THE INFLUENCE OF PRIMARY MARKET GROWTH ON HUMAN CAPITAL DEVELOPMENT: A COMPARSION OF REGIONAL AND INDIVIDUAL OUTCOMES

by

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A DISSERTATION

Presented to the Department of Sociology
and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

September 2017

DISSERTATION APPROVAL PAGE

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Title: The Influence of Primary Market Growth on Human Capital Development: A Comparison of Regional and Individual Outcomes

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Degree awarded September 2017

DISSERTATION ABSTRACT

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The purpose of this study is to gauge the influence of local/regional labor market conditions on educational outcomes, using human capital and dual labor markets as guiding theories. To gain an understanding of how growth in multiple labor market tiers and various occupation types influence local human capital development as well as students' decisions to invest in their own human capital; two modeling approaches are utilized. First, the association between local employment growth by labor market tier and aggregate human capital development is evaluated. Second, occupations found to significantly influence local human capital development are transferred to models gauging the educational attainment of individual respondents. Results indicate primary market employment growth has a positive impact on the number of county residents with a high school, Associate's, and Bachelor's degree. At the individual-level, primary market growth increased the likelihood of earning a high school and Associate's degree but did not influence the odds of earning a Bachelor's degree.

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Reeves, E., Lowe, J. (2009). Quantile Regression: An Education Policy Research Tool. *Southern Rural Sociology,* 24(1), 173-199.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Currently, there is a plethora of studies addressing human capital investment within the context of education. Much of the literature bridging local labor market conditions and education outcomes focuses on high school dropout rates and college enrollment in relation to unemployment rates and local wages. Historically, few studies have attempted to link growth within specific labor markets to the type of degree residents earn, i.e., a high school degree/G.E.D., an Associate's, and a Bachelor's. In other words, do potential degree earners consider the types of jobs available to them when making decisions concerning their human capital investment? Are students more likely to pursue a college degree if there has been substantial growth within occupations requiring a college education? Corollary, are they less likely to pursue a college degree if employment growth has primarily occurred with secondary market occupations? What about high school graduation and earning an associate's degree? Are students more likely to graduate high school if locally available jobs only require a high school degree? Are they more likely to finish high school if locally available jobs require an Associate's or Bachelor's degree?

The purpose of this study is to gauge the influence of local/regional labor market conditions on educational outcomes, using human capital and dual labor markets as guiding theories. To gain an understanding of how growth in multiple labor market tiers and various occupation types influence local human capital development as well as students' decisions to invest in their own human capital; two modeling approaches are utilized. First, the association between local employment growth by labor market tier and aggregate human capital development is evaluated. Here, the percentage gain in counties stock of high school

graduates, Associate's degree earners, and Bachelor's degree earners between 2000 and 2014 is regressed against employment gains within primary, mid-level, and secondary labor markets within the same timeframe. Second, occupations found to significantly influence local human capital development are transferred to models gauging the educational attainment of individual respondents. In both sets of models, "educational attainment" is measured by the type of degree earned as a means of testing whether growth in primary, secondary, and mid-level labor markets have measurably different magnitudes of effect on the type of degree earned.

Factors such as parents'/guardians' educational background and socioeconomic status are commonly held as influential elements affecting students' educational attainment. Overlooked is the fact that these elements too, are potentially influenced by the local/regional markets they were raised in, much like their children. In isolated, rural pockets of the US—particularly central Appalachia—generations of family members have participated in the same local labor markets, never "settling down" too far outside of their place of origin. In these locations, parents and children often share similar labor-market experiences and may make similar decisions when it comes to human capital investment. If most available jobs are primarily within secondary markets, additional education beyond high school (or less than a high school in many cases) may not be considered a sound investment.

The proposed influence of locally available occupations on educational attainment is somewhat intuitive and in line with Becker's theory of human capital. In the early stages of the "career path," most people are faced with the decision of entering the job market after/during high school or to postpone entry and invest in additional training via postsecondary school or trade school. In the traditional model, wages that could be earned

throughout the duration of the training period (often years) are forfeited in favor of higher wages later. It follows, if high-skilled occupations are scarce both locally and within a [subjectively] reasonable commuting distance, financing additional training and/or education may be viewed as a bad investment by recent graduates. As such, a higher proportion of graduates may enter the labor market immediately after high school graduation—or during high school—compared to areas with a more diverse labor market or where more high-skill occupations are available.

In addition, the proposed influence is an extension of Bozick's research on the warehouse hypothesis linking perceived job opportunities to college enrollment, though with a few caveats. Bozick's analysis focuses on the propensity of recent high school graduates to enroll in college based on the unemployment rate and the volume of locally available jobs that do not require a college degree. Whereas Bozick's study examines unemployment and job availability during the year that high school seniors graduate, this study examines employment growth by labor market tier and occupation type over a period of 10 years; beginning when respondents were sophomores in 2002, and ending in 2013—when respondents would have been roughly 25-27 years old. Additionally, this study examines the likelihood of graduating high school and earning an Associate's or Bachelor's degree based on perceived job opportunities as opposed to college enrollment.

This study attempts to answer six questions. 1. Does employment growth in primary market occupations stimulate growth in the number of high school graduates and college degree earners? 2. Given (1) is verified, how does the impact of employment growth in primary occupations compare to the impact of growth in lower-tiered occupations? 3. Does employment growth in primary market occupations influence the probability of respondents

graduating high school and/or earning a college degree? 4. Given (3), how does the impact of employment growth in primary occupations compare to the impact of growth in lower-tiered occupations? 5. Does employment growth in primary, mid-level, and secondary market occupations influence the high school graduation and/or earning a degree when controlling for network/homophily effects? 6. Do occupations illustrated to affect growth/decline in the number of degree earners translate to an increased/decreased probability of earning a degree among individuals?

Academic literature thus far has not linked labor markets to educational outcomes in the manner I am proposing. Often, the causal relationship addressed is usually the opposite, i.e., the role of educational outcomes on career choices and/or local labor markets. To ascertain the influence of local/regional labor markets on educational outcomes, both human capital and dual labor markets will be guiding theories; the former for its emphasis on incentives, the latter for its structural account of the American labor market. Due to data and theoretical limitations, however, this study does allow for the assessment of individual mechanisms—outside of background factors such as parents' socioeconomic status and level of education—which may influence students' decisions on their human capital investment. Here, the primary independent variables of interest focus on change in aggregate employment opportunities within an 8 to 10 year time frame. As such, individual mechanisms associated with occupational and educational outcomes—parental involvement in students' education, network ties leading to information about local employment opportunities, cultural capital, etc.—will not be addressed in this analysis.

The remainder of this chapter is laid out as such; section 1 identifies key literature pertaining to human capital theory and the use of token measures of labor-market health—

such as business-cycles—as explicates of high school graduation rates and college enrollment rates. Section 2 details literature on dual labor market theory as a response to neoclassic economic models of human capital. Section 3 highlights literature on the role of networks/homophily on education outcomes. Section 4 discusses the limitations of Human Capital and Dual Labor Market Theories in their assessment of educational outcomes and what it means for the current study. The final section provides a roadmap for the dissertation.

Human Capital, Labor Markets, and Educational Outcomes

Human Capital Theory falls under the umbrella of Ration Choice Theory which characterizes humans as self-interested (though, not necessarily selfish) rational actors whose decisions are governed by "utility maximization" (Hechter & Kanazawa, 1997; Green & Shaprio, 1994; Little, 1991). Individuals are assumed to have a set of interests/goals for which they evaluate appropriate courses of action to obtain. Agents then rank each course of action on the perceived ability to maximize their preferences. Human capital theory is moreorless Rational Choice Theory applied to the development of advanced/nuanced skill-sets to maximize wages, benefits, etc. and/or advance in one's current occupation. In general, human capital is accrued in the same matter as other forms of capital; most require some degree of monetary or time investment, with the general expectation of returns exceeding the initial cost. Human beings invest in their health, education, vocational training, etc. with the expectation of greater returns on their investment over the course of their lifetimes (Becker, 1964; Shultz, 1961). Within the context of education, students "invest" in additional education to develop a more refined skill set with the expectation that their future earnings will offset the cost of training as well as wages lost during the training process. In situations where; A) there are very few locally available high-skill occupations; or B) recent graduates

are not embedded in networks containing information about available high-skill, high-wage occupations; pursuing additional education/training may not be seen as an appropriate avenue for maximizing income or job satisfaction.

Human capital theory is pervasive in studies of education. Much of the literature on human capital investment focuses on the influence of markets on high school dropout rates (Rees & Mocain, 1997; Black, McKinnish, & Sanders 2005; Duncan, 1965; Rumberger, 1983; Neumark & Wascher, 1995; Goldin & Katz, 1997), college attendance (Betts & McFarland, 1995; Fuller, Manski, & Wise, 1982; Manski & Wise, 1983; Becker, 1994; Schultz, 1961; Perna, 2000), choice of college major (Altonji, Blom, & Meghir, 2012; Song & Glick, 2004; Davies & Guppy, 1997) and returns to education (Becker, 1964; Shultz, 1961; Kane & Rouse, 1995; Morgenstern, 1973; Mincer, 1958; Blaug, 1972; Rouse, 2005; Roksa & Levey, 2010). In addition, economic boom and bust cycles have also been linked to high school dropout rates and college enrollment rates (Bedard & Douglas, 2007; Light, 1996). For the purposes of this study, the incentives for finishing high school and/or earning a college degree will be the focus.

High School Dropouts

The consequences of not finishing a high school degree are immense; hence non-completion seems counter-intuitive in the contexts of human capital theory. Compared to people with a high school degree, dropouts experience lower lifetime earnings (Rumberger, 1987; Rouse, 2005; Sum, Khatiwada, & McLaughlin, 2009), contribute significantly less to the tax base (Rouse, 2005; Sum, Khatiwada, & McLaughlin, 2009; Catterall, 1987), are more dependent on social welfare (Rumberger, 1987; Catterall, 1987; Levin, 1972) and more likely to be unemployed (Rumberger, 1987; Sum, Khatiwada, & McLaughlin, 2009; Rouse, 2005;

Catterall, 1987). On a related note, Brenner (1976) found that unemployed persons are more likely to experience poor mental and/or physical health, increased mortality, suicide, and admission to state mental hospitals. Indirectly, this suggests earning a high school degree not only increases employability, lifetime earnings, etc.; but also, increases overall health as well. Despite negative outcomes routinely associated with dropping out of high school, both labor market conditions and long-term wage increases have been illustrated as influential on high school dropout rates.

Using reconstructed data from the 1960 Census, Duncan (1965) examined the relationship between high school graduation and unemployment rates from 1902 to 1956. She found that during periods of high unemployment, a larger percentage of students remained in school. When unemployment was low, high school completion rates decreased. Partitioning out high school completion rates by race and gender, Rumberger (1983) found both black and Hispanic students were more likely to dropout when local unemployment rates were low. However, white males where *more* likely to dropout during periods of high unemployment. When queried as to why they left school, nearly a quarter of male respondents cited "economic reasons" as the main catalyst for dropping out. Comparatively, 15 percent of female respondents left school for early entry into the labor force. Noted by Black et al (2005), the Duncan study suffers from variable omission bias (does not include family background variables) and the Rumberger study does not account for local labor market characteristics other than unemployment.

Utilizing panel-data estimation techniques and district-level data to account for variable omission bias and unobserved environmental characteristics, Rees and Mocan (1997) illustrated that both White and Hispanic students are less likely to leave school when local

unemployment rates are high. In fact, a 1 percent increase in New York State's unemployment rate was associated with a 2 percent decrease in district dropout rates. This effect remained significant even when controlling for factors such as teachers' education and years of experience. Black students, however, are more likely to leave school when economic conditions are turbulent (suggestions as to why was not given). Though Rees and Mocan adjust for variable omission bias and include locational characteristics, they do not account for the variation of industries within local labor markets.

Three studies address the effect of wage increases in low-skill occupations on high school completion rates. Neumark and Wascher (1995) used a conditional logit model to analyze state-year data from 1977 to 1989. They found that increases in states' minimum wages significantly increases high school dropout rates and is inversely related to the proportion of teens that are neither employed nor enrolled in school. Wages in the manufacturing industry have also been illustrated as influential on high school completion (Goldin & Katz, 2008), though results may not be applicable to present markets given the dated time frame of the study (1910 to 1940). Black, McKinnish, and Sanders (2005) provide a more contemporary study of the coal industry in Pennsylvania and Kentucky during the 1970s and 1980s. They found that the high wages accompanying the coal boom of the 1970s decreased high school enrollment rates in coal-producing counties. Corollary, high school enrollment increased during the coal bust of the 1980s. In addition, they illustrated that a 10 percent increase in wages for low-skill labor decreased high school enrollment by 5 to 7 percent. Though studies by Goldin and Katz (2008) and Black, McKinnish, and Sanders (2005) take wage differentials and industry-type into account;

examining a single industry is too restrictive—results are not applicable to other industry types.

College Enrollment/Completion

High school graduates opting for additional education and/or training are essentially making several investments with the expectation of returns exceeding expenses. First, there is the cost of attendance which includes tuition, books, supplies, room, board, etc. Per data pulled from the National Center for Education Statistics (2014), the average cost of obtaining a Bachelor's degree at a 4-year public institution (including room and board) exceeded $67,000[1] for the 2011-12 academic year—an increase of over 80 percent since 2001-02. Even if potential college students were eligible for the maximum Pell Grant amount, the cost of a degree would have still averaged $45,000. Other than the expenses directly associated with college attendance, there are also indirect costs. This includes less leisure time, the cost of transportation to and from the university, as well as forgone wages and opportunities that come with full-time employment (Becker, 1993). In short, pursuing a post-secondary education is an expensive endeavor. For recent high school graduates, the expense may be viewed as excessive if they [recent graduates] live in areas where homogeneous, low-skill occupations dominate the local job market.

Despite the increasing expense of a college education, many benefits are associated with earning a degree. Of those benefits, perhaps the most notable is a substantial increase in wages (Jaeger & Page, 1996; Becker, 1993, Belman & Heywood, 1991). Among persons 25 and over, bachelor's degree holders out earn high school graduates by $22,000+ annually (2012 American Community Survey, 3-year estimate). Over the course of a lifetime, the

[1] This figure assumes a Bachelor's degree in obtained within four years.

additional income translates to an estimated $660,000[2] more than high school graduates. Other benefits of a college degree include a more fulfilling work environment, better health and health care, and a decreased likelihood of unemployment (Baum & Payea, 2004; Bowen, 1996; Leslie & Brinkman, 1988). The benefits of a college education are not limited to the bachelor's degree, as several studies have indicated significant increases in pay among Associate's degree earners (Kane & Rouse, 1995; Belman & Heywood, 1991; Jaeger & Page, 1996; Marcotee et al, 2005). In addition, Kane and Rouse (1995) found that community college attendees who did not obtain their Associates degree still out earned those without a college education by 10 percent. The benefits of a degree are not limited to individuals. Societal benefits include an increased tax base, lower incarceration rates, higher voter turnout, increased blood donations at local clinics, decreased likelihood of smoking, and a locally reduced strain on social welfare programs (Baum & Pyea, 2004, Bowen, 1996).

Other than studies which examine economic returns to a college degree, there is very little research connecting labor market conditions to obtaining an Associate's or Bachelor's, though several examine its link to college enrollment. Morissette, Chan and Lu (2014), for example, found that college enrollment in Canada was linked to global oil prices from 2001 to 2008; as global oil prices decreased, college enrollment increased. As with research on high school completion, several studies link college enrollments to unemployment rates (Betts & McFarland, 1995; Hillman & Orians, 2013; Pennington, McGinty, & Williams 2002; Bozick, 2009). Largely, an increase in unemployment coincides with an increase in college enrollment, particularly at community colleges. Indeed, increased unemployment rates have also been illustrated to influence the decision to enroll part-time or full-time

[2] 30 years of employment with an additional $22,000 per year.

(Stratton, O'Toole & Wetzel, 2004). Utilizing the warehouse hypothesis—which holds that students are more likely to remain in school when labor market conditions are unfavorable and more likely to exit school for employment when market conditions are favorable—Bozick (2009) illustrated that recent high school graduates where more likely to enroll in college when unemployment was high and the availability of jobs that do not require a Bachelor's degree is low. Corollary, students were more likely enter the job market when unemployment was low and the number of available jobs that do not require a Bachelor's degree is high.

Dual Labor Market Theory

During the 1960s, government-funded occupational training programs were sprouting up in central cities to combat what was perceived as "supply-side" deficiencies within the workforce (Doeringer et al, 1972) as part of a Lyndon Johnson's "War on Poverty." The consensus, and a view in line with human capital theory, was that regionally high unemployment and underemployment rates were the byproduct of an uneducated and unskilled workforce, thus making them "unemployable." In response, the Concentrated Employment Project (CEP) was established to aid government programs in educating and training workers to increase "manpower," thus producing more employable workers and reducing underemployment and poverty, or so the logic went. In an 18-month study of a CEP program established in Boston, Doeinger et al. (1972) found that high unemployment was not related to the employability of the workforce so much as the quality of the occupations they had access to. Most trainees who participated in the CEP-sponsored program were placed in low-wage occupations that did not offer a career ladder. As such, many employees quit their jobs.

Stemming from neoclassical economic theories' inability to explain occupationally-based differences in labor market experiences, skepticism of human capital theory's efficacy became prevalent. Additionally, human capital theory did not address occupational clustering or segregation as well as wage differentials across racial, gendered, and spatial divides (England, 1982; Poire, 1972, 1975; Zellnar, 1972; Weisskoff, 1972; Gordon, 1971). In short, human capital theory was criticized for its failure to take structural processes into account. Instead of focusing on differences between occupations and the markets they are embedded in, the primary focus of human capital theory is investment in one's own skill set—people who are unemployable or have low-skill jobs have not developed the expertise adequate to obtain a quality occupation. Subsequently, and in response to the deficiencies of neoclassical economic theories, Dual Labor Market/Labor Market Segmentation Theory was developed.

Born from the Doeringer and Piore's (1971) research on internal labor markets, dual labor market theory conceptualizes the American labor market as divided into good jobs and bad jobs, each type clustering together to form two separate markets. Good jobs are located in the primary market while bad jobs are located in the secondary market. Jobs within the primary market share several characteristics including "high wages, good work conditions, employment stability, chances of advancement, equity, and due process in work rules" (Doeringer & Piore, 1971). In contrast, the secondary market consists of jobs that: are low paying, unstable, offer limited benefits (if any), provide a poor working environment, offer little chance of advancement, and high turnover.

Regarding the primary market, early proponents of dual labor market theory realized many occupations fell somewhere in between primary and secondary. As such, the primary market was eventually broken up into upper and lower tiers (Piore, 1973, 1975; Osterman

1975), each with their own unique set of characteristics. Upper tier occupations offer more job control and autonomy; are often more complex in nature; "encourage and require creative….self-initiating characteristics;" are less routinized; have higher turnover rates due to advancement; and are more "closely related to formal education and personal achievements" (Harrison & Sum, 1979; Reich, Gordon, & Edwards, 1973; Hudson, 2007). Examples of upper tier occupations include management, professor, doctor, lawyer, etc. Lower tier jobs within the primary sector are "more routinized, and encourage personality characteristics of dependability, discipline, responsiveness to rules and authority, and acceptance of a firm's goals" (pg. 360. Reich, Gordon, & Edwards, 1973). In addition, turnover is slow in low-tier occupations as employees become "locked in a career pattern" or a specific internal market (Doeringer & Piore, 1971; Anderson, Butler, & Sloan, 1987). Some examples of low-tier occupations within the primary market include factory work, clerical work, and most blue-collar occupations in general.

Another characteristic of dual labor market theory is the limited mobility to move from the secondary to the primary market (Doeringer & Piore, 1971). In many cases, "work" is not the primary focus of persons employed in the secondary market. The income derived from these occupations could be supplemental, as employees' households may have a primary market breadwinner (Hudson, 2007). Other research suggests that workers initially employed is in the secondary labor market will continue to work in this sector throughout the course of their life (Gordon, 1972; Piore, 1970; as cited in Hudson, 2007).

Previous Research

As with human capital theory, much of the literature on dual labor market theory has been mixed. Supportive studies focus on the segregated nature of the labor market (Oster

1979; Kaufman, Hodson, & Fligstein, 1979; Gittleman & Howell, 1995); differences between primary and secondary markets (Graham & Shakow 1990); and groups that are more frequently segregated to occupations within the secondary market--specifically women, immigrants, and nonwhites (Boston, 1990; Zellnar, 1971; Weisskoff, 1972; Hiebert, 1991; Sakamoto and Chen, 1991; Sakamoto & Powers, 1995; Leontaridi, 1998). Studies more critical of dual labor markets cite the theories ambiguity (Heckman & Hotz, 1986; Leontaridi, 1998) and question the "limited mobility" tenant (Griffin, Kalleberg, & Alexander, 1981; Anderson, Butler, & Sloan, 1987).

Several studies have implemented a factor analysis approach to illustrate distinct groupings of occupations based on a number of characteristics. Analyzing 83 3-digit 1960 Census code industries, Oster (1979) found evidence supporting dual structuralism within the job market. Industrial characteristics associated with the primary markets—characteristics such as a concentration of firms with sales over $100 million, total industrial assets, and total industrial income—significantly "loaded" to create a single factor. An additional PDF (population probability density function) test both confirmed and partitioned 55 of the 83 industries into the secondary (or peripheral) market and 28 into the primary (or "core") market. Using a combination of both factor and cluster analysis, Kaufman and company (1979) classified the American labor market into 16 distinct sectors. Dimensions used to distinguish differences between sectors included concentration (the extent to which industries are dominated by a handful of companies), size, capital/labor intensity, foreign involvement, government intervention (i.e., regulation), profit, autonomy, unionization, productivity, and growth. In an assessment of 621 occupations, Gittleman and Howell (1995) grouped

occupations into 6 job categories using a cluster analysis. Here, occupations were clustered based on 17 measures of job quality.

Studies of the American labor market have also highlight gender- and race-based occupational segmentation (Zellnar, 1972; Weisskoff, 1972; Hiebert; 1991; Leontaridi, 1998). In 1900, roughly one-third of employed women were concentrated into a single occupational category, namely "private household worker" (Weisskoff, 1972). As of 1969, the distribution of women across occupations increased though the "type" of occupations women were concentrated in were similar. Utilizing 1960 census data, Zellnar (1972) demonstrated that roughly 50 percent of employed women held occupations in which they made 80 percent or more of the employees. Only 2 percent of employed men where in these occupations. Indeed, 90 percent of men held jobs where they made up more than a third of all employees. The effects of this segmentation process were shown to drive down the overall wages of women.

Regarding immigration, studies suggest many immigrant workers form and participate in enclave markets and/or remain in the secondary labor market (Wilson & Portes, 1980; Mata & Pendakur, 1999). It is not uncommon for immigrants new to the U.S. labor market to start their own small businesses and employ other immigrants (Wilson & Portes, 1980). Mata & Pendakur (1999) suggest that immigrant entrepreneurship may be a response to the nature of a dual labor market economy. Due to education and/or language barriers, immigrants may choose self-employment over working in the secondary labor market. Indeed, Alcobendas and Rodriguerz-Planas (2010) show that immigrants to Spain are disproportionately funneled into the secondary labor market despite the skill and education of the workforce. The authors suggest that several occupations requiring a high degree of education also require some form

of certification—certification which may be specific to the host country. As such, many immigrants choose self-employment or seek work in immigrant-owned businesses.

Previous studies also show minorities tend to be segregated to the secondary labor market (Rosenberg, 1976 as cited in Dickens and Lang 1985; Carnoy, & Rumberger 1980; Dickens & Lang, 1985; Boston, 1990; Hudson, 2007). Rosenberg (1976), Carnoy, and Rumberger (1980) found that minority workers are more likely to begin their careers in the secondary labor market and also more likely to remain there compared to whites. Boston (1990), shows that 58.8 percent of black men and 47.3 percent of black women were employed in the secondary sector in 1983—a time when all workers in the secondary labor market accounted for a quarter of all citizens in the labor force. Extrapolating from a series of studies, Dickens and Lang (1985) hold that there are barriers to primary sector jobs for minorities that do not exist for whites. Hudson (2007), using a multinomial hierarchical modeling technique, found that both black men and women, noncitizen Hispanic men and women, and Native American men are more likely to be employed in the secondary labor market.

Studies examining the spatial dimension of dual labor market theory tend to focus on "spatial mismatch," or what occupations are spatially accessible to whom. Dubbed the Spatial Mismatch Hypothesis (SMH), researchers have utilized the theory to explain income, opportunity, and employment differentials between urban and suburban spaces; primarily focusing on inner-city poverty among African Americans (Kain, 1992; Ihlanfeldt & Sjoqusit, 1998). McLafftery and Preston (1992), for example, found that African American and Hispanic women in northern New Jersey are more dependent on public transportation and thus have poorer spatial access to jobs compared to white women. Latina women were shown

to have better access to jobs within the local labor market but also earned considerably less than African American and White women. This suggests that there was not a lack of occupations in the area, but a lack of decent-paying occupations. Doeringer et al (1972) also concluded that the number of occupations available in urban centers was not an issue so much as the lack of well-paying jobs. Venti (1975) reach similar conclusions in his study of welfare recipients in Massachusetts.

