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ABSTRACT

Occupation and Gender*

Occupational differences by gender remain a common feature of labor markets. We begin by documenting recent trends in occupational segregation and its implications. We then review recent empirical research, focusing on new classes of explanations that emphasize the role of gender differences in psychological traits, preferences for non-pecuniary (family-friendly) job characteristics, personality traits, and skills. Using detailed data on occupational work content from O*NET linked to the American Community Survey (ACS), we examine how the various job attributes identified in the literature affect men and women's occupational choices and the gender wage gap. Finally, we consider the role of gender identity and social norms in shaping occupational choice and preferences for various job attributes. We conclude with policy implications and suggestions for future research.

JEL Classification: J16, J24

Keywords: gender, occupation, segregation, gender preferences, family-friendly, psychological traits, personality traits, identity

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1. Introduction

Despite the converging roles of men and women in the labor market, occupational segregation, defined as the tendency of men and women to work in different occupations, continues to be a strong feature in labor markets around the world. Gender differences in occupation and industry have been widely found to contribute to gender wage differences.[1] Recent work by Blau and Kahn (2016) highlights that as women have closed the gap in human capital accumulation, traditional human capital variables such as education and experience explain little of the gender wage gap, while gender differences in occupation and industry continue to be important. In fact, in 2010, occupation and industry were found to constitute the largest portion of the explained component of the gender wage gap. These trends highlight the importance of understanding the causes and consequences of differences in employment distributions by gender.

In this chapter, we begin by discussing the measurement of occupational segregation (Section 2.1) and trends in occupational segregation (Section 2.2). Section 3 examines the implications of occupational segregation, focusing on its impact on gender differences in pay. In Section 4, we review a range of potential explanations, focusing in particular on new classes of explanations for gender differences in occupational choice. Earlier work typically attributed patterns of occupational segregation by gender to differences in human capital accumulation (either pre- or post-labor market entry) or to discrimination being more pronounced in some occupations than others. While gender differences in preferences for particular job attributes has been suggested as a potential explanation for gender differences in occupational choice, empirically, it has been quite difficult to distinguish between preferences and discrimination. In Section 4.1, we review recent advances in understanding gender differences in preferences for job attributes that includes research emphasizing the potential role of systematic differences in psychological traits between men and women such as risk preferences, attitudes toward competition, and social preferences. We also consider the role of women's relative preference for non-pecuniary (family-friendly) job characteristics that may lead them to choose lower-paying occupations that offer better career-family balance. Section 4.2 reviews recent literature that highlights the role of gender differences in personality traits and other sources of gender differences in skills that might contribute to differences in occupational choices, such as sex differences in interpersonal styles, social skills, and sensory and motor skills. In Section 4.3, we use detailed data on occupational work content, activities, and skills from the Occupational Information Network (O*NET) database, linked to the 2009-2011 American Community Survey (ACS) to provide a comprehensive descriptive analysis of the relationship between the occupational characteristics discussed in Sections 4.1 and 4.2 and gender differences in occupational choice and gender wage gaps. In Section 4.4, we explore the role of gender identity and social norms regarding the appropriate behavior and roles of men and women in society and how this might shape occupational choice. We conclude in Section 5 with some suggestions for future research and policy implications.

[1] For example, see Groshen (1991), Macpherson and Hirsch (1995), Altonji and Blank (1999), Blau et al, (2009), and Blau and Kahn (2016

2. Measurement and Trends in Occupational Segregation

2.1 Measurement of Occupational Segregation

A commonly used measure to summarize differences in the distribution of women and men across occupation categories is the index of segregation developed by Duncan and Duncan (1955). The index of occupational segregation by sex is computed as:

$$D = 0.5 \sum_{j} |M_j - F_j|$$

where M_j (F_j) is the fraction of all employed males (females) who work in occupation j. The index, which ranges between 0 and 1, indicates the proportion of women or men that would need to change occupations for the occupational distribution of men and women to be the same. In other words, if the distribution of men and women across occupational categories were identical (complete integration), the segregation index would equal 0. If all the occupations were either completely male or completely female (complete segregation), the segregation index would equal 1.

When considering changes in the segregation index over time, it is important to distinguish between two potential channels. First, a decline in the segregation index could occur because of changes in sex composition within occupations, which occurs, for example, when women enter male-dominated occupations, or conversely, when men enter female-dominated occupations. Second, shifts in the occupation mix of the economy away from predominantly male or predominantly female occupations would cause a decline in the segregation index, even if the extent of "within occupation" segregation remained unchanged (Gibbs, 1965; Blau, Brummund, and Liu, 2013). Fuchs (1975) proposed a method to decompose the overall change in segregation into a component that captures changes in sex composition, and a component that captures changes in the occupation mix.

2.2 Trends in Occupational Segregation over Time

As discussed in Blau et al. (1998), historical evidence suggests that the index of segregation was relatively stable from 1900 to 1950 at about 0.66 to 0.68. Blau et al. (2013) provide a systematic analysis of the trends in occupational segregation by gender from 1970 to 2009. As observed in Figure 1 (reproduced based on Table 2 in Blau et al., 2013), there was a large decline in the segregation index over the period, with the rate of decline diminishing substantially over the decades. Between 1970 and 1980, the index declined rapidly by about 6 to 9 percentage points. Between 1980 and 1990, the index declined by about 4 to 6 percentage point. The index continued to decline from 1990 to 2009, albeit at a diminished pace. Overall, these trends suggest that while there has been increasing gender integration across occupations over time, the degree of occupational segregation remains relatively high (according to Massey and Denton (1993), an index of segregation of 0.3 and below is considered low, between 0.4 and 0.6 is considered moderate, and above 0.6 is considered high).

Blau et al. (2013) show that the reductions in occupational segregation can be attributed to both the sex composition and occupation mix effects in each decade, with the exception of the 2000s, where the sex

composition effect accounted for the bulk of the (modest) reduction in segregation. This decomposition highlights that the slowing decline of the segregation index has been accompanied by a corresponding decline in magnitude of the sex composition effect, suggesting that slowdown in sex segregation does indeed represent a slowing in gender integration within occupation, rather than changes in the occupation mix in the labor market.

Consistent with the findings from earlier studies, the authors demonstrate that the decline in the sex composition effect was largely due to the movement of women into male-dominated occupations rather than a movement of men into female-dominated occupations.[2] This effect was further reinforced by the significant increase in the female share of total employment from 1970 to 2009. This uneven redistribution of women led to a substantial decline in the share of men in heavily male occupations, and had less of an impact on the share of women in heavily female occupations. These changes were accompanied by a substantial increase in the share of women in moderately (60 to 80 percent) female occupations, suggesting that the entry of women into initially male-dominated or integrated occupations may cause some occupations to re-segregate or "tip" toward becoming predominantly female (Strober and Arnold, 1987; Reskin, 1990; Pan, 2015).

