Literature Review on the Determinants of Residential Employment

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I. Introduction

The purpose of this literature review is to summarize the theoretical and empirical literature on the determinants of residential employment. Findings from this literature review will provide the necessary background for our proposal to conduct research on the factors affecting the probability of employment for the residents of Washington, DC. This review is a counterpart to the review by Wolman, Levy, Young, and Blumenthal (2008) also provided to the Office of Revenue Analysis, that focused on the determinants of area economic competitiveness. Here our concern is not with the determinants of the number and types of jobs in the District of Columbia, but with the employment of DC residents, regardless of where they work. While a competitive advantage for the District will provide more opportunities for employment of District residents, the factors that drive residential employment differ from those that determine how many jobs are in a region. Local jobs may go to persons outside of the jurisdiction and local residents may work in jobs that are outside of the jurisdiction.

There is little academic literature on employment by place of residence per se. There is however an extensive literature addressing various aspects of employment in ways relevant to residential employment. The focus of our review is on literature that addresses the question of what factors account for the number or percentage of city (or some sub-regional area) residents who are employed or, put in other terms, what are the factors that determine the probability that a resident of a particular sub-regional area will be in employment? The literature that is relevant will thus be research on individual

employment generally and employment for particular classes of individuals (by race, gender, age, etc.).

We begin with a short discussion of the type of literature we review in this paper. We identify four major factors related to labor supply that affect the employment of a resident: 1) a resident's own human capital; 2) individual characteristics relevant to employment, particularly race and gender, but also immigration status, and incarceration; 3) the access of an area resident to available jobs in the regional labor market; 4) and the willingness and ability of the resident to seek employment given alternative sources of income, physical disability, the need to care for children at home, etc., all of which affect labor force participation rates and thus employment. In addition, labor demand - the overall state of the regional labor market and the particular kind of worker skills required – will also affect the employability of District residents. The probability of an individual being employed is clearly partly a function of the number of jobs available in the regional economy in aggregate and, more specifically, in the occupational sector for which he/she has skills. However, much of the relevant literature in this area has already been discussed in our review of the economic competitiveness literature at the regional level.

While our main focus in the literature review is on determinants of employment, we will also review findings from studies of labor market participation and hours worked. Labor supply decisions are made at two levels – extensive and intensive (Heckman 1993). Extensive labor supply decisions concern the choice to enter the labor market (a choice necessary for an individual to be employed and thus a determinant of employability), while intensive labor supply decisions concern the number of hours that a person in the labor market chooses to work. Evidence generally shows that extensive labor supply decisions are more sensitive to changes in other variables – such as changes in income and family status – than are intensive labor supply decisions (Heckman 1993). This may be a function of the fact that many employees do not have a choice in the number of hours they work each pay period.

A major limitation of the existing literature for our purposes is that much of it uses wage rates or earnings as the dependent variable instead of employment status. While wages and earnings are related to employment status (if a person does not work, their wages will be $0; earnings is a product of wages times the number of hours worked), the factors that impact employment are not identical to the factors that impact earnings. For example, in the literature on human capital, this review will show that education attainment is an important predictor of employment status, but that specific skills may have a stronger impact on earnings. Similarly, the literature on incarceration shows that felons have much larger earnings differentials than they do employment differentials. While we attempt to focus on studies that use employment status, labor force participation or hours worked as the dependent variables, in areas where the number of these studies is limited, our literature review supplements the discussion with studies that use wages or earnings as the dependent variable.

Decisions about whether to enter the labor force and how much to work differ, for reasons we discuss in the review, by race, gender, and age, and by combinations of these three factors. Much of the literature is concerned with a specific subset of potential employees or breaks out one or more of these groups for specific analysis. For example, many empirical studies estimate separate results for the sexes (Haveman, Bershadker, and Schwabish 2003 and Pryor and Schaffer 1999, races (Pager 2003), or even separate results for racial/gender groups (Pryor and Schaffer 1999) to name just a few. Other studies only include data on one gender or one race, with the literature on male employment greatly exceeding that on female employment, particularly in the criminal justice field. Thus, while certain factors, such as increasing human capital, will benefit all genders and races, it is important to acknowledge that the actual relationship between the variables differs within racial and gender groups. For example, research has shown that blacks experience a lower return to more resume credentials than whites (Bertrand and Mullainathon 2003), but also a larger negative return to incarceration (Pager 2003). As a consequence we paid special attention in our literature search for differences along race, gender, and/or age dimensions.

As the above discussion suggests, the relevant literature in our purview is quite diverse and encompasses several fields of literature that are seldom treated as related – literature on employment and labor markets, spatial mismatch, human capital, economic development, welfare policy, health economics, and criminal justice – to name just a few. In fact, the present research team was unable to locate a single article or book that included all of the factors discussed in this literature review. Our diverse approach to the research ultimately strengthens both this review and the proposed research project in that it allows the current researchers to look at an important issue with a more comprehensive view than much of the existing literature.

The following report is organized as follows: we begin with a discussion of human capital, which is cited as a major predictor of individual employment status, and as the Wolman et al. (2008) report showed, of economic growth. Next we turn to a discussion of inherent traits that impact an individual's likelihood of employment, including race, gender, and immigration status. The third section discusses residential access to jobs, looking at whether there is a spatial mismatch between residents and open jobs. The final section looks at individual labor supply functions that pertain to the willingness and ability of people to work.

II. Human Capital

Human capital is the value that a given individual can add to productive capacity (Haveman, Bershadker, and Schwabish 2003). One way to conceptualize human capital is as analogous to physical capital. If total output is a function of labor/human capital and physical capital, than an area's human capital is "the value of the labor resources that are embodied in its working-age citizens" or "the discounted present value of the stream of outputs attributed to the potential productive activities of the nation's [region's] citizens" (Haveman, Bershadker, and Schwabish 2003, pg. 2). Human capital is a function of education, work experience, job training, and other attributes (motivation, attitude. i.e., "soft skills") and skills (such as strength and writing ability).

Human capital is a major predictor of employment outcomes both in the U.S. and abroad, but unfortunately is a very difficult concept to measure. Although it is widely acknowledged that they paint an incomplete picture, the two most common measures of human capital are education and experience (often proxied by age). While many of the studies focus on education, education and experience are often treated jointly – in part because there is a time trade-off to gaining skills from education and from gaining skills from employment. As the following sections detail more thoroughly, there are no perfect measures for human capital, but there is both theoretical and empirical evidence to suggest that age and experience are important determinants of future employment. Obviously, the use of these two indicators leaves out important aspects of human capital that may be particularly relevant for certain job functions – public speaking ability, creativity, ability to work well with others – to name just a few. However, it is largely necessary to exclude these types of abilities, traits, and skills from empirical analyses due to the impossibility of obtaining valid and reliable measurements of them across people.

A. Education, Skills, and Employment

Education and Skill Effects on Employment: Education (operationalized by some measure of educational attainment) is the strongest and most widely used measure of human capital in the empirical literature, and, not surprisingly, it is a major determinant of future employment (Card 1999). This is consistent with the review by Wolman et al. (2008) who find that regional economic growth is largely driven by education levels of the workforce.

However, it is important to acknowledge that skills matter in addition to education, with increased skills being only one of several results of education. Looking at findings from the National Adult Literacy Survey (NALS), Pryor and Schaffer (1999) distinguish between skills and education: "Cognitive skills reflect our ability to use reading, writing, and calculating skills to solve problems. Education (particularly as measured by attainment measures) is partly an indicator of what we know, and partly a formal credential attesting to the number of years of formal schooling we have had, and the

examinations we have successfully passed… cognitive skills and education play separate and quite distinct roles as determinants of employment and wages" (pg.11).

In their quantitative estimate of the impacts of education and literacy on employment for people aged 25-49, Pryor and Schaffer (1999) find that the probability of employment increases 3.5 percentage points for men and 7.2 percentage points for women with each standard deviation increase in functional literacy (a skill variable). However, education also impacts employment, though its effects are reduced when literacy is accounted for. Pryor and Schaffer (1999 pg.39), controlling for a variety of factors including functional literacy,[1] found the following effects of education:

- For Men
    - Neither trade/vocational school nor some university education has a statistically significant impact on the probability of employment relative to a high-school degree.
    - High-school drop-outs have a 5.0 lower percentage point probability of employment than high-school graduates.
    - Those with only a GED have a 10.3 lower percentage point probability of employment than high-school graduates.
    - Those with at least one graduate degree have a 6.3 higher percentage point probability of employment than high-school graduates.
- For Women
    - There is no statistical relationship between the probability of employment resulting from trade/vocational school or a B.A. /B.S. relative to a high-school degree.
    - High-school drop-outs have a 12.6 percentage point decrease in the probability of employment relative to high-school graduates.
    - GED recipients see their probabilities of employment decrease 6.1 percentage points from those with a high-school degree.

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[1] These factors include race, place of birth, region of residence, residence in a metropolitan area, age, and whether the individual was living alone and had never been married.

o Some university education increases the probability of employment 3.1 percentage points relative to a high-school degree only.

o A graduate degree results in a 13.1 percentage point increase in the probability of employment relative to only a high-school degree.

These findings suggest that once literacy is accounted for, college education plays a smaller role in determining employment outcomes than it does otherwise, but that graduate education retains its explanatory power. They also suggest a significant negative effect with failure to complete high-school even when literacy is controlled for, indicating high school completion may be a reflection of other employment related skills such as motivation and/or that high school completion is used by employers as an indicator of motivation, attitude and other soft-skills related to employability.

For females, education significantly increases the probability of employment. Compared to women with less than a high-school degree, women with a college degree are over 30 percent more likely to have a job, women with some college are about 25 percent more likely to have a job, and women with a high-school degree are about 20 percent more likely to have a job (Waldfogel, Higuchi, and Abe 1999). For women with children, each additional year of education increases the likelihood of employment by 8 percent (Hofferth 1996).

Outcomes for women who are otherwise less likely to succeed in the U.S. economy are also improved by education, though for these groups, a high-school education is more relevant than a college education. For women inmates in Illinois, having graduated from high school increases the likelihood of post-incarceration employment 6.7 percent (Cho and LaLonde 2005). For female welfare recipients in Michigan, having less than a high-school education decreases the probability of working 20 or more hours a week by 10.7 points, while having fewer than four job skills decreases the probability 17.2 points (Danziger, Corcoran, Danziger, Heflin, Kalil, Levine, Rosen, Seefeldt, Siefort, and Tolman 1999).

Further, persons with less than 12 years of education tend to be disproportionately affected by economic shocks. Hoynes (2000) finds that the effect of an economic shock is 5.4 times larger for low-educated, non-white women and 3.9 times larger for low-educated, non-white men than it is for educated white men in terms of the percentage of the population that works at all. For the percent of the population that works full-time, the effect of an economic shock is 3.5 times greater for low-educated, non-white men, 2.4 times greater for low-educated, white women, and 4.5 times greater for low-educated, non-white women. These findings suggest that education may offer some job protection during difficult economic times. That more educated people are somewhat insulated from labor market shocks is also evidenced in data on unemployment. Mincer (1991) finds that more highly educated men experience lower incidences of unemployment due to both greater attachments to their employers and due to a greater ease of transition between jobs. However, this effect is largely attributable to more on-the-job training that employees with higher education levels get.

Another group that is less likely to participate in the labor force in the absence of education is men over the age of 55. From 1994 – 2005, men in the U.S. were significantly more likely to participate in the labor force as their education levels rose. Relative to men with a high-school degree, high-school drop-outs and especially men with eight or fewer years of education were significantly less likely to work. Men with some postsecondary education or a postsecondary degree were significantly more likely to work. The effect of a university degree on older male labor force participation was about 3 times the size of the effect of a post-secondary degree and the effect of a graduate or professional degree was over 4 times as large (Shirle 2008).