Research critical of dual labor market theory cites its ambiguity and the supposed inability of workers in secondary markets to move to primary markets. Analyzing labor market earnings and inequality among Panamanian males, Heckman and Hotz's (1986) income model of persons above the poverty line did not explain earnings of the poor, even when controlling for selection bias. They cite a number of reasons why their results do not support to dual labor market theory including: the potential existence of two or more sectors in the labor market, yet all are lumped into "primary" or "secondary'; workers as utility maximizers rather than earning maximizers; the inability to separate the cost associated with moving between secondary and primary sectors from barriers to entry; and false distributional assumptions. The authors conclude that in order to test for the existence of a dual market, a "true functional form of the earnings equation under the hypothesis of no dualism" is assumed to be known (pg. 529). As such, Heckman and Hotz hold dual labor market theory as untestable.

Leontaridi (1998) also cites the presupposed existence of two labor sectors as an inherent weakness of dual labor market theory. Extrapolating from previous studies, the author concludes that while the use of cluster and factor analysis solves the issue of "a priori segment determination," the number of proposed sectors resulting from these studies are

dependent on both the number and type of variables used. This suggests there is not an agreed-upon methodology to test dual labor market theory.

Regarding mobility between secondary and primary sectors, several studies have found that rigid barriers between markets do not exist.[3] Anderson, Butler, and Sloan (1987), using the Panel Study of Income Dynamics, develop indices of job traits which are used to characterize occupations as good or bad. Their results indicate that job groupings based on jobs traits (wages, layoffs, unionized, unemployment, etc.) did not conform to dual labor market theory. Given that occupations could not be clustered based on their characteristics, rigid barriers between sectors do not exist. In a previous study examining the determinants of early labor market entry; Griffin, Kalleberg, and Alexander (1981) found "considerable inter-sectoral mobility" and few characteristic differences in the employees working in each sector. Mayhew and Roswell (1979) and McNabb (1987) found that the education of workers was highly correlated with their place in the "occupational hierarchy," thus the existence of rigid barriers between primary and secondary sectors are questionable.

The Influence of Peers on Academic Achievement

For well over half a century, the role of peers on students' educational, occupational, and long-term life outcomes has been a topic of interest among education researchers. Much of the literature on peer-group effects has focused on the role of social cliques as a means of establishing class boundaries (Hollingshead, 1949), peer influence on academic performance (Coleman, 1961; Hanushek et al, 2003; Calvo-Armengol et al 2009; Hoxby, 2000; Zimmerman, 2003; Angrist & Lang, 2002), student tracking (Duflo, Dupas, & Kemer, 2011);

[3] For additional material, see Psacharopoulos (1978), Mayhew and Rosewell (1979), McNabb (1987), Leigh (1976), and Schiller (1977).

the likelihood of dropping out of high school (Cairns, Cairns, & Neckerman, 1989; Jimerson et al, 2000:Carbonaro & Workman, 2013, 2016); selection bias in peer-effect studies (Zimmerman, 2003; Sacerdote, 2001; Hoxby, 2000); college major (Sacerdote, 2001); and student aspirations (Haller & Butterworth, 1960; Alexander & Campbell, 1964; Cuncan, Haller, & Portes, 1968; Carbonaro and Workman, 2016; Martin, 2009).

Social Cliques and Academic Achievement

Regarding social cliques, in a field study of 735 adolescents between the ages of 13 and 18 residing in a Midwest community, Hollingshead (1949) found that teenager's behaviors were linked to their position with the towns stratified social structure. The youths of Elmstown, Illinois predominantly interacted with and dated those within the same social strata, with the occasional deviation. In addition, Hollingshead noted that students within the lower strata generally did not engage in any social and/or community events; high school students did not attend athletic events, join school clubs, etc. In short, youths and their families within the lower strata did not have strong ties to their community.

Studies have generally been mixed on the influence of peers when it comes to students' academic achievement. Some illustrate a connection between peer groups and achievement as early as elementary and middle school. Utilizing a series of models that control for student, school, and school-by-grade fixed effects, Hanushek et al (2003) illustrated that peer achievement among 3rd through 6th grade students had a positive influence on students' achievement growth. Results indicated that a .1 standard deviation increase in peer achievement leads to a .02 increase in student achievement. When the distribution of math scores were parsed, results were similar, though students in the uppermost quartile were not as responsive to peer achievement.

In a study of 3rd, 5th, and 7th graders enrolled in Boston's Metco program, Angrist and Lang (2002) found that lower-scoring Metco participants did not significantly influence the reading scores of their non-Metco peers. On the other hand, they did find evidence of an intragroup effect based on racial composition. Specifically, there was an inverse relationship between the proportion of Metco students and the reading test scores of Non-Metco students among minority girls. As the former increased, the latter decreased.

In a study which examined peer effects, teacher incentives, and student tracking in Kenya; Duflo, Dupas, and Kemer (2011) found 1st graders who attended schools with an achievement-based tracking system outperformed their peers at non-tracking schools. Utilizing a unique experimental design, 60 randomly selected schools assigned students to sections based on initial test scores on a standardized exam given at the beginning of the academic year. The remaining 61 schools randomly assigned students to one of two sections, regardless of their initial achievement. At the end of an 18-month period, 1st graders who attended tracking schools scored[4] .14 standard deviations higher than students in non-tracking schools. One year later, the difference had increased to .16 standard deviations. When examined by section, students in both tiers benefited from tracking, the bottom tier[5] gaining .16 standard deviations and the upper tier gaining .19 standard deviations.

In a separate analysis of friendship networks, Calvo-Armengol, Patacchini, and Zenou (2009) highlight the importance of peer influence on education outcomes. Using the Katz-Bonacich measure of network centrality, the authors show a standard deviation increase equates to an achievement gain of 7% of one standard deviation. It is worth noting, however,

[4] Students were tested on language and mathematics.
[5] Students scoring below the median were placed into the lower tier section. Those scoring above the median were assigned to the upper tier.

that parental education accounted for a gain of 17% of one standard deviation per unit increase. Results of their study indicate that students' location within friendship networks has a significant impact on their educational outcomes, though the effect size is small.

Several studies have also indicated that peer influence plays a significant role in high school graduation. A study of early school dropouts by Cairns, Cairns, and Neckerman (1989) showed a positive correlation between students' friendship networks during 7th grade and leaving school by their junior year. Among both male and female cliques, there was a positive association between dropping out school and having friends who had dropped out of school. In a separate longitudinal analysis of high school dropouts, Jimerson and company (2000) illustrated peer competence at age 16 influences students' graduation status at age 19. In fact, the Wilks's Lambda score for peer competence was slightly higher than the score for students' academic achievement.

By themselves, these studies do not necessarily illustrate a peer effect on the probability of graduating high school and/or dropping out. Instead, the results may illustrate students' tendency to affiliate with those having similar academic aspirations. In a study carried out by Carbonaro and Workman (2013), however, a distinction is made between types of friendship networks; specifically, close and distant friendships. The authors conclude that while the volume of close friendship ties is negatively associated with dropping out of school, the characteristics of close friends did not influence the likelihood of dropping out. In contrast, the characteristics of *distant* ties was positively associated with dropping out. A later study by Carbonaro and Workman (2016) illustrated the characteristics of friends' friends was at least as strong of a predictor as friends' characteristics on dropping out of school and expectations of college enrollment. Here, a homophily effect would dictate that the

characteristics of close ties be more influential than those of distant ties, yet the works of Carbonaro and Workman show that distant ties are at least as important as close ties.

Selection Bias

As one may infer from the studies covered so far, selection bias is a pervasive issue when analyzing peer-influence on academic achievement, as it difficult to determine if the effects are, in fact, due to the influence of peers, or merely a reflection[6] between students and their peer groups. In other words, students' academic outcomes are not influenced by their peers so much as students with similar aspirations are more likely to interact with each other. Their associated outcomes may still be a product of individuals' background factors such as aspirations, interests, socioeconomic background, etc.

Results from several studies illustrate why homophily is so problematic when peer effects are of concern. Early models of peer influence on educational and aspirational outcomes note the effects are potentially overshadowed by homophily effects (Haller & Butterworth, 1960; Alexander & Campbell, 1964; Duncan, Haller, & Portes, 1968). Additionally, many studies highlight the proclivity of youths to befriend other youths who share similar characteristics, such as race/ethnicity (Moody, 2001; Joyner & Kao, 2000), gender (Shrum, Creek, & Hunter, 1988), and behavior (Kandel, 1978; Cohen, 1977). In Kandel's (1978) study of adolescent friendships, for example, similarities in attitudes and opinions among youths were due to friendship choice, not peer influence. Utilizing longitudinal data on 957 "best-schoolfriend dyads," the author illustrates students tend to "coordinate their choices of friends and their behaviors…so as to maximize congruency within friendship pairs." Dyads in which members shared similar frequencies of marijuana use, political identification, educational

[6] See Manksi (1993) for details.

aspirations, and "minor delinquent activities" were more likely to remain intact at the end of the school year. Members of new dyads which formed during the school year also shared similarities in recreational drug use, political leanings, educational pursuits, and delinquent behaviors.

Flashman (2012) also links educational aspirations and achievement to changing dynamics within friendship networks. In her study of high school students, results indicated that high-achieving students were more likely to develop friendship ties with other high-achieving students. Corollary, low-achieving students were more likely to develop ties with low-achieving students. The link between educational achievement and choice of friends remained significant after controlling students' socioeconomic backgrounds, race/ethnicity, and proximity to other students. Taken together, these studies illustrate a seemingly endogenous relationship between student behavior and peer group influence.

Several methodological approaches have been implemented by scholars as a means of isolating peer effects from homophily effects. Utilizing the Texas Schools Microdata Panel, Hoxby (2000), for example, used two separate strategies for measuring peer effects in the classroom, both of which control for school policies, school location, parental influence on classrooms/schools, student tracking by achievement, and a series of other factors that may introduce selection bias. The first strategy involved measuring the variation in adjacent cohorts' (groups who are in the same grade, in the same school, within the same academic year) share of gender and racial groups. In the second approach, the author measures idiosyncratic variation in achievement between student groups and tests whether classroom variation in race and gender is correlated with the variation in achievement. Results supported the "peer effect" hypothesis; students who were surrounded by high achieving

peers earned higher reading scores. A 1-point increase in peers' test scores generated a .10 to .55 increase in students' test scores, depending on model specifications.

Studies by Zimmerman (2003) and Sacerdote (2001) attempt to control for the selection bias, via quasi-experiments involving randomly assigned, first-year college roommates. In both studies, the authors examined students' achievement outcomes based on the achievement of their roommates. Zimmerman found that students who were assigned high achieving roommates earned a higher cumulative and first-semester GPA. Additionally, results indicated "mid-level" achievers who shared a room with "low-level" achievers had lower GPAs compared to their "mid-level" peers with middle and high achieving roommates. Sacedote (2001) also found a link between freshmen GPAs and that of their roommates, though there was not an association between roommates' college majors or decisions related to the job market. In both Zimmerman's study of Williams College students and Sacedote's study of Dartmouth freshmen, students' academic achievement was significantly influenced by the achievement of peers, but the effect size was small.

Limitations to Human Capital Theory and Dual Labor Markets

Despite their usage in studies of educational attainment, human capital theory and Dual Labor Markets are not without limits. In both instances, there is the assumption of rational actions on the part of potential degree-seeking persons while neglecting several individual mechanisms which may also hold sway on the decision to pursue a degree. Specifically, background variables such as parents' highest level of education, parents' socioeconomic status, parental involvement in children's education, quality of home life, and cultural capital have been routinely illustrated to influence educational outcomes. As such, these factors may influence students' interpretation of available job opportunities as well as their decisions

regarding human capital investment. It is entirely possible for students who grow up in areas with an abundance of diverse occupations requiring an Associate's or Bachelor's degree to opt out of college for employment at a local car dealership, product distribution center, etc. based on information and/or expectations of their parents, close relatives, friends, and peer groups. The fact that Human Capital Theory and Dual Labor Markets does not account for this is limiting.

Several studies have illustrated parents' education and income influences both their children's educational attainment and occupational outcomes (Jimerson, Egeland, & Teo, 1999; Halle et al. 1997; Luster, Rhoades, & Haas,1989; Davis-Kean, 2005). Utilizing the 1997 Child Development Supplement of the Panel Study of Income Dynamics, Davis-Kean (2005), illustrated that parent's education and income directly the educational expectations they have of their children; hence indirectly affecting children's reading ability as well as their standardized math and reading scores. Additionally, Parent's education and income had a positive effect on parental warmth within the home environment which, in turn, has also been linked to higher educational outcomes (Glasgow et al, 1997).

Dimaggio (1983) and Dimaggio and Mohr (1985) illustrate that cultural capital plays a significant role in education. Measuring several dimensions of cultural capital (attitudes towards the arts, cultural interests, etc.) on the academic performance of junior-year high school students, Dimaggio (1983) found cultural capital had a positive effect on math, English, and history grades among both male and females. In a latter study, Dimaggio and Mohr (1985) found cultural capital to not only improve grades during high school, but to also influence the likelihood of college enrollment. Additionally, cultural capital has also been

illustrated to facilitate entry into high-wage, high-skill, professional occupations (Egerton, 1997).

Synthesis of the Literature and Road Map

Research utilizing human capital theory illustrates a strong, positive association between obtaining a high school and/or college degree and overall lifetime earnings, contributions to the local tax base, lowered unemployment, decreased dependency on social welfare, increased lifespan, better health and health care, and increased job satisfaction. In addition, previous studies show the incentives for earning a high school degree/GED and/or pursue a college education outweigh the loss of potential wages earned. Despite the incentives, many persons reside in areas void of the types of jobs which provide the above-mentioned incentives. What research has not addressed thus far is if and to what degree the composition of local markets incentivizes residents to complete high school and/or earn a college degree. While studies by Rees and Mocan (1997) and Rumberger (1983) include local employment characteristics as predictors of high school dropout rates, they do not account for the variation of local job opportunities. Whereas some studies have link high school dropout rates and college enrollment to boom and bust cycles within specific industries (Black et al, 2005; Morissette, Chan & Lu, 2014), research thus far has not assessed the influence of local job opportunities in multiple fields. In situations where; A) there are very few high-skill occupations locally/regionally; or B) recent graduates are not embedded in networks containing information about available high-skill, high-wage occupations; pursuing additional education/training may not be an appropriate avenue for maximizing income or job satisfaction.

Dual labor market theory holds that the American labor market is essentially divided into good and bad jobs, the former found in primary markets and the later in secondary markets. Characteristics of jobs within primary markets include high pay; benefits such as paid vacation, sick leave, maternity leave, a retirement plan, etc.; and in most cases, are allocated to persons with an advanced skill set. Jobs in the secondary market are characteristically the exact opposite of jobs in the primary market (low pay, little or no benefits, does not require an advanced skill set, etc.). Within the context of the US; women, minorities, and immigrants are often relegated to the secondary labor market while white males occupy the primary market. Perhaps most salient to this study, however, is that primary jobs may be spatial inaccessibility, thus creating a roadblock to better incomes, increased benefits, etc. As such, if most occupations within local/region markets are low paying jobs that do not require an advanced skill set, fewer people within the area will have graduated high school and/or earned a college degree. On the other hand, if high paying occupations are readily accessible, people will be more likely to graduate high school and/or earn a degree.

Studies of peer influence on educational outcomes have routinely illustrated a positive association between the "company students keep" and their academic performance, whether the effect is a product of influence or homophily. Thus far, research addressing educational outcomes has not compared/contrasted the influence on local labor markets to network/homophily effects.

Lastly, several factors which are routinely associated with educational attainment and occupational outcomes are not included in this analysis due to data limitations. Specifically, data on cultural capital, individual mechanisms associated with parents' SES and education level, parental involvement with children's education, and connections to persons with

information about potential job openings are not included in this study. As such, results cannot speak to how the occupational background of parents effect the occupational outcomes of their children; or how parental involvement in the local PTA and/or other school activities affects their children's educational prospects; or how network connections to persons working in high-wage, high-skill occupations may or may not influence students to earn a college degree so that they too may work within a similar industry; etc.

Roadmap

In Chapter II, I detail the methodological approach used to answer questions 1 through 5, and introduce a "desirability" index, utilized to divide 23 American Community Survey occupational categories into three distinct tiers. Chapter III details the results of tested hypotheses which address the association between county-level employment growth by occupation and counties' stock of high school graduates/GED earners, Associate's degree earners, and Bachelor's degree earners is assessed (hypotheses 1 and 2). In Chapter IV, I address hypotheses 3 through 5. Occupations for which employment growth has a significant impact on aggregate human capital growth are used in a second series of models examining their influence on the educational outcomes of individual respondents. In the final chapter, concluding remarks and a discussion of the study's implications are provided.

CHAPTER II

METHODOLOGY

The purpose of this study is to gauge the influence of local/regional labor market conditions on educational outcomes, using human capital and dual labor markets as guiding theories. To gain insight as to if and/or how labor market development influences local human capital development via high school completion and/or earning postsecondary degree, two modeling approaches are utilized. First, the influence of local employment growth with primary, midlevel, and secondary labor markets and individual occupations on the volume of high school graduates and college degree earners is assessed. Second, occupations found to significantly influence local human capital growth are transferred to a model gauging the educational attainment of individual respondents.

When assessing the role of local job markets on educational outcomes, it is important to determine if growth in specific labor markets and occupations increase local human capital development prior to examining their role on individual outcomes. For the sake of parsimony, this study works under the assumption that if a specific job type does not generate an increase in regional human capital, it will not sufficiently motivate young adults to continue their education beyond necessity.[7] For example—and speaking hypothetically—if growth in sales occupations is associated with a proportional increase in the number of high school degrees but does not influence growth in the number of bachelor's degrees, then growth in sales occupations will positively influence the probability of graduating high school/earning a G.E.D., but have no bearing on postsecondary education. In this scenario, if

[7] Preliminary models indicated occupations which did not influence aggregate human capital growth were nonsignificant predictors of individual outcomes.

a student wanted to pursue a career in sales, there would be no need to continue his/her education beyond high school, thus growth in sales occupations would not encourage the pursual of an Associate's or Bachelor's degree.

Aggregate Data

All data used to assess the influence of local employment growth by occupation on educational gains is culled from the 2000 decennial census and the 2014 American Community Survey (ACS) 5-Year Average. Specifically, data pertaining to 23 ACS occupation types for all US counties are utilized. If accessible employment within these occupations have a positive net effect on educational outcomes, then growth in the former should coincide with growth in the latter. As such, change in earned degrees between 2000 and 2014 are regressed against employment change by labor market and occupation within the same timeframe.

To measure growth over time in the dependent and independent variables, logged differences were calculated such that:

$$\textbf{Log(2014\_var + 1) - Log(2000\_var +1) = Log(} \frac{\mathbf{2014}_{var}\mathbf{+1}}{\mathbf{2000}var\mathbf{+1}} \textbf{) = Log(difference\_var),}$$

where 1 is added to the total of each variable to prevent taking the log of 0 which is undefined. In the unlikely event that the volume of high school graduates, college degree earners, or employed persons in occupation "X" is 0 for in any given county, adding 1 to the total will still reflect the absence as;

$$\textbf{Log(0 + 1) = Log(1) = 0.}$$

Occupations are measured at two levels of aggregation, the first of which is as defined by the ACS. Second, all occupations are collapsed into three categories to reflect three distinct job markets; more precisely, the primary job market, a midlevel job market, and the secondary job market. As a means of collapsing occupations into one of three categories, a "desirability" index was constructed using data pulled from the 2014 ACS microdata set, provided by IPUMS. Data on individuals' income and educational attainment was standardized and summed across each occupation. Afterwards, an overall "desirability" score was generated by averaging the summed values for each occupation and ranking them in descending order. The top eight occupational categories were grouped together as tier-1 jobs and are intended to reflect occupations in the primary job market; the seven middle occupations represent the midlevel job market, and the bottom eight reflect the secondary job market. Table 2.1 lists all occupational categories, their corresponding education distribution, average income, desirability scores, and corresponding ranking. A brief description of the occupations is provided in the appendix.[8]

In addition to employment changes by occupation, rural-urban continuum codes are also included to test for differences in earned degrees between rural and urban counties. Also, this will partially address differences between rural and urban labor markets, as the latter tends to be less developed than the former. Maintained by the United States Department of Agriculture (USDA), rural-urban continuum codes range from 1 to 9 and detail counties' population size and proximity to a metro area. For the present analysis, the 2013 continuum

[8] For a complete list of jobs within each occupation, the 2000 OCC codes can be found on the IPUMS website at https://usa.ipums.org/usa/volii/occ2000.shtml

codes are used as they are the most up-to-date. A detailed description of rural-urban continuum codes is located in table 2.2.

Several race/ethnicity factors are included as control factors, as many studies have identified a racially-based education gap (Ladson-Billings, 2006; Reimers, Cordelia, 1983; Farkas, 2003). In addition, Rumberger (1983) and Rees and Mocan (1997) found that young white, Hispanic, and Black men respond differently to local labor market conditions. Previous labor market research has repeatedly illustrated that minority groups are overwhelming excluded from primary market occupations and often reside in areas with limited access to high-wage employment. As such, growth in the Asian, Black, Hispanic, Native American, Pacific Islander, White, and Multiracial populations are accounted for. Ideally, this will allow for better assessment of the relationship between local job markets and human capital development.

Table 2.2. 2013 Rural-Urban Continuum Codes

2013 Rurality Code	Description
1	Metro - Counties in metro areas of 1 million population or more
2	Metro - Counties in metro areas of 250,000 to 1 million population
3	Metro - Counties in metro areas of fewer than 250,000 population
4	Nonmetro - Urban population of 20,000 or more, adjacent to a metro area
5	Nonmetro - Urban population of 20,000 or more, not adjacent to a metro area
6	Nonmetro - Urban population of 2,500 to 19,999, adjacent to a metro area
7	Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Nonmetro - Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Nonmetro - Completely rural or less than 2,500 urban population, not adjacent to a metro area

A Note on Labor Markets

Historically, geographic proxies have often been used as a means of measuring local labor market conditions, with the units ranging in size. Several studies have utilized metropolitan statistical areas (MSAs) as the geographic boundaries of local labor markets.

For example, Blau, Khan, and Waldfogel (2000) showed that the marriage rate of women are influenced by better female labor markets and worse male labor markets within 111 MSAs. In an analysis of 72 MSAs, Marquis and Long (2001) illustrated that employers are more likely to offer their employees health insurance at a higher contribution rate in tighter labor markets with greater unionization. McCall (2001) also utilized MSAs as proxies for local labor markets in her study of racial, ethnic, and gendered wage differences within metropolitan labor markets.

A common issue brought up with the use of MSAs as proxies for local labor markets by scholars is that they consist entirely of metropolitan areas. As such, the influence of labor market conditions in more rural areas o cannot be inferred from empirical results. As means of troubleshooting, researchers have often opted to use Public Use Microdata Area (PUMA) units as geographic labor market proxies as they are smaller than MSAs and take commuting patterns into consideration (Smith, 2012; Tolbert & Sizer, 1996). As such, results are more relatable to areas of the country other than metropolitan spaces.

An additional method of measuring local labor market conditions—and implemented in this study—is to use counties as the geographical unit of interest. Though they typically do not constitute the entirety of a local labor market, the relatively smaller size of counties compared to MSAs or PUMAs allows researchers to gauge the influence of market conditions at a micro-level. Whereas employment opportunities may be plentiful in the east end of town, this does not mean they are plentiful in the western portion. Within the context of job opportunities and college enrollment, Borzick (2009) tied the high school location of graduating seniors to county-level unemployment rates and the availability of jobs that did not require a college degree. Thompson (2009) uses both county and state-level data to

examine the influence of the minimum wage on teenage employment. Overall, there is not a single "go to" geographic unit that is used as a proxy for local labor markets.

Data for Model of Individual Outcomes

To measure the effect of local/regional labor market conditions on high school graduation, occupational employment shifts were measured at the county level over a period of 10 to 14 years. Employment-by-occupation data was culled from the 2000 US Census and the 2014 American Community Survey's (ACS) 5-year estimate. As with the aggregate models of human capital development, employment growth within primary, midlevel, and secondary labor markets are the main independent variables of interest. Growth in individual occupations, though of interest, is a secondary concern and their inclusion is more exploratory in nature. While this study aims to assess the influence of primary markets relative to midlevel and secondary markets, hypothesizing the influence of individual occupations goes beyond the scope.

The primary dependent variables of interest were pulled from the 2002 Educational Longitudinal Survey (ELS). Collected in four waves, ELS provides nationally representative panel-data detailing students' "trajectories from the beginning of high school into postsecondary education, the workforce, and beyond.[9]" During the base year[10] in 2002, ELS surveyed high school sophomores, collecting data on where they went to high school, their class schedules, grades, standardized test scores, relationships with peers and school faculty, home life, etc. Respondents were surveyed again in 2004, 2006, and 2012 with questions ranging from whether they graduated high school to their current job prospects. In total, ELS

[9] www.nces.ed.gov/surveys/els2002

[10] In 2002, the target population for first wave of surveys and interviews was limited to high school sophomores. During the second wave of surveys and interviews in 2004, additional high school seniors were included in the pool of respondents.

contains more than 8,000 variables pertaining to respondents' education, high schools, colleges, occupations, etc.

