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Urban College Graduates;Their Investments in and Returns for Strong Quantitative Skills, Social Capital Skills, and Soft Skills

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URBAN COLLEGE GRADUATES: THEIR INVESTMENTS IN AND RETURNS FOR STRONG QUANTITATIVE SKILLS, SOCIAL CAPITAL SKILLS, AND SOFT SKILLS

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DEDICATION

This dissertation is dedicated to my parents, Earl and Sonia Haynes, in appreciation of their sacrifice and serenity and to my brother, Phil, in appreciation of all the fun times.

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URBAN COLLEGE GRADUATES: THEIR INVESTMENTS IN AND RETURNS FOR STRONG QUANTITATIVE SKILLS, SOCIAL CAPITAL SKILLS, AND SOFT SKILLS

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ABSTRACT

This case study examined strong quantitative skills, social capital skills, and soft skills of urban college graduates using data from the Multi-City Study of Urban Inequality Household Survey. The urban college graduates lived in Atlanta, Boston, or Los Angeles and had bachelor's, master's, PhD, and professional degrees. Among the three skills only strong quantitative skills was found to be associated with positive and significant returns. Those returns did not emerge because strong quantitative skills were used as a proxy for the ability to perform jobs that require frequent use of mathematics and frequent use of computers. Instead, strong quantitative skills seemed to signal that urban college graduates have the ability to handle complexity. Contrary to previous findings, neither race—black or white—nor gender significantly affected returns for social capital skills. Similarly, returns for soft skills did not differ significantly by race, gender, or age. Only urban college graduates with PhD or professional degrees got a significant return for their social capital skills. This finding supports the view that social capital skills are demanded from professionals. No evidence was found to support the hypothesis that differences in social capital skills and soft skills significantly contribute to variations in earnings among urban college graduates. Findings from this study and other studies imply that universities should concentrate on developing the strong quantitative skills of college

students. Findings from other studies imply that employers demand that non-college graduates have soft skills and social capital skills that facilitate momentary and unproblematic encounters with customers, co-workers, and supervisors. In contrast, findings from this study and other studies imply that employers demand that college graduates use their soft skills in tandem with their social capital skills to establish and maintain firm, long-term, and cross-functional relationships that may facilitate access to resources such as revenues, sponsors, advocates, and constituents.

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CHAPTER I

WHAT DOES HAVING STRONG QUANTITATIVE SKILLS TELL EMPLOYERS ABOUT URBAN COLLEGE GRADUATES?

1.1 Introduction

Studies that examine the earnings of college graduates usually do not look into different types of job skills that enhance earnings or that employers' value. Instead, the studies mostly follow Mincer's (1974) model (Mason, 1997; Osberg, 1984) and presume that educational attainment and work experience are the best available indicators of valued job skills. Furthermore, regression results from these studies support the belief that an additional and higher degree typically enhances valued job skills and consequently enhances earnings. On the other hand, regression results from studies that do not use educational attainment and work experience as proxies for jobs skills indicate that some job skills are valued while others are not valued (e.g., Mitra, 2000, 2001, 2002; Paglin & Rufolo, 1990). Generally, the value of each job skill varies by type of job and length of job tenure (Glaser, Mohammadreza, Veloski, Blacklow, & Goepp, 1992; Guzzetta & Bollens, 2003; National Center on the Education Quality of the Workforce, 1995). A college education contributes to future earnings from jobs by developing job

skills that are scarce and costly to acquire (see, e.g., Bowles & Gintis, 2000; Wolff, 1997).

In studies that divide job skills into verbal, mechanical, or quantitative skills, only an increase in quantitative skills has consistently been linked with a significant increase in earnings (Ferguson, 1995; Grogger & Eide, 1995; Lee & Lee, 2009; Mitra, 2000, 2001, 2002; Murnane, Willett, Duhaldeborde, & Tyler, 2000; Murnane, Willett, & Levy, 1995; Paglin & Rufolo, 1990; Song, Orazem, & Wohlgemuth, 2008; Taubman & Wales, 1974; Weinberger, 1999). Quantitative skills are the acquired abilities to define, analyze, and solve quantifiable problems. Quantitative skills are a form of hard skills. The effect that quantitative skills have on earnings appears to depend on the degree of skills acquired. Weak quantitative skills are chiefly associated with lower earnings by Blacks (Ferguson, 1995; Mitra, 2000; Pinkston, 2006) and females (Mitra, 2000, 2002; Murnane, Willett, & Levy, 1995; Paglin & Rufolo, 1990; Pinkston, 2003; Weinberger, 1999). Strong quantitative skills are associated with significantly higher pay (Lee & Lee, 2009; Paglin & Rufolo, 1990).

Findings from a few studies indicate that the market value for quantitative skills grew during the late 1970s and the late 1980s (Ferguson, 1995; Grogger & Eide, 1995; Murnane, Willett, & Levy, 1995). Song, Orazem, and Wohlgemuth (2008) acknowledged that the reason why quantitative skills had a consistently positive and significant effect on earnings and grew in value is still unclear. They speculate that the value of quantitative skills, especially strong quantitative skills among college graduates, grew because the skills facilitated the use of information technology, including computers. Murnane, Willett, and Levy (1995) suggested that the growth in value of quantitative skills be

attributed to the occupational shift in the 1970s away from mechanical jobs that did not require math skills (see also, Howell & Wolff, 1991). In addition, Spence (1976) implied that skills such as quantitative skills are valued because these skills have a direct effect on productivity. In contrast, education is mainly a signal of productivity. The value of quantitative skills may also be related to the information these skills provide about other valuable but hard to observe or unobservable skills (see, e.g., Aigner & Cain, 1977).

Studies on the relationship between quantitative skills or strong quantitative skills and earnings mostly use data from large national and longitudinal surveys (e.g., Grogger & Eide, 1995; Mitra, 2000, 2002; Murnane, Willett, & Levy, 1995) and rarely include a distinct analysis of college graduates, urban college graduates, or their employers. This part of the study helps to close that gap by testing several hypotheses that revolve around urban college graduates, their employers, and strong quantitative skills. In this part of the study, urban college graduates (UCGS) are individuals who live in an urban area of the United States and have at least a bachelor's degree. In this part of the study, as in previous studies, strong quantitative skills (SQS), which are acquired abilities to define, analyze, and solve quantifiable problems that are above a peer group average, are signaled by undergraduate majors with the highest mathematics content (Lee & Lee, 2009; Paglin & Rufolo, 1990; Weinberger, 1999). In this part of the study, SQS are represented by average Graduate Record Examination (GRE) quantitative (GRE-Q) scores of 575 or higher. Actual GRE-Q scores were not available for the UCGS examined in this part of the study. Therefore, the average GRE-Q score of students with an identical undergraduate major was imputed to each of the UCGS examined.

The hypotheses tested in this part of the study to help close the gap in the quantitative skills literature on UCGS and their employers were as follows: (a) employers attach a significant value to the SQS of UCGS, (b) the share of UCGS with SQS who have jobs that require frequent use of mathematics and frequent use of computers is significantly higher than the share of UCGS with no SQS who have jobs that require frequent use of mathematics and frequent use of computers, and (c) employers consider SQS a proxy for the ability to do jobs that require frequent use of mathematics and frequent use of computers. In the hypotheses, frequent means daily or weekly. Frequent use does not denote degree of proficiency.

The purpose of this part of the study was to discover whether employers significantly value SQS of employees who are UCGS and to find out if these employers regard SQS as a proxy for math skills and computer skills. Why would anyone be concerned about whether or why employers value the SQS of urban college graduate employees? The concern stems from the skills shortage and skills mismatch hinted at in prior literature due to the demand for SQS and the continued scarcity of these skills among UCGS (Farkas, 2003; Handel, 2003; Kasarda, 1990; Litecky, Arnett, & Prabhakar, 2004; Moss & Tilly, 2001a; Murnane et al., 2000; Paglin & Rufolo, 1990). A skills shortage occurs when the demand for workers is greater than the supply of workers who have the skills needed to fulfill a job's requirements and are willing and available to do the job at the prevailing market wage in the existing work conditions (Shah & Burke, 2005). A skills mismatch is an imbalance between degree of skills job candidates' possess and degree of skills needed to do a job (Darrah, 1994; Handel, 2003).

A skills shortage and skills mismatch that is related to SQS would make it hard for employers in urban areas to fill some job vacancies and hard for some UCGS to qualify for jobs that require, for instance, math and computer skills (Coy, 2009). A skills shortage and skills mismatch would also raise labor costs and unemployment in the long run (Shah & Burke, 2005). The literature is rife with anecdotes from employers about their difficulty to fill jobs in urban areas (e.g., Farley, Danziger, & Holzer, 2000; Holzer, 1996; Moss & Tilly, 2001b). The literature contains accounts of employers who blame professional schools for their failure to emphasize strong math, science, and other technical skills that many college graduates need to perform intricate work (e.g., Becker, 1964b; Handel, 2003; Murphy & Jenks, 1983; Nyman, 2006; "Skills Mismatch Hits Engineering," 2006). It is also likely that differences in quantitative skills contributed to the growth in the income gap among college graduates (Bound & Freeman, 1992; Long, 2000; O'Neill, 1990). Starting in the late 1980s, this income gap, its precipitants, and products were the subjects of several articles and books. The articles and books relay the difficulty that some college graduates were having at getting and holding jobs and the outwardly overnight million dollar successes of other college graduates (e.g., Bound & Freeman, 1992; Ehrenreich, 2005; "End of an American Dream," 1988; Levy & Murnane, 1992).

The hypotheses on the value and implications of having and not having SQS were tested using regression analysis within a quantitative case study research methodology. The regressions used data from the Multi-City Study of Urban Inequality (MCSUI) Household Survey (MCSUI-HS). The MCSUI was designed to study ways in which changing labor market dynamics, racial attitudes and stereotypes, and residential

segregation affect various aspects of urban inequality (Bobo et al., 2000). Data from the MCSUI-HS are responses to a 1992-1994 survey of randomly selected adult residents of Atlanta, Boston, Detroit, and Los Angeles. Data from UCGS who lived in Detroit were not analyzed in this part of the study because of the absence of information on many of the variables used in the regressions.

Findings in this part of the study on SQS extend previous findings in the quantitative skills literature. The extension is principally due to the analysis of data on UCGS who worked in a variety of industries and occupations and held undergraduate, graduate, doctoral, and professional degrees in 41 fields and disciplines. The extension is also due to findings on employers implied by results from the examination of data on UCGS. Besides, SQS rather than quantitative skills were examined.

The most important finding in this part of the study is that employers attach a significant value to the SQS of the UCGS. Contrary to prediction, employers do not assign a significant value to SQS because SQS is a proxy for the ability to perform jobs that require frequent use of mathematics and frequent use of computers (Murnane, Willett, & Levy, 1995; Song, Orazem, & Wohlgemuth, 2008). Nonetheless, approximately 10% of the value that is attached to SQS in this part of the study is related to computer skills. Employers apparently look to SQS as a signal of some facet of computer skills.

Findings in previous studies indicate that large employers are more inclined to believe that SQS are associated with computers skills and to pay more for SQS (Mitra, 1999). In this part of the study, large employers employ 1,000 or more employees. The finding in this part of the study that UCGS with SQS are significantly more likely than

other UCGS to have jobs that require frequent use of computers extends previous findings that SQS are associated with computers skills. Furthermore, findings in this part of the study and previous studies imply that employers are using SQS as a signal of the ability to handle complexity, including complex computer systems. The implication is underpinned by the complexity of undergraduate majors pursued by UCGS with SQS, the complexity of jobs offered by mid-sized and large employers, and the complexity of computer systems used by mid-sized and large employers.

The remainder of this chapter on SQS and UCGS continues below in sections. Section 1.2 lays out unaddressed issues raised in the quantitative skills literature that triggered this part of the study. Section 1.3 consists of a description of the models and tests used to address the unaddressed issues formulated as hypotheses. Section 1.4 includes details of the research methodology used in this part of the study, including the criteria for selecting the UCGS from the MCSUI-HS. Section 1.5 contains an interpretation of the descriptive statistics and the test results. Section 1.6 has a discussion on the findings in this part of the study, whether the findings here support previous findings, and how the findings here may guide future research.

1.2 Literature Review

A review of the quantitative skills literature is presented in this section. First, the way in which the quantitative skills literature grew out of the human capital literature is laid out. Second, the theory that employers view education more as a signal of productivity than as a contributor to productivity is outlined. Third, the effect of quantitative skills on returns to education is described. Fourth, findings on the effect of

having strong versus weak quantitative skills are discussed. Fifth, reasons why quantitative skills are valued and have grown in value are presented.

The quantitative skills literature is an offshoot of the human capital literature. Human capital is the stock, at a point in time, of acquired knowledge and abilities embedded in an individual that is transformed into hard skills which are applied to perform jobs, among other things (Becker, 1962; Bjerk, 2003; Moss & Tilly, 1995, 2001a, 2001b; Schultz, 1961). Quantitative skills are a form of hard skills. Walsh (1935), Mincer (1958), Schultz (1961), and Becker (1962) are given credit for presenting the earliest human capital earnings models that specify how differences in individual investments in education and on-the-job training relate to differences in employability, job skills, productivity, and earnings (Leslie & Brinkman, 1988; Mathur, 1999). Human capital theory is rooted in findings from earnings models that, holding all else equal, on average, the greater the human capital investment made in an individual, the larger the future earnings generated by the individual.

Early reports in the human capital literature herald investing in a college education as one way of increasing human capital stock and consequently increasing earnings. In the bulk of the early reports, cost-benefit analysis was applied and a comparison was made between returns to investments in a college education and returns to investments in supposedly comparable assets or enterprises (e.g., Becker, 1962; Hansen & Weisbrod, 1969; Walsh, 1935). Later reports, from studies that applied regression analysis, continued to highlight the earnings benefit of investing in a college education (e.g., Cohn & Hughes, 1994; Leslie & Brinkman, 1988).

Some researchers have criticized the earnings models described in the early human capital literature for producing biased estimators of returns to education or a college education. The bias was supposedly due to the omission of variables that take into account the influence on earnings of cognitive ability (e.g., Cohn & Kiker, 1986), socioeconomic background (e.g., Altonji & Dunn, 1996), school quality (e.g., Behrman & Birdsall, 1983), and demographic traits (e.g., O'Neill, 1990). The researchers contend that the omissions produce overstated returns and correspondingly overstate the importance of the relationship between education and earnings. From the late 1950s until the late 1970s, the Mincerian earnings model (Mincer, 1974) that only looks at the importance of education and work experience—which represents on-the-job training—to earnings was commonly used by researchers in studies on factors that relate to earnings. Other researchers have, nonetheless, proposed that factors other than education and work experience significantly influence earnings and extensions of the Mincerian earnings model would show that the added factors materially reduce the influence of education on earnings.

The post-Mincerian era that started in the early 1980s is the era of correcting omitted variable bias by adding controls for cognitive ability, socioeconomic background, school quality, demographic traits, and other factors to earnings models. With the exception of findings by Bjerk (2003), findings from several studies reveal that additions of controls to earnings models for cognitive ability, socioeconomic background, school quality, and demographic traits did not eliminate or render insignificant the positive effect of education or a college education on earnings. In a study that used 1989-1993 data on Black and White males from the National Longitudinal Survey of Youth, 1979

cohort (NLSY79), Bjerk (2003) found returns to a college education insignificant for Black males in low-skill jobs and concluded that returns to a college education are more dependent on type of job held than race of jobholder.

Another criticism of the early human capital literature is Spence's (1973, 1976) criticism that employers value education more as a signal of productivity than as a contributor to productivity. According to Spence (1976), employers are typically unaware of the productivity of new hires. Nevertheless, employers attach a value to the expected productivity of new hires. The value of expected productivity is determined in part by productivity signaled by the new hire's education. Information on productivity provided by the education signal is assessed by the employer in light of the employer's experience with patterns of investments in education by others. Spence's (1976) market signaling theory stresses that education is an indirect indicator or signal of a new hire's skills, but a new hire's productivity is the direct outcome of a new hire's skills. He also stated that "employers know that education is a signal, that there are other attributes of [new hires] that partially determine productivity, and that these are being captured in the [education] signal" (p. 53).

Findings such as those by Serneels (2008) confirm Spence's (1973, 1976) market signaling theory (see also, Brown & Sessions, 2006; Murnane, Willett, & Levy, 1995; Murnane et al., 2000). In his study, Serneels (2008) found returns to education unrelated to performance. However, returns to skills and abilities were directly related to performance. In the study, performance was synonymous with productivity. Contemporary employers view the output of productivity as products and services and the main input of productivity as new ideas (Drucker, 1994; Florida, 2002). Serneels (2008)

further found that education affected earnings by signaling skills and abilities. He also noted that employers use education as a screen to allocate workers to jobs, with better educated workers allocated to higher-level jobs. The study used data from the Ghana Manufacturing Enterprise Survey 2000.

Spence's (1976) speculation that attributes of new hires other than education determine the productivity of new hires and that those attributes are captured in the education signal was one of the catalysts for studies on whether returns to job skills were captured in education returns. In the studies, job skills were usually divided into verbal skills and quantitative skills. In earnings models used in the studies, verbal skills were represented by verbal test scores and quantitative skills were represented by quantitative test scores. Between verbal skills and quantitative skills, quantitative skills were consistently the stronger predictor of future earnings (Murnane, Willett, & Levy, 1995; Murnane et al., 2000). In addition, several studies unearth little difference in verbal skills among college graduates but a significant difference in quantitative skills among college graduates (Mitra, 2002; Paglin & Rufolo, 1990; Song, Orazem, & Wohlgemuth, 2008; Weinberger, 1999). Based on their analysis of scores provided by the Educational Testing Service for 1963 to 1993, Song, Orazem, and Wohlgemuth (2008) reported that: (a) the difference in average Graduate Record Examination (GRE) verbal (GRE-V) scores between Blacks and Whites was 1.3 and (b) the difference in average GRE quantitative (GRE-Q) scores between Blacks and Whites was 20.7. They also reported that: (a) the difference in average GRE-V scores between males and females was 8.0 and (b) the difference in average GRE-Q scores between males and females was 37.5.

Findings on differences between quantitative and verbal skills have led researchers to conduct job skills studies that look into whether returns to quantitative skills—but not verbal skills—were captured in the returns to education. In one study that used data from the National Longitudinal Study of the High School Class of 1972 (NLS72) and High School and Beyond (HSB), Murnane, Willett, and Levy (1995) found that the addition of a quantitative skills variable reduced the returns to education for the 1978 NLS72 male cohort by 41% and for the 1986 HSB male cohort by 52%. They also found that the addition of a quantitative skills variable reduced the returns to education for the 1978 NLS72 female cohort by 31% and for the 1986 HSB female cohort by 43%. Therefore, between one-third and one-half of the initial returns to education captured returns to quantitative skills (see also, Murnane et al., 2000; Green & Riddell, 2003).

In a study that used 1982 starting salary data from two national surveys of recent 4-year college graduates, Paglin and Rufolo (1990) discovered that employers attach little or no value to verbal skills, because the 4-year college graduates have practically the same level of verbal skills; alternatively, employers attach the highest value to SQS, which are scarce among the 4-year college graduates. In their study, Song, Orazem, and Wohlgemuth (2008) determined that employers pay an 18.1% premium for a 100 point increase in GRE-Q score. Murnane et al. (2000) reported that their examination of data from the 1986 wave of the 1978 NLS72 male cohort shows that males who entered college with math scores that were at least one standard deviation above the mean (i.e., SQS) earned 10% more than males who entered college with math scores that were at least one standard deviation below the mean (i.e., weak quantitative skills; see also, Blackburn & Neumark, 1993). The difference in earnings was statistically significant.

Furthermore, among a representative sample of 1983-1984 U.S. 4-year college graduates, graduates who pursued majors with a high mathematical content earned significantly more, on average, than other graduates (Weinberger, 1999). According to Lee and Lee (2009), holding all else equal, on average, 4-year college graduates from a southern U.S. university who graduated during 2005 and 2007 and pursued majors with the highest mathematical content earned $10,383 more per year than their counterparts who pursued majors with the lowest mathematical content. In spite of findings that employers attach a positive and significant value to the SQS of a broad range of recent college graduates, no study has specifically looked into whether employers similarly attach a positive and significant value to the SQS of UCGS.

A few reports indicate that male-female and Black-White earnings differences are also related to differences in amount and value of strong versus weak quantitative skills. An analysis of GRE-Q scores by Paglin and Rufolo (1990) reveals that scores of female 4-year college graduates were two times more frequent in the lowest portion of the score distribution (200-400) than scores of male 4-year college graduates. In contrast, scores of male 4-year college graduates were two times more frequent in the highest portion of the score distribution (600-800) than scores of female 4-year college graduates. In a study involving male and female test scores from the National Longitudinal Survey of Youth, 1997 cohort (NLSY97), Mitra (2002) found that before age 14 female scores were higher than male scores on the math and verbal sections of the Armed Services Vocational Aptitude Battery (ASVAB) tests. After age 14, female scores were lower than male scores on the math section of the ASVAB and higher than male scores on the verbal section of the ASVAB. These findings and other findings that higher-paying jobs are

mostly secured by individuals with SQS (Lee & Lee, 2009; Pritchard, Potter, & Saccucci, 2004) inspired Paglin and Rufolo's (1990) view that one of the reasons why male 4-year college graduates tend to earn more than female 4-year college graduates is because more males have the SQS needed to perform jobs in higher-paying fields. Notwithstanding, male and female 4-year college graduates with equal SQS got *equal* returns for the skills (see also, Mitra, 2002).

While males customarily had stronger quantitative skills than females and earned more than females, Whites typically had stronger quantitative skills than Blacks and earned more than Blacks—particularly Blacks in low-skill jobs (Bjerk, 2003). Findings in two separate studies indicate that Blacks with education comparable to Whites had quantitative skills that were significantly weaker than Whites (Mitra, 2000; Murnane et al., 2000). Song, Orazem, and Wohlgemuth (2008) revealed that young males consistently have the highest GRE-Q scores. Young males also receive the highest return for quantitative skills. The early and significantly high returns discourage young males from pursuing higher degrees.

In addition to the findings in an array of studies that earnings differences were partially due to differences in quantitative skills, the findings in a few studies suggest that the market value for quantitative skills and SQS grew during the late 1970s and the late 1980s (Ferguson, 1995; Grogger & Eide, 1995; Murnane, Willett, & Levy, 1995). After their evaluation of then existing quantitative skills literature, Song, Orazem, and Wohlgemuth (2008) asserted that the reason for the consistently positive and significant value of SQS and the growth in value is still unclear. They, nevertheless, speculated that the value of quantitative skills, especially SQS among college graduates, grew because

college graduates with SQS were adept at using computers. Coincidentally, large employers paid more for quantitative skills (Garen, 1985; Mitra, 1999). Up to the early 1990s, computer skills were rarely formally demanded or sought through testing, except in the computer industry (e.g., U.S. Department of Labor, Employment and Training Administration, 1993). Yet, a 1991 Labor Department report stated that meetings and discussions with numerous business owners, public employers, unions, employees, and supervisors revealed that current and future workers need to be able to efficiently use resources, interpersonal skills, information, systems, and technology—especially computers—(see O'Neil, Allred, & Baker, 1992; U.S. Department of Labor, The Secretary's Commission on Achieving Necessary Skills, 1991). Moss and Tilly (2000) also reported that increased computer use, organizational change, and installation of new technological apparatus were the most common reasons for the upsurge in skill requirements by some Boston-area employers during the late 1980s and the mid-1990s (see also, Levy & Murnane, 2004).

Despite numerous findings recounting the high value that employers put on SQS, SQS are invisible or hard for employers to observe before an individual is hired (see e.g., Pinkston, 2003, 2006; Spence, 1976). On the other hand, an individual's education is visible or easy for employers to observe (Spence, 2002). Employers seemed to be getting information about the degree of quantitative skills of each college graduate from the degree of quantitative skills of others with similar patterns of investments in undergraduate majors (Paglin & Rufolo, 1990; Spence, 1976, 2002; Weinberger, 1999). To be precise, a public sector employer who wants to hire a college graduate with an undergraduate degree in botany for a rainforest management job forms an expectation

about the degree of quantitative skills of that graduate from the graduate's undergraduate major and the experience the employer had with other graduates who pursued the same undergraduate major (e.g., Spence, 1973, 1976).

Similar to SQS, computer skills are hard for employers to observe without the aid of a testing mechanism. Tests for computer skills were available to employers in the early 1990s. Unfortunately, the tests were expensive, somewhat unreliable, and generic. The shortcomings of testing may have encouraged employers to forgo or augment testing with a quantitative skills assessment by undergraduate major. As Spence (1976) explained, screening for skills with a mechanism that is relatively easy to detect can become a substitute for costly observation or testing. Employers may forgo testing for computer skills if having SQS signals having computer skills. In that case, jobs that require computer skills would be mostly filled with college graduates with SQS. No study has included an investigation into whether college graduates or UCGS with SQS more so than others have jobs that require computer skills. This part of the study included an investigation into that likelihood for UCGS.

Murnane, Willett, and Levy (1995) suggested that the growth in value of quantitative skills may have been due not only to the pervasiveness of computer use in the workplace, but also to the occupational shift in the 1970s. The occupational shift spurred an increase in automation and interconnectedness between systems (Holzer, 1996; Levy & Murnane, 2004). The increase in the use of new interconnected technological systems apparently stimulated an increase in the use of mathematics and mathematics-based problem solving skills in jobs. By the late 1980s, employers of largely blue collar workers noticeably reduced demand for workers with mechanical and physical

skills and increased demand for workers with interpersonal and quantitative skills (Howell & Wolff, 1991; Moss & Tilly, 2000; Murnane, Willett & Levy, 1995). By the mid-1990s, SAP, PeopleSoft, and other computer software that connect systems were fixtures in organizations—especially large organizations. Levy and Murnane (1992) cited shifts in demand and supply during the late 1970s and the late 1980s as triggers for the spike in demand for highly-skilled workers with college degrees and for the rise in the college wage premium. Grogger and Eide (1995) countered that the failure in previous studies to account for quantitative skills may have produced an overstatement of the college wage premium. On the whole, the demand for SQS may be linked to the frequent use of mathematics as well as the frequent use of computers in contemporary jobs; this unsubstantiated link was tested in this part of the study.

In her study on job sorting by employer size that used data from the 1988 wave of the NLSY79, Mitra (1999) questioned the then prevailing rationale for the significant value attributed to quantitative skills. Supposedly, large employers placed a significant value on quantitative skills because they wanted employees with outstanding skills. In the study, having quantitative skills were positively and significantly related to being employed by a large employer. Blacks and females had significantly lower quantitative skills than Whites and males. Yet, Blacks and females were significantly more likely to be employed by a large employer. Mitra (1999) suggested that large employers routinely hire workers with exceptional quantitative skills except in the case of Blacks and females. She believed large employers made an exception for Blacks and females to comply with affirmative action laws. Affirmative action laws are in place to remedy past discrimination. Forms of past discrimination are taste discrimination and statistical

discrimination. Taste discrimination occurs when employers take actions, such as hiring, promoting, and paying a premium for same group workers, which perpetuate their own, their employees' or their customers' prejudice (Becker, 1964a; Wolff, 1997). Employers engage in statistical discrimination when, due to a lack or misapplication of information, they assess the characteristics and skills of job candidates based on a stereotype about the group to which the job candidate belongs (Aigner & Cain, 1977). Furthermore, screening discrimination is a type of statistical discrimination that involves different employer interpretations of signals obtained during the screening process by race or gender (Cornell & Welch, 1996).

The studies described in this section that directly or indirectly looked at the value of quantitative skills or SQS did not look at the value in terms of UCGS or employers who employ UCGS. As a result, unanswered questions remain that relate to value of SQS of UCGS to their employers and in certain jobs. In this part of the study, a quantitative case study design was used to obtain empirically supported answers to a few of the unanswered questions prompted by gaps in the quantitative skills literature. The case consisted of UCGS from the Multi-City Study of Urban Inequality Household Survey (MCSUI-HS) who met the subsample selection criteria specified in section 1.4. The unanswered questions were expressed as the following hypotheses, (a) employers attach a significant value to the SQS of UCGS, (b) the share of UCGS with SQS who have jobs that require frequent use of mathematics and frequent use of computers is significantly higher than the share of UCGS with no SQS who have jobs that require frequent use of mathematics and frequent use of computers, and (c) employers consider SQS a proxy for

the ability to do jobs that require frequent use of mathematics and frequent use of computers.

Studies discussed in this section were gathered from the quantitative skills and human capital literatures. In keeping with Creswell's (2003) recommendation, Figure 1

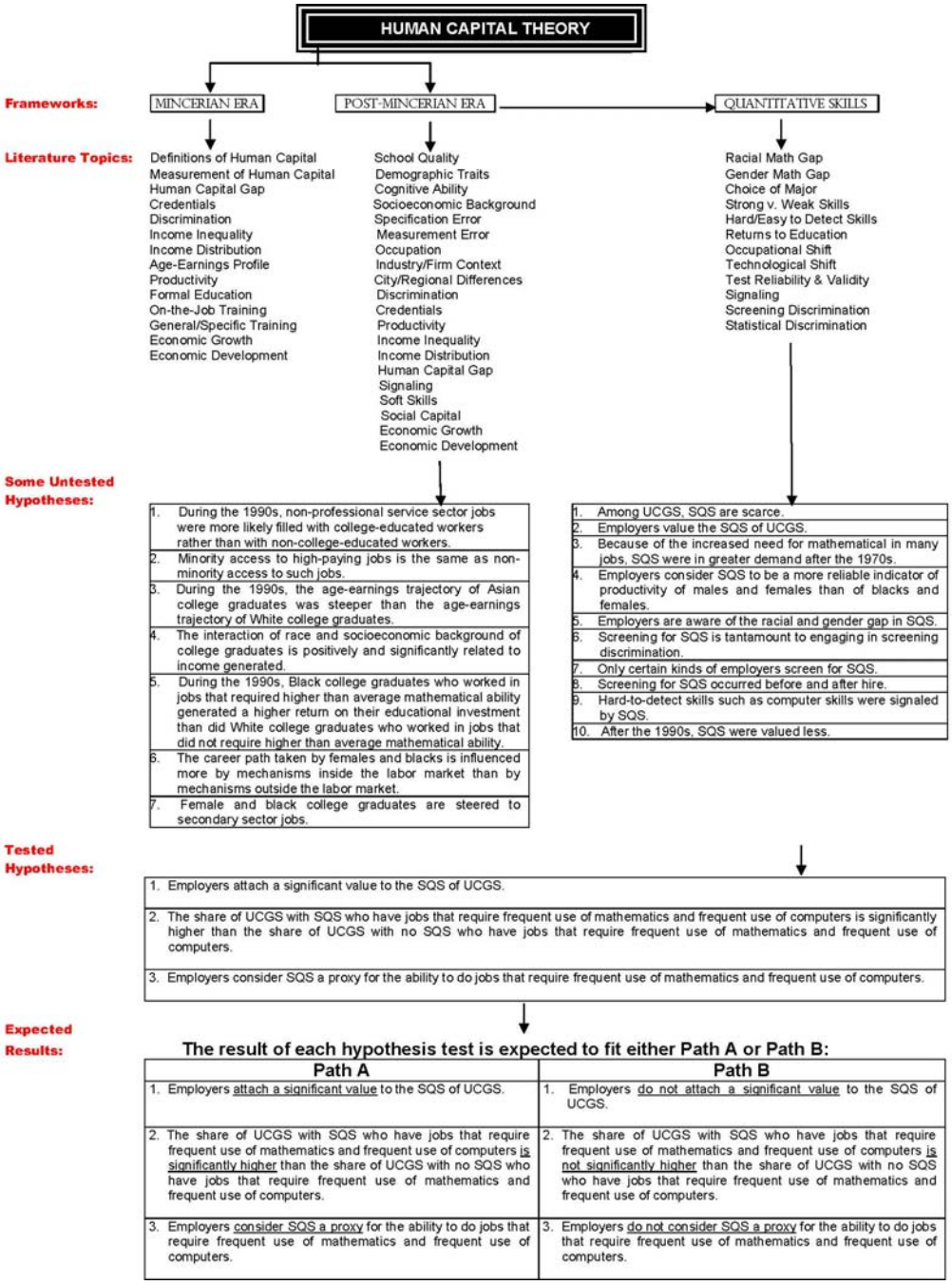


Figure 1. Conceptual Model for Strong Quantitative Skills

contains a conceptual model that ties both streams of extant literature to this part of the study. The first part of the conceptual model lists topics addressed in the literatures. The second part of the conceptual model identifies several untested hypotheses proposed by other researchers for further study. The third part of the conceptual model specifies the hypotheses tested in this part of the study. The last part of the conceptual model gives an outline of possible results from the hypothesis tests carried out in this part of the study.

1.3 Hypotheses

Regression models developed to test the hypotheses listed above and prompted by gaps in the quantitative skills literature are specified in this section along with their attendant decision rules. Three hypothesis tests were carried out. Fisher's exact test was used to test Hypothesis 2. The other hypotheses were tested with weighted least square regression models. Weights were applied because Blacks and low-income households were over-sampled in the MCSUI-HS.

Prior to specifying the regression models, average GRE-Q scores of students with undergraduate majors identical to that of the UCGS were assigned or imputed as average GRE-Q scores of the UCGS to signify their quantitative skills. Accordingly, average GRE-Q scores assigned to the UCGS in this part of the study are not the actual scores of the UCGS. This assignment of scores was possible because students who take the GRE state their undergraduate major. Average GRE-Q scores for business majors are the equivalent of their average Graduate Management Admission Test (GMAT) quantitative scores. See Table I for a list of average GRE-Q score by undergraduate major. Paglin and Rufolo (1990) discovered that during 1976 and 1987 average GRE-Q scores of 180,000 to 200,000 students followed a steady yearly pattern by undergraduate major. Also, GRE-

Q scores and other test scores that arise from mathematical computations were commonly used to represent quantitative skills in regression models (see, e.g., Ferguson, 1995; Grogger & Eide, 1995; Lee & Lee, 2009; Mitra, 1999, 2000, 2001, 2002; Murnane, Willett, & Levy, 1995; Paglin & Rufolo, 1990; Rivera-Batiz, 1992; Song, Orazem, & Wohlgemuth, 2008; Weinberger, 1999). Data on each UCGS undergraduate major was provided in the MCSUI-HS dataset. Consequently, an average GRE-Q score could be assigned to each of the UCGS examined. The assignment of average GRE-Q score by undergraduate major in this part of the study corresponds with similar assignments by Goodison (as cited in Paglin & Rufolo, 1990), Paglin and Rufolo (1990), and Weinberger (1999).

