention as mechanisms through which individuals can enter and advance in labor markets.

There are also implications of my research for the body of literature on the sociology of the professions, some of which I discussed already in Chapter 3. One direct critique of the canonical works in the sociology of professions that I present in the third chapter of this dissertation is that the assumption of close alignment between professional associations and their members may be misguided. Scholars considering the fundamental question of "what is a profession" might do well to look beyond an occupation's stage in the adoption of institutions associated with professionalization (e.g., Abbott 1991) and instead focus more on the interests represented in those institutions. For example, while frontline retail sales nominally has professional certification programs offered by the National Retail Federation, representatives of the NRF indicated at a tradeshow that the certification was designed in large part to satisfy the training needs of large retailers who are the Federation's most influential dues-paying members. Making more qualitative judgments of the extent to which an occupation engages in self-governance and the institutional arrangements that facilitate or hinder it may help professions scholars predict the situations under which occupational closure will occur and create value for workers.

Finally, this dissertation touches on topics of relevance to the sociology of organizations. I found evidence that the certification wage premium cannot be dismissed as merely the product of self-selection into certification on the part of more capable individuals; thus, the certification wage premium may derive from its effectiveness at singling competence. My case, occupational certification, therefore validates the general findings of a range of studies of so-called "certification contests" in the organizations literature that examine the effect of endorsements on business outcomes and argue that endorsements help firms and individual entrepreneurs build their

businesses (e.g., Polidoro 2013; Sine, David, and Mitsuhashi 2007; Zott and Huy 2007). Thus, this study adds to an accumulating body of evidence validating the importance of third party credentials for positive market outcomes. Indeed, future work may reconcile the findings of research on occupational certification with research on certification in other contexts, including the certification of products and accreditation of organizations. Such research may contribute to a unified theoretical framework for explaining the contexts in which certification programs will emerge and how they come to adopt a more or less inclusive character.

Appendix A. Estimated Coefficients from Logistic Regression of Certification on Individual and Occupational Covariates.

Education	Model 1	Model 2	Model 3
Less than HS Diploma	-1.742**	-1.361**	-1.329**
	(0.233)	(0.245)	(0.293)
HS Diploma	-1.016**	-0.689**	-0.680**
	(0.153)	(0.166)	(0.210)
Some College	-0.425**	-0.130*	-0.149
	(0.145)	(0.157)	(0.190)
AA/AS Degree	-0.133	0.114	-0.022
	(0.149)	(0.158)	(0.180)
BA/BS Degree	-0.464**	-0.288*	-0.267+
	(0.140)	(0.144)	(0.159)
MA/MS Degree	-0.117	-0.015	0.070
	(0.148)	(0.152)	(0.164)
Respondent Higher than Average Ed in Occupation? (1=Y)	-0.033	-0.017	-0.004
	(0.074)	(0.175)	(0.092)
Individual and Occupational Characteristics			
Respondent an Underrepresented Minority? 1=Y	-0.095	-0.080	-0.074
	(0.094)	(0.095)	(0.095)

Respondent's Sex (1=F)	-0.333**	-0.229**	-0.151*
	(0.058)	(0.061)	(0.069)
Respondent's Age	0.004*	0.0008	0.0002
	(0.002)	(0.002)	(0.002)
Respondent US-born? (1=Y)	0.150+	0.157+	0.194*
	(0.087)	(0.087)	(0.089)
N of Months Employed or Looking for Work Since 08		0.003*	0.003*
		(0.001)	(0.001)
N of Voluntary Job Quits		-0.006	-0.012
		(0.019)	(0.018)
N of Occupation Changes		-0.001	-0.001
		(0.035)	(0.035)
N of Months Unemployed since 2008		0.009+	0.009+
		(0.005)	(0.006)
N of Months Part-time since 2008		-0.004	-0.004
		(0.003)	(0.003)
Monthly Income		0.00003**	0.00003**
		(0.00001)	(0.00001)
Hours Worked Weekly		0.005*	0.005+
		(0.003)	(0.003)
Respondent in a Labor Union? (1=Y)		-0.094	-0.041
		(0.096)	(0.099)
Occupation-Level Fixed Effects	Omitted	Omitted	Included
Constant	-2.398**	-3.123**	-3.006**

	(0.192)	(0.252)	(0.289)
Observations	29,121	29,121	29,121

Robust standard errors in parentheses. Professional and doctoral degrees are the reference group for educational attainment variables.

** p<0.01, * p<0.05, + p<0.1

Appendix B. ELS Composite Measures.

The standardized test composite score is a norm-referenced measure of a student's level of achievement on a standardized test of cognitive achievement administered with the Education Longitudinal Survey (ELS). It is a standardized measure with a mean of 50 and standard deviation of 10. Mathematics and reading test results are averaged.

The instrumental motivation composite variable is described by the NCES as "a scale of the base-year respondent's instrumental or extrinsic motivation, i.e. motivation to perform well academically in order to satisfy external goals like future job opportunities or financial security" (US Department of Education 2014b). Items that contribute to the scale include whether the student studies to get good grades and whether the student studies to increase his or her job opportunities. It is standardized to have a mean of 0 and a standard deviation of 1.

The effort and persistence composite variable is also calculated by the NCES and described as "scale of the respondent's self-rated effort and persistence in the base year" (US Department of Education 2014b). It is based upon items self-rated by the student himself or herself, including whether the student remembers important things when studying and whether the student puts forth his or her best effort when studying, and is standardized to have a mean of 0 and a standard deviation of 1.

Appendix C. List of Interview Sources and Events Attended.

Interviews

In-Text Identifier	Title	Occupation or Industry Represented by Certification Organization	Interview Length	Date
1	Former Executive	Human Resources	45 minutes	July 2013
2	Executive	Human Resources	1 hour	December 2013
3	Executive	Human Resources	1 hour	December 2013
4	Consultant	Various Organizations	1 hour	January 2014
5	Executive	Human Resources	45 minutes	February 2014
6	Consultant	Various Organizations	1 hour	April 2014
7	Director	Organization Serving Various Certifiers	30 minutes	April 2014
8	Director	Organization Serving Various Certifiers	30 minutes	May 2014
9	Director	Organization Serving Various Certifiers	30 minutes	June 2014
10	Director	Healthcare	45 minutes	August 2014
11	Volunteer, Board Member	Law	30 minutes	August 2014
12	Director	Healthcare	45 minutes	September 2014
13	Executive	Management	20 minutes	October 2014

14	Director	Law; Environment	2 hours	October 2014
15	Former Executive	Environment	45 minutes	November 2014
16	Consultant	Basic Skills	1 hour 15 minutes	November 2015
17	Director	Healthcare	1 hour	May 2016
18	Executive Director	Healthcare	1 hour	May 2016
19	Executive	Healthcare	1 hour	May 2016
20	Executive	Accreditation of Organizations	45 minutes	May 2016

Events Attended

Nature of Event	Sponsoring Organization	Year
Tradeshow	Association with many certification professionals	2014
Tradeshow	Association with many training, for profit education, certification professionals	2015
Small Conference	Association with many certification professionals	2016
Focus Group	Recently formed organization for individuals in the association management profession	2014

Focus Group	Existing professional association in agriculture	2016

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