Several other measures were pulled from the ELS database to use as controls or to create new variables of interest. Regarding the former, respondents' demographics as well as their parents' educational attainment and income are routinely illustrated as influential on high school graduation (Sewell & Shah, 1968; Dubow, Boxer, & Huesman, 2009; Roscigno, 1998; Astone & McLanahan, 1991; Krien & Beller, 1998). Specifically, underrepresented minority students are less likely to graduate or earn a G.E.D. compared to their white peers (Dubow, Boxer, & Huesman, 2009; Roscigno, 1998). In addition, parent's education and income are positively associated with students' academic success (Sewell & Shah, 1968; Astone & McLanahan, 1991); the higher the degree obtained or income earned, the more likely respondents will graduate.

Six variables are used to gauge the influence of social networks/homophily on degree attainment and labor market entry. Regarding the former, this study works with assumption that respondents are more likely to graduate high school if they are surrounded by friends and/or peers who plan to attend college after graduation, whether it's a product of influence or homophily. As for the latter, the line of reasoning is similar; respondents who are surrounded by friends and/or peers who plan to enter the labor force after high school are less likely to graduate and/or pursue a college degree.

Two variables are used to gauge how many of the respondents' friends planned to attend a community college or a 4-year university after high school graduation. For both measures, four categories were provided: "None," "Some of them," "Most of them," and "All of them." Here, it is important to note that these were the responses available to respondents, and that

data pertaining to these two survey items were not relabeled, categorized calculations based on the proportion of respondents' friends who planned to attend college, though it would be preferable. In addition, two index variables are used to gauge respondents' subjective views as to the desire of others. Specifically, they measure whether respondents believe their ties want them to go to college and/or get a job after high school graduation. Here, each index variable is the sum of responses to six dichotomous variables, creating two measures ranging from 0 to 6. Specifically, each survey item queries whether respondents felt as though they were expected to continue their education or enroll in college by their mother, father, other relatives, friend, favorite teacher, and school guidance counselor. A seventh survey item pertaining to respondents' favorite coach was also available, but not used since it severely restricted the pool of respondents (a considerably small proportion of high school students participate in sports compared to those who do not). Lastly, two school-level survey items were included as additional measures of peer influence and/or homophily, each measuring the percent of graduating seniors from the previous year[11] who entered the labor market/military or went to a 4-year university. All network/homophily survey items are located in the appendix.

As with the aggregate model, the 2013 USDA rural-urban continuum codes[12] are used to gauge both the rurality and population size of counties. This will allow for the assessment of high school graduation differences based on students' proximity to urban areas.

[11] The previous cohort would have graduated in 2003. Most first-wave ELS respondents would have been juniors at the time.
[12] Rural-Urban continuum codes are located in table 2.2.

The Aggregate Model

To assess whether employment gains by occupation influences individual students' educational attainment, I first assess local employment growth on local human capital development. This intermediary step is carried out for two reasons. First, as a means of data reduction. Second, to eliminate occupation types from models assessing individual outcomes, as there is no reason to hold students will pursue academic credentials beyond what is required for their career of choice. In the first stage of this analysis, the dependent variable is the percent change in the number of residents, age 25 or older, with degree "X" from 2000 to 2014. These changes are measured at the county level, i.e., counties are the initial unit of analysis before moving to the individual level. In addition, the dependent variables refer to the highest degree earned, thus a 25% increase in the number of high school graduates/G.E.D. earners does not include Associate or Bachelor's degree earners; a 25% increase in Associate's degree earners does not include high school graduates or Bachelor's degree earners, and so on.

For simplicity, a log-log multiple regression is utilized to regress percent change in degrees against occupational employment differences for 3,132 counties, excluding Puerto Rico and other US territories not granted statehood. As of 2014, 3,142 counties fell within this category, but during the 2000 decennial census, there were 3,141. Additionally, employment information was not available for 8 counties, 3 of which are in Alaska, 2 are in Virginia, and 1 county in Illinois, Louisiana, and New Mexico. The model is operationalized by the linear function:

$$\mathbf{Log(y) = \beta_0 + \beta_1 log(\Delta\ Primary\ Job\ Market) + \beta_2 log(\Delta\ Midlevel\ Job\ Market) + \beta_3 log(\Delta\ Secondary\ Job\ Market) + X\beta + \epsilon,}$$

Where β_1 through β_3 represent one of three job markets, $X\beta$ is the matrix-vector product of control variables, and ϵ is the error term. In addition, a second model assessing the influence of individual occupations is included to determine if growth within specific fields stimulate or reduce human capital development. The additional models take the form:

$$\mathbf{Log(y) = \beta_0 + \beta_1 log(\Delta\ Management) + \beta_2 log(\Delta\ Business) + \beta_3 log(\Delta\ Computer/Math) + \beta_4 log(\Delta\ Architecture/Engineering) + \beta_5 log(\Delta\ Life, Physical, \&\ Social\ Sciences) + \beta_6 log(\Delta\ Community\ \&\ Social\ Services) + \beta_7 log(\Delta\ Legal\ Occupations) + \beta_8 log(\Delta\ Education, Training, and\ Library\ Science) + \beta_9 log(\Delta\ Arts\ \&\ Entertainment) + \beta_{10} log(\Delta\ Healthcare\ Practitioners) + \beta_{11} log(\Delta\ Healthcare\ Technicians) + \beta_{12} log(\Delta\ Healthcare\ Support) + \beta_{13} log(\Delta\ Protective\ Services) + \beta_{14} log(\Delta\ Food\ Preparation\ \&\ Serving) + \beta_{15} log(\Delta\ Building\ \&\ Grounds\ keeping\ \&\ Maintenance) + \beta_{16} log(\Delta\ Personal\ Care) + \beta_{17} log(\Delta\ Sales) + \beta_{18} log(\Delta\ Office\ and\ Administrative\ Support) + \beta_{19} log(\Delta\ Farming, Fishing, and\ Forestry) + \beta_{20} log(\Delta\ Construction\ and\ Extraction) + \beta_{21} log(\Delta\ Installation, Maintenance, and\ Repair) + \beta_{22} log(\Delta\ Production) + \beta_{23} log(\Delta\ Transportation) + \beta_{24} log(Rural\ Continuum) + X\beta + \epsilon,}$$

Where β_1 through β_{24} are the independent variables of interest, $X\beta$ is the matrix-vector product of control variables, and ϵ is the error term. Independent variables found to significantly influence the volume of high school graduates, Associate's degree earners, and Bachelor's degree earners will be used in a series of models assessing individual outcomes.

Models of Individual Outcomes

To gauge the influence of local labor markets on individual high school graduation outcomes, a step-wise logistic regression is utilized. Given that data used in the proceeding models are measured at three levels of aggregation, the structure is inherently hierarchical (students in schools in counties). In the preliminary stages of model construction, hierarchical modeling was attempted but ultimately abandon due to time constraints and a lack of convergence. Though a hierarchical model would have been preferable as it adjusts for the overestimation of individual-level factors and the underestimation of aggregate-level factors (Bryk & Raudenbush, 1992); clustering the error terms in a logistic model is a viable

alternative as it adjusts the standard error terms of coefficients based on the clustering units of interest. In the present study, the cluster units are county-level FIPS codes. In total, the model includes the responses of 12,670 respondents within 750 schools within 710 counties.[13] The labor market models take the form:

$$\mathbf{E\ (y = 1 \mid X) = \beta_0 + \beta_1 log(\Delta\ Primary\ Job\ Market) + \beta_2 log(\Delta\ Mid\text{-}Level\ Job\ Market) + \beta_3 log(\Delta\ Secondary\ Job\ Market) + X_1\beta + X_2\beta + \epsilon,}$$

where y is the probability of graduating high school, earning an Associate's degree, or earning a Bachelor's degree (three separate models), β_1 through β_3 represents one of three job markets, $X_1\beta$ is the matrix-vector product of control variables, $X_2\beta$ is the matrix-vector product of networks/homophily variables, and ϵ is the error term. In addition to the model above, a second model with job types collapsed into their respective tiers will also be evaluated. The model is specified as:

$$\mathbf{E\ (\ y = 1 \mid X) = \beta_0 + \beta_1 log(\Delta\ Management) + \beta_2 log(\Delta\ Business) + \beta_3 log(\Delta\ Computer/Math) + \beta_4 log(\Delta\ Architecture/Engineering) + \beta_5 log(\Delta\ Life, Physical, \&\ Social\ Sciences) + \beta_6 log(\Delta\ Community\ \&\ Social\ Services) + \beta_7 log(\Delta\ Legal\ Occupations) + \beta_8 log(\Delta\ Education, Training, and\ Library\ Science) + \beta_9 log(\Delta\ Arts\ \&\ Entertainment) + \beta_{10} log(\Delta\ Healthcare\ Practitioners) + \beta_{11} log(\Delta\ Healthcare\ Technicians) + \beta_{12} log(\Delta\ Healthcare\ Support) + \beta_{13} log(\Delta\ Protective\ Services) + \beta_{14} log(\Delta\ Food\ Preparation\ \&\ Serving) + \beta_{15} log(\Delta\ Building\ \&\ Grounds\ keeping\ \&\ Maintenance) + \beta_{16} log(\Delta\ Personal\ Care) + \beta_{17} log(\Delta\ Sales) + \beta_{18} log(\Delta\ Office\ and\ Administrative\ Support) + \beta_{19} log(\Delta\ Farming, Fishing, and\ Forestry) + \beta_{20} log(\Delta\ Construction\ and\ Extraction) + \beta_{21} log(\Delta\ Installation, Maintenance, and\ Repair) + \beta_{22} log(\Delta\ Production) + \beta_{23} log(\Delta\ Transportation) + \beta_{24} (Rural\ Continuum) + X_1\beta + X_2\beta + \epsilon,}$$

where y represents the outcome variables, β_1 through β_{24} are the independent variables of interest, $X_1\beta$ is the matrix-vector product of control variables, $X_2\beta$ is the matrix-vector product of networks/homophily variables, and ϵ is the error term. Note, individual occupations listed in the model specification will differ by the dependent variable being assessed. Here, the objective is to simply illustrate the form each model will potentially take.

[13] Reported sample sizes are rounded to the nearest 10 to comply with ELS security protocols.

Limitations

There are several limitations to this study, the first of which, is defining geographical boundaries of local labor markets. Within the context of this study, counties are used as proxies for "local." Unlike defined boundaries such as block groups, census tracks, counties, states, etc.; the boundaries of local markets are undefined. They encompass several geographic units, portions of others, span adjacent states, and vary in size. Second, one can reside within the boundaries of "Local Market A" while working in "Local Market B" and vice versa. The distance between Markets A & B could potentially range from a few miles to a few hundred miles. Markets A & B could overlap and/or draw potential employees from the same region. As such, employment growth in one market may lead to increased human capital development in an adjacent, less developed market. This could make counties ideal proxies for "local" in that they are smaller units within a bigger market, or a liability since it is near impossible to untangle whether growth in Local Market A incentivizes mass human capital investment in Local Market B.

In addition to issues of defining the boundaries of "local" labor markets, having more information about the occupations would be ideal. Specifically, what type of benefits do they offer? How much variation is there in the distribution of education credentials among persons employed in Occupation X? Do all jobs in Occupation X require a specific degree? Most of them? Are certain jobs in Occupation X more or less similar to jobs in Occupation Y? Currently, the North American Industry Classification System lists well over 1000 separate occupations, each with their own code and description. Unfortunately, county-level employment counts for most occupations are not available due to issues of anonymity. Categorizing occupations into primary, midlevel, and secondary markets based on pay,

benefits, required education, and location is more ideal than relying on 23 predefined occupation codes. Several jobs within the "Mathematics & Computer Science" and "Architecture & Engineering" fields, for example, may have more in common with each other than the jobs they are grouped with.

Lastly, and specific to the models of aggregate human capital development, is the issue of migration. As mentioned, this study utilizes data from the 2000 Decennial Census and the 2014 American Community Survey. Unfortunately, available measures of migration are not in synch. In the 2000 Census, migration is measured as the number of persons who resided in a different household, county, state, or country in 1995. Though migration is also measured in the American Community Survey, a timeframe is not discussed. Additionally, migration by age-distribution is not available, thus the proportion of migrants 25 years old or older is not known—measures of degree attainment are restricted to adults. The absence of a migration variable, however, may be beneficial to the aggregate analysis. If the hypothesized relationship between primary market growth and increased human capital investment is true, local residents may not be the only persons incentivized to finish high school and/or earn a college degree. Persons from adjacent counties, states, etc. may relocate to take advantage of new job opportunities, thus local residents will "bear witness" to primary market growth. This, in turn, could still incentivize county residence to invest in their education.

Hypotheses

This study attempts to answer six questions. 1. Does employment growth in primary market occupations stimulate growth in the number of high school graduates and college degree earners? 2. Given (1) is verified, how does the impact of employment growth in primary occupations compare to the impact of growth in lower-tiered occupations? 3. Does

employment growth in primary market occupations influence the probability of respondents graduating high school and/or earning a college degree? 4. Given (3), how does the impact of employment growth in primary occupations compare to the impact of growth in lower-tiered occupations? 5. Does employment growth in primary, mid-level, and secondary market occupations influence the probability of graduating high school and/or earning a degree when controlling for network/homophily effects? 6. Do occupations illustrated to affect regional growth/decline in the stock of degree earners translate into an increased/decreased probability of earning a degree?

Regarding question 1, previous research illustrates students are more likely to graduate high school, enroll in college, etc. if there are strong incentives to do so. Black et al (2005) found students were more likely to remain in school when employment in coal-mining regions were low but were likely to drop out if wages were high. Other researchers highlight a similar linkage between college enrollment and local employment rates as well as full-time/part-time enrollment status and employment rates. Taken together, this suggests that local job markets containing a high concentration of primary sector occupations—i.e., occupations which typically require education beyond high school—will generate more high school graduates as well as Associate and Bachelor's degree earners. The proposed association between primary sector employment levels and educational attainment may seem like a bit of a leap based on the previously indicated association between employment rates and education. Another way to think to of it would be to consider the job prospects of high school dropouts in Silicon Valley during a period of increased employment growth within the tech industry. As for question 2, growth in primary market occupations are hypothesized to generate a larger increase in Associate and Bachelor's degree earners, compared to the mid-

level and secondary job markets. From table 2.1, employment growth in primary market occupations generally requires at least an Associate's degree, if not a Bachelor's, thus an increased availability of high-wage, high-benefit occupations will primarily effect the volume of college educated residents.

Similar to logic used for hypothesis/question 1, employment growth within primary market occupations will increase the probability of graduating high school, earning an Associate's degree, and/or earning a Bachelor's degree (question 3). If a prerequisite for access to local, primary market occupations is education beyond high school, respondents will be more likely to graduate high school and/or earn a college degree. As for question 4, growth in primary job markets are hypothesized to induce a higher probability of earning a college degree compare to growth in mid-level and secondary job markets.

Regarding networks/homophily, question 5 proposes a direct comparison of employment effects and social network effects on earning a degree. While it is hypothesized that networks/homophily will have a positive impact on educational outcomes, it is beyond the scope of this study to address whether it will be larger or smaller than growth in primary, mid-level, and secondary job markets.

The sixth and final question addresses whether aggregate, local job growth by occupational sector translates to educational gains by individuals. While this research question does not have an associated hypothesis, comparing the aggregate outcome to individuals' behaviors is a worthwhile endeavor, as growth in high-skill industries is often touted as a remedy to economic depression, i.e., rural isolated pockets of Appalachia, mid-west plains states, etc.

Table 2.1. Occupations and Their Corresponding Desirability Ranks and Scores

	Occupations	< HS Degree	HS Degree/G.E.D.	Associate's	Bachelor's +	Average Income	Desirability Score	Desirability Rank
Primary Job Market	**Legal Occupations**	0.57%	14.39%	6.30%	78.74%	$88,290.36	2.11	1
	Healthcare Practitioners	0.54%	14.78%	22.31%	62.36%	$70,074.67	1.48	2
	Life, Physical, and Social Sciences	1.28%	16.31%	3.92%	78.49%	$54,904.20	1.4	3
	Computers & Mathematics	0.76%	24.08%	9.93%	65.23%	$70,674.50	1.36	4
	Architecture & Engineering	1.16%	23.45%	11.70%	63.69%	$69,298.71	1.34	5
	Management	3.46%	36.10%	7.66%	52.77%	$70,898.27	1.14	6
	Business & Finance	1.11%	26.53%	8.48%	63.88%	$58,598.67	1.1	7
	Education, Training, & Libraries	1.37%	17.95%	4.85%	75.84%	$34,476.76	0.91	8
Midlevel Job Market	**Community & Social Services**	2.18%	21.23%	5.72%	70.86%	$34,311.08	0.82	9
	Arts & Design, Entertainment	4.53%	32.90%	8.53%	54.04%	$32,045.15	0.39	10
	Healthcare Technologists	1.60%	47.78%	23.25%	27.36%	$36,117.94	0.15	11
	Protective Services	7.26%	58.85%	12.43%	21.46%	$38,689.13	-0.01	12
	Sales	9.62%	57.31%	7.66%	25.41%	$32,063.65	-0.18	13
	Office/Admin Support	5.58%	64.76%	10.60%	19.06%	$25,602.54	-0.33	14
	Installation & Repair	12.46%	68.35%	12.06%	7.13%	$35,492.72	-0.45	15
Secondary Job Market	**Healthcare Support**	10.29%	66.95%	12.22%	10.55%	$19,611.05	-0.62	16
	Production	19.61%	66.75%	6.49%	7.15%	$29,462.17	-0.75	17
	Transportation	19.66%	68.14%	5.18%	7.02%	$25,201.98	-0.79	18
	Personal Care	14.45%	63.73%	7.98%	13.84%	$11,443.62	-0.81	19
	Construction/Extraction	23.03%	65.42%	5.60%	5.95%	$27,103.55	-0.87	20
	Food Preparation & Service	23.91%	63.14%	5.86%	7.09%	$11,567.35	-1.05	21
	Maintenance Occupations	30.64%	59.39%	4.43%	5.53%	$14,724.85	-1.24	22
	Farming	45.52%	44.92%	3.55%	6.01%	$16,086.10	-1.59	23

CHAPTER III

THE INFLUENCE OF PRIMARY MARKET EMPLOYMENT CHANGES ON COUNTIES' STOCK OF DEGREE EARNERS

This chapter tests hypotheses 1and 2 as well as details the influence of employment growth in primary, mid-level, and secondary market occupations (also referred to as tiers 1, 2, and 3, respectively) on counties' stock of high school graduates, Associate's degree earners, and Bachelor's degree earners. Results indicate that growth in most occupations are positively associated with gains in counties' aggregate human capital, though the influence varies by degree type and occupational tier.

Aggregate Descriptive Statistics

Table 3.1 details the arithmetic mean percentage change in demographics and employment by occupation in 3,132 US counties between 2000 and 2014. Regarding high school completion, the percent of graduates 25 and older increased by 20.74% with a standard deviation of 16.61%, suggesting a large amount of variability by county. Though not illustrated in table 2, the overall high school graduation rate decline in 168 counties, 20 of which by more than 20%. Upon closer inspection, most of the counties that experienced a sharp increase are predominantly located in Southern and Midwestern states, including Texas, Louisiana, Georgia, Kansas, Nebraska, Mississippi, Virginia, and South Dakota. The remaining counties had less than 1,200 residents and low population densities to match.

The average increase in adults with an Associate's or Bachelor's degree is considerably larger than the increase in high school graduates/G.E.D. earners, averaging 41.66% and

35.14% respectively. In addition, their respective standard deviations indicate a broader range of dispersal, suggesting some counties experienced well over 100% growth in the number of college-educated residents, yet others experienced a substantial brain drain. Indeed, 96 counties exceeded 100% growth in the number of Associate's degree earners while 67 counties experienced a net loss. Results are similar for Bachelor's degree earners, were 83 counties experienced 100%+ growth, and 185 counties experienced a decline. Of the 185 counties, 88 are classified as rural, 82 are non-metro, and 15 are metro.

Per the Census, the overall population increased by 13.3% between 2000 and July 1, 2014.[14] At the county-level, population increase has averaged 5.6%, suggesting that the bulk of the growth has occurred in a small handful of locations.[15] Regarding race, average population growth of several minority groups has increased significantly since 2000. The Hispanic population, for example, has nearly doubled with an average growth of 92.3% per county. Much of the growth is attributable to the establishment of new migrant destinations outside of traditional gateway cities such as Chicago, Los Angeles, and New York (Massey & Capoferro, 2008). Counties which were atypical migrant destinations did not have substantial Hispanic populations prior to 2000. In fact, counties where the Hispanic population grew by 500% or more are in the Dakotas, Georgia, Mississippi, Wyoming, Pennsylvania—states without an established gateway city.[16] This, in effect, increases the average growth rate. County-level growth of Asians, Blacks, and persons of two or more races were also relatively high. On average, there was a proportional decline of Native American, White, and "Other" populations.

[14] Figure calculated using American FactFinder Population estimates.
[15] Because of high variance inflation factor scores, percent population change and percent employment change are not incorporated into the regression models.
[16] Figures calculated using data from the 2000 Census and 2014 ACS 5-year estimate.

Variability in growth among some racial/ethnic groups is substantial. For example, growth of the Pacific Islander population averaged nearly 20%, with a standard deviation of 134.3%. This suggests that most US counties outside of Hawaii had a small Pacific Islander population; where an increase of 5 to 10 people potentially generates 500% to 1,000% growth. Indeed, the Pacific Islander population of Genevieve County, Missouri increased by 2,860%--or from 0 to 286 residents. This degree of variability also occurs among Asian and Black populations.

On average, US counties have a rurality rating of 5 which corresponds to a nonmetro county with an urban population of at least 20,000 and is not adjacent to a metro area. For reference, counties falling into this category include Klamath County, OR and Hopkins County, KY. Most counties (i.e., the mode) however, are considered nonmetro, have an urban population of 2,500 to 19,999 and are adjacent to a metro area.

Occupations in the primary job market account for the top eight job types in terms of cumulative human capital and income and include; legal occupations; healthcare; the life, physical and social sciences; computer sciences and mathematics; architecture and engineering; management; business and finance; and education, training and library services. Average growth in each occupation varies but employment was positive. Jobs in computer science and mathematics had the highest average growth at 44.6%. Average growth in the number of employed healthcare practitioners was the second largest at 31.2%. Gains in business/finance; life, physical and social sciences; and legal occupations were substantial at 19.05%, 13.37%, and 21.13%, respectively. Employment growth was less than 10% in three occupations; specifically, management, education/library science, and architecture/engineering.

Regarding variability, the standard deviations for most top tier occupations are considerably larger than their respective means. The standard deviation for computer science and mathematics, for example, is 87.59%. This suggests that the number of available occupations was limited in several counties in 2000 but became more numerous by 2014. The high degree of variability in the remaining primary-market occupations likely occurs for the same reason; the number of available jobs were relatively low in 2000 but grew modestly by 2014.

Occupations in the second tier are considered "middle of the pack" in terms of cumulative human capital and income, hence will also be referred to as mid-level occupations. Jobs in this second tier include; community and social services; art and design; healthcare technologists; protective services; sales; office and administrative support; and installation and repair. Overall, county-level growth was positive for most mid-level occupations with the exception of installation and repairs jobs as well as office and administrative support; employment in the former decreasing by 9.29% and in the latter by 1.57%. Average growth in the number of healthcare technologists exceeded 38% between 2000 and 2014 which points to a continued demand for healthcare services, perhaps due to the aging Baby Boom population, 47.4% of which were 60 years old or older as of July 1st, 2014.[17] Gains in protective services and community and social services both exceeded 20% which suggests an increased demand for public safety and social workers between 2000 and 2014. There was moderate growth among art and design occupations with an average increase of 8.15%. Growth in sales occupations averaged just 2.04%.

[17] Calculated using annual estimates of the residential population provided by the Census.

Occupations group into the bottom tier include healthcare support, office/administrative support, personal care, construction/extraction, production, maintenance, transportation, and food preparation and service. Much of this likely due to the near 20% decline in production occupations since 2000, as the average declines in office/administrative and construction/extraction employment are less than 2%. Overall, average employment in the bottom 8 occupations increased by 9.62%, or less than half the average growth of the top tier. Mirroring gains in health practitioner and health technologist occupations, health support jobs have increased by an average of about 27% per county; again suggesting a continued need for healthcare services. Employment within personal care occupations also increased by nearly 30%. There was also a modest gain in the number of jobs in maintenance and grounds keeping at 24.01%. Employment within food preparation occupations increased by 16.63% and transportation jobs increased by 2.76%.

Aggregate Results

High School Graduation/G.E.D

Table 3.2 details the log-log regression results for change in the number of adults with at least a high school degree or GED. Here, results are presented in three models to gain better insight as to how employment shifts by labor markets and occupations influence the number of secondary degrees. Model 1 details the control variables along with rurality, and though not addressed, the significant influence of demographic factors should be noted. Models 2 gauges the influence of employment gains within primary, midlevel, and secondary markets, while the third model evaluates the impact of job growth within individual occupations.

As indicated in model 1, percent change in the number of high school graduates/G.E.D. earners is negatively associated with rurality. Compared to metropolitan counties of 2

million people or more, for example, 11.7% fewer rural residents (counties with a population < 2,500) graduated high school between 2000 and 2014. This result is in line with previous studies which illustrate a negative association between rurality and educational outcomes (Rosicingo & Crowle, 2001; Rumberger & Lim, 2008; Brown & Swanson, 2004; Byun, Meece, & Irvin, 2012). Additionally, the intercept indicates metro counties would have experienced an average growth of 11.7% in the number of high school graduates when county demographics remained constant. Regarding model fit, the base model explains 13.4% of the variance in educational attainment and an F-statistic of 54.80.