Table I. Average GRE-Q Score by Undergraduate Major

Undergraduate Major	Average GRE-Q Score
Engineering & Physical Sciences	675
Computer Science	650
Mathematics	625
Economics	600
Architecture & Biology	575
Business & Social Sciences other than Economics	500
Communications, Humanities & Health Professions	475
Education & Home Economics	450
Library Science & Public Affairs	425

Note. Adapted from "Mathematical College Majors and the Gender Gap in Wages," by C. J. Weinberger, 1999, *Industrial Relations, 38*, p. 413.

In addition, average GRE-Q score was used to create a SQS dummy variable that was a component of all the regression models. The UCGS had SQS if they were assigned an average GRE-Q score of 575 or higher. The average QRE-Q score of 575 was the cut-off because the unweighted average GRE-Q score of all the UCGS in this part of the study was 509 and one standard deviation (66) above that unweighted average was 575.

Earnings was an outcome variable in several regression models. In those regression models, the natural logarithm of hourly wage paid by an employer to an urban college graduate (*i*) in a survey year was designated as earnings. Hourly wage was first converted to 2008 dollars with the Consumer Price Index for all urban consumers and then transformed to a natural logarithmic form to create an outcome variable with a normal distribution. The UCGS examined in the regression models were the aggregate of non-randomly selected college graduates from Atlanta, Boston, and Los Angeles who met the subsample selection criteria set out in section 1.4.

Control variables were also used in the regression models. Controls were used for unchangeable as well as changeable individual attributes. Although all the controls are listed below, the way in which the controls were used in the models varied. Control variables were used for the following unchangeable attributes: (a) birth in the U.S. (Behtoui, 2007); (b) racial group (i.e., Black or White; Ferguson, 1995; Mitra, 2000; Murnane, Willett, & Levy, 1995); (c) gender group (i.e., male or female; Mitra, 2000, 2002; Murnane, Willett, & Levy, 1995; Paglin & Rufolo, 1990; U.S. General Accounting Office, 2003; Weinberger, 1999); (d) socioeconomic background (i.e., living with both parents until age 16; Loury, 1977; Mitra, 2000; Murnane, Willett, & Levy, 1995); and (e) year of survey response (Fan, Wei, & Zhang, 2005).

Control variables were used in the regression models for the following changeable attributes: (a) hard skills (i.e., highest college degree attained, potential work experience, and potential work experience squared; Becker, 1964a; Mincer, 1974; with potential work experience calculated as age minus school leaving age multiplied by the proportion of time spent working after leaving school); (b) supervisory or nonsupervisory work position (Mitra, 2000, 2002); (c) private sector or public sector employment (Grodsky & Pager, 2001); (d) number of employees (Mitra, 2000, 2002); (e) job tenure (Pinkston, 2003, 2006; U.S. General Accounting Office, 2003); (f) union membership (i.e., being a union member and/or subject to a collective bargaining agreement; Blackburn & Neumark, 1993; U.S. General Accounting Office, 2003); (g) undergraduate major (Grogger & Eide, 1995; Weinberger, 1999); and (h) city of residence (i.e., an Atlanta, Boston, or Los Angeles resident; Mitra, 2000; Rivera-Batiz, 1992).

The first regression model was developed to test Hypothesis 1, which states that employers attach a significant value to the SQS of UCGS. Hypothesis 1 would be supported by the results if the regression coefficient for SQS is positive ($\beta > 0$) and statistically significant ($p < .05$) in the earnings model. On account of the nonrandom method of selection, UCGS with SQS and UCGS without SQS may have been categorized in a selective way. Selection bias would produce biased regression coefficients in the earnings model. A means of determining if there is selection bias in an initial earnings model and then controlling for the bias in an adjusted earnings model is by obtaining the inverse Mill's ratio produced by the Heckman two-step selection bias correction procedure (Heckman, 1979; Sales, Plomondon, Magid, Spertus, & Rumsfeld, 2004; Smits, 2003). If the inverse Mill's ratio is statistically significant ($p < .05$), then it

is used in an adjusted earnings models as a control for selection bias. The adjusted earnings model becomes the correct earnings model. If the inverse Mill's ratio is not statistically significant, then the regression coefficients in the initial earnings model do not suffer from selection bias and the initial earnings model is the correct earnings model.

Because of the possibility of selection bias connected with SQS, the Heckman two-step procedure was carried out before Hypothesis 1 was tested. One step in the Heckman two-step procedure uses a logistic regression model and the other step uses an earnings model. At least one variable that is unrelated to earnings must be included in the logistic regression model and excluded from the earnings model. The variable for number of employees fits that criteria and was applied. Even though undergraduate major is related to earnings and would not normally be added to the logistic regression model in the Heckman two-step procedure, a variable for undergraduate major was included to remove the multicollinearity between the SQS variable and the inverse Mill's ratio variable. Multicollinearity arose because data on predicted probabilities from the logistic regression model, which used SQS as the dichotomous outcome variable, produced the inverse Mill's ratio (see Smits, 2003).

The two models used in the Heckman two-step procedure and the initial earnings model were specified as shown immediately below. Wholly dummy variables are underlined and expected signs are provided in the specifications. In the earnings models and all the others models that included hard skills, a positive regression coefficient was expected for each underlying variable except the work experience squared variable. Each model also produced an error term (E). In the models specified below, (a) the initial earnings model was a regression model that did not take into account the possibility of

selection bias associated with SQS, (b) the logistic regression model was used to obtain the inverse Mill's ratio, and (c) the adjusted earnings model was a regression model that incorporated a possible selection bias control. The three models used were as follows:

Hypothesis 1. Employers attach a significant value to the SQS of UCGS.

Initial Earnings Model:

$$\text{Ln Earnings}_i = \beta_0 + \beta_1 \underline{\text{SQS}}_{1i} + \beta_2 \underline{\text{Black}}_{2i} - \beta_3 \underline{\text{Female}}_{3i} + \beta_4 \underline{\text{Born in the U.S.}}_{4i} + \beta_5 \text{Hard Skills}_{5i} + \beta_6 \underline{\text{Lived with Both Parents Until 16}}_{6i} + \beta_7 \text{Job Tenure}_{7i} + \beta_8 \underline{\text{Union}}_{8i} + \beta_9 \underline{\text{Supervisor}}_{9i} + \beta_{10} \underline{\text{Private Sector}}_{10i} + \beta_{11} \underline{\text{Residency}}_{11i} + \beta_{12} \text{Year}_{12i} + E_i$$

Logit Model:

$$\text{Prob}(Y = 1 = \underline{\text{SQS}})_i = \beta_0 + \beta_1 \text{Number of Employees}_{1i} - \beta_2 \underline{\text{Black}}_{2i} - \beta_3 \underline{\text{Female}}_{3i} + \beta_4 \underline{\text{Born in the U.S.}}_{4i} + \beta_5 \text{Hard Skills}_{5i} + \beta_6 \underline{\text{Undergraduate Major}}_{6i} + \beta_7 \underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8 \text{Job Tenure}_{8i} - \beta_9 \underline{\text{Union}}_{9i} + \beta_{10} \underline{\text{Supervisor}}_{10i} + \beta_{11} \underline{\text{Private Sector}}_{11i} + \beta_{12} \underline{\text{Residency}}_{12i} + \beta_{13} \text{Year}_{13i} + E_i$$

Adj. Earnings Model:

$$\text{Ln Earnings}_i = \beta_0 + \beta_1 \underline{\text{SQS}}_{1i} + \beta_2 \underline{\text{Black}}_{2i} - \beta_3 \underline{\text{Female}}_{3i} + \beta_4 \underline{\text{Born in the U.S.}}_{4i} + \beta_5 \text{Hard Skills}_{5i} + \beta_6 \underline{\text{Lived with Both Parents Until 16}}_{6i} + \beta_7 \text{Job Tenure}_{7i} + \beta_8 \underline{\text{Union}}_{8i} + \beta_9 \underline{\text{Supervisor}}_{9i} + \beta_{10} \underline{\text{Private Sector}}_{10i} + \beta_{11} \underline{\text{Residency}}_{11i} + \beta_{12} \text{Year}_{12i} + \beta_{13} \text{Inverse Mill's Ratio}_{13i} + E_i$$

A test of Hypothesis 2 was formulated to find out whether the results support the view that the share of UCGS with SQS who have jobs that require frequent use of mathematics and frequent use of computers is significantly higher than the share of UCGS with no SQS who have jobs that require frequent use of mathematics and frequent use of computers. Hypothesis 2 would be supported if Fisher's exact test of significance indicates that the differences in proportions are statistically significant ($p < .05$). Fisher's exact test was appropriate for this hypothesis test because categorical data (e.g., SQS vs.

No SQS and Frequent Use of Mathematics vs. No Frequent Use of Mathematics) were used in the test and the sample was relatively small. Cross tabulations were carried out to find out: (a) the share of the UCGS with and without SQS who have jobs that require frequent use of mathematics and (b) the share of the UCGS with and without SQS who have jobs that require frequent use of computers. Hypothesis 2 was tested as shown below.

> *Hypothesis 2*. The share of UCGS with SQS who have jobs that require frequent use of mathematics and frequent use of computers is significantly higher than the share of UCGS with no SQS who have jobs that require frequent use of mathematics and frequent use of computers.

Frequent Use of Mathematics: Fisher's exact test of Prob(%SQS > %No SQS) < 0.05

Frequent Use of Computers: Fisher's exact test of Prob(%SQS > %No SQS) < 0.05

Regression models were also developed to test Hypothesis 3, which states that employers consider SQS a proxy for the ability to do jobs that require frequent use of mathematics and frequent use of computers. Hypothesis 3 would be supported if the separate addition of a frequent use of mathematics and a frequent use of computers variable to the earnings model is associated with the regression coefficient for: (a) SQS no longer being positive ($\beta > 0$) and statistically significant ($p < .05$) and (b) frequent use of mathematics and frequent use of computers, respectively, being positive ($\beta > 0$) and statistically significant ($p < .05$) in Model 2 and Model 3 below. The regression models used to test Hypothesis 3 are presented immediately below. Model 1 did not include a variable for frequent use of mathematics or frequent use of computers and is the same as the initial earnings model above. Model 2 had a dummy variable for frequent use of

mathematics and Model 3 had a dummy variable for frequent use of computers. Model 3 had both job requirement dummy variables.

> *Hypothesis 3*. Employers consider SQS a proxy for the ability to do jobs that require frequent use of mathematics and frequent use of computers.

Model 1: $$\text{Ln Earnings}_i = \beta_0 + \beta_1 \underline{\text{SQS}}_{1i} + \beta_2 \underline{\text{Black}}_{2i} - \beta_3 \underline{\text{Female}}_{3i} + \beta_4 \underline{\text{Born in the U.S.}}_{4i} + \beta_5 \text{Hard Skills}_{5i} + \beta_6 \underline{\text{Lived with Both Parents Until 16}}_{6i} + \beta_7 \text{Job Tenure}_{7i} + \beta_8 \underline{\text{Union}}_{8i} + \beta_9 \underline{\text{Supervisor}}_{9i} + \beta_{10} \underline{\text{Private Sector}}_{10i} + \beta_{11} \underline{\text{Residency}}_{11i} + \beta_{12} \text{Year}_{12i} + E_i$$

Model 2: $$\text{Ln Earnings}_i = \beta_0 + \beta_1 \underline{\text{SQS}}_{1i} + \beta_2 \underline{\text{Frequent Use of Mathematics}}_{2i} + \beta_3 \underline{\text{Black}}_{3i} - \beta_4 \underline{\text{Female}}_{4i} + \beta_5 \underline{\text{Born in the U.S.}}_{5i} + \beta_6 \text{Hard Skills}_{6i} + \beta_7 \underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8 \text{Job Tenure}_{8i} + \beta_9 \underline{\text{Union}}_{9i} + \beta_{10} \underline{\text{Supervisor}}_{10i} + \beta_{11} \underline{\text{Private Sector}}_{11i} + \beta_{12} \underline{\text{Residency}}_{12i} + \beta_{13} \text{Year}_{13i} + E_i$$

Model 3: $$\text{Ln Earnings}_i = \beta_0 + \beta_1 \underline{\text{SQS}}_{1i} + \beta_2 \underline{\text{Frequent Use of Computers}}_{2i} + \beta_3 \underline{\text{Black}}_{3i} - \beta_4 \underline{\text{Female}}_{4i} + \beta_5 \underline{\text{Born in the U.S.}}_{5i} + \beta_6 \text{Hard Skills}_{6i} + \beta_7 \underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8 \text{Job Tenure}_{8i} + \beta_9 \underline{\text{Union}}_{9i} + \beta_{10} \underline{\text{Supervisor}}_{10i} + \beta_{11} \underline{\text{Private Sector}}_{11i} + \beta_{12} \underline{\text{Residency}}_{12i} + \beta_{13} \text{Year}_{13i} + E_i$$

Model 4: $$\text{Ln Earnings}_i = \beta_0 + \beta_1 \underline{\text{SQS}}_{1i} + \beta_2 \underline{\text{Frequent Use of Mathematics}}_{2i} + \beta_3 \underline{\text{Frequent Use of Computers}}_{3i} + \beta_4 \underline{\text{Black}}_{4i} - \beta_5 \underline{\text{Female}}_{5i} + \beta_6 \underline{\text{Born in the U.S.}}_{6i} + \beta_7 \text{Hard Skills}_{7i} + \beta_8 \underline{\text{Lived with Both Parents Until 16}}_{8i} + \beta_9 \text{Job Tenure}_{9i} + \beta_{10} \underline{\text{Union}}_{10i} + \beta_{11} \underline{\text{Supervisor}}_{11i} + \beta_{12} \underline{\text{Private Sector}}_{12i} + \beta_{13} \underline{\text{Residency}}_{13i} + \beta_{14} \text{Year}_{14i} + E_i$$

1.4 Research Methodology

A quantitative case study research design was used to obtain empirically supported findings on the hypotheses tested in this part of the study. A case study is usually undertaken to examine a contemporary phenomenon in a real-life context (Yin, 1994). This case study was undertaken to examine a contemporary phenomenon (the demand for SQS) in a real-life context (the work-life of UCGS). Empirical results on the

demand for SQS and the relationship between job requirements and SQS could be obtained in a case study that compares actual results to results predicted by the hypotheses because the MCSUI-HS dataset has quantitative or quantifiable data that relate to undergraduate major, earnings, demography, socioeconomic background, and job features.

The empirical foundation of this quantitative case study was hypothesis test results. The hypothesis test results were the outgrowth of the analysis of data on a subsample of UCGS from the MCSUI-HS. The MCSUI-HS dataset is available through the Inter-University Consortium for Political and Social Research and was used to test various hypotheses that were reported in more than 30 journal articles and several dissertations and books.

Empirical results were sought from a subsample of UCGS whose primary non-leisure activity was working for an employer other than them. Therefore, data on a subsample of non-self-employed respondents from the MCSUI-HS dataset were analyzed. The subsample consisted of respondents who met all of the following criteria: (a) attained at least a bachelor's degree, (b) were not self-employed, (c) earned more than $1 per hour but less than $150 per hour, (d) were between age 21 and 65 at the time survey responses were provided, and (e) provided information concerning all the variables used in the hypothesis tests.

There were 546 respondents who met the subsample selection criteria. Of the 546 respondents, 292 were female, 254 were male, 181 were Black, and 365 were White. The comparatively small number of Blacks in the subsample may have hindered findings of significant racial differences. Data on Hispanics and Asians were not analyzed because

few Hispanic and Asian respondents outside Los Angeles met the subsample selection criteria.

Data on the subsample of UCGS were analyzed as described in the hypotheses section with the Statistical Package for Social Sciences (SPSS). The regression results from SPSS were then interpreted to determine if the decision rule for each hypothesis was satisfied. Satisfaction of a decision rule led to a finding that the UCGS provide support for the matching hypothesis. Regression results, descriptive statistics, contextual issues related to the time when and place where data were collected for the MCSUI-HS, and postulations and previous findings in the literature were used in the discussion in section 1.6 to reconcile or explain any difference between the actual findings in this part of the study and the predicted findings.

Certain strengths and limitations arose from the use of a quantitative case study and the analysis of subsample data from the MCSUI-HS dataset. In terms of strengths, the MCSUI-HS dataset includes data on hourly wages, demographic and socioeconomic attributes, work settings, and human capital acquisitions. That type of data has regularly been used in regression models to detect sources of wage premiums even though hourly wages tend to produce a more conservative estimate of the racial and gender wage gap than annual wages (Tomaskovic-Devey, 1993). The customary data, along with data on quantitative skills, was used in this part of the study to determine whether a premium was paid to UCGS with SQS, among other things. Average GRE-Q score by undergraduate major was used to represent quantitative skills. Data on undergraduate major of each of the UCGS was provided in the MCSUI-HS dataset. Data on average GRE-Q score by undergraduate major was obtained from Paglin and Rufolo (1990) and Weinberger

(1999). An additional strength of the methodology and dataset related to the generalization of findings. Analytical generalizations (i.e., attributions of support or non-support for hypotheses; see Yin, 1994) could be made from findings generated by tests of data on the UCGS.

In terms of limitations, findings from this quantitative case study were limited to the UCGS examined. Findings could not be extended to any other group or generalized to any population. Since the data in the MCSUI-HS dataset are cross-sectional, the findings are only instructive of relationships with and effects on earnings in the early 1990s. Another limitation was history. In the early 1990s when the data were collected, the United States was recovering from the 1991-1992 economic downturn. Employer wage setting, hiring, and screening criteria may have differed during that period from periods with no recent or similar economic downturn.

Furthermore, even though data on UCGS were collected as part of the MCSUI-HS and can be carved out of the dataset, the data were not collected with the specific intent of studying early 1990s labor market dynamics as they related to UCGS. Consequently, the MCSUI-HS dataset does not contain data on college quality and there is no data in the dataset suitable for use as a proxy for college quality, especially by selectivity or cost, as in Long (2000). Researchers that include Hertz, Tilly, and Massagli (2001) used data from the MCSUI-HS on average number of years of parent's education as a proxy for school quality of predominantly non-UCGS. There are also findings that both substantiate (e.g., Juhn, Murphy, & Pierce, 1993; Maxwell, 1994) and refute (e.g., Card & Krueger, 1992a, 1992b; Grogger, 1996) the importance of school quality to differences in Black-White earnings. In any event, the general consensus is that the better

the college quality, the higher the income of graduates (see e.g., Behrman & Birdsall, 1983; Daniere & Mechling, 1970; Link, 1973; Weisbrod & Karpoff, 1968). This part of the study likely suffered from selection bias due to the analysis of data on UCGS who were not randomly selected and did not work for themselves. According to Holzer (1996), employers have similar general hiring criteria and, as a result, tend to hire employees who are alike in many respects despite differences in their race or gender.

In addition to the strengths and limitations connected with external validity, this case study was susceptible to construct validity threats (Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002). For instance, in order to be viewed in a more favorable light by interviewers, respondents may have provided incorrect information about seemingly sensitive matters such as income, educational attainment, college major, and family structure; thus, tainting the validity of those and similarly sensitive constructs. The GRE and GMAT are only taken by individuals who plan to attend graduate and professional schools (Paglin & Rufolo, 1990). The UCGS who had a bachelor's degree but had no intention of attending graduate or professional school may have differed in not only quantitative skills but also in other characteristics. No information is provided in the MCSUI-HS dataset that indicates whether UCGS with no more than a bachelor's degree contemplated attending graduate or professional schools. In addition, as stated above, test scores are hard for employers to observe. Employers do not usually ask job seekers for test scores. Furthermore, test scores have been found to be more reliable of the skills and abilities of Whites and males than of the skills and abilities of Blacks and females (Pinkston, 2003, 2006).

In this part of the study, actual GRE-Q scores were not available for the UCGS examined and the average GRE-Q score of students with an identical undergraduate major was assigned to each of the UCGS examined. As a result, average GRE-Q scores used in this part of the study were not an ideal proxy for quantitative skills. Therefore, data from the non-representative UCGS analyzed cannot generate internally valid estimators to predict the value of average GRE-Q scores for UCGS other than those examined in this part of the study (see Angrist & Krueger, 1999).

1.5 Results

Results generated by this quantitative case study from regression models, descriptive statistics, and non-parametric calculations are presented and interpreted in this section. In the description of the partial regression coefficient for any explanatory variable, the condition holding all other variables in the model constant applies in all instances and is, therefore, not restated below. Similarly, the partial regression coefficient for each explanatory and control variable concerns the mean or difference in means in the case of a dummy variable. As a result, neither the phrase on average nor a similar phrase is reiterated below. The reported effect of any variable on an outcome variable relates to the partial effect. Relationships between variables are interpreted as being statistically significant if the corresponding *p* value is less than .05. Relationships between variables are interpreted as being marginally significant if the associated *p* value is between .05 and .1. Otherwise, relationships between variables are interpreted as being statistically insignificant. A reference to a bachelor's, master's, PhD, or professional degree is a reference to the highest degree attained.

Most of the UCGS (73.1%) in this part of the study had imputed average GRE-Q scores of 475 to 500 (see Tables I & II). Only a few of the UCGS may have scored below 475. The imputed scores imply that most of the UCGS pursued undergraduate majors in business, social science, communications, humanities, and healthcare. College graduates with average GRE-Q scores of 575 or higher usually pursued undergraduate majors in architecture, biology, economics, mathematics, physical sciences, computer science, and engineering. Most of the UCGS with SQS had imputed average GRE-Q scores of 675 (see Figure 2).

Table II. Average GRE-Q Score Frequency

Average GRE-Q score	Frequency	Percent	Cumulative Percent
425	3	0.5	0.5
450	42	7.7	8.2
475	266	48.7	57.0
500	133	24.4	81.3
575	23	4.2	85.5
600	10	1.8	87.4
625	9	1.6	89.0
650	14	2.6	91.6
675	46	8.4	100.0
Total	546	100.0	--

The information on descriptive statistics in Table III indicates, among other things, that approximately 22% of the UCGS had SQS or imputed average GRE-Q scores of 575 or higher. In addition, a large portion of the UCGS frequently use mathematics (86%) and computers (84%) in their jobs. Most of the UCGS (a) possessed no more than a bachelor's degree; (b) were between age 25 and 42; (c) were White; (d) were born in the U.S.; (e) lived in Los Angeles; (f) worked in the private sector; (g) worked at mid-

sized firms; (h) worked as professionals, managers, and technicians; and (i) earned between $13 and $36 per hour. The weighted mean log hourly wage when transformed to dollars is $22.87 per hour. References below to earnings differences between the UCGS are at times in terms of the transformed mean dollar earnings. Approximately 51% of the UCGS had their jobs for a year or less and 67% of the UCGS had their jobs for 2 years or less. The UCGS were, therefore, largely recent hires.

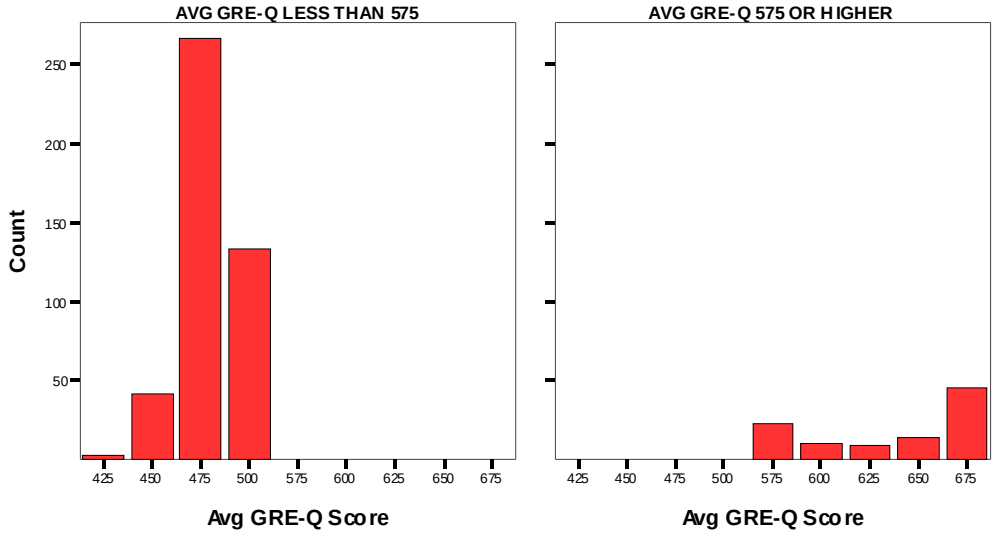


Figure 2. Graph of Average GRE-Q Score Frequency

Some differences between UCGS with SQS and UCGS without SQS are apparent in the descriptive statistics in Table IV. As expected, UCGS with SQS had significantly higher imputed average GRE-Q scores. In addition, UCGS with SQS were mostly professional specialty, physical science, and biological science majors. A smaller share of the UCGS with SQS was born in the U.S. (76%) than the share of other UCGS (93%). Female imputed average GRE-Q scores were 34 points lower than male scores. One consequence of the significant gender difference in scores was that less than 30% of the UCGS with SQS were female.

Table III. Descriptive Statistics--For the Pool of UCGS

Variables & Number of Respondents (dummy variables are in bold type)	Weighted Mean	Std. Deviation
Log hourly wage (546)	3.13	24.28
Quantitative skills (raw avg. score) (546)	514.98	3589.98
Strong quantitative skills[a] (SQS) (102)	0.22	21.09
Frequent use of mathematics[b] (435)	0.86	17.83
Frequent use of computers[c](416)	0.84	18.79
Hard skills:		
Master's degree[d] (137)	0.26	22.41
PhD or professional degree[d](23)	0.05	10.63
Work experience (years) (546)	14.15	518.41
Work experience squared (years) (546)	303.52	18,828.18
Born in the U.S.[e] (487)	0.89	15.91
Age (546)	37.49	511.14
Black[f] (181)	0.11	16.16
Female[g] (292)	0.45	25.39
Lived with both parents until 16[h] (448)	0.86	17.47
Undergraduate major:		
Foreign area studies[i] (39)	0.05	10.88
Social sciences[i] (216)	0.39	24.91
Physical and biological sciences[i] (42)	0.07	12.95
Professional specialty[i] (188)	0.38	24.80
Workplace and job features:		
Supervisor[j] (210)	0.39	24.89
Private sector[k] (363)	0.71	23.03
Number of employees (546)	407.98	47,901.16
Job tenure (years) (546)	5.01	663.59
Union[l] (131)	0.21	20.81
Residency:		
Atlanta resident[m] (150)	0.17	19.09
Boston resident[m] (143)	0.38	24.80
Year (546)	93.39	24.82
Number of observations	546.00	546.00

Notes. The mean value for each named dummy variable category indicates the percent of UCGS in the named category. The No. of UCGS in the named dummy variable category is in parentheses.
[a]No SQS is the omitted category. [b]Infrequent use of mathematics is the omitted category. [c]Infrequent use of computers is the omitted category. [d]Bachelor's degree is the omitted category. [e]Not born in the U.S. is the omitted category. [f]White is the omitted category. [g]Male is the omitted category. [h]Did not live with both parents until 16 is the omitted category. [i]Liberal arts-general studies is the omitted category. [j]Nonsupervisor is the omitted category. [k]Public sector is the omitted category. [l]Nonunion is the omitted category. [m]Los Angeles resident is the omitted category.

Data in Table IV indicates that UCGS with SQS and UCGS without SQS differed by work and workplace attributes. UCGS with SQS more so than other UCGS held jobs that required frequent mathematics use and frequent computer use. Also, UCGS with SQS worked in significantly larger firms than other UCGS (864-employee compared to

Table IV. Descriptive Statistics--By SQS and No SQS

Variables (dummy variables are in bold type)	SQS		No SQS	
	Weighted Mean	Std. Dev.	Weighted Mean	Std. Dev.
Log hourly wage	3.28	22.84	3.09	24.20
Quantitative skills (raw avg. score)	640.84	2,121.50	479.70	789.51
Strong quantitative skills[a] (SQS)	1.00	0.00	0.00	0.00
Frequent use of mathematics[b]	0.93	13.81	0.84	18.51
Frequent use of computers[c]	0.94	13.48	0.81	19.60
Hard skills:				
Master's degree[d]	0.39	27.03	0.23	20.90
PhD or professional degree[d]	0.07	13.89	0.04	9.72
Work experience (years)	12.98	511.01	14.48	519.48
Work experience squared (years)	253.42	18,293.75	317.56	18,909.61
Born in the U.S.[e]	0.76	23.80	0.93	12.89
Age	36.76	517.77	37.69	509.72
Black[f]	0.11	17.66	0.11	15.82
Female[g]	0.29	25.12	0.50	24.99
Lived with both parents until 16[h]	0.82	21.33	0.88	16.43
Undergraduate major:				
Foreign area studies[i]	0.00	0.00	0.06	11.99
Social sciences[i]	0.14	19.22	0.46	24.93
Physical and biological sciences[i]	0.32	25.78	0.00	0.00
Professional specialty[i]	0.51	27.70	0.35	23.81
Workplace and job features:				
Supervisor[j]	0.39	27.06	0.39	24.40
Private sector[k]	0.69	25.60	0.72	22.42
Number of employees	863.48	82,769.04	280.28	32,785.07
Job tenure (years)	2.88	241.12	5.61	724.16
Union[l]	0.13	18.87	0.23	21.13
Residency:				
Atlanta resident[m]	0.10	16.38	0.19	19.55
Boston resident[m]	0.39	27.04	0.38	24.29
Year	93.47	27.66	93.36	24.03
Number of observations	102.00	102.00	444.00	444.00

Notes. The mean value for each named dummy variable category indicates the percent of UCGS in the named category. The No. of UCGS in the named dummy variable category is in parentheses.
[a]No SQS is the omitted category. [b]Infrequent use of mathematics is the omitted category. [c]Infrequent use of computers is the omitted category. [d]Bachelor's degree is the omitted category. [e]Not born in the U.S. is the omitted category. [f]White is the omitted category. [g]Male is the omitted category. [h]Did not live with both parents until 16 is the omitted category. [i]Liberal arts-general studies is the omitted category. [j]Nonsupervisor is the omitted category. [k]Public sector is the omitted category. [l]Nonunion is the omitted category. [m]Los Angeles resident is the omitted category.

280-employee firms). Those differences may partly explain the 0.2 log point earnings advantage of UCGS with SQS. Even though this information on averages helps with

understanding and predicting regression results, a finding that a hypothesis is or is not supported by data from the UCGS rests on regression results. Therefore, information about the regression results follows.

Regression results from the test of Hypothesis 1 support the hypothesis that employers attach a significant value to the SQS of the UCGS. Support for Hypothesis 1 is indicated by the positive and statistically significant ($\beta = 0.188$, $p = .000$) coefficient for SQS in the initial earnings model in Table V, Model 1. Given that mean earnings are UCGS with higher degrees and more work experience are not significantly more likely to have SQS.

Table V. Regression Results--Hypothesis 1 for SQS

Variables (dummy variables are in bold type)	Model 1 Initial Earnings Model β	Model 2 SQS Logistic Regression Model e^{β}	Model 3 Adjusted Earnings Model β
Strong quantitative skills[a] (SQS)	0.188	-	0.182
	(0.048)*	-	(0.079)*
Number of employees	-	1.000	-
	-	(0.000)*	-
Inverse Mill's Ratio	-	-	0.006
	-	-	(0.055)
Black[b]	0.044	0.475	0.043
	(0.062)	(0.395)°	(0.062)
Female[c]	-0.064	0.285	-0.065
	(0.038)°	(0.352)*	(0.039)°
Born in the U.S.[d]	0.154	0.379	0.153
	(0.061*	(0.423)*	(0.064)*
Hard skills			
--Master's degree[e]	0.076	1.266	0.076
	(0.047)	(0.401)	(0.047)
--PhD or professional degree[e]	0.205	0.238	0.206
	(0.090)*	(1.314)	(0.091)*
--Work experience (years)	0.040	0.957	0.040
	(0.006)*	(0.053)	(0.006)*
--Work experience squared (years)	-0.001	1.001	-0.001
	(0.000)*	(0.002)	(0.000)*

(continued)

Table V. Regression Results--Hypothesis 1 (continued)

Variables (dummy variables are in bold type)	Model 1 Initial Earnings Model β	Model 2 SQS Logistic Regression Model e^{β}	Model 3 Adjusted Earnings Model β
Undergraduate major			
--Foreign area studies[f]	-	0.000	-
	-	(24.676)	-
--social sciences[f]	-	0.382	-
	-	(0.578)[o]	-
--physical & biological sciences[f]	-	3.511E+05	-
	-	(23.383)	-
--professional specialty[f]	-	2.093	-
	-	(0.524)	-
Lived with both parents until 16[g]	-0.031	0.983	-0.032
	(0.055)	(0.457)	(0.055)
Job tenure (years)	0.003	0.981	0.003
	(0.001)*	(0.023)	(0.001)*
Union[h]	-0.011	0.419	-0.011
	(0.053)	(0.522)[o]	(0.054)
Supervisor[i]	0.183	0.671	0.183
	(0.039)*	(0.345)	(0.039)*
Private sector[j]	-0.128	0.895	-0.128
	(0.048)*	(0.414)	(0.049)*
Residency			
--Atlanta resident[k]	-0.088	0.507	-0.088
	(0.061)	(0.468)	(0.061)
--Boston resident[k]	0.025	0.330	0.024
	(0.045)	(0.451)*	(0.046)
Year	-0.021	0.510	-0.021
	(0.044)	(0.388)[o]	(0.044)
Constant	4.655	3.790E+27	4.698
	(4.085)	(36.381)[o]	(4.110)
Adjusted R^2 or Cox & Snell R^2	20.8%	37.3%	20.6%
Model significance	0.000	0.000	0.000
Number of observations	546.000	546.000	546.000

Notes. *Significant at less than 0.05. [o]Marginally significant at less than 0.10 standard errors are in parentheses.
[a]No SQS is the omitted category. [b]White is the omitted category. [c]Male is the omitted category. [d]Not born in the U.S. is the omitted category. [e]Bachelor's degree is the omitted category. [f]Liberal arts-general studies is the omitted category. [g]Did not live with parents until 16 is the omitted category. [h]Nonunion member is the omitted category. [i]Nonsupervisor is the omitted category. [j]Public sector is the omitted category. [k]Los Angeles resident is the omitted category.

approximately $22.87 per hour, UCGS with SQS earn 20.7% or $4.73 per hour more than other UCGS. Since the inverse Mill's ratio in Table V, Model 3 is statistically insignificant ($\beta = 0.006$, $p = .919$), there is no evidence of selection bias among the coefficients in the initial earnings model. Besides, the change in coefficients between the initial earnings model and the adjusted earnings model is modest or nonexistent. Therefore, the initial earnings model is the correctly specified earnings model.