One of the major limitations to existing literature on education and employment is that the focus tends to be on wages as opposed to employment status or hours worked. In these types of studies (described in the following section, "Returns to Education, Experience, and Skills"), the dependent variable is wages or earnings and the researchers estimate the impacts of education, years worked, or other skills. However, Trostel and Walker (2006) argue that this vein of research has served to obscure the relationship

between employment and education, while also introducing biases into the empirical findings:

> empirical research on labor supply has ignored the interaction between the work/education and work/leisure choices. The level of education is treated as an exogenous variable in the estimation of labor supply elasticities (either explicitly or implicitly by splitting the sample by education level). In other words, education is implicitly assumed to affect the rate of pay, but not the hours worked… empirical research on the rate of return to education may also be biased and/or inefficient because it fails to account for the endogenous interaction between education and hours worked. In particular, studies that use the wage rate as the dependent variable typically do not account for the endogeneity of participation, and may therefore be subject to sample-selection bias. (pg.378)

Trostel and Walker (2006) estimate the relationship between education and employment across 27 countries using data drawn from the 1991 U.S. Current Population Survey, the 1994-1998 Family Resources Survey administered by the UK Department of Work and Pensions, and the 1989-1995 International Social Survey Programme. The authors find a significant relationship between education and hours worked that is relatively consistent across all 27 countries. For men, each additional year of education is associated with an additional 0.9-1.3 hours of work per week. For women, each additional year of education is associated with an addition 2.1-2.4 hours of work per week. Further, most of the variation is the result of choices at the extensive margin (the decision whether or not to work) as opposed to choices at the intensive margin (the decision about how many hours to work each week). For men, the probability of working increases 1.6-2.6 percentage points for each additional year of education; for women, the increase is 3.4-3.8 percentage points. Within these ranges, the estimates for the U.S. tended to show some of the strongest relationships. In the U.S., an additional year of education increases the probability of male employment 1.95 percentage points and increases the weekly hours worked by 1.34. An additional year of education increases the probability of female employment 3.7 percentage points and the weekly work hours by 2.36. (Trostel and Walker 2006). Thus, there is a strong relationship between employment status and education, despite the fact that existing literature is far more focused on the relationship between earnings and education.

Soft Skills Effects on Employment: Human capital also consists of individual behavioral traits that are related to productivity. Such traits may affect employment levels in two ways. Certain personality traits may tend to make people more inclined to be proactive in finding employment, and these same traits are also likely to make people more successful in employment and increase the attractiveness of a potential employee to an employers. Pryor and Shaffer (1999) present evidence from a 1994 Educational Quality of the Workforce study carried out by the U.S. Census Bureau, which asked employers to rank the following factors in terms of their importance to the hiring of front-line workers (scale of 1-5, with 5 being the highest; means (standard deviations)):

- Applicants' attitude   4.62 (0.69)
- Applicants' communication skills   4.23 (0.93)
- Previous work experience   3.96 (1.09)
- Coworkers' recommendations   3.42 (1.14)
- Employers' recommendations   3.37 (1.25)
- Industry-based credentials   3.17 (1.36)
- Years of completed schooling   2.88 (1.17)
- Scores in interview test   2.54 (1.50)
- Academic performance (grades)   2.48 (1.08)
- Applicants' school reputation   2.41 (1.27)
- Teacher recommendations   2.07 (1.19)

As the above findings illustrate that, "soft skills" are cited as being highly important. The two biggest factors cited were attitude and communication skill; the variables related to educational importance received lower scores. Understandably, given the difficulty in generating data on these "soft skill" characteristics, these variables are seldom accounted for in the empirical literature that employs data on individual workers. Furthermore, if educational attainment is correlated with soft skills such as attitude and communication skills (which seems plausible), education coefficients in much of the existing literature may suffer from a positive bias.

Kanfer, Wanberg, and Kantrowitz (2001) model employment status as a function of job search activities and of personality characteristics. The authors posit that certain

personality traits make persons more aggressive in their efforts to look for employment, and more aggressive job searches result in greater likelihood of employment and shorter spells of unemployment. The same personality traits that promote job search behaviors (resume preparation, going to interviews, reading the classified ads) also tend to promote improved employment outcomes (status, search duration, number of job offers). Kanfer et al. (2001) do a quantitative meta-analysis of existing studies in the fields of social science, economics, and management computerized databases, including studies that reported at least one zero-order correlation between at least one job search variable and at least one employment outcome, or between at least one personality trait and at least one job-search or employment-outcome variable.

Kanfer et al. (2001) find that personal characteristics have a strong relationship to job search behavior and employment outcomes. For example, increased job searching was associated with extroversion, openness, agreeableness, conscientiousness, higher self-esteem, higher self-efficacy, and increased social support, while neuroticism was a significant negative predictor of job search activity. Job search was then a significant predictor of employment status ($r = 0.21$), number of job offers ($r = 0.28$), and duration of unemployment ($r = -0.14$) (pg.845).

Research on "neighborhood effects" and their relationship to employment outcomes also may provide some indication of the relevance of soft skills. Neighborhood effects are the external effects that neighborhood composition imposes on individuals living in a neighborhood, including the transmission of peer attitudes and values, modeling behavior, etc. The neighborhood effects literature has frequently found that these effects have detrimental effects on individuals living in high poverty areas (for a recent review see Galster, Marcotte, Mandell, Wolman, & Augustine [2007]).

Raphael (1998b), for example, finds that the percentage of neighborhood residents living in poverty is negatively associated with the employment rates of neighborhood residents after controlling for a large number of appropriate variables. O'Regan and Quigley (1996, 1998) also find that neighborhood effects (percentage of neighborhood residents

who are non-white, poor, on public assistance, unemployed, and not at work) are significantly and negatively related to employment probability. These studies suggest that soft skills have an impact on employment, and are largely built through channels unrelated to formal education and work experience.

Experience Effects on Employment: Similar to soft skills, human capital is accrued in less formal venues via work experience. Previous labor market experience is an indicator of attachment to the work force, commitment to employment, and holding attitudes conducive to productive work. Cooke, in a study of several metropolitan areas including Washington, DC (1996), for example, estimated the probability of employment for black males aged 16-65 in several metropolitan areas and found that five years of prior work experience and amount of weeks worked in the previous year were positively related to the probability of employment. However, there are some limitations to the existing literature regarding the effects of education. First, as will be discussed below, many studies proxy education using age or some variant of age minus years of education based on the somewhat dubious premise that all adults are continuously employed or in school (for a description of these studies see Card 1999). A second limitation is that certain jobs and industries are likely to do more to increase human capital than others. Measuring prior workforce participation captures the effect of employment, but is more a measure of individual labor force decisions and pre-existing ability. Years worked, is therefore a rather imprecise measure of the additional *human capital* that results from an additional year of work.

B. The Effect of Education and Skills on Wages; Returns to Education
As noted above, it is widely acknowledged that education is an important predictor of employment outcomes: "One of the most important 'facts' about the labor market is that individuals with more education earn higher wages. Hundreds of studies from many different countries confirm that average wages are higher for more highly-educated workers" (Card 1994, pg.1).

Haveman, Bershadker, and Schwabish (2003) find that education is significantly related to the ability for individuals to work near their potential – or in their terms, maximize their earnings capacity[2] utilization rates. Further, it appears to becoming more important over time. In 1975, people with less than 12 years of schooling achieved 48 percent of their earnings potential, and this only increased to 49 percent in 2000; those with 12 years of schooling saw an increase from 61 percent to 64 percent over the same time period. The biggest change was observed for persons with 13-15 years of education that saw earnings capacity utilization rise from 65 percent in 1975 to 73 percent in 2000. Those with 16 or more years school also experienced an increase in earnings capacity utilization (from 77 percent to 82 percent) though as a percentage change it was qualitatively smaller (pg. 203).

Despite the consensus that education is correlated with improvements in earnings and employment, the empirical literature is mixed as to how this relationship operates and how education should be measured. One major theme that emerges in the literature is that unmeasured factors, such as family upbringing, innate ability, and motivation determine both educational outcomes and future employment outcomes, thus generating omitted variable bias and/or selection bias in econometric modeling: "In the absence of experimental evidence, it is very hard to know whether the higher earnings observed for better-educated worker are *caused* by their higher education, or whether individuals with greater earning capacity have chosen to acquire more schooling" (Card 1999, pg. 1802). This has given rise to a variety of statistical techniques attempting to remove this bias. Within the literature, there is no consensus as to which the "best" method is or how findings are changed when bias is properly accounted for.

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[2] Haveman et al. quantify human capital as "the market value of the annual earnings that the working-age [18-64] population would generate if it were used to its full-potential [full-time full-year employment for everyone" (pg.3). The authors then use wage data from full-time, full-year workers to estimate potential wages for all people based on their age, gender, race, and education levels; generating a measure of earnings capacity. As a measure of human capital this strategy is useful for identifying total potential earnings and for comparing actual earnings to potential. It does, however, suffer from some practical limitations pertinent to the current proposed study. Earnings capacity is an original measure and is not collected in any data sets produced by government agencies or research institutions. To generate an earnings capacity at an individual level and then use this measure to predict future employment status would also introduce severe endogeneity concerns into modeling.

Traditional studies of education and earnings are usually organized around a common Ordinary Least Squares (OLS) regression where the dependent variable is the logarithm (log) of earnings and the independent variables are years of completed education and a quadratic equation for experience. Since experience tends to be rather hard to measure, it is often measured as potential experience which is equal to age minus years spent in school minus six (resting on the assumption that people start school at age six, do not work while in school, and work continuously upon graduation) (Card 1999, pg. 1804). In his review of the empirical literature, Card (1999) notes that this basic model well-approximates actual data observations in the aggregate, but does not fit as well when data is disaggregated for specific age and education groups. One major objection to the traditional model is that it rests on the assumption that the returns to education are linear, which there is reason to doubt, particularly for the 12th and 16th years of schooling. Starting in the late 1990s, the U.S. Census Bureau started to measure education by degree attainment as opposed to years completed (Card 1999, pg. 1807). However, Card (1999) finds that the traditional linear model actually tends to produce appropriate estimates:

> A simple regression with a linear schooling terms and a low-order polynomial in potential experience explains 20-35 percent of the variation in observed earnings data, with predictable and precisely-estimated coefficients in almost all applications. Close examination reveals that the model is too parsimonious to fully characterize the joint distribution of earnings, age, and schooling. Nonetheless, it provides a natural starting point for the building of more complex models of earnings determination, and for investigating the effects of other covariates such as race, gender, and firm characteristics (pg. 1809).

In more recent empirical analysis, economists have continued to adopt alternatives to the traditional model, in part because it does not address the possibilities of selection and omitted variable bias discussed above, in part to increase the explanatory power of their models past 35 percent, and in part, to estimate equations for subgroups of the population. In a literature review on the empirical studies of education and earnings, Card (1994) suggests that traditional comparisons of wages and education levels can understate the true impact of education. The reason for this is that individuals experience different marginal rates to return from education. However, it is also possible that

traditional studies over-estimate the returns to education by failing to account for an unobserved ability bias.

One strategy to deal with estimation problems is to use an instrumental variable model to measure the effect of education on earnings. Some of the instrumental variables employed in recent literature include education system variables (such as mandatory schooling laws and proximity to a four-year college) or individual traits (such as quarter of birth and working while in school). In a review of instrumental variable estimates, Card (1999) finds that instrumental variable estimation tends to produce higher regression coefficients than traditional models, often as much as 30 percent larger. The reason for this difference is that the people most likely to be affected by polices such as mandatory education are those that would not have pursued as much education in the absence of such laws; and therefore experience a higher return than individuals that would have pursued equal levels of education in the absence of such requirements. However, Card (1999) also finds that empirical studies of twins suggest an ability bias of about 10 percent that is captured in traditional OLS studies (pg. 1802). This would suggest that traditional OLS models *overestimate* the effects of education, as opposed to underestimating them.

As discussed in the previous section the relationship between skills, abilities and educational attainment makes estimation of returns to education difficult. Recent literature on the returns to has increasingly devoted attention to controlling for the impact of skills. It finds that education is a poor proxy for human capital, and has greatly reduced explanatory power once skills and abilities are accounted for: "variations in direct measures of skill, such as mathematical ability or eye-hand coordination, account for a significant fraction of the increased dispersion in income for those with a college degree. Surprisingly, we show that the group who has fared worst in the labor market in the past several decades are those who are educated but unskilled" (Ingram and Neumann 2000, pg. 1). In a study of the returns to education and skill, Ingram and Neumann (2000) find that between 1980 and 1998 the returns to mathematical and verbal abilities have nearly doubled, while the returns to education have not increased. However, as the

authors note, increases in verbal and mathematical skills are also the product of education, even if education is not a precise measure of skill level. There are several reasons why skill levels differ from those with identical education – personal ability, differences in the quality of educational institutions, more rapid change in job responsibilities than in educational curriculum, and the fact that for many, education is a "one-time" thing, usually ended by age 25, while skill accumulation continues indefinitely (Ingram and Neumann 2000, pg. 3-4).