To understand the persistence of occupational segregation, Pan (2015) investigates the dynamics of the process through which occupations have responded to the entry of women into the labor force. She documents that the dynamics of occupational segregation appear to be highly nonlinear and exhibit tipping patterns – that is, as the share of women in an occupation exceeds a critical threshold or range, men "flee" the occupation, leading to rapid feminization. These "tipping points" could arise from a Schelling (1971) social interaction model where tipping results from male preferences toward the fraction female in their occupation. Men's aversion to working in occupations with too many females may be due to the existence of society-wide gender-job associations that impinge on masculine identities (Akerlof and Kranton, 2000). Goldin's (2013) "pollution" model of discrimination suggests that men's reluctance to associate with females in the workplace could also be due to informational constraints (this model is described in detail in Section 4.4). Consistent with the predictions from the Schelling model, Pan (2015) finds that occupations tip at a lower female share in regions where men hold more sexist attitudes toward the appropriate role of women. The tipping phenomenon can provide a partial explanation for the persisting levels of segregation observed in the labor market today, and may also help explain why the historical path to gender equality has been relatively slow.

3. Occupations and the Gender Pay Gap

The persistence of relatively high levels of occupational segregation, coupled with large differences across occupations in pay suggests that the underrepresentation of women in high paying, male-dominated professions could help account for the gender pay gap. A large literature shows that female occupations pay less than male occupations with similar measured characteristics (Blau and Kahn, 2016; Levanon, England, and Allison, 2009).

[2] See for example, Cotter et al. (1995) and Blau et al. (1998).

Blau and Kahn (2016) perform a decomposition of the gender pay gap and document a rise in the relative importance of occupation and industry in explaining the gender wage gap. They find that in 1980, gender gaps in occupation and industry together accounted for 20 percent of the gender pay gap; by 2011, both factors explained more than half of the gender wage gap, and constituted the largest measured factors that account for male-female differences in wages.[3] This underscores Goldin (2014)'s observation that "as women have increased their productivity enhancing characteristics and as they 'look' more like men, the human capital part of the wage difference has been squeezed out."

While much of the literature has focused on gender-based sorting across occupations and its implications for the gender pay gap, Goldin (2014) emphasizes that the fact that a significant gender wage gap remains even after accounting for occupation and industry differences highlights the need to look *within* occupations to understand how jobs are organized and compensated and how this might differentially affect men and women. Specifically, she argues that some jobs disproportionately reward individuals who are willing to work long (and particular) hours, and that these same occupations tend to impose the largest penalties for workforce interruptions. As women tend to place a higher value on temporal flexibility, the result is a classic compensating differential equilibrium (Rosen, 1986) – women and men sort across workplaces and/or job positions accordingly, and workers earn premiums for providing long hours of work in workplaces that face higher costs of providing the amenity. Using a cross-section of occupations from the 2010 ACS, Goldin (2014) provides support for this view by showing that the returns to working long hours are higher in occupations that are characterized by less flexible work schedules or requirements (e.g. meeting deadlines, contact with others, establishing and maintaining interpersonal relationships, adhering to schedules, degree to which worker has close substitutes). Moreover, she shows that occupations characterized by higher returns to long hours (nonlinear pay) are also those with larger gender gaps in earnings. To the extent that the measured returns to working long hours have increased considerably over time across education groups, and for most occupations (Kuhn and Lozano, 2008; Cortes and Pan, 2016a), this might provide an explanation for the slow-down of the convergence of the gender pay gap in the past two decades (Cha and Weeden, 2014).

4. Factors Affecting Occupational Segregation by Gender

4.1 Gender Differences in Tastes and Preferences for Job Attributes

In this section, we discuss evidence of gender differences in tastes and preferences that might contribute to the persistence of occupational segregation and of gender gaps. We distinguish between preferences or tastes in two distinct dimensions. The first relates to gender differences in psychological attributes or preferences that may interact with the nature or content of the job to make some occupations more attractive to women and others more attractive to men – specifically, gender differences in risk preferences and attitudes toward competition, and social preferences (importance of social contribution vs. success and money). The second relates to preferences for certain job amenities such as temporal

[3] Occupation (Industry) fixed effects explain 5.1 (4.6) and 7.6 (4.1) percentage points of the gender wage gap in 1980 and 2010, respectively. While occupation and industry explain a slightly larger percentage point wage gap (11.7 vs. 9.7) in 2010 vs. 1980, the large increase in the share of the gender wage gap explained by both variables is largely driven by the decline in the total gender wage gap (47.7 percent vs. 23.1 percent) from 1980 to 2010 due, in part, to the disappearance of the human capital (education and experience) gap.

flexibility.[4] These distinct preferences by gender may translate into gender differences in earnings due to compensating differentials in which women are willing to give up higher earnings to obtain other job attributes.

4.1.1 Attitudes toward Risk and Competition

Gender differences in risk aversion and competitiveness have been found in the laboratory and in the field (see excellent surveys by Bertrand (2011) and Azmat and Petrongolo (2014)).[5] As jobs in different sectors differ on a variety of attributes such as job security, earnings stability, injury and fatality risk, performance evaluation, and degree of competition, systematic gender differences in attitudes toward risk and competition could directly affect the types of jobs that men and women sort into, and consequently, gender gaps in earnings.

Despite the potentially important role that gender differences in risk aversion might play in explaining occupational segregation, the literature on the topic is scant, likely due to data availability, as most labor force surveys do not include direct measures of risk aversion. DeLeire and Levy (2004) overcome the lack of direct measures by using family composition as a proxy for risk aversion. Their hypothesis is that single parents and married mothers with children are more averse to death risk in the job. Using data from the CPS and data on fatal and nonfatal risks associated with each occupation from the BLS, they find that within gender, single parents are more averse to risk and tend to sort into safer occupations. They also find that women are much more risk averse than men, and women with no children are more risk averse than single fathers. Sloane and Grazier (2006) find similar results for the United Kingdom. DeLeire and Levy (2004) argue that differences in fatality risk across occupations can explain about a quarter of gender segregation by occupation.

Bonin et al. (2007) study the effect of earnings risk, measured as the variation in the unexplained component of wages, on occupational choice. Utilizing the German Socio-Economic Panel, which includes a self-reported measure of risk aversion, the authors find that individuals willing to take more risks earn more and sort into occupations with greater earnings dispersion. An important limitation of the study is that the sample is restricted to males; therefore, it does not directly address the role of gender differences in risk aversion on occupational segregation and gender wage gaps. Nonetheless, to the extent that women have been found to be consistently more risk averse than men, the findings from this study suggest that women are likely to end up being overrepresented in low-risk occupations that offer lower earnings variance and, as a result of compensating wage differentials, earn lower pay.

[4] We note, however, that gender differences in both dimensions might share a common cause, namely, gender identity and social norms regarding the appropriate role or behavior of women in society.

[5] Laboratory experiments typically use randomization to test hypotheses in the highly controlled, albeit artificial, setting of a laboratory. Field experiments apply similar experimental methods as those used in the laboratory but in the real world. Field experiments often have the advantage that the outcomes are observed in a natural setting and are therefore likely to have higher external validity than laboratory experiments. Moreover, some phenomenon (e.g. occupational choice or educational choice) cannot be easily studied in a laboratory. However, the trade-off is that field experiments tend to be a lot more expensive and researchers typically have less precise control over experimental conditions.