Model 2 highlights the influence of employment growth within each occupational tier on percent change in the number of high school graduates/G.E.D. earners. Overall, employment growth in all three occupational tiers have a positive impact on aggregate human capital development though the magnitudes of effect were not anticipated. First, each percent of job growth within primary markets is equated with a .11% increase in degree earners; and while a significant predictor of educational attainment, is *significantly smaller* than the impact of growth within the midlevel market. A similar phenomenon occurs within the secondary market; while growth is also highly associated with high school completion, the influence of midlevel markets is markedly stronger.[18] There is not a significant difference of influence between primary and secondary job growth. Regarding fit, model 2 is a significant improvement over the base model, increasing the variance explained by more than 20%. In addition, the F-statistic increased from 54.80 to 136.10, also indicative of a substantial improvement over an intercept-only model. The partial F-statistic indicates the introduction of labor market tiers significantly improves the base model.

[18] Significant difference tests produced z-scores of 9.5 when comparing midlevel to primary markets and 9.0 when comparing midlevel to secondary markets.

Model 3 is an expansion of model 2, parsing out the influence of individual occupations within each labor market tier. Overall, growth in several occupation types significantly influence the educational attainment of counties' populations. Within the primary labor market, job growth within education and management are illustrated to positively impact human capital development, with the latter having a significantly larger effect than the former.[19] In both instances, however, job growth would have to be substantial in order to generate a sizeable increase in degree earners. Employment in management, for example, would have to increase by about 15% to increase the volume of high school graduates by 1%.

Whereas growth in management and education is positively associated with high school graduation, job growth within life, physical, and social sciences as well as business and finance is shown to have a negative impact on high school graduation; though the mean effect of each is considerably small, equating to a .007% and .009% decline per 1% increase in job development. This phenomenon is may be due to the education requirements for employment within these fields. In other words, growth within the sciences and finance is more likely to attract college educated persons—not those whose educations ends at graduation.

Five of the seven occupations within the midlevel labor market are also illustrated to influence the volume of high school graduates/G.E.D. earners. First, job growth in office and administrative support generated the largest change in education outcomes, generating a .142% increase per 1% gain in employment. Sales occupations are also illustrated to generate significant growth in counties' high school graduate population, producing a .092% increase for each percent of growth. Job development within the protective services and installation

[19] Z-score of 4.45

and repair also positively influence human capital development, but to a comparably lesser degree than office/administrative support jobs and sales occupations. Arts and entertainments, however, negatively impact the volume of high school graduates though the effect is small. Employment gains in community and social services, and healthcare technology do not significantly the volume of high school graduates.

From model 3, all but two secondary market occupations are illustrated to significantly impact counties' aggregate human capital growth. As with primary and midlevel market occupations, no job-type produces a substantial increase/decrease in the number high school graduates, despite having a significant, non-zero effect. Additionally, the slope effect of these occupations are moreorless comparable to one another with the exception of farming, which is shown to have a negative impact. For example, a 1% increase in transportation employment produces a .044% increase in the number of high school graduates, whereas 1% growth within the food and services industry generates a .042% increase in graduates. When a significance test was employed to examine whether there was a measurable difference in the occupational coefficients within the secondary labor market, significant differences occurred between transportation and maintenance, food services and maintenance, transportation and personal care, and food services and personal care. Employment growth within production and construction occupations did not affect the volume of high school graduates.

Overall, it shouldn't be too surprising at most secondary market occupations produce growth in the number of high-school educated citizens as most jobs require at least a 12^{th} grade education regardless of whether that education translates to a 12^{th} grade skill set. The negative association between growth in farming and aggregate human capital growth may

largely be a product of the type of persons who relocate, whether permanently or temporarily, for agricultural work; specifically, immigrants from Mexico and Central America.

The fit of model 3 is an improvement over the base model, with an increase in the adjusted R^2 from .134 to .350. The F-statistic indicates the model is preferable to an intercept-only model, though not as successful as model 2; likely due to the addition of 23 independent variables to the base model as opposed to just 3. Indeed, the partial F-statistic confers that the additional variance explained in model 3—compared to model 2—has more to do with the number of variables used instead of the explanatory power of the variables themselves. This indicates that the error of model 3 is slightly higher than model 1 and substantially higher than model 2. Overall, this suggests regressing human capital development against employment growth by labor market tiers is more parsimonious than regressing over individual occupations.

Summary: Occupational Employment Growth and High School Graduation

Table 3.3 highlights the influence of all 23 ACS occupational categories on counties' aggregate human capital growth. At a glance, employment growth in roughly half of those categories significantly impacts the residential volume of high school graduates/G.E.D. earners. Upon further inspection it becomes apparent that growth in these occupations must be substantial to have a modicum of influence. In addition, the impact of aggregate job development within labor markets is considerably larger than any job growth in any single occupation within those labor markets. Within the primary labor market, the expansion of management is projected to increase counties' human capital development by .06-.09% per 1% increase. If the volume of management positions were to increase by 50%, the number of high school graduates is projected to increase by 2.9%-4.7%. If employment were to double,

this would still only equate to about a 5.7%-9.4% increase. As for job growth in the education sector—a doubling is projected to generate a .1%-3.4% increase. As a whole, job growth within the primary labor market, while potentially acting as an incentive which leads to a better educated populous, would only generate growth of about 8.3%-14.1% for each doubling of employment. As such, this suggests the availability of high-skill, high-wage occupations plays a small role in incentivizing high school graduation.

Compared to job development within primary markets, midlevel market professions are associated with proportionally more growth; the biggest single contributor being the expansion of office jobs and administrative support. In fact, growth within this industry accounts for a larger volume of high school graduates than development within the primary market as a whole. For example, counties in which the number of persons employed in office and administrative support positions double; the number of high school graduates are projected to increase by 11.9%-16.6%. Recall the employment doubling effect within the primary market is projected to generate 8.3%-14.1% growth. Employment expansion within sales positions is also projected to increase the volume of high school graduates by a considerable amount relative to primary market occupations; generating about a .74%-1.11% increase per 10% gain in employment. Protective service jobs and installation and repair jobs are also illustrated to significantly stimulate human capital development; more so than the majority of primary market occupations. Employment growth within midlevel job markets as a whole is where the potential for human capital development really shines. Here, a 10% increase in employment in projected to increase counties' stock of high school graduates by 2.9%-3.6%. If midlevel market growth were to double, this would increase to 29.3%-36.0%--or more than double the projected effect of primary market growth. This suggests the

availability of jobs within midlevel labor markets is a strong incentive for high school completion; much more so than jobs typically requiring additional education as a prerequisite for employment; legal occupations, math and computer science, architecture and engineering, etc.

The expansion of six of eight secondary market occupations were illustrated to significantly influence counties' aggregate human capital growth, all of which by less than 1% per 10% increase [in employment]. Among these six occupations both food services and transportation are projected to increase the number of high school graduates by 3%-6% for each doubling of employment within each sector. Job development within personal care and maintenance occupations are projected to stimulate high school completion by 1%-3% each time the number of employed persons double. The only secondary labor market occupation demonstrated to have a negative impact on high school graduation is farming, and likely for the reasons mentioned earlier. Perhaps one of the more striking finding in table 3.3 is that secondary market growth is projected to increase arithmetically (though not statistically) more high school graduates than primary market growth. Here again, this is likely due to the alignment of the skill set required in these occupations and the skill set provided by a high school education compared to a college education. In other words, the skills necessary to function as a personal care giver, for example, are more in line with the skills learned in high school whereas those learned in college would seldom be used.

To gain better insight into which occupations exert the most influence on high school graduation, the standardized beta coefficients for all occupations were calculated, sorted, and color coded to designate the labor market they are categorized into (red = primary market; green = midlevel market; blue = secondary market). Jobs which proved uninfluential are not

included. The results are located in table 3.4. Overall, primary market occupations round out the bottom three positions in terms of influence and the top two positions are midlevel market jobs. Comparing the top half of occupations to the bottom half we see that the former consists predominantly of midlevel and secondary occupations while the latter consists of mostly secondary and primary market jobs. In light of the evidence presented in tables 3-2, 3-3, and 3-4; job growth within primary markets, while exerting a significant influence on high school graduation, does not exert as much influence as job growth within midlevel markets.

Associate's Degree

Table 3.5 details the log-log regression results for change in the number of adults with an Associate's degree based on local labor market growth. Here again, results are presented in three models where model 1 establishes a base model of demographic shifts and rurality, model 2 gauging the influence of labor markets, and model 3 evaluates the impact of job growth within individual occupations.

As indicated in model 1, growth in several racial/ethnic populations are associated with both positive and negative changes in the number of residential Associate's degree earners. County location does not significantly impact the volume of residential associate's degree earners. The intercept for model 1 indicates that the volume of persons with a degree was projected to grow by about 1.5% between 2000 and 2014, controlling for demographic factors. As for model fit, the combination of demographic factors and a measure of rurality explains 5.9% of the variation. The F-ratio for the base model stands at 22.61.

Employment growth within primary, midlevel, and secondary labor markets are significantly associated with growth in the number of 2-year degree earners. Job growth

within primary and midlevel markets is illustrated to produce a .337% and .405% increase in the volume of junior college graduates per 1% increase in employment. Growth within secondary markets, however, has a negative impact on aggregate human capital growth, reducing the volume of degree earners by .218% per unit increase. Intuitively, this makes sense as occupations within the secondary labor market are not typically associated with a college education. And from table (2-something), it was pointed out that the average education level of persons employed within the secondary market is slightly less than a high school degree. As such, job expansion within low-wage, low-benefit occupations would not stimulate growth in the number of Associate's degrees earned.

Comparing growth within the primary and midlevel markets, the slope-effects are statistically the same when the standard errors are taken into account. This suggests job growth in both markets may incentivize local and regional residents to invest in their human capital. In addition, it also suggests the need for an education beyond high school is not confined to primary market occupations despite the average education of persons employed in midlevel market being slightly more than a high school degree.

Regarding fit, the percent of explained variance increases by 10.7% when labor market tiers are introduced into the model. Further, the increased F-ratio informs us of a decrease in the mean of the squared residuals, thus a decrease in error compared to the null model. Further, the partial F-statistic indicates the introduction of labor market tiers a substantial improvement over the base model of demographics and counties' proximities to urban areas.

Collectively, employment gains between 2000 and 2014 in roughly have of the occupations in model 3 is illustrated to significantly influence change in the volume of residents with a 2-year degree. Within the primary market, growth in the number of persons

employed as healthcare practitioners, managers, and educators have a positive impact on human capital growth. All three occupations have nearly identical slope effects, ranging from .075% to .089% growth per percent increase in employment. Statistically, the impact of growth within these sectors does not differ. Growth in legal occupations also effects the volume of degree holders, however it marginally significant. Surprisingly, job creation within the remaining primary market occupations does not influence human capital development. This may be due to size differentials between fields. The volume of persons required in healthcare, management, and education may outnumber the volume of people needed for architecture, computer science, finance, etc. Proportionally, these fields may have experienced considerable growth between 2000 and 2014 but the raw number of people employed remained small.

Within the midlevel labor market, growth in five occupations is linked to aggregate human capital development. Growth within the office and administrative support sector has the largest slope effect among midmarket occupations, generating a .188% increase in the volume of Associate's degree earners per percent gain in employment. Expansion in sales has the second largest impact on human capital development, accounting for a .099% increase. When the impact of job development within sales and administrative support are compared via a z-test, the latter was significantly more influential[20]. Job development in community and social services as well as healthcare technology is also illustrated to influence human capital growth, though to a lesser degree than sales and administrative support. Arts and entertainment is the only midmarket occupation to negatively affect counties' volume of Associate's degree earners.

[20] A significant difference test between the two coefficients yielded a z-score of 3.047.

From model 3, job expansion within secondary labor markets negatively impact local human capital development. Specifically, employment growth in the production, transportation, and farming sectors reduce the growth in counties' stocks of 2-year degree holders, though the effect size is rather smaller. In the transportation industry, for example, a 10% gain in employment is associated with a .36% decline in aggregate human capital growth. A 10% gain within the farming industry equates to .3% reduction in human capital growth. Comparatively, several primary and midlevel market occupations have a substantially larger impact on the number of Associate's degrees earned; particularly, growth within healthcare, management, education, sales, and office work/administrative support.

Regarding fit, the percent of explained variance increased between models 1 and 3, though the F-stat slightly decreased, thus indicating the base model introduces slightly less error. Compared to model 2, however, both the explained variance and the F-stat declined, the latter considerably so. Additionally, the partial F-statistic indicates the degree of improvement between models 1 and 3 may again have more to do with number of variables used than the explanatory power of each individual variables. As with the models of high school graduation, this suggests measuring job development by labor market tier is a more parsimonious method of ascertaining human capital growth. Further, it also suggests local development within specific fields, while important, does not necessarily catalyze human capital growth. What matters more is whether—and how much—growth occurs in primary, midlevel, and secondary job markets.

Summary: Occupational Employment Growth and Associate's Degree Earners

Table 3.6 highlights the potential impact of all 23 ACS occupations and their corresponding labor market tiers on the number of Associate degree earners. Similar to the

effect of employment growth on high school graduation, occupational development would need to be somewhat large to generate noticeable growth in the number of residential Associate's degree holders. Among primary market occupations, development within healthcare, management, and education stimulate a fair degree of growth, with the number of 2-year degree holders projected to increase by 3.9%-11.1% in counties where employment in any of these industries doubles. From table 3.1, the arithmetic mean percent growth within healthcare, management, and education is 31.2%, 9.5%, and 9.7% respectively. This translates to an average 2.9%-5.5% increase in the number of Associate's degree earners due to the employment growth within these occupations. As an occupational tier, however, the potential for growth is far more substantial. For example, if primary market employment were to double, the volume of degree holders is projected to increase by 28.0% to 39.4%. In short, this supports the hypothesis that job growth within primary markets incentivizes additional investment in human capital development.

Job growth in mid-market occupations would also need to be somewhat large to stimulate local human capital development. Regarding sales and office/administrative support, the volume of Associate degree earners is projected to increase by 6.26%-13.5% and 14.2%-23.4% for each doubling of employment. Held at their averages, however, the number of degree holders is projected to grow by .5%-2.5%. As an aggregate market, the potential for development is slightly larger than the sum of its parts, generating 33.9%-47.0% growth for each doubling in employment. Held at the average, the number of degree earners is projected to decrease, as the number of persons employed in midlevel market occupations declined by .5% between 2000 and 2014. But in terms of influential power, job growth in midlevel markets is just as strong as job growth in primary markets. As such, the hypothesis that the

influence of growth in primary markets will be greater than growth within the midlevel and secondary labor markets is not supported.

From tables 3-5 and 3-6, growth within the secondary labor market negatively influences human capital development. Parsed out by occupations, production, transportation, and farming each have a negative impact on the volume of Associate's degree earners, albeit a small one. Even in hypothetical scenario where employment within the farming industry, for example, increased by 100%--the decline in human capital growth would only amount to 2%-4%. As a block of occupations though, the decline becomes more substantial, potentially generating a 27.6% loss in the number of college educated residents. Comparing the absolute magnitudes of effect within each labor market, both primary and midlevel market development generate significantly more human capital growth than secondary market development.[21] Intuitively, this makes sense as there is no need of an Associate's degree in most secondary market occupations.

The ranked impact of occupations which significantly affect human capital growth is detailed in table 3.7. Overall, three primary and two secondary occupations generate the majority of influence. Job growth among healthcare practitioners and office/administrative staff are nearly identical in importance as to their effect on counties' stock of junior college graduates. The top five positions are rounded out by sales, education, and management. The bottom six positions consist of three midlevel and three secondary market occupations with growth in farming exerting much of the influence. Collectively, and with regards to occupations, the standardized betas suggest much of the incentive to earn a 2-year degree stems from employment growth in the primary and midlevel markets.

[21] Comparing the coefficients of primary and secondary markets produced a z-score of 2.9. For midlevel and secondary markets, the test statistic was 4.2.

Bachelor's Degree

Table 3.8 highlights the impact of job growth on the number of residents who have earned a Bachelor's degree. As illustrated in model 1, rurality has a negative and significant impact on the percent of bachelor's degree earners. This suggests there is something about rural areas that is not conducive to earning a BA nor are they viewed as particularly desirable to college educated migrants. For example, growth in the most remote counties (not adjacent to a metro county and having a population less than 2,500) was projected to be 13.6% less than metropolitan areas with a population of 2 million or more. Overall, counties' degree of rurality as well as change in its demographic makeup account for 17% of the variation in aggregate human capital.

Regarding model 2; employment growth in primary, midlevel, and secondary labor markets significantly impact growth in the number of college-educated residents. Within primary and midlevel markets, job development is positively associated with aggregate human capital development, generating .53% and .32% growth per percentage increase, respectively. This suggests potential college graduates may factor the availability of both high-wage, high-skill and medium-wage, medium-skill occupations into their decision to pursue a Bachelor's degree. Comparing coefficients, however, job growth within primary labor markets generate significantly more growth in the number of degree holders[22], thus indicating the availability of high-wage, high-skill jobs incentivizes a college education more so than midlevel occupations. Secondary markets occupations are negatively associated with growth in the number of bachelor's degree holders, decreasing growth by .12% per 1% gain in employment.

[22] A test of significant differences produced a z-score of 6.554.

Compared to the base model, the inclusion of occupational tiers significantly improves the overall fit. First, the amount of explained variance increases by more than 20%. Second, the F-statistic increases substantially, indicative of a sizeable reduction in error relative to the intercept-only model. Also of note, most demographic variables lose their significance as predictors of aggregate human capital development when the makeup of local job markets is accounted for.

Parsed out by individual occupations, several jobs within each labor market tier significantly impacts growth in counties' stock of Bachelor's degree holders. Within the primary market, 6 of 8 occupations have a positive and significant effect on aggregate human capital development with growth in education and management being the largest contributors; accounting for a .18% and .14% increase per 1% gain in employment, respectively. The development of healthcare and business occupations are also shown to stimulate growth in the number of degrees earned, though to a demonstrably lesser extent. Though significant contributors, growth within math & computer sciences as well as architecture & engineering are associated with much more limited growth. This is likely due to the "niche-like" character of these occupational sectors and the number of available positions there within, relative to job types such as "management," "business," "education," etc. In short, these findings support the hypothesis that job growth within the primary market will increase the volume of Bachelor's degrees earned.

Within midlevel labor markets, employment growth within five occupations increases the volume of Bachelor's degree earners. As with previous models, job development in sales and office/administrative support generates the bulk human capital gains associated with medium-skill, medium-wage occupations. Further, compared to job growth within

management occupations, the slope-effects are indistinguishable. In other words, the creation of jobs in management, sales, and administrative support have virtually the same degree of influence on the number of degrees earned. The three remaining midlevel occupations generate considerably less human capital growth, but are significant contributors nonetheless. Of note however, is that the influence of job growth within the arts & entertainment, health tech, mathematics & computer science, and architecture & engineering are statistically identical. Overall, the striking similarities of influence shared by primary and midlevel labor markets is further indication that people factor in the availability of both high-wage and medium-wage occupations when determining whether to obtain a Bachelor's degree.

Among secondary market occupations, four are illustrated as influential, three of which in a negative fashion. From model 3, job growth in production, construction/extraction, and farming reduce growth in the number of Bachelor's degree earned. Here, however, the effect is small; accounting for a .027%, .028%, and .019% decline (respectively) for each percent increase in employment. Growth in the personal care sector is the only secondary market occupation positively associated with earning a secondary degree—and this is not likely due to the education requirements associated with the jobs. This is likely a product of the type of services sought out by college educated citizens. Generally speaking, people employed in high-wage, high-skill occupations typically have some form of postsecondary education, the disposable income to pay for services such as childcare, hospice care, etc. and the lack of time required to carry out these services for themselves. As such, job growth in personal care is likely a byproduct of growth in the number of residential Bachelor's degree earners—not an incentive to earn a Bachelor's degree.

Concerning fit, model 3 is a seeming improvement over the base model though it is difficult to say anything conclusive compared to model 2. Compared to model 1, the inclusion of individual occupations increases the amount of variance explained from 17% to 39.4%. The F-stat, however, drops from 72.34 to 64.81. Compared to model 2, parsing out the regression by occupations decreases both the explained variance and the F-statistic. On the other hand, model 3 demonstrates which occupations in which labor market tiers account for the bulk of the influence associated with the corresponding tier. Job growth in management and education account for the bulk of human capital development associated with the primary market, sales and office/administrative support account for the bulk human capital development within the midlevel market, etc. As such, in terms of explanatory power model 3 falls short of model 2. In terms of description, however, it is more informative.

Summary: Occupational Employment Growth and Bachelor's Degree Earners

Table 3.9 highlights the potential impact of all 23 ACS occupations on the volume of Bachelor's degrees earned. Similar to the influence of job growth on the number of high school and Associate's degrees; occupational development would have to be substantial to generate large, proportional gains in aggregate human capital. Among primary market occupations, job growth within management and education produced the largest growth in degrees earned, yet the projected influence of each ranges between .12% - .17% and .15% - .20% per percent increase in employment. In other words, the number of persons employed in either of these sectors would have to increase by 10% to increase the number of Bachelor's degree earners by 1.2% - 1.7% (management) and 1.5% - 2.0% (education). In a scenario where the number of persons employed as managers or educators doubles, counties' stocks of college educated residents is projected to increase by 11.7% - 17.0% and 15.3% - 19.9%,

respectively. For the remaining primary market occupations, a "doubling effect" is projected to stimulate less than 10% growth in aggregate human capital. If we focus on job development within the primary market instead of the individual jobs within, the potential for additional human capital development growth becomes more profound. For example, counties in which primary market employment growth reached 25% are projected to increase their stock of college educated residents by 12.2% - 14.2%. At 100% growth, this increases to 48.7% - 56.8%. Collectively, this suggests the availability of high-wage, high-skill occupations incentivize the pursuit of a Bachelor's degree.

Overall, job growth within midlevel occupations does not stimulate as much growth in the number of residential Bachelor's degree earners, though the influence was stronger than expected; particularly within sales and office/administrative support. Comparatively, the influence of growth within these two occupational sectors is nearly on par with management. Employment growth in sales, for example, is projected to increase the volume of college-educated residents by 9.5% - 14.8% if the number persons working in the sector doubles. As noted, the projected influence of management ranges between 11.7% and 17.0%, thus there is a sizable overlap. The projected influence of job growth within other midlevel occupations is significantly smaller than both sales and administrative support, stimulating less than 5% growth of Bachelor's degree holders.

Examined as an occupational tier, the expansion of medium-wage job opportunities is illustrated to exert far more influence on human capital development than any individual midmarket position. For example, the volume of residential college graduates is projected to increase by 2.7% - 3.7% in counties where midmarket job growth reaches 10%. At 25%

growth, the volume of graduates increases by 6.8% - 9.2%. Here again, this indicates that diversity within job markets matters more than individual occupations themselves.

Apart from personal care occupations, job growth within the secondary market is negatively associated with the volume of residential college graduates. Fortunately, the degree of job growth which would have to occur in a single secondary market occupation to substantively negate local human capital development is immense. If employment were to double in production, construction/extraction, and farming the reduction in human capital growth would amount to a 4.7% at most. This is less than a third of the maximum projected growth associated with the expansion of management, education, sales, and administrative support. As an occupational block, the potential impact on human capital growth is more substantial, projected to decrease growth in the number of college-educated residents by as much as 15.8%, should labor needs within the secondary market double. Collectively, this illustrates secondary market development is more influential than growth within a single low-wage industry. Put into context, residents are less likely to pursue a college education if most new job opportunities are within the secondary labor market.

The standardized beta coefficients in table 3.10, ranked in terms of absolute magnitude, illustrate the 7 most influential occupations are within primary and midlevel labor markets. At the top of list is education, thus suggesting the availability of jobs within elementary, middle, and high schools, school libraries, etc. maybe a strong incentive for local and region residents to pursue a Bachelor's degree. Interestingly though, job growth within architecture & engineering as well as computer science & mathematics, while significantly influential, round out the bottom of the list indicating job openings within these fields do not necessarily provide a strong incentive to finish college. As previously mentioned however, this may be

due to the volume of laborers required in these fields relative to others. Also noteworthy is the influence of job growth in farming relative to the primary and midlevel occupations with lower standardized betas. In effect, county development within the farming industry may be more of a deterrent to higher education than jobs with healthcare technology and computer science are an incentive.

Discussion, Implications for Model of Individuals

Overall, employment growth in several occupational categories was positively associated with gains in counties' high school graduate/G.E.D. stock, Associate's degree earners, and Bachelor's degree earners. A comparative summary detailing the impact of job growth on aggregate human capital is provided in table 3.11. Regarding the volume of county residents with a high school degree or G.E.D., most growth was associated with increases in employment increases within the midlevel labor market, specifically sales and administrative support occupations. Job development within primary and secondary labor markets are also positively associated with the volume of high school graduates, though surprising their predicted slope effects are similar. Interestingly, job growth in two primary market occupations is negatively associated with high school graduation. This is likely because jobs within these industries require at least some form of postsecondary education. As such, job growth in life, physical, and social sciences as well as architecture and engineering does not incentive local residents to culminate their education with a high school degree nor does it incentive high school graduates to relocate to counties with job opportunities in these fields. Farming was the only secondary market occupation to negatively impact counties' stock of high school graduates. This suggests that a high school education is not necessary for farm employment as the required skills needed for day-to-day tasks are learned on the job.