The test of Hypothesis 1 also involved the use of a logistic regression model. Results from the logistic regression model indicate that Boston residency, birth in the U.S., gender, and employer size (measured as number of employees) are significantly associated with having SQS (see Table V, Model 2). All of these attributes, except employer size, reduce the likelihood that the UCGS have SQS. More important, the results do not point to employers engaging in creaming (i.e., identifying the best UCGS).

Table VI shows the results of Fisher's exact test and cross tabulations for Hypothesis 2, which states that the share of UCGS with SQS who have jobs that require frequent use of mathematics and frequent use of computers is significantly higher than the share of UCGS with no SQS who have jobs that require frequent use of mathematics and frequent use of computers. Hypothesis 2 is partially supported. The part of Hypothesis 2 on frequent use of computers is supported. The results in Table VI illustrate that the share of UCGS with SQS who have jobs that require frequent use of computers (88.2%) is significantly higher (p = .001) than the share of UCGS with no SQS who have jobs that require frequent use of computers (73.4%). The results suggest that UCGS with SQS are significantly more likely than UCGS with no SQS to have jobs that require frequent use of computers. The results in Table VI also indicate that UCGS with SQS are marginally significantly (p = .076) more likely than UCGS with no SQS to have jobs that require frequent use of mathematics. Even though the likelihood for both job requirements is not significant, the results suggest that one thing that makes UCGS with SQS distinctive is their ability to perform jobs that require frequent use of mathematics and frequent use of computers.

The results for Hypothesis 2 imply that employer demand for SQS may have been a proxy for demand for frequent use of mathematics and frequent use of computers. In other words, having SQS seemed to suggest to employers that UCGS had other skills that were even more difficult to observe or assess than SQS. One of the supposedly difficult to observe skills in the early 1990s was computer skills.

Table VI. Test Results--Hypothesis 2 for SQS

Job requirement	Share of UCGS with SQS	Share of UCGS with no SQS	Exact significance (*p* value)
Frequent use of mathematics	86.3%	78.2%	.076
Frequent use of computers	88.2%	73.4%	.001

A test of Hypothesis 3 was carried out to find out whether the results support the prospect that employers consider SQS a proxy for the ability to do jobs that require frequent use of mathematics and frequent use of computers. Hypothesis 3 is not supported by the results. Hypothesis 3 would have been supported if the two decision rules that apply to hypothesis were fulfilled. First, the regression coefficient for SQS is no longer positive ($\beta > 0$) and statistically significant ($p < .05$) after the separate addition of a frequent use of mathematics and a frequent use of computers variable to the earnings model. Second, the regression coefficient for frequent use of mathematics and frequent use of computers is positive ($\beta > 0$) and statistically significant ($p < .05$) after the respective addition of a frequent use of mathematics and a frequent use of computers variable to the earnings model. As indicated in Table VII, the first decision rule is not satisfied because SQS continues to be positive and statistically significant after the

addition of a frequent use of mathematics and a frequent use of computers variable. The second decision rule is also not satisfied since the regression coefficient for frequent use of mathematics is positive but insignificant ($\beta = 0.014$, $p = .805$). However, Table VII, Model 3 shows that the regression coefficient for frequent use of computers is positive and significant ($\beta = 0.186$, $p = .000$).

Table VII. Regression Results--Hypothesis 3 for SQS

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage			
	Model 1	Model 2	Model 3	Model 4
	No FUOM or FUOC	FUOM	FUOC	FUOM + FUOC
	β	β	β	β
Strong quantitative skills (SQS)[a]	0.188	0.187	0.167	0.170
	(0.048)*	(0.048)*	(0.047)*	(0.048)*
Frequent use of mathematics (FUOM)[b]	-	0.014	-	-0.043
	-	(0.055)	-	(0.057)
Frequent use of computers (FUOC)[c]	-	-	0.186	0.196
	-	-	(0.051)*	(0.053)*
Black[d]	0.044	0.044	0.045	0.046
	-0.062	(0.062)	(0.061)	(0.061)
Female[e]	-0.064	-0.063	-0.048	-0.050
	(0.038)°	(0.038)	-0.038	(0.038)
Born in the U.S.[f]	0.154	0.153	0.134	0.136
	(0.061*	(0.062)*	(0.061)*	(0.061)*
Hard skills				
--Master's degree[g]	0.076	0.075	0.071	0.072
	(0.047)	(0.047)	(0.046)	(0.046)
--PhD or professional degree[g]	0.205	0.208	0.175	0.163
	(0.090)*	(0.091)*	(0.090)°	(0.091)°
--Work experience (years)	0.040	0.040	0.039	0.040
	(0.006)*	(0.006)*	(0.006)*	(0.006)*
--Work experience squared (years)	-0.001	-0.001	-0.001	-0.001
	(0.000)*	(0.000)*	(0.000)*	(0.000)*
Lived with both parents until 16[h]	-0.031	-0.032	-0.047	-0.047
	(0.055)	(0.055)	(0.054)	(0.054)

(continued)

Table VII. Regression Results--Hypothesis 3 for SQS (continued)

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage			
	Model 1	Model 2	Model 3	Model 4
	No FUOM or FUOC	FUOM	FUOC	FUOM + FUOC
	β	β	β	β
Job tenure (years)	0.003	0.003	0.003	0.003
	(0.001)*	(0.001)*	(0.001)*	(0.001)*
Union[i]	-0.011	-0.011	0.002	0.003
	(0.053)	(0.054)	(0.053)	(0.053)
Supervisor[j]	0.183	0.181	0.171	0.175
	(0.039)*	(0.040)*	(0.039)*	(0.039)*
Private sector[k]	-0.128	-0.129	-0.127	-0.125
	(0.048)*	(0.049)*	(0.048)[o]	(0.048)*
Residency				
--Atlanta resident[l]	-0.088	-0.088	-0.075	-0.073
	(0.061)	(0.061)	(0.061)	(0.061)
--Boston resident[l]	0.025	0.023	0.016	0.020
	(0.045)	(0.045)	(0.044)	(0.045)
Year	-0.021	-0.021	-0.010	-0.011
	(0.044)	(0.044)	(0.043)	(0.043)
Constant	4.655	4.619	3.531	3.581
	(4.085)	(4.091)	(4.050)	(4.052)
Adjusted R^2	20.8%	20.6%	22.6%	22.5%
Model significance	0.000	0.000	0.000	0.000
Number of observations	546.000	546.000	546.000	546.000

Notes. *Significant at less than 0.05. [o]Marginally significant at less than 0.10.
[a]no SQS is the omitted category. [b]No FUOM is the omitted category. [c]No FUOC is the omitted category. [d]White is the omitted category. [e]Male is the omitted category. [f]Not born in the U.S. is the omitted category. [g]Bachelor's degree is the omitted category. [h]Did not live with parents until 16 is the omitted category. [i]Nonunion member is the omitted category. [j]Nonsupervisor is the omitted category. [k]Public sector is the omitted category. [l]Los Angeles resident is the omitted category.

The results in Table VII indicate that employers did not consider SQS a proxy for the ability to do jobs that require frequent use of mathematics and frequent use of computers. This indication is buttressed by results shown in Table VII, Model 3 that SQS and frequent use of computers are independently associated with a significant 18%-20% marginal increase in the earnings of the UCGS. Still, the 10% reduction in the regression coefficient for SQS and the change from a positive to a negative return for frequent use of mathematics when the frequent use of computers variable is included (compare Table VII, Model 1 & Model 4) suggests that some of the significant value that is attached to SQS and the return for frequent use of mathematics is related to computer skills. A

summary of the results on all the hypotheses tested in this part of the study is presented in Table VIII.

Table VIII. Hypotheses on SQS Supported or Not Supported

	Hypotheses	Supported	Not Supported
1.	Employers attach a significant value to the SQS of UCGS.	√	
2.	The share of UCGS with SQS who have jobs that require frequent use of mathematics and frequent use of computers is significantly higher than the share of UCGS with no SQS who have jobs that require frequent use of mathematics and frequent use of computers.	√ (Only supported in the case of frequent use of computers.)	
3.	Employers consider SQS a proxy for the ability to do jobs that require frequent use of mathematics and frequent use of computers.		√

1.6 Discussion

This section includes a discussion of findings in this part of the study that extend the quantitative skills literature with new information on UCGS, their SQS, and their employers. In addition, ways in which previous findings are supported by the UCGS are described. Speculation on how the new findings might be interpreted or affect policy is put forward. Lastly, ways in which future research may extend the quantitative skills literature by addressing questions that remain concerning UCGS, their SQS, and their employers are discussed.

The most important finding in this part of the study is that employers attach a significant value to the SQS of the UCGS. Interestingly, SQS have a higher value than additional higher degrees, including PhD and professional degrees (see Table VII, Model 4). Contrary to prediction, employers do not assign a significant value to SQS because

SQS is a proxy for the ability to perform jobs that require frequent use of mathematics and frequent use of computers (Murnane, Willett, & Levy, 1995; Song, Orazem, & Wohlgemuth, 2008). Nonetheless, some of the value that is attached to SQS is related to computer skills.

Findings in previous studies indicate that large employers are more inclined to believe that SQS are associated with computers skills and to pay more for SQS. In the Mitra (1999) study, large employers (i.e., employers with 1,000 or more employees) paid significantly more for enhanced quantitative skills. In this part of the study, large employers paid UCGS with SQS 23.7% more than they paid other UCGS. In comparison, employers with less than 1,000 employees paid UCGS with SQS 18.4% more than they paid other UCGS. Findings by Garen (1985) suggest that large employers rely more on indicators of ability than on assessments of actual ability due to comparatively high screening costs. Higher screening costs may also be the reason why large employers pay higher premiums for indicators of ability such as SQS. Findings in this part of the study extend previous findings, regarding the belief that SQS are associated with computers skills because of higher pay for SQS in periods of high demand for computer skills, with the finding that UCGS with SQS are significantly more likely than other UCGS to have jobs that require frequent use of computers.

Even though employers in this part of the study are not using SQS to determine whether UCGS have the ability to perform jobs that require frequent use of mathematics and frequent use of computers, employers in this part of the study and other studies look to SQS as a signal of some facet of computer skills that is not supplied by frequent use of computers. This means that information on frequent use of computers and undergraduate

major does not tell employers the information they appear to be using SQS to find out. Findings in this part of the study and previous studies imply that employers are using SQS as a signal of the ability to handle complexity, including complex computer systems. The implication is underpinned by the complexity of undergraduate majors pursued by UCGS with SQS, the complexity of jobs offered by mid-sized and large employers, and the complexity of computer systems used by mid-sized and large employers.

Findings in previous studies which suggest that employer demand for SQS is not a momentary fad are supported by findings in this part of the study. Whether the period was the 1970s, 1980s, 1990s, or 2000s, employers demanded SQS (Lee & Lee, 2009; Mitra, 2000, 2001, 2002; Murnane, Willett, & Levy, 1995; Murnane et al., 2000; Paglin & Rufolo, 1990; Song, Orazem, & Wohlgemuth, 2008; Weinberger, 1999). Findings in this part of the study and other studies also indicate that college graduates who live in urban, rural, northern, southern, eastern, and western parts of the United States are paid a premium for SQS (Lee & Lee, 2009; Mitra, 2000, 2001, 2002; Murnane, Willett, & Levy, 1995; Murnane et al., 2000; Paglin & Rufolo, 1990; Song, Orazem, & Wohlgemuth, 2008; Weinberger, 1999).

The continued reliance by employers on SQS as a signal of the ability to handle complexity may be evidence of market failure that compels a governmental remedy which makes differentiation of UCGS less dependent on the SQS signal and more dependent on assessments of actual ability. After all, employers have been relying on information signaled by SQS since the late 1970s (Grogger & Eide, 1995; Murnane, Willett, & Levy, 1995; Murnane et al., 2000). However, findings from this part of the study suggest that the problem with the use of SQS as a signal is not in the application

but in the outcome. There is no evidence that the SQS signal is applied arbitrarily or capriciously. Average GRE-Q scores and other math test scores are objective measures of quantitative skills. No study has reported on different evaluations of equal test scores by, for example, race or gender. Instead, Paglin and Rufolo (1990) reported that male and female 4-year college graduates with equally high quantitative scores get an equal return (see also, Mitra, 2002). Even actions of large employers with regard to SQS do not fit neatly into acts of taste discrimination, statistical discrimination, or screening discrimination. In the Mitra (1999) study, more Blacks and females worked for higher-paying large employers than for other employers, even though Blacks and females had significantly lower quantitative skills than Whites and males. Blacks and females in that study mostly held nonsupervisory jobs. Mitra (1999) described the Blacks and females in the study as affirmative action hires. In this part of the study, the insignificant inverse Mill's ratio indicates that UCGS with SQS do not have unmeasured skills or characteristics that make them significantly different from UCGS without SQS.

Notwithstanding the even application of the SQS signal, past experience makes employers aware of patterns in quantitative skills or test scores among college graduates (e.g., Spence, 1973, 1976, 2002). The patterns relate to: (a) females with significantly lower quantitative skills than males (Mitra, 2000; Paglin & Rufolo, 1990; Song, Orazem, & Wohlgemuth, 2008; Weinberger, 1999); (b) Blacks with lower quantitative skills than Whites (Mitra, 2000; Murnane et al., 2000; Song, Orazem, & Wohlgemuth, 2008); (c) Blacks and females in lower-paying jobs regardless of degree of quantitative skills (Mitra, 1999); and (d) young males with no more than bachelor's degrees and uppermost GRE-Q scores who usually do not pursue higher degrees (Song, Orazem, &

Wohlgemuth, 2008). Employers seem to be exploiting the patterns by, for example, selecting young males with bachelor's degrees and SQS, paying them exorbitant starting salaries, and by doing so discouraging them from going back to college for higher degrees (Song, Orazem, & Wohlgemuth, 2008).

The problem is that employers, and mainly large employers, use their experience to identify college graduates with SQS to maintain the status quo with regard to the allocation of jobs. Average GRE-Q scores by undergraduate major, race, and gender have remained relatively steady over time (Paglin & Rufolo, 1990). Average GRE-Q scores and other math test scores are also objective measures of quantitative skills. By relying on an objective and therefore justifiable indicator of skills to select and sort college graduates, employers are able to fill jobs in the way they always filled jobs and with the kinds of persons whom they always used to fill jobs without fear of inquiry, reprimand, or punishment. Coincidentally, there is no verification that employers who test actual ability sort college graduates differently from employers who use the SQS signal. The use of the SQS signal makes the sorting of college graduates into jobs easy and objective.

The findings in this small case study and previous studies indicate that the application of the SQS signal: (a) is not discriminatory on its face, (b) is not applied arbitrarily or capriciously, and (c) has not generated widespread reports of discriminatory outcomes. Therefore, government intervention into the application of the SQS signal would at this time be unfounded. The findings have, nonetheless, triggered additional questions on SQS and UCGS.

Further research is needed that address additional questions on SQS and UCGS. The additional questions would touch on whether: (a) there is a significant link between

having SQS and having jobs at large firms that require the use of complex computer systems; (b) the link between having SQS and having jobs that require the use of complex computer systems differs by age, race, or gender; (c) Blacks and females with SQS are more often than not placed in nonmanagerial and nonprofessional jobs; (d) the placement of Blacks and females with SQS into nonmanagerial and nonprofessional jobs differ by employer size; and (e) findings on the foregoing differ by decade after the 1970s. Research on these additional questions would benefit from a methodological approach that focuses on jobs, job requirements, actual GRE-Q scores, and actual screens, signals, or tests used by employers in a nationally representative sample of UCGS and/or their employers. Research on the additional questions that use the recommended methodology would provide information on, among other things, whether employer hiring practices that revolve around the use of SQS as a signal or otherwise in the 1980s, 1990s, and 2000s amounted to a pretext for hiring as usual—except when complying with affirmative action laws.

CHAPTER II

INVESTMENTS IN AND RETURNS FOR THE SOCIAL CAPITAL SKILLS OF URBAN COLLEGE GRADUATES

2.1 Introduction

Wolman and Spitzley (1999) described economic development activities as supply-side and demand-side government interventions to increase an area's employment, increase the income of residents of an area, and, consequently, increase the revenues of an area One common supply-side intervention is job skills training, which is generally established to redress market failure arising from the underinvestment by a host of individuals in an area in the acquisition of demanded job skills. The underinvestment becomes visible as a job skills mismatch; that is, a discernible gap between the job skills demanded by employers and the job skills supplied by employees and job candidates (Darrah, 1994; Handel, 2003). Job skills training more often than not develops into human capital training or hard skills training (Fitzgerald, 1993). Human capital is the stock, at a point in time, of acquired knowledge and abilities that is transformed into hard skills which are applied to perform jobs, among other things (Bjerk, 2003; Moss & Tilly, 1995, 2001a, 2001b). An investment or increase in an individual's hard skills in one period usually enhances that individual's earnings in a later period. Job skills are believed

to be multidimensional and not just hard skills (Bailey & Mitchell, 2006; Bowles, Gintis, & Osborne 2001; Farkas, 2003; Glaeser, Laibson, & Sacerdote, 2002; Jackall, 1983; Kalleberg & Leicht, 1986; Litecky, Arnett, & Prabhakar, 2004; Moss & Tilly, 2001a; Stasz, 2001). Darrah (1994) also indicated that each dimension or element must be necessary to complete a job task to be a job skill.

Whereas the supply-side government intervention of job skills training customarily addresses one element of job skills, hard skills, the intervention does not regularly address any other element of job skills. The irregularity may be due to the lack of empirical evidence which substantiates that other skills are elements of job skills. Empirical evidence from earnings models has substantiated that hard skills are an element of job skills. As a result, Loury (1977), an economist, campaigned for the addition of social capital (according to him, resources resulting from family relationships and community ties) to earnings models to draw attention to the link between social capital and earnings as well as differences in earnings between Blacks and Whites. He asserted that programs aimed at reducing wage gaps between Blacks and Whites need to incorporate measured differences in quantity, quality, and returns for social capital between Blacks and Whites.

Recently, sociologists and organizational behaviorists have suggested that social capital skills are an element of the job skills of professionals, who are typically college graduates, because they need to generate resources such as corporate revenues, non-profit funding, sponsors, advocates, and constituents (Burt, 1992; Burt & Ronchi, 2007; Dreher & Cox, 1996; Grodsky & Pager, 2001; Ostrom, 2000; Pfeffer & Fong, 2002). Social capital skills (SCS) are the stock, at a point in time, of acquired methods of establishing,

maintaining, and reinforcing relationships with individuals who are in groups or organizations for the purpose of gaining access to resources such as corporate revenues, nonprofit funding, sponsors, advocates, and constituents (e.g., Bourdieu, 1986; Burt, 1992). Grodsky and Pager (2001) believed that Black male professionals earned less than White male professionals who worked in similar jobs and had equivalent hard skills because they had less SCS and were, therefore, less able to develop and maintain lucrative clients. Similarly, Dreher and Cox (1996) found that females with master of business administration degrees (MBAs) were significantly less likely than males with MBAs to form earnings enhancing mentoring relationships with White male mentors.

Sociologists, organizational behaviorists, and economists have obtained mixed results from their investigations into the role that SCS play in the generation of earnings. Some researchers found a positive and significant link between SCS and earnings (e.g., Barros, 2006; Dreher & Cox, 1996; Smith, 2000). Other researchers found a negative and/or insignificant relationship between SCS and earnings (e.g., Marsden & Hurlbert, 1988; Mouw, 2003). A possible explanation for the mixed results is the use of different proxies. Some studies used one SCS proxy while others used two to six SCS proxies. Furthermore, SCS proxies have been used to represent quantity of SCS, quality of SCS, and quantity and quality of SCS. A group of researchers even made a distinction between absolute SCS and relative SCS (see Belliveau, O'Reilly, & Wade, 1996). Absolute SCS is the extent and prestige of a focal individual's personal contacts. Relative SCS is the extent and prestige of a focal individual's personal contacts in comparison with the extent and prestige of one of the focal individual's personal contacts whom the focal individual asks to or expects to exert influence or reciprocate in a specific situation. The analysis of

different types of samples (one-firm, multiple-firm, one-industry, or multiple-industry) may also have triggered the mixed results. Furthermore, one researcher indicated that SCS are not widely or consistently viewed as important job skills because an individual's SCS aggregates into a firm's SCS (Burt, 1992).

Closer scrutiny of the mixed results on SCS and earnings prompted some researchers to hypothesize that SCS are only important when they complement the hard skills of highly educated workers (Arrow & Borzekowski, 2004; Burt, 1992; Glaeser et al., 2002; Ioannides & Soetevent, 2006). If SCS only complement high levels of hard skills, then positive and significant returns for SCS would only surface among workers with high levels of hard skills. In several studies on non-U.S. samples and one study on a sample of U.S. college graduates with MBAs, the findings support the hypothesis that SCS complement hard skills (e.g., Borocz & Southworth, 1998; Dreher & Cox, 1996; Meyerson, 1994; Smith, 2000). However, some of those studies and other studies did not find support for the hypothesis that SCS only complement hard skills of highly educated workers (e.g., Borocz & Southworth, 1998; Heckman & Rubinstein, 2001; Smith, 2000).

Previous studies that tested the hypothesis that SCS are an element of the job skills of professionals, by examining the link between SCS and earnings, concentrated on college graduates with business degrees, college graduates who work at one firm, and non-U.S. college graduates. This part of the study also tested the hypothesis by investigating the link between SCS and earnings but with a sample of urban college graduates who (a) lived in three dissimilar U.S. cities, (b) worked in a variety of industries and occupations, and (c) had undergraduate, graduate, doctoral, and professional degrees in a range of fields and disciplines (the UCGS). The hypothesis was

tested in this part of the study as a first step toward filling the gap in the social capital literature on whether job skills training should include SCS training.

Regression models were used in this part of the study to test the hypothesis that SCS are an element of the job skills of professionals and other related hypotheses with data on the UCGS. Specifically, regression models were used to test the following hypotheses: (a) returns for the SCS of UCGS are positive and significant; (b) UCGS who have more hard skills also have more SCS; (c) the higher the college degree, the greater the return for the SCS of UCGS; (d) the SCS of UCGS differ significantly by race and gender; and (e) returns for the SCS of UCGS differ significantly by race and gender. The hypotheses were tested in this quantitative case study with data from the Multi-City Study of Urban Inequality (MCSUI) Household Survey (MCSUI-HS). The MCSUI was designed to study ways in which changing labor market dynamics, racial attitudes and stereotypes, and residential segregation affect various aspects of urban inequality (Bobo et al., 2000). Data from the MCSUI-HS are responses to a 1992-1994 survey of randomly selected adult residents of Atlanta, Boston, Detroit, and Los Angeles. Data from the UCGS who lived in Detroit were not analyzed in this part of the study because of the absence of information on many of the variables used in the regressions.

This part of the study generated the finding that SCS are not a job skill element required from all the UCGS examined. In addition, the UCGS who have more hard skills do not correspondingly have more SCS. The UCGS with PhD or professional degrees have significantly more SCS than the UCGS with master's degrees and receive a significantly higher return for their SCS than the UCGS with bachelor's and master's degrees. The majority of the UCGS with PhD or professional degrees in this part of the

study were lawyers, physicians, psychologists, pharmacists, and college professors. As Grodsky and Pager (2001) predicted, individuals like the UCGS in those occupations likely develop a lucrative client base that make a direct return for their SCS investment possible (see Burt, 1992). As a result, the UCGS with PhD or professional degrees add support to the proposition that SCS are an element of the job skills of professionals (Burt, 1992; Burt & Ronchi, 2007; Dreher & Cox, 1996; Grodsky & Pager, 2001; Ostrom, 2000; Pfeffer & Fong, 2002). Unexpectedly, there is no significant difference among the UCGS in investments in SCS or returns for SCS by race or gender. The findings of insignificant differences in SCS and returns for SCS by race or gender are possibly a reflection of the similarity of the UCGS examined, as predicted by Holzer (1996).

The remainder of this chapter on SCS and UCGS is presented below in sections. Section 2.2 contains a report on the strands of literature on SCS, in general, and the SCS of college-educated workers and professionals, in particular. Section 2.3 consists of a description of the models and decision rules used in the hypothesis tests in this part of the study. Section 2.4 concerns the methodology by which this part of the study was conducted, including the criteria for selecting the UCGS. Section 2.5 includes the presentation and interpretation of the results from the hypothesis tests. Section 2.6 contains a discussion of the findings from this part of the study, a reconciliation of the actual findings with the predicted findings, and proposals for future research.

2.2 Literature Review

A review of the social capital literature is presented in this section, with emphasis given to the literature on the SCS of college-educated workers and professionals. The review consists of a description of the: (a) social capital literature before 1986 and in and

after 1986; (b) links between SCS and job access, job mobility, and job returns, respectively; (c) findings from previous tests of the hypothesis that SCS are a complement to high levels of hard skills; and (d) findings that led to the hypothesis that there is a difference in investments in and returns for the SCS of Black professionals relative to White professionals and male professionals relative to female professionals. The description is by topic, but interspersed within the description is the contribution of economists, sociologists, and organizational behaviorists to different strands of the social capital literature that touch on SCS. The concluding paragraphs contain an account of gaps in the social capital literature on SCS that are the focus of this part of the study and a description of the conceptual model that guided this part of the study.

An examination of the social capital literature as it relates to SCS shows that the literature can be divided into two periods: before 1986 and in and after 1986. Before 1986, the social capital literature reports almost exclusively on individual social capital and individual social capital is defined by type of social capital source (see, e.g., Granovetter, 1974; Lin, Vaughn, & Ensel, 1981; Loury, 1977; Rees, 1966). Social capital sources are also referred to as job contacts, mentors, personal contacts, personal networks, personal ties, relational networks, social contacts, social networks, and social resources. In the early period, social capital is described as a form of capital that is based on relationships with individuals or groups who can later be called on for reciprocal benefits such as jobs referrals (Granovetter, 1974; Loury, 1977; Rees, 1966). In addition, quantity and status or affluence of individuals or groups in relationships with the focal individual is used as an indirect measure of quantity and quality of social capital of the focal individual.

Before 1986, several sociologists examined whether differences in access to jobs are related to differences in social capital sources. The researchers use data on workers at various levels of organizations in their studies. Findings from the studies indicate that the most common way to find and secure low-level as well as high-level jobs was through well-placed or influential social capital sources (Granovetter, 1974; Lin, Vaughn, & Ensel, 1981; Rees, 1966). Granovetter (1974) found well-placed or influential social capital sources to be acquaintances (i.e., weak ties) and not friends and relatives (i.e., strong ties). Before 1986, sociologists also found that well-placed social capital sources were linked with job mobility by enabling jobseekers to secure higher-paying and higher-status jobs (e.g., Lin, Vaughn, & Ensel, 1981). Well-placed social capital sources in the Lin, Vaughn, and Ensel (1981) study had high-status occupations, as indicated by the ranking of occupational status with Duncan's Socioeconomic Index.

Before 1986, organizational behaviorists investigated the connection between memberships in social networks inside firms and job mobility. In one study of nonsupervisory male and female employees at a newspaper publishing company, being promoted was found to be significantly related to being integrated into the male social network and the dominant network (Brass, 1985). Female participation in the male social network and the dominant network was found to be rare or nonexistent. The dominant network has the four top executives at the newspaper, who were all male.

In and after 1986, reports on SCS and earnings appeared in the social capital literature and reports by economists that offered new ways to measure social capital (e.g., Glaeser et al., 2002) and SCS (e.g., Barros, 2006) began to appear. Research on SCS was spurred by Bourdieu's (1986) reformulation of the definition of social capital, on account

of direct observation, from a means to find and get jobs to a means of getting all kinds of resources and Burt's (1992) finding that SCS are linked with generating profits for businesses. Burt (1992), nevertheless, pointed out that SCS might not have a post-hire earnings component, because employers may only assess SCS during the pre-employment screening process to narrow the hiring pool. In contrast, Bridges & Villemez (1986) indicated that work experience is a proxy for SCS. Mixed results emerged from research on whether SCS is an element of jobs skills that depended on tests of whether there is a positive and significant relationship between SCS and earnings.

In a study that used data on Portuguese cooperative managers, Barros (2006) found a positive and significant relationship—for the most part—between SCS and earnings (see also, Kugler, 2003). He pointed out that cooperative management is a profession that emphasizes close social ties with members and cooperative managers are indirectly employees of members (see also, Zeuli & Cropp, 2004). The six SCS proxy variables in his earnings models represented: (a) network ties (the number of friends and relatives in management who influenced the respondent's career); (b) other ties (the number of friends and relatives outside of management who influenced the respondent's career); (c) high-level ties (the number of well-placed patrons who influenced the respondent's career); (d) weak ties (the number of acquaintances); (e) structural holes (one minus the proportion of links among all the respondent's friends and relatives); and (f) career development (whether or not the respondent received career advice from a mentor). With the exception of the career development, a marginal increase in each SCS proxy was significantly associated with an increase in earnings. Career development was positively but insignificantly related to earnings (cf. Dreher & Cox, 1996).

Other researchers reported that the relationship between SCS and earnings in their studies was largely negative and insignificant (Bridges & Villemez, 1986; Smith, 2000). For example, in the Marsden and Hurlbert (1988) study, the addition of controls for educational attainment, experience, job features, race, year of job change, selection bias, and intervening nonwork incidences rendered two of the five explanatory SCS proxy variables (tie strength and personal contact's job prestige) insignificantly related to earnings. The other explanatory SCS proxy variables remained insignificantly related to earnings. The five SCS proxy variables in the earnings models represented: (a) tie strength, (b) personal contact's job prestige, (c) whether a personal contact was connected to a hiring firm, (d) influence of personal contact, and (e) personal contact's work sector. The study involved an analysis of post-1945 job transition data on 456 men from the 1970 Detroit Area Study.

Another set of researchers stated that the type of effect that SCS has on earnings depends on the type of SCS examined. Those researchers labeled SCS as either absolute or relative (e.g., Belliveau, O'Reilly, & Wade, 1996). Absolute SCS is the extent and prestige of a focal individual's personal contacts. Relative SCS is the extent and prestige of the focal individual's personal contacts in comparison with the extent and prestige of one of the focal individual's personal contacts whom the focal individual asks to or expects to exert influence or reciprocate in a specific situation. The distinction between absolute SCS and relative SCS was applied in a study on the effect of SCS inside 61 U.S. public corporations from nine industries. In the study, the researchers examined data on dyads of chief executive officers (CEOs) and their compensation committee chairpersons (Chairs). One finding from the study was that CEOs receive significantly more

compensation when they are paired with Chairs who have less relative SCS, and vice versa. In contrast, the additional compensation that CEOs receive for absolute SCS was insignificant. The researchers found that absolute SCS was not a vital component of CEO compensation but relative SCS was a vital element of CEO compensation. Data analyzed in the study was obtained from Business Week's 1985 Annual Survey of Executive Compensation, Standard & Poor's Compustat Database, Who's Who in Finance and Industry, Who's Who in America, and proxy statements.

The analysis of different types of SCS is not the only possible explanation for the mixed results reported. However, the mixed results and, more important, the result that the relationship between SCS and earnings was sometimes insignificant prompted some researchers to postulate that SCS are only important when they complement high levels of hard skills (Arrow & Borzekowski, 2004; Burt, 1992; Glaeser et al., 2002; Ioannides & Soetevent, 2006). The postulation revolves around the notion that SCS by itself has little impact on earnings from low-wage jobs, because earnings from low-wage jobs do not usually rely on the development of an external and sometimes internal client base (cf. Goldsmith, Veum, & Darity, 1997). Conversely, earnings from many high-wage jobs that demand high levels of hard skills investments are commonly tied to the development of a lucrative client base (Burt, 1992; Grodsky & Pager, 2001). In the latter case, the SCS of, for instance, investment bankers give them the opportunity to apply their hard skills and to derive a return from their hard skills and SCS investment (Burt, 1992; Grodsky & Pager, 2001). Individuals who aspire to high-wage jobs such as investment banking sometimes begin developing contacts in college, especially elite colleges, with the goal of accumulating influential contacts and a future client base. For those aspirants, the

contacts developed while in college may be equally or more valuable than the hard skills gained through college (Belliveau, O'Reilly, & Wade, 1996; Deresiewicz, 2008).

A few findings by sociologists support the notion that SCS complement hard skills. For instance, in a study on the SCS of 111 Swedish executives, 72% of whom were university-educated, Meyerson (1994) found that SCS (i.e., established share of strong external ties) added explanatory power to the earnings model (see also, Borocz & Southworth, 1998) and was positively and significantly associated with earnings. Similarly, hard skills (from being university-educated) were positively and marginally significantly associated with earnings. Most of the executives worked in comparatively low-performing firms, which could have intensified their reliance on SCS. In the Meyerson (1994) study, the hard skills of the executives that relate to schooling played a less important role than SCS in generating earnings (see also, Belliveau, O'Reilly, & Wade, 1996). The results from the model in which SCS was interacted with hard skills demonstrate that the interaction of SCS and hard skills was insignificantly related to earnings. The results suggest that SCS have an additive rather than a multiplicative effect on earnings.

However, the only findings that provided support for the hypothesis that SCS complement the hard skills of highly educated came out of organizational behavior studies. Findings from one organizational behavior study on SCS (i.e., cultivating White male mentors) and hard skills (i.e., post-schooling work experience) of U.S. MBAs indicated that MBAs with White male mentors earned a significant $22,500 more per year than MBAs with no mentor and having White male mentors was significantly

related to earnings (Dreher & Cox, 1996). Having non-White male mentors insignificantly increased earnings.

Findings from the organizational behavior study and the Meyerson (1994) study draw attention to the importance of SCS to college-educated workers and add support to the finding by Pfefffer and Fong (2002) that college graduates, especially college graduates with MBAs, are inclined to accumulate an abundance of SCS. However, the findings from both studies do not support or address Deresiewicz's (2008) contention that college students from less prominent schools and programs do not accumulate extensive SCS because of a lack of emphasis on developing personal contacts. The studies are also not generalizable to a broad population of U.S. college graduates. The Meyerson (1994) study is limited because it examined non-U.S. workers. The Dreher and Cox (1996) study is limited because it examined college graduates with MBAs. In any event, findings from the Dreher and Cox (1996) study substantiate previous findings that highly educated White male professionals and managers in the U.S., who are in formal positions of authority, tend to be well-placed sources (Lincoln & Miller, 1979). Mentors in the Dreher and Cox (1996) study were males and females in jobs that were more senior than the jobs of the MBAs.

Researchers have also hypothesized that the consistent wage gap between Black and White professionals as well as male and female professionals (e.g., U.S. General Accounting Office, 2003) is partly related to a SCS gap or a difference in compensation for similar SCS (e.g., Brass, 1985; Eagly & Carli, 2007; Grodsky & Pager, 2001; Green, Hammer, & Tigges, 2000; Ibarra, 1992; Smith, 2000; Washington, 2009). The hypothesis is underlied by findings from an analysis of data from the 1985 General Social Survey

that Whites have the largest social network, Hispanics have the second largest social network, and Blacks have the smallest social network (Green, Hammer, & Tigges, 2000). In addition, females tend to have smaller social networks than males.