To address the issue of skills, education, and earnings, Ingram and Neumann (2000) use data from the Dictionary of Occupational Titles (DOT) and CPS data. DOT has released four editions between 1939 and 1991 as an outgrowth of occupational research beginning in the 1930s aimed at matching workers to jobs based on skills and job responsibilities. Ingram and Neumann (2000) then regressed the log of weekly wages on the following variables: years of education, experience, experience squared, gender, race, and four skill factor variables (generated through a factor analysis using the DOT data). The authors find that the return to intelligence was about 12 percent in the 1980s, rising to 21 percent in the 1990s. Fine motor and clerical skills, coordination, and strength each also exhibited smaller (all less than 5 percent) positive skills in the 1990s. During the 1990s, the return to education was almost 11 percent when skills were dropped from the model, but only less than 7 percent when skills were included. The impacts of experience and race on wages also decrease when skills are included in the equation, with the racial coefficients approaching zero.

Recent research (Belzil and Hansen 2002) has explicitly attempted to deal with the ability bias in estimating the returns to education. The authors argue that although market ability and school ability are highly correlated, those with a relative advantage in market ability see relatively lower returns to education than those with a relative advantage in school ability. Belzil and Hansen (2002) argue that when ability is accounted for, the returns to education are lower than is commonly estimated in the literature and take on a convex shape. They find that returns to education (in terms of wages) are 1 percent or less until grade 11, rise to 3.7 percent in grade 12, and rise above 10 percent for grades 14

to 16, suggesting that those with higher school abilities tend to experience both more schooling and higher returns to education. Belzil and Hansen (2002) also control for actual years of experience in quadratic format (years working and years working squared) and obtain a concave result. This suggests that the returns to working are higher in early years, but diminish with time.

Findings from a study of the effects of completing GED certification on wages also confirm the presence of an ability bias. Heckman and LaFontaine (2006) use data from the National Adult Literacy Survey (NALS) to control for reading ability when they regress wage on GED passage and find that any positive effect of passing the GED disappears once reading ability is accounted for. The wages of GED recipients are statistically indifferent from high-school drop-outs and lower than high-school graduates. The authors argue that the positive GED effect that is frequently observed is due to selection bias in the GED – high school drop-outs who choose to take the GED tend to be those with higher abilities to begin with.

III. Individual Attributes, and Employment

Certain individual traits, particularly race and gender (and place of birth) tend to be important predictors of employment status despite the fact that these are inherent traits and neither the individual nor policy makers have any control of them. Other individual attributes, such as immigration or incarceration, while not inherited traits, are immutable once they have occurred.

A. Race and Gender

On a purely descriptive level, without controlling for any other factors, major differences exist in the employment outcomes of minorities and women. (See Table 1 for summary statistics from the CPS 1996.

Table 1: Wage and Employment Differentials by Race and Gender

	1995 Employment Rate (%)	1995 Average Weeks Worked	1995 Average Annual Earnings ($)
White Males	84.0	42.3	36,169
Black Males	64.7	34.1	23,645
Hispanic Males	76.8	38.6	20,418
White Females	69.5	34.4	20,522
Black Females	62.0	31.3	17,624
Hispanic Females	53.2	26.3	15,372

Data drawn from Altonji and Blank 1999

First, for both genders, whites experience better labor outcomes than do Blacks and Hispanics. Females participate less in the labor force, work fewer hours, and earn less than do males. Among males, blacks are disadvantaged for all three employment outcomes compared to both Hispanics and whites, while for females; Hispanics are the most disadvantaged group. While these differences are not based on statistical testing or experiments, they are significant enough to warrant further examination.

Some of these differences disappear when controls for other important variables such as education, skills, etc. are controlled for. However, employment outcomes for minority groups may be worse than those for whites, ceteris paribus, for a variety of reasons, including racial discrimination in employment and other characteristics that might also vary by race such as inferior job networks. Employment outcomes for women may be worse than those for men, ceteris paribus, because of employment discrimination, lower labor force participation, differences that might exist in willingness to take part-time as opposed to full-time jobs, differences in the distance women may be willing to travel to find employment, etc.

Differential employment outcomes among minority groups are caused by very different factors than those that produce differences between the sexes. As Altonji and Blank (1999, pg. 3164) observe "Black and Hispanic differences in labor force participation are largely due to group differences in background characteristics." On the other hand, the labor supply of women is fundamentally different than men's. Altonji and Blank observe that "the coefficients on personal characteristics (children and marital status) are much

more negative for women than for men". The economics literature generally sees male labor supply as a dichotomous choice in allocating time between labor and leisure, while it sees female labor supply as being a choice in between market work, home work, and leisure (Blau and Kahn 2007). Because this section is devoted to traits that individuals can not change – i.e. their race and gender, the labor supply discussion is reserved for a later section in the paper that addresses personal traits and family structure that change over the course of a lifetime.

With respect to the probability of employment, Pryor and Schaffer (1999) find that, after imposing controls[3], black, non-Hispanic men[4] have a 3.5 percentage point lower probability of working than white men, while for Hispanic men and other races, the results are statistically insignificant. For women, there is no significant change in employment status for blacks or Hispanics relative to whites, but "other" races have an 8.7 percentage point probability of being less likely to work (pg. 39).

Inferior employment outcomes for minorities and women are reflected in hourly wages as well as the probability of employment. Using CPS data, Altonji and Blank (1999) specify a set of equations looking at the impacts of race and gender on hourly wages for 1979 and 1995. The models vary in terms of how many control variables are included. The most basic model includes no controls, while their most complex model includes controls for education, experience, region, personal characteristics, occupation, industry, and job characteristics. Table 2 summarizes the findings for both 1979 and 1995 for the most basic and the most complete models.

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[3] These factors include education, literacy, place of birth, region of residence, residence in a metropolitan area, and being a never-married person living alone.

[4] There are several difficulties with the existing literature on race and gender discrimination. With respect to race, the biggest obstacle is that most of the literature focuses on blacks versus whites without addressing other racial groups: "[There is] a major lack in the research literature. There is remarkably little empirical work on Hispanics/non-Hispanic white differences or on Hispanic/black differences in labor market outcomes. There is even less empirical work looking at other racial groups, such as Asian Americans or American Indians" (Altonji and Blank 1999, pg. 3145).

Table 2: Race and Gender Coefficients on Earnings

	1979 No Other Controls	1979 All Controls	1995 No Other Controls	1995 All Controls
Black	-0.142 (0.010)	-0.061 (0.010)	-0.207 (0.012)	-0.089 (0.011)
Hispanic	-0.152 (0.010)	-0.040 (0.010)	-0.379 (0.010)	-0.102 (0.009)
Female	-0.436 (0.006)	-0.348 (0.0006)	-0.279 (0.007)	-0.221 (0.007)

*Standard errors in parenthesis; Source: Altonji and Blank 1999 pg. 3157

As the table suggests, being a minority or a woman negatively affects hourly wages. The effect of being Black and Hispanic on hourly wages has increased since 1979, while it has declined for women, but women still experience more adverse wage results than do minorities. For both minorities and for females, the regression coefficients decrease in the fully specified model with controls added, but this effect is significantly more pronounced for blacks and Hispanics than it is for women, which Altonji and Blank (1999) attribute to similarity between the sexes in their control variables.

 To further explore gender and race differences, the authors employ a similar methodology to data from the National Longitudinal Survey of Youth (NLSY) which provides data on a single cohort of blacks and whites aged 29-37 in 1994. The advantages of the NLSY data set is that it provides information on individuals' scores on the Armed Forces Qualifying Exam (AFQE), presumably a measure of skills and abilities, actual years of work experience, and family background characteristics. Altonji and Blank (1999) find that the inclusion of the extra variables has little impact on female wage differentials but that the inclusion of AFQE scores almost entirely eliminates the black wage differential (pg. 3161).

Altonji and Blank (1999) also find that the returns to education and experience differ by race and gender. They find that blacks and Hispanics experience larger returns to education than whites but lower returns to experience, while the effects of education and experience are similar for women and men.

Discrimination is clearly a major reason that minorities and females, controlling for other factors, experience worse employment outcomes than men. Discrimination can be divided into two categories: prejudice (disinclination for members of one group to interact with members of another group) and statistical (imperfect information about skills or behaviors of minority groups) (Altonji and Blank 1999, pg. 3168). In a review of the theoretical literature on discrimination, Altonji and Blank (1999) find credence for both types of discrimination and note that it can occur on the part of employers, other employees, and customers, all of which tends to reduce employment opportunities for disadvantaged groups. When they review the empirical literature, the authors find that the evidence for existing discrimination against women and blacks is conclusive, although the type and source of the discrimination is unclear. This is true for multiple types of studies reviewed including: 1) Audit studies – studies that match "applicants" in the basis of all characteristics except for race or gender to isolate the impact of race or gender on hiring decisions; these may be done with resumes that have "typical" racial or gender names or by sending interviewers to employers for an application or interview; 2) studies of professional athletes that take advantage of rich performance data and compare performance to pay by race; and 3) studies that measure the marginal productivity of various types of workers by race and/or gender and compare output levels to wages (Altonji and Blank 1999)

The empirical trends observed by Altonji and Blank (1999) are supported in other reviews of the literature. Holzer (1998) looks at the effects of US antidiscrimination policy on employer hiring of minorities and females. He notes that evidence from the 1970s hinted that both minorities and females made great strides in contracting jobs, but that discrimination still exists. Qualitative studies based on interviews with employers reveal very negative attitudes towards black employees, particularly young males. Holzer surveys employers in Atlanta, Boston, Detroit, and Los Angeles between 1992 and 1994, finding that blacks comprised fewer than 20 percent of new hires, Hispanics 12-14 percent, and Asians 4-5 percent. Women, on the other hand, accounted for over half of new employees. However, low-skilled job hires were predominately more likely to be minority, and blacks comprised a larger percent (over 30 percent) of hires in central

cities than in the suburbs. Larger firms were more likely to hire blacks, while smaller firms were more likely to hire Hispanics. Holzer's literature review also found that in labor market audit studies where otherwise comparable applicants of different races are paired, both black and Hispanic applicants had a lower probability of receiving a job offer.

A more recent and particularly careful audit study was done by Bertrand and Mullainathan (2003) for the National Bureau of Economic Research. This study sent almost 5,000 hypothetical resumes to employment ads in sales, administrative support, clerical, and consumer services job categories to employers in Boston and Chicago. Resumes were identical in everything but name, with each resume being assigned a very black or a very white sounding name (names selected from birth certificate name frequencies in Massachusetts) and two high-quality, two low-quality applications sent to each job. The authors found that white names received 50 percent more callbacks for interviews than did black names. Further, stronger resumes benefited white applicants more than black applicants, with higher quality resumes improving white callback rates 30 percent but black callback rates only 9 percent. There was no observed variation in racial discrimination between genders, occupations, or industries. Betrand and Mullainathan (2003) found that resumes from a zip code with a higher percentage of white residents, a more educated population, or a higher income were more likely to receive a call back, but that this effect did not vary between blacks and whites.

Looking at the reasons behind racial discrimination, Moss and Tilly (1996) interviewed employers about the importance of "soft" skills in their hiring decisions. For the purposes of their study, soft skills were defined as "skills, abilities, and traits that pertain to personality, attitude, and behavior rather than to formal or technical knowledge" (pg. 256). Soft skills were grouped into interaction skills (with customers, coworkers, and supervisors) and motivation skills (such as enthusiasm, positive work attitude, dependability, and willingness to learn). Interview subjects were asked to rank the importance of hard skills, interaction skills, and motivation skills; and the researchers found that 86 percent of respondents listed soft skills among the most important hiring

criteria, with almost half placing them first on the list (Moss and Tilly 1996, pg. 258). Respondents consistently saw blacks as lacking in soft skills, and the employers that had the most negative views of blacks tended to place the most emphasis on the importance of soft skills, suggesting a major disadvantage for blacks in the labor market. Perhaps, what was most surprising about Moss and Tilly's (1996) findings was the strength and prevalence of openly expressed negative attitudes towards black employees. For example, 32 percent of interviewees described black men as "defensive, hostile, or having a 'difficult' attitude" (pg. 260) and 40 percent described black men as "unmotivated employees" (pg. 262).