The literature on the role of gender differences in attitudes toward competition in explaining differential sorting into jobs is considerably larger. Flory, Leibbrandt, and List (2014) examine whether competitive workplaces deter female workers using a field experiment in which they randomize close to 9,000 job seekers into job ads with varying compensation schemes. They find large gender differences in the willingness to apply for a job with a more competitive compensation scheme. By varying other aspects of the job ads, the authors find teamwork, the age of the job seekers, and whether the job position has overt gender associations, attenuate gender differences in preferences toward competition. Smaller gender differences are found in studies that utilize survey data to infer preferences toward jobs that offer more competitive compensation schemes. Using data from the British Workplace Employment Relations Survey (WERS), Manning and Saidi (2008) find that women in the United Kingdom are slightly less likely than men to be employed in jobs in which compensation is based on performance, and that gender differences in the receipt of performance pay explains only a small portion of the gender wage gap in their data. Using NLSY data, McGee, McGee, and Pan (2015) find consistent results for the United States, although their results suggest slightly larger gender differences in the incidence of performance pay and its role in explaining the gender pay gap, particularly for the most recent cohort. Nonetheless, the observed gender differences in the likelihood of working in a performance pay job do not appear anywhere as large as the analogous gender difference observed in laboratory and field studies. One reason for this difference is that in the laboratory, subjects choose between environments fully characterized by differences in competitiveness, whereas in the labor market, workers choose between jobs with many characteristics, and competitiveness may not be the most important preference when considering gender differences in the labor market (McGee, McGee, and Pan, 2015). Furthermore, laboratory experiments may be designed in such a way as to magnify differences, whereas in reality, such compensation or incentive schemes may not be observed in the labor market (Manning and Saidi, 2008).

Several papers have examined the role of tastes for competition in career choice. Buser, Niederle, and Oosterbeek (2014) combine an experimental measure of competitiveness with the academic track choice for a sample of high school students in the Netherlands. They find that more competitive students (according to the laboratory measure of competitiveness) were significantly more likely to choose the more prestigious academic tracks of math and science, even after controlling for ability measures. Moreover, gender differences in the laboratory measure of competitiveness explain about a fifth of the gender gap in academic track choices among Dutch students. In contrast, Reuben, Wiswall, and Zafar (2016) do not find a significant relationship between laboratory measures of competition and college major choice in a sample of students from New York University. They do, however, find that competitiveness is positively correlated with expected earnings, even within majors. They conclude that gender gaps in competitiveness and overconfidence explain about 18 percent of the gender gap in earnings expectations. Finally, Reuben, Sapienza, and Zingales (2015) combine laboratory measures of preferences toward competition with labor market outcomes for a sample of MBAs from a top business school. Their findings suggest that more competitive individuals, as measured by their choices in the lab, earn 9 log points more than their less competitive counterparts, after controlling for demographic and ability measures. They show that one channel through which competitiveness affects salary is industry choice, with more competitive students more likely to go into finance and consulting. The authors estimate that gender differences in tastes for competition accounts for close to 10 percent of the gender gap in earnings.

One potential rationalization for women's distaste toward competition is that women may underperform in competitive settings. Several laboratory experiments have documented such gender differences in performance in response to competitive pressure (Gneezy, Niederle and Rustichini, 2003; Gneezy and Rustichini, 2004).[6] To the extent that these differences extend to the labor market, they might play a role in explaining gender pay gaps. Evidence from the field, however, is mixed. Earlier studies by Lavy (2013) and Paserman (2010) examine gender differences in the performance of high school teachers and professional tennis players, respectively, and find little evidence that women underperform in more competitive settings. More recently, a number of studies focusing on real-world academic settings show that men appear to outperform women when competitive pressures are higher, whereas the reverse holds true in less competitive settings (Cai et al., 2016; Morin, 2015; Azmat, Calsamiglia, and Nagore Iriberri, 2015; Örs, Palomino, and Peyrache, 2013; Attali, Neeman, and Schlosser, 2011, and Jurajda and Munich, 2011). As most of the existing studies focus on specific occupations (e.g. high school teachers and tennis players) or academic settings, the extent to which such performance differentials can explain actual gender differences in labor market outcomes remains unclear.

4.1.2 Social Preferences: The Importance of Social Contribution vs. Success and Money

Women and men could select into different occupations if they differ in terms of the importance that they attach to certain job attributes, such as the perceived social value of the work in an occupation and opportunities to interact and empathize with people. Gender differences in social preferences have been studied both through experiments and surveys. In laboratory experiments, the focus has been on differences in altruism. The main findings suggest that women are not in absolute terms more socially oriented or altruistic, but that their altruism is different. Andreoni and Vesterlund (2001) finds that when altruism is expensive, women are kinder, but when it is cheap, men are more altruistic. Reviewing the existing literature, Croson and Gneezy (2009) concludes that women are neither more nor less socially oriented, but their social preferences appear to be more malleable and context dependent.

More consistent gender differences in social preferences are found in surveys. Using data from the National Longitudinal Study of the High School Class of 1972 (NLS72) and the National Education Longitudinal Study of 1988/94 (NELS88), Fortin (2008) documents important gender differences in the importance attached to money/work vs. people/family. In particular, she reports that the share of men who answer that "the chance to be a leader" is very important in selecting a career and that "having lots of money" is very important in life is 10 percentage points larger than the share for women. In contrast, women are 10 percentage points more likely than men to state that "opportunities to work with people rather than things" and "opportunities to be helpful to others or useful to society" are very important in choosing a career. Based on wage regressions that control for these preference measures, Fortin concludes that gender differences in valuing money/work and people/family account for 1.7 of the 23 log points gender gap in 1986. This role is larger than the role of gender differences in educational attainment and cognitive skills combined and are almost as important in magnitude as the role of gender differences in labor market experience and job tenure. Grove, Hussey, and Jetter (2011) report similar findings as Fortin (2008) in their study of students who took the GMAT entrance exam for graduate business school in the U.S. Similarly, Pinker (2008) argues that women tend to prefer jobs that require empathy and interacting

[6] By contrast, Niederle and Vesterlund (2007) find that men and women's performance increased similarly in the tournament scheme relative to the noncompetitive compensation scheme.

with people, which could explain why women are over-represented in people-oriented occupations and "care work" such as teaching and nursing (Folbre, 2012). Lordan and Pischke (2016) show that women report higher levels of job satisfaction and are less likely to leave people-oriented occupation. By contrast, men are typically less affected by the degree of people-orientedness of their occupations. Consistent with the notion that men place a higher value on money, several studies have shown that expected earnings or social status is a stronger determinant of college major choices for men relative to women (Freeman and Hirsch, 2008, Montmarquette, Cannings, and Mahseredjian, 2002, Boudarbat and Montmarquette, 2009, Zafar, 2013).