Growth in the remaining occupations, however, have a positive influence on the residential stock of high school graduates, though to varying degrees.

Job growth in all labor market tiers and most occupations had a significant impact on counties' stock of Associate degree earners, with just six occupations proving uninfluential. Three primary market occupations were positively associate with an increase in the number of 2-year degree holders, specifically; healthcare, management, and education. Among mid-market occupations, employment gains in protective services and installation & repair did not significantly impact aggregate human capital growth, suggesting many jobs within these sectors do not require education beyond high school, nor do they provide incentive to enroll in college. As with high school graduation, the association between employment in farming and Associate's degree earners was also negative.

Comparatively, the influence of employment growth in primary and midlevel labor markets on the volume of Associate degree earners is statistically identical, suggesting local job opportunities in high-wage and medium-wage occupations incentivize college enrollment equally. On the other hand, growth in secondary labor markets reduce growth of Associate's degree earners suggesting locals will not invest in a college degree if the job market does not adequately compensate their efforts.

Nearly all primary market occupations influence growth in the number of college educated residents, which is somewhat intuitive. Most occupations in fields like "Computers & Mathematics," "Architecture & Engineering," etc. likely require a college degree as a prerequisite for employment. Additionally, most midlevel occupations are positively associate with the volume of Bachelor's degree earners, though the influence of job growth in the midlevel markets, as a whole, is slightly smaller. This is likely due to the varied

educational requirements of jobs nested within the subcategories of mid-market occupations. Many jobs within sales and administrative support, for example, may require employees to have an Associate's or Bachelor's degree before considering them for employment.

Only two mid-market occupations did not significantly contribute to counties' stock of Bachelor's degree earners; specifically, protective service jobs and installation and repair jobs. This suggests a large proportion of jobs within these industries do not require a college education, hence employment growth within these occupations generally would not provide incentive to pursue a postsecondary degree.

Lastly, four secondary market occupations were illustrated to impact the volume of residential college graduates, three of which negatively so. While employment growth in personal care has a small, positive influence on human capital growth, gains in production and construction/extraction, and farming were negatively associated with human capital growth. This suggests that most jobs grouped into these categories do not require their employees to have earned a 4-year degree for employment, thus job opportunities in these fields do not incentivize continuing one's education beyond high school.

As illustrated, all labor market tiers and many individual occupations are associate with local human capital growth via increases in the number of high school graduates, Associate's degree earners, and Bachelor's degree earners. The caveat is that the extent of those gains is dependent on the type of occupations available. Comparatively, expansion in primary markets generated more growth than mid-level or secondary market occupations in terms of 4-year degree earners, yet did not increase the number of high school graduates as much as mid-level markets. This pattern becomes more apparent when considering labor market tiers. For example, counties' stock of high school graduates was predicted to increase by 8.3% -

14.10% for each doubling of employment within primary market occupations, 29.3% - 36.0% within mid-market occupations, and 9.0% - 15.2% within secondary market occupations. As such, primary market job opportunities are about as influential as secondary job market opportunities when it comes to growth in the number of high school graduates; midlevel markets are far more influential in this respect.

The pattern between secondary market occupations and regional human capital growth is also illustrative of a relationship between job type and educational credentials, with associated gains in counties' stock of Associate and Bachelor's degree earners being minimal—and in fact negative—compared to high school graduates/GED earners. At 100% growth in the number of employed persons, in secondary markets are predicted to increase the percent of high school graduates by 9.0% - 15.2%; decrease the volume of Associate's degree earners by 16.1% - 27.6%; and decrease the volume of Bachelor's degree earners by 7.7% - 15.8%. These findings are in line with what human capital theory would predict; growth in occupations which do not offer high wages, good benefits, etc. generates less growth counties' stock of high school graduates than college degree earners.

Overall, results indicate that growth in any job type, while somewhat influential to human capital, does not make a substantial contribution. Sizable growth does not occur until employment gains are several standard deviations above the mean. At this threshold, growth in occupations like management, healthcare diagnostics, and education generate considerable gains. As such, occupational gains are more influential as consolidated units, i.e., primary market jobs (or tier 1), mid-level market jobs (tier 2) and secondary market jobs (tier 3). This will be become more apparent when individual outcomes are regressed against employment changes by occupation tiers.

Hypotheses Revisited

Regarding hypotheses, results of the aggregate models are generally supportive. The first hypothesis, *"Local job markets with high employment growth in primary market occupations—i.e., occupations which typically require education beyond high school—will generate more high school graduates as well as Associate and Bachelor's degree earners."* received mixed support by the county-level models. Overall, Employment growth in primary market occupations was positively associate with growth in each degree type, though the volume of a growth varied by degree. Specifically, job growth in primary labor markets was predicted to increase counties' stocks of high school graduates by 8.3% - 14.1% per each doubling of employment; increased Associate's degree earners by 28.0% - 39.4%; and Bachelor's degree earners by 48.7% - 56.8%.

As for the second hypothesis, "*growth in primary market occupations will generate a larger increase in college degree earners, compared to the mid-level and secondary job markets;"* is partially supported. Specifically, expansion of primary market employment increased counties' stock of Bachelor's degree earners yet midlevel market growth generated more Associate's degree earners.

Implications for model of individual outcomes

Results from this chapter dictate which variables are used to assess the relationship between county-level job growth and individuals' educational attainment outcomes. Only those occupations which have a significant impact on counties' human capital growth are included, thus job growth in "Architecture & Engineering," "Production," and "Transportation" will not be used to assess the probability of graduating high school; "Protective Services," "Healthcare Support", "Personal Care," "Food Preparation," and

"Maintenance" will not be used to assess earning a 2-year degree; etc. That said, a model with all 23 ACS occupations grouped into their respective tiers will be utilized to evaluate the aggregate influence of growth within primary, mid-level, and secondary markets. In addition, results from this model will be used to support or refute hypotheses 3, 4, and 5.

Table 3.1. Summary Statistics

Variables	Mean	std. dev.
HS Degree/G.E.D.	0.207	0.166
Associate's Degree	0.417	0.271
Bachelor's Degree	0.351	0.281
Asian	0.604	1.159
Black	0.504	1.485
Hispanic	0.923	0.902
Native	-0.095	0.550
Pacific	0.200	1.343
White	-0.038	0.169
Two or more	0.434	0.850
Other	-0.738	0.366
Rurality	0.050	0.027
Legal Occupations	0.211	0.684
Healthcare Practitioners	0.312	0.433
Life, Physical, and Social Sciences	0.134	0.676
Computers & Mathematics	0.446	0.876
Architecture & Engineering	0.077	0.585
Management	0.095	0.278
Business & Finance	0.191	0.433
Education, Training, & Libraries	0.097	0.306
Community & Social Services	0.207	0.521
Arts & Design, Entertainment	0.082	0.542
Healthcare Technologists	0.381	0.578
Protective Services	0.276	0.517
Sales	0.020	0.239
Office/Admin Support	-0.016	0.191
Installation & Repair	-0.093	0.277
Healthcare Support	0.269	0.484
Production	-0.200	0.283
Transportation	0.028	0.273

Personal Care	0.291	0.434
Construction/Extraction	-0.009	0.320
Food Preparation & Service	0.166	0.382
Maintenance Occupations	0.240	0.375
Farming	0.005	0.510
Primary Market Occupations	0.112	0.217
Mid-Level Market Occupations	-0.005	0.161
Secondary Market Occupations	0.022	0.188

N = 3,132

Table 3.2. Percent Change in the Number of Adults, 25 or older, with a High School Degree

	Model 1		Model 2		Model 3	
	B	**Std. Error**	**B**	**Std. Error**	**B**	**Std. Error**
Asian	.012***	.003	.002	.002	.003	.002
Black	0.003	.003	-.006	.003	-.003	.003
Hispanic	.023***	.005	.004	.004	-.001	.004
Native	.001	.002	-.001	.002	.000	.002
Pacific	.000	.002	-.003	.002	-.001	.002
White	.133***	.013	.070***	.011	.068***	.011
Two or More	-.008***	.004	-.013***	.003	-.013***	.003
Other	-.024***	.001	-.003**	.001	-.004**	.001
Rurality	-.013***	.008	-.004***	.001	-.002*	.001
Primary Occupations			.111***	.015		
Mid-Market Occupations			.327***	.017		
Secondary Occupations			.123***	.015		
Legal Occupations					.002	.002
Healthcare Practitioners					.007	.005
Life, Physical, and Social Sciences					-.007**	.002
Computers & Mathematics					.002	.002
Architecture & Engineering					-.006*	.003
Management					.075***	.010
Business & Finance					-.009	.005
Education, Training, & Libraries					.018*	.008
Community & Social Services					.000	.004
Arts & Design, Entertainment					-.005	.003
Healthcare Technologists					.007	.004
Protective Services					.028***	.004
Sales					.092***	.009
Office/Admin Support					.142***	.012

Installation & Repair					.030***	.007
Healthcare Support					.030***	.005
Production					.005	.006
Transportation					.044***	.008
Personal Care					.024***	.004
Construction/Extraction					-.005	.007
Food Preparation & Service					.042***	.007
Maintenance Occupations					.020**	.007
Farming					-.011**	.003
Constant	.117***	.008	.087***	.008	.067***	.008
F	*54.80*		*136.10*		*53.63*	
F-Partial			*328.28*		*46.01*	
R^2	*.134*		*.341*		*.350*	

**** = p< .001; ** = p < .01; * = p < .05*

Table 3.3. Influence of Occupational Growth on Percent Change in Residential High School Graduates/G.E.D. Earners, 90% CI

Occupations	Change per 1% increase		Change per 10% increase		Change per 50% increase		Change per 100% increase	
	Lower	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**
Legal Occupations	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Healthcare Practitioners	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Life, Physical, and Social Sciences	-0.01%	0.00%	-0.11%	-0.03%	-0.55%	-0.15%	-1.10%	-0.30%
Computers & Mathematics	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Architecture & Engineering	-0.01%	0.00%	-0.11%	-0.01%	-0.55%	-0.05%	-1.10%	-0.10%
Management	0.06%	0.09%	0.57%	0.94%	2.85%	4.70%	5.70%	9.40%
Business & Finance	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Education, Training, & Libraries	0.00%	0.03%	0.04%	0.32%	0.20%	1.60%	0.40%	3.20%
Tier-1 Occupations	***0.09%***	***0.14%***	***0.87%***	***1.36%***	***4.35%***	***6.80%***	***8.70%***	***13.60%***
Community & Social Services	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Arts & Design, Entertainment	-0.01%	0.00%	-0.10%	0.00%	-0.50%	-0.01%	-1.00%	-0.01%
Healthcare Technologists	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Protective Services	0.02%	0.04%	0.20%	0.37%	1.00%	1.85%	2.00%	3.70%
Sales	0.08%	0.11%	0.76%	1.08%	3.80%	5.40%	7.60%	10.80%
Office/Admin Support	0.12%	0.16%	1.23%	1.61%	6.15%	8.05%	12.30%	16.10%
Installation & Repair	0.02%	0.04%	0.17%	0.40%	0.85%	2.00%	1.70%	4.00%
Tier-2 Occupations	***0.30%***	***0.36%***	***2.98%***	***3.55%***	***14.90%***	***17.75%***	***29.80%***	***35.50%***
Healthcare Support	0.02%	0.04%	0.22%	0.40%	1.10%	2.00%	2.20%	4.00%
Production	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Transportation	0.03%	0.06%	0.31%	0.60%	1.55%	3.00%	3.10%	6.00%
Personal Care	0.02%	0.03%	0.15%	0.33%	0.75%	1.65%	1.50%	3.30%

Construction/Extraction	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Food Preparation & Service	0.03%	0.05%	0.30%	0.50%	1.50%	2.50%	3.00%	5.00%
Maintenance Occupations	0.01%	0.03%	0.10%	0.30%	0.50%	1.50%	1.00%	3.00%
Farming	-0.02%	-0.01%	-0.20%	-0.10%	-1.00%	-0.50%	-2.00%	-1.00%
Tier-3 Occupations	***0.10%***	***0.15%***	***0.98%***	***1.47%***	***4.90%***	***7.35%***	***9.80%***	***14.70%***

Table 3.4. Standardized Beta Coefficients, High School Graduation

	Std. Beta
Office/Admin Support	0.192
Sales	0.155
Management	0.132
Food Preparation & Service	0.102
Healthcare Support	0.098
Protective Services	0.097
Transportation	0.086
Installation & Repair	0.069
Personal Care	0.069
Farming	0.048
Maintenance Occupations	0.046
Life, Physical, and Social Sciences	0.045
Education, Training, & Libraries	0.036
Architecture & Engineering	0.030

Table 3.5. Percent Change in the Number of Adults, 25 or older, with an Associate's Degree

Variables	**Model 1**		**Model 2**		**Model 3**	
	B	**Std. Error**	**B**	**Std. Error**	**B**	**Std. Error**
Asian	-.010*	.005	-.019***	.004	-.020***	.004
Black	.018**	.006	.012	.006	.010	.006
Hispanic	.022*	.009	.000	.009	.000	.009
Native	-.008	.005	-.006	.004	-.007	.004
Pacific	-.001	.003	-.002	.003	-.002	.003
White	.258***	.023	.146***	.022	.162***	.022
Two or More	-.001	.007	.005	.006	.003	.006
Other	-.010***	.003	-.006*	.002	-.005*	.002
Rurality	-.001	.002	-.010***	.002	.010***	.002
Primary Occupations (Tier-1)			.337***	.029		
Mid-Market Occupations (Tier-2)			.405***	.034		

Secondary Occupations (Tier-3)			-.218***	.029		
Legal Occupations					.008	.004
Healthcare Practitioners					.089***	.011
Life, Physical, and Social Sciences					-.004	.004
Computers & Mathematics					.006	.005
Architecture & Engineering					.000	.006
Management					.075***	.019
Business & Finance					.005	.009
Education, Training, & Libraries					.076***	.017
Community & Social Services					.031***	.008
Arts & Design, Entertainment					-.017**	.006
Healthcare Technologists					.023**	.008
Protective Services					.001	.009
Sales					.099***	.018
Office/Admin Support					.188***	.023
Installation & Repair					.024	.013
Healthcare Support					-.005	.009
Production					-.028*	.013
Transportation					-.036*	.016
Personal Care					.017	.011
Construction/Extraction					-.003	.014
Food Preparation & Service					-.004	.013
Maintenance Occupations					-.002	.014
Farming					-.030***	.007
Constant	.413***	.015	.350***	.015	.345***	.016
F	*22.61*		*52.80*		*20.12*	
Partial F	*--*		*134.68*		*18.02*	
R^2	*.059*		*.166*		*.164*	

**** = p< .001; ** = p < .01; * = p < .05; ~ = p < .01*

Table 3.6. Influence of Occupational Growth on Percent Change in Residential Associate's Degree Earners, 90% CI

Occupations	**Change per 1% increase**		**Change per 10% increase**		**Change per 50% increase**		**Change per 100% increase**	
	Lower	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**
Legal Occupations	0.00%	0.02%	0.04%	0.15%	0.20%	0.75%	0.40%	1.50%
Healthcare Practitioners	0.07%	0.11%	0.70%	1.10%	3.50%	5.50%	7.00%	11.00%
Life, Physical, and Social Sciences	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Computers & Mathematics	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Architecture & Engineering	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Management	0.04%	0.11%	0.37%	1.11%	1.85%	5.55%	3.70%	11.10%

Business & Finance	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Education, Training, & Libraries	0.05%	0.10%	0.48%	1.03%	2.40%	5.15%	4.80%	10.30%
Tier-1 Occupations	***0.27%***	***0.36%***	***2.72%***	***3.64%***	***13.60%***	***18.20%***	***27.20%***	***36.40%***
Community & Social Services	0.02%	0.04%	0.17%	0.44%	0.85%	2.20%	1.70%	4.40%
Arts & Design, Entertainment	-0.03%	-0.01%	-0.28%	-0.05%	-1.39%	-0.25%	-2.77%	-0.50%
Healthcare Technologists	0.01%	0.04%	0.07%	0.39%	0.35%	1.94%	0.70%	3.87%
Protective Services	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Sales	0.07%	0.13%	0.68%	1.29%	3.40%	6.45%	6.80%	12.90%
Office/Admin Support	0.15%	0.23%	1.49%	2.27%	7.45%	11.35%	14.90%	22.70%
Installation & Repair	0.00%	0.05%	0.02%	0.46%	0.10%	2.30%	0.20%	4.60%
Tier-2 Occupations	***0.36%***	***0.47%***	***3.64%***	***4.73%***	***18.20%***	***23.65%***	***36.40%***	***47.30%***
Healthcare Support	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Production	-0.05%	-0.01%	-0.52%	-0.06%	-2.60%	-0.30%	-5.20%	-0.60%
Transportation	-0.06%	-0.01%	-0.62%	-0.06%	-3.10%	-0.30%	-6.20%	-0.60%
Personal Care	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Construction/Extraction	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Food Preparation & Service	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Maintenance Occupations	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Farming	-0.04%	-0.02%	-0.40%	-0.18%	-2.00%	-0.90%	-4.00%	-1.80%
Tier-3 Occupations	***-0.28%***	***-0.16%***	***-2.76%***	***-1.61%***	***-13.78%***	***-8.07%***	***-27.55%***	***-16.13%***

Table 3.7. Standardized Beta Coefficients, Associate Degree Attainment

Occupations	Std. Beta
Healthcare Practitioners	0.151
Office/Admin Support	0.146
Sales	0.096
Education, Training, & Libraries	0.088
Management	0.075
Farming	-0.074
Community & Social Services	0.065
Healthcare Technologists	0.050
Arts & Design, Entertainment	0.050
Transportation	-0.040
Production	-0.039
Installation & Repair	0.032
Legal Occupations	0.029

Table 3.8. Percent Change in the Number of Adults, 25 or older, with an Associate's Degree

Variables	Model 1		Model 2		Model 3	
	B	Std. Error	B	Std. Error	B	Std. Error
Asian	.019***	.004	.005	.003	.004	.003
Black	.021***	.005	.012**	.004	.012**	.004
Hispanic	.042***	.007	.009	.006	.004	.006
Native	-.004	.004	-.004	.003	-.005	.003
Pacific	.003	.002	.001	.002	.002	.002
White	.227***	.018	.078***	.016	.093***	.016
Two or More	-.012*	.005	-.001	.004	-.005	.002
Other	-.009***	.002	-.003	.002	-.003	.005
Rurality	-.017***	.001	-.002	.001	.001	.001
Primary Occupations (Tier-1)			.508***	.020		
Mid-Market Occupations (Tier-2)			.338***	.024		
Secondary Occupations (Tier-3)			-.113***	.021		
Legal Occupations					.004	.003
Healthcare Practitioners					.049***	.008
Life, Physical, and Social Sciences					.002	.003
Computers & Mathematics					.007*	.003
Architecture & Engineering					.009*	.004
Management					.144***	.014
Business & Finance					.045***	.007
Education, Training, & Libraries					.176***	.012
Community & Social Services					.032***	.006
Arts & Design, Entertainment					.011**	.004
Healthcare Technologists					.018**	.006
Protective Services					.009	.006
Sales					.122***	.013
Office/Admin Support					.113***	.017
Installation & Repair					.004	.010
Healthcare Support					-.005	.007
Production					-.027**	.009
Transportation					.004	.012
Personal Care					.024**	.008
Construction/Extraction					-.028**	.010
Food Preparation & Service					.002	.009
Maintenance Occupations					.003	.010
Farming					-.019***	.005
Constant	.314***	.011	.209***	.011	.210***	.012
F	*72.34*		*178.23*		*64.81*	
Partial F	--		*410.45*		*51.31*	

R^2	*.170*	*.405*	*.394*

**** = p< .001; ** = p < .01; * = p < .05*

Table 3.9. Influence of Occupational Growth on Percent Change in Residential Bachelor's Degree Earners, 90% CI

Occupations	Change per 1% increase		Change per 10% increase		Change per 50% increase		Change per 100% increase	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Legal Occupations	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Healthcare Practitioners	0.04%	0.06%	0.36%	0.61%	1.80%	3.05%	3.60%	6.10%
Life, Physical, and Social Sciences	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Computers & Mathematics	0.00%	0.01%	0.01%	0.12%	0.05%	0.60%	0.10%	1.20%
Architecture & Engineering	0.00%	0.02%	0.02%	0.16%	0.10%	0.80%	0.20%	1.59%
Management	0.12%	0.17%	1.21%	1.66%	6.05%	8.30%	12.10%	16.60%
Business & Finance	0.03%	0.06%	0.34%	0.55%	1.70%	2.75%	3.40%	5.50%
Education, Training, & Libraries	0.16%	0.20%	1.56%	1.95%	7.80%	9.75%	15.60%	19.50%
Primary Market Occupations	***0.48%***	***0.54%***	***4.76%***	***5.41%***	***23.80%***	***27.05%***	***47.60%***	***54.10%***
Community & Social Services	0.02%	0.04%	0.22%	0.42%	1.10%	2.10%	2.20%	4.19%
Arts & Design, Entertainment	0.00%	0.02%	0.04%	0.18%	0.20%	0.89%	0.40%	1.77%
Healthcare Technologists	0.01%	0.03%	0.08%	0.28%	0.40%	1.38%	0.80%	2.75%
Protective Services	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Sales	0.10%	0.14%	0.96%	1.43%	4.80%	7.15%	9.60%	14.30%
Office/Admin Support	0.09%	0.14%	0.85%	1.40%	4.25%	7.02%	8.50%	14.04%
Installation & Repair	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Midlevel Market Occupations	***0.30%***	***0.37%***	***2.99%***	***3.75%***	***14.95%***	***18.73%***	***29.90%***	***37.45%***
Healthcare Support	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Production	-0.04%	-0.01%	-0.41%	-0.12%	-2.07%	-0.59%	-4.13%	-1.18%
Transportation	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Personal Care	0.01%	0.04%	0.12%	0.37%	0.59%	1.84%	1.18%	3.67%
Construction/Extraction	-0.04%	-0.01%	-0.44%	-0.11%	-2.20%	-0.55%	-4.40%	-1.09%
Food Preparation & Service	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Maintenance Occupations	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Farming	-0.03%	-0.01%	-0.27%	-0.11%	-1.35%	-0.57%	-2.70%	-1.15%
Secondary Market Occupations	***-0.15%***	***-0.08%***	***-1.47%***	***-0.79%***	***-7.35%***	***-3.95%***	***-14.69%***	***-7.90%***

Table 3.10. Standardized Beta Coefficients, Bachelor's Degree Attainment

	Std. Beta
Education, Training, & Libraries	0.243
Management	0.172
Sales	0.140
Office/Admin Support	0.104
Business & Finance	0.101
Healthcare Practitioners	0.097
Community & Social Services	0.081
Farming	-0.058
Personal Care	0.048
Healthcare Technologists	0.046
Production	-0.044
Construction/Extraction	-0.041
Arts & Design, Entertainment	0.039
Architecture & Engineering	0.032
Computers & Mathematics	0.028

Table 3.11. Influence of Occupational Growth on Percent Change in Human Capital Development, 90% CI

Occupations	Volume of High School Degrees				Volume of Associate's Degrees				Volume of Bachelor's Degrees			
	Change per 50% increase		Change per 100% increase		Change per 50% increase		Change per 100% increase		Change per 50% increase		Change per 100% increase	
	Lower 95% CI	Upper 95% CI	Lower 95% CI	Upper 95% CI	Lower 95% CI	Upper 95% CI	Lower 95% CI	Upper 95% CI	Lower 95% CI	Upper 95% CI	Lower 95% CI	Upper 95% CI
Legal Occupations	n.s.	n.s.	n.s.	n.s.	0.20%	0.75%	0.40%	1.50%	n.s.	n.s.	n.s.	n.s.
Healthcare Practitioners	n.s.	n.s.	n.s.	n.s.	3.50%	5.50%	7.00%	11.00%	1.80%	3.05%	3.60%	6.10%
Life, Physical, and Social Sciences	-0.55%	-0.15%	-1.10%	-0.30%	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Computers & Mathematics	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.05%	0.60%	0.10%	1.20%
Architecture & Engineering	-0.55%	-0.05%	-1.10%	-0.10%	n.s.	n.s.	n.s.	n.s.	0.10%	0.80%	0.20%	1.59%
Management	2.85%	4.70%	5.70%	9.40%	1.85%	5.55%	3.70%	11.10%	6.05%	8.30%	12.10%	16.60%
Business & Finance	-1.00%	-5.00%	-2.00%	-10.00%	n.s.	n.s.	n.s.	n.s.	1.70%	2.75%	3.40%	5.50%
Education, Training, & Libraries	0.20%	1.60%	0.40%	3.20%	2.40%	5.15%	4.80%	10.30%	7.80%	9.75%	15.60%	19.50%
Tier-1 Occupations	***4.35%***	***6.80%***	***8.70%***	***13.60%***	***14.00%***	***19.70%***	***28.00%***	***39.40%***	***24.68%***	***28.08%***	***49.36%***	***56.15%***
Community & Social Services	n.s.	n.s.	n.s.	n.s.	0.85%	2.20%	1.70%	4.40%	1.10%	2.10%	2.20%	4.19%
Arts & Design, Entertainment	-0.50%	-0.01%	-1.00%	-0.01%	-1.39%	-0.25%	-2.77%	-0.50%	0.20%	0.89%	0.40%	1.77%
Healthcare Technologists	n.s.	n.s.	n.s.	n.s.	0.35%	1.94%	0.70%	3.87%	0.40%	1.38%	0.80%	2.75%
Protective Services	1.00%	1.85%	2.00%	3.70%	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Sales	3.80%	5.40%	7.60%	10.80%	3.40%	6.45%	6.80%	12.90%	4.80%	7.15%	9.60%	14.30%
Office/Admin Support	6.15%	8.05%	12.30%	16.10%	7.45%	11.35%	14.90%	22.70%	4.25%	7.02%	8.50%	14.04%
Installation & Repair	0.85%	2.00%	1.70%	4.00%	0.10%	2.30%	0.20%	4.60%	n.s.	n.s.	n.s.	n.s.
Tier-2 Occupations	***14.90%***	***17.75%***	***29.80%***	***35.50%***	***16.95%***	***23.50%***	***33.90%***	***47.00%***	***10.01%***	***17.93%***	***20.01%***	***35.85%***
Healthcare Support	1.10%	2.00%	2.20%	4.00%	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Production	n.s.	n.s.	n.s.	n.s.	-2.60%	-0.30%	-5.20%	-0.60%	-2.07%	-0.59%	-4.13%	-1.18%
Transportation	1.55%	3.00%	3.10%	6.00%	-3.10%	-0.30%	-6.20%	-0.60%	n.s.	n.s.	n.s.	n.s.
Personal Care	0.75%	1.65%	1.50%	3.30%	n.s.	n.s.	n.s.	n.s.	0.59%	1.84%	1.18%	3.67%
Construction/Extraction	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	-2.20%	-0.55%	-4.40%	-1.09%
Food Preparation & Service	1.50%	2.50%	3.00%	5.00%	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Maintenance Occupations	0.50%	1.50%	1.00%	3.00%	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Farming	-1.00%	-0.50%	-2.00%	-1.00%	-2.00%	-0.90%	-4.00%	-1.80%	-1.35%	-0.57%	-2.70%	-1.15%
Tier-3 Occupations	***4.90%***	***7.35%***	***9.80%***	***14.70%***	***-13.78%***	***-8.07%***	***-27.55%***	***-16.13%***	***-7.58%***	***-3.84%***	***-15.15%***	***-7.69%***

CHAPTER IV

THE INFLUENCE OF EMPLOYMENT GAINS IN PRIMARY MARKETS ON THE PROBABILITY OF GRADUATING HIGH SCHOOL AND/OR EARNING A COLLEGE DEGREE

This chapter tests hypotheses 3, 4, and 5; evaluating the influence of employment growth within primary, midlevel, and secondary labor markets on the probability of graduating high school, earning an Associate's degree, and earning a Bachelor's degree. In addition, the influence of job growth in individual occupations within each labor market tier is assessed. Results indicate employment growth plays a small yet significant role in respondents' education outcomes. Networks, however, play a much larger role.