Related to the issue of discrimination is the issue of *perceived* discrimination. Little literature has been devoted to this topic (in all likelihood due to the difficulty in measuring it), but perceptions of discrimination may cause employees and applicants to behave in ways that ultimately undermine employment outcomes. In a study of the barriers to employment for welfare recipients, Danziger et al. (1999) note that existing research suggests employer discrimination on the basis of race, but that there is little information on discrimination on the basis of welfare status. Survey participants in the study (welfare recipients in Michigan) were asked whether they had ever experienced discrimination on the basis of race, gender, or welfare status. In a regression on employment status (defined as working 20 or more hours a week), the authors found that perceived discrimination reduced the probability of working by 13.1 percent, after controlling for individual characteristics, including other obstacles to employment (pg.25).

B. Immigration

The literature on immigration status and employment is both limited in quantity and ambiguous in findings. From a theoretical perspective, there are offsetting effects to foreign-born status at play. Immigrants may be less likely to find work due to a poorer grasp of the English language or due to more limited social networks and knowledge of the labor market. On the other hand, most immigrants arrive in the U.S. for the purpose

of taking advantage of the job opportunities available and will devote more time to searching for a job and working (Pryor and Schaffer 1999). In an empirical analysis, Pryor and Schaffer (1999) find more support for the latter hypothesis, with foreign born men having a 1.7 percentage point higher probability of working that U.S. born men; and foreign born women having a 2.4 percentage point higher probability of working than U.S. born women, though neither coefficient is statistically significant (pg.39). In their study on soft skills and race, Moss and Tilly (1996) focus on the black population, but one of their questions concerned immigrants. When asked whether they thought that immigrants had a stronger work ethic than native born workers, well over 80 percent of respondents thought that they did (pg. 263). This suggests that the negative outcomes for Hispanics in the labor market may be more a function of racial views than due to their increased likelihood of being immigrants.

The majority of the literature on immigration and employment focuses on earnings and skill levels, generally modeling the economic performance of immigrants as the log of wages with a dummy variable for immigration status and a continuous variable for the number of years residing in the U.S. As a literature review by Borgas (1994) reveals, most early studies that used this format found that immigrants earned about 17 percent less than natives upon arrival to the U.S. but experienced faster wage growth, overtaking native earnings around residence year 15, and earning 11 percent more by residence year 30 (Borgas 1994). Borgas found that more recent cohorts tend to have slower wage growth, largely because in recent years, immigrants have had lower skill and education levels relative to native born workers – which is mostly due to more rapid increases in domestic college graduation rates as opposed to deterioration in foreign education levels. Thus, even with longer tenures in the U.S., the wages of more recent immigrants are unlikely to catch up with and overtake the wages of the native born. An important difficulty with estimating the impact of immigration status on employment is that immigrants from different countries experience very different outcomes, and as the literature on wages suggests, these relationships change over time.

C. Incarceration, Criminal Activity, and Employment

Theoretically, there are several related factors that could impact employment: criminal activity, arrest, incarceration, and length of incarceration. The research we report on below indicate that incarceration has negative effects on employability, while arrest and conviction (i.e., a police record) have no or little effects.

Economists have often viewed criminal activity as a substitute for legitimate employment (Freeman, 1994, 1999). When deciding between legitimate employment and crime, the individual considers the payoff to illegal activity, the probability of being caught, and the consequences of being caught. These three factors generate an expected return to crime which is then compared to the expected wage received in the legitimate economy. When the expected return to crime exceeds the expected wage, an individual will choose crime over employment (Freeman 1999); thus, those who commit crimes should be less likely to work, all else being equal. However, as Freeman (1994) notes, this relationship is very difficult to observe in practice, and in reality, crime and employment are not perfect substitutes for one another.

One obstacle to estimating the impact of crime on employment is that it is very hard to obtain legitimate information on criminal activity. Data on arrests and convictions provide information on people who got caught for the crimes they commit but do not include the people who committed crimes and were not caught. Survey data in which people self-report crime tends to be unreliable, as people systematically underreport their own criminal activity. In addition to the data problem, there is an endogeneity problem with crime and employment. Do people commit crimes because they can't obtain legitimate work or are they not working because they are otherwise occupied with illegal activities? In his review of the literature on crime and employment, Freeman (1994) concludes that while criminal activity is concentrated at the lower end of the income distribution, there is insufficient evidence to show that unemployment *causes* crime or vice versa.

While the relationship between criminal activity and employment is uncertain, partly because of the difficulty of conducting research, there is a substantial amount of research on the effect of arrest and incarceration on employment. A criminal record may affect employability in several ways, both with respect to labor supply and the demand for labor. Arrest and/or incarceration may provide a negative signal to potential employers about employee attitude, motivation, and other soft skills, dropping someone with an arrest record to the bottom end of the labor queue. In addition, incarceration is sometimes viewed as negative human capital as a consequence of deterioration of employable skills while incarcerated (Western, King, and Welman 2001).

In a summary of existing literature, Freeman (1994, 1999) fails to find a relationship between arrests and future employment. However, he reports that some research shows a clear relationship between going to prison and future employment: "The big difference in employment rates between those who commit crimes and those who do not is found for young men who later go to jail for their crimes…Many employers eschew hiring a person with a criminal record… a young man incarcerated in 1979 worked about 25 percent less in the ensuing eight years than a man who had not gone to prison" (Freeman 1994, pg.22-23).

In a more recent review of the literature, Western et al. (2001) note that there are several causal mechanisms by which incarceration can harm future labor market outcomes. The most obvious causal mechanism is the stigma associated with conviction. In addition to making convicts appear less attractive to prospective employers, in many professions (such as licensed or professional and public sector) felony records legally disqualify individuals from employment. While stigmatization affects the demand for employment, the supply of employment is also affected by incarceration. While in prison, jobs skills may erode, and the convict is unable to acquire new skills. Western et al. (2001) also note that imprisonment can exacerbate mental and physical illnesses, promote survival strategies that are not well-suited to life outside of prison, and erode social connections that could help provide future job connections (pg.413).

In a review of the empirical literature on incarceration and labor market outcomes, Western et al. (2001) find several interesting themes. First, the relatively few studies that address arrests and convictions fail to find a persistent relationship with future employment. Incarceration is likely to impact future employment status, but to a smaller degree than one might expect. Of the studies reviewed, estimates of a decrease in employment rates range from 0 percent to 25 percent points, with most studies finding that employment rates drop 5 to 10 percentage points. However, the effects decrease in the long term, with some studies finding that after 18 months or so of observation, differences in employment rates disappear altogether. The impact on earnings, however, is much more consistently significant, with studies finding a range of 5 to 30 percent decrease in earnings as a result of incarceration, most suggesting that the effect is greater than 10 percent. Estimates of earning losses resulting from incarceration are significantly higher for older prisoners, white-collar workers, and those with higher earnings prior to incarceration.

The findings in Western et al. (2001) are largely (though not entirely) consistent with those of Freeman (1999). Of the studies reviewed by Freeman, most found a much larger and more consistent effect on earnings than on employment. Although the majority of the studies reviewed by Freeman find a slightly higher effect of incarceration on employment rates than those reviewed by Western et al. (2001), the range was still the same, and Freeman notes that when individual fixed effects are included in the model, the relationship between incarceration and employment decreases. The studies Freeman reviews also generally find that earnings decrease from about 10-30 percent as a result of incarceration. Freeman's research differs from Western et al. (2001) in that, unlike the literature reviewed (see above), he finds evidence that arrests and convictions negatively impact labor market outcomes independently of incarceration. However, he notes that these impacts tend to be confined to the short-term, whereas the impacts of incarceration on earnings persist over time. Also unlike Western et al., Freeman (1999) finds that the impact of incarceration on earnings is stronger for younger workers, suggesting that there is not a consistent pattern documenting the relationship of age to incarceration impact.

Incarceration lengths, which have increased considerably since the late 1980s, may matter as well. Kling (2006) notes that there are several theoretical reasons why longer incarcerations would have negative impacts on subsequent labor market outcomes. First, there is the argument that during incarceration, individuals lose the possibility to gain work experience and skills, resulting in a deterioration of human capital. The stigma of incarceration may also increase with longer spells, providing a deterrent to prospective employers. Alternatively, longer incarcerations may increase opportunities for rehabilitative programs and post-release supervision; and increase the attractiveness of legitimate work upon release. However, Kling (2006) tested these hypotheses and found no relationship between length of individuals incarceration spells (for those who served 0.5 to 4.5 years) and the fraction of quarters after incarceration with any positive earnings (which is analogous to employment status), the fraction of quarters with earnings above the 2002 poverty threshold, and average quarterly earnings. He finds no evidence to support the conjecture that longer incarcerations harm future outcomes – in the first two years after release, longer incarceration spells were associated with *higher* levels of employment and earnings; and in the seven-nine year period after incarceration, there was no relationship between length of incarceration and employment status.

Much of the literature on crime and employment reviewed above is largely confined to the male population, in part because males comprise such a large percent of the prison population. Within the male population, another subgroup to receive attention in the literature is poor fathers. Since the decision to commit a crime is associated with both the predicted returns to crime and with the wage one could earn in the legitimate economy, it is not surprising that individuals with fewer options for legitimate work are more likely to commit crimes. Using data from the Fragile Families and Child Wellbeing Study, Geller, Garfinkel, and Western (2006) find that for poor fathers, incarceration reduces the likelihood of employment by about 6 percent, and reduces hourly wages by 14-26 percent. The authors control for individual features using a propensity score that matches individuals that were not imprisoned with those that were based on their propensity (or likelihood) of committing a crime.

Much less attention has been given to the effects of incarceration on female employment levels, perhaps because they comprise smaller proportions of both the prison and the employed populations. Unfortunately, as women's incarceration rates increase, the gap in the literature is becoming more problematic. Between 1990 and 1998, the US female prison population increased 92 percent, while the male population increased only 67 percent, yet the literature on criminal recidivism and other post-incarceration outcomes remains focused on male prisoners (Harm and Phillips 2001). One empirical study located discusses the impact of incarceration on economically disadvantaged women's (defined as having contact with state child or social welfare systems) employment rates using administrative data from the state of Illinois during the late 1990s. The authors found that *post*-incarceration employment rates are not impacted by time in prison. For some groups of women (those with four or more children, those serving longer prison spells, and those serving time for person-related or drug-related crimes), the authors even observe a small *positive* effect from incarceration, with employment rates increasing about six percent. Due to very low earnings in the disadvantaged female felon population, the impact of incarceration on earnings is likely to be much smaller than the impact of incarceration on employment rates (Cho and LaLonde 2005).

The studies described above tend to rely on either administrative data collected by government organizations or survey data on individuals. In the area of crime and incarceration, there are some very serious risks to using administrative or survey data. First, the personality traits that predispose a person towards crime are also likely to predispose them to be poor employees. Pager (2003) notes that among empirical studies using this type of data, there are a wide range of estimates of the impact of crime on employment, with some studies concluding that there is no relationship; the observed relationship is truly due to personal characteristics. Another risk to using survey or administrative data is that it does not provide insight into causal mechanisms. If a relationship is observed between reduced employment and incarcerations, does this relationship occur as a result of the stigma associated with conviction or as a result of a loss of human capital while in prison (Pager 2003)?

To get around some of these issues, Pager (2003) uses an experimental audit design evaluating the effect of a *criminal record* on future employment. This strategy allows one to estimate the impact of the stigma of incarceration as opposed to any effects from an erosion of human capital. Two sets of males (one black and one white) were matched on the basis of physical appearance and presentation style. They were then given hypothetical resumes identical in all respects except that one of them had a criminal record. The pairs then applied for 350 entry-level jobs, with both members of each racial team applying for the same job. The order of application and which member of the team had a criminal record was randomly varied. The dependent variable of interest was the percent of completed applications that resulted in a callback from the employer. Pager (2003) found that for the white pair, 34 percent of applications resulted in a callback for the non-criminal record, compared to only 17 percent of applications with a criminal record. For the black pair, only 14 percent of *noncriminal* applications resulted in a callback, and only 5 percent of criminal applications resulted in a callback. These findings suggest not only a large stigmatization effects for having a criminal record, but also the persistence of a racial component in hiring decisions. For white applicants, having a criminal record reduces the chance of getting a job by about half, while for black applicants a criminal record reduces the chance of getting a job by about two-thirds.