What is missing from these studies is a direct exploration of the channel through which gender differences in pro-social preferences affects occupational choice and the gender wage gap. In Section 4.3, we attempt to address this gap by using the O*NET database to construct an occupation-specific measure of social contribution and relate it gender differences in occupational choice.

4.1.3 Preferences for Workplace Flexibility

Another dimension that might lead men and women to make different job choices is an occupation's demand for workers' time. Some occupations require employees to put in long hours of work, work at non-standard times, or to be available at short notice. As women typically have greater household responsibilities, they tend to place a higher value than men on workplace flexibility, and thus have a preference for jobs that allow a greater degree of temporal flexibility. For example, based on our calculations from the 2005 International Social Survey Programme (ISSP),[7] if given the option, 50 percent of females aged 25 to 64 and only 25 percent of males would prefer a part-time job to a full-time job. Similarly, more women than men consider that "it is important or very important that a job allows them to decide times or days of work." Finally, even though, on average, women work fewer hours than men, they are 20 percent more likely to answer that they will "prefer working fewer hours and earning less money" than "working more hours and earning more money" or "working the same number of hours and earning the same money."

Recent work by Flabbi and Moro (2012) and Wiswall and Zafar (2016) seek to quantify these gender differences in preferences for workplace flexibility. Flabbi and Moro (2012) estimate preference parameters for a search and matching model with wage bargaining in which both flexible and non-flexible jobs are offered. Using data from the CPS, they find that more than one-third of women place a positive value on flexibility; however, willingness to pay for it is not high. College educated women with a positive preference are willing to pay between 1 and 10 cents per hour to work part-time, whereas those with at most a high school degree are willing to pay about 2.5 cents per hour. Utilizing a survey of hypothetical job choices administered to undergraduate students from an elite university, Wiswall and Zafar (2016) estimate larger willingness to pay for workplace flexibility. They find that women have significantly higher willingness to pay for a job that offers the option of working part-time than men – females are willing to give up 7.3 percent of their annual salary for a job with a part-time option; by contrast, men are willing to give up 1 percent of their annual salary.

[7] The ISSP is a cross-national collaboration on social surveys and has data for 32 countries, US included. Each year the survey includes a module on a specific topic. The 2005 module was on "Work Orientations". The sample size for 2005 is close to 45,000.

A small but growing number of papers have examined how workplace time requirements affect women's decisions to participate in the labor market and occupational choice. Pertold-Gebicka, Pertold, and Gupta (2016) document a switch from private to public sector jobs after the birth of a child in Denmark. Herr and Wolfram (2012) document that among Harvard graduates, women in flexible jobs — defined as the capacity to cut one's hours — are five to six percentage points more likely to remain working after having children. Using longitudinal data from the Survey of Income and Program Participation (SIPP), Cha (2013) shows that mothers are more likely to exit male-dominated occupations when they work 50 hours or more per week, but the same effect is not observed for men or childless women. Wasserman (2015) focuses on the decisions of female medical residents and finds that a reduction in weekly residency hours of medical specialties induced women to enter those specialties. Cortes and Pan (2016b) focus on the broader population of college-educated women and find that an increase in the share of males working more than 50 hours a week in an occupation reduces the share of young mothers working in that occupation, even after controlling for the occupation distribution of childless married women or men. Their findings suggest that recent increases in the prevalence of overwork might explain the persistent under-representation of mothers in engineering and business.

A separate but related set of recent papers explore the relationship between how occupations reward flexibility and the gender pay gap. Goldin (2014) documents that occupations vary in terms of how they reward long hours of work and that occupations characterized by a higher degree of convexity in the relationship between earnings and weekly hours are also those with the largest gender wage gaps. Cha and Weeden (2014) document that rising returns to overwork, coupled with the gender gap in the propensity to work overtime, worked to slow the convergence of the gender wage gap between 1979-2009. Cortes and Pan (2016a) find that exogenous shocks to the supply of long hours by high-skilled women – generated by intercity variation in low-skilled immigrant flows – reduce gender pay gaps among the college educated in occupations that disproportionately reward longer hours of work.

The role of the demand and supply for temporal flexibility in the gender composition of occupations is nicely exemplified in Goldin and Katz (2016)'s work on pharmacists. They document how increased substitution between pharmacists (resulting from technological changes) and the growth of retail chains at the expense of independent pharmacies reduced the prevalence and returns to working long hours attracting women to the occupation. Today, about 55% of pharmacists are female compared to 18 percent in 1980, and the gender earnings gap is much smaller than in almost any other college graduate field.

4.2 Gender Differences in Personality Traits and Skills

Traditional supply-side explanations for gender differences in job choices and gender wage gaps tended to focus on differences in human capital accumulation between men and women (Altonji and Blank, 1999). As the gender education gap has reversed in favor of women, recent studies have considered a more nuanced view of gender differences in personality traits and skills and how these skills are rewarded in the labor market. These differences in personality traits and skills can be regarded as part of an individuals' set of productive traits which are directly valued in the market, thus affecting how men and women sort into different occupations or jobs and earnings (Bertrand, 2011).

An obvious difference between men and women is that women tend to have a comparative advantage in cognitive relative to manual or motor skills, and these gender differences in "brains" vs. "brawn" are likely to explain why women tend to select into occupations that are more cognitive-task intensive (Welch, 2000). Several papers provide evidence that women have better interpersonal or "people" skills than men, and are matched to occupations in which "people" tasks are more important.[8] Borghans, ter Weel and Weinberg (2008) show that personality at age 16 is a significant predictor of later job assignment, and relatively caring people are more likely to work in caring jobs. Moreover, Borghans, ter Weel, and Weinberg (2014) document that the relative employment of women is higher in occupations that place a greater emphasis on people tasks, consistent with the idea that women are more well-endowed in interpersonal skills. A recent paper by Baker and Cornelson (2016) investigates the extent to which sex differences in sensory, motor, and spatial aptitudes can explain the observed degree of occupational segregation. The results indicate that these skills, as captured by Dictionary of Occupational Titles (DOT) codes, strongly predict men's and women's occupational choices, in the directions indicated by scientific research. The authors estimate that eliminating selection on these aptitudes would reduce the index of segregation by 23 percent in both 1970 and 2012. Moreover, accounting for gender differences in other skills such as cognitive skills, physical strength, and people skills, in addition to sensory, motor, and spatial aptitudes, would reduce the index by about one-third in both years. Using a similar approach and proxies for job skill requirements from the O*NET database, Levanon and Grusky (2012) find that physical and interactional social skills are particularly important in explaining gender occupational segregation.

Several papers focus on gender differences in interactive, analytic, and social skills to understand the impact of technological change on occupational skill requirements and female relative wages. These papers highlight that gender-based occupational selection on the basis of some personality traits and skills may increasingly favor women due to the growing importance of these skills in wage determination. In particular, these papers posit that technological changes are likely to have disproportionately benefitted women as women tend to be relatively more endowed in the skills that cannot be easily automated. Using a task-based framework introduced by Autor, Levy and Murnane (2003) and data from West Germany, Black and Spitz-Oener (2010) find that women have experienced relative increases in non-routine analytic tasks and non-routine interactive tasks, which are associated with higher skill levels. Moreover, women have experienced a pronounced decline in routine task inputs, in contrast to men, who experienced little change. The authors find that these relative task changes can account for a large fraction of the closing of the gender wage gap between 1979 and 1999.