The hypothesis is, however, more directly related to findings by Dreher and Cox (1996) that Whites with MBAs are more likely than non-Whites with MBAs to form earnings enhancing mentoring relationships with White male mentors. Males with MBAs are also more likely than females with MBAs to form mentoring relationships with White male mentors. Furthermore, Grodsky and Pager (2001) found that Black male professionals earned less than White male professionals who worked in similar jobs and had equivalent stocks of hard skills. The researchers stated that in their study the jobs with the largest racial earnings gap required the active development and maintenance of a lucrative client base. Those jobs were in insurance, law, investment banking, medicine, shipping, and real property management. The study results arose from an analysis of 1990 Public Use Microdata Sample (1990 PUMS) data on approximately one million men. The researchers could not test their hypothesis that SCS contributes to the wage gap among professionals because the 1990 PUMS dataset does have information on SCS. In addition, the researchers could not test the accuracy of anecdotal evidence from some employers on the shortage of SCS, which they believed could be a pretext for improper job sorting or discrimination.

As the foregoing description shows, findings from previous studies on whether SCS are an element of the job skills of professionals were based on the examination of samples of mostly college graduates with business degrees, college graduates who worked at one firm, and non-U.S. college graduates. In addition, findings from the studies

were inconsistent. Findings on whether SCS complement the hard skills of highly educated workers were also inconsistent. Findings on differences in SCS and differences in compensation for SCS by gender came from one study of MBAs. Then again, tests have not yet been done to determine whether there are differences in SCS and differences in compensation for SCS by race. Also, none of the previous studies specifically examined the SCS of professionals who live or work in urban areas. For these reasons, hypothesis tests were carried out in this part of the study to fill remaining gaps on SCS in the social capital literature on whether: (a) returns for the SCS of UCGS are positive and significant; (b) UCGS who have more hard skills also have more SCS; (c) the higher the college degree, the greater the return for the SCS of UCGS; (d) the SCS of UCGS differ significantly by race and gender; and (e) returns for the SCS of UCGS differ significantly by race and gender. The hypotheses were tested as described below in section 2.3 with data on the UCGS from the MCSUI-HS.

The social capital literature has an interdisciplinary and interfield heritage due chiefly to the findings of economists, sociologists, and organizational behaviorists concerning SCS and labor market as well as non-labor market outcomes. In accordance with Creswell's (2003) recommendation, Figure 3 contains the conceptual model that is based on the extant literature on SCS from different fields and disciplines and was used as a guide in this part of the study. The first part of the conceptual model lists specific

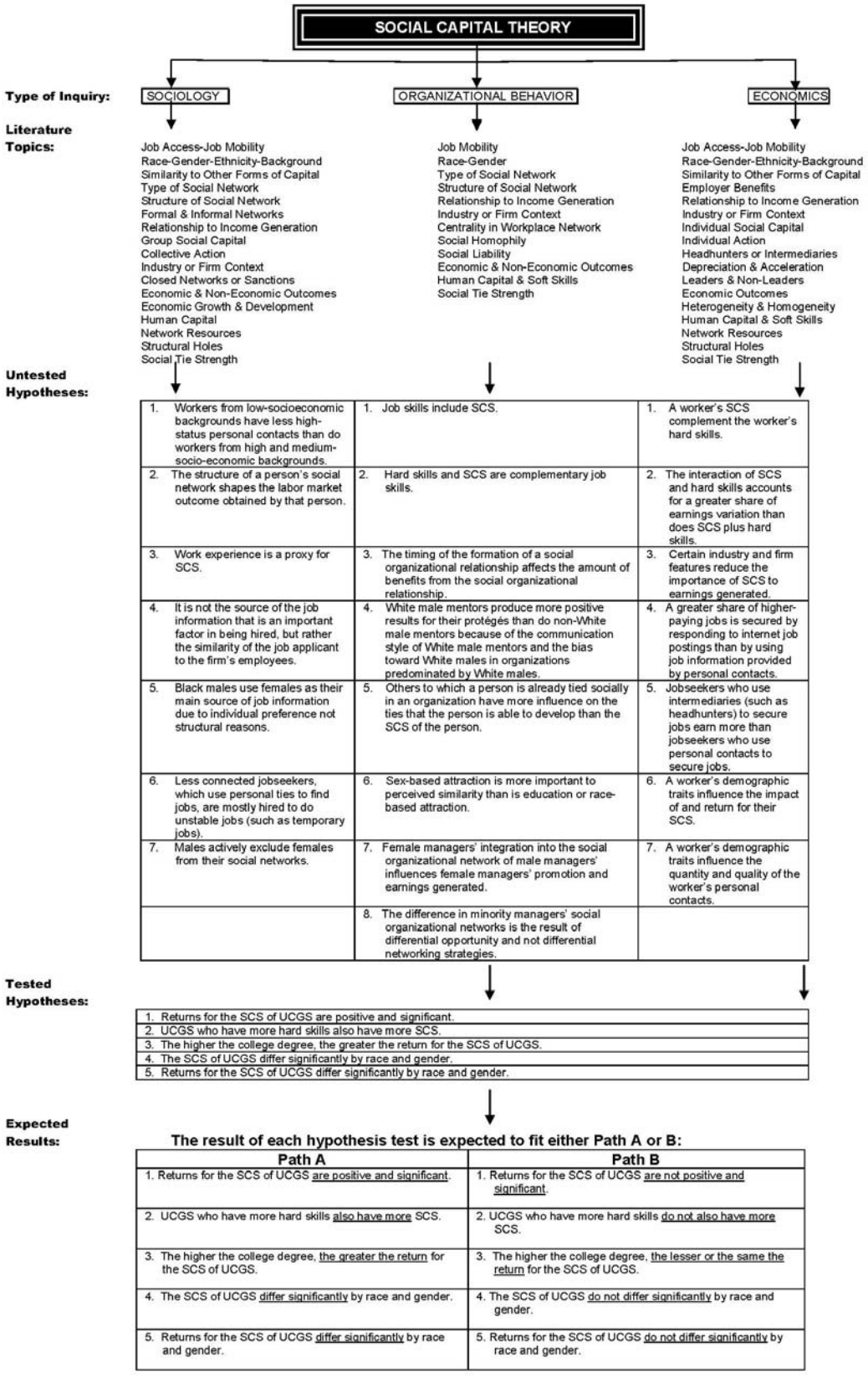


Figure 3. Conceptual Model for Social Capital Skills

topics addressed by discipline or field in the social capital literature. The second part of the conceptual model identifies hypotheses proposed by other researchers for further study. The third part of the conceptual model specifies the hypotheses tested in this part of the study. The last part of the conceptual model shows the expected results from the hypothesis tests.

2.3 Hypotheses

In this section, the regression models and the attendant decision rules used in this part of the study to test the hypotheses on SCS are specified. Five hypothesis tests were carried out using weighted least square regressions. Weights were applied because Blacks and low-income households were over-sampled in the MCSUI-HS. In addition to regression coefficients, means, standard deviations, and *F* statistics were calculated. The main assumption made in formulating the models was that earnings, SCS, and hard skills are not determined simultaneously. Another assumption was that there was no difference in willingness to supply SCS between different groups of UCGS.

Earnings was the outcome variable in several regression models. In those regression models, the natural logarithm of hourly wage paid by an employer to each of the UCGS (*i*) in a survey year was designated as earnings. Hourly wage was first converted to 2008 dollars with the Consumer Price Index for all urban consumers and then transformed to a natural logarithmic form to create an outcome variable with a normal distribution. The UCGS examined with the regression models were the collection of non-randomly selected college graduates from Atlanta, Boston, and Los Angeles who met the subsample selection criteria set out in section 2.4.

In addition, SCS was set to be represented in the regression models by four variables that provide (a) the number of social capital sources (Bourdieu, 1986; Borocz & Southworth, 1998) mentioned in response to a name generator question that requested the name of no more than three personal contacts outside the respondent's household—likely leading to the naming of strong ties (see Stoloff, Glanville, & Bienenstock, 1999); (b) the number of social capital sources who were White males (Dreher & Cox, 1996; Lincoln & Miller, 1979; Stoloff, Glanville, & Bienenstock, 1999); (c) the number of social capital sources who were college-educated (Borocz & Southworth, 1998; Mouw, 2003; Stoloff, Glanville, & Bienenstock, 1999); and (d) the number of social capital sources who had a steady job (Ioannides & Loury, 2004; Ioannides & Soetevent, 2006; Mouw, 2003).

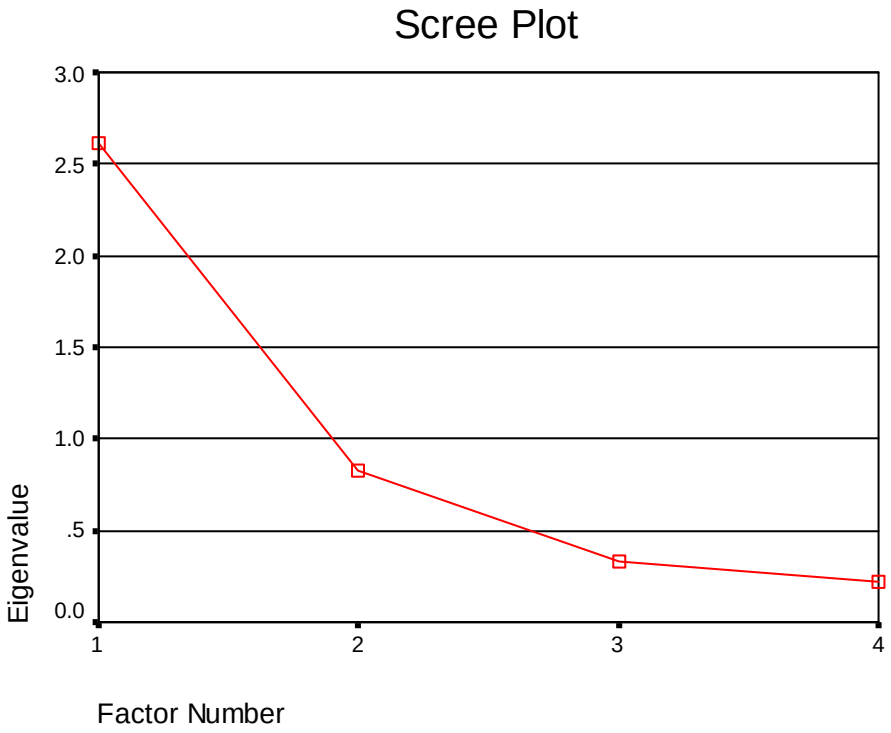
However, factor analysis indicated that the four variables that were going to be included in the regression models measured one latent factor (Behtoui, 2007; Hair, Anderson, Tatham, & Grablowsky, 1984): Quantity and quality of SCS (see the Factor Matrix in Table IX). The one-factor solution was chosen after considering the two-factor solution suggested by the scree plot in Table IX and finding a high correlation (0.85) between the two factors. The high correlation between the two factors could result in multicollinearity. Another researcher's recommendation that one factor should be used when there is a high correlation between separate quantity and quality measures of SCS (e.g., Behtoui, 2007) was followed. The factor analysis was done using principal axis factoring, varimax rotation, and ±0.3 as the minimum significant factor loading. The factor scores produced by factor analysis were standardized as *z* scores. The *z* scores were used to represent quantity and quality of SCS or SCS in this part of the study.

Table IX. Factor Analysis Results

Factor Matrix[a]	
Variables	Factor
	1
No. of social capital sources	0.909705015
No. of sources with a steady job	0.839639201
No. of college-educated sources	0.799921254
No. of White male sources	0.358781927

Extraction Method: Principal Axis Factoring.

[a]1 factor extracted. 9 iterations required.



Correlation Matrix[a]				
	No. of social capital sources	No. of sources with a steady job	No. of college-educated sources	No. of White male sources
No. of social capital sources	1.000000000	0.765487652	0.724510776	0.331789382
No. of sources with a steady job	0.765487652	1.000000000	0.673400496	0.292317009
No. of college-educated sources	0.724510776	0.673400496	1.000000000	0.290220602
No. of White male sources	0.331789382	0.292317009	0.290220602	1.000000000

[a]Determinant = .161

(continued)

Table IX. Factor Analysis Results (continued)

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.767123946
Bartlett's Test of Sphericity	Approx. χ^2	1049.085743
	df	6.000000000
	Sig.	2.1583E-223

Communalities

Variables	Initial	Extraction
No. of social capital sources	0.671738096	0.827563214
No. of sources with a steady job	0.616433578	0.704993988
No. of college-educated sources	0.560703479	0.639874013
No. of White male sources	0.117053909	0.128724471

Note. Extraction Method: Principal Axis Factoring.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.615707332	65.3926833	65.3926833	2.301155686	57.52889216	57.52889216
2	0.828186495	20.70466237	86.09734567			
3	0.33185353	8.296338254	94.39368392			
4	0.224252643	5.606316077	100.0000000			

Note. Extraction Method: Principal Axis Factoring.

Control variables were also used in the regression models to represent some unchangeable and changeable individual attributes. Although all the controls are listed below, the way in which the controls were used in the models varied. Control variables were used for the following unchangeable attributes: (a) birth in the U.S. (Behtoui, 2007); (b) race (i.e., Black or White; Ferguson, 1995; Mitra, 2000; Murnane, Willett, & Levy, 1995); (c) gender (i.e., male or female; Mitra, 2000, 2002; Murnane, Willett, & Levy, 1995; Paglin & Rufolo, 1990; U.S. General Accounting Office, 2003; Weinberger, 1999);

(d) socioeconomic background (i.e., living with both parents until age 16; Loury, 1977; Mitra, 2000; Murnane, Willett, & Levy, 1995); and (e) year of survey response (Fan, Wei, & Zhang, 2005).

Control variables were used in the regression models to represent the following changeable attributes: (a) hard skills (i.e., highest college degree attained, potential work experience, and potential work experience squared; Becker, 1964a; Mincer, 1974; with potential work experience calculated as age minus school leaving age multiplied by the proportion of time spent working after leaving school); (b) marital or live-in partner status (Behtoui, 2007); (c) parentage of child or children under age 6 (Eagly & Carli, 2007; Huffman & Torres, 2002); (d) supervisory or nonsupervisory work position (Borocz & Southworth, 1998); (e) private sector or public sector employment (Grodsky & Pager, 2001); (f) job tenure (Smith, 2000; U.S. General Accounting Office, 2003); (g) union membership (i.e., being a union member and/or subject to a collective bargaining agreement; Behtoui, 2007; U.S. General Accounting Office, 2003); and (h) city of residence (i.e., an Atlanta, Boston or Los Angeles resident; Black, Kolesnickova, & Taylor, 2007; Mouw, 2003).

The first regression model was developed to test the prediction in Hypothesis 1 that returns for the SCS of UCGS are positive and significant. Hypothesis 1 would be supported if SCS are positively ($\beta \geq 0$) and statistically significantly ($p < .05$) related to the earnings of the UCGS. The fulfillment of the preceding requirement was interpreted as the satisfaction of the decision rule for Hypothesis 1. The fulfillment of similar requirements that are described below and relate to the remaining hypothesis tests was also interpreted as the satisfaction of the corresponding decision rules. A formulaic

specification of the model used to test Hypothesis 1 is laid out immediately below. Wholly dummy variables are underlined and expected signs are provided in the specification. In the model specified immediately below and other models specified in this section that include hard skills, a positive regression coefficient was expected for each underlying variable except the work experience squared variable. Each model was also expected to produce an error term (E).

Hypothesis 1. Returns for the SCS of UCGS are positive and significant.

Model: $$\text{Ln Earnings}_i = \beta_0 + \beta_1 \text{SCS}_{1i} + \beta_2 \text{Hard Skills}_{2i} + \beta_3 \underline{\text{Black}}_{3i} - \beta_4 \underline{\text{Female}}_{4i} + \beta_5 \underline{\text{Born in the U.S.}}_{5i} + \beta_6 \underline{\text{Lived with Both Parents Until 16}}_{6i} + \beta_7 \underline{\text{Partnered or Married}}_{7i} - \beta_8 \underline{\text{Children Under Six}}_{8i} + \beta_9 \text{Job Tenure}_{9i} + \beta_{10} \underline{\text{Union}}_{10i} + \beta_{11} \underline{\text{Supervisor}}_{11i} + \beta_{12} \underline{\text{Private Sector}}_{12i} + \beta_{13} \underline{\text{Residency}}_{13i} + \beta_{14} \text{Year}_{14i} + E_i$$

A regression model was also formulated to determine whether Hypothesis 2—that UCGS who have more hard skills also have more SCS—is supported by the results from the data on the UCGS. Hypothesis 2 would be supported by the results from the regression model specified immediately below if (a) work experience is positively ($\beta \geq 0$) and statistically significantly ($p < .05$) related to SCS and (b) the UCGS with degrees higher than bachelor's degrees have statistically significantly ($p < .05$) more ($\beta > 0$) SCS than the UCGS with bachelor's degrees.

Hypothesis 2. UCGS who have more hard skills also have more SCS.

Model: $SCS_i = \beta_0 + \beta_1 \text{Hard Skills}_{1i} - \beta_2 \underline{\text{Black}}_{2i} - \beta_3 \underline{\text{Female}}_{3i} + \beta_4 \underline{\text{Born in the U.S.}}_{4i} + \beta_5 \underline{\text{Lived with Both Parents Until 16}}_{5i} + \beta_6 \underline{\text{Partnered or Married}}_{6i} - \beta_7 \underline{\text{Children Under Six}}_{7i} + \beta_8 \text{Job Tenure}_{8i} + \beta_9 \underline{\text{Union}}_{9i} + \beta_{10} \underline{\text{Supervisor}}_{10i} + \beta_{11} \underline{\text{Private Sector}}_{11i} + \beta_{12} \underline{\text{Residency}}_{12i} + \beta_{13} \text{Year}_{13i} + E_i$

Another regression model was constructed to find out whether UCGS with higher degrees receive a greater return for their SCS, as stated in Hypothesis 3, which would be supported by the regression results if the interaction of SCS and college degree attained above a bachelor's degree is positive ($\beta > 0$) and statistically significant ($p < .05$) in the model specified immediately below. Variables that represent each college degree were included under hard skills.

Hypothesis 3. The higher the college degree, the greater the return for the SCS of UCGS.

Model: $\text{Ln Earnings}_i = \beta_0 + \beta_1 SCS_{1i} + \beta_2 \text{Hard Skills}_{2i} + \beta_3 (SCS_{1i} \times \underline{\text{Degrees}}_{2i})_{3i} + \beta_4 \underline{\text{Black}}_{4i} - \beta_5 \underline{\text{Female}}_{5i} + \beta_6 \underline{\text{Born in the U.S.}}_{6i} + \beta_7 \underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8 \underline{\text{Partnered or Married}}_{8i} - \beta_9 \underline{\text{Children Under Six}}_{9i} + \beta_{10} \text{Job Tenure}_{10i} + \beta_{11} \underline{\text{Union}}_{11i} + \beta_{12} \underline{\text{Supervisor}}_{12i} + \beta_{13} \underline{\text{Private Sector}}_{13i} + \beta_{14} \underline{\text{Residency}}_{14i} + \beta_{15} \text{Year}_{15i} + E_i$

A test of Hypothesis 4 was carried out with a regression model to find out whether the SCS of UCGS differ significantly by race and gender. Hypothesis 4 would be supported by the regression results if the regression coefficient for Black and female is statistically significantly ($p < .05$) different from zero ($\beta \neq 0$). The regression model that was used to test Hypothesis 2 was also used to test Hypothesis 4 and is shown under the description for Hypothesis 2.

Hypothesis 4. The SCS of UCGS differ significantly by race and gender.

A series of regression models was developed to test Hypothesis 5, which predicts that the returns UCGS receive for their SCS differ significantly by race and gender. Hypothesis 5 would be supported by the results if the regression coefficient for the respective Black and female interaction with SCS is statistically significantly ($p < .05$) different ($\beta \neq 0$) from zero in the model specified immediately below as Model 1 and Model 2.

> *Hypothesis 5*. Returns for the SCS of UCGS differ significantly by race and gender.

Model 1:
$$\text{Ln Earnings}_i = \beta_0 + \beta_1 SCS_{1i} + \beta_2 \text{Hard Skills}_{2i} + \beta_3 \underline{\text{Black}}_{3i} - \beta_4 \underline{\text{Female}}_{4i} + \beta_5 (\underline{\text{Black}}_{3i} \times SCS_{1i})_{5i} + \beta_6 \underline{\text{Born in the U.S.}}_{6i} + \beta_7 \underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8 \underline{\text{Partnered or Married}}_{8i} - \beta_9 \underline{\text{Children Under Six}}_{9i} + \beta_{10} \text{Job Tenure}_{10i} + \beta_{11} \underline{\text{Union}}_{11i} + \beta_{12} \underline{\text{Supervisor}}_{12i} + \beta_{13} \underline{\text{Private Sector}}_{13i} + \beta_{14} \underline{\text{Residency}}_{14i} + \beta_{15} \text{Year}_{15i} + E_i$$

Model 2:
$$\text{Ln Earnings}_i = \beta_0 + \beta_1 SCS_{1i} + \beta_2 \text{Hard Skills}_{2i} + \beta_3 \underline{\text{Black}}_{3i} - \beta_4 \underline{\text{Female}}_{4i} - \beta_5 (\underline{\text{Female}}_{4i} \times SCS_{1i})_{5i} + \beta_6 \underline{\text{Born in the U.S.}}_{6i} + \beta_7 \underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8 \underline{\text{Partnered or Married}}_{8i} - \beta_9 \underline{\text{Children Under Six}}_{9i} + \beta_{10} \text{Job Tenure}_{10i} + \beta_{11} \underline{\text{Union}}_{11i} + \beta_{12} \underline{\text{Supervisor}}_{12i} + \beta_{13} \underline{\text{Private Sector}}_{13i} + \beta_{14} \underline{\text{Residency}}_{14i} + \beta_{15} \text{Year}_{15i} + E_i$$

Model 3:
$$\text{Ln Earnings}_i = \beta_0 + \beta_1 SCS_{1i} + \beta_2 \text{Hard Skills}_{2i} + \beta_3 \underline{\text{Black}}_{3i} - \beta_4 \underline{\text{Female}}_{4i} + \beta_5 (\underline{\text{Black}}_{3i} \times SCS_{1i})_{5i} - \beta_6 (\underline{\text{Female}}_{4i} \times SCS_{1i})_{6i} + \beta_7 \underline{\text{Born in the U.S.}}_{7i} + \beta_8 \underline{\text{Lived with Both Parents Until 16}}_{8i} + \beta_9 \underline{\text{Partnered or Married}}_{9i} - \beta_{10} \underline{\text{Children Under Six}}_{10i} + \beta_{11} \text{Job Tenure}_{11i} + \beta_{12} \underline{\text{Union}}_{12i} + \beta_{13} \underline{\text{Supervisor}}_{13i} + \beta_{14} \underline{\text{Private Sector}}_{14i} + \beta_{15} \underline{\text{Residency}}_{15i} + \beta_{16} \text{Year}_{16i} + E_i$$

2.4 Research Methodology

This section contains a description of the reasons for selecting, the steps taken to bring about, and the strengths and limitations of the quantitative case study research design used to investigate untested concepts mentioned in the social capital literature in the manner stated in the hypotheses section above. As noted by Yin (1994), a case study is usually undertaken to examine a contemporary phenomenon within a real-life context.

This case study was undertaken to examine a contemporary phenomenon (the belief since the 1980s that SCS are associated with positive labor market outcomes) within a real-life context (the work-life of UCGS). Due to the inclusion of quantitative or quantifiable data in the MCSUI-HS dataset on SCS, labor market outcomes, personal history, and work history that is typically used in regression models that touch on SCS, empirical results on SCS in the work-life of UCGS could be gathered for use in a case study that compares actual results with predicted results.

The empirical foundation of this quantitative case study was hypothesis test results. The hypothesis test results were the outcome of the analysis of data on a subsample of UCGS from the MCSUI-HS. The MCSUI-HS dataset is available through the Inter-University Consortium for Political and Social Research and was used to test various hypotheses. The findings from those hypothesis test results were reported in several journal articles, dissertations, and books.

Empirical results were sought from a subsample of UCGS whose primary nonleisure activity was working for an employer other than them. Therefore, data from on a subsample of non-self-employed respondents from the MCSUI-HS dataset were analyzed. The subsample consisted of respondents who met all of the following criteria: (a) attained at least a bachelor's degree, (b) were not self-employed, (c) earned more than $1 per hour but less than $150 per hour, (d) were between age of 21 and 65 at the time survey responses were provided, and (e) provided information concerning all the variables used in the hypothesis tests.

The empirical results from this quantitative case study arose out of an analysis of data on 546 UCGS who met the subsample selection criteria. Of the 546 respondents, 292

were female, 254 were male, 181 were Black, and 365 were White. The comparatively small number of Blacks (11%) in the subsample may have hindered findings of significant racial differences. Data on Hispanics and Asians were not analyzed because few Hispanic and Asian respondents outside Los Angeles met the subsample selection criteria.

Data on the subsample of UCGS were analyzed this quantitative case study as described in the hypotheses section above with the Statistical Package for Social Sciences (SPSS). The regression results from SPSS were then interpreted to determine if the decision rule for each hypothesis was satisfied. Satisfaction of a decision rule led to a finding that the UCGS provide support for the corresponding hypothesis. Regression results, descriptive statistics, standard deviations, contextual issues related to the time when and place where data were collected for the MCSUI-HS, and postulations and previous findings in the literature were in the discussion in section 2.6 to reconcile or explain any difference between actual findings in this part of the study and predicted findings.

Certain strengths and limitations emerged from the use of a quantitative case study research design and the MCSUI-HS dataset. One strength was having data from the MCSUI-HS on social capital sources that facilitated the investigation of SCS. Another strength concerned the generalization of findings. Although the case study involved the analysis of data from non-randomly selected and non-equivalent groups, analytical generalizations (i.e., attributing support or nonsupport for hypotheses from empirical results; see Yin, 1994) could be made from empirical results produced by regression tests of data on the UCGS.

In terms of limitations, findings from this quantitative case study were limited to the UCGS examined. Findings could not be extended to other groups or generalized to any population. Since the data in the MCSUI-HS dataset are cross-sectional, the findings are only instructive of relationships between independent and outcome variables. Another limitation of the case study was history. In the early 1990s when the survey data were collected, the U.S. was recovering from the 1991-1992 economic downturn. Employer wage setting, hiring, and screening criteria may have differed during that period from periods with no recent or similar economic downturn. Due to the non-random nature of the selection of the subsample, selection bias may also have affected the results. Moreover, even though data on the UCGS were collected as part of the MCSUI-HS and could be carved out of the dataset, the data were not collected with the specific intent of studying labor market dynamics in terms of UCGS.

In addition to the strengths and limitations connected with external validity, this quantitative case study was susceptible to construct validity threats (Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002) because of actual or missing data from the MCSUI-HS dataset. For instance, in order to be viewed in a more favorable light by interviewers, respondents may have provided incorrect information about seemingly sensitive matters such as earnings, amount and type of social capital sources, educational attainment, and work history. This incorrect information would taint the validity of those and similarly sensitive constructs. The MCSUI-HS dataset did not give information on the societal status of or financial capital held by any of the social capital sources—a direct indicator of quality of social capital sources. As a result, indirect indicators such as the number of social capital sources with a steady job were used to obtain a measure of

the quality of social capital sources. The formulation of the SCS construct may also be considered vulnerable to researcher subjectivity (see Yin, 1994). The construct could be criticized for being purposefully formulated with the objective of obtaining a particular result. This kind of researcher subjectivity opens this part of the study up to criticism for lack of rigor and use of a fuzzy concept (Danson, 1999; Yin, 1994). The fuzzy concept criticism is particularly probable because several definitions of social capital and SCS are provided in the literature (see Portes, 1998).

This quantitative case study used the Bourdieu (1986) and Burt (1992) definitions of SCS because these definitions were supplemented with explanations of how SCS can be identified and how SCS can arise (see Portes, 1998; Woolcock, 1998). However, neither definition made a differentiation between strong ties (in which family and friends are social capital sources) and weak ties (in which acquaintances are social capital sources). The central finding from the seminal work by Granovetter (1974) is that weak ties more so than strong ties produce positive outcomes for professional, managerial, and technical workers in the labor market (cf. Bridges & Villemez, 1986; Marsden & Hurlbert, 1988; Smith, 2000). Although this case study is not about the effect of either weak ties or strong ties, the use of data on one or the other type of tie may affect the results obtained. It is, therefore, noteworthy that the data on SCS used in this part of the study were on strong ties. In light of the foregoing, results from tests conducted as a part of this study were interpreted in view of the above-described strengths and limitations.

2.5 Results

Results generated by this quantitative case study from regression models, descriptive statistics, and non-parametric calculations are presented and interpreted in this

section. In the description of the partial regression coefficient for any explanatory variable, the condition holding all other variables constant applies in all instances and is, therefore, not restated below. Similarly, the partial regression coefficient for each explanatory and control variable relates to the mean or difference in means in the case of a dummy variable. Therefore, neither the phrase on average nor a similar phrase is reiterated below. The reported effect of any variable on an outcome variable relates to the partial effect. Relationships between variables are interpreted as being statistically significant if the corresponding *p* value is less than .05. Relationships between variables are interpreted as being marginally significant if the associated *p* value is between .05 and .1. Otherwise, relationships between variables are interpreted as being statistically insignificant. A reference to a bachelor's, master's, PhD, or professional degree is a reference to the highest degree attained.

Before probing the results from the regression models, information about means, standard deviations, and nonparametric calculations that may be useful in understanding the regression results are presented. Information on all the UCGS in Table X indicate that the UCGS overwhelmingly have strong ties (approximately 95% of all ties) as SCS sources. Yet, the professed labor market enhancing ties are weak ties. Possibly due to the way that the name generator question was framed, a small number of social capital sources are named (roughly two). That small number of social capital sources may not be enough to positively contribute to the SCS and, consequently, the earnings of the UCGS. Moreover, the social capital sources are generally the same gender and race as the UCGS. Approximately 70% of the UCGS only have bachelor's degrees. The UCGS mostly work for employers who have less than 1,000 employees and in nonunion and nonsupervisory

jobs. Those types of employers and jobs may not attach any value much less a significant value to SCS. The weighted mean log hourly wage of all the UCGS is 3.13 or approximately $22.87 per hour.

Table X. Descriptive Statistics--For the Pool of UCGS

Variables and Number of Respondents (dummy variables are in bold type)	Weighted Mean	Std. Deviation
Log hourly wage (546)	3.13	24.28
Social capital skills (SCS) (*z* scores) (546)	0.15	45.08
No. of social capital sources (546)	2.52	45.68
No. of sources with a steady job (546)	2.11	51.12
No. of college-educated sources (546)	2.00	52.48
No. of White male sources (546)	0.99	51.38
Percent of strong ties (546)	94.54	897.06
Hard skills:		
Master's degree[a] (137)	0.26	22.41
PhD or professional degree[a] (23)	0.05	10.63
Work experience (years) (546)	14.15	518.41
Work experience squared (years) (546)	303.52	18828.18
Individual characteristics:		
Black[b](181)	0.11	16.16
Female[c] (292)	0.45	25.39
Born in the U.S.[d] (487)	0.89	15.91
Lived with both parents until 16[e] (448)	0.86	17.47
Married or live-in partner[f] (252)	0.63	24.62
Children under six[g] (91)	0.21	20.88
Workplace and job features:		
Job tenure (years) (546)	5.01	663.59
Union[h] (131)	0.21	20.81
Supervisor[i] (210)	0.39	24.89
Private sector[j] (363)	0.71	23.03
Residency:		
Atlanta resident[k] (150)	0.17	19.09
Boston resident[k] (143)	0.38	24.80
Year (546)	93.39	24.82
Number of observations	546.00	546.00

Notes. The mean value for each named dummy variable category indicates the percent of UCGS in the named category. The No. of UCGS in the named dummy variable category is in parentheses.
[a]Bachelor's degree is the omitted category. [b]White is the omitted category. [c]Male is the omitted category. [d]Not born in the U.S. is the omitted category. [e]id not live with both parents until 16 is the omitted category. [f]Not married or not living with a partner is the omitted category. [g]Did not have children under six is the omitted category. [h]Nonunion is the omitted category. [i]Nonsupervisor is the omitted category. [j]Public sector is the omitted category. [k]Los Angeles resident is the omitted category.

Table XI provides information on differences among the UCGS by race and gender. Other than earnings and SCS, differences between males and females are trivial. Males earn roughly $2.30 per hour more than females, but females have more SCS than males. Blacks earn approximately $1.18 per hour more than Whites, but Whites have more SCS than Blacks, who have more strong ties than any other group. Blacks also have more PhD or professional degrees than any other group and Blacks have the longest job tenure. Blacks and females are from lower socioeconomic backgrounds than Whites and males. Still, UCGS in each of the groups are at least middle-class.

Table XII shows differences among the UCGS by level of college degree. The UCGS with PhD or professional degrees have the most SCS and UCGS with master's degrees have the least SCS. Almost all of the ties that UCGS with PhD or professional degrees have are strong ties. Though not shown in Table XII, a review of job features and job titles in the MCSUI-HS dataset reveals that the majority of the UCGS with PhD or professional degrees are lawyers, physicians, psychologists, pharmacists, and college professors. In contrast, most of the UCGS with master's degree are elementary and high school teachers, nurses, librarians, social workers, school counselors, paralegals, human resource managers, and school administrators. Also, UCGS with PhD or professional degrees work in firms that are nearly twice as large as firms in which UCGS with bachelor's and master's degrees work. Although information on means helps with understanding and predicting the regression results, the finding as to whether a hypothesis is or is not supported by the UCGS rests on the regression results. As a result, the description of the regression results is presented below.