In a recent literature review, Holzer (2007) groups the types of studies on incarceration and employment outcomes into three groups: (1) those focusing on the demand side (employer hiring); (2) those focusing on the supply side (individual level data); and (3) those using state-level data to observe aggregate effects. Studies focusing on the demand side (surveying employers or using an experimental audit such as the one by Pager 20003) consistently find reluctance on the part of employers to hire persons with a criminal record, with stronger effects observed for blacks than for whites in all cases. However, these results vary with the type of occupation, the type of company, and the nature of the reported offense.

Looking at studies on the supply side, Holzer (2007) concludes that studies using survey data uniformly find that incarceration has negative effects on both employment and earnings, though he does not report the quantified size of these effects. However, studies using administrative prison and unemployment data present a more complex picture. These studies generally find that employment levels of offenders are very low both before and after incarceration and that there is an increase in employment levels immediately after incarceration. This bump in employment levels fades over time and the long-term effects on employment vary widely across the studies. These surprising and inconsistent findings are very likely due to the selection bias that persists in studies of prisoners as well as difficulty in tracking down a population that tends to have unstable housing and employment patterns before and after institutionalization (Holzer 2007).

In addition, Holzer notes that there may be population spillovers to the non-incarcerated population resulting from criminal activity. Particularly for young black men, Holzer (2007) argues, negative stigmas of incarceration spill over into the population that has not been convicted of a crime, reducing the employment and earnings among all young, unskilled men. This causes individual level data to miss some of the negative employment effects of incarceration. Data at the state level supports this hypothesis, finding that for every one point increase in black male incarceration rates, employment and labor force participation of non-offenders decreases by a percentage point or more (Holzer 2007, pg. 27). Based on the total evidence discussed, Holzer concludes: "the high rates of imprisonment in the U.S. reduce employment *opportunities* (i.e. employer demand for their labor) for those who have been incarcerated and even for some of those who have not been. Whether these reduced opportunities actually translate into reduced employment and earnings *outcomes* is a little less clear, though the preponderance of the evidence considered suggests that it does" (Holzer 2007, pg. 27-28).

In addition to individual characteristics that effect employment options, residents must have access to jobs in order to be employed. Our review now turns to the factors that impact residential access to jobs.

IV. Residential Access to Jobs

The probability of employment for a resident may also be a function of his residential location relative to the geographic location of available jobs, with respect to either physical distance or commuting time. In particular, it is frequently hypothesized (or sometimes simply asserted) that residents of inner cities, who in many cities are predominantly minority, will be disadvantaged because job growth and availability is increasingly occurring in suburban areas. The research related to this hypothesis is largely dealt with in the "spatial mismatch" literature.

The spatial mismatch hypothesis (SMH) was first developed by John Kain (1968), who posited that part of the difference between the employment rates of blacks and comparable whites was due to the fact there were "fewer jobs per worker in or near black areas than white areas" resulting from exogenous residential segregation by race (Ihlandfeldt and Sjoquist 1998). Minority residential sorting behavior was largely unchanged even as suburban communities began to grow, and new job opportunities emerged, generating residential segregation. The resulting spatial dispersion of residential location yielded a disproportionately large number of blacks residing in inner-cities, while most of the suburbs tend to be occupied by white residents.

The SMH is particularly relevant for our study of employment probabilities of DC residents. A spatial mismatch implies that inner-city residents in general or minorities in particular do not have equal access to jobs and a consequential reduction in the probability of employment. Given that the population of The District is close to 61 percent African American, the existence of a spatial mismatch would significantly alter residential employment functions (U.S. Census Bureau Brief 2000).

In order to understand the spatial mismatch literature we first divide the SMH into two distinct categories: first, a "pure" spatial effect of job access, meaning that access to jobs is a spatial issue irrespective of race in which case inner city whites and blacks should be

disadvantaged equally; and second, a racial component of SMH. The racial component of SMH can occur via two possible venues. First, it could exist because inner-city blacks face a greater disadvantage in job access than do inner-city whites, even controlling for other factors such as education and income. A second possibility is that, given residential patterns, the average black will face greater job access problems than will the average white, since blacks live disproportionately in the inner city while whites live disproportionately in suburbs.

The logic of job access disadvantage for any inner city resident relative to suburban resident is that, as observed above, jobs are increasingly located in suburbs and, indeed, in outer suburbs. Inner city residents thus have a longer distance to travel to jobs and longer commuting times. This disadvantage is exacerbated if the inner city household does not own an automobile or is not located near a public transit stop which runs to suburban job locations. Black inner city residents may be more disadvantaged than whites if there is a relationship between automobile ownership and race (which is plausible since blacks tend to have lower incomes than whites). They may also face increased disadvantages if there is racial discrimination by employers or if black residents have access to job networks that are less informative than those of white inner-city residents. The consequences of these disadvantages may be that black residents will have to extend their job search further into the hinterlands in order to find an available job, which can prove problematic if they also face disadvantages in transportation.

Overall, a scan of several literature reviews on the spatial mismatch hypothesis by Holzer (1991), Ihlanfeldt (1992), Kain (1992), Moss and Tilly (1991), and Wheeler (1990) provides either strong or moderate support for the SMH. Only one early review by Jencks and Mayer (1992) suggested that results were "so mixed that no prudent policy analyst should rely on it."

 The literature on spatial mismatch employs either commuting time or some more direct measure of job access. Commuting time to areas of job location or growth is sometimes used as an independent variable in explaining the probability of employment for an

individual. It is also sometimes used as a dependent variable with race used as an independent variable to determine whether blacks have longer commuting times and thus poorer job access then similarly situated whites. However, it is important to control for income, since whites, who on average have higher income than Blacks may choose to trade off longer commutes for more housing. Consider the standard urban model where the income elasticity of housing demand is greater than the income elasticity of commuting cost and average house sizes increase with distance from the center city. In this case, commuting distances will tend to rise with income because higher income earners chose to commute longer distances in order to consume more units of housing. (Jackson 1979).

More direct measures of access to jobs than commuting times are also employed in the SMH literature. Presumably, access to jobs should affect employment options: those who live further from available jobs should be disadvantaged with respect to employability than those who live closer. The ideal measure of job accessibility is the number of job vacancies within varying distances from a resident's house. Various measures of nearby in the literature are used, such as, neighborhoods, zip codes, contiguous zip codes and neighboring counties. However, utilization of this data is limited. Proximity to employment, or mean commuting time of workers in a specified area, typically serves as proxy to job access. This also only captures vacancies due to job turnover and not those due to job growth. Other measures include distance or commuting time to areas with high job levels, density, or growth. It should also be acknowledged that there is a relationship between mode of transportation and commuting time – thus, studies of proximity may be poor indicators of commuting if persons that live and work in the same areas rely on different methods of transportation. Similarly, persons with comparable commuting times travel very different distances to work if they rely on different modes of transportation. For example, in 2000, about 80 percent of commuters that traveled 20 minutes or less to work drove alone; while only about 1 percent took public transportation. Of drivers commuting more than 60 minutes, over 20 percent took public transportation and less than 60 percent drove alone (US Census Bureau 2004). This suggests that readers of the spatial mismatch literature must be cautious when interpreting

results when variables include either distance or commute times without controlling for mode of transportation or access to a car.

Further, there are problems with these approaches. Employed individuals may change their residential location in response to their job location. Also, as noted, some people with jobs (and therefore, higher incomes) may self select to have longer commutes to consume more housing at lower prices. Thus, there exists some simultaneity between employment and residential location. Any estimated effect of job access on employment will likely be biased toward zero if the simultaneity is ignored (Ihlanfeldt1992

The simultaneity of earnings/employment and residential location is often addressed by analyzing the employment trends of youths still living at home. The assumption is that youth residential locations are exogenously determined by their parents. However, youth education, unobserved skills, and other characteristics that affect employment are often correlated with that of their parents. Therefore, youth residential locations may be endogenous even if parents placed no value on their childrens earnings when making residential location decisions. The results of these studies may also be biased by sample selection because unemployed youths may be more likely to live with their parents. Lastly, the results from youth employment studies my not be generalized to adults because adults may tend to be less sensitive to commuting distance issues such as automobile access, time constraints relating to school obligations and more formal job information outlets.

A. Studies of "Pure" Spatial Mismatch

The pure spatial mismatch hypothesis is that job access affects employability regardless of race, although some of the studies also examine whether it affects minorities differentially. A corollary of the hypothesis is that blacks who live in the suburbs should have better access to jobs than similar blacks who live in the city.

There is now a substantial body of research bearing upon the pure spatial mismatch hypothesis and its corollaries. Several studies use the 1990 PUMS data with the same basic methodology employed by Ihlanfeldt and Sjoquist (1990) who look at differences in youth employment rates by race. The methodology is as follows: Ideally, job accessibility would be measured by the "minimum distance the individual marginal youth would be required to commute if a job were taken." The mean travel time of workers living within the youth's community is frequently employed as a proxy. Ihlanfeldt and Sjoquist calculated two separate mean travel times as the time it takes someone living in the youth's community, who commutes with a privately owned vehicle, to get to work: one for blacks and one for whites. The authors found that estimated travel time was both statistically significant and nontrivial in magnitude in explaining the probability of employment for both whites and black youth in the Philadelphia region after controlling for a number of personal characteristics[5]. The negative findings held both for 16-19 year olds who were living at home and for 20-24 year olds with less than a college education not enrolled in school or in the military. One limitation to this approach is that they do not control for car ownership – so some of the estimated travel times are likely to be significantly downwardly biased.

Ihlanfeldt and Sjoquist (1990) also found that black youths in Philadelphia have significantly worse access to employment opportunities than whites. They estimate that, depending on the methodology used, 29 to 54 percent of the employment probability gap between white and black youths can be explained by differences in job access among the races. The authors found similar results for black youth employment probabilities in L.A. and Chicago.

Thompson (1997) looked at the labor force participation rate of less educated females, ages 18 to 35, in Chicago, Philly and L.A. The justification for this approach is that the lower levels of income of less educated females remove the simultaneity bias that is observed when higher income individuals choose longer commute times in order to

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[5] These factors include age, sex, years of education, health status, whether the high school diploma had been obtained, marital status for individuals, family income net of the youth's earnings; the head of household's sex, education level, occupational class, and employment status.

increase their housing consumption. Measuring job access with a travel-time based measure, Thompson found that "job access has a statistically significant effect on labor market participation rates of white, black and Hispanic women living in all three MSAs" after controlling for other personal characteristics[6] (Ihlandfeldt and Sjoquist 1998).

Raphael (1998b) estimates employment-to-population ratios based on unique geographically defined job accessibility measures, a competing labor supply variable that takes geography into account and variables describing the neighborhood's demographic composition[7]. Geographically based measures improve on past measures because they take into account the fact that job access within an arbitrarily defined area is not equal across that area. For example, a job access measure within a 30 minute public transit commute encompasses commutes as low as 1 minute to commutes *up to* the 30 minute boundary. In other words, arbitrarily set commuting distances do not allow for accessibility to vary by distance. Furthermore, an arbitrary commute boundary fails to account for any potential large employer just beyond the boundary that may exert significant influence on the neighborhoods labor market. Raphael (1998b) thusly concludes that:

> …employment opportunities should be defined by net changes in employment rather than in levels. This better measures the geography of intra-metropolitan industrial change and provides a more concise measure of employment opportunities available to inner-city youth. Second, the neighborhood accessibility measure should account for the neighborhood's proximity to all other neighborhoods within the local labor market. In addition, the measure should account for the attenuating effect of distance on accessibility. Furthermore, the incorporation of distance should be based on the observed commute behavior of already employed workers rather than on arbitrary speculation. (pg. 91)

Raphael estimates a gravity equation that accounts for these accessibility issues, dividing demographic data on aggregate tract-to-tract youth commute flow data set and tract-level

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[6] These factors include education, number of children, other household income, age, and occupation (either current or prior).

[7] These characteristics include the proportion of all 16-19 year olds that are enrolled in school, the proportion of 16-19 year olds that are high school dropouts, the proportion of adult residents with less than a high school education, average neighborhood household income, the proportion of residents living in poverty, and the proportion of households headed by a single parent.

counts of 16-19 year old male youths by employment status and by race, and peak period zone-to-zone travel times provided by the Bay Area Metro Transportation Commission. The job accessibility measures are found to be significant and positive predictors of employment probabilities for both white and black youths in his model. Raphael (1998b) compares job accessibility measures with the proportion of the census tract's residents who are black, and finds that differential accessibility explains between 30 and 50 percent of the difference in neighborhood employment rates between whites and blacks.