Borghans, ter Weel, and Weinberg (2014) examine the effect of computerization on the relative demand for people/social skills and its implications for the labor-market outcomes of women. They present evidence that the spread of computers appears to have increased the relative demand for interpersonal interactions, which can potentially explain the rise in women's relative wages from the late 1970s to the early 1990s.[9] The authors argue that the slowing convergence of the gender-wage gap since the mid-

[8] Several studies have also shown that females score higher on tests of emotional and social intelligence (Hall, 1978, Woolley et al., 2010, Kirkland et al., 2013).

[9] Bacolod and Blum (2010) also demonstrate that increased demand for social skills might account for the narrowing of the gender wage gap.

1990s appears consistent with a slowdown in the rate of growth of the importance of people tasks, perhaps due to computers becoming more effective at substituting for interactive tasks.

4.3 How Do Occupational Characteristics Affect Occupational Segregation and Gender Wage Gaps?

Most of the studies that we reviewed in the sections above consider how gender differences in tastes or skill for a particular occupational attribute may lead to gender differences in labor market outcomes. As these studies use different settings (laboratory vs. field vs. surveys), datasets, and outcomes, it is not easy to compare the results across studies to get an overall sense of how gender differences in preferences/tastes for the various occupational attributes affects occupational segregation and observed gender wage gaps.

In this section, we attempt to address this gap by utilizing detailed information on the work content, activities, abilities, and skills required in an occupation from the O*NET database linked to data from the 2011 ACS to provide a comprehensive descriptive analysis of how gender differences in work-related preferences and skills affect men and women's occupational choices and the gender wage gap.

We create six composite variables using the O*NET database to describe the characteristics of an occupation, focusing in particular on the aspects of the job that map most closely to the job attributes discussed in sections above. Unless otherwise noted, the O*NET questions used are based on a five-point scale.[10] We construct the following measures:

1. *Competition*: Based on the question "How competitive is your current job?"

2. *Social Contribution*: Based on three questions, (a) "How important is concern for others to the performance of your current job" (b) "How important is assisting and caring for others to the performance of your current job" (c) "How important is service orientation to the performance of your current job" (actively looking for ways to help people).

3. *Inflexibility*: Based on two questions, (a) "How often does your current job require you to meet strict deadlines?" (1: never, 2: once a year or more but not every month, 3: once a month or more but not every week, 4: once a week or more but not every day, 5: every day). (b) "How many hours do you work in a typical week on your current job" (1: less than 40 hours, 2: 40 hours, 3: more than 40 hours).

4. *Interactional Skills*: Based on four questions, (a) "How much contact with others (by telephone, face-to-face, or otherwise) is required to performance your current job?" (b) "How important are interactions that require you to work with or contribute to a work group or team to perform your current job?" (c) "How important is establishing and maintaining interpersonal relationships to the performance of your current job?" (d) "How important is social perceptiveness to the performance of your current job?"

[10] Please refer to the O*NET data documentation for more details on the variable definitions.

5. *Cognitive Skills*: Based on the importance placed on the following four abilities for the performance of the job, (a) written comprehension, (b) mathematical reasoning ability, (c) deductive reasoning, (d) inductive reasoning.

6. *Physical Skills*: Based on the importance placed on the following two activities for the performance of the job, (a) general physical activities and (b) handling and moving objects.

To link the O*NET measures to the occupations in the Census, we use the crosswalks developed by Autor and Acemoglu (2011) and Dorn (2009). Our sample is comprised of 318 occupations. The composite measures are constructed by first normalizing each of the O*NET characteristics to have a mean of zero and standard deviation one in the full sample of occupations and taking the average of the normalized components. For ease of interpretation, we normalize the composite measures to have a mean of zero and standard deviation one in the full, unweighted, sample of occupations.

To examine the relationship between the various occupational characteristics and gender differences in occupational choice, we relate each of the six O*NET composite measures to the share of females age 25 to 54 in an occupation in 2011. Figure 2 graphically depicts the cross-occupation correlations. The size of the circle represents the employment size of each occupation and the dashed line in each panel is the fitted regression line, weighted by the employment size of each occupation. The correlations illustrated in the figure are all in the expected direction – the share of females is higher in occupations that are less competitive, place a greater emphasis on social contributions, are more flexible, require more interactional skills, and require less physical skills. There is a slight positive relationship between the fraction female in an occupation and the measure of cognitive skills, but the correlation is not statistically significant.

Columns (1) to (6) of Table 1 confirm the graphical correlations presented in Figure 2. With the exception of the cognitive skill index, the correlations are all highly statistically significant. In Column (7), we include all six composite measures together into the model to examine the independent effect of each occupational characteristic, conditional on the other occupational attributes. The magnitude of the coefficient estimate on interactional skills is now close to zero and not statistically significant, most likely because the measure of interactional skills and social contribution are highly correlated.[11] The coefficient estimates on the measures of competition, social contribution, flexibility, and physical skills remain statistically and economically significant. As shown in Column (8), these results continue to hold even when we include additional controls for occupation-level characteristics such as the educational composition, average age, and racial composition of workers in an occupation. The magnitude of the estimates from the full regression specification in Column (8) imply that a one standard deviation increase in the competition measure is associated with a 6.8 percentage point decrease in the female share in an occupation. A one standard deviation increase in the social contribution index is associated with a 12.7 percentage point increase in female share, while the corresponding increase in the inflexibility index is associated with a 5.8 percentage point decrease in female share. Finally, a one standard deviation increase in the importance of physical skills in an occupation is associated with a 16.6 percentage point decline in

[11] In fact, when the social contribution index is omitted from the model, the interactional skills index is positive and highly statistically significant.

the female share in an occupation. Overall, these results offer some empirical evidence in support of the notion that gender differences in preferences and skills for different job attributes contribute to gender differentials in occupational choice.

Next, we examine whether gender differences in occupational choice on the basis of these occupational attributes translate into gender differences in wages, Table 2 reports the gender difference in hourly wages among full-time, full-year workers in specifications with and without the various composite measures. Column (1) indicates that the hourly wages of females are about 22 percent lower than that of males after controlling for individual characteristics such as race, education, age and marital status.[12] Columns (2) to (6) include each of the composite measures in turn. The estimates in Column (2) indicate that the underrepresentation of women in competitive occupations lowered their relative wages, such that the competition index alone can explain about 23 percent of the residual gender wage gap. Gender differences in sorting on the basis of social contribution and flexibility account for about 5 percent and 27 percent of the residual gender wage gap, respectively (see Columns (3) and (4)). In contrast, gender differences in occupational choice on the basis of the three skill indexes (interactional, cognitive, and physical) tended to *raise* women's relative wages. This occurs because women tend to sort into occupations with higher interactional and cognitive skills, and these skills are associated higher wages. Moreover, women sort away from occupations that require more physical skills, which tend to offer lower wages. In Column (8), we estimate a full specification that includes all the occupational measures and find that, together, the six occupational characteristics can explain about 14 percent of the residual gender wage gap.