Table XI. Descriptive Statistics--By Race and Gender

Variables (dummy variables are in bold type)	Male		Female		White		Black	
	Wgted. Mean	Std. Dev.	Wgted. Mean	Std. Dev.	Wgted. Mean	Std. Dev.	Wgted. Mean	Std. Dev.
Log hourly wage	3.18	27.07	3.08	21.36	3.13	28.34	3.18	12.60
Social capital skills (SCS) (*z* scores)	0.07	56.22	0.25	31.90	0.16	51.99	0.06	26.04
No. of social capital sources	2.41	56.77	2.66	32.12	2.53	52.64	2.46	26.67
No. of sources with a steady job	2.02	61.70	2.22	39.22	2.12	58.87	2.08	30.02
No. of college-educated sources	1.92	60.82	2.10	43.62	2.02	60.51	1.90	30.38
No. of White male sources	1.37	57.87	0.53	34.56	1.08	59.57	0.28	17.48
Percent of strong ties	94.68	963.63	94.37	836.47	94.27	1070.26	96.71	339.76
Hard skills:								
Master's degree[a]	0.31	25.50	0.21	19.06	0.26	25.84	0.26	13.05
PhD or professional degree[a]	0.04	11.43	0.05	9.90	0.04	11.53	0.09	8.44
Work experience (years	14.45	582.58	13.79	455.76	14.14	598.36	14.19	299.45
Work experience squared (years)	319.90	22165.30	283.86	15336.70	303.71	21752.06	302.00	10794.81
Individual characteristics:								
Black[b]	0.11	17.34	0.12	15.10	0.00	0.00	1.00	0.00
Female[c]	0.00	0.00	1.00	0.00	0.45	29.25	0.47	14.90
Born in the U.S.[d]	0.88	18.10	0.91	13.73	0.90	17.70	0.83	11.34
Lived with both parents until 16[e]	0.89	17.46	0.84	17.41	0.88	19.08	0.74	13.12
Married or live-in partner[f]	0.63	26.64	0.63	22.75	0.64	28.20	0.55	14.85
Children under six[g]	0.24	23.44	0.19	18.34	0.22	24.29	0.17	11.22
Workplace and job features:								
Job tenure (years)	5.30	758.18	4.66	569.59	4.88	763.52	6.06	391.55
Union[h]	0.17	20.81	0.26	20.62	0.20	23.28	0.34	14.12
Supervisor[i]	0.38	26.87	0.40	23.07	0.38	28.49	0.50	14.93
Private sector[j]	0.71	25.03	0.72	21.18	0.72	26.33	0.66	14.19
Residency:								
Atlanta resident[k]	0.13	18.52	0.22	19.36	0.14	20.22	0.41	14.70
Boston resident[k]	0.42	27.24	0.35	22.39	0.42	29.03	0.08	8.01
Year	93.46	27.55	93.30	21.46	93.38	28.46	93.46	14.89
Number of observations	254.00	254.00	292.00	292.00	365.00	365.00	181.00	181.00

Notes. The mean value for each named dummy variable category indicates the percent of UCGS in the named category. [a]Bachelor's degree is the omitted category. [b]White is the omitted category. [c]male is the omitted category. [d]Not born in the U.S. is the omitted category. [e]Did not live with both parents until 16 is the omitted category. [f]Not married or not living with a partner is the omitted category. [g]Did not have children under six is the omitted category. [h]Nonunion is the omitted category. [i]Nonsupervisor is the omitted category. [j]Public sector is the omitted category. [k]Los Angeles resident is the omitted category.

Table XII. Descriptive Statistics--By Level of College Degree

Variables (dummy variables are in bold type)	Bachelor's Degree		Master's Degree		PhD or Prof Degree	
	Wgted. Mean	Std. Dev.	Wgted. Mean	Std. Dev.	Wgted. Mean	Std. Dev.
Log hourly wage	3.08	22.97	3.24	26.39	3.35	24.12
Social capital skills (SCS) (*z* scores)	0.23	42.49	-0.08	50.92	0.37	37.50
No. of social capital sources	2.60	43.16	2.28	51.79	2.75	33.09
No. of sources with a steady job	2.23	48.16	1.80	55.54	2.13	52.81
No. of college-educated sources	2.01	51.03	1.89	55.85	2.55	47.83
No. of White male sources	1.00	50.71	1.03	53.07	0.62	50.35
Percent of strong ties	93.93	956.06	95.26	784.67	99.69	174.43
Hard skills:						
Master's degree[a]	0.00	0.00	1.00	0.00	0.00	0.00
PhD or professional degree[a]	0.00	0.00	0.00	0.00	1.00	0.00
Work experience (years	12.60	456.36	18.68	618.26	11.64	421.31
Work experience squared (years)	240.41	15,356.97	489.31	24,559.26	195.97	11,520.68
Individual characteristics:						
Black[b]	0.11	15.62	0.11	16.42	0.22	22.36
Female[c]	0.49	25.24	0.36	25.05	0.46	27.00
Born in the U.S.[d]	0.92	13.70	0.83	19.56	0.78	22.25
Lived with both parents until 16[e]	0.86	17.46	0.85	18.46	0.97	9.28
Married or live-in partner[f]	0.57	24.98	0.75	22.63	0.82	20.72
Children under six[g]	0.19	19.77	0.26	22.91	0.31	25.06
Workplace and job features:						
Job tenure (years)	5.06	711.58	5.06	566.09	3.96	251.18
Union[h]	0.18	19.30	0.27	23.21	0.38	26.23
Supervisor[i]	0.38	24.50	0.41	25.68	0.48	27.05
Private sector[j]	0.78	20.86	0.58	25.78	0.47	27.02
Residency:						
Atlanta resident[k]	0.19	19.93	0.11	16.24	0.14	18.69
Boston resident[k]	0.35	24.13	0.47	26.07	0.35	25.82
Year	93.36	24.27	93.45	25.99	93.37	26.07
Number of observations	386.00	386.00	137.00	137.00	23.00	23.00

Notes. The mean value for each named dummy variable category indicates the percent of UCGS in the named category. [a]Bachelor's degree is the omitted category. [b]White is the omitted category. [c]Male is the omitted category. [d]Not born in the U.S. is the omitted category. [e]Did not live with both parents until 16 is the omitted category. [f]Not married or not living with a partner is the omitted category. [g]Did not have children under six is the omitted category. [h]Nonunion is the omitted category. [i]Nonsupervisor is the omitted category. [j]Public sector is the omitted category. [k]Los Angeles resident is the omitted category.

Hypothesis 1, which predicts that returns for the SCS of UCGS are positive and significant, was tested with regression models. The regression results do not support Hypothesis 1. Hypothesis 1 would have been supported if SCS was positively ($\beta \geq 0$) and statistically significantly ($p < .05$) related to the earnings of the UCGS. The regression results in Table XIII, Model 1 indicate that returns for SCS are positive and insignificant ($\beta = 0.008$, $p = .841$). These results imply that earnings increase by 18 cents for each one-standard-deviation increase in SCS, based on mean earnings of $22.87.

Table XIII. Regression Results--Hypotheses 1 and 3 for SCS

	Dependent Variable: Natural Log of Hourly Wage	
	Model 1	Model 2
Variables	SCS	Degree X SCS
(dummy variables are in bold type)	β	β
Social capital skills (SCS)	0.008	0.056
	(0.022)	(0.027)
Hard skills		
--Master's degree[a]	0.091	0.098
	(0.047)[o]	(0.047)[*]
--PhD or prof. degree[a]	0.215	0.105
	(0.091)*	(0.101)
--Work experience (years)	0.037	0.039
	(0.006)*	(0.006)*
--Work experience squared (years)	-0.001	-0.001
	(0.000)*	(0.000)*
Degree x SCS		
--Master's degree x SCS[b]	-	-0.114
	-	(0.047)*
--PhD or prof. degree x SCS[b]	-	0.105
	-	(0.128)*
Black[c]	0.055	0.054
	(0.062)	(0.062)
Female[d]	-0.073	-0.065
	(0.038)[0]	(0.038)[0]
Born in the U.S.[e]	0.116	0.142
	(0.062)[o]	(0.062)[*]
Lived with both parents until 16[f]	-0.030	-0.037
	(0.055)	(0.054)
Married or Live-in partner[g]	-0.015	-0.028
	(0.044)	(0.043)
Children under six[h]	0.196	0.190
	(0.052)*	(0.051)*

(continued)

Table XIII. Regression Results--Hypotheses 1 and 3 (continued)

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage	
	Model 1	Model 2
	SCS	Degree X SCS
	β	β
Job tenure (years)	0.003	0.003
	(0.001)[o]	(0.001)*
Union[i]	-0.070	-0.059
	(0.054)	(0.054)
Supervisor[j]	0.180	0.176
	(0.039)*	(0.039)*
Private sector[k]	-0.134	-0.138
	(0.049)*	(0.048)*
Residency		
--Atlanta resident[l]	-0.123	-0.126
	(0.061)*	(0.061)*
--Boston resident[l]	-0.013	-0.028
	(0.046)	(0.045)
Year	-0.012	-0.008
	(0.044)	(0.044)
Constant	3.924	3.521
	(4.137)	(4.100)
Adjusted R^2	20.5%	22.0%
Model siignificance	0.000	0.000
Number of observations	546.000	546.000

Notes. *significant at less than 0.05. [o]Marginally significant at 0.05 to 0.10 standard error in parentheses.
[a]Bachelor's degree is the omitted category. [b]Bachelor's degree x SCS is the omitted category. [c]White is the omitted category. [d]Male is the omitted category. [e]Not born in the U.S. is the omitted category. [f]Did not live with both parents until 16 is the omitted category. [g]Not married or not living with a partner is the omitted category. [h]No children under six is the omitted category. [i]Nonunion member is the omitted category. [j]Nonsupervisor is the omitted category. [k]Public sector is the omitted category. [l]Los Angeles resident is the omitted category.

Hypothesis 2 proposes that UCGS who have more hard skills also have more SCS. Hypothesis 2 is partially supported by the regression results presented in Table XIV which indicate that the UCGS with PhD or professional degrees have significantly more SCS than the UCGS with master's degrees ($\beta = 0.407$, $p = .031$). Though not shown, the UCGS with PhD or professional degrees have insignificantly more SCS than the UCGS with bachelor's degrees ($\beta = 0.215$, $p = .234$). Hypothesis 2 would have been fully supported by the regression results if additional work experience was significantly associated with additional SCS and the UCGS with PhD or professional degrees had

significantly more SCS than the UCGS with bachelor's degrees. In addition to having PhD or professional degrees, being born in the U.S., working in the private sector, and being a union member are significantly linked with enhancing SCS.

Table XIV. Regression Results--Hypotheses 2 and 4 for SCS

Variables (dummy variables are in bold type)	Dependent Variable: Social Capital Skills β
Hard skills	
--Bachelor's degree[a]	0.193
	(0.093)*
--PhD or prof. degree[a]	0.407
	(0.189)*
--Work experience (years)	0.002
	(0.012)
--Work experience squared (years)	0.000
	(0.000)
Black[c]	-0.104
	(0.124)
Female[d]	0.131
	(0.076)[o]
Born in the U.S.[e]	0.541
	(0.121)*
Lived with both parents until 16[f]	0.180
	(0.109)
Married or Live-in partner[g]	0.049
	(0.087)
Children under six[h]	0.102
	(0.103)
Job tenure (years)	-0.007
	(0.003)*
Union[i]	0.297
	(0.107)*
Supervisor[j]	-0.075
	(0.078)
Private sector[k]	0.277
	(0.097)*

(continued)

Table XIV. Regression Results--Hypotheses 2 and 4 (continued)

Variables (dummy variables are in bold type)	Dependent Variable: Social Capital Skills β
Residency	
--Atlanta resident[l]	0.069
	(0.122)
--Boston resident[l]	-0.067
	(0.091)
Year	0.082
	(0.088)
Constant	-8.543
	(8.227)
Adjusted R^2	8.7%
Model significance	0.000
Number of observations	546.000

Notes. *Significant at less than 0.05. [o]Marginally significant at 0.05 to 0.10. Standard error in parentheses. [a]Bachelor's degree is the omitted category. [b]White is the omitted category. [c]Male is the omitted category. [d]Not born in the U.S. is the omitted category. [e]Did not live with both parents until 16 is the omitted category. [f]Not married or not living with a partner is the omitted category. [g]No children under six is the omitted category. [h]Nonunion member is the omitted category. [i]Nonsupervisor is the omitted category. [j]Public sector is the omitted category. [k]Los Angeles resident is the omitted category.

Hypothesis 3 predicts that UCGS with degrees higher than bachelor's degrees receive a greater return for their SCS. The prediction is partially supported by the regression results on the UCGS with PhD or professional degrees. Hypothesis 3 is supported in instances where the interaction of SCS and college degree attained above a bachelor's degree is positive ($\beta > 0$) and statistically significant ($p < .05$). Results from the interaction model (see Table XIII, Model 2) suggest that only the UCGS with PhD or professional degrees receive returns for a one standard deviation increase in their SCS that are significantly higher than those received by the UCGS with bachelor's ($\beta = 0.105$, $p = .019$) and master's degrees ($\beta = 0.143$, $p = .002$) Results on the model that shows the difference in returns between the UCGS with master's degrees and the UCGS with PhD or professional degrees are not shown in Table XIII since the regression coefficient for the interaction would be the only statistic that differs from the results shown in Model 2.

An *F* test that compared Model 1 and Model 2 in Table XIII indicates that the interactive model adds significantly to the explanation of the variation in earnings among the UCGS ($F_{2, 525} = 6.218$, $p = .002$). That result suggests that SCS have a more palpable effect on earnings when used in tandem with knowledge gained in connection with advanced or professional degrees or when they facilitate the use of knowledge gained in connection with advanced or professional degrees.

The prediction in Hypothesis 4 that the SCS of UCGS differ significantly by race and gender is not supported by the regression results. Hypothesis 4 would have been supported by the regression results if the regression coefficient for Black and female was statistically significantly ($p < .05$) different from zero ($\beta \neq 0$). The regression results in Table XIV indicate that Blacks have insignificantly less SCS than Whites ($\beta = -0.104$, $p = .403$) and females have marginally significantly more SCS than males ($\beta = 0.131$, $p = .083$). These results suggest that there is no significant difference in SCS between Black and White or male and female UCGS in this part of the study. However, as expected, Black UCGS have somewhat less SCS than White UCGS. Contrary to expectation, female UCGS have slightly more SCS than male UCGS.

Hypothesis 5 was tested with regression models to find out if the return that UCGS receive for their SCS differs significantly by race and gender. Hypothesis 5 is not supported by the regression results. Hypothesis 5 would have been supported by the regression results if the regression coefficient for the respective Black and female interaction with SCS was statistically significantly ($p < .05$) different ($\beta \neq 0$) from zero. The regression results in Table XV, Model 1 indicate that the difference in returns for SCS between Blacks and Whites is not significant ($\beta = 0.040$, $p = 0.336$), but the

Table XV. Regression Results--Hypothesis 5 for SCS

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage Model 1 Race × SCS β	Model 2 Gender × SCS β	Model 3 Race × SCS + Gender × SCS β
Social capital skills (SCS)	-0.008	0.002	-0.009
	(0.024)	(0.026)	(0.027)
Hard skills			
--Master's degree[a]	0.088	0.090	0.088
	(0.047)[o]	(0.047)[o]	(0.047)[o]
--PhD or prof. degree[a]	0.210	0.215	0.210
	(0.091)*	(0.091)*	(0.091)*
--Work experience (years)	0.038	0.037	0.038
	(0.006)*	(0.006)*	(0.006)*
--Work experience squared (years)	-0.001	-0.001	-0.001
	(0.000)*	(0.000)*	(0.000)*
Black[b]	0.051	0.057	0.052
	(0.062)	-0.063	-0.063
Female[c]	-0.070	-0.075	-0.071
	(0.038)[o]	(0.040)[o]	(0.040)[o]
Black x SCS[d]	0.040	-	0.040
	(0.068)	-	(0.070)
Female x SCS[e]	-	0.012	0.003
	-	(0.049)	(0.050)
Born in the U.S.[f]	0.125	0.117	0.125
	(0.062)*	(0.062)[o]	(0.063)*
Lived with both parents until 16[g]	-0.033	-0.029	-0.033
	(0.055)	(0.055)	(0.055)
Married or Live-in partner[h]	-0.014	-0.014	-0.013
	(0.044)	(0.044)	(0.044)
Children under six[i]	0.196	0.197	0.196
	(0.052)*	(0.052)*	(0.052)*
Job tenure (years)	0.002	0.003	0.002
	(0.001)	(0.001)[o]	(0.001)
Union[j]	-0.071	-0.070	-0.071
	(0.054)	(0.054)	(0.054)
Supervisor[k]	0.178	0.179	0.178
	(0.039)*	(0.040)*	(0.040)*
Private sector[l]	-0.134	-0.135	-0.134
	(0.049)*	(0.049)*	(0.049)*
Residency	0.000		
--Atlanta resident[m]	-0.120	-0.123	-0.120
	(0.061)[o]	(0.061)*	(0.062)[o]
--Boston resident[m]	-0.013	-0.014	-0.013
	(0.046)	(0.046)	(0.046)
Year	(0.054)	-0.012	-0.012
		(0.044)	(0.044)
Constant	3.938	3.940	3.941
	(4.137)	(4.141)	(4.142)
Adjusted R^2	20.4%	20.3%	20.3%
Model significance	0.000	0.000	0.000
Number of observations	546.000	546.000	546.000

Notes: *Significant at less than 0.05. [o]Marginally significant at 0.05 to 0.10. Standard error in parentheses.
[a]Bachelor's degree is the omitted category. [b]White is the omitted category. [c]Male is the omitted category. [d]White x SCS is the omitted category. [e]Male x SCS is the omitted category. [f]Not born in the U.S. is the omitted category. [g]Did not live with both parents until 16 is the omitted category. [h]Not married or not living with a partner is the omitted category. [i]No children under six is the omitted category. [j]Nonunion member is the omitted category. [k]Nonsupervisor is the omitted category. [l]Public sector is the omitted category. [m]Los Angeles resident is the omitted category.

comparatively scarce SCS among Black UCGS yields a relatively higher unit price. It is possible that Blacks generate a higher price because their SCS are unique.

The test results for Hypothesis 5 on gender in Table XV, Model 2 reveal that the difference in returns for SCS is not significant ($\beta = 0.012$, $p = 0.803$) and female UCGS receive an insignificantly higher return for their SCS than male UCGS. The moderately higher return that females receive for their SCS suggests that females may have SCS that directly generate work-related benefits. Females may also work for employers who value female SCS more than they value male SCS. The results of F tests on the combined ($F_{2, 525} = 0.464$, $p = 0.629$) and separate addition of the race ($F_{1, 526} = 0.926$, $p = 0.336$) and gender ($F_{1, 526} = 0.062$, $p = 0.803$) interaction with SCS to the earnings model provide further evidence that returns for SCS by race and gender in this part of the study have little to do with overall variation in earnings among the UCGS. A summary of all the results from this part of the study is presented in Table XVI.

Table XVI. Hypotheses on SCS Supported or Not Supported

Hypotheses	Supported	Not Supported
1. Returns for the SCS of UCGS are positive and significant.		√
2. UCGS who have more hard skills also have more SCS.	√ (Only supported by the UCGS with PhD or professional degrees because they have significantly more SCS than the UCGS with master's degrees.)	
3. The higher the college degree, the greater the return for the SCS of UCGS.	√ (Only supported by the UCGS with PhD or professional degrees because they get a significantly higher return for their SCS than the UCGS with bachelor's and master's degrees.)	
4. The SCS of UCGS differ significantly by race and gender.		√
5. Returns for the SCS of UCGS differ significantly by race and gender.		√

2.6 Discussion

This section includes a discussion of findings in this part of the study that extend the social capital literature with new information on the SCS of UCGS. In addition, ways in which the actual findings differ from or agree with previous findings are described. Speculation on how the new findings might be interpreted or affect policy is presented. Lastly, ways in which future research could add to the findings in this part of the study by addressing questions that remain about SCS are discussed.

The finding in this part of the study from the test of Hypothesis 1 is that returns for the SCS of UCGS are positive but not significant. This finding is not consistent with findings from previous studies on SCS and earnings of college-educated workers. Findings in those studies indicate that returns for SCS are positively and significantly related to earnings (see Barros, 2006; Borocz & Southworth, 1998; Dreher & Cox, 1996; Meyerson, 1994). The Meyerson (1994) study is quite similar to this part of the study, mainly because findings in the Meyerson (1994) study are based on SCS that arise exclusively from strong ties. Meyerson (1994) found SCS in her study positively and significantly related to earnings. The key difference among this part of the study, the Meyerson (1994) study, and related studies is methodology—especially the kind of people in the sample. For instance, the Meyerson (1994) study examined Swedish executives in low-performing firms. Several of the studies on SCS examined non-U.S. workers (see also, Barros, 2006; Borocz & Southworth, 1998). In a study of U.S. workers, Dreher and Cox (1996) only examined UCGS with graduate business degrees. It is unclear whether demand for SCS from non-U.S. workers who are college educated differ from demand for SCS from U.S. workers who are college-educated.

The finding from the test of Hypothesis 1 is, however, consistent with the finding in the Belliveau, O'Reilly, and Wade (1996) study that makes a distinction between absolute and relative SCS. In the Belliveau, O'Reilly, and Wade (1996) study, absolute SCS were positively and insignificantly related to CEO compensation and relative SCS were positively and significantly related to CEO compensation. Relative SCS are the embodiment of the comparison of the quantity and quality of the SCS of the focal individual with the quantity and quality of the SCS of the focal individual's social capital source. Absolute SCS do not take into account the quantity and quality of the SCS of any person other than the focal individual. The SCS examined in this part of the study were absolute SCS.

The finding from the test of Hypothesis 1 may have been an offshoot of larger macro economic phenomena as well as smaller micro economic occurrences. In terms of the larger macro economic phenomena, the loose labor market of the early 1990s may have enabled employers to avoid paying for SCS. In addition, the somewhat recent shift to a more service-job oriented economy may have made employers unaware of the ascendance of SCS to separate job skills; that is, a component required to complete a job and not merely an ability sometimes used in a job (Darrah, 1994). On the other hand, SCS may sometimes be used to get hired and to get clients but are not job skills since they are not used regularly on the job. Darrah (1994) asserted that some abilities that employers claim are necessary job skills are simply preferred, because none of the incumbents have those abilities.

In terms of the smaller micro economic factors, employers may have been unwilling to separately pay for individual SCS because individual SCS accumulate to the

firm (Burt, 1992). Employers may also have been unable to separately pay for individual SCS because they found individual SCS difficult or impossible to measure. In addition, anecdotal evidence from some employers on the shortage of SCS among certain employees and job candidates could have been a pretext for improper job sorting or discrimination (Grodsky & Pager, 2001; Moss & Tilly, 2001a). Burt (1992) pointed out that SCS might not have a post-hire earnings component, which was tested in this part of the study, because SCS is assessed during the pre-employment screening process to narrow the hiring pool. If that is correct, then the importance of SCS would likely be reflected in starting salaries.

Results from the test of Hypothesis 2 prompt the finding that, except for the UCGS with PhD or professional degrees, UCGS who have more hard skills do not have more SCS. This finding contravenes the assertion by Bridges and Villemez (1986) that work experience spawns and is a proxy for SCS. This finding also contradicts the finding by Pfeffer and Fong (2002) that college graduates with MBAs are inclined to accumulate an abundance of SCS at prominent business schools. Conversely, Deresiewicz (2008) suggested that college students from less prominent schools and programs may not accumulate extensive SCS because of a lack of emphasis on developing personal contacts. The UCGS with master's degrees in this part of the study may not have extensive SCS because of their concentration in occupations that do not hinge on them developing a profitable client base (Grodsky & Pager, 2001). Most of the UCGS with master's degree were elementary and high school teachers, nurses, librarians, social workers, school counselors, paralegals, human resource managers, and school administrators.

Hypothesis 3 predicts that UCGS with degrees higher than bachelor's degrees receive a greater return for their SCS. In this part of the study, only the UCGS with PhD or professional degrees receive a significantly greater return for their SCS than the UCGS with bachelor's and master's degrees. This finding is consistent with predictions that SCS combined with high levels of hard skills generally improve labor market outcomes (Arrow & Borzekowski, 2004; Glaeser et al., 2002; Ioannides & Soetevent, 2006). High levels of hard skills seem to mean intricate occupational specializations. The majority of the UCGS with PhD or professional degrees were lawyers, physicians, psychologists, pharmacists, and college professors. Conceivably, the UCGS in those occupations need to develop a lucrative client base (Grodsky & Pager, 2001). For those UCGS, getting clients may be an integral part of their jobs (e.g., Darrah, 1994). The developed client base then allows the UCGS with occupational specializations to derive a directly attributable return for their SCS as well as their hard skills (Burt, 1992). Alternatively, as stated above, most of the UCGS with master's degree are concentrated in occupations that do not hinge on the development of a lucrative client base. Differences in returns for SCS by level of college degree may also relate to differences in employer size. The UCGS with PhD or professional degrees in this part of the study generally worked for large employers who may have been better equipped to identify and pay for SCS.

Contrary to the prediction in Hypothesis 4, no significant difference in SCS by race and gender is found in this part of the study. Instead, White UCGS have slightly more SCS than Black UCGS and female UCGS have marginally significantly more SCS than male UCGS. The finding on Hypothesis 4 is consistent with previous findings on race but not with previous findings on gender (see e.g., Brass, 1985; Dreher & Cox, 1996;

Green, Hammer, & Tigges, 2000; Ibarra, 1992, 1995). Green, Hammer, and Tigges (2000) indicated that an analysis of data from the 1985 General Social Survey found Whites have the largest social network, Hispanics have the second largest social network, and Blacks have the smallest social network. They also indicated that females tend to have smaller social networks than males. Previous studies on social networks did not control for the influence of social class. Female UCGS are possibly in a social class that is different from the social class of non-college educated females or females in lower levels of organizations who were the subjects of many of the previous studies. In addition, unlike this part of the study, previous studies were primarily field studies that used data on workers at one firm or workers with one common trait. The Brass (1985) study, for example, analyzed data on male-female social network differences at a newspaper publishing company. The Dreher and Cox (1996) study looked at mentoring and MBAs. In general, findings in this part of the study relate to SCS measured outside work, findings in previous studies largely relate to social networks observed in a workplace.

The finding concerning Hypothesis 5—that the return UCGS received for their SCS did not differ significantly by either race or gender—is contrary to the expected finding. The expectation was that Blacks would receive significantly less compensation for their SCS than Whites (see Grodsky & Pager, 2001) and females would receive significantly less compensation for their SCS than males (Smith, 2000). Instead, Blacks in this part of the study earn slightly more for a one-standard-deviation increase in SCS than Whites. Females in this part of the study also earn slightly more for a one-standard deviation-increase in SCS than males. Blacks and females may be getting slightly more

compensation for their SCS because their SCS may be generating resources that previously eluded employers.

The findings from this part of the study provide insight into who accumulates SCS, how SCS are accumulated in relation to hard skills, and whether the accumulated SCS generates different returns for different degrees held, races, and genders. The findings also serve—along with related findings—as the foundation for the determination of whether: (a) SCS are an element of job skills and (b) policymakers should prescribe SCS training for college students. The findings in this part of the study lead to the determination that SCS, as measured in this part of the study, are not an element of job skills demanded from all UCGS and mandatory SCS training is unfounded. Notwithstanding, findings in this part of the study on the UCGS with PhD or professional degrees add support to the proposition that SCS are an element of the job skills of professionals.

The findings do, however, leave several questions on SCS unanswered. These unanswered questions could be the subject of future research. The unanswered questions include whether among a representative sample of U.S. professionals: (a) SCS that are measured before employment are positively and significantly related to starting salary; (b) SCS that are measured after employment and in work settings are positively and significantly related to post-hire earnings; (c) Blacks and Whites in identical jobs make different investments in SCS and get different returns for SCS; and (d) males and females in identical jobs make different investments in SCS and get different returns for SCS. An agreement among researchers on the definition and measurement of SCS and social

capital, as is the case with human capital and hard skills, is the feature that would most greatly enhance the usefulness and credibility of findings on SCS in future research.

CHAPTER III

INVESTMENTS IN AND RETURNS FOR THE SOFT SKILLS OF A CASE OF URBAN COLLEGE GRADUATES IN THE EARLY 1990S

3.1 Introduction

In a 1958 article, Mincer noted that an individual's job skills are an end product of training. Training is defined in the article as education at elementary school, high school, college, and on-the-job. Neither Mincer (1958) nor any of the other early human capital scholars defined job skills. They, however, implied that job skills are synonymous with human capital. Human capital is the stock, at a point in time, of acquired knowledge and abilities that is transformed into hard skills which are applied to perform jobs, among other things (Becker, 1962; Bjerk, 2003; Moss & Tilly, 1995, 2001a, 2001b; Schultz, 1961). An individual's human capital is objectively measurable and is demonstrated in jobs such as writing, computing, accounting, and engineering (Bjerk, 2003; Moss & Tilly, 2001a). In prior literature, human capital is sometimes referred to as hard skills, cognitive skills, non-generic skills, general skills or technical skills and the extent of an individual's human capital investment is used as a proxy for that individual's human capital. The human capital proxy variable is frequently used in hypothesis tests. Human capital theory is undergirded by hypothesis test results which indicate that, holding

everything else equal, on average, the greater the human capital investment made in an individual, the larger the future earnings generated by the individual.

One of the primary aims of modern-day colleges is to develop students' job skills (Leslie & Brinkman, 1988), but the job skills that are formally developed by colleges may exclude some of the skills demanded in the contemporary labor market. General job skills development by colleges has traditionally been equivalent to human capital development (Bowles & Gintis, 1976; Mayo, 1945). Yet, contemporary human capital scholars, other scholars, and employers contend that job skills are more than simply the outcome of human capital development. They believe that job skills are multidimensional (Bailey & Mitchell, 2006; Bowles, Gintis, & Osborne, 2001; Cappelli, 1995; Farkas, 2003; Glaeser, Laibson, & Sacerdote, 2002; Heckman & Rubinstein, 2001; Heckman, Stixrud, & Urzua, 2006; Holzer, 1996; Jackall, 1983; Kalleberg & Leicht, 1986; Levy & Murnane, 2004; Litecky, Arnett, & Prabhakar, 2004; Mason, 1997; Moss & Tilly, 2001a; Stasz, 2001).

In the 1980s, American employers began to claim that many employees and job candidates have the hard skills but not the soft skills necessary for jobs (Cappelli, 1995; U.S. Department of Labor, 1991). Soft skills are the stock, at a point in time, of acquired non-technical abilities and traits that are used in jobs in accordance with situational demands that revolve around unwritten communication, work ethic or attitude, and interaction (Conrad, 1999; Hogan & Shelton, 1998; Moss & Tilly, 1995, 1996). Soft skills are subjectively measurable (Conrad, 1999). In prior literature, soft skills were occasionally referred to as behavioral skills, generic skills, noncognitive skills, nontechnical skills, unobservable skills, intangible skills or social skills. An offshoot of

Moss and Tilly's (1995) research on race in urban work settings is their classification of traits such as self-esteem and dependability as motivational soft skills (MSS) and abilities such as giving understandable spoken feedback and understanding what should not be said at a meeting as interactional soft skills (ISS). Labor market outcomes have been studied in terms of quantity and/or quality of soft skills. Unless otherwise stated, quantity and quality of soft skills are referred to in this part of the study as soft skills. In addition, ISS means the oral communication style of middle-class, American-born, Whites who live or work in American cities and MSS are cooperativeness, calmness, and conscientiousness.

Soft skills demanded from one group may differ from soft skills demanded from another group. For example, some employers have expressed a demand for college graduates who can: (a) exhibit an executive presence; (b) link individual desires to organizational desires; (c) handle ambiguity; (d) display cultural sophistication; (e) communicate good-naturedly with cross-functional colleagues; and (f) motivate subordinates to achieve organizational goals (Becker, 1964b; Feldman & Newcomb, 1973; Jackall, 1983; Maes, Weldy, & Icenogle, 1997; Nyman, 2006; Ray, 1989; Wolosky, 2008). Soft skills used by one group or in one job may differ from soft skills used by another group or in another job; however, soft skills can be used across jobs except at times in different ways.

At first, employers were highly vocal about soft skills deficiencies among non-college graduates and then employers became vocal about soft skills deficiencies that plague some college graduates. Employer dissatisfaction with the soft skills of college graduates generally fell into two categories. Employers indicated that many recent,

young, and technically-inclined college graduates were unable to fit in and easily communicate with clients, constituents, colleagues, subordinates, and supervisors (Boyce, Williams, Kelley, & Yee, 2001; Gavaghan, 1999; Gilleard & Gilleard, 2002; Handel, 2003; Maes, Weldy, & Icenogle, 1997; Nguyen, 1998; Payne, 2005). Employers also expressed dissatisfaction with the inability of a range of college graduates to use their soft skills to close a deal. Closing a deal includes getting selected by a client or supervisor to do a project, getting selected for sponsorship, and securing funding, capital, or venture capital (Baron & Markman, 2000; Cassens Moss, 1987; Litecky, Arnett, & Prabhakar, 2004).

The escalation of the gap in income between different groups of U.S. college graduates in the 1980s and early 1990s may relate to differences in soft skills as well as differences in social capital skills (Burt, 1992; Burt & Ronchi, 2007; Dreher & Cox, 1996; Grodsky & Pager, 2001; Ostrom, 2000; Pfeffer & Fong, 2002). Social capital skills are the stock, at a point in time, of acquired methods of establishing, maintaining, and reinforcing relationships with individuals who are in groups or organizations for the purpose of gaining access to resources such as corporate revenues, non-profit funding, sponsors, advocates, and constituents (e.g., Bourdieu, 1986; Coleman, 1988). Social capital skills and soft skills are used in tandem when, for example, an agent gains access to the special projects marketing officer of a company to whom she later makes a face-to-face request for sponsorship of an athlete (e.g., Baron & Markman, 2000). If employers paid a premium to college graduates with soft skills and social capital skills, then the premium may have contributed to the growth in the income gap during the 1980s and early 1990s between different groups of college graduates. Reports tend to describe gaps

in income by age, race, and gender (Bound & Freeman, 1992; Eckstein & Nagypál, 2004; Katz & Autor, 1999; Levy & Murnane, 1992; Long, 2000; O'Neill, 1990; Tomaskovic-Devey, Thomas, & Johnson, 2005).

In addition to the hypothesis concerning the premium for soft skills and social capital skills, other hypotheses have been proposed for the growth in the income gap during the 1980s and early 1990s between different groups of workers. Some of the other hypotheses rest on differences in: (a) school quality (Grogger, 1996); (b) academic achievement (Juhn, Murphy, & Pierce, as cited in O'Neill, 1990); (c) concentration in private versus public sector industries (Grodsky & Pager, 2001; O'Neill, 1990); (d) periods of unemployment, job search, and job tenure (Tomaskovic-Devey, Thomas, & Johnson, 2005); (e) concentration in managerial or professional occupations (Bound & Freeman, 1992; Cotton, 1990); (f) hours per week worked or weeks per year worked (Tomaskovic-Devey, Thomas, & Johnson, 2005); (g) concentration in occupations that differ noticeably by gender ratio or race ratio (Groshen, 1991); (h) class or socioeconomic background (Mason, 1997); and (i) post-1970s affirmative action induced hiring (O'Neill, 1990). The foregoing hypotheses on differences have been tested, but findings on college graduates or urban college graduates are normally not provided. This part of the study specifically examined urban college graduates. Urban college graduates (UCGS) are individuals who live in an urban area of the United States of America and have at least a bachelor's degree.