Furthermore, Raphael re-estimates his equations using employment level-based measures of job accessibility instead of net employment change, and finds that job accessibility is insignificant in explaining employment rate differentials between the average white and black youth. This suggests that it is the *growth* of jobs (i.e., the net number of new jobs) that predicts youth employment rates rather than the *level* (i.e., total number) of jobs. This result is similar to Cooke (1993) and Immergluck (1996), which may shed light further on the SMH debate and how it relates to youths.

Rodgers (1997) studied unemployment duration in Pittsburgh. His measure of job access is a gravity equation that measures worker proximity to areas of employment change or level diminishing with distance controlling for personal characteristics[8]. Rodgers' findings are similar to Raphael (1998b). Employment change-based measures of access are found to affect unemployment duration in a positive and statistically significant manner. Cooke (1996) used 1990 PUMS data to estimate the probability of employment for black males aged 16-65 across several metropolitan regions. His findings for Washington D.C. imply that blacks who live in suburbs are more likely to be employed than those living in the inner-city, controlling for age, earnings and education, also suggesting a pure racial mismatch irrespective of race.

Stoll (1999) estimates the probability of employment for Washington D.C. area residents, comparing youth in D.C. with otherwise similar youths in Prince Georges and

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[8] These controls include age, education, household size, marital status, industry, weeks of entitlement remaining and a black dummy.

Montgomery counties. Controlling for a variety of variables[9], Stoll finds that Prince Georges and Montgomery County black youths are 8 and 11 percent respectively more likely to be employed than their D.C. counterparts and that Prince Georges and Montgomery County white youth residents are 17 and 22 percent more likely to be employed than their D.C. counterparts. In particular, among black and white high school drop outs, those living in either of the two surrounding counties are 25 to 30 percent more likely to be employed than if they resided in the District.

O'Regan and Quigley (1996, 1998) use 1990 Census records to estimate employment and idleness for teenagers in Newark and 3 other large New Jersey MSAs. They measure job accessibility as an index of employment potential (the accessibility of each residence zone to all of the workplaces distributed throughout the region) and include as controls neighborhood composition, along with youth family variables. They find that job access effects were significantly strong but that neighborhood effects (percent white, percent poor, percent on public assistance, percent unemployment, and percent of the adults not at work) had a stronger impact on employment than job access.

A few studies do not find a pure spatial mismatch effect in general or for either race. Cooke (1997) looks at 1990 PUMS data from the Boston Consolidated Statistical Area. He employs an ordered logit estimation of the ordinal labor force participation ranging from 1 (out of the labor force) to 5 (working full time) for all individuals aged 16-65, and separate estimates for black and white females. His explanatory variables are mean commuting time of the PUMA, parental status, occupation, and use of public transit. He finds no significant affect of job access on labor force behavior of either black males or females. His only significant finding is that white married mothers' labor force behavior is negatively affected by job access. Cooke, however, does not account for the

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[9] These variables include residential control, age, school enrollment, high school graduate if out of school, have a child, one-parent household, female-headed household, family income (net of youth's earnings), and a dummy for household head's major occupation. Estimations were also done using household head's education, whether the household had access to more than two cars, and weeks worked by household head. Stoll also creates variables to compare youth employment probabilities for those who live in PG County inside the beltway versus outside the beltway.

simultaneity of residential location and labor force status, which casts doubt on the relevance of his findings.

Cooke (1993) and Immergluck (1996) use nearby jobs-to-workers ratios to explain neighborhood-level unemployment rates in Marion County Indiana and the Chicago MSA, respectively. Cooke finds no significant job access affect on unemployment, while Immergluck finds a statistically significant but substantively negligible affect. Thus, neither study suggests evidence of the SMH. Raphael (1998b) using 1980 and 1990 Census tract-level employment data finds that on average, blacks live nearer to areas with higher employment *levels* than whites but further from areas with net employment *growth*. This could help explain the results of Cooke (1993) and Immergluck (1996). This suggests further support for the fact that if a spatial mismatch exists it is the result of changes in the number of jobs as opposed to the existing stock of jobs. It also suggests that when employment growth is accounted for, there is likely to be some spatial mismatch that occurs irrespective of race.

B. Studies relating to the racial aspect of SMH

While the above section looked at the differences in employment outcomes in terms of residential location, the following section looks at whether blacks are more adversely affected by their residential location in terms of obtaining employment than are whites. Because the commuting studies find such a strong relationship between commuting times and race, it is likely that the SMH is a function of both race and residential location.

McLafferty and Preston (1992) make use of 1980 PUMS data in Northern New Jersey to show that minority women have longer commute times than white women, thus supporting the racial aspect of the SMH. Although they find that minorities rely more heavily on public transportation, they fail to standardize the comparison of commute times by transportation mode, which may introduce bias into their estimate of a spatial mismatch. Their finding that minorities rely more heavily on public transportation should imply that they will tend to have longer commute times irrespective of space.

In a later study, McLafferty and Preston (1996) examine commuting times for New York area residents by race, gender, and residence by city and suburb. They measure racial spatial mismatch as the difference in means between actual black travel time and expected travel time once personal characteristics are accounted for[10]. The mean expected travel time is estimated by substituting the means of the independent variables for the black travel time equations into the commuting equations estimated for whites. This substitution of means normalizes commuting behavior between blacks and whites and allows one to access what the average black commute time would be if they had similar control characteristics to whites. A spatial mismatch is found for blacks in both 1980 and 1990 living in the center of the metropolitan region. In other words, the estimated travel time for inner city blacks with similar characteristics to inner city whites is significantly less than the actual observed commute times for blacks. The differences between actual and expected mean travel times are not significant for black residents living in the suburbs, suggesting that blacks who live in the city are more disadvantaged than their suburban counterparts.

Gabriel and Rosenthal (1996) use 1985 and 1989 neighborhood cluster data from the American Housing Survey (AHS) to estimate a fixed-effect commuting time model. They estimate actual commute times for employed workers while controlling for a number of individual traits[11]. They find that black workers had commuting times, on average, 14 percent longer than comparable Asians or whites who live in the same neighborhood. Their fixed-effect model addresses the issue that whites (and possibly blacks) place a premium on lower housing costs and other neighborhood amenities, and thus are willing to accept longer commutes. However, as Gabriel and Rosenthal acknowledge, this result is also consistent with discrimination against blacks in general

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[10] The personal characteristics include age, education, earnings, occupation, industry, household income, marital status, presence of children, and mode of transportation.

[11] The individual traits include quality-adjusted housing prices, neighborhood amenities, earnings, demographic characteristics—age, education and marital status, and the number of vehicles available to the worker's household.

Gabriel and Rosenthal (1996) also find that Blacks with a high school degree incur roughly 22 percent longer commute times than their white or Asian counterparts. Blacks with less than a high school degree do not have statistically significant commute differences than comparable whites and Asians. Blacks with a college degree or more have slightly shorter commute times than comparable whites and Asians. These results could reflect the fact that low skilled workers are able to find suitable jobs close to their neighborhoods while those with a high school degree compete in a segment of the labor market where jobs are more geographically limited. Blacks with higher education degrees may not be adversely affected by discrimination, and thus, may self select into residential areas closer to employment centers**.**

Pastor and Adams (1996) use a commuting time-based measure of job accessibility to analyze the L.A. labor market. They determine the wage rate as a function of household poverty rate, average commuting time of all workers residing in the worker's PUMA, and the worker's own commuting time. They find "both the poverty rate and job accessibility have statistically significant effects on wages" as anticipated, but that the poverty rate and not job accessibility is the dominant explanatory variable (Ihlanfeldt and Sjoquist (1998). This may be due to the fact that other studies cited in this review have found that job growth is more important than job accessibility. The major flaw in their analysis, however, is the failure to account for the simultaneity of earnings and residential location.

Raphael (1998a) used 1990 PUMS data to assess the difference of similar youth's employment probabilities who reside in high and low job access areas within Oakland. Like others, he emphasizes that proximity to job growth is more important as a job accessibility measure than proximity to employment level. He compares employment rates of youths 16-21 living at home. Controlling for a host of individual and family background characteristics[12], he finds that white and Latino youths residing in high job

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[12] The control variables include age, a female dummy variable, a dummy variable that indicated working disability a dummy variable for being a female that has a child, educational attainment (high school or some high school), a school enrollment status dummy variable, and racial dummies for Latinos, Blacks and Asians. The family background controls include, family income squared, the presence of an automobile, number of other employed household workers, the number of other employed household youths (to account for a labor-market network affect), a dummy indicating a two parent family, and the weeks worked of the

growth areas have much higher employment probabilities than do similar youth residing in low growth areas. Black and Asian employment rates are also higher, but the results are not statistically significant.

In his study of youth employment in the Washington DC region, Stoll (1999 see the end of the "Pure Spatial Mismatch" for our description of the study,) calculates employment probabilities for young black men assuming they are given the same employment opportunities as whites in DC, Prince Georges County, and Montgomery County. Stoll finds that location explains 13 percent of the white-black employment difference between Prince Georges County and DC, 50 percent within Prince Georges County, 69 percent in Montgomery County-DC, and 62 percent within Montgomery County. The larger employment differences associated with Montgomery County are likely attributable to the fact that employment growth in Montgomery County was stronger than in either Prince Georges or DC between 1970 and 1990.

Making use of a natural experiment, Fernandez (2008) looks for evidence of spatial mismatch through a longitudinal analysis of a relocating food processing plant. The relocation of the firm from the Milwaukee Central Business District to one of the area's suburban rings can be treated as an exogenous demand shock to the local labor market because the employees did not choose the relocation site. This eliminates any self selection bias other studies have encountered. Further, the author documents a variety of issues that suggest the firm's relocations decision was in no way motivated by a desire to move away from a heavily minority-populated area.

Fernandez (2008) looks at the increase in the average commute time for black, Hispanic, and non-Hispanic white employees that resulted from the plant relocation. Though all race classes experienced an increase in commute times, blacks and Hispanics' commute times nearly doubled, whereas white commute times only increased approximately 14 percent. Against this back-drop, the author analyzes whether or not there were

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parents the previous year (the parents work habits and attitudes are assumed to affect the child's and capture network affects.

discernable differences in employee turn-over across races. A counterfactual was created to assess employee turn-over occurring during a 40 month period of the move against employee turnover during a 24 month period just prior to the move. There was no evidence to support the hypothesis that longer relative commute times produced turn-over differences between racial groups. This may be because the firm guaranteed wages during the move and the inclusion of a no layoff policy suggests the firm was acting in a manner to maximize workforce retention. Furthermore, the economic conditions of the area during the move were precarious; wages for blue-collar jobs were plummeting, and the U.S. was in a mild recession, making employee turn-over for both groups less attractive. Lastly, it is possible that some of the job search and networking effects that SMH suggests for inner-city black employment were not realized since the analysis was performed on actual employees of the firms, who presumably, had perfect information about the firms' plans to relocate.

Hellerstein, Neumark, McInerney (2007) modeled employment probability as a function of job density (defined as number of jobs relative to the population in the resident's zip code), using the 2000 Census Sample Edited Detail File (SEDF), controlling for a variety of other variables[13]. When job density is defined by skill level (in terms of educational attainment), the descriptive results suggest that the jobs close to black neighborhoods are high skill jobs, and that low skill jobs in black neighborhoods are sparse. Hellerstein et al. then compare race-specific job density measures to see if low-skill jobs available near areas where blacks reside are held by non-blacks. They find that the low-skill job density measure for whites is considerably higher than for blacks even in areas where blacks live. They conclude that a racial spatial mismatch occurs due to a lack of jobs that are available to blacks, as opposed to a lack of jobs at appropriate skill levels.

The regression results from Hellerstein et al.'s 2007 study suggest that a 10 percent increase in job density for high school dropouts will increase black employment

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[13] Other variables include age (linear and quadratic terms), marital status, education (5 dummies for H.S. degree, some college, associate's degree, Bachelor's degree, and advanced degree), MSA fixed effects, and residence in central city, non-central city, or suburb. They also augmented the model to allow the effects of job density to vary with an individual's education and skill level.

probability by 0.6 percent. Furthermore, they find that the higher the density of jobs for less educated workers, the greater the employment for *all* residents, regardless of race or education. However, the strength of the effect is larger for less educated residents. These results are consistent with the spatial mismatch hypothesis; though it may be the case that endogenous residential sorting is occurring.