4.4 Gender Identity and Social Norms

Another potential explanation for the persistence of occupational segregation is the presence of slow moving gender identity norms regarding what is the "appropriate" work for men and women. In their influential paper, Akerlof and Kranton (2000) define identity as one's sense of self, or one's sense of belonging to a social category that comes packaged with a view about how people in that category should behave. Akerlof and Kranton (2000) propose a model where one's identity directly enters the utility function – in this model, social identity influences economic outcomes because deviating from the prescribed behavior associated with one's social category is costly.

Akerlof and Kranton (2000) apply the model to the notion of gender identity and consider how identity considerations may influence occupational segregation by gender. In this application, the two relevant social categories are those of a "man" and a "woman", and these two categories entail specific behavioral prescriptions. Akerlof and Kranton (2000) cite examples of occupations that are "gendered" e.g. Marines and trial lawyers are viewed as masculine, while nurses are viewed as feminine. As such, women (men) in "masculine (feminine)" occupations may incur a disutility as their actions are in conflict with the behavioral prescription for that gender category. This could explain why women may be reluctant to enter male professions. At the same time, a woman working in a "man's" job may threaten men's masculinity and their gender identity, prompting them to act against female co-workers, which creates a further disincentive for women to enter the occupation. In this context, the identity model provides a micro-foundation for taste-discrimination models (Becker, 1971), which assume that some groups have a

[12] The gender wage gap conditional on individual characteristics is commonly referred to as the "residual gender wage gap".

"distaste" for working with members of another group. Here, men are reluctant to associate with women on the job because of the perceived loss in male identity, even if in other circumstances, men get along well with women.

Goldin (2013) proposes a related model that shows how identity considerations can result in men wanting to avoid working with women in the same occupation. In her pollution theory of discrimination, Goldin (2013) assumes that in addition to wages, men also value how society construes the status or prestige of the occupation. In the model, prestige is based on the level of a productivity-related characteristic such as strength, skill, education, or ability, that might originally define the minimum qualification needed to enter a particular occupation. In the presence of uncertainty about changes in technology, society infers the change from observables, and female entrants into an occupation may signal that the job has undergone a negative productivity shock, even when it has not. Men therefore want to avoid having females in their occupations in order to protect their occupational status. In contrast to the identity model, where occupational desegregation occurs largely through change in social norms regarding gender identity, the "pollution" model emphasizes the role of imperfect information about the true productivity of female entrants into an occupation. In particular, Goldin (2013) suggests that occupational desegregation in the 1970s and 1980s could, in part, be explained by the credentialization of occupations through the widespread use of degrees and licenses, which served to provide objective measures of workers' productivity and eliminate the negative signal of hiring women.

While the gender identity model provides a useful way for understanding how social norms and discrimination may perpetuate occupational segregation, direct empirical tests of the relevance of the gender identity model in explaining occupational segregation are few. Several recent papers provide some indirect evidence consistent with the predictions of the gender identity model. Usui (2008) finds that women report less satisfaction with job-related amenities in male dominated jobs, while males are either indifferent or report higher satisfaction in predominantly male jobs. Using data from the United States, Britain, and Russia, Lordan and Pischke (2016) replicate these findings on job satisfaction, and additionally show that in occupations with a higher share of males, women are more likely to leave, while males are more likely to stay. They find that part of this effect for females is driven by differences in job content and context as proxied for by occupational characteristics which they label 'people,' 'brains,' and 'brawn.' The authors interpret these results as suggesting that women and men have different tastes for the content of the work that they do; nonetheless, the gendered nature of these occupation characteristics (e.g. female job satisfaction is lower in occupations with higher 'brawn' content, but higher in occupations that have higher 'people' and 'brain' content) suggests that identity considerations may lead men and women to gravitate toward occupations that require the skills that match prevailing gender stereotypes.

The difficulty in empirically distinguishing whether underlying gender differences in tastes and preferences for certain occupational attributes (such as those discussed in Section 4.1) are innate or stem from socially constructed gender identity norms has been discussed in some detail in the review article by Bertrand (2011). Bertrand (2011) provides an overview of studies in psychology that suggests that psychological attributes such as risk preferences, confidence, and assertiveness may be part of what people associate with the male identity, while women are expected to be docile and generous, and risk adverse (Eagly, 1987; Eckel and Grossman, 2002). Women's preferences for temporal flexibility may

also reflect adherence to behavioral prescriptions that indicate that men should take on the role of breadwinners and women as homemakers. As such, gender differences in personality traits and preferences could be a reflection of women (and men) conforming to societal expectations of the appropriate behavior or role of women (and men) as dictated by the identity considerations. There is some evidence that men and women that identify with more "masculine" traits[13] appear more likely to enter male-dominated fields of study and occupations (Antecol and Cobb Clark, 2013).

Two recent studies utilize a laboratory setting to establish a causal link between gender identity and preferences. Cadsby et al. (2013) examine how making salient gender and family identities vs. professional identities may influence preferences for competition. The authors generate exogenous variation in the salience of various social identities by "priming" MBA-student participants through questionnaires concerning either gender/family or professional issues. The authors find that females primed with the gender/family identity are significantly less competitive than those primed with the professional identity. Interestingly, opposite patterns were obtained for male subjects – males primed with the gender/family identity were significantly more competitive than those primed with the professional identity. Extrapolating these results, the authors hypothesize that one potential reason why women opt out of competitive professional occupations and careers may be the increased salience of the gender/family identity over the lifecycle. Focusing instead on risk preferences, D'Acunto (2015) uses a field setting – the Amazon Mechanical Turk (mTurk) online platform – to examine how subjects' risk tolerance changes after an experimental manipulation of their gender identity. Gender identity was made salient to treated subjects by asking them to read and respond (in the form of a short essay) to a text about gender stereotypes. Men whose identity were made more salient (exposed to male-identity prime) or threatened (exposed to female-identity prime) were found to be more risk tolerant after the experimental manipulation, and tended to invest more in risky opportunities. There were no discernable effects on women.[14] The author also finds that the effects appear weaker for younger cohorts of men, suggesting that gender identity stereotypes may have weakened over time.

5. Conclusion

Despite the remarkable progress that women have made in the labor market over the past century, occupations continue to be segregated along gender lines. The differential sorting of men and women into different occupations could be an important channel through which gender wage differences are maintained. At the same time, the same factors that lead men and women to choose different occupations may also have a direct effect on the gender wage gap. Over the last decade, labor economists have increasingly moved beyond the traditional focus on human capital differences and discrimination to explain gender differences in labor market outcomes. We reviewed three broad classes of explanations that have been the subject of much of the recent empirical work. These new classes of explanations have a

[13] In their study, masculine traits include a set of attributes such as independence, assertiveness, (not) shy, (not) sensitive, (not) emotional. These attributes have been identified as masculine in the Bern Sex Role Inventory (BSRI), an instrument used by psychologists to judge the masculinity or feminity of a person (Bern, 1974).