In this part of the study, data on a case of UCGS were examined with regression models to find out whether in the early 1990s: (a) employers paid a premium for the soft skills of UCGS; (b) investments in soft skills as well as compensation for soft skills

differed significantly among UCGS by age, racial, and gender group; and (c) soft skills, social capital skills, and hard skills combined explained significantly more of the variation in earnings among UCGS than hard skills alone. The college graduates examined in this part of the study lived in a U.S. urban area and had a bachelor's degree and in many instances higher degrees. These college graduates were considered UCGS. The early 1990s was the focus of this part of the study because publicly available datasets that contained pre-1990s, mid-1990s, and 1990s data on UCGS did not simultaneously contain data on earnings, hard skills, social capital skills, and soft skills.

Findings from this part of the study arose primarily from results of regression models that used 1992 to 1994 data on UCGS from the Multi-City Study of Urban Inequality (MCSUI) Household Survey (MCSUI-HS). The MCSUI was designed to study ways in which changing labor market dynamics, racial attitudes and stereotypes, and residential segregation affect various aspects of urban inequality (Bobo et al., 2000). Data from the MCSUI-HS are responses to a survey of randomly selected adult residents of Atlanta, Boston, Detroit, and Los Angeles. Data on UCGS who lived in Detroit were not analyzed in this part of the study because of the absence of information on many of the variables used in the regression models.

Findings from this part of the study extend previous findings in the soft skills literature. First, previous findings are extended by the examination of contemporary UCGS from three dissimilar U.S. cities who worked in a variety of industries and occupations and who acquired undergraduate, graduate, doctoral, and professional degrees in a range of fields and disciplines. Second, previous findings are extended by findings on differences in ISS and MSS by age and gender. Third, previous findings are

extended by findings on the concurrent addition to an earnings model of explanatory variables that represent soft skills and social capital skills.

The finding from the test of Hypothesis 1 is that employers did not pay a premium for the soft skills of the UCGS in the early 1990s. Employers did not pay a premium for ISS or MSS because neither was scarce among the UCGS. Unexpectedly, the return for MSS was negative and insignificant. The finding of a negative return for MSS in this part of the study may be a reflection of the previous finding that: (a) MSS are only valued in non-college jobs and when workers do not have college degrees (Heckman, Stixrud, & Urzua, 2006) or (b) it takes roughly two decades for MSS acquired before entry into the labor market to bring about productivity gains that merit compensation (Dunifon & Duncan, 1998). Further research is needed to find out which, if any, of those previous findings on MSS is pertinent to UCGS.

One finding that emerges from the test of Hypothesis 2 is that White UCGS invested significantly more in ISS in the early 1990s than Black UCGS. Contrary to expectation, younger UCGS, who were under age 36, invested significantly more in MSS in the early 1990s than older UCGS. Despite those findings, the finding from the test of Hypothesis 3 indicates that returns for ISS and MSS among the UCGS in the early 1990s did not differ significantly by age, racial, or gender group. The returns for soft skills did not differ significantly between groups because soft skills were broadly available among the UCGS.

Contrary to the prediction in Hypothesis 4, soft skills and social capital skills had little to do with the variation in earnings in the early 1990s among the UCGS. Yet, approximately 16% of the returns normally attributed to hard skills acquired through

getting or having master's, PhD, and professional degrees were related to soft skills and social capital skills. This finding gives limited support to the notion that UCGS are compensated for soft skills and social capital skills acquired through college, but this and other findings in this part of the study indicate that the compensation is not significant.

The remainder of this chapter on soft skills and UCGS continues below in sections. Section 3.2 contains a description of relevant segments of the soft skills literature. Section 3.3 includes specifications of the regression models used in the hypothesis tests conducted in this part of the study. Section 3.4 gives details of the research method used in this part of the study, including the criteria for selecting the UCGS examined. Section 3.5 consists of an interpretation of the results from the hypothesis tests conducted. Section 3.6 has the findings from this part of the study, the reconciliation of actual versus predicted findings, and the corresponding policy implications.

3.2 Literature Review

This section contains a description of the catalyst for soft skills research and the areas of agreement and disagreement among researchers, practitioners, and employers about the features of soft skills. In addition, findings on the demand for and supply of soft skills are described. The contention that variations in earnings are related to the soft skills mismatch and the discriminatory treatment of certain groups because of their soft skills is discussed. The concluding paragraphs highlight gaps in the soft skills literature that stimulated this part of the study, including the absence of studies on the combined role of soft skills, social capital skills, and hard skills.

Mayo (1945), a psychologist and sociologist, indicated in his discussion about job skills in industrial civilizations that at some point in a society, the previously neglected factor—here soft skills—becomes the more important factor. In the discussion, he also indicated that workers in pre-industrial times simultaneously learned hard skills and soft skills (which he referred to as social skills) in their apprenticeships and both skills were considered essential to getting jobs, completing jobs, and retaining customers. Nevertheless, in the 1940s, colleges concentrated on formally developing hard skills and overlooked formal soft skills development. Mayo (1945) portrayed the failure of colleges to formally develop soft skills as a leading contributor to the scarcity of soft skills among college-educated workers in the 1940s and as a reason why employers considered soft skills more important than hard skills.

The importance of soft skills in the modern workplace was signaled in a 1991 report by the Labor Secretary's Commission on Achieving Necessary Skills (the SCANS Report) that outlined the skills students would need to succeed in the twenty-first century workplace (Packer, 1992; U.S. Department of Labor, 1991). Recommendations made in the SCANS Report on necessary skills were based on findings from surveys of U.S. employers, employees, and work related organizations that include unions. The main feature of the SCANS Report was the recommendation that all workers in the twenty-first century workplace, regardless of occupation, exhibit five competencies and three foundations. One of the competencies was interpersonal skills (e.g., working well with people) and one of the foundations was personal qualities (e.g., sociability). Interpersonal skills and personal qualities fall within the ambit of soft skills. The remaining competencies and foundations are arguably hard skills.

Recent reports on soft skills in the labor economics, psychology, sociology, and organizational behavior literatures stem from the Scans Report and the work by Mayo (1945) on job skills. Anecdotal evidence from employers about soft skills shortcomings by race, gender, age, and ethnicity pointed labor economists toward conducting research on soft skills under the umbrella of the economics of discrimination. In contrast, research on the soft skills of college-educated workers is reported more prevalently in the psychology, sociology, and organizational behavior literatures. Notwithstanding, reports in the different literatures disjointedly address soft skills. As a result, descriptions in this section are by topic area and not literature genre.

A survey of academic and nonacademic literatures, employers, and job training program administrators to find out whether soft skills affect hiring of urban minorities steered Conrad (1999) to devise a function-based definition of soft skills. She defined soft skills as:

> Non-technical skills, abilities, and traits required to function in a specific (structured) employment environment so as to: (1) deliver information or services to customers and co-workers; (2) work effectively as a member of a team; (3) learn or acquire the technical skill required to perform a task; (4) inspire the confidence of supervisors and management; and (5) understand and adapt to the cultural norms of the workplace (p. 6).

In addition, Conrad (1999) classified soft skills as cognitive skills (e.g., determining what is needed to accomplish work assignments), oral communication skills (e.g., orally transmitting information appropriate to listeners and situations), personal qualities (e.g., being willing to learn), and interpersonal skills (e.g., being able to conduct ones self at work according to work norms).

In her report on soft skills and urban minority hires, Conrad (1999) pointed out that there is general agreement among researchers and practitioners that oral communication skills, interpersonal skills, and personal qualities are essential for getting jobs, but cognitive skills are critical for keeping jobs. Researchers and practitioners also agree that employer assessments of soft skills are subjective, soft skills cannot be measured with the same precision as hard skills, soft skills are learned, and soft skills are dependent on workplace and job context (e.g., Hochwarter et al., 2006; Moss & Tilly, 1996, 2001a; Pulich & Tourigny, 2004). Points of disagreement revolve around how soft skills should be measured (Handel, 2003; Moss & Tilly, 1995; Packer, 1992; Strebler, 1997), who bears the bulk of the responsibility for teaching soft skills (Cappelli, 1995; Carneiro, Heckman, & Masterov, 2005; Deil-Amen, 2006; Mayo, 1945), and when soft skills are important—pre-hire or post-hire (Baron & Markman, 2000; Cassens Moss, 1987; Edwards, 1976; Holzer, 1996; Litecky, Arnett, & Prabhakar, 2004; Moss & Tilly, 1995, 1996; Pfeffer & Fong, 2002). Edwards (1976) contended that soft skills are only assessed during pre-employment screenings to narrow the hiring pool. Baron and Markman (2000), Litecky, Arnett, and Prabhakar (2004), and Moss (1987) contrarily contended that soft skills have a post-hire earnings component.

Contemporary reports on soft skills were first written by Moss and Tilly (1995, 1996, 1999; see also, Kirschenman, Moss, & Tilly, 1995) and described requirements and perceptions that may have discouraged urban employers from hiring Blacks. The first peer reviewed report on soft skills by Moss and Tilly (1995) is considered the seminal contemporary report on soft skills. One of the chief contributions of that report to the literature is their cluster analysis-based classification of soft skills in urban work settings.

They classified soft skills as MSS or ISS. An employee's MSS are traits that include positive attitude, positive self-esteem, assertiveness, and dependability. The traits facilitate work without much oversight or inducement. An employee's ISS are abilities that facilitate effective interactions with customers, co-workers, constituents, and supervisors and include assimilation, clear and appropriate spoken communication, and cordial operation within a team.

Moss and Tilly (1995, 1996, 2000, 2001a, & 2001b) also presented findings in a series of reports on assertions that employer demand for soft skills from non-college graduates who work in urban areas was growing. They found that service sector employers placed considerable emphasis on soft skills and employers across sectors claimed that added competitive pressure, increased customer contact, and intensified organizational downsizing or restructuring magnified demand for employees with soft skills (see also, Bluestone & Stephenson, 2000; Conrad, 1999; Davis, 1993; Howell & Wolff, 1991; Ray, 1989). In addition, Holzer (1996) found that soft skills were used daily in more than half of the non-college jobs surveyed in the MCSUI. Non-college jobs do not require a college degree. Reports on other studies indicate that contemporary employers downplay typical school-based factors in making hiring decisions, especially among job finalists, and pay closer attention to attitude, communication skills, and previous work experience (Cappelli, 1995; Handel, 2003; Maes, Weldy, & Icenogle, 1997; National Center on the Educational Quality of the Workforce, 1995; Stasz, 2001).

Growing employer demand for workers with soft skills reportedly affected non-college graduates as well as college graduates. Most of the literature on soft skills concern non-college graduates who live and/or work in urban areas. The small body of

literature on soft skills and college graduates largely refers to soft skills shortcomings of college graduates with technical majors (e.g., information systems, engineering, and accounting) and soft skills shortcomings of recent and young college graduates (Boyce et al., 2001; Davis & Woodward, 2006; Gavaghan, 1999; Gilleard & Gilleard, 2002; Handel, 2003; Maes, Weldy, & Icenogle, 1997; Nguyen, 1998; Payne, 2005). The focus on urban work settings virtually disappears when the literature addresses soft skills and college graduates.

The literature contains anecdotes from employers and results from surveys of employers which indicate that employers believe many recent, young, and technically-inclined college graduates are unable to fit in and easily communicate with clients, constituents, colleagues, subordinates, and supervisors (Boyce et al., 2001; Gavaghan, 1999; Gilleard & Gilleard, 2002; Handel, 2003; Maes, Weldy, & Icenogle, 1997; Nguyen, 1998; Payne, 2005). Maes, Weldy, and Icenogle (1997) reported that managers think colleges provide training in the wrong type of communication skills or in communication skills that students might never use or might not use until 20 years after they leave college (see also, Baker & Phillips, 2001). Instead of preparing students to make presentations to large groups and to instruct and interview others, managers want colleges to teach students how to conduct meetings and to resolve conflicts with co-workers and customers. Above all, managers want colleges to produce graduates who are proficient at listening, following instructions, conversing, and giving feedback. Findings on communication skills and assimilation are tantamount to findings on ISS.

Findings on MSS relate less to its scarcity among younger workers and more to returns or demand for MSS. In a study by Dunifon and Duncan (1998) that examined

workers in different age cohorts, they found that earnings gains were associated with MSS acquired by younger workers before they entered the workforce (see also, Goldsmith, Veum, & Darity, 1997). In the study, MSS were a sense of personal control and a preference for challenges. They also found that positive and significant returns for MSS took about 15 to 25 years to emerge. Their findings arose from their analysis of data from the Panel Study of Income Dynamics. Similarly, Mueller and Plug (2006) find MSS (i.e., openness and calmness) measured as part of the 1957 Wisconsin Longitudinal Study to be positively and significantly related to earnings measured 35 years later.

One study that examined demand for MSS (i.e., self-control and positive self-esteem) in terms of value for the MSS of 4-year college graduates was the Heckman, Stixrud, and Urzua (2006) study. They found in the study that the MSS of 4-year college graduates were valued less than the MSS of high school dropouts to 2-year college graduates (see also, Ferris, Witt, & Hochwarter, 2001). In contrast, the hard skills of 4-year college graduates were valued the most when compared to the value of the hard skills of all the other schooling groups (see also, Levy & Murnane, 1992). In the study, MSS were measured 8 to 16 years before earnings were measured. The main contribution of the study to the literature is the finding that MSS were only valued in non-college jobs and when workers did not have college degrees. The study used data on individuals at age 30 from the National Longitudinal Survey of Youth, 1979 cohort.

Older workers who are college graduates in managerial and executives positions also encountered demands for soft skills. For instance, managers in large chemical and textile companies stated that promotions to middle and upper management were more dependent on soft skills than on hard skills (Jackall, 1983). The soft skills evaluated for

promotions were: (a) having a powerful patron, (b) giving sophisticated presentations and answers, (c) being a team player, (d) having self-control, and (e) displaying company appropriate appearance and dress. In another instance, senior executives stated that their soft skills were their most demanded and used job skills (Baker & Phillips, 2001). They mostly used communication, management, and leadership skills.

Some employers blamed soft skills deficiencies on professional and technical schools in the United States that fail to teach recent, young, and technically-inclined college graduates the soft skills necessary for entry-level professional work (e.g., Becker, 1964b; Deil-Amen, 2006; Maes, Weldy, & Icenogle, 1997; Murphy & Jenks, 1983; Nyman, 2006). Other employers expressed displeasure with the inability of all kinds of college graduates to use their soft skills to close a deal. Closing a deal includes getting selected by a client or supervisor to do a project, getting selected for sponsorship, and securing funding, capital, or venture capital (Baron & Markman, 2000; Cassens Moss, 1987; Litecky, Arnett, & Prabhakar, 2004). Soft skills deficiencies among professional and corporate workers spurred the growth in the soft skills corporate training market by 26.1% of the total corporate training market during 2004 and 2006 ("Leading Soft Skills Trainer to Generate $1.89 Billion," 2006).

Despite employer dissatisfaction with the quality and scope of soft skills training by colleges, college graduates continue to supply soft skills acquired in college. Soft skills training provided by colleges includes, but is not limited to, informal lessons in manners, poise, cultural sophistication, and values exhibited by the middle-class and upper-middle-class (Feldman & Newcomb, 1973; see also, Maes, Weldy, & Icenogle, 1997). Even so, Bowles and Gintis (1976) criticized colleges for tailoring soft skills

training to the typical social class of their students and the hierarchy of jobs that their students tend to secure. Deresiewicsz (2008) contended that this tailored training is the main reason why students at Cleveland State University were generally taught skills for low-level supervisory jobs and students at elite colleges such as Yale University were taught leadership skills that prepare them for leadership positions in major corporations and the government.

Some college graduates supply the precise soft skills demanded by employers because of techniques learned in employer-sponsored training programs (Littlefield, 1995; Leigh, Lee, & Lindquist, 1999). Training provided by or through employers can be expensive and time-consuming to formulate, implement, and evaluate. Due to those features, employer-sponsored soft skills training is usually carried out by large firms, related networks of small firms, and consulting firms (National Center on the Educational Quality of the Workforce, 1995; Stasz, 2001). Training is predominantly offered to highly-skilled employees and employees in jobs that are hard to fill. Employers who use independent contractors, part-time employees, and temporary employees are able to provide on-the-job soft skills training to broader groups of workers at a comparatively low cost. Reliance on employer-sponsored soft skills training programs to fulfill overall employer demand poses one major problem: Individuals who are not employed by sponsoring employers are not exposed to the soft skills training.

The soft skills that U.S. employers demand are culturally defined and are commonly supplied by mainstream Americans (i.e., middle-class, American-born, Whites who live or work in American cities; Lang, 1986; Wilson, 1996, 1997; Moss & Tilly, 1996, 1999, 2001a; Strebler, 1997). Soft skills are sometimes acquired through

interactions within families and communities. Job applicants and employees who do not have interactions within families and communities that are similar to mainstream American families and communities might not develop and, hence, be able to supply soft skills valued by employers. Wilson (1987, 1991, 1996) believed that continued segregation in housing by race and class and disproportionate fragmentation of the nuclear minority family has produced pockets of socially isolated individuals who have not had the opportunity to learn mainstream behaviors. The socially isolated individuals tend to be Blacks and Hispanics who live in high-poverty inner-city areas.

Some female managers and executives claimed that they were not getting more senior jobs partly because they were being judged for promotions by male senior executives on the basis of male cultural norms and soft skills that were typically supplied by males (see Strebler, 1997; Groves, 2005). In keeping with that claim, Mueller and Plug (2006) found that only females were positively and significantly rewarded for being conscientious and only males were positively and significantly rewarded for being disagreeable. In another study that used mostly self-reported data from banking industry managers, Penley et al. (1991) found that female managers were significantly more introverted than male managers and female managers had significantly lower oral communication skills than male managers. Their finding of a positive and significant link between oral communication skills and job performance prompted the researchers to speculate that the lower oral communication skills of female managers contribute to their lower job performance ratings. The researchers, however, added the caveat that other studies indicate that females tend to self-report lower skill ratings than males due to the

comparatively higher standards that females place on themselves (e.g., Maccoby & Jacklin as cited in Penley et al., 1991).

Some researchers believe that a portion of the variation in earnings among non-college graduates and college graduates is associated with soft skills, particularly the above-described gap between soft skills that employers demand and soft skills that employees and job candidates supply (Bowles, Gintis, & Osborne, 2001; Farkas, 2003; Glaeser, Laibson, & Sacerdote, 2002; Heckman & Rubinstein, 2001; Heckman, Stixrud, & Urzua, 2006; Litecky, Arnett, & Prabhakar, 2004; Moss & Tilly, 2001a). This gap is commonly referred to as the soft skills mismatch (Handel, 2003). The soft skills mismatch encompasses not only differences in amount of soft skills, but also differences in value ascribed to soft skills (Ling, 2002). Studies on soft skills and earnings inequality or earnings distribution overwhelmingly analyze non-college graduates who live and/or work in urban areas (Moss & Tilly, 1995, 1996; Holzer, 1996; Bluestone & Stevenson, 2000; Farley, Danzinger & Holzer, 2000; Sjoquist, 2000; Moss & Tilly, 2000, 2001a & 2001b; O'Connor, Tilly, & Bobo, 2001). Yet, the largest gap in earnings after the mid-1970s is between different groups of college graduates (O'Neill, 1990; Bound & Freeman, 1992; Long, 2000; Grodsky & Pager, 2001).

Other researchers have expressed the view that some of the variation in earnings between different groups of non-college graduates and college graduates is associated with the discriminatory treatment of certain groups because of their soft skills or lack of soft skills. The researchers have also stated that employers overstate their demand for soft skills as a pretext for discriminating against workers with certain demographic and/or socio-economic attributes (Moss & Tilly, 1995, 1996; Holzer, 1996; Conrad, 1999).

Forms of discrimination that employers may be applying are taste discrimination and statistical discrimination. Taste discrimination occurs when employers take actions, such as hiring, promoting, and paying a premium for same group workers, which perpetuate their own, their employees' or their customers' prejudice (Becker, 1964a; Wolff, 1997). Employers engage in statistical discrimination when, due to a lack or misapplication of information, they assess the characteristics and skills of job candidates based on a stereotype about the group to which the job candidate belongs (Aigner & Cain, 1977).

Studies on soft skills and discrimination that include college graduates and UCGS usually do not involve separate examinations of college graduates or UCGS. The Fan, Wei, and Zhang (2005) study on workers in white-collar jobs jointly examined non-college graduates and college graduates. In the study, Black, White, Hispanic, and Asian males in hard skills and soft skills jobs were examined. The researchers found a significant difference in earnings between White males and Black males only. Black males in soft skills jobs earned significantly less than White males and Black males in hard skills jobs earned significantly more than White males. In addition, they found only Black males to be significantly more likely to choose hard skills jobs and shun soft skills jobs. The researchers speculated that past discriminatory treatment related to their soft skills motivated Black males to develop a comparative advantage in hard skills.

Findings from studies reported in the labor economics, psychology, sociology, and organizational behavior literatures support the notion that a multitude of skills that include soft skills, social capital skills, and hard skills are applied in jobs. The findings do not rank the multitude of skills by importance even though the skills are generally applied in assorted combinations and at different times. Instead, the findings typically indicate

that one or two of the three skills is important (see Farkas, 2003; Glaeser, Laibson, & Sacerdote, 2002; Goldsmith, Veum, & Darity, 1997; Grodsky & Pager, 2001; Heckman, Stixrud, & Urzua, 2006; Ray, 1989).

It is still unclear for whom and under what circumstances soft skills, social capital skills, and hard skills are always, sometimes, or rarely essential and the optimal combination of these skills for college graduates. The uncertainty continues because most employers cannot clearly identify the different skills (Moss & Tilly, 1995, 1996, 2000; Bluestone & Stevenson, 2000). Consequently, findings from quantitative studies that substantiate the importance of soft skills may be dubious because findings from qualitative studies call attention to employers who mistake hard skills for soft skills (e.g., Bluestone & Stevenson, 2000). Previous findings on soft skills may also be questionable because researchers did not take into account purportedly complementary skills such as social capital skills (Baron & Markman, 2000; Grodsky & Pager, 2001).

Some researchers suggest that soft skills, social capital skills, and hard skills are acquired and applied sequentially (Conrad, 1999; Baron & Markman, 2000; Litecky, Arnett, & Prabhakar; 2004). They think that hard skills are acquired first to give the individual the ability to provide a good or service. Social capital skills are developed next to give the individual access to people or organizations that may need the individual's good or service. The individual then gets selected to provide the good or service by a person or organization after a face-to-face meeting that showcases the individual's soft skills. In that scenario, all three skills are needed to complete the job and receive compensation for the job. Therefore, all three skills are separate job skills by Darrah's

(1994) definition of job skills. In his definition, job skills are abilities and traits required to complete jobs and not merely mechanisms sometimes used in jobs.

The abovementioned studies that dealt with soft skills and discrimination in employment or soft skills mismatches did not explicitly examine UCGS who work in a variety of companies, industries, and occupations. As a result, many unanswered questions remain concerning soft skills and UCGS. In this part of the study, a quantitative case study was used to obtain empirically supported answers to a few of the unanswered questions prompted by gaps in the soft skills literature. The case consisted of a subsample of UCGS from the Multi-City Study of Urban Inequality Household Survey (MCSUI-HS). The unanswered questions investigated were articulated as the following hypotheses: (a) employers paid a premium in the early 1990s for the soft skills of UCGS; (b) in the early 1990s, older, White, and male UCGS were significantly more likely to have soft skills than younger, Black, and female UCGS; (c) the compensation that UCGS received in the early 1990s for their soft skills differed significantly by age, racial, and gender group; and (d) in the early 1990s, the combination of soft skills, social capital skills, and hard skills explained significantly more of the variation in earnings among UCGS than hard skills alone. The hypotheses were tested in the manner described in section 3.3.

Findings from this part of the study help fill gaps in the soft skills literature on UCGS. The soft skills literature is split into two streams of research: Soft skills mismatch and discrimination in employment. Figure 4 contains a conceptual model, in the manner

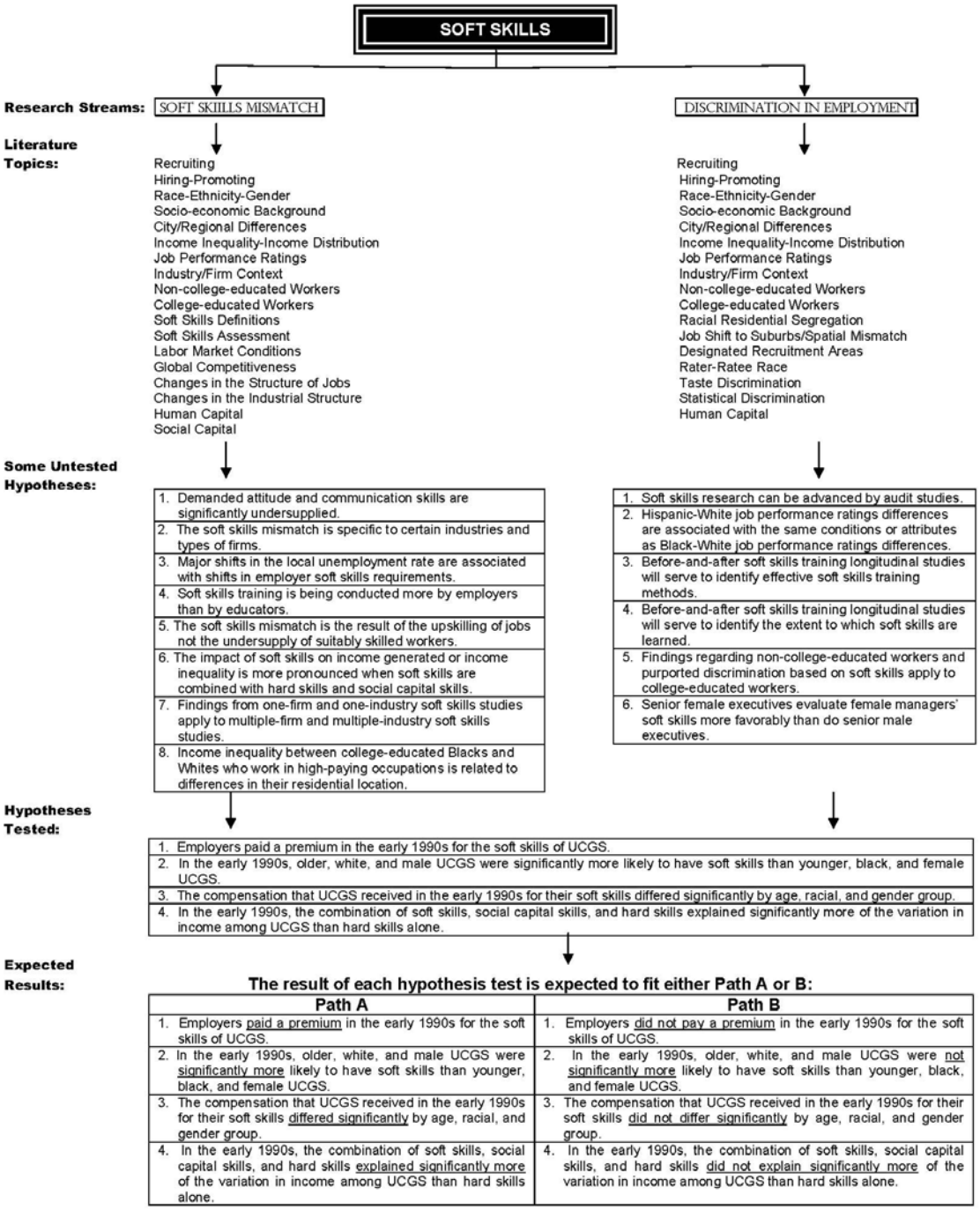


Figure 4. Conceptual Model for Soft Skills

recommended by Creswell (2003), which is based on the extant literature on soft skills. The first part of the soft skills conceptual model lists topics addressed in the literature within each research stream. The second part of the conceptual model identifies some

untested hypotheses proposed by other researchers for further study. The third part of the conceptual model specifies the hypotheses tested in this part of the study. The fourth and last part of the conceptual model shows possible results from the hypothesis tests.

3.3 Hypotheses

Regression models and attendant decision rules formulated to test hypotheses prompted by gaps in the soft skills literature and investigated in this part of the study are specified in this section. Four hypothesis tests were carried out using weighted least square regression models and in one instance logistic regression models. Weighted models took into account the over-sampling of Blacks and low-income households in the MCSUI-HS. Logistic regression models were used to test the hypothesis that called for the use of a dichotomous dependent variable; that is, had or did not have soft skills (Liao, 1994; Wright, 1995). In addition to partial regression coefficients, means and standard deviations were also calculated. The main assumption made in formulating the regression models was that earnings, soft skills, social capital skills, and hard skills were not determined simultaneously. Another assumption was that there was no difference in willingness to supply job skills between different groups of UCGS.

Earnings was an outcome variable in several of the regression models. In those regression models, the natural logarithm of hourly wage paid by an employer to an urban college graduate (i) in a survey year was designated as earnings. Hourly wage was first converted to 2008 dollars with the Consumer Price Index for all urban consumers and then transformed to a natural logarithmic form to create an outcome variable with a normal distribution. The UCGS examined in the regression models were the aggregate of

non-randomly selected college graduates from Atlanta, Boston, and Los Angeles who met the subsample selection criteria set out in section 3.4 below.

Since the soft skills analyzed with regression models were used in urban work settings, Moss and Tilly's (1995) two-tiered classification of soft skills in an urban work setting was followed. Accordingly, soft skills were represented by two dummy variables: (a) an ISS dummy variable (based on survey interviewers' judgments of whether the UCGS did or did not speak English as excellently as middle-class, American-born, Whites who live or work in American cities; see Dávila, Bohara, & Saenz, 1993) and (b) a MSS dummy variable (based on survey interviewers' judgments of whether the UCGS were or were not cooperative, calm, and conscientious; see Goldsmith, Veum, & Darity, 1997; Heckman, Stixrud, & Urzua, 2006). Researchers in one study found instant judgments of soft skills by novices to be more accurate than judgments by professionals (see "Physiognomy and Success: Face Value," 2008).

Choice and non-choice controls were also used in the regression models. Choice controls represented phenomena or occurrences that could directly or indirectly have been selected by an individual. Non-choice controls represented phenomena or occurrences that are usually not chosen by an individual. All of the controls used in the models represented factors that the literature indicates affects earnings, soft skills, social capital skills, and/or hard skills.

Choice controls used in the regression models related to: (a) hard skills (i.e., highest college degree attained, potential work experience, and potential work experience squared; Becker, 1964a; Mincer, 1974; with potential work experience being represented by age minus school leaving age multiplied by the proportion of time spent working after

leaving school); (b) job tenure (Smith, 2000; U.S. General Accounting Office, 2003); (c) union membership (i.e., being a union member and/or subject to a collective bargaining agreement; U.S. General Accounting Office, 2003; Behtoui, 2007); (d) supervisory or nonsupervisory work position (Borocz & Southworth, 1998); (e) private sector or public sector employment (Grodsky & Pager, 2001); and (f) city of residence (i.e., an Atlanta, Boston, or Los Angeles resident; Mouw, 2003; Black, Kolesnickova, & Taylor, 2007).

Non-choice controls used in the regression models related to: (a) birth in the U.S. (Behtoui, 2007); (b) racial group (i.e., Black or White; Dreher & Cox, 1996; Smith, 2000; Glaeser et al., 2002); (c) gender group (i.e., male or female; Ibarra, 1992; Dreher & Cox, 1996; Glaeser et al., 2002; U.S. General Accounting Office, 2003); (d) age group (i.e., age 21-35 or age 36-65; Handel, 2003); (e) socioeconomic background (i.e., living with both parents until age 16; Loury, 1977; Meyerson, 1994; Walpole, 1998); and (f) year of survey response (Fan, Wei & Zhang, 2005). Each model also produced an error term (E).

Regression models were first developed to test Hypothesis 1, which states that employers paid a premium in the early 1990s for the soft skills of UCGS. Hypothesis 1 would be supported by the results if the regression coefficient for any of the explanatory soft skills dummy variables (coded as 1 to signify having the soft skill) is positive ($\beta > 0$) and statistically significantly ($p < .05$) in the earnings model. The fulfillment of the foregoing requirement was interpreted as the satisfaction of the decision rule for Hypothesis 1. The fulfillment of similar requirements that are described below and that relate to the remaining hypothesis tests was also interpreted as the satisfaction of the related decision rules.

Immediately below is a formulaic representation of the regression model used to test Hypothesis 1. Wholly dummy variables are underlined and expected signs are provided. In this and other models that include hard skills, a positive regression coefficient was expected for each underlying variable except the work experience squared variable. The regression model used to test Hypothesis 1 was as follows:

> *Hypothesis 1*. Employers paid a premium in the early 1990s for the soft skills of UCGS.

Model: $$\text{Ln Earnings}_i = \beta_0 + \beta_1\underline{\text{Soft Skills}}_{1i} - \beta_2\underline{\text{Black}}_{2i} - \beta_3\underline{\text{Female}}_{3i} - \beta_4\underline{\text{Under Age 36}}_{4i} + \beta_5\underline{\text{Born in the U.S.}}_{5i} + \beta_6\underline{\text{Lived with Both Parents Until 16}}_{6i} + \beta_7\text{Year}_{7i} + \beta_8\text{Hard Skills}_{8i} + \beta_9\text{Job Tenure}_{9i} + \beta_{10}\underline{\text{Union}}_{10i} + \beta_{11}\underline{\text{Supervisor}}_{11i} + \beta_{12}\underline{\text{Private Sector}}_{12i} + \beta_{13}\underline{\text{Residency}}_{13i} + E_i$$

Logistic regression models were formulated to test Hypothesis 2 that older, White, and male UCGS were significantly more likely, in the early 1990s, to have soft skills than younger, Black, and female UCGS. Hypothesis 2 would be supported by the results if the odds of having ISS and MSS are statistically significantly ($p < .05$) greater ($e^{\beta} > 1$) for UCGS who were over age 35, White, and male than for UCGS who were under age 36, Black, and female. The specific predictor dummy variables of interest in the models were: (a) over age 35, (b) White, and (c) male. The models used to test Hypothesis 2 were as follows:

> *Hypothesis 2*. In the early 1990s, older, White, and male UCGS were significantly more likely to have soft skills than younger, Black, and female UCGS.