The literature on spatial mismatch published to-date suggests that the difference in employment probabilities between minorities and whites is due to both space and race. Minority workers have on average longer commute times, and tend to have poorer access to centers of high job growth relative to whites. Furthermore, there is evidence suggesting that when minorities do not have limited spatial access to job growth relative to whites, their employment probabilities are still hindered. Possible discrimination and a skill mismatch between the types of jobs that are created and the skills inner-city minorities possess are likely culprits.

V. The Willingness and Ability to Work

In addition to employer demand for workers – which is a function of population attributes and the local labor market – there is the issue of the supply of workers. Labor supply is important to residential employment because if residents are either unwilling or unable to work, residential employment levels will be low even in times of local job growth and increasing human capital.

A. Willingness to Work

Existing literature suggests that while aggregate employment participation remained relatively constant over the latter half of the 20th century, the composition of the labor pool has changed. The most important trend is the significant increase in female labor supply after the 1950s, but the U.S. labor force has also shifted from the older workers to the younger, and from single persons to married couples (McGrattan and Rogerson

1998). That this is a function of the increased willingness for new groups to participate in the labor force can be found in evidence from a study by Haveman, Bershadker, and Schwabish (2003). The authors estimate the earnings potential for individuals if they were work at full capacity (40 hours per week) controlling for their age, gender, race, and educational attainment. They then compare actual hours worked and earnings to potential total earnings. For all subgroups of the population the percent of potential earnings utilized increased between 1975 and 2000, however, the rates of increase varied dramatically by population subgroup – with the biggest difference being a 49.9 percent increase in female utilization compared to only 6.8 percent increase for male. Nonwhite utilization rates rose 24.2 percent, compared to 16.3 percent for whites; and workers aged 25-54 increased their utilization almost twice that of workers aged 18-24 and workers aged 55-64 (Haveman, Bershadker, and Schwabish 2003, pg. 203). These findings highlight that an understanding of employment status requires an understanding of labor supply as well as labor demand.

What determines an individual's willingness to work? The starting point is labor elasticity with respect to wages. The economist's premise is that individuals face a choice between leisure and the ability to consume goods and services. The ability to consume is a function of income, which is in part, a function of wages. Decisions about employment are thus based on the wage level since that signifies what additional consumption power an individual gains as from one lost hour of leisure. Other sources of income (pensions, investment income, welfare, unemployment insurance, and criminal activity) affect willingness to work as well, since they alter the amount an individual can consume in the absence of any work.

Heckman (1993) comments that in the latter part of the 20th century, there have been many advances in the labor economics field, but that the most important is the recognition and interpretation of multiple co-existing labor supply functions. Heckman (1993) cites the most important distinction as the difference between choices at the *extensive* margin (the decision to participate) and choices at the *intensive* margin (the decision about how many hours a week to work once participation has been selected) (pg.

116).   These distinctions are important because the decision to participate in the labor market is much more elastic with response to wage than the decision about how many hours to work. A failure to distinguish between the two sets of choices in many older econometric studies resulted in a 1960s characterization of married-female labor participation as much more elastic than male labor supply because female *extensive* decisions were compared to male *intensive* decisions (Heckman 1993, pg.117). In fact, the elasticity of labor supply nears zero for additional hours worked as wages rise and original hours of work rise. Theoretically, this distinction makes sense because for many jobs, the employee does not have a choice in how many hours to work once the job has been accepted.

Male and Female Labor Supply Functions: Empirical research on the determinants of labor supply indicates the probability of participating in the labor force varies by gender, age, marital status, and, for women, the presence, number and age of children,. In an empirical study aimed at estimating the U.S. labor supply of the mid-1980s, Kimmel and Kniesner (1998) find that the aggregate employment elasticity with respect to wage rates is 1.5 (i.e., a 1 percent increase in wage rates results in a 1.5 percent increase in employment), while the aggregate compensated hours elasticity is only 0.5; and that these two measures combined can explain about 75 percent of the variation in wage-induced employment choices. The authors also find that female labor supply is more elastic than male; but that marriage reduces employment elasticity with respect to wage for women and raises it for men. For single males, employment elasticity is 0.6, which rises to 1.1 for married men. For single women, the employment elasticity is 2.4; this drops to 1.8 for married women (Kimmel and Kniesner 1998).

Descriptive studies of labor force participation suggest that the participation rates of older workers have decreased relative to those of young workers. One interesting feature to this trend is the differential effects between women and men. Pryor and Schaffer (1999) find that men in the 45-49 age group (reference group is age 25-29) have a 2.6 percentage point decrease in the probability of working, while women in the same age group have a 5.6 percentage point *increase* in the probability of working (pg.39). However, a recent

study by Shirle (2008) finds that since the Mid-1990s, male labor force participation has increased for men between 55 and 64. Shirle's evidence suggests that for married men, the single largest predictor of labor force participation is the spousal participation decision. Spousal employment can impact employment decisions in two ways. First, it creates an income effect. With a female earner, family income is less dependent of male wages, thus reducing the employment of married men with working wives. On the other hand, spousal employment may reduce the attractiveness of leisure time since there is no companion with which to share it. Shirle (2008) argues that the leisure effect dominates the income effect (not surprising since previous literature finds husband employment elasticity with respect to wives wages in the range of zero), thus, the rise in female employment levels is now producing an increase in older male employment, with spousal employment now explaining one-fourth of U.S. labor force participation for married men between 55 and 64 (Shirle 2008).

The presence of children and options available regarding childcare are particularly important to female willingness to work, although research suggests that having a child is less of a deterrent to work than it was in previous decades. In 1970, only 30 percent of mothers with preschool age children were working, but by 1992, 62 percent were working. Additionally, labor force participation for mothers with infants has risen dramatically. In the 1960s, only 14 percent of mothers worked within the first six months of giving birth and only 17 percent worked within the first year. By the mid-1980s, 53 percent of mothers worked within the first six months of giving birth and 61 percent within the first year, suggesting huge changes in the relationship between children and the mothers' work status (Hofferth 1996).

Despite the increased labor force participation among mothers, evidence still suggests that all other things being equal, women with children are less likely to work, particularly when their children are young. For both married and unmarried mothers in the United States, the presence of a child under the age of 1 reduces the probability of employment by about 30 percent. The presence of a child under the age of 5 reduces employment probability by 20 percent, and once the youngest child has reached school age, the

probability of employment is only reduced by 10 percent (Waldfogel, Higuchi, and Abe 1999). In addition to the age of the children, workplace policies impact the probability of working after childbirth. Looking at job retention (women who return to the same job after childbirth), the Waldfogel et al. find that women with maternity leave benefits are significantly more likely to return to their original job, although this effect decreases when prior job tenure is accounted for and is smaller for women with a college education.

Hofferth (1996) looks at the effects of both public and private policies on mother's reentry into the labor market after giving birth using data from the National Child Care Survey from 1990, a survey of households with children under age 13 funded by the National Association for the Education of Young Children and the Administration for Children, Youth, and Families. Using a proportional hazards model, Hofferth estimated the length of time before mothers started working after a birth. Hofferth found that each year of education increased the probability of working by 8 percent. Each year of age reduced the probability of employment by 4 percent, while each additional $1,000 of family income reduced the probability of working by 1 percent. Each additional child reduced the probability of working 14 percent. With respect to the public and private policy variables, state-level policy variables had no impact on reentry into the labor force, but private policies (especially the ability to work part-time) were significantly related to returning to work after child birth.

Unearned Income and Labor Supply: In addition to wages, gender differences, and family structure, unearned income has an impact of labor supply choices, but as Imbens, Rubin, and Sacerdote (1999) note, estimating the impact is difficult: "Estimation of income effect, however, is complicated by the fact that realistic amounts of income are almost never randomly assigned and exogenous changes in income are difficult to identify" (pg. 1). In reviewing the literature on income's impacts on employment choices, the authors characterize studies as falling into one of three categories. The first types of studies are those using micro-data with unearned income measured frequently as spousal labor income or capital income. Unfortunately, both spousal income and capital income are not truly exogenous to personal earned income. A second set of studies come

from a set of negative income tax experiments conducted in the early 1970s, which tended to find that male labor supply was insignificantly related to income supplements, though critics of the studies argue that this is due to the fact that the studies only covered participants for a span of three to five years. The third types of study that Imbens, Rubin, and Sacerdote (1999) describe are those taking advantages of natural experiments that resulted in a likely random distribution of large sums of money. Examples of natural experiments include one-time war reparations to Israeli citizens from the German government, one-time payments to selected-service men and WWII, and the effects of inheritances on employment. The authors argue that these measures may not be truly exogenous but are more likely to be independent of personal preferences than spousal earnings or capital income.

Imbens, Rubin, and Sacerdote (1999) take advantage of one such natural experiment to get around the measurement challenges of assessing the general effect of unearned income on work behavior. They survey Massachusetts lottery players to relate the impact of lottery winnings to labor choices. Measuring labor choices in terms of the decision to work, the number of hours worked, and future earnings (as reported by the Social Security Administration), the authors find that winning a modest lottery prize ($15,000 a year for 20 years does not impact future earnings) while winning a large prize ($80,000 a year) reduces labor supply, hours worked, and earnings, with the findings unchanged after adding controls for gender, age, and previous employment status. The authors acknowledge that there results may have limited external validity due to the fact that lottery winnings may be treated differently from other sources of unearned income and from the fact that lottery players may not be representative of the general population.

There is also a considerable existing literature on the impact of income transfer programs on the labor supply of the poor. Economic theory suggests that income transfer programs should reduce the labor supply of recipients. This effect occurs both because the benefits from these programs increase household income without any work effort, but also because of the high marginal tax rates these impose on recipients as their earned income rises and means tested income from income support programs is reduced. In his

review of the literature, Moffit (2002) notes that there is a strong correlation between labor force participation of recipients and marginal tax rates and that most programs to help low-income persons (such as TANF, Medicaid, and Food Stamps) have 100 percent marginal tax rates at some income level. Further, marginal tax rates are particularly high for families participating in multiple programs when an increase in income would cause them to loose multiple sources of benefits. For example, even after the 1996 passage of TANF (which *reduced* the marginal tax rates of welfare), going from no work to part time work at the minimum wage resulted in a marginal tax rate of 34 – 71 percent from the loss of TANF and Food Stamps alone (this does not include housing subsidies or Medicaid which would increase the marginal tax rate) (Moffitt 2002).

However, to some extent these adverse effects are mitigated by the Earned Income Tax Credit (EITC – a negative income tax for low-income persons in the U.S.) which serves to reduce these high marginal tax rates and improve the labor supply of persons at the low-end of the income distribution. For persons moving from no employment to part-time employment, the EITC accomplishes this objective, reducing marginal tax rates by 40 percent, so that adjusted marginal tax rates are 30 to 47 percent. On the other hand, the EITC increases marginal tax rates associated with moving from minimum wage to $9 an hour at full time work because it starts to be phased out (Moffit 2002). These marginal tax rates suggest that the EITC should have two labor supply effects: (1) it will induce single parents to work at least some hours during a year; and (2) it will decrease hours worked among those already working (Meyer 2002). Phrased slightly differently, economic theory suggests that the EITC will increase labor force participation at the extensive margin but reduce it at the intensive margin.

In his review of the empirical literature, Moffit (2002) finds that the field is dominated by methodological controversies regarding appropriate data sources and estimation methods. Generally, though, the literature prior to 1995, found that the old AFDC program reduced labor supply by about 10 to 50 percent from what it would be in the absence of the program, while the Food Stamps program had minimal impact on labor supply. Recent research confirms the lack of disincentives in the Food Stamp program, but has had more

mixed results regarding TANF and the EITC, though there is some evidence to suggest that the EITC increases the probability of working but not the number of hours worked. It appears that the switch from AFDC to TANF and the addition of the EITC has reduced the negative labor supply incentives of welfare, though the magnitude of the change has not been estimated (Moffit 2002).

Noonen et al. (2005) find that during the 1990s, the EITC was a major driver of increased employment for all single mothers – explaining 20-25 percent of the increase in black single mothers' employment and 23-31 percent of the variation in white single mothers' employment. The change from AFDC to TANF was also a cause of increased employment, though substantively smaller – accounting for 10-20 percent of the increase in black single mothers' employment and 8 percent of whites.