[14] An earlier study by Benjamin et al. (2010) finds no effect of gender salience on risk preferences, although they uncover effects for racial salience. There are two main differences between the studies. Benjamin et al. (2010) use a between-subjects experimental design while D'Acunto (2015) uses a within-subject design. Secondly, the experimental prime used in D'Acunto (2015)'s study was a lot more aggressive than the primes used in the Benjamin et al. (2010) study

lot of potential to improve our understanding of the underlying causes of gender differences in occupations and how occupation and gender interact to affect gender wage gaps. Nonetheless, there is clear scope for future work to address the gaps in the current literature.

While gender differences in behavioral traits such as risk aversion and attitudes toward competition are quite well established in the laboratory and field, and have been shown to matter for labor market outcomes in some settings, more work needs to be done to assess the quantitative relevance of these factors for observed gender differences in occupational choice and wages. Studies that use observational data to link measured preferences, job attributes, and occupation and wage outcomes offer some promise in addressing this question. Nonetheless, such regression-based studies (including the descriptive analysis presented in Section 4.3) may be susceptible to issues relating to the endogeneity of preferences for certain job attributes. Moreover, to the extent that the share of women in an occupation might affect the workplace environment and measured occupational characteristics, there is a concern of reverse causality. Furthermore, it is challenging to attach a causal interpretation to the various behavioral/personality traits or occupational attributes included in this model, since there is a question about precisely what it is that these variables are capturing, and whether the observed relationships may be capturing omitted factors. Therefore, such evidence based on survey data may need to be combined with well-designed experiments in the field and/or plausible sources of exogenous variation in order to credibly identify how gender differences in preferences and behavior shape labor market outcomes.

Another aspect that would benefit from future research is an investigation of the sources of gender differences in behavioral traits and preferences. The extent to which the observed gender differences in tastes and preferences for particular job attributes are due to biological differences between men and women (nature) or are shaped by the social environment (nurture) remains an open question. The potential role of nurture in shaping these preferences and labor market outcomes is particularly important for thinking about policy responses. Risk preferences, attitudes toward competition, and social preferences may be components one's gender identity, and the strength of these preferences may be influenced by the presence of social norms that dictate what the appropriate behavior of women (and men) should be (Bertrand, 2011). Furthermore, gender differences in preferences for workplace flexibility are likely to have its roots in the traditional gender division of labor in the household, which in turn, could be maintained by an adherence to gender identity norms. To the extent that gender identity and social norms may be an important underlying cause, it would be important to understand what drives these norms. Several papers have evaluated historical factors that may have affected these norms such as the advent of the Pill (Goldin and Katz, 2002) and WWII (Fernandez, Fogli, and Olivetti, 2004). Additional research on the role of social factors in shaping gender identity norms can help further our understanding on viable policy initiatives to address the remaining labor market gaps.

Finally, to the extent that gender differences in household roles remain pervasive, occupational differences in the degree of workplace flexibility is likely to have a differential effect on men and women. Moreover, the secular increase in workplace time demands over time in the United States (Kuhn and Lozano, 2008; Cortes and Pan (2016a, 2016b)) suggests that this factor is likely to become an increasingly binding constraint for women seeking to effectively combine career and family. What remains less well-understood is why some occupations have a larger demand for long (and particular) work hours than others, and why the demand for workers to put in long (and particular) hours has increased differentially across occupations and countries. Understanding the relative importance of underlying causes of these changes – e.g. changes in compensation schemes, technological change, market structure, globalization – and how they may have influenced organizational practices and workplace cultures, can help to facilitate the design of policies. At the same time, a careful exploration of

how occupations have successfully re-organized their workplace environment to accommodate greater flexibility could provide valuable lessons for ways to enhance temporal flexibility in occupations (Goldin, 2014).

Our review of the recent literature offers a number of policy implications for tackling occupational segregation and gender pay differentials. The importance of social norms and gender identity considerations in shaping occupational choice (perhaps by affecting men and women's tastes and preferences for certain occupational attributes) suggest that policies aimed at removing gender stereotypes and changing gender norms could have potentially large pay-offs. Such policies could include exposing more women to traditionally male subjects (e.g. science, technology, engineering, and mathematics (STEM) fields) early on in school, efforts to encourage the hiring of women in male-dominated professions, as well as incentives and policies to retain women in these fields. Moreover, given gender differences in household responsibilities, policies that increase the availability of household substitutes (e.g. immigrant domestic help and affordable high quality childcare) and promote workplace flexibility can help to relax some of the constraints that women face in seeking to pursue careers in occupations that require a high degree of time commitment.

References

Akerlof, George A. and Rachel E. Kranton. 2000. "Economics and Identity." Quarterly Journal of Economics. Vol. 115(3):715-753.

Altonji, Joseph G., Rebecca M. Blank. 1999. "Race and Gender in the Labor Market." In *Handbook of Labor Economics,* Volume 3c, edited by Orley C. Ashenfelter and David Card, 3143–3259. Amsterdam: North-Holland.

Andreoni, James and Lise Vesterlund. 2001. "Which is the Fair Sex? Gender Differences in Altruism". The Quarterly Journal of Economics, 116 (1) 293-312.

Antecol, H., & Cobb-Clark, D. A. 2013. "Do Psychosocial Traits Help Explain Gender Segregation in Young People's Occupations?" Labour Economics*,* Vol. 21: 59-73.

Attali Yigal, Zvika Neeman and Analia Schlosser. 2011. "Rise to the Challenge or Not Give a Damn: Differential Performance in High vs. low-stakes Tests." IZA Discussion Paper No. 5693.

Autor, David and Daron Acemoglu. 2011. "Skills, Tasks and Technologies: Implications for Employment and Earnings." Handbook of Labor Economics Volume 4, Amsterdam: Elsevier, Orley Ashenfelter and David E. Card (eds.), 1043-1171.

Autor, David, Frank Levy, and Richard Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." Quarterly Journal of Economics. Vol. 118(4):1279–1333.

Azmat, Ghazala and Barbera Petrongolo. 2014. "Gender and the Labor Market: What Have We Learned from Field and Lab Experiments?" Labor Economics. Vol. 30: 32-40.

Azmat Ghazala, Caterina Calsamiglia and Nagore Iriberri. 2015. "Gender Difference in Response to Big Stakes." Journal of the European Economic Association, forthcoming

Bacolod, Marigee P. and Bernado S. Blum. 2010. "Two Sides of the Same Coin: U.S. "Residual" Inequality and the Gender Gap." Journal of Human Resources. Vol. 45(1): 197-242.

Baker, Michael and Corneslon Kirsten. 2016. "Gender Based Occupational Segregation and Sex Differences in Sensory, Motor and Spatial Aptitudes." NBER Working Paper Series. No. 22248.

Becker, Gary. 1971. The Economics of Discrimination. Second Edition. University of Chicago Press.

Benjamin, Dan, James J. Choi, and Joshua A. Strickland. 2010. "Social Identity and Preferences." American Economic Review. Vol. 3(100): 1913-1928.