ISS Model: $$\text{Prob}(Y = 1 = \underline{\text{ISS}})_i = \beta_0 + \beta_1\underline{\text{Over Age 35}}_{1i} + \beta_2\underline{\text{White}}_{2i} + \beta_3\underline{\text{Male}}_{3i} + \beta_4\underline{\text{Born in the U.S.}}_{4i} + \beta_5\underline{\text{Lived with Both Parents Until 16}}_{5i} + \beta_6\text{Year}_{6i} + \beta_7\text{Hard Skills}_{7i} + \beta_9\text{Job Tenure}_{9i} + \beta_{10}\underline{\text{Union}}_{10i} + \beta_{11}\underline{\text{Supervisor}}_{11i} + \beta_{12}\underline{\text{Private Sector}}_{12i} + \beta_{13}\underline{\text{Residency}}_{13i} + E_i$$

MSS Model: $\text{Prob}(Y = 1 = \underline{\text{MSS}})_i = \beta_0 + \beta_1\underline{\text{Over Age 35}}_{1i} + \beta_2\underline{\text{White}}_{2i} + \beta_3\underline{\text{Male}}_{3i} + \beta_4\underline{\text{Born in the U.S.}}_{4i} + \beta_5\underline{\text{Lived with Both Parents Until 16}}_{5i} + \beta_6\text{Year}_{6i} + \beta_7\text{Hard Skills}_{7i} + \beta_9\text{Job Tenure}_{9i} + \beta_{10}\underline{\text{Union}}_{10i} + \beta_{11}\underline{\text{Supervisor}}_{11i} + \beta_{12}\underline{\text{Private Sector}}_{12i} + \beta_{13}\underline{\text{Residency}}_{13i} + E_i$

Hypothesis 3 was tested using the regression models outlined immediately below to find out if the results support the belief that in the early 1990s the compensation UCGS received for their soft skills differed significantly by age, racial, and gender group. Hypothesis 3 would be supported by the results if the respective age, race, and gender interaction with ISS and MSS in the earnings model is statistically significantly ($p < .05$) different ($\beta \neq 0$) from zero. In the models specified below, Model 1 is the age interaction model, Model 2 is the race interaction model, and Model 3 is the gender interaction model. Model 4 has all the interactions. The models used to test Hypothesis 3 were as follows:

> *Hypothesis 3*. The compensation that UCGS received in the early 1990s for their soft skills differed significantly by age, racial, and gender group.

Model 1: $\text{Ln Earnings}_i = \beta_0 + \beta_1\underline{\text{Soft Skills}}_{1i} - \beta_2\underline{\text{Black}}_{2i} - \beta_3\underline{\text{Female}}_{3i} - \beta_4\underline{\text{Under Age 36}}_{4i} - \beta_5(\underline{\text{Under Age 36}}_{4i} \times \underline{\text{Soft Skills}}_{1i})_{5i} + \beta_6\underline{\text{Born in the U.S.}}_{6i} + \beta_7\underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8\text{Year}_{8i} + \beta_9\text{Hard Skills}_{9i} + \beta_{10}\text{Job Tenure}_{10i} + \beta_{11}\underline{\text{Union}}_{11i} + \beta_{12}\underline{\text{Supervisor}}_{12i} + \beta_{13}\underline{\text{Private Sector}}_{13i} + \beta_{14}\underline{\text{Residency}}_{14i} + E_i$

Model 2: $\text{Ln Earnings}_i = \beta_0 + \beta_1\underline{\text{Soft Skills}}_{1i} - \beta_2\underline{\text{Black}}_{2i} - \beta_3\underline{\text{Female}}_{3i} - \beta_4\underline{\text{Under Age 36}}_{4i} - \beta_5(\underline{\text{Black}}_{2i} \times \underline{\text{Soft Skills}}_{1i})_{5i} + \beta_6\underline{\text{Born in the U.S.}}_{6i} + \beta_7\underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8\text{Year}_{8i} + \beta_9\text{Hard Skills}_{9i} + \beta_{10}\text{Job Tenure}_{10i} + \beta_{11}\underline{\text{Union}}_{11i} + \beta_{12}\underline{\text{Supervisor}}_{12i} + \beta_{13}\underline{\text{Private Sector}}_{13i} + \beta_{14}\underline{\text{Residency}}_{14i} + E_i$

Model 3: $\text{Ln Earnings}_i = \beta_0 + \beta_1\underline{\text{Soft Skills}}_{1i} - \beta_2\underline{\text{Black}}_{2i} - \beta_3\underline{\text{Female}}_{3i} - \beta_4\underline{\text{Under Age 36}}_{4i} - \beta_5(\underline{\text{Female}}_{3i} \times \underline{\text{Soft Skills}}_{1i})_{5i} + \beta_6\underline{\text{Born in the U.S.}}_{6i} + \beta_7\underline{\text{Lived with Both Parents Until 16}}_{7i} + \beta_8\text{Year}_{8i} + \beta_9\text{Hard Skills}_{9i} + \beta_{10}\text{Job Tenure}_{10i} + \beta_{11}\underline{\text{Union}}_{11i} + \beta_{12}\underline{\text{Supervisor}}_{12i} + \beta_{13}\underline{\text{Private Sector}}_{13i} + \beta_{14}\underline{\text{Residency}}_{14i} + E_i$

Model 4: $\text{Ln Earnings}_i = \beta_0 + \beta_1\underline{\text{Soft Skills}}_{1i} - \beta_2\underline{\text{Black}}_{2i} - \beta_3\underline{\text{Female}}_{3i} - \beta_4\underline{\text{Under Age 36}}_{4i} - \beta_5(\underline{\text{Under Age 36}}_{4i} \times \underline{\text{Soft Skills}}_{1i})_{5i} - \beta_6(\underline{\text{Black}}_{2i} \times \underline{\text{Soft Skills}}_{1i})_{6i} - \beta_7(\underline{\text{Female}}_{3i} \times \underline{\text{Soft Skills}}_{1i})_{7i} + \beta_8\underline{\text{Born in the U.S.}}_{8i} + \beta_9\underline{\text{Lived with Both Parents Until 16}}_{9i} + \beta_{10}\text{Year}_{10i} + \beta_{11}\text{Hard Skills}_{11i} + \beta_{12}\text{Job Tenure}_{12i} + \beta_{13}\underline{\text{Union}}_{13i} + \beta_{14}\underline{\text{Supervisor}}_{14i} + \beta_{15}\underline{\text{Private Sector}}_{15i} + \beta_{16}\underline{\text{Residency}}_{16i} + E_i$

A test of Hypothesis 4 was conducted to investigate whether the regression results indicate support for the hypothesis. Hypothesis 4 is an expression of the concept that soft skills and social capital skills complement each other and hard skills and, as such, significantly improve the explanatory power of earnings models that only have hard skills. Hypothesis 4 would be supported if the *F* statistic that is calculated after the addition of soft skills and social capital skills variables to the earnings model, as shown in Model 2 below, indicates that the addition significantly ($p < .05$) increases the initial R^2. For the purpose of carrying out the *F* test that produces the *F* statistic, four possible proxies for social capital skills were reduced to one variable through factor analysis. The factor scores produced by factor analysis made up the social capital index. The social capital index was then standardized as *z* scores and used in one of the regression models that underlie the *F* test. The models used to test Hypothesis 4 were as follows:

> Hypothesis 4. In the early 1990s, the combination of soft skills, social capital skills, and hard skills explained significantly more of the variation in earnings among UCGS than hard skills alone.

Model 1: $$\text{Ln Earnings}_i = \beta_0 + \beta_1\text{Hard Skills}_{1i} - \beta_2\underline{\text{Black}}_{2i} - \beta_3\underline{\text{Female}}_{3i} - \beta_4\underline{\text{Under Age 36}}_{4i} + \beta_5\underline{\text{Born in the U.S.}}_{5i} + \beta_6\underline{\text{Lived with Both Parents Until 16}}_{6i} + \beta_8\text{Year}_{8i} + \beta_9\text{Job Tenure}_{9i} + \beta_{10}\underline{\text{Union}}_{10i} + \beta_{11}\underline{\text{Supervisor}}_{11i} + \beta_{12}\underline{\text{Private Sector}}_{12i} + \beta_{13}\underline{\text{Residency}}_{13i} + E_i$$

Model 2: $$\text{Ln Earnings}_i = \beta_0 + \beta_1\underline{\text{Soft Skills}}_{1i} + \beta_2\text{Social Capital Skills}_{2i} + \beta_3\text{Hard Skills}_{3i} - \beta_4\underline{\text{Black}}_{4i} - \beta_5\underline{\text{Female}}_{5i} - \beta_6\underline{\text{Under Age 36}}_{6i} + \beta_7\underline{\text{Born in the U.S.}}_{7i} + \beta_8\underline{\text{Lived with Both Parents Until 16}}_{8i} + \beta_9\text{Year}_{9i} + \beta_{10}\text{Job Tenure}_{10i} + \beta_{11}\underline{\text{Union}}_{11i} + \beta_{12}\underline{\text{Supervisor}}_{13i} + \beta_{14}\underline{\text{Private Sector}}_{14i} + \beta_{15}\underline{\text{Residency}}_{15i} + E_i$$

3.4 Research Methodology

A quantitative case study research design was used to obtain empirically supported findings on the hypotheses tested in this part of the study. A case study is usually undertaken to examine a contemporary phenomenon in a real-life context (Yin, 1994). This case study was undertaken to examine a contemporary phenomenon (the demand for soft skills) in a real-life context (the work-life of UCGS). Quantitative or quantifiable data on soft skills, social capital skills, hard skills, earnings, demographic attributes, and work attributes are provided in the MCSUI-HS dataset. That kind of data has been used in regression models to obtain empirical information on employer demand.

The empirical foundation of this case study was hypothesis test results. The hypothesis test results were the outcome of the analysis of data on a subsample of UCGS from the MCSUI-HS dataset. The MCSUI-HS dataset is available through the Inter-University Consortium for Political and Social Research and has been used to test various hypotheses. Findings from those hypothesis tests have been reported in more than 30 journal articles and several dissertations and books. Some of the journal articles and books are cited in this part of the study.

Empirical results were sought from a subsample of UCGS whose primary non-leisure activity was working for an employer other than them. Therefore, only data on a subsample of non-self-employed respondents from the MCSUI-HS dataset were analyzed. The subsample consisted of respondents who met all of the following criteria: (a) attained a bachelor's or higher college degree, (b) were not self-employed, (c) earned more than $1 per hour but less than $150 per hour, (d) were between age 21 and 65 at the

time survey responses were provided, and (e) provided information concerning all the variables used in the hypothesis tests.

There were 546 respondents who met the subsample selection criteria. Of the 546 respondents, 292 were female, 254 were male, 181 were Black, 365 were White, 244 were under age 36, and 302 were over age 35. The comparatively small number of Blacks in the subsample may hinder findings of significant racial differences. Data on Hispanics and Asians were not analyzed because few Hispanic and Asian respondents outside Los Angeles met the subsample selection criteria.

Data on the subsample from the MCSUI-HS dataset were analyzed as described in the hypotheses section above with the Statistical Package for Social Sciences (SPSS). The regression results from the SPSS analysis were then interpreted to determine if the decision rule for each hypothesis was satisfied. Satisfaction of a decision rule led to a finding that the UCGS provide support for the matching hypothesis. Regression results, descriptive statistics, contextual issues related to the time when and place where data were collected for the MCSUI-HS, and postulations and previous findings in the literature were used in the discussion in section 3.6 to reconcile or explain any difference between actual findings from this part of the study and predicted findings.

Certain strengths and limitations arose from the use of a quantitative case study and the MCSUI-HS dataset. In terms of strengths, the MCSUI-HS dataset included data on hourly wages, demographic and socioeconomic attributes, work settings, and hard skills of college graduates from three large and geographically divergent U.S. urban areas. That type of data has regularly been used in regression models to detect sources of wage premiums. That customary data, along with the soft skills data, were used in this

part of the study to determine whether a wage premium was paid for the soft skills of the UCGS. An additional strength of the methodology and dataset related to the generalization of findings. Analytical generalizations (i.e., attributing support or non-support for hypotheses; see Yin, 1994) could be made from empirical results produced by regression tests of data on the UCGS.

In terms of limitations, hypothesis test results from this quantitative case study only yielded information on whether the UCGS provide support for each hypothesis tested (see Yin, 1994) and not on whether a nationally representative sample of UCGS provide support for each hypothesis. As a result, findings from this part of the study only apply to the UCGS examined. Since the data in the MCSUI-HS are cross-sectional, hypothesis test results from the data are only instructive of relationships and effects at a specific time, the early 1990s. Another limitation was history. In the early 1990s, when the survey data was collected, the U.S. was recovering from the 1991-1992 economic downturn. Employer wage setting, hiring, and screening criteria may have differed during that period from periods with no recent or similar economic downturn.

Moreover, even though data on college-educated workers were collected as part of the MCSUI-HS and can be carved out of the dataset to test hypotheses in this case study, the data were not collected with the specific intent of studying early 1990s labor market dynamics in terms of college-educated workers. Consequently, the MCSUI-HS dataset does not contain data on college quality and there is no data in the dataset suitable for use as a proxy for college quality. Yet, there is a consensus among researchers that the better the college quality, the higher the income of graduates (see, e.g., Daniere & Mechling, 1970; Link, 1973; Behrman & Birdsall, 1983). In addition, this part of the

study likely suffered from selection bias due to the analysis of data from non-randomly selected respondents and respondents who were employed by another person. According to Holzer (1996), when a group of employers has similar general hiring criteria, the group tends to hire homogeneous employees in spite of the race or gender of the employees.

In addition to the strengths and limitations connected with external validity, this case study was susceptible to construct validity threats (Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002). For instance, in order to be viewed in a more favorable light by interviewers, respondents may have provided incorrect information about seemingly sensitive matters such as income, educational attainment, and family structure; thus, tainting the validity of those and similarly sensitive constructs. The MCSUI-HS dataset contained limited and to some extent inexact information on soft skills. The ISS measure could be considered an expert rating by the survey interviewer on oral communication proficiency and, thus, a direct measure of ISS. The MSS measure may be a less credible measure since an individual's behavior at work, which was not being measured in the survey, may be different from that individual's behavior away from work. Issues concerning the measurement of soft skills and what constitutes demanded soft skills may cause others to contend that soft skills were not suitably represented by the soft skills variables used in this part of the study. Results from tests conducted as a part of this case study were interpreted in view of the above-described strengths and limitations.

3.5 Results

Results produced by this quantitative case study from regression models, descriptive statistics, and non-parametric calculations are presented and interpreted in this

section. In the description of the partial regression coefficient for any explanatory variable, the condition holding all other variables in the model constant applies in all instances and is not restated below. Similarly, the partial regression coefficient for each explanatory and control variable concerns the mean or difference in means in the case of a dummy variable. As a result of that stipulation, neither the phrase on average nor a similar phrase is reiterated below. The reported effect of any variable on an outcome variable relates to the partial effect. Relationships between variables are interpreted as being statistically significant if the corresponding *p* value is less than 0.05. Relationships between variables are interpreted as being marginally significant if the associated *p* value is between 0.05 and 0.10. Otherwise, relationships between variables are interpreted as being statistically insignificant. A reference to a bachelor's, master's, PhD, or professional degree is a reference to the highest degree attained.

Data in Table XVII on weighted means for the pool of UCGS illustrate that a majority of the UCGS had ISS (83%) and MSS (76%). Also, most of the UCGS had no more than a bachelor's degree, were White, lived in Los Angeles, had private sector jobs, and were born in the U.S. In contrast, few of the UCGS had PhD or professional degrees, were supervisors, were Black, or held union jobs. The weighted mean log wage of the UCGS when transformed to dollars was $22.87 per hour.

Descriptive statistics on the UCGS by gender, race, and age group are provided in Table XVIII. Information in Table XVIII reveals that slightly more females (85%) had ISS than males (82%). Contrary to expectation, Black UCGS earned approximately 2% more than White UCGS. Almost two times more Black UCGS than White UCGS had

Table XVII. Descriptive Statistics--For the Pool of UCGS

Variables and Number of Respondents (dummy variables are in bold type)	Weighted Mean	Std. Deviation
Log hourly wage (546)	3.13	24.28
Soft skills:		
Interactional soft skills (ISS)[a] (433)	0.83	19.19
Motivational soft skills (MSS)[b] (414)	0.76	21.91
Social capital (*z* scores) (546)	0.15	45.08
Hard skills:		
Master's degree[c] (137)	0.26	22.41
PhD or professional degree[c] (23)	0.05	10.63
Work experience (years) (546)	14.15	518.41
Work experience squared (years) (546)	303.52	18828.18
Individual characteristics:		
Born in the U.S.[d] (487)	0.89	15.91
Age 21-35[e] (244)	0.50	25.50
Black[f] (181)	0.11	16.16
Female[g] (292)	0.45	25.39
Lived with both parents until 16[h] (448)	0.86	17.47
Workplace and job features:		
Supervisor[i] (210)	0.39	24.89
Private sector[j] (363)	0.71	23.03
Job tenure (years) (546)	5.01	663.59
Union[k] (131)	0.21	20.81
Residency:		
Atlanta resident[l] (150)	0.17	19.09
Boston resident[l] (143)	0.38	24.80
Year (546)	93.39	24.82
Number of observations	546.00	546.00

Notes. The mean value for each named dummy variable category indicates the percent of UCGS in the named category. The No. of UCGS in the named dummy variable category is in parentheses.
[a]No ISS is the omitted category. [b]No MSS is the omitted category. [c]Bachelor's degree is the omitted category. [d]Not born in the U.S. is the omitted category. [e]Age 36-65 is the omitted category. [f]White is the omitted category. [g]Male is the omitted category. [h]Did not live with both parents until 16 is the omitted category. [i]Nonsupervisor is the omitted category. [j]Public sector is the omitted category. [k]Nonunion member is the omitted category. [l]Los Angeles resident is the omitted category.

union jobs and almost two times more Black UCGS than White UCGS were supervisors. As expected, older UCGS earned more than younger UCGS, but younger UCGS had more ISS and MSS than older UCGS. Also, younger UCGS worked mostly in the private

Table XVIII. Descriptive Statistics--By Race, Gender and Age Group

Variables (dummy variables are in bold type)	Male		Female		White		Black		Age 21-35		Age 36-65	
	Wgtd. Mean	Std. Dev.	Wgtd. Mean	Std. Dev.	Wgtd. Mean	Std. Dev.	Wgtd. Mean	Std. Dev.	Wgtd. Mean	Std. Dev.	Wgtd. Mean	Std. Dev.
Log hourly wage	3.18	27.07	3.08	21.36	3.13	28.34	3.18	12.60	3.07	21.73	3.20	25.83
Soft skills:												
Interactional soft skills (ISS)[a]	0.82	21.42	0.85	17.02	0.83	21.95	0.80	11.84	0.84	19.51	0.81	18.93
Motivational soft skills (MSS)[b]	0.77	23.40	0.74	20.55	0.75	25.47	0.81	11.80	0.78	22.24	0.73	21.61
Social capital (*z* scores)	0.07	56.22	0.25	31.90	0.16	51.99	0.06	26.04	0.21	47.89	0.10	42.60
Hard skills:												
Master's degree[c]	0.31	25.50	0.21	19.06	0.26	25.84	0.26	13.05	0.19	21.13	0.33	22.93
PhD or professional degree[c]	0.04	11.43	0.05	9.90	0.04	11.53	0.09	8.44	0.03	8.69	0.06	11.91
Work experience (years)	14.45	582.58	13.79	455.76	14.14	598.36	14.19	299.45	6.65	262.63	21.53	412.94
Work experience squared (years)	319.89	22,165.30	283.86	15,336.70	303.71	21,752.05	302.00	10,794.80	68.09	4,429.03	535.28	19,213.34
Individual characteristics:												
Born in the U.S.[d]	0.88	18.10	0.91	13.73	0.90	17.70	0.83	11.34	0.90	15.88	0.88	15.94
Age 21-35[e]	0.54	27.54	0.44	23.36	0.50	29.38	0.49	14.93	1.00	0.00	0.00	0.00
Black[f]	0.11	17.34	0.12	15.10	0.00	0.00	1.00	0.00	0.11	16.91	0.12	15.56
Female[g]	0.00	0.00	1.00	0.00	0.45	29.25	0.47	14.90	0.40	26.39	0.50	24.35
Lived with both parents until 16[h]	0.89	17.46	0.84	17.41	0.88	19.08	0.74	13.12	0.85	19.29	0.88	15.84
Workplace and job features:												
Supervisor[i]	0.38	26.87	0.40	23.07	0.38	28.49	0.50	14.93	0.31	24.97	0.47	24.30
Private sector[j]	0.71	25.03	0.72	21.18	0.72	26.33	0.66	14.19	0.76	23.05	0.67	22.86
Job tenure (years)	5.30	758.18	4.66	569.59	4.88	763.52	6.06	391.55	3.84	762.96	6.16	566.63
Union[k]	0.17	20.81	0.26	20.62	0.20	23.28	0.34	14.12	0.18	20.50	0.25	20.96
Residency:												
Atlanta resident[l]	0.13	18.52	0.22	19.36	0.14	20.22	0.41	14.70	0.15	19.41	0.18	18.82
Boston resident[l]	0.42	27.24	0.35	22.39	0.42	29.03	0.08	8.01	0.48	26.86	0.29	22.16
Year	93.46	27.55	93.30	21.46	93.38	28.46	93.46	14.89	93.41	26.44	93.36	23.43
Number of observations	254.00	254.00	292.00	292.00	365.00	365.00	181.00	181.00	244.00	244.00	302.00	302.00

Notes. The mean value for each named dummy variable category indicates the percent of UCGS in the named category. The No. of UCGS in the named dummy variable category is in parentheses

[a]No ISS is the omitted category. [b]No MSS is the omitted category. [c]Bachelor's degree is the omitted category. [d]Not born in the U.S. is the omitted category. [e]Age 36-65 is the omitted category. [f]White is the omitted category. [g]Male is the omitted category. [h]Did not live with both parents until 16 is the omitted category. [i]Nonsupervisor is the omitted category. [j]Public sector is the omitted category. [k]Nonunion member is the omitted category. [l]Los Angeles resident is the omitted category.

sector. Even though information regarding averages and tendencies helps with understanding and predicting the regression results, a finding that a hypothesis is or is not supported by data from the UCGS rests on regression results. Therefore, information about the regression results follows immediately below.

Regression results from the test of Hypothesis 1—that employers paid a premium in the early 1990s for the soft skills of UCGS—do not support the hypothesis. Hypothesis 1 would have been supported by the results if the regression coefficient for ISS or MSS was positive ($\beta > 0$) and statistically significantly ($p < .05$) in the earnings model shown in Table XIX. Instead, the regression coefficient for ISS is positive and marginally significant ($\beta = 0.100$, $p = 0.056$) and the regression coefficient for MSS is negative and statistically insignificant ($\beta = -0.055$, $p = 0.219$). The results suggest that employers did not pay a premium in the early 1990s for ISS or MSS. Contrary to expectation, employers paid UCGS with ISS only slightly (roughly 10%) more than other UCGS. Also, employers laid a 5% penalty on UCGS for having MSS. In other words, UCGS who were cooperative, calm, and conscientious were penalized for having those traits. Employers seemed to attach a bit more value to the opposite traits—namely shrewdness, assertiveness, and impetuousness.

The results from the test of Hypothesis 1 imply that employers gave little weight to soft skills when they set pay for UCGS in the early 1990s. However, the results do not indicate whether groups previously found to have soft skills or to have more soft skills than their counterparts earned significantly more because of their soft skills and whether among the UCGS those groups had significantly more soft skills than their counterparts.

Table XIX. Regression Results--Hypothesis 1 for Soft Skills

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage β
Soft skills	
--Interactional soft skills (ISS)[a]	0.100
	(0.052)[o]
--Motivational soft skills (MSS)[b]	-0.055
	(0.045)
Black[c]	0.040
	(0.062)
Female[d]	-0.063
	(0.038)
Age 21-35[e]	0.257
	(0.059)*
Born in the U.S.[f]	0.074
	(0.062)
Lived with both parents until 16[g]	-0.026
	(0.054)
Year	-0.024
	(0.044)
Hard skills	
--Master's degree[h]	0.105
	(0.046)*
--PhD or professional degree[h]	0.279
	(0.092)*
--Work experience (years)	0.059
	(0.007)*
--Work experience squared (years)	-0.001
	(0.000)*
Job tenure (years)	0.003
	(0.001)[o]
Union[i]	-0.022
	(0.053)
Supervisor[j]	0.187
	(0.039)*
Private sector[k]	-0.143
	(0.048)*
Residency	
--Atlanta resident[l]	-0.112
	(0.061)[o]
--Boston resident[l]	-0.005
	(0.046)
Constant	4.679
	(4.083)
Adjusted R^2	21.7%
Model significance	0.000
Number of observations	546.000

Notes. *Significant at less than 0.05. [o]Marginally significant at less than 0.10. Standard error is in parentheses. [a]No ISS is the omitted category. [b]No MSS is the omitted category. [c]White is the omitted category. [d]Male is the omitted category. [e]Age 36-65 is the omitted category. [f]Not born in the U.S. is the omitted category [g]Did not live with both parents until 16 is the omitted category. [h]Bachelor's degree is the omitted category. [i]Nonunion member is the omitted category. [j]Nonsupervisor is the omitted category. [k]Public sector is the omitted category. [l]Los Angeles resident is the omitted category.

Hypothesis 2 addresses investments in soft skills by group and Hypothesis 3 concerns compensation for soft skills by group.

Logistic regression models were used to test the prediction in Hypothesis 2 about the likelihood of investments in soft skills. Hypothesis 2 states that older, White, and male UCGS were significantly more likely, in the early 1990s, to have soft skills than were younger, Black, and female UCGS. Results from the logistic regression models do not fully support Hypothesis 2, which would have been fully supported by the results presented in Table XX if the odds of having ISS and MSS were statistically significantly ($p < .05$) greater ($e^{\beta} > 1$) for UCGS who were over age 35, White, and male than for UCGS who were under age 36, Black, and female. The results only support the part of Hypothesis 2 that relates to race and ISS. In Table XX, Model 1, the odds that Whites had ISS are significantly greater than the odds that Blacks had ISS ($e^{\beta} = 1.692$, $p = .038$).

Contrary to prediction, the odds that older UCGS had ISS are 0.532 times as high as the odds that younger UCGS had ISS. Also, the odds that older UCGS had MSS are a significant 0.392 times as high as the odds that younger UCGS had MSS. Essentially, the odds are greater that younger UCGS rather than older UCGS had ISS and MSS in the early 1990s. The odds that males had ISS are insignificantly greater than the odds that females had ISS and the odds that males had MSS are only 0.713 as high as the odds that females had ISS. The results from the test of Hypothesis 2 suggest that soft skills endowments among the UCGS in the early 1990s faintly replicated previous patterns of soft skills endowments by age, racial, and gender group. The results, however, support previous findings that individuals who are White, American-born, and from higher

Table XX. Regression Results--Hypothesis 2 for Soft Skills

Variables (dummy variables are in bold type)	Dependent Variable: Had or Did Not Have ISS or MSS	
	Model 1	Model 2
	Interactional Soft Skills (ISS)[a]	Motivational Soft Skills (MSS)[b]
	e^{β}	e^{β}
Age 36-65[c]	0.532	0.392
	(0.363)	(0.343)*
White[d]	1.692	0.941
	(0.254)*	(0.240)
Male[e]	1.069	0.713
	(0.238)	(0.216)
Born in the U.S.[f]	7.031	0.688
	(0.334)*	(0.373)
Lived with both parents until 16[g]	1.722	1.214
	(0.279)[o]	(0.272)
Year	0.436	1.259
	(0.315)*	(0.274)
Hard skills		
--Master's degree[h]	1.681	0.898
	(0.303)[o]	(0.253)
--PhD or professional degree[h]	14.197	2.140
	(1.085)*	(0.654)
--Work experience (years)	0.955	1.032
	(0.045)	(0.040)
--Work experience squared (years)	1.001	0.999
	(0.001)	(0.001)
Job tenure (years)	1.073	1.024
	(0.030)*	(0.017)
Union[i]	0.960	1.304
	(0.322)	(0.300)
Supervisor[j]	1.145	1.345
	(0.244)	(0.223)
Private sector[k]	0.592	0.715
	(0.296)[o]	(0.261)
Residency		
--Atlanta resident[l]	0.823	1.003
	(0.385)	(0.315)
--Boston resident[l]	1.801	2.885
	(0.344)[o]	(0.326)*
Constant	2.619E+33	0.000
	(29.505)*	(25.621)
Cox & Snell R^2	13.6%	7.8%
Model significance	0.000	0.000
Number of observations	546.000	546.000

Notes. *Significant at less than 0.05. [o]Marginally significant at less than 0.10. Standard error is in parentheses. [a]Did not have ISS is the omitted category. [b]Did not have MSS is the omitted category. [c]Age 21-35 is the omitted category. [d]Black is the omitted category. [e]Female is the omitted category. [f]Not born in the U.S. is the omitted category. [g]Did not live with both parents until 16 is the omitted category. [h]Bachelor's degree is the omitted category. [i]Nonunion member is the omitted category. [j]Nonsupervisor is the omitted category. [k]Public sector is the omitted category. [l]Los Angeles resident is the omitted category.

socioeconomic backgrounds are significantly or marginally significantly more likely to have ISS.

Hypothesis 3 was tested with regression models to find out if the compensation that UCGS received for their soft skills in the early 1990s differed significantly by their age, racial, and gender group. Hypothesis 3 is not supported by the test results. The decision rule for Hypothesis 3 set empirical support on regression results which indicate that the respective age, race, and gender interaction with ISS and MSS in the earnings model is statistically significantly ($p < .05$) different ($\beta \neq 0$) from zero. The results on the interactions are shown in Table XXI. None of the age, race, or gender interactions in Table XXI is statistically significant. The results suggest that compensation for ISS and MSS among UCGS in the early 1990s did not depend on the age, racial, or gender group.

Hypothesis 4 was the last hypothesis tested in this part of the study. Hypothesis 4 predicts that an earnings model with soft skills, social capital skills, and hard skills variables generates a significantly higher R^2 than an earnings model with hard skills variables. If accurate, an earnings model with soft skills and social capital skills variables would give a better explanation of the variation in earnings among the UCGS than a model without these variables. Hypothesis 4 would be supported if the F statistic that is calculated after the addition of soft skills and social capital skills variables, as illustrated in Table XXII, indicates that the addition significantly ($p < .05$) augments the initial R^2. The F statistic that was calculated to test Hypothesis 4 (see Table XXIII) did not indicate that the R^2 was statistically significantly augmented by the addition of the soft skills and social capital skills variables to the earnings model. The F statistic of 1.546 has a p value of .202, which suggests that the change in the adjusted R^2 (from 21.3% to 21.6%) is

insignificant and that Hypothesis 4 is not supported. Furthermore, other *F* statistics shown in Table XXIII demonstrate that the separate

Table XXI. Regression Results--Hypothesis 3 for Soft Skills

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage			
	Model 1	Model 2	Model 3	Model 4
	Age × SS	Race × SS	Gender × SS	All Interactions
	β	β	β	β
Soft skills (SS)				
--Interactional soft skills (ISS)[a]	0.107	0.095	0.059	0.065
	(0.069)	(0.052)°	(0.067)	(0.083)
--Motivational soft skills (MSS)[b]	-0.124	-0.067	0.004	-0.087
	(0.060)*	(0.047)	(0.062)	(0.078)
Black[c]	0.038	-0.463	0.043	-0.380
	(0.062)	(0.559)	(0.062)	(0.562)
Female[d]	-0.063	-0.062	-0.169	-0.165
	(0.038)°	(0.038)	(0.097)°	(0.098)°
Age 21-35[e]	0.301	0.254	0.263	0.312
	(0.100)*	(0.059)*	(0.059)*	(0.101)*
Age 21-35 x ISS[f]	-0.016	-	-	-0.024
	(0.099)	-	-	(0.101)
Age 21-35 x MSS[g]	-0.149	-	-	-0.147
	(0.088)°	-	-	(0.089)°
Black x ISS[h]	-	0.535	-	0.455
	-	(0.561)	-	(0.563)
Black x MSS[i]	-	-0.141	-	-0.154
	-	(0.144)		(0.146)
Female x ISS[j]	-	-	0.094	0.094
	-	-	(0.102)	(0.102)
Female x MSS[k]	-	-	0.116	0.098
	-	-	(0.088)	(0.089)
Born in the U.S.[l]	0.071	0.072	0.064	0.062
	(0.062)	(0.062)	(0.062)	(0.063)
Lived with both parents until 16[m]	-0.034	-0.026	-0.016	-0.025
	(0.055)	(0.055)	(0.055)	(0.055)
Year	-0.028	-0.023	-0.031	-0.033
	(0.044)	(0.044)	(0.044)	(0.044)
Hard skills				
--Master's degree[n]	0.109	0.106	0.099	0.104
	(0.046)*	(0.046)*	(0.046)*	(0.047)*
--PhD or professional degree[n]	0.274	0.274	0.285	0.274
	(0.092)*	(0.092)*	(0.092)*	(0.092)*
--Work experience (years)	0.057	0.059	0.059	0.058
	(0.007)*	(0.007)*	(0.007)*	(0.007)*
--Work experience squared (years)	-0.001	-0.001	-0.001	-0.001
	(0.000)*	(0.000)*	(0.000)*	(0.000)*

(continued)

Table XXI. Regression Results--Hypothesis 3 (continued)

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage			
	Model 1	Model 2	Model 3	Model 4
	Age × SS	Race × SS	Gender × SS	All Interactions
	β	β	β	β
Job tenure (years)	0.003	0.003	0.003	0.003
	(0.001)[o]	(0.001)[o]	(0.001)[o]	(0.001)[o]
Union[o]	-0.022	-0.024	-0.026	-0.029
	(0.054)	(0.053)	(0.054)	(0.054)
Supervisor[p]	0.196	0.188	0.186	0.194
	(0.039)*	(0.039)*	(0.039)*	(0.039)*
Private sector[q]	-0.150	-0.144	-0.144	-0.151
	(0.048)*	(0.048)*	(0.048)*	(0.048)*
Residency				
--Atlanta resident[r]	-0.122	-0.104	-0.125	-0.126
	(0.061)*	(0.061)[o]	(0.062)*	(0.062)*
--Boston resident[r]	-0.004	-0.001	-0.020	-0.014
	(0.046)	(0.046)	(0.047)	(0.047)
Constant	5.137	4.630	5.372	5.661
	(4.097)	(4.086)	(4.119)	(4.136)
Adjusted R^2	21.9%	21.7%	21.8%	21.8%
Model significance	0.000	0.000	0.000	0.000
Number of observations	546.000	546.000	546.000	546.000

Notes. *significant at less than 0.05. [o]Marginally significant at less than 0.10. Standard error is in parentheses. [a]No ISS is the omitted category. [b]No MSS is the omitted category. [c]White is the omitted category. [d]Male is the omitted category. [e]Age 36-65 is the omitted category. [f]Age 36-65 × ISS is the omitted category. [g]Age 36-65 × MSS is the omitted category. [h]White × ISS is the omitted category. [i]White × MSS is the omitted category. [j]Male × ISS is the omitted category. [k]Male × MSS is the omitted category. [l]not born in the U.S. is the omitted category. [m]Did not live with both parents until 16 is the omitted category. [n]Bachelor's degree is the omitted category. [o]Nonunion member is the omitted category. [p]Nonsupervisor is the omitted category. [q]Public sector is the omitted category. [r]Los Angeles resident is the omitted category.

addition of soft skills and social capital skills do not significantly improve the explanatory power of the initial earnings model.