In a more recent study, Noonan, Smith, and Corcoran (2005) look at the impact of the EITC during the 1990s and between 2000 and 2003 for black and white single mothers. The employment of black single mothers rose from 49 percent in 1991 to 69 percent in 2000; for white single mothers, the respective numbers are 70 percent and 83 percent. Between 2000 and 2003 both groups saw their employment rates fall – down to 68 percent for blacks and to 77 percent for whites. These numbers suggest that while white single mothers are more likely to work than black single mothers, the employment rates for black single mothers are increasing faster than those for whites.

The high marginal tax rates associated with programs to assist low-income people are problematic because they provide significant disincentives to work. As the EITC example shows, there is no way to eliminate these disincentives because at some point, eligibility ends – otherwise, the programs are no longer targeting low-income people.

Research also indicates that unearned income from government programs other than those targeted towards to poor has an impact on the non-poor. One category of literature on unearned income focuses on social insurance. In a literature review on social insurance, Krueger and Meyer (2002), find that existing evidence is much more

conclusive regarding unemployment insurance (UI) and workers compensation (WC) than it is on social security and disability insurance. The authors find that the elasticity of both incidence and duration of unemployment is about 1.0 with respect to UI benefits; and the elasticity of incidence and duration with respect to workers compensation claims is between 0.5 and 1.0. For all four programs, there are a variety of existing methodologies to address the question of unearned income's impact on labor decisions, but most studies rely on differences between state policies or changes to federal policies in impacting the magnitude of the effects. A limitation of this field of research is that benefits for UI, WC, social security, and disability insurance are a function of a person's earning's history in addition to government policies.

With respect to unemployment insurance, Krueger and Meyer (2002) find that empirical evidence supports the hypotheses that receipt of UI reduces labor force participation. However, in a review of the U.S. and international literature on UI, Fredriksson and Holmlund (2006) find that increased stringency of enforcement of job-search requirements (particularly when coupled with financial sanctions) can significantly reduce the time on unemployment and raise the rate of transition from non-employed to employed status. Workmen's compensation affects labor supply by reducing efforts on the part of employers and employees to prevent injuries, and by increasing the likelihood of filing a claim for benefits and remaining out of the work force while benefits are being received, hypotheses that find support in the empirical literature (Krueger and Meyer 2002).

While empirical studies of UI and WC tend to reach similar conclusions, Krueger and Meyer (2002) find that the literature on Social Security and Disability Insurance is far less clear, in part due to estimation challenges and interactions with other conditions and government programs. With respect to Social Security, it impacts labor supply through changes in retirement decisions; however, the direction of this relationship is uncertain. Social Security creates a wealth effect by providing income to persons over the age of 62, possibly promoting earlier retirement, but because benefits increase for those who remain in the work force there is also an incentive to delay retirement. One clear finding in the

literature on retirement decisions and social security is that there are very high retirement rates just after the 62nd and 65th birthdays.   Krueger and Meyer (2002) note that some studies have linked these retirement patterns to health insurance status – largely because of Medicaid eligibility. Workers lacking employer-sponsored health care are most likely to retire at age 62, while those that have employer-sponsored health insurance but no insurance upon retirement, are most likely to retire upon reaching age 65. Krueger and Meyer (2002) also note that the retirement peaks observed at age 65 may be the result of pension penalties for workers that continue working after reaching age 65 and former mandatory retirement ages (though these were eliminated for most occupations in 1987).

Taken together, these findings suggest that there is substantial evidence that income support and social insurance programs impact labor supply, usually as a deterrent, but that the nature and magnitude of the impacts are difficult to measure.

B. Ability to Work

In addition to people's willingness to work, it is important to account for their ability to work. An individual may be unable to work because of physical or mental disability, age, or lack of transportation or available child care. We have already discussed the latter two concerns in previous sections. Here we focus on health as a factor affecting employability.

There are several theoretical reasons why employment might be sensitive to health status. Poor health may make it difficult for individuals to perform adequately in a work environment, thereby reducing their productivity (and their attractiveness to potential employers); it may also reduce an individual's ability to physically get to the place of work. As Currie and Madrian (1999) suggest, (1) poor health may lower worker productivity or prevent functionality entirely; (2) employer costs in accommodating disabled or ill workers may result in fewer hires or reduced wages for people in poor health; (3) persons in poor health may face discrimination; and (4) poor health may

reduce a person's total time endowment, changing the relative attractiveness of leisure relative to income.

Indeed, health status is an important determinant of employment status. Haveman, Bershadker, and Schwabish (2003) look at the difference between earnings capacity and actual earnings finding that illness is a major and increasing source of unrealized earnings. In 1970, unrealized earnings as a result of illness were 13.94 percent of total unrealized earnings, rising to 21.32 percent in 2000, suggesting that illness of the working age population is an increasing source of persons not working to their full potential. Evidence also suggests that illness is an increasingly important determinant of female employment relative to male. Between 1975 and 2000, the per capita change in lost earnings as a result of illness increased $307 for men and $601 for women, which indicates either an increase in illness among working age women relative to men or higher work elasticity with respect to health status among women (pg. 107-127).

Research on the effect of health on employability is confounded by the difficulty in defining and measuring health status. In their review of the existing literature, Currie and Madrian (1999) group the types of health measures used into eight categories: (1) self-reported health status from survey data; (2) health limitations on the ability to work; (3) other functional limitations on activities of daily living; (4) presence of acute or chronic conditions; (5) medical utilization; (6) clinical assessments; (7) nutritional status; and (8) expected or future morbidity (pg.3314). The authors note that empirical results are very sensitive to the choice of health measure and recommend using multiple measures. Self-reported measures (particularly those that ask respondents whether they have a condition that interferes with their ability to work) tend to be most relevant for labor market decisions since different jobs require different types of skills – the inability to walk would be much more debilitating for a construction worker than for a computer programmer, for example. However, self-reporting of health status is subject to several biases[14].

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[14] First, those out of the labor market (particularly persons that have applied for disability insurance) are more likely to report poor health status than persons of equal health status that remain in the labor market. This could create an upward bias in the estimate of the impact of health status on employment status. In the opposite direction, there is a relationship between seeking treatment or having a diagnosis and reporting a

Bound, Stinebricker, and Waidmann (2007) recommend modeling health as a latent variable to avoid the problems associated with more traditional measures of health status. The authors argue that self-reported health measures are problematic because they are discrete when health status is a continuous condition, respondents use different scales when responding to survey questions, and there is an endogenous relationship between labor force decisions and responses to questions about health status. Bound et al. (2007) use the latent variable approach with data from the Health and Retirement Study (survey conducted between 1992 and 1998). For single men aged 50-62, they find that labor force exits are five to ten times greater for those in poor health than for those in average health, a large result but lower than what they would have found had they employed the traditional binary measure of health status, the authors note.

Despite significant variation in findings regarding health and employment, Currie and Madrian (1999) conclude that there is significant evidence that both employment status and wages are impacted by health, but that the effect on hours worked is stronger than the effect on hourly wages (pg. 3319). Poor health is also an important predictor of early retirement, with a stronger effect in older populations. Mental illness and substance abuse tend to have an especially large impact on employment, a finding the authors attribute to the fact that these are more prevalent in the prime age working population than other conditions, which predominantly impact the elderly.

In terms of disability and employment, Haveman and Wolfe (2000) find that the employment of all men decreased between 1970 and 1992, but at a much faster rate for the disabled, particularly the disabled aged 55-64. Table 3 illustrates these differences:

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condition. Since access to medical treatment is highly correlated with income and employment, this could increase the percentage of employed, wealthy persons reporting poor health, generating a downward bias in the coefficients.

Table 3: Differences in Labor Force Participation by Disability Status

	1970 Labor Force Participation Rate (%)	1992 Labor Force Participation Rate (%)
All Men	79-91	65-85
Disabled Men	52-72	33-60
All Women	43-52	47-72
Disabled Women	25-35	26-50

Data from Haveman and Wolfe 2000

These numbers suggest that currently disabled males and females are about equally likely to be employed but that the employment of disabled males is decreasing while that of females is increasing.

In a study of the impacts of health on employment status in Australia, Cai and Kalb (2006) find that health is a more important predictor of employment for the elderly and for women. The authors use data from the 2001 Household, Income, and Labour Dynamics in Australia (HILDA) survey and jointly model labor participation and health status. Health is measured as a scale variable based on self-reported health (5 scales from poor to excellent) and the model is estimated separately for the following groups: men under 50, women under 50, men 50-65, and women 50-61 Controlling for a variety of other factors[15], the authors find that for an older man, moving from good to poor health decreases the probability of labor force participation by almost 7 percent, while the same move for a younger man reduces the probability less than 1 percent. For females, the effects are even stronger; with a move from good to poor health reducing the likelihood of labor force participation by almost 9 percent for older women and almost 2 percent for younger. When going from excellent health to poor, men over 50 see an almost 21 percent decrease in the probability of labor force participation compared with a little over 2 percent decrease for men under 50. For women the respective numbers are over 25 percent and 6.5 percent (pg.254).

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[15] The authors control for age, education, marital status, foreign birth, and children in the labor force equation. Included in the health status equation are age, marital status, education, nature of employment, and selected lifestyle characteristics.

Health status also interacts with other determinants of employment. In a review of the literature, Currie and Madrian (1999) note that the elasticity of labor supply to wages is much smaller for the healthy than for the non-healthy. Studies that control for health status thus tend to have much smaller estimates of wage responsiveness than those that don't (pg. 3314). The authors also note the relationship between race and health status. They find that older black men are 1.5 to 2.5 times more likely than older white men to have one of several debilitating diseases, and that health status is highly correlated with socio-economic status. Thus, many of the observed racial gaps in employment may result from differences in health status. One problem with estimating the effects is that most of the research on health and employment status focuses on elderly white males, offering no variation based on gender, race, and age.

Conclusions that can be drawn from the literature review on health and employment status are that health status is an important predictor of work status. However, these effects increase with age and are stronger for women than for men. An additional complication is that health status is itself a function of access to health care. Access to health care is largely determined by income and especially in the U.S. employer-based health care system, employment. Thus, the relationship between health status and employment is likely to be endogenous (Currie and Madrian 1999).

Conclusion

We have reviewed literature relating to the determinants of employment status and the probability of employment for individuals as background to our proposal for research on the determinants of employment for residents of Washington, DC. This review demonstrates that the relevant factors can be categorized as 1) human capital, 2) individual attributes, including race, gender, immigration status, and criminal record, 3) access to jobs, 4) willingness and ability to work, and 5) the availability of jobs in the regional labor market. Table 4 summarizes our findings. Where relevant the findings are broken down by race and gender.

Table 4: Summary of Findings from Residential Employment Literature Review

Variable	Effects on Men	Effects on Women	Extent of the Literature	Consistency of the Literature
Formal Education	+ +	+ +	Large	Consistent
Literacy	+ +	+ +	Small	Consistent
Other Skills	+ +	+ +	Small	Consistent
Work Experience	+ +	+ +	Small	Consistent
Age + Age Squared*	+ +/- -	+/-	Large	Consistent
Minority Status	- -	-	Large	Inconsistent
Immigrant Status	?	?	Small	Inconsistent
History of Incarceration	- (A) - - (B)	?	Large for men, small for women	Mostly consistent
Residence in Inner City	- (A) - - (B)	- (A) - - (B)	Large	Consistent
Proximity to Available Jobs	- - (A) - - (B)	- - - - (B)	Large	Consistent
Marital Status	+ (B) + + (W)	- -	Large	Consistent
Children at Home	+	- (B)** - - (W)**	Large	Consistent
Unearned Income: Social Insurance	-	-	Medium	Inconsistent
Unearned Income: Means Tested	0	- -	Large	Inconsistent
Health Status	- -	- -	Large	Consistent

*Age plus age squared are used to reflect that for age, the relationship is quadratic, not linear. That is employment peaks around age 30-45 depending on the model, sample, time period, and other control variables

**This is highly dependent on the age of the children and interacts with marital status and family leave policies.

***Where possible, we have indicated variables that have different effects for different racial groups. In some cases, race does not interact with the variable or the nature of the interaction is not known.

    +   = positive relationship, more symbols indicates a stronger relationship

    -   = negative relationship, more symbols indicates a stronger relationship

    A   = all races

    B   = blacks

    W = whites

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