Descriptive Statistics of Individual Outcomes

Table 4.1 details the summary statistics for variables used in logistic models. Overall, 95.5% of participants completed high school or earned a G.E.D., suggesting a sampling bias within the data. According to the most recent ACS 5-year estimate, 86.3% of the US population have earned a high school degree or its equivalent—nearly 10% less the than graduation rate of ELS respondents. Here, self-selection bias is the most likely cause of the skew. Respondents who participated in the ELS survey may value education more than the general public.

In regards to demographics, the sample is reflective of the general population in some aspects but differs in others. Males and females have roughly equal representation with 50% of each included in the sample. Asians constitute 9.7% of respondents, though in 2000 and

2005, roughly the timeframe when potential respondents were contacted, Asians accounted for just 3.5% and 4.3% of the population, respectively. Population figures for Blacks, Hispanics, and Native Americans (accounting for 12%, 13%, and 1% of the sample respectively) are moreorless in line with those from the 2000 census and 2005 ACS, plus or minus 1%. Parent's income also suggests a slight upward skew within the sample data, as the average US household income in 2000—just two years prior to the first wave of survey interviews—hovered around $55,000. The average income of respondents' parents is just above $69,000. As for parents' highest level of education, most had at least some college experience, but did not necessarily obtain a 2-year or 4-year degree (an average of 13.46 years of education).

As illustrated in table 4.1, the average number of respondents' friends who planned to attend community college after high school falls between "Some" and "Most." Comparatively, respondents reported that "Most" to "All" of their friends had plans to attend a 4-year college. It's difficult to ascertain how representative these figures are of the general populous circa 2004, the year most ELS participants would have graduated. According to the National Center for Higher Education Management Systems (NCHEMS)[23], 55.7% of graduates enrolled in college the following semester (in 2004). This would roughly correspond to "Most."

On average, respondents reported about two-thirds of persons with whom they have close ties encouraged them to enroll in college. Here again, the purpose of this measure is to gauge the degree to which respondents feel they are expected to pursue a college degree; the more encouraged they feel to continue their education beyond high school, the more likely they

[23] http://www.higheredinfo.org/dbrowser/?year=2004&level=nation&mode=map&state=0&submeasure=63

will actually graduate high school. The average of this index variable suggests that over half of respondents' close ties wanted them to continue their education. In comparison, very few respondents reported their close ties preferred them to get a job instead of pursuing a postsecondary degree. In fact, of the 12,670 respondents, less than 10% believed any of their ties wanted them to seek employment immediately after graduation. Corollary, and at the school level, an average of 44.5% of the previous year's graduating class enrolled at 4-year universities the following semester, and 11.33% entered the job market.

By and large, most respondents attended high school in metro counties with a population nearing 250,000, as suggested by an average rurality score of 2.95. Regarding primary market occupations, there was growth among all job types, from a low of 1.23% in architecture and engineering to a maximum of 36.39% in healthcare practitioner jobs. Compared to the descriptive statistics for the aggregate model (table 3.1), employment gains in the logistic model differ substantially, likely due to the smaller number of counties included in the model as well as repeated observations. For example, average employment gains in management and education, educational training, and library occupations were 9.46% and 9.71%, respectively, when all 3,142 counties are included. When the sample is reduced to 710—the number of counties corresponding to respondents' high school locations—employment gains increase to 18.14% and 19.74% respectively. In addition, the spread in employment growth by occupation is not as pronounced. This suggests that respondents' counties of origin may fundamentally differ from counties not included in the logistic model. Overall, job growth in primary labor markets averaged 22.2%.

From 2000 to 2014, there was 4.2% employment gain in mid-level market occupations, with a large degree of variation by job type. For example, employment in installation &

repair as well as office and administrative support positions decreased by 8.4% and 2.4%, respectively. At the other extreme, employment in healthcare technologies, protective services, and community & social services increased by an average of 41.7%, 28.2%, and 26.2%, respectively. There were modest expansions within art, design, & entertainment as well as sales occupations, each experiencing 11.6% and 6.3% growth.

Average county growth in the majority of secondary market occupations was substantial, with the only decline occurring in production. Positive growth in both healthcare support and personal care, coupled with employment gains in healthcare technologies and healthcare diagnoses suggest a general upward trend in demand for health-related occupations; a pattern most likely attributable to an aging baby-boom population, many of which are approaching retirement. Average employment growth in maintenance as well as food preparation and service jobs was considerably larger compared to growth in the majority of occupations in all three tiers. This suggests a continued increase in service based occupations.

Comparing average employment gains within each occupational tier, there was more growth within primary labor markets at 22.2%. Additionally, growth within each individual tier-1 occupation exceeds 15%, and three exceed 20%. This suggests an increasing demand for skilled workers among employers, which is hypothesized to have a positive impact on the likelihood of graduating high school, earning an Associate's degree, and earning a Bachelor's degree. Job growth within the mid-level market was substantially smaller at just 4.2% between 2000 and 2014. Growth within the secondary market was more than three times that of mid-market occupations at 13.8%.

Logistic Model Results

High School Graduation/G.E.D.

Table 4.2 highlights the odds of earning a high school degree or a G.E.D. based on assessed independent variables across three models. Model 1 details the influence of rurality and information access about college via network/homophily effects. Model 2 introduces employment growth within primary, midlevel, and secondary labor markets. The final model accounts for all three tiers, rurality, and network/homophily effects. Of note, the influence of control variables is not displayed in any of the models.

Indicated in model 1, networks/homophily have a significant impact on the probability of graduating high school. Respondents who reported their friends planned on attending college were more likely to graduate compared to their counterparts. Here, the magnitude and significance is dependent on the type of college respondents' friends want to attend. Participants were projected to be 10.2% more likely to graduate high school if some of their friends planned to attend a 2-year community college and 51.2% more likely if they planned to enroll at a 4-year university. Corollary, those who reported nearly all of their friends planned to attend a 2-year or 4-year college are projected to be 30.6% and 153.3% more likely to graduate.

Students believing their family, friends, peers, etc. wanted them to enroll in college were more likely to graduate high school. Respondents who reported that at least one close family member, peer, or school faculty member encouraged them to attend college were nearly 30%[24] more likely to graduate or earn a G.E.D. This suggests the average student would more than likely graduate, since participants reported receiving encouragement from about 3

[24] Percentages will no longer be referred to as projections, though it should still be assumed.

close ties. High school graduation was not effected by encouragement to enter the job market though. This is likely due to most occupations requiring potential employees to have at least earned a high school degree.

The percentage of the previous year's graduating class that enrolled in college or entered the job market had a positive effect on the likelihood of graduation. In both instances, respondents were 2.4% more likely to graduate for each percentage increase in the number of the previous year's cohort that went to a 4-year university. The location of respondents' high schools also influenced whether they graduated, with rural schools outperforming urban and suburban schools.

The constant for model 1 indicates that, on average, students have a fairly high likelihood of finishing high school—predicted to be about 80%. Regarding fit, two test statistics will be utilized to gauge whether the addition of labor market and occupation variables improve the base model. The BIC is used to determine if the inclusion of additional variables offers more explanatory power, controlling for the number of factors used. Ideally, the BIC value should decrease the more complex the model becomes, indicating a better fit. Tjur's-R^2 will be used in conjunction with the BIC, though it is not based on the percent reduction of the negative log likelihood. Instead, it is the difference between the predicted mean likelihood of an event occurring and the predicted mean likelihood of the event not occurring. In model 1, for example, the predicted mean likelihood of respondents graduating high school was 95.5% while the predicted mean of not graduating was 4.5%. The difference between the two values is 91%.[25] Whereas the BIC should ideally decrease with the addition of occupational variables, the Tjur's R^2 should increase, indicating the gap between the predicted mean of

[25] For a more in depth discussion of Tjur's R^2, see Tjur (2009).

graduating, earning a Associate's etc. and the predicted mean of not graduating, etc. has widened.

In model 2, the influence of employment growth within primary, midlevel, and secondary labor markets are added to the model. Whereas the influence of job growth in individual occupations may be too small to measure, collapsing occupations into their respective tiers may illuminate labor market influences on high school graduation that are otherwise invisible. Results indicate that employment gains within primary labor markets are a significant predictor of finishing high school/earning a G.E.D. Here, a 1% increase in employment is predicted to generate a 2.37% increase in the likelihood of graduating. Attending high school in counties where primary market job growth was extreme would heavily influence respondents' educational outcomes. If primary market employment were to increase by 10%, respondents are predicted to be 23.7% more likely to graduate; at 25% it increases to 59.3%, and so on. In short, employment growth in high-skill, high-wage occupations begets an increased likelihood of finishing high school, thus it may function as an incentive for students to invest in their education. Regarding model fit though, the Tjur's R^2 (still .911), BIC (increased from 3253.03 to 3276.62), and network/homophily factors are virtually unchanged compared to model 1. This suggests the inclusion of job growth by occupational tier does not add any additional explanatory power to the base model, despite the significance of growth within primary markets.

Model 3 parses out occupations within each labor market tier which were found to significantly affect local human capital growth. As with models 1 and 2, respondents who attended high school in rural and suburban counties were more likely graduate, all other factors being equal. Additionally, the predicted magnitude of effect was roughly the same as

in previous models, or about a 12.8% increased/decreased chance of graduating per unit change. Among primary market occupations, employment growth within management and business & finance are illustrated to increase the odds of obtaining a degree. Regarding management, the impact is substantial, predicted to increase the likelihood of graduation by 1.9% for every 1% increase in employment. This suggests the availability of jobs within management may incentivize students to finish high school as they may not be considered for these positions otherwise. On the other hand, it may reflect resources made available to local schools. Given management occupations are classified as high-wage, an increase in the number of persons employed in these positions would likely constitute an increase in local school revenues via property taxes. Though job development in business & finance does not seem as influential given its slope effect, the influence is still noteworthy, projected to increase the odds of graduation by an average of .553% per percent employment growth. In addition, the standard error for growth in management indicates its effect size could be markedly lower than what is reported in model 3.

Regarding midlevel and secondary market occupations, none of the former are significantly influential. Among secondary market occupations, employment growth in food preparation & service negatively impact on graduation; predicted to decrease the likelihood by .621% per 1% increase in employment. Here, this may indicate respondents are less motivated to finish high school if local job opportunities do not require it. As with management, however, it could also reflect local school funding—food service occupations are low-wage, hence funds available to local schools would likely decrease within counties where development of the food and service industry was rapid and extreme.

As for model fit, the Tjur's R^2 remains unchanged when all occupational factors are incorporated into the model. Additionally, the BIC increases from 3253.03 in the base model to 3366.29 in the full model. This suggests that county-level predictors did not add any additional explanatory power to the networks/homophily model despite the influence of employment gains in primary labor markets, management occupations, and the food and service industry. As with models 1 and 2, network/homophily factors are virtually unchanged.

Summary: Networks/Homophily, Employment Growth, and High School Graduation

Table 4.3 summarizes influential factors of high school graduation as well as a few non-significant factors for added context. Broken up into four sections, the table converts odds ratios to percentages and details how a unit change in "x" affects "y". The unit of change is unique in each section, thus each has its own designated heading. Here, the purpose is to better compare and contrast the roles of social networks/homophily and job growth on earning a high school degree/G.E.D.

Overall, networks/homophily are more influential on respondents' educational outcomes compared to local job growth. Regarding "Networks & Homophily 1," students who reported at least a few of their friends had college aspirations were more likely to finish high school. If most of their friends planned to attend college, the likelihood of graduation was amplified. It is important to note, however, the extreme range associated with each network factor. For example, if a few friends planned to attend community college, respondents are projected to be 2.2% - 18.4% more likely to finish high school. If most of their friends planned to attend community college the range increases to 6.6% - 55.2%. Another way of interpreting this is having connections to people with minor college ambition may influence

one's education a little or a lot. What can be said with more certainty is the difference of influence between having friends who want to go to community college vs. having friends who want to go to a 4-year college is substantial. Having just a few Bachelor's-seeking friends is projected to increase the likelihood of graduation by 41.1% - 63.4%.

The expectations of others also exert a substantial influence as to whether respondents finished high school or earned a G.E.D. Having at least one contact who harbors college aspirations for the respondent is projected to increase their odds of graduating by 24.2% - 35.5%. The strongest network/homophily predictors, however, were the actions of the previous graduating cohort. For example, if students were enrolled at an institute in which 25% of the previous cohort attended a 4-year college; they were 50.0% - 72.5% more likely to graduate. If 25% of the previous cohort entered the job market, respondents were 42.5% - 87.5% more likely to graduate.

Job growth within counties can substantially impact the odds of finishing high school. As with a few networks/homophily effects, however, there is some uncertainty as to just how impactful it actually is. For example, employment growth within management was predicted to have a positive influence on the odds of high school graduation. From table 4.3, the projected likelihood of graduating increases by .39% - 4.9% for each 1% increase in employment. Of the 710 counties included in this analysis, the volume of persons employed in management increased by 100% or more in 4 of them. So, in those four counties the likelihood of finishing high school is projected to have increased by at least 39.0% - 490.0%. Similarly, employment growth within primary markets is projected to increase the likelihood of high school graduation by .33% - 7.52% per 1% increase. Within the same four counties, growth in primary market employment also exceeded 100%, equating to an increased

likelihood of 33.0% - 752.0%. Collectively, this indicates very few counties experienced extreme growth in the number of management and/or primary market positions, and among those that did, the impact could have ranged from extreme to minimal. As such, all that can be said is that perceived job opportunities within management and/or primary market occupations potentially incentivizes students to finish high school.

Associate's Degree

Table 4.4 details the log-odds results of obtaining an Associate's degree based on employment growth within county labor markets and network/homophily effects. Several network/homophily measures significantly influence the odds of earning a junior college degree. First, respondents were more likely to earn an Associate's if at least some of their friends planned to attend a 2-year college after high school and less likely if they planned to attend a 4-year college. Regarding the former, students were predicted to be 26.1% more likely to obtain a degree if at least some their friends planned to attend community college. If all of their friends planned to enroll, this figure increases to 78.3%. As for the latter, respondents were 12.1% less likely to earn a 2-year degree if some of their friends planned to attend a 4-year university and 36.3% less likely if all of them planned to enroll.

Whether respondents believed they were expected to go to college and/or enter the labor market after high school is also illustrated to affect their educational outcomes. Those who felt their parents, friends, peers, etc. wanted them to go to college were more likely to continue their education and earn an Associate's. Those who felt expected to enter the job market were less likely to earn a degree, though it is unclear whether this means they were also less likely to pursue a postsecondary degree, and/or more likely to get a job immediately after high school.

Respondents who felt that at least one of their close ties (mother, father, other relative, friend, school counselor, etc.) wanted them to enroll in college were projected to be 5.8% more likely to do so, eventually earning a degree. If all measured ties encouraged them to continue, the predicted odds increased to 34%. Comparatively, believing friends and relatives prefer labor market entry to college enrollment is a stronger incentive; on average, respondents were projected to be 15.3% less likely to earn a 2-year degree for each tie they believed would prefer it if they [respondents] would get a job after graduation. If respondents believed this of all measured ties, it is projected to decrease the odds by 91.8%.

From model 2, employment growth in primary and secondary labor markets significantly impact the likelihood of earning an Associate's. Regarding primary labor markets, job growth positively influences on education outcomes predicted to increase the odds of earning a degree by about 1.5% for each 1% increase in employment. Growth within secondary markets has the opposite effect, reducing the likelihood of degree obtainment by about .56% per 1% gain in employment. Mid-level market occupations do not influence degree attainment. Taken together, this supports the assumption that access to higher paying and higher skilled jobs increases the likelihood of local residents investing in their education. Likewise, respondents are less likely to pursue education beyond high school if it is not requirement for local employment.

Regarding fit, a slightly larger BIC statistic for model 2 indicates the addition of labor market effects to network/homophily factors does not add additional explanatory power to the model despite the significant influence of primary and secondary market growth. In addition, the Tjur's R^2 remains static at .87. This suggests that while occupational

opportunities may incentivize respondents to pursue a 2-year degree, the educational preferences of persons within their networks is more influential.

In the full model, employment growth in four occupations significantly impacts respondents' educational outcomes. Within the primary market, growth in the healthcare industry increases the likelihood of earning an Associate's; suggesting local development within the medical field may incentivize students to pursue a postsecondary education. Within local midlevel labor markets, job creation within art, design, and entertainment is negatively influential, predicted to reduce the likelihood of degree attainment by an average of .28% per 1% of employment growth. This suggests students are less likely to consider a career in the entertainment industry when deciding whether they should enroll in college. Further, this likely indicates students believe a high school education is sufficient enough for most entertainment-related occupations.

Among secondary market occupations, an increased availability of production and farming jobs reduces the likelihood of earning an Associate. Employment growth within production, for example, is predicted to decrease the odds by an average of about .4% per 1% increase in persons employed within the industry. Further development of the farming industry decreases the odds by about .133% per percent growth. Taken together, this suggests job development within local secondary labor markets does not incentivize students to pursue a postsecondary education. Instead, it suggests students are more likely to enter the labor market after high school graduation as local job opportunities do not require additional schooling.

As for fit, the full model does not increase Tjur's R^2 yet the associated BIC increases by nearly 80 compared to the base model. As such, the inclusion of occupational variables does

not sufficiently add to the explanatory power of model 1 despite providing additional information as to the influence of local labor markets on individuals' decisions about their human capital investments.

Summary: Networks/Homophily, Employment Growth, and Earing an Associate's Degree

Table 4.5 summarizes factors which influence the likelihood of earning an Associate's degree. In addition, as a few non-significant factors are added for context. Overall, networks/homophily factors are more influence on respondents' educational outcomes compared to local job growth. Regarding "Networks & Homophily 1", students who reported that at least a few of their friends planned to attend community college are projected to be 18.9% - 33.4% more likely to earn an Associate's degree. If their friends planned to attend a 4-year college, however, respondents were 6.6% - 17.2% less likely to earn a 2-year degree. At this juncture we cannot say if this is because respondents are more likely to earn Bachelor's if their friends attend 4-year schools. We can only surmise that being surrounded by Bachelor's-degree-seeking friends decreases the probability of earning an Associate's.

Additionally, students' decisions on their own human capital investment is shaped and molded by to the desires and expectations of family, friends, peers, etc. For example, the likelihood of students continuing their education beyond high school is projected to increase by 1.7% - 9.7% for every person within their network who wanted them to go to college. Further, respondents were 4.4% - 25.1% less likely to earn a degree for each network tie that preferred they enter the labor market after graduation. The actions of the previous graduating cohort is also influential, slightly decreasing the odds of earning an Associate's if they enrolled at a 4-year institution in mass.

As with several occupations mentioned thus far, the projected range of influence of job growth is fairly broad. For example, employment gains within healthcare is predicted to increase degree attainment by .05% - 1.07% per 1% growth. If the number of employed persons were to double, the range would increase to 4.6% - 107.0%. As such, it is difficult to pin down how attractive local careers in medicine are to potential college students. Likewise, it is hard to say anything concrete as to the size of the impact of growth within the entertainment, manufacturing, and farming industries—only that the impact is indeed negative.

Similar to growth within individual occupations, the predicted range of impact associated with job development within primary and secondary labor markets is rather large. Within primary markets, the degree of influence ranges from .27% - 4.2% for each 1% of employment growth. In counties where primary market employment has doubled, the range increases to 26.8% - 416.0%. As for secondary market growth, each doubling is projected to reduce the odds of degree obtainment by 18.7% - 76.5%. Collectively, this suggests that while the local availability of high-wage and low-wage occupations significantly impacts students' human capital investment decisions, the magnitude of influence ranges from "a little" to "a lot."

Bachelor's Degree

Table 4.6 highlights the influence of networks/homophily, high school location, and job growth on the likelihood of earning a Bachelor's degree. In the base model, all network/homophily variables are illustrated to significantly impact the odds of earning a Bachelor's degree. For example, respondents were less likely to earn a 4-year degree if their friends planned to enroll at a junior college after high school, yet more likely if their friends

planned to attend a 4-year university. Here, the difference in projected influence is substantial, suggesting that network ties to Bachelor's-seeking friends many outweigh the negative influence of ties to Associate's seekers. On average, respondents were projected to be 39.5% more likely to earn a Bachelor's if a few of their friends (compared to none of them) planned to enroll at a 4-year university. Ties to a few Associate-seeking friends is projected to decrease 4-year degree attainment by about 12%. Despite the negative association, the relative influence of friends attending a 4-year university is more influential. If respondents had an equal number of friends planning to enroll in community college *and* a 4-year university, they themselves were more likely to earn a Bachelor's degree.

The desires of respondents' parents, other family members, friends, peers, etc. has a strong impact on earning a 4-year degree. For example, the projected likelihood of students continuing their education beyond high school increased by 14.5% for each person wanting the respondent to go to college. Further, projected degree attainment is reduced by 31.1% for each tie who preferred they enter the labor market. Similarly, an increase in volume of the previous graduating cohort who enrolled in a 4-year college was positively associated with earning a degree while entering the job market or military was inversely related. Collectively, this highlights the importance of social networks/homophily in respondents' decisions regarding their own human capital development.

From model 2, job growth in midlevel labor market occupations is negatively associated with Bachelor's degree attainment. Here, the odds of graduating college are projected to be reduced by roughly .5% for each 1% of employment growth within medium-wage occupations. Oddly though, job growth in the primary markets does not influence college completion, yet from table 4.4 and 4-5, both affect the likelihood of earning an Associate's.

This suggests respondents are able to find jobs within the primary market despite not having a 4-year degree and/or many jobs within the primary market do not require a BA. As such, respondents invest as much as necessary in their own human capital to earn a 2-year degree.

Further, job growth within secondary markets marginally influences 4-year degree attainment—a finding that seems somewhat counterintuitive. Here, a local overabundance of low-wage jobs may incentive students to finish college and seek employment outside of the region. Additionally, it may reflect services typically used in college town by current students, i.e., fast food, recreational activities, etc. As the demand for student-oriented services increases, so too does the volume of persons required to provide these services. Regarding fit, the addition of employment growth within local labor markets increases the BIC statistic by 20, indicating the inclusion of network/homophily factors along with control variables is more parsimonious.