Bern, SL. 1974. "The Measurement of Psychological Androgyny." Journal of Consulting and Clinical Psychology. Vol. 42(2): 155-162.

Bertrand, Marianne. 2011. "New Perspectives on Gender." In *Handbook of Labor Economics,* Volume 4b, edited by Orley C. Ashenfelter and David Card, 1545-1592. Amsterdam: Elsevier, Ltd.

Black, Sandra E. and Alexandra Spitz-Oener. 2010. "Explaining Women's Success: Technological Change and the Skill Content of Women's Work." The Review of Economics and Statistics, 92 (1), 187–194.

Blau, Francine D., Marianne A. Ferber and Anne E. Winkler. 2009. The Economics of Women, Men, and Work. Upper Saddle River, N.J.: Prentice-Hall, 6th ed.

Blau, Francine D., Patricia Simpson, and Deborah Anderson. 1998. "Continuing Progress? Trends in Occupational Segregation in the United States over the 1970s and 1980s." Feminist Economics. Vol. 4(3): 29-71.

Blau, Francine D., Peter Brummund, and Albert Yung-Hsu Liu. 2013. "Segregation by Gender 1970–2009: Adjusting for the Impact of Changes in the Occupational Coding System." Demography. Vol. 50 (2): 471-92.

Blau, Francine D. and Lawrence M. Kahn. 2016. "The Gender Wage Gap: Extent, Trends, and Sources." Journal of Economic Literature, forthcoming.

Bonin, Holger, Dohmen, Thomas, Falk, Armin, Huffman, David, Sunde, Uwe, 2007. "Cross Sectional Earnings Risk and Occupational Sorting: The Role of Risk Attitudes." Labour Economics 14 (6), 926–937.

Borghans, Lex, Bas ter Weel, and Bruce A. Weinberg, 2008. "Interpersonal Styles and Labor Market Outcomes", Journal of Human Resources. Vol. 43(4): 815-858.

Borghans, Lex, Bas terWeel, and Bruce Weinberg. 2014. "People Skills and the Labor-Market Outcomes of Underrepresented Groups." ILRReview. Vol. 67 (2): 287-334.

Boudarbat, B., Montmarquette, C.. 2009. "Choice of fields of study of Canadian university graduates: the role of gender and their parents' education." Education Economics 17 (2), 185–213.

Buser, Thomas, Muriel Niederle, and Hessel Oosterbeek. 2014. "Gender, Competitiveness and Career Choices." The Quarterly Journal of Economics. Vol. 129(3): 1409-1447.

Cadsby, C. Bram, Maros Servatka, and Fei Song. 2013. "How Competitive are Female Professionals? A Tale of Identity Conflict." Journal of Economic Behavior and Organization. Vol 92: 284-303.

Cai, Xiqian, Yi Lu, Jessica Pan, and Songfa Zhong. 2016. "Gender Gap under Pressure: Evidence from China's National College Entrance Examination." Working Paper.

Cha, Youngjoo. 2013. “Overwork and the Persistence of Gender Segregation in Occupations.” Gender & Society. Vol. 27(2): 158-184.

Cha, Youngjoo and Kim A. Weeden. 2014. “Overwork and the Slow Convergence in the Gender Gap in Wages.” American Sociological Review. Vol. 79(3): 457-484

Cortes, Patricia and Jessica Pan. 2016a. “When Time Binds: Returns to Working Long Hours and the Gender Wage Gap among the Highly Skilled.” IZA DP No. 9846.

Cortes, Patricia and Jessica Pan. 2016b. “Prevalence of Long Hours and Skilled Women's Job Choices.” IZA DP No. 10225.

Cotter, David A., Joann M. DeFiore, Joan M. Hermsen, Brenda Marsteller Kowalewski, and Reeve Vanneman. 1995. “Occupational Gender Segregation in the 1980s.” Social Science Research. Vol. 24(4): 439-454.

Croson, Rachel and Uri Gneezy. 2009. “Gender Differences in Preferences.” Journal of Economic Literature. Vol. 47(2): 448-74

D’Acunto, Francesco. 2015. “Identity, Overconfidence, and Investment Decisions.” Working Paper.

DeLeire, Thomas and Helen Levy. 2004. "Worker Sorting and The Risk Of Death On The Job." Journal of Labor Economics. Vol. 22(4): 925-953.

Dorn, David. 2009. “Essays on Inequality, Spatial Interaction, and the Demand for Skills.” Dissertation University of St. Gallen no. 3613.

Duncan, Otis Dudley and Beverly Duncan. 1955. “A Methodological Analysis of Segregation Indexes.” *American Sociological Review* 20 (2): 210-17.

Eagly, A. H.. 1987. Sex Differences in Social Behavior: A Social-Role interpretation. Hillsdale, NJ: Erlbaum.

Eckel, Catherine C. and Grossman, Philip J. 2002. "Sex Differences and Statistical Stereotyping in Attitudes toward Financial Risk." Evolution and Human Behavior. 23(4): 281-295.

Fernandez, Raquel, Fogli, Alessandra, Olivetti, Claudia, 2004. “Mothers and Sons: Preference Development and Female Labor Force Dynamics.” Quarterly Journal of Economics. Vol. 119 (4): 1249–1299.

Flabbi, Luca and Andrea Moro. 2012. "The Effect of Job Flexibility on Female Labor Market Outcomes: Estimates from a Search and Bargaining Model." Journal of Econometrics. Vol. 168(1): 81-95.

Flory, Jeffrey A., Andreas Leibbrandt, and John A. List. 2014. “Do Competitive Work Places Deter Female Workers? A Large-Scale Natural Field Experiment on Gender Differences in Job-Entry Decisions.” Review of Economic Studies 82 (1): 122-155.

Folbre, Nancy, ed. 2012. For Love and Money: Care Provision in the United States. New York: Russell Sage Foundation.

Fortin, Nicole M. 2008. “The Gender Wage Gap Among Young Adults in the United States; The Importance of Money Versus People.” Journal of Human Resources. Vol. 43 (4): 884–918.

Freeman, J.A., Hirsch, B.T.. 2008. “College Majors and the Knowledge Content of Jobs.” Economics of Education Review. Vol. 27: 517–535.

Fuchs, Victor R. 1975. “A Note on Sex Segregation in Professional Occupations.” Explorations in Economic Research 2: 105–111.

Gibbs, Jack P.. 1965. "Occupational Differentiation of Negroes and Whites in the United States," Social Forces. 44:159-165.

Gneezy, Uri, Muriel Niederle and Aldo Rustichini. 2003. “Performance in Competitive Environments: Gender Differences.” Quarterly Review of Economics. Vol. 118 (3): 1049-74.

Gneezy, Uri and Aldo Rustichini. 2004. “Gender and Competition at a Young Age.” American Economic Review. Vol. 94: 377–381.

Goldin, Claudia. 2013. A Pollution Theory of Discrimination: Male and Female Differences in Occupations and Earnings. In Human Capital and History: The American Record. University of