The results from the test of Hypothesis 4 also imply that some of the earnings that are usually attributed to hard skills acquired through master's, PhD, and professional degrees may instead be attributable to soft skills and social capital skills. The results in Table XXII show that the addition of soft skills and social capital skills variables to the earnings model produces an 8.7% reduction in the effect of master's degrees on earnings

Table XXII. Regression Results--Hypothesis 4 for Soft Skills

Variables (dummy variables are in bold type)	Dependent Variable: Natural Log of Hourly Wage	
	Model 1	Model 2
	HS + Controls	SS + SC + HS + Controls
	β	β
Soft skills (SS)		
--Interactional soft skills[a]	-	0.099
	-	(0.053)[o]
--Motivational soft skills[b]	-	-0.055
	-	(0.045)
Social capital (SC)	-	0.001
	-	(0.022)
Hard skills (HS)		
--Master's degree[c]	0.115	0.105
	(0.046)*	(0.047)*
--PhD or professional degree[c]	0.300	0.279
	(0.091)*	(0.092)*
--Work experience (years)	0.058	0.059
	(0.007)*	(0.007)*
--Work experience squared (years)	-0.001	-0.001
	(0.000)*	(0.000)*
Black[d]	0.035	0.040
	(0.062)	(0.062)
Female[e]	-0.058	-0.063
	(0.038)	(0.038)
Age 21-35[f]	0.260	0.257
	(0.059)*	(0.059)*
Born in the U.S.[g]	0.110	0.073
	(0.060)[o]	(0.063)
Lived with both parents until 16[h]	-0.032	-0.026
	(0.054)	(0.055)
Year	-0.031	-0.024
	(0.044)	(0.044)
Job tenure (years)	0.003	0.003
	(0.001)[o]	(0.001)[o]
Union[i]	-0.039	-0.022
	(0.053)	(0.054)
Supervisor[j]	0.188	0.188
	(0.039)*	(0.039)*
Private sector[k]	-0.150	-0.144
	(0.048)*	(0.049)*
Residency		
--Atlanta resident[l]	-0.114	-0.112
	(0.061)[o]	(0.061)[o]
--Boston resident[l]	-0.014	-0.005
	(0.045)	(0.046)
Constant	5.405	4.679
	(4.074)	(4.083)
Adjusted R^2	21.3%	21.6%
Model significance	0.001	0.000
Number of observations	546.000	546.000

Notes. *Significant at less than 0.05. [o]Marginally significant at less than 0.10. Standard error is in parentheses.
[a]No interactional soft skills is the omitted category. [b]No motivational soft skills is the omitted category. [c]Bachelor's degree is the omitted category. [d]White is the omitted category. [e]Male is the omitted category. [f]Age 36-65 is the omitted category. [g]Not born in the U.S. is the omitted category. [h]Did not live with parents until 16 is the omitted category. [i]Nonunion member is the omitted category. [j]Nonsupervisor is the omitted category. [k]Public sector is the omitted category. [l]Los Angeles resident is the omitted category.

and a 7.0% reduction in the effect of PhD or professional degrees on earnings. The results provide limited support for the notion that UCGS are compensated for soft skills and social capital skills acquired through college. Notwithstanding, other results in Table XXII indicate that earnings generated by a marginal increase in hard skills was considerable—ranging from 6% to 32%—and statistically significant, while earnings generated by marginal increases in soft skills and social capital skills ranged from nonexistent to unexceptional. A summary of the results on the four hypotheses tested in this part of the study is presented in Table XXV.

Table XXIII. *F* Test Results on Soft Skills and Social Capital Skills Jointly--Hypothesis 4

ANOVA[a]

Model	Source of Variation	Sum of Squares	*df*	Mean Square	*F*	Significance of *F*
1	Regression - ESS_{model1}	75978.011	16	4748.626	10.243	0.000
	Residual - RSS_{model1}	245250.025	529	463.611		
	Total	321228.036	545			
2	Regression - ESS_{model2}	78122.274	19	4111.699	8.896	0.000
	Residual - RSS_{model2}	243105.762	526	462.178		
	Total	321228.036	545			

[a]N or number of observations = 546

$$F = \frac{RSS_{model1} - RSS_{model2}/\text{number of new explanatory variables in model 2 (or 3)}}{RSS_{model2}/\text{N-number of parameters in new model 2 (or 526)}}$$

$$F = \frac{714.754}{462.178}$$

$$F = 1.546_{3,526,}\ p = 0.202$$

Table XXIV. *F* Test Results on Soft Skills and Social Capital Skills Separately--Hypothesis 4

Soft Skills

ANOVA[a]

Model	Source of Variation	Sum of Squares	*df*	Mean Square	*F*	Significance of *F*
1	Regression - ESS_{model1}	75978.011	16	4748.626	10.243	0.000
	Residual - RSS_{model1}	245250.025	529	463.611		
	Total	321228.036	545			
2	Regression - ESS_{model2}	78121.077	18	4340.060	9.408	0.000
	Residual - RSS_{model2}	243106.958	527	461.304		
	Total	321228.036	545			

[a]N or number of observations = 546

$$F = \frac{RSS_{model1} - RSS_{model2}/\text{number of new explanatory variables in model 2 (or 2)}}{RSS_{model2}/\text{N-number of parameters in new model 2 (or 527)}}$$

$$F = \frac{1071.534}{461.304}$$

$F = 2.323_{2,\ 527,}\ p = 0.099$

Social Capital Skills

ANOVA[a]

Model	Source of Variation	Sum of Squares	*df*	Mean Square	*F*	Significance of *F*
1	Regression - ESS_{model1}	75978.011	16	4748.626	10.243	0.000
	Residual - RSS_{model1}	245250.025	529	463.611		
	Total	321228.036	545			
2	Regression - ESS_{model2}	76012.988	17	4471.352	9.628	0.000
	Residual - RSS_{model2}	245215.048	528	464.422		
	Total	321228.036	545			

[a]N or number of observations = 546

$$F = \frac{RSS_{model1} - RSS_{model2}/\text{number of new explanatory variables in model 2 (or 1)}}{RSS_{model2}/\text{N-number of parameters in new model 2 (or 528)}}$$

$$F = \frac{34.977}{464.422}$$

$F = 0.075_{1,528,}\ p = 0.784$

Table XXV. Hypotheses on Soft Skills Supported or Not Supported by the Case of UCGS

Hypotheses	Supported	Not Supported
1. Employers paid a premium in the early 1990s for the soft skills of UCGS.		√ (However, UCGS with ISS were paid marginally significantly more than other UCGS.)
2. In the early 1990s, older, White, and male UCGS were significantly more likely to have soft skills than younger, Black, and female UCGS.	√ (Support only relates to White UCGS who were significantly more likely than Black UCGS to have ISS in the early 1990s.)	
3. The compensation that UCGS received in the early 1990s for their soft skills differed significantly by age, racial, and gender group.		√
4. In the early 1990s, the combination of soft skills, social capital skills, and hard skills explained significantly more of the variation in earnings among the UCGS than hard skills alone.		√

3.6 Discussion

The findings from hypothesis test results and other results generated in this part of the study are presented in this section. The findings are also compared to previous findings but, for the most part, the findings do not support implications in previous findings on soft skills and UCGS. Policy implications of the findings are also discussed. Data used in this part of the study had shortcomings. The shortcomings can be remedied. Therefore, suggestions on topics for and the design of future research are presented in this section.

The finding on MSS (i.e., cooperativeness, calmness, and conscientiousness) from the test of Hypothesis 1 is that the MSS of the UCGS were negatively and insignificantly related to their early 1990s earnings. Earnings and MSS were measured around the same time, but it is unclear when MSS were acquired. The finding on MSS in this part of the study is consistent with previous findings on college graduates and college-educated workers. Heckman, Stixrud, and Urzua (2006) found MSS measured eight to 16 years before earnings were measured to be negatively valued by employers of 30 year old 4-year college graduates (see also, Ferris, Witt & Hochwarter, 2001). The negative returns for MSS may be a reflection of: (a) Heckman, Stixrud, and Urzua's (2006) finding that MSS are only valued in non-college jobs and when workers do not have college degrees or (b) Dunifon and Duncan's (1998) finding that it takes roughly two decades for MSS to bring about productivity gains that merit compensation.

The finding in this part of the study that ISS (i.e., the oral communication style of middle-class, American-born, Whites who live or work in American cities) were positively and marginally significantly related to the earnings of the UCGS in the early 1990s corresponds with findings from other quantitative studies, though the level of significance varied. However, those studies mainly examined non-college graduates or workers in non-college jobs (e.g., Kalleberg & Leicht, 1986; Dávila, Bohara, & Saenz, 1993; Holzer, 1996; Carnevale, Fry, & Lowell, 2001; Ling, 2002). In contrast, the finding that neither the ISS nor the MSS of UCGS was significantly demanded by employers contradicts a collection of findings in qualitative studies and findings based on non-parametric analyses of demand for college-educated and non-college-educated workers with soft skills (Mayo, 1945; Edwards, 1976; Jackall, 1983; Cappelli, 1995; National

Center on the Education Quality of the Workforce, 1995; Kirschenman, Moss, & Tilly, 1995; Moss & Tilly, 1996; Conrad, 1999; Maes, Weldy, & Icenogle, 1997; Nguyen, 1998; Stasz, 2001; Handel, 2003).

The finding in this part of the study that neither ISS nor MSS was positively and statistically significantly related to the early 1990s earnings of the UCGS may have come about because of larger macro economic phenomena as well as smaller micro economic occurrences. With regard to macro economic phenomena, the loose labor market of the early 1990s may have enabled employers to avoid paying a premium for soft skills. In addition, in the early 1990s, the somewhat recent sectoral shift to a more service-job oriented economy may have left employers unaware of the ascendance of ISS and MSS to job skills; that is, abilities and traits required to complete jobs rather than mechanisms sometimes used in jobs (Darrah, 1994).

With regard to micro economic factors, employers may have considered soft skills more important than hard skills (Mayo, 1945; Howell & Wolff, 1991; Moss & Tilly, 1996; Bryans North & Worth, 2004) but they may also have found it unfeasible to pay for soft skills that were difficult or impractical to separate and measure (Handel, 2003). Some employers reportedly did not know how to identify soft skills and confused soft skills with hard skills (Moss & Tilly, 1995, 1996, 2000; Bluestone & Stevenson, 2000). One finding in this part of the study from the test of Hypothesis 4 is that some of the earnings usually attributed to hard skills acquired through master's, PhD, and professional degrees were attributable to soft skills and social capital skills. Furthermore, soft skills tend to be similar among individuals with equivalent hard skills (Jackall, 1983;

Stasz, 2001). The UCGS were debatably equivalently college-educated; more important, over 75% of them had ISS and MSS.

The findings here on the soft skills of employed UCGS provide support for Edwards' (1976) contention that soft skills do not have a post-hire earnings component, because the findings indicate that soft skills have an insignificant effect on earnings. He contended that soft skills are only assessed during pre-employment screenings to narrow the hiring pool; therefore, soft skills are only reflected in starting salaries. Starting salaries were not collected in the MCSUI-HS. All the same, some researchers who used starting salaries in regression models (e.g., Holzer, 1996) did not find a statistically significant relationship between soft skills and starting salaries.

The important finding that emerges from the test of hypotheses 2 is that the UCGS who were White, American-born, and from higher socioeconomic backgrounds were significantly or marginally significantly more likely to have made investments in ISS than other UCGS. This finding is in line with previous findings (see Lang, 1986; Wilson, 1996, 1997; Moss & Tilly, 1996, 1999, 2001a). On the other hand, the finding in this part of the study on insignificantly different investments in ISS and MSS by age group and gender group is in conflict with previous findings.

Because of previous findings by researchers such as Maes, Weldy, and Icenogle (1997), the expectation was that younger UCGS would be less likely to have soft skills than older UCGS. In this part of the study, younger UCGS were more likely to have ISS and significantly more likely to have MSS than older UCGS. Younger UCGS in this part of the study were mostly between age 25 and 35. In comparison, younger college graduates in studies by Maes, Weldy, and Icenogle (1997), Nguyen (1998), and Gilleard

and Gilleard (2000) were in their early 20s and were likely very recent labor market entrants. Also, findings in this part of the study were based on parametric analysis while findings from previous studies were largely derived from non-parametric analysis. The soft skills that are considered important tend to vary throughout careers and vary by age group (Boyce et al., 2001). For instance, at the beginning of careers, employers consider conscientiousness and cooperativeness to be important (Nguyen, 1998). By the midpoint of careers, employers consider persuasiveness, authoritativeness, assertiveness, and leadership to be more important than conscientiousness and cooperativeness (Strebler, 1997; Baron & Markman, 2000; Baker & Phillips, 2001). The demand for conscientiousness and cooperativeness early rather than late in careers may be another reason why younger UCGS in this part of the study were significantly more likely than older UCGS to have MSS.

Previous findings generally indicated that college-educated males more so than college-educated females had soft skills (e.g., Lang, 1986; Penley et al., 1991; Strebler, 1997). The difference among the findings on soft skills and gender was chiefly due to the assortment of data collection methods. In studies in which data on soft skills were collected from self-reports, a significant difference in soft skills between females and males was found (e.g., Penley et al., 1991; Groves, 2005). In studies in which data on soft skills were collected by measures independent of respondents, including this part of the study, no significant difference in soft skills by gender was found (e.g., Xie & White, 1997). Findings based on self-reports may have suffered from measurement error due to the tendency of females to give themselves lower skills ratings (Maccoby & Jacklin, as cited in Penley et al., 1991).

The finding from the test of Hypothesis 3 is that compensation for ISS and MSS among the UCGS in the early 1990s did not depend on age, racial, or gender group. The finding differs from previous findings and implications in previous findings. Previous findings imply that younger college graduates who do not have the soft skills needed to close deals fail to benefit financially and otherwise from the deals (see Cassens Moss, 1987; Baron & Markman, 2000; Litecky, Arnett & Prabhakar, 2004). In the Fan, Wei, and Zhang (2005) study, Black males in soft skills jobs earned significantly less than White males (see also, Lang, 1986). Mueller and Plug (2006) reported that the compensation that males and females get for soft skills differ significantly. Notwithstanding, compensation for soft skills in this part of the study did not differ significantly between groups because soft skills were commonly available among the UCGS.

The last finding in this part of the study relates to the prediction in Hypothesis 4 that an earnings model with soft skills, social capital skills, and hard skills variables generates a significantly higher R^2 and, hence, a superior explanation of the variation in earnings among the UCGS than an earnings model with hard skills variables. The prediction is not supported. The finding that soft skills and social capital skills had little to do with the variation in earnings in the early 1990s among the UCGS is likely related to the prevalence of soft skills and social capital skills among the UCGS. In any event, approximately 16% of the returns normally attributed to hard skills acquired through master's, PhD, and professional degrees were related to soft skills and social capital skills. This finding gives limited support to the implication that UCGS are compensated for soft skills and social capital skills acquired through college (Mayo, 1945; Becker,

1964b; Baron & Markman, 2000; Grodsky & Pager, 2001; Wolosky, 2008), but this and other findings in this part of the study indicate that the compensation is not significant.

The findings from this case study refute employer claims, findings in qualitative studies, and findings on non-UCGS about the importance of soft skills in contemporary jobs and the need for more or different soft skills training by colleges. The findings indicate that neither soft skills nor soft skills combined with social capital skills had a significant affect on the earnings of the UCGS after they were hired. Some of the UCGS made significantly greater investments in soft skills, but employers did not pay them for the additional investments. Employers also did not set compensation for soft skills based on age, racial, or gender group. This finding implies that employers did not compensate the UCGS for their soft skills in a discriminatory way. For these reasons, government intervention that prescribes more or different soft skills training by colleges would at this time be groundless.

The above-described refutation is based solely on findings from this part of the study and specific definitions and measurements of ISS and MSS. The measurements were not ideal primarily because they were: (a) not provided by or formulated with the help of employers, (b) measured once, and (c) taken after hire but not before hire. In addition, relatively few Blacks and few cities were represented in this part of the study. These and other shortcomings of this part of the study can be corrected in future research.

The findings from future research that use corrected measures of ISS and MSS and address questions that relate to this part of the study would extend and possibly clarify the findings in this part of the study. Questions that are primed for future research are whether: (a) it takes two decades for MSS acquired by UCGS to be linked with a

positive and significant return, (b) employer demand for ISS and MSS from UCGS changed after the early 1990s, and (c) employers correctly identify ISS and MSS after the early 1990s. A series of field studies would allow future researchers to obtain valid pre-employment and post-employment measures of soft skills in urban work settings as well as employer and employee input. The use of field studies would also allow future researchers to supplement collected data with data from their direct observation of demand for and supply of soft skills in urban work settings.

CHAPTER IV

APPLICATION OF FINDINGS ON STRONG QUANTITATIVE SKILLS, SOCIAL CAPITAL SKILLS, AND SOFT SKILLS TO COLLEGE STUDENTS

4.1 Demand for Different Skills from College Graduates and Non-College Graduates

Findings from quantitative skills, social capital skills, and soft skills literatures as well as findings from Chapters I, II, and III of this study indicate that there are some job skills that employers only demand from non-college graduates or college graduates. In this section, findings on job skills are described by type of graduate and employer demand is signified by the positive and significant return given for a job skill. First, findings on job skills and non-college graduates from previous studies are described. Second, findings from Chapter I, II, or III of this study on whether those jobs skills were demanded from college graduates who live in urban areas in the United States (U.S.) or urban college graduates (UCGS) are presented. Third, findings from previous studies on whether those jobs skills were demanded from college graduates are provided. Fourth, all the findings are compared and possible reasons for differences are presented.

In a study that used 1993 mathematics test scores from the National Longitudinal Survey of Youth, 1979 cohort (NLSY79) as indicators of quantitative skills, Mitra (2001)

found that quantitative skills of blue-collar workers were not demanded by employers. Quantitative skills are acquired abilities to define, analyze, and solve quantifiable problems. Blue-collar workers tend to be non-college graduates. In the study, quantitative skills of white-collar professionals and managers, who tend to be college graduates, were positively and significantly related to earnings (see also, Mitra, 2002). In addition, workers with above average quantitative skills or strong quantitative skills (SQS) received statistically significantly more pay than workers with below average quantitative skills.

The finding in Chapter I of this study on UCGS with SQS corresponds with the finding in the Mitra (2001) study that white-collar professionals and managers with SQS were in demand in the early 1990s. Findings reported in Chapters I, II, and III of this study stem from the analysis of data on UCGS from the Multi-City Study of Urban Inequality (MCSUI) Household Survey (MCSUI-HS). In Chapter I of this study, UCGS with SQS earned a significant 20.7% more than other UCGS. Having an imputed average Graduate Record Examination quantitative (GRE-Q) score of 575 or higher signified having SQS in Chapter I of this study. As in Paglin & Rufolo (1990) and Weinberger (1999) studies, average GRE-Q scores of other college students with identical undergraduate majors were assigned to UCGS in Chapter I of this study because the MCSUI-HS dataset did not contain data on GRE-Q scores.

The finding in Chapter I of this study and the finding in the Mitra (2001) study on demand for college graduates with SQS agree with other findings reported in the quantitative skills literature that were based on test results on data from the 1970s through the 2000s (e.g., Lee & Lee, 2009; Murnane, Willett, & Levy, 1995; Paglin & Rufolo,

1990; Song, Orazem, & Wohlgemuth, 2008). Even today in 2010, a finding from a study that used non-parametric analysis indicates that the 10 undergraduate majors that command the highest median starting salaries are generally pursued by college graduates with SQS (Weinberger, 1999; Wolgemuth, 2010). The 10 undergraduate majors consist of seven branches of engineering, economics, physics, and computer science. In addition, whereas male college graduates usually earn more than female college graduates, male and female college graduates with equal SQS generally get equal returns for their SQS (Mitra, 2002; Paglin & Rufolo, 1990). The findings in Chapter I of this study and in previous studies suggest that SQS are a signal to employers of the ability to handle complex technical jobs, complex information systems, and complex organizational demands (Mitra, 1999; Wolgemuth, 2010).

Findings in quantitative and qualitative studies on non-college graduates indicate that additional social capital skills (SCS) were not associated with a significant increase in earnings (e.g., Falcon, 1995; Green, Tigges, & Diaz, 1999). Essentially, SCS are acquired methods of establishing, maintaining, and reinforcing relationships with individuals, who act as social capital sources and who are in groups or organizations, for the purpose of gaining access to resources such as revenues, sponsors, advocates, and constituents (Bourdieu, 1986; Burt, 1992). An example of the findings on the SCS of non-college graduates arises out of the Smith (2000) study that used data from the MCSUI-HS. In that study, SCS (i.e. developing and using social capital sources to find jobs) were found to be associated with a decline in the earnings of non-college graduates.

The finding in Chapter II of this study on the entire case of UCGS indicates that additional SCS did not significantly boost earnings. Approximately 95 percent of the

social capital sources of the UCGS were close friends and family members. Previous studies suggest that close friends and family members are seldom well-placed or influential in firms or workplace networks (Granovetter, 1974; Marsden & Hurlbert, 1988). As a result, close friends and family members usually do not facilitate access to resources valued at work (Burt, 1992; Smith, 2000). In Chapter II of this study, as in previous studies on white-collar workers in the U.S., earnings generated through close friends and family members were not significant (Granovetter, 1974, 1995; Marsden & Hurlbert, 1988).

Conversely, another finding in Chapter II of this study indicates that UCGS with PhD or professional degrees were paid significantly more for their SCS than other UCGS. That finding implies that the earnings of UCGS with PhD or professional degrees depended on them having social capital sources that made access to resources valued at work possible. In other words, the earnings of UCGS with PhD or professional degrees depended on them having social capital sources that were distant friends or acquaintances (e.g., Granovetter, 1974; Marsden & Hurlbert, 1988).

Reports from other studies indicate that professionals, executives, managers, and technicians secured high-paying jobs through well-placed or influential social capital sources obtained through the application of their SCS (Granovetter, 1974, 1995; Lin, Vaughn, & Ensel, 1981; Marsden & Hurlbert, 1988). In addition, Dreher and Cox (1996) reported that college graduates with master of business administration degrees (MBAs) who used their SCS to establish mentoring relationships with White males earned a significant 18% more than other MBAs. Their study used 1969-1989 data on college graduates from nine business schools in the U.S. White male professionals, executives,

and managers in formal positions of authority, such as many of the White male mentors in the Dreher and Cox (1996) study, are usually well-placed within firms and workplace networks (Brass, 1985; Lincoln & Miller, 1979).

In the sociology literature, the usefulness of workplace networks in facilitating access to task-related, career, and social support is a function of the diversity or distance of social capital sources and the status of social capital sources (Ibarra, 1995). In her study, Ibarra (1995) found that among mid-level managers at four Fortune 500 companies differences in advancement potential were associated with differences in workplace network configurations. High-potential managers had significantly more diverse or distant social capital sources than non-high-potential managers. On the other hand, the social capital sources of high-potential managers and non-high-potential managers did not differ significantly by status. High-potential was a designation given to mid-level managers when their supervisors believed that they would advance in the future to a position several levels higher than their current position. The finding in the Ibarra (1995) study suggests that the development of numerous diverse or distance social capital sources is more beneficial than the development of high-status social capital sources.

Studies on the soft skills of non-college graduates were more often than not studies on basic communication skills or basic verbal skills measured by (a) responses to word problems and questions on paragraph comprehension or (b) assessments of the ability to speak English clearly or frequently. In a study that used 1993 data from the NLSY79, Mitra (2002) found basic verbal skills of blue-collar workers to be positively and significantly related to earnings but basic verbal skills of white-collar workers to be

negatively and insignificantly related to earnings. Verbal test scores reported in the NLSY79 were used as indicators of basic verbal skills.

Holzer (1996) carried out a study on the connection between communication skills and starting weekly wage of mostly non-college graduates using data from the Employer Survey portion of the MCSUI. In the study, communication skills were operationalized as talking to customers daily. Talking to customers daily was found to be associated with an insignificant 2.8% increase in starting weekly wage. Despite the fairly conflicting findings on communication or verbal skills of non-college graduates, occupational colleges that normally serve students from lower socioeconomic backgrounds and offer courses that lead to associates degrees in business, healthcare, computers, and electronics are the only colleges in the U.S. that make soft skills training an explicit part of their curricula, overall policy, and job placement services (Deil-Amen, 2006).

In Chapter III of this study, the contemporary view that soft skills include abilities and traits (Conrad, 1999; Moss & Tilly, 1995) was followed. Accordingly, interactional soft skills (abilities) and motivational soft skills (traits) of UCGS were separately examined. Conrad (1999) pointed out that interactional soft skills and motivational soft skills are required in specific employment environments in order to: (a) deliver information or services; (b) work effectively as a member of a team; (c) learn technical skills required to perform tasks; (d) inspire the confidence of supervisors; and (e) understand and adapt to workplace norms.

The examination of data on soft skills of UCGS, which is described in Chapter III of this study, produced the finding that employers attached a marginal value to

interactional soft skills and an insignificant penalty to motivational soft skills. More than 75 percent of the UCGS had interactional soft skills and motivational soft skills. Interactional soft skills were represented by the ability to speak English as excellently as middle-class, American-born, Whites who live or work in U.S. cities. Motivational soft skills were represented by cooperativeness, calmness, and conscientiousness.

While few studies distinctly examined motivational soft skills of college graduates, several studies examined interactional soft skills or basic verbal skills of college graduates. After separately analyzing data on high school dropouts, high school graduates, 2-year college graduates, and 4-year college graduates, Heckman, Stixrud, and Urzua (2006) inferred that motivational soft skills were only demanded from non-college graduates. In their study that used data from the NLSY79, motivational soft skills were represented by self-control and positive self-esteem.

Findings from quantitative studies on basic verbal skills of college graduates agree with the finding from the Mitra (2002) study and Chapter III of this study that employers attached little or no value to basic verbal skills, because college graduates usually had basic verbal skills (Mitra, 2001; Murnane, Willett, & Levy, 1995; Murnane et al., 2000; Paglin & Rufolo, 1990). Alternatively, findings in several qualitative studies suggest that recent college graduates (particularly college graduates who majored in hard sciences, finance, accounting, and information technology) lack advanced verbal skills (Boyce, Williams, Kelley, & Yee, 2001; Gilleard & Gilleard, 2002; Maes, Weldy, & Icenogle, 1997; Nguyen, 1998). Those recent college graduates are purportedly unable to easily communicate with diverse groups of clients, constituents, co-workers, and supervisors. Other qualitative studies generated findings that employers want different

kinds of advanced verbal skills from less recent and older college graduates. Employers want less recent and older college graduates to have advanced verbal skills that allow them to demonstrate persuasiveness, assertiveness, and leadership (Baker & Phillips, 2001; Jackall, 1983; Strebler, 1997).

The findings from Chapter III of this study and previous studies indicate that employers demanded much more than basic verbal skills from college graduates. Findings from employer surveys indicate that employers at firms of varying sizes demanded that above all college graduates have soft skills that facilitate relationship-building with individuals inside and outside firms (Baker & Phillips, 2001; Maes, Weldy, & Icenogle, 1997; Nyman, 2006; Wolosky, 2008). Employer descriptions of relationship-building skills indicate that these skills are tantamount to using soft skills in tandem with SCS (e.g, Nyman, 2006; Wolosky, 2008). Employers seemed to believe that longer-term and deeper associations with diverse groups of individuals that result from relationship-building facilitate not only getting along but also cordially resolving conflicts, satisfying unstated desires, maneuvering ambiguous situations, and retaining a broad base of clients (Wolosky, 2008).

4.2 Application of Findings on Strong Quantitative Skills, Social Capital Skills, and Soft Skills to College Students

If numerous qualitative studies indicate that employers have in the past and continue to demand that college graduates have soft skills and SCS (which they combine and call relationship-building skills), then why were soft skills and SCS in Chapters II and III of this study and several quantitative studies insignificantly related to the earnings

of college graduates? The answer lies in what was examined and the type of examinations. What was examined?

In Chapters II and III of this study and some other quantitative studies, data on inadequate proxies for soft skills and SCS were gathered from surveys of employees conducted away from workplaces and without taking into account job or workplace contexts in which soft skills and SCS were used. Qualitative studies indicate that employers want college graduates who can use their soft skills to, for instance, make sophisticated presentations, resolve conflicts with co-workers and clients, negotiate arrangements, obtain favorable terms through persuasive arguments, and notice unstated opportunities to offer services (Jackall, 1983; Maes, Weldy, & Icenogle, 1997; Nyman, 2006; Wolosky, 2008). Yet, Chapter III of this study and some other quantitative studies used the ability to speak English as well as middle-class Whites as the proxy for those soft skills. Additionally, quantitative and qualitative studies indicate that work-related resources are mostly acquired through diverse or distant social capital sources (e.g., Dreher & Cox, 1996; Granovetter, 1974; Ibarra, 1995; Marsden & Hurlbert, 1988). However, Chapter II of this study used the number and quality of close friends and close family members as the proxy for SCS.

While the type of quantitative examinations that used data collected away from workplaces generated findings that soft skills and SCS were not demanded by employers, quantitative examinations of data on soft skills and SCS collected in field studies at workplaces, which were infused with information on job or workplace contexts, produced contradictory findings (Borocz & Southworth, 1998; Brass, 1985; Burt & Ronchi, 2007; Dreher & Cox, 1996; Ferris, Witt, & Hochwarter, 2001; Ibarra, 1995; Meyerson, 1994).

Furthermore, findings that soft skills and SCS were significantly related to enhanced post-hire earnings of college graduates only seemed to arise when college graduates got to apply their SQS or other hard skills after they first applied their soft skills and/or SCS (e.g., Baron & Markman, 2000; Barros, 2006; Meyerson, 1994; Smith, 2000). For example, Baron and Markham (2000) noted that entrepreneurs who were often young college graduates secured venture capital to expand dot-com ventures in the 1990s or closed the deal in one face-to-face meeting with venture capitalists. The face-to-face meeting generally took place after due diligence reviews of documents, systems, and markets were conducted. Likewise, in Chapter II of this study, UCGS with PhD or professional degrees who used their SCS to get clients received significantly higher compensation than other UCGS.

Because of the inadequate proxies used in Chapters II and III of this study, findings from this study cannot inform 4-year colleges and universities (hereafter, universities) about whether soft skills and SCS training enhance the outcomes or opportunities of college students in the labor market. Also, the findings do not shed any light on whether strategies that have already been implemented by universities to impart soft skills and SCS training are helpful. The only recommendation on the application of findings in this study is that universities concentrate on developing the SQS of college students. If universities can identify females and minorities with SQS in the admissions process, then they also may be able to strongly encourage those females and minorities to pursue undergraduate majors in higher-paying fields such as engineering, physics, economics, and computer science.

Findings from field studies, however, support anecdotal evidence that soft skills and SCS are demanded from college graduates after they are hired. Universities that heed these findings informally conduct soft skills and SCS training by holding mixers in which students attempt to collect as many business cards as possible or develop acquaintanceships as quickly as possible with other students or alumni in their field or discipline. Students also make numerous individual or group presentations in their classes and are extensively involved in group projects. What is wrong with these informal mixers, group projects, and occasional soft skills and SCS training classes at many universities? They do not afford college students the opportunity to make contacts outside their field or discipline. Even more important, they do not afford college students the opportunity to develop skills in establishing, maintaining, and reinforcing longer-term and deeper relationships with individuals outside their field or discipline.

Informal mixers, group projects, and occasional soft skills and SCS training classes are normally the domain of specific departments or schools within universities. For example, many students in a university's business school and law school take conflict resolution classes, but none or a few of the students in the university's school of architecture take conflict resolution classes. Another example is of accounting majors building relationships with other accounting majors as a result of these informal mixers, group projects, and occasional soft skills and SCS training classes. However, in work contexts, accountants generally do not hire accountants. Accountants are hired to participate in transactions or review financial documents by, among others, investment bankers, traditional bankers, entrepreneurs, government officials, environmental engineers, and lawyers. Because college graduates are involved in transactions inside

and outside firms that involve many others in different fields and disciplines, employers want college students in all disciplines and all fields to receive soft skills and SCS training (Maes, Weldy, & Icenogle, 1997; Nyman, 2006; Wolosky, 2008).

Universities can take steps that produce relationship-building skills that go beyond informal mixers, group projects, and a few soft skills and SCS training classes. One such step could be assembling diverse students. During orientation universities can assemble, for example, four undergraduates from the business school, nursing school, engineering school, and urban affairs school who have nothing in common other than being at the same university and require that they: (a) keep a diary in which they record occurrences or interesting happenings at no less than four scheduled face-to-face, half-hour or more, encounters each year of their tenure at the university, with the last of the four encounters being a meeting in the office of a faculty member from one of the four schools who will assign a grade to the student from his or her school; (b) note in the diary who initiated each of the three non-faculty encounters and the type of encounter, i.e. whether the encounter was a meeting for coffee or watching a basketball game on campus; (c) produce receipts from the place where the three non-faculty encounters were held; and (d) receive a grade for the entire exercise based on information in the diary, attendance at the encounters, and apparent level of familiarity with the other group members. The objective of the exercise is to teach college students how to continually use their soft skills and SCS to establish and maintain strong, long-term, cross-functional relationships (Greer, 2010).

Some universities require, give academic credit for, or strongly suggest that college students complete paid or unpaid internships because employers believe that

internships teach college students on-the-job skills (Burnsed, 2010). Accordingly, another step could be the adoption of that practice by other universities. Some large universities refrain from requiring internships because of the scarcity of jobs in urban areas where many of the universities are located. Yet, universities can provide training through unpaid internships. After all, accounts payable departments at universities resemble accounts payable department at for-profit and non-profit firms. Many universities also operate businesses such as hospitals, museums, concert halls, and sports arenas that can be used to impart on-the-job relationship-building skills. The need for internship positions for students will also compel universities to strengthen their ties with other local employers. Universities that implement the foregoing steps will be laying the foundation for the future implementation of formal soft skills and SCS training classes that develop relationship-building skills.

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