From model 3, job growth in the farming industry is positively associated with earning a Bachelor's degree while employment gains in the remaining jobs are non-influential. Similar to model 2, this may indicate a lack of local high-wage job opportunities is a catalyst for human capital investment as a means of leaving the area. Also noteworthy is that job growth within any individual medium-wage occupation does not affect degree attainment, despite the negative association between midlevel markets and college completion. This may indicate employment options within individual occupations does not matter as much as options within aggregated labor markets. Regarding fit, the increase in the BIC from model 1 and the unchanging Tjur's R^2 value further indicates the inclusion of individual market occupations does not improve upon the networks/homophily model.

Summary: Networks/Homophily, Employment Growth, and Earning a Bachelor's Degree

Table 4.7 summarizes factors that influence the likelihood of earning a Bachelor's degree. As with previous summary tables, factors are broken up into four sections with a unique unit of change in each section. Again, networks/homophily prove more influential on respondents' educational outcomes compared to local job growth. First, the type of college students' friends aspire to attend significantly effects the likelihood of earning a Bachelor's degree. If they planned to attend a 2-year college, respondents were less likely to earn a 4-year degree. On the other hand, if they planned to attend a 4-year college, respondents were more likely to earn a 4-year degree. Coupled with an increased probability of earning an Associate's if friends planned to attend community college (tables 4-4 and 4-5), we can now assert respondents tend to pursue the same type of degree (2-year, 4-year, professional, etc.) as their friends, be it a product of peer influence or the tendency to associate with persons similar to themselves.

Again, the desires and expectations of others seemed to impact students' decisions in relation to their own human capital development. For example, the likelihood of respondents continuing their education beyond high school is projected to increase by 11.7% - 17.6% for every person within their networks who wanted them to go to college. Further, respondents were .2% - .3% less likely to earn a degree for each network tie that preferred they enter the labor market after high school graduation. The human-capital related decisions of the previous cohort impacted respondents' decision making in a similar fashion. As the proportion of graduates who enrolled in a 4-year college increased, so too did the likelihood of earning a Bachelor's degree. As the proportion of graduates entering the labor market increased, the probability that respondents would earn a Bachelor's decreased.

As with high school completion and Associate degree attainment, job growth is not as influential on respondents' education outcomes. Here again, the projected ranges of influence are substantial. For example, development within the farming industry is projected to increase the odds of earning a Bachelor's degree by .01% - .2% for each percent of employment growth. If farming employment were to double, the projected increase in odds ranges between 1% and 20%. The impact of job availability within local secondary labor markets can range from a .01% - 1.2% increased likelihood at 1% growth to a 1.0% - 120.0% at 100% growth. In short, while employment growth within midlevel and secondary markets is influential, the magnitude of effect can range from miniscule to large. Perhaps the most counter-intuitive finding however is that job growth within local primary markets did not influence Bachelor's degree attainment. This suggests those who finished college did not consider employment in local, high-wage occupations as a reason to pursue their degree. Further, growth in mid-level occupations negatively impacted the likelihood of earning a 4-year degree. This may be due to the fact that the majority of mid-level occupations do not require a Bachelor's as a prerequisite to employment, thus job growth in these industries decreases the likelihood of finishing college.

Discussion/Conclusion

Table 4.8 summarizes factors found to influence the likelihood of finishing high school, earning an Associate's degree, and earning a Bachelor's degree. Overall, county-level employment growth in just a handful of occupations influenced respondents' educational outcomes, and the occupations which proved influential varied by degree. Among high school graduates, growth in a single primary market occupations significantly influences the odds of earning a degree or a GED. Specifically, growth in management occupations

significantly influenced the probability of graduation, though; A) growth must be substantial to have a sizeable effect; and B) the projected impact can range from minute to substantial, thus it is difficult to say anything concrete about the availability of management-oriented occupations as an incentive to graduate high school. When primary market occupations are aggregated together however, the association is positive thus lending partial support to hypothesis 3; employment growth in primary market occupations will have a positive impact on degree attainment. Again, however, it is important to note the projected range of influence is broad. Growth in mid-market occupations proved non-influential whereas job growth in a single secondary market occupation—food preparation and service—was negatively associated with graduation. Here again though, the effect size was small, equating to a .13% - .84% decline in the odds of graduation per 1.0% employment growth. This, coupled with the fact that the aggregate effect of secondary market occupations was not influential—it is difficult to say anything concrete about the relation between low-skill, low-pay jobs and high school graduation.

Job growth in primary market occupations was also shown to affect the likelihood of earning an Associate's degree. Specifically, job growth in management and healthcare improve the likelihood of earning 2-year degree, the former considerably more so than the latter. In addition, the aggregate influence substantially improves the odds, projected to increase them by as much as 5.2% per percentage of employment growth. From this we can inferred that local job growth within primary markets incentivizes students to finish high school as well as pursue additional education. Strangely though, local growth with primary markets did not affect the likelihood of earning a Bachelor's degree. This may suggest those pursuing a 4-year degree look beyond local markets for job prospects, hence local economic

conditions do not factor into their decision to attend college. Respondents have likely considered a plethora of potentially job opportunities before attending a 4-year university.

Job growth within mid-market occupations is not as influential on educational outcomes when considered as an aggregate whole. In fact, growth within individual mid-market industries did not influence the likelihood of finishing high school or earning a Bachelor's degree, though growth in the entertainment industry reduced the odds of earning an Associate's. As an aggregate labor market, however, it is projected to reduce influence the probability of earning a Bachelor's by as much as .63% per percent of employment growth. In addition, job growth in the arts and entertainment industry is negatively associated with earning a 2-year degree, though does not affect the likelihood of graduating high school or earning a Bachelor's.

Regarding secondary market occupations, growth within food service and farming industries are illustrated to influence the educational outcomes of respondents, thus here too, the type of jobs locally available may affect peoples' decisions on their own human capital investments. Job growth within the food preparation industry—an industry dominated by fast food jobs which do not require employees to have a high school degree—decreased the likelihood of graduating high school, but was not associated with earning a college degree. Growth in the farming industry negatively impacts the odds of earning a 2-year degree, yet *increases* the odds of earning a Bachelor's. When aggregated, employment growth within secondary labor markets are illustrated to negatively affect the odds of earning an Associate's degree yet positively affect the likelihood of earning a Bachelor's.

Perhaps the most illuminating, though unsurprising aspect of this study is the strong association between network/homophily factors and degree attainment. By and large,

networks not only have a great deal of influence on educational outcomes—thus decisions regarding human capital—they also exert a stronger impact compared to local labor market conditions. For example, respondents who reported having friends with college aspirations were more likely to graduate high school and earn an Associate's or Bachelor's degree, depending on the type of college they wanted to attend. Having friends who wanted to attend a 2-year college increased the likelihood of earning an Associate's but had a negative effect on earning a Bachelor's. Likewise, having friends who wanted to attend a 4-year college increased the odds of earning a Bachelor's but was negatively associated with earning a 2-year degree. Additionally, students who felt as though their parents, relatives, friends, teachers, etc. expected them to enroll in college were more likely to finish high school as well as earn a college degree. If they felt as though they were supposed to get a job after high school, they were less likely to earn an Associate's or Bachelor's. Even the post-high school graduation plans of the previous senior cohort influenced whether respondents themselves graduated high school and/or earned a 4-year degree.

Hypotheses Revisited

Support for hypotheses three, four, and five has been mixed. Regarding hypothesis 3 (*Employment growth within primary market occupations will increase the probability of graduating high school, earning an Associate's degree, and/or earning a Bachelor's degree*), job growth within primary market occupations was positively associated with graduating high school and earning a 2-year degree, but had no effect on earning a 4-year degree. When disaggregated, job growth in management occupations had a positive effect on finishing high school and earning an Associate's degree. Growth in the healthcare industry increased the odds of earning an Associate's but had no effect on high school or college graduation. Overall, results offer partial support to hypothesis 3.

Hypothesis 4, *Employment growth in primary job markets will induce a higher likelihood of earning an Associate's degree and earning a Bachelor's degree compared to job growth in the mid-level and secondary job markets,* is partially supported. First, employment growth in midlevel job markets had a negative impact on the odds of earning a Bachelor's degree, yet primary market growth affected the odds of earning an Associate's but not a Bachelor's. Oddly though, growth in secondary markets was positively associated with earning a 4-year degree. Here again, this may suggest local labor markets are not a consideration for those who decide to pursue a college degree. They may in fact, "casting a wider net" so to speak, i.e., take regional, state, and national markets into account. Further, employment growth within secondary labor markets may reflect services solicited by students in college towns.

Hypothesis 5, *Social Networks/Homophily will positively impact students' education outcomes;* is also confirmed, and it should be noted that the influential difference between job growth and network/homophily factors is quite large, and in favor of the latter. In addition to the large cleavage in magnitude, the Tjur's R^2 statistic remained static between all models of high school graduation, earning an Associate's degree and earning a Bachelor's degree. In conjunction with the ever-increasing BIC value between models; one can conclude that while local job growth within high-pay, high-skill occupations plays a role in respondents' education outcomes, it takes a back seat to the company they keep.

Table 4.1. Summary Statistics of Individual Model

Variables	mean	std. dev.	N
HS	0.955	0.206	12,670
Associate's	0.065	0.246	12,670
Bachelor's	0.302	0.459	12,670
Female	0.503	0.5	12,670
Asian	0.097	0.296	12,670
Black	0.123	0.328	12,670
Hispanic	0.133	0.339	12,670
Native	0.008	0.087	12,670
Two or more	0.065	0.617	12,670
Parent's Income	69028.5	2.36	12,670
Parent's Highest Level of Education	13.46	5.73	12,670
Number of Friends planning to attend a 2-year college	2.42	1.05	12,670
Number of Friends planning to attend a 4-year college	3.37	1.16	12,670
Expected to go to college	3.89	2.07	12,670
Expected to get a job	0.15	0.58	12,670
% of previous cohort who went to a 4-year school	0.445	0.306	750
% of previous cohort who entered the job market after high school	0.113	0.433	750
Rurality	2.95	2.16	710
Legal Occupations	0.187	0.372	710
Healthcare Practitioners	0.364	0.305	710
Life, Physical, and Social Sciences	0.080	0.400	710
Computers & Mathematics	0.316	0.551	710
Architecture & Engineering	0.012	0.286	710
Management	0.181	0.212	710
Business & Finance	0.220	0.270	710
Education, Training, & Libraries	0.197	0.222	710
Primary Market Occupations	***0.222***	***0.189***	***710***
Community & Social Services	0.262	0.344	710
Arts & Design, Entertainment	0.116	0.345	710
Healthcare Technologists	0.417	0.365	710
Protective Services	0.282	0.351	710
Sales	0.063	0.180	710

Office/Admin Support	-0.024	0.164	710
Installation & Repair	-0.084	0.192	710
Mid-Level Market Occupations	***0.042***	***0.159***	***710***
Healthcare Support	0.430	0.350	710
Production	-0.190	0.174	710
Transportation	0.116	0.218	710
Personal Care	0.466	0.344	710
Construction/Extraction	0.013	0.239	710
Food Preparation & Service	0.319	0.286	710
Maintenance Occupations	0.345	0.278	710
Farming	0.167	0.502	710
Secondary Market Occupations	***0.138***	***0.187***	***710***

Table 4.2. The Influence of Networks/Homophily and Labor Market Growth on earning a High School Degree

Variables	Model 1		Model 2		Model 3	
	B	Std. Error	B	Std. Error	B	Std. Error
Number of Friends planning to attend a 2-year college	1.103*	0.049	1.106*	0.049	1.100*	0.049
Number of Friends planning to attend a 4-year college	1.512***	0.067	1.513***	0.067	1.519***	0.068
Expected to go to college after high school	1.296***	0.034	1.297***	0.034	1.296***	0.034
Expected to get a job	1.080	0.073	1.083	0.072	1.080	0.073
% of previous cohort who went to a 4-year college	1.024***	0.003	1.024***	0.003	1.024***	0.003
% of previous cohort who entered the job market after high school	1.024***	0.005	1.024***	0.005	1.024***	0.006
Rurality	1.122**	0.040	1.149***	0.045	1.128**	0.047
Primary Occupations (Tier-1)			3.366*	1.900		
Mid-Market Occupations (Tier-2)			0.376	0.267		
Secondary Occupations (Tier-3)			1.009	0.542		
Life, Physical, and Social Sciences					1.170	0.131
Architecture & Engineering					0.858	0.174
Management					2.924*	1.311
Education, Training, & Libraries					0.876	0.323
Protective Services					0.939	0.242

Sales					0.706	0.445
Office/Admin Support					0.621	0.335
Installation & Repair					1.404	0.548
Healthcare Support					1.004	0.276
Transportation					1.267	0.634
Personal Care					1.497	0.433
Food Preparation & Service					0.379*	0.160
Maintenance Occupations					1.024	0.365
Farming					1.119	0.143
Constant	4.177	.610	0.186	.036	.229	.056
BIC	*3253.03*		*3276.62*		*3366.29*	
Tjur's R^2	*.91*		*.91*		*.91*	

Table 4.3. Summary of Factors Influencing High School Degree/G.E.D. Attainment, 90% Confidence Intervals

Networks & Homophily 1	**Avg.**	**A few Friends (1)**		**Some Friends (2)**		**Most Friends (3)**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Number of Friends planning to attend a 2-year college	2.42	0.80%	20.00%	1.60%	40.00%	2.40%	60.00%
Number of Friends planning to attend a 4-year college	3.37	39.20%	65.80%	78.40%	131.60%	117.60%	197.40%
Networks & Homophily 2	**Avg.**	**1 network tie**		**3 network ties**		**6 network ties**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Expected to go to college after high school	3.89	23.10%	36.50%	69.30%	109.50%	138.60%	219.00%
Expected to get a job	0.15	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Networks & Homophily 3	**Avg.**	**25%**		**50%**		**75%**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
% of previous cohort who went to a 4-year college	44.50%	47.50%	75.00%	95.00%	150.00%	142.50%	225.00%
% of previous cohort who entered the job market after high school	11.33%	37.50%	92.50%	75.00%	185.00%	112.50%	277.50%
Occupations	**Avg.**	**per 1% Increase**		**per 10% Increase**		**per 100% Increase**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Management	18.10%	0.21%	6.04%	2.10%	60.40%	21.00%	604.00%
Food Preparation & Service	31.90%	-0.84%	-0.13%	-8.40%	-1.30%	-84.00%	-13.00%
Primary Market Occupations	***22.20%***	***0.11%***	***9.20%***	***1.10%***	***92.00%***	***11.00%***	***920.00%***
Mid-level Market Occupations	***4.20%***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	n.s.

Secondary Market Occupations	***13.80%***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	n.s.

Table 4.4. The Influence of Networks/Homophily and Labor Market Growth on earning an Associate's Degree

Variables	Model 1		Model 2		Model 3	
	B	Std. Error	B	Std. Error	B	Std. Error
Number of Friends planning to attend a 2-year college	1.261***	0.046	1.261***	0.045	1.261***	0.045
Number of Friends planning to attend a 4-year college	0.879**	0.033	0.880***	0.032	0.880***	0.032
Expected to go to college after high school	1.055*	0.024	1.058*	0.024	1.055*	0.024
Expected to get a job	0.845*	0.063	0.847*	0.063	0.841*	0.063
% of previous cohort who went to a 4-year college	0.998~	0.002	0.998~	0.002	0.997~	0.002
% of previous cohort who entered the job market after high school	1.000	0.002	1.000	0.002	1.000	0.002
Rurality	1.038	0.022	1.030	0.023	1.023	0.025
Primary Occupations (Tier-1)			2.560*	1.091		
Mid-Market Occupations (Tier-2)			0.503	0.236		
Secondary Occupations (Tier-3)			0.438*	0.165		
Healthcare Practitioners					1.472~	0.306
Management					1.177	0.346
Education, Training, & Libraries					1.441	0.414
Community & Social Services					0.971	0.137
Arts & Design, Entertainment					0.714**	0.080
Healthcare Technologists					0.903	0.143
Sales					0.751	0.268
Office/Admin Support					0.771	0.282
Production					0.601*	0.145
Transportation					1.071	0.313
Farming					0.867~	0.069
Constant	0.058	.009	0.053	0.010	.047	0.010
BIC	*6082.21*		*6097.58*		*6160.09*	
Tjur's R^2	*.871*		*.871*		*.871*	

Table 4.5. Summary of Factors Influencing Associate's Degree Attainment, 90% Confidence Intervals

Networks & Homophily 1	**Avg.**	**A few Friends (1)**		**Some Friends (2)**		**Most Friends (3)**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Number of Friends planning to attend a 2-year college	2.42	18.90%	33.40%	37.80%	66.80%	56.70%	100.20%
Number of Friends planning to attend a 4-year college	3.37	-17.20%	-6.60%	-34.40%	-13.20%	-51.60%	-19.80%
Networks & Homophily 2	**Avg.**	**1 network tie**		**3 network ties**		**6 network ties**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Expected to go to college after high school	3.89	1.67%	9.40%	5.01%	28.20%	10.02%	56.40%
Expected to get a job	0.15	-25.70%	-2.70%	-77.10%	-8.10%	-154.20%	-16.20%
Networks & Homophily 3	**Avg.**	**25%**		**50%**		**75%**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
% of previous cohort who went to a 4-year college	*44.50%*	*-0.15%*	*-0.01%*	*-0.30%*	*-0.01%*	*-0.45%*	*-0.02%*
% of previous cohort who entered the job market after high school	11.33%	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Occupations	**Avg.**	**per 1% Increase**		**per 10% Increase**		**per 100% Increase**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Healthcare Practitioners	--	*0.04%*	*1.07%*	*0.40%*	*10.70%*	*4.00%*	*107.00%*
Arts & Design, Entertainment	--	-0.33%	-0.11%	-3.30%	-1.10%	-33.00%	-11.00%
Production	--	-0.84%	-0.13%	-8.40%	-1.30%	-84.00%	-13.00%
Farming	--	-0.24%	-0.01%	-2.40%	-0.10%	-24.00%	-1.00%
Primary Market Occupations	**--**	***0.28%***	***5.20%***	***2.80%***	***52.00%***	***28.00%***	***520.00%***
Mid-level Market Occupations	**--**	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	n.s.
Secondary Market Occupations	**--**	***-0.74%***	***-0.18%***	***-7.40%***	***-1.82%***	***-74.00%***	***-18.20%***

Table 4.6. The Influence of Networks/Homophily and Labor Market Growth on earning a Bachelor's Degree

Variables	Model 1		Model 2		Model 3	
	B	Std. Error	B	Std. Error	B	Std. Error
Number of Friends planning to attend a 2-year college	0.882***	0.019	0.878***	0.019	0.881***	0.019
Number of Friends planning to attend a 4-year college	1.395***	0.031	1.395***	0.031	1.397***	0.031
Expected to go to college after high school	1.145***	0.015	1.146***	0.015	1.146***	0.015
Expected to get a job	0.689***	0.053	0.690***	0.052	0.690***	0.052
% of previous cohort who went to a 4-year college	1.005***	0.001	1.004***	0.001	1.004***	0.001
% of previous cohort who entered the job market after high school	0.996*	0.002	0.997*	0.002	0.996*	0.002
Rurality	0.970*	0.013	0.982	0.014	0.986	0.015
Primary Occupations (Tier-1)			1.448	0.403		
Mid-Market Occupations (Tier-2)			0.506*	0.163		
Secondary Occupations (Tier-3)			1.494~	0.342		
Healthcare Practitioners					1.002	0.144
Computers & Mathematics					0.941	0.056
Architecture & Engineering					1.100	0.109
Management					0.966	0.209
Business & Finance					0.992	0.150
Education, Training, & Libraries					1.054	0.202
Community & Social Services					1.001	0.094
Arts & Design, Entertainment					1.067	0.081
Healthcare Technologists					0.942	0.092
Sales					1.133	0.301
Office/Admin Support					0.853	0.227
Production					0.898	0.129
Personal Care					1.130	0.138
Construction/Extraction					0.926	0.110
Farming					1.103~	0.057
BIC	*13658.27*		*13679.99*		*13723.73*	
R^2	*.39*		*.39*		*.39*	

Table 4.7. Summary of Factors Influencing Bachelor's Degree Attainment, 90% Confidence Intervals

Networks & Homophily 1	**Avg.**	**A few Friends (1)**		**Some Friends (2)**		**Most Friends (3)**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Number of Friends planning to attend a 2-year college	2.42	-0.16%	-0.08%	-0.31%	-0.16%	-0.47%	-0.25%
Number of Friends planning to attend a 4-year college	3.37	33.70%	45.90%	67.40%	91.80%	101.10%	137.70%
Networks & Homophily 2	**Avg.**	**1 network tie**		**3 network ties**		**6 network ties**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Expected to go to college after high school	3.89	11.70%	17.60%	35.10%	52.80%	70.20%	105.60%
Expected to get a job	0.15	-0.31%	-0.20%	-0.92%	-0.60%	-1.83%	-1.19%
Networks & Homophily 3	**Avg.**	**25%**		**50%**		**75%**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
% of previous cohort who went to a 4-year college	44.50%	0.50%	1.50%	1.00%	3.00%	1.50%	4.50%
% of previous cohort who entered the job market after high school	11.33%	-0.01%	-0.0010%	-0.01%	-0.0020%	-0.02%	-0.0030%
Occupations	**Avg.**	**Change per 1% Increase**		**Change per 10% Increase**		**Change per 100% Increase**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Farming		*0.01%*	*0.20%*	*0.10%*	*2.00%*	*1.00%*	*20.00%*
Primary Market Occupations	**--**	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	n.s.
Mid-level Market Occupations	**--**	***-0.63%***	***-0.05%***	***-6.31%***	***-0.49%***	***-63.10%***	**-4.90%**
Secondary Market Occupations	**--**	***0.01%***	***1.20%***	***0.10%***	***12.00%***	***1.00%***	***120.00%***

Table 4.8. Summary of Factors Influencing Degree Attainment, 90% Confidence Intervals

		High School		Associate's Degree		Bachelor'	
Networks & Homophily 1	**Avg.**	**A few Friends**		**A few Friends (1)**		**A few Friends**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Number of Friends planning to attend a 2-year college	2.42	0.80%	20.00%	18.90%	33.40%	-0.16%	-0.08%
Number of Friends planning to attend a 4-year college	3.37	39.20%	65.80%	-17.20%	-6.60%	33.70%	45.90%
Networks & Homophily 2	**Avg.**	**1 network tie**		**1 network tie**		**1 network tie**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Expected to go to college after high school	3.89	23.10%	36.50%	1.67%	9.40%	11.70%	17.60%
Expected to get a job	0.15	n.s.	n.s.	-25.70%	-2.70%	-0.31%	-0.20%
Networks & Homophily 3	**Avg.**	**25%**		**25%**		**25%**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
% of previous cohort who went to a 4-year college	44.50%	47.50%	75.00%	*-0.15%*	*-0.01%*	0.50%	1.50%
% of previous cohort who entered the job market after high school	11.33%	37.50%	92.50%	n.s.	n.s.	-0.01%	-0.0010%
Occupations	**Avg.**	**per 1% Increase**		**per 1% Increase**		**per 1% Increase**	
		Lower	*Upper*	*Lower*	*Upper*	*Lower*	*Upper*
Management	18.1%	0.21%	6.04%	n.s.	n.s.	n.s.	n.s.
Healthcare Practitioners	36.4%	n.s.	n.s.	*0.04%*	*1.07%*	n.s.	n.s.
Arts & Design, Entertainment	11.6%	n.s.	n.s.	-0.33%	-0.11%	n.s.	n.s.
Production	-19.0%	n.s.	n.s.	-0.84%	-0.13%	n.s.	n.s.
Farming	16.7%	n.s.	n.s.	-0.24%	-0.01%	0.01%	0.20%
Food Preparation & Service	31.9%	-0.84%	-0.13%	n.s.	n.s.	n.s.	n.s.
Primary Market Occupations	***22.20%***	***0.11%***	***9.20%***	***0.28%***	***5.20%***	***n.s.***	***n.s.***
Mid-level Market Occupations	***4.20%***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***-0.63%***	***-0.05%***
Secondary Market Occupations	***13.80%***	***n.s.***	***n.s.***	***-0.74%***	***-0.18%***	***0.01%***	***1.20%***

CHAPTER V

DISCUSSION/CONCLUSION

Utilizing Human Capital theory and Dual Labor Market theory, this study attempts to answer six questions addressing the relationship between job growth in primary, mid-level, and secondary labor markets and their impact on human capital development. Specifically: 1. Does employment growth in primary market occupations stimulate growth in the number of high school graduates and college degree earners? 2. Given (1) is verified, how does the impact of employment growth in primary occupations compare to midlevel and secondary market occupations? 3. Does employment growth in primary market occupations influence the probability of respondents graduating high school and/or earning a college degree? 4. Given (3), how does the impact of employment growth in primary occupations compare to the impact of growth in lower-tiered occupations? 5. Does employment growth in primary, mid-level, and secondary market occupations influence the probability of graduating high school and/or earning a degree when controlling for network/homophily effects? 6. Do occupations illustrated to affect regional growth/decline in the number of degree earners translate into an increased/decreased probability of earning a degree among individuals?

Overall, aggregate and respondent-level analyses illustrate two separate stories as to the role of local labor market conditions in the development of human capital. At the county-level, employment growth within primary, midlevel, and secondary markets was shown to influence aggregate human capital development via an increased volume of credential residents. Network/homophily factors, however, are better predictors of individuals' degree attainment. Each will be addressed in turn.

Utilizing a series of log-log regression models, change in counties' volume of high school and college educated residents was in part, shown to be dependent on employment growth in local markets. From table 3.2, job development within primary, midlevel, and secondary markets positively impacts growth in counties' stock of high school graduates/G.E.D. earners. Among the three tiers, employment growth in midlevel occupations was significantly more influential compared to primary and secondary markets; predicted to increase the volume of graduates by an average of .327% for each percentage increase in employment. The impact of primary and secondary market growth was statistically identical. This suggests employment opportunities in medium-wage occupations are more of an incentive to finish secondary school than high-wage or low-wage occupations. In hindsight, this is somewhat intuitive as occupations within primary markets typically require education beyond high school while many secondary market jobs do not require their employees to graduate or earn a G.E.D. From table 2.1, the highest degree earned by persons employed within midlevel market occupations leans towards high school completion or the equivalent.

Parsed out by occupations, many were shown to stimulate growth in the number of high school graduates. Within primary markets, employment growth within management and education were positively influential while growth in life, physical, and social sciences; architecture and engineering; and business and finance were negatively influential. As with model 2, the negative impact of the latter occupations likely reflects the need for additional education to fill job vacancies within these fields. As such, those whose highest education level of education is the equivalent of a high school degree are not incentivized by these occupations. In turn, employment growth in life sciences, architecture, etc. may lead to a decrease in counties' stock of college-educated residents. Within midlevel and secondary

markets, growth within most occupations increased the volume of residential high school graduates.

In table 3.5, all occupational tiers were shown to increase the volume of Associate's degree earners. Here though, primary and midlevel market growth were shown to have roughly the same impact, suggesting local and/or regional job opportunities in both medium and high-wage occupations may incentivize 2-year degree attainment. Job development within secondary markets was shown to negatively impact the volume of Associate's degree earners; suggesting local secondary market expansion may not incentivize local/regional residents to pursue education beyond high school, since these occupations typically do not require a 2-year degree.

Parsed out by occupations, the impact of each generally reflected the influence of the aggregate tier it fell under. For example, primary market job growth has a strong, positive impact on the volume of Associate's degree earners, projected to increase it by .337% per percentage of employment growth. The influence of the four primary market occupations found to significantly impact the number of college educated residents, was also shown to be positive. Within all three tiers, job growth in the entertainment industry was the only exception to the rule, generating negative growth while gains in midlevel market employment generate positive growth.

In table 3.8, all three occupational tiers were once again shown to influence degree attainment, this time change in the number of persons with a Bachelor's degree. Overall, job growth within primary markets had the strongest effect, predicted to increase the volume of college graduates by .528% for each percentage increase in employment. Comparatively, the impact of midlevel markets was predicted to be .319%. A significant difference test verified

the slope effect of primary market growth was indeed greater than midlevel market growth, producing a z-score of 6.554. As one may suspect, secondary market job growth had a net negative impact on the volume of residential college graduates, predicted to decrease growth by .117% per percentage increase in employment.

Parsed out by occupations, most job types were reflective of their respective tier. For example, all significant primary and midlevel occupations had the same direction of effect as primary and midlevel markets. Also worth noting is that two midlevel market occupations—specifically sales and office/administrative support—had statistically identical slope effects as management, a primary market occupation. This suggests that while growth in midlevel markets, as a whole, may not have the same impact on the volume of college educated residence, local/regional job opportunities within a few midlevel occupations may incentivize Bachelor's degree attainment. Within secondary markets, job growth in personal care was the only significantly influential occupation to positively affect aggregate human capital development. As mention previously, this is not likely due to the level of education required to get a job within the field of personal care. Instead, this likely stems from the demand for the services provided by persons employed in personal care—daycare, hospice care, etc.

In table 3.11, the 90% confidence intervals for all occupations found to significantly influence aggregate human capital development are presented. Echoing results from tables 3-2, 3-5, and 3-8, the potential impact of employment growth varies by labor market, occupation type, and degree of interest. Also of note, the amount of employment growth required to produce sizable increases/decreases in the volume of residential degree earners is substantial. Regarding high school, a doubling of employment in management, for example, was predicted to increase the volume graduates by 5.7% - 9.4%. For reference, recall from

table 3.1 the mean growth in employment within management positions between 2000 and 2014 was 9.5%. This translates to about a .2% - 1.0% increase in degree earners. A similar pattern occurs when considering other degree-types. A doubling of employment in office/administrative support was projected to increase the volume of Associate's degree recipients by 14.9% - 22.7%, yet average growth for the industry stood at -1.6%; a doubling of employment in education was projected to increase the volume of Bachelor's degree earners by 15.6% - 19.5%, yet average growth was 9.7%. Collectively, this suggests that while employment growth within primary, midlevel, and secondary labor markets—and the jobs there within—may influence the type of degree local/regional residents ultimately earn, the effect size can be quite small.

After accounting for the effects of employment growth on aggregate human capital development, occupational tiers as well was the job types found to be significantly influential were transferred to a series of logistic models as a means of analyzing the influence of local labor markets on individuals' education outcomes. In addition, the influence of social networks/homophily was also included such that the impact of local market conditions and social ties could be compared. Overall, job growth in primary market occupations increased the probability of respondents graduating high school and earning an Associate's degree, but had no bearing on Bachelor's degree attainment.

From table 4.2, job creation within local primary markets had a substantial impact on the odds of graduating high school; the likelihood projected to increase by an average of 2.26% for each percent of employment growth. Increases/declines in midlevel and secondary markets were not significantly influential. Parsed out by occupations, job growth in management, business & finance, and food services were illustrated to affect high school

graduation, the latter of the three in a negative fashion. This suggests growth within primary markets may incentivize students to finish high school and possibly move on to college. In addition, whereas job growth within secondary labor markets was not influential, growth in specific fields might be. From table 2.1, nearly a quarter of workers employed in the food and services industry have not graduated high school nor earned a G.E.D., thus if fast food occupations are all that is locally available, residents may not feel the need to finish high school—they can find employment without it.

The influence of social networks/homophily on high school graduation was readily apparent. If respondents' friends had college ambitions, they were more likely to finish high school. In addition, if students felt as though their family, friends, peers, etc. expected them to go to college, they were more likely to do so. Further, if members of the previous graduating cohort enrolled in college or entered the labor market, respondents were again, more likely to graduate.

Regarding Associate's degree attainment (table 4.4), job growth within primary and secondary markets were significantly influential factors; with the former associated with increased odds, the latter with decreased odds. When labor markets were parsed out by occupations found to influence aggregate human capital development, job growth within the healthcare industry was positively associated with earning a 2-year degree, projected to increase the odds by as much as 1.07% for each percent of employment growth. Further development of the arts & entertainment industry, production, and farming reduced the odds. Once again, networks/homophily were found to be substantially influential, though unlike their impact on high school graduation, a few factors had a negative impact. For example, the odds of earning a 2-year degree increased if respondents' friends planned to enroll in

community college, but declined if they planned to enroll at a 4-year university. Similarly, the odds decreased if the previous graduating cohort tended to enroll at 4-year universities. The same affect occurs in regards to the desires and expectations of others, with the odds of earning a degree increasing if respondents felt as though they were expected to go to college, yet decreased if they believed their family, friends, peers, etc. expected them to get a job after graduating high school.

From table 4.6, employment growth within midlevel and secondary markets were found to influence the odds of earning a Bachelor's degree, yet only one occupation was found to be influential. Regarding midlevel markets, job growth had a net negative effect on college graduation, projected to decrease the odds by an average of .494% for each percent of job growth. Counterintuitively, development of secondary markets was found to be positively influential while primary market growth did not have an effect. These two phenomena may be linked, however. Bachelor's seekers maybe incentivized by perceived job opportunities outside of their local region due to the overabundance of low-wage occupations.

Bachelor's degree attainment was also shown to be affected by respondents' social networks. If a respondent's friends planned to enroll in community college, (s)he was less likely to earn a Bachelor's degree, yet if they planned to enroll at a 4-year university, (s)he was more likely to earn a Bachelor's. The same pattern occurs when considering the desires and expectations of others as well as the actions of the previous graduate cohort. If respondents believed their family members, peers, etc. preferred them to go to college; they were more likely to attain a 4-year degree. If they felt they were expected to enter the job market, they were less likely to finish college. Likewise, if the previous graduating cohort

went to college, respondents were more likely to go to college; if the cohort entered the work force, respondents were more likely to enter the workforce.

Across all logistic models, the influence of job growth was shown to fluctuate to a large degree. From table 4.5, for example, development within primary markets was projected to increase the odds of earning an Associate's by .28% - 5.2% per percentage increase in employment. Secondary market development is projected to decrease the odds by .18% - .74%. Held at the county average, this means the projected odds of a respondent earning 2-year degree increases by 6.2% - 115.4% due to employment growth in the local primary market. Corollary, the odds are reduced by 4.0% - 16.4% due to employment growth in the local secondary market. As such, nothing concrete can be said about the influential magnitude of primary and secondary markets on earning an Associate's; only that the former is positively influential, while the latter is negatively influential. This pattern is pervasive across all models of educational attainment.

Overall, it is difficult to say whether the expansion of job opportunities is as influential on individuals' human capital decisions as the company they keep. The volume of growth required to increase respondents' prospects of finishing high school and/or earning a college degree can be substantial and the magnitude of effect can range considerably. A 1.0% increase in employment within local primary markets, for example, is projected to increase the odds of earning an Associate's degree by .28% - 5.2%. Network factors obviously play a large role, yet the extent of their potential effect is artificially limited by the number of persons in respondents' networks they were asked about. If we consider "Networks & Homophily 2" in tables 4-3, 4-5, and 4-7 the upper limit is 6 ties. Further, the range of persons in ego's network is limited to parents, close relatives, close friends, favorite teachers,

and the school guidance counselor. The number and variety of potentially influential persons within respondents' networks is likely greater than 6. That said, the odds of earning a 2-year degree are projected to increase by 1.67% - 9.4% for each tie respondents felt expected them to enroll in college.

If changes in Tjur's R^2 and the BIC are used as the yardstick to determine whether perceived opportunity or networks/homophily have a greater impact on respondents' human capital decisions; the latter would be preferable. Across all models measuring their association with high school graduation, earning an Associate's degree, and earning a Bachelor's degree; the R^2 value remained static while the BIC increased when market and occupation variables were added. In addition, the value and significance of coefficients for all network variables remained virtually unchanged when labor market characteristics were included. This suggests that while local job growth may play a small role in respondents' education outcomes, it does not provide any additional explanatory power compared to network/homophily effects.

Hypotheses Revisited

Evidence for the first hypothesis—that job growth in primary market occupations will generate more high school graduates, Associate's degree earners and Bachelor's degree earners—was confirmed via models of aggregate human capital growth in Chapter III. By and large, Employment growth within primary labor markets was positively associated with human capital growth. In addition, the amount of growth with which they were associated generally increased monotonically with the type of degree assessed. Whereas the overall influence of job growth was positively related to high school graduation, the amount of human capital growth it accounted for was somewhat larger for 2-year and 4-year degree

earners. This suggests that job growth in high-wage, high-skill jobs are a catalyst for regional human capital growth, whether it stems from the local populous furthering their education or migrants.

The second hypothesis—job growth in primary market occupations will generate a larger increase in Associate's degree and Bachelor's degree earners, compared to the mid-level and secondary job markets—was partially supported. Whereas increased employment opportunities in primary markets generated more human capital growth via the number of 4-year degree holders, it generated fewer Associate's degree earners compared to midlevel markets. In hindsight, this makes sense as primary market jobs generally require "primary market degrees," as illustrated in table 2.1. This too, suggests people tend to strike equilibrium between their own human capital investment and the types of occupations available to them. If local job growth predominantly occurs within mid-level market occupations, employment seekers will adjust their time and money investments to compensate, i.e., obtain the degree of education required by most jobs available to them.

Whereas the first two hypotheses tested the relationship between local job growth and aggregate human capital development, hypotheses three through five tested the effects of local job growth on the probability of graduating high school and/or earn a college degree. Evidence for hypothesis three— employment growth within primary market occupations will increase the probability of graduating high school, earning an Associate's degree, and/or earning a Bachelor's degree —was partially supported. Whereas primary market growth was positively associated the odds of graduating high school and earning an Associate's, it did not influence Bachelor's degree attainment. This may suggest local labor markets are not the

only consideration taken into account when deciding to pursue a 4-year degree. Regional, state, and nation job opportunities may also be c.

Hypothesis four—employment growth in primary job markets will induce a higher likelihood of earning an Associate's degree and Bachelor's degree compared to job growth in the mid-level and secondary job markets—is partially supported, though with a few caveats. First, employment growth in midlevel job markets were not significant predictors of Associate's degree attainment and was negatively associated with earning a Bachelor's degree. Second, while primary market growth did not significantly impact the odds of earning a Bachelor's, secondary market growth was positively associated though the effect was marginal. It is also worth noting that primary market growth had a positive impact on the odds of high school completion while midlevel and secondary markets where not influential.

Hypothesis five—Social Networks/Homophily will impact students' education outcomes —is also supported. Overall, the majority of network variables significantly influenced the likelihood of graduating high school, earning an Associate's degree, and earning a Bachelor's degree. Respondents were malleable to the influences and/or desires of the people around them regarding decisions on their own human capital. In addition, the company respondents kept proved more influential than local employment growth in high-wage, high-skill occupations. In fact, adding employment variables did not increase the predictive power of the base model, as indicated by the Tjur's R^2 statistic and the increased BIC. This suggests that local employment changes by occupation, at best, play a minor role in individuals' decisions pertaining to human capital development.

Finally, how does the association between aggregate primary market job growth and aggregate human capital development compare to the behaviors of individuals? Overall,

primary market growth was illustrated to affect growth in the number of residential high school graduates, Associate's degree earners, and Bachelor's degree earners. At the individual level, it only affected the odds of high school completion. Additionally, whereas growth within mid-level and secondary job markets where found to positively influence counties' stocks of high school graduates, neither affected the likelihood of residents graduating high school. This suggests the bump in human capital was primarily due to migration. Local job growth in midlevel markets was shown to positively affect the number of college degree earners, yet did not affect the odds of respondents earning an Associate's and a negative effect on earning a Bachelor's. This too, suggests much of counties' increase in human capital between 2000 and 2014 was primarily due to migration, not the conditions of local markets themselves.

Improvements & Discussion

Several steps could be taken to strengthen the results of this analysis. Concerning data, it would be beneficial to include measures of parental involvement in respondents' educational trajectories. If parents' involvement in the education process effects whether their children finish high school, enroll in college, earn an Associate's or Bachelor's, it may also affect what respondents view as incentives to enter the job market. Further, data as to whether any of the survey respondents' network ties have leads on job opportunities would also be beneficial. It is entirely possible that respondents who opt out of college still have access to well-paying jobs despite local market conditions.

In addition, the present study would likely benefit from changes to the modeling procedure. First, instead of measuring the impact of employment change from time A to time B, it may be more beneficial to assess the impact from A to B to C to D, etc. The assessment

of market influences on respondents' educational outcomes at multiple points in time would be ideal as it would allow for the inclusion of factors which may be time sensitive and/or "life events." For example, respondents may not immediately enroll in college after high school graduation and opt for employment instead. Should the job be lost, respondents may pursue a college degree to increase their chances of obtaining a better occupation and decrease the likelihood of unemployment in the future. In addition, life events such as marriage, child birth, etc. may delay college entry and degree attainment once enrolled. Further, market conditions may interact of life events to drastically increase or decrease the likelihood of earning a degree. For example, persons living in rural areas with limited work options may choose to enroll in college as a means of supporting themselves and their dependents, whereas new parent(s) in areas with diverse job options may choose to work instead.

This study could also benefit from hierarchical nesting which would permit the assessment of market conditions at multiple levels of aggregation. This could illuminate "which" job opportunities in "what" markets incentivize college attendance and/or the pursual of a degree. For students pursuing a Bachelor's within highly specialized fields, job opportunities in the county might not matter as much as those within county groups, the region, the state, or the US. If students from rural, landlocked areas want to go into oceanography, they would not consider the local market as a viable option. In a hierarchical time-series model, the market conditions at each level of aggregation could be modeled overtime.

Results of this study carry some education policy implications, particularly when it comes to the phenomenon dubbed "brain drain," the tendency of young, college educated

persons to leave rural, underdeveloped areas. Results indicate growth in primary market occupations has a positive effect on the likelihood of finishing high school and earning an Associate's degree yet growth in secondary markets had a negative impact on the later. This suggests local governments should be mindful of the industries permitted to enter the area. If the goal is to develop and improve market conditions such that young, educated youths will remain in the county, region, state, etc.—further generating the manpower and skills necessary to improve the local economy—emphasis should be placed on increasing job opportunities in primary labor markets. Further, less emphasis should be placed on secondary market industries such as production and farming. Policy makers should be wary of giving tax incentives as a means of attracting car assembly plants, textile mills, warehouse distribution centers, etc. and instead opt to recruit companies dedicated to healthcare, the sciences, and education. Ideally, this would reduce the degree of regional brain drain and increase the overall quality of residential life.

APPENDIX A

DESCRIPTION OF OCCUPATIONS

Management Occupations: Jobs in management span all 23 ACS occupational categories. This includes chief executives of companies, financial managers, transportation, storage and distribution managers, farm managers, construction managers, education administrators, funeral directors, etc. In short, occupations classified as "Management" involve the oversight and guidance of employees. Additionally, management positions are not categorized with their respective occupational groups. For example, farm managers are not classified as both management occupations and farm occupations. They are classified only as the former. Compared to other occupational categories, management jobs received the highest desirability score, ranking of 6.

Business and Finance Occupations: Occupations within business and finance range from credit, budget, and personal finance advisors to market analysts, logisticians, claims adjusters, and cost adjusters, etc. In terms of desirability, occupations in business and finance are ranked 7th.

Computer and Mathematical Occupations: Computer and mathematical occupations include mathematicians, statisticians, web developers, database administrators, systems analysts, etc. Computer and mathematical occupations are ranked 4th, in terms of desirability.

Architecture and Engineering Occupations: Mechanical engineers, civil engineers, chemical engineers, surveyors, cartographers, drafters, etc. are examples of job types categorized as Architecture and Engineering occupations. Of note, though computer hardware engineers are included in this category, they are not categorized as a "Computer

and Mathematical Occupation." Architecture and engineering jobs received a desirability ranking of 5th.

Life, Physical, and Social Science Occupations: Jobs in this category emphasize research. Occupations range from biology, geology, chemistry, astronomy, and physics to sociology, psychology, and econometrics. As measured, Life, physical, and social science occupations are the 3rd highest ranking category.

Community and Social Services Occupations: Community and social services jobs include councilors, social workers, probation officers, clergy, and other religious workers. Occupations within this category have an aggregated desirability ranking of 8th out of 23.

Legal Occupations: Lawyers, judges, magistrates, paralegals, etc. are categorized as legal occupations. Legal Occupations are the highest ranked occupational category in terms of income and the educational attainment of its workforce.

Education, Training, and Library Occupations: Most occupations falling under this category are involved with K-12 education, including elementary and middle school teachers, high school teachers, teacher assistants, librarians, etc. Jobs within the education industry are collectively ranked 8th out of 23.

Arts, Design, Entertainment, Sports, and Media Occupations: Jobs within this area are largely within the entertainment industry. These occupations include athletes, singers, songwriters, dancers, news anchors, actors, writers, authors, etc. In terms of desirability, jobs within entertainment are ranked 10th.

Health Practitioner Occupations: Health practitioners include dentists, doctors, nurses, physical therapists, speech pathologists, dieticians, optometrists, etc. Of note, health practitioners does not include health technologists or health support staff, both of which are

their own designated categories. Occupations classified as "Health Practitioner" are ranked 2nd in terms of desirability.

Health Technology Occupations: Health technology occupations include clinical lab technicians, emergency medical technicians (EMTs), and other technical positions not including health practice or diagnosis. Health Technology Occupations received a desirability rank of 11.

Health Support Occupations: By and large, persons holding jobs that are categorized as "Health Support" do not perform health diagnoses. Instead, they occupy positions such as home health aides, massage therapists, medical assistants, pharmacy aides, etc. Compare to other occupational categories included in this analysis, health support occupations are in the lower spectrum of desirability ranking of 16.

Protective Service Occupations: People employed in protective services include police officers, firefighters, corrections officers, animal control workers, detectives, lifeguards, and moreorless any occupation that involves public safety (sans healthcare). The protective services industry is in "the middle of the pack" in terms of its desirability score, with a rank of 12.

Food Preparation and Service Occupations: Bartenders, dishwashers, waiters, waitresses, cooks, and any occupation that involves servicing the public foodstuffs fall into this category. Compared to other occupational categories, food preparation received the lowest desirability rank with a score of 21.

Building and Grounds Cleaning/Maintenance Occupations: Janitors, maids, housekeepers, and pest control workers constitute the majority of jobs in this category.

Maintenance occupations are near the bottom of the hierarchy in terms of desirability with a ranking of 22.

Personal Care and Service Occupations: Flight attendants, personal care aides, barbers, hairdressers, tour guides, other recreation workers, etc. are classified into this category. Personal care occupations are ranked in the lower quartile regarding desirability, with a rank of 19.

Sales and Related Occupations: As suggested by its name, "sales and related occupations" consists primarily of retail jobs, such as cashier, telemarketer, travel agent, advertising, street vendor, insurance salesman, etc. Sales occupations scored a desirability rank of 13 out of 23.

Office and Administrative Support Occupations: The spectrum of jobs in this category is vast, but the common theme among them is that they consist of clerks, assistants, as well as other jobs that were once labeled "pink-collar." Occupations range from data entry, account clerks, office clerks, mail clerks, library assistants, secretaries, dispatchers, etc. Office and administrative support occupations received a ranking of 14 out of 23.

Farming, Fishing, and Forestry Occupations: Logging, fishing, hunting, forest conservation, agricultural inspectors, etc. are lumped into this category. Compared to other occupations, jobs like these generally do not require education beyond high school, nor do they command a large salary, evidenced by their aggregate desirability ranking; 23 out of 23.

Construction and Extraction Occupations: Persons whose primary job is in anyway related to construction fall into this category. This includes occupations such as carpentry, dry walling, stone masonry, roofing, sheet-metal work, elevator installation, boiler making, highway maintenance, etc. Though the type of labor involved is not related to construction,

mining is also included. Overall, jobs classified as "Construction and Extraction" have a score of 20 out of 23.

Installation and Repair Occupations: Occupations such as small engine repair, aircraft mechanics, home appliance repair, power-line installation and repair, etc. are grouped into this category. These types of jobs received a desirability rank of 15 out of 23.

Production Occupations: Among all ACS occupational groupings, production jobs are the most varied, ranging from motor assembly, print binding, and upholstery to baking, tobacco roasting, and jeweler/precious stone worker. Despite the variability of job types within this category, collectively production occupations received a rank of 17 out of 23. This is likely due to the fact that most production jobs do not require an extensive skill set or pay well.

Transportation and Material Moving Occupations: Bus drivers, airplane pilots, train operators, truck drivers, sailors, and any other job involving public transportation, or the transportation of product, are grouped into this category. Transportation occupations received a rank of 18 out of 23.

APPENDIX B

SOCIAL NETWORKS/HOMOPHILY SURVEY ITEMS

F1S44A: Mother's desire for respondent after high school (mark all that apply).

a) Go to college
b) Get a full-time job
c) Enter vocational/technical school or an apprenticeship
d) Enter military service
e) Get married
f) They think I should do what I want
g) I don't know

F1S44B: Father's desire for respondent after high school (mark all that apply).

a) Go to college
b) Get a full-time job
c) Enter vocational/technical school or an apprenticeship
d) Enter military service
e) Get married
f) They think I should do what I want
g) I don't know

F1S44C: Close relative's desire for respondent after high school (mark all that apply).

a) Go to college
b) Get a full-time job
c) Enter vocational/technical school or an apprenticeship
d) Enter military service
e) Get married
f) They think I should do what I want
g) I don't know

F1S44D: Friend's desire for respondent after high school (mark all that apply).

a) Go to college
b) Get a full-time job
c) Enter vocational/technical school or an apprenticeship
d) Enter military service
e) Get married
f) They think I should do what I want
g) I don't know

F1S44E: School counselor's desire for respondent after high school (mark all that apply).

a) Go to college
b) Get a full-time job
c) Enter vocational/technical school or an apprenticeship
d) Enter military service
e) Get married
f) They think I should do what I want
g) I don't know

F1S44F: Favorite teacher's desire for respondent after high school (mark all that apply).

a) Go to college
b) Get a full-time job
c) Enter vocational/technical school or an apprenticeship
d) Enter military service
e) Get married
f) They think I should do what I want
g) I don't know

F1S65C: How many of your friends plan to attend a 2-year community college?

a) None
b) A few
c) Some
d) Most
e) All

F1S65C: How many of your friends plan to attend a 2-year community college?

a) None
b) A few
c) Some
d) Most
e) All

F1S65D: How many of your friends plan to attend a 4-year college/university?

a) None
b) A few
c) Some
d) Most
e) All

F1A19A: Percent of 2003 graduates who went to a 4-year college/university

a) None
b) 1-10%
c) 11-24%
d) 25-49%
e) 50-74%
f) 75-100%

F1A19C: Percent of 2003 graduates who entered the labor market after graduation

a) None
b) 1-10%
c) 11-24%
d) 25-49%
e) 50-74%
f) 75-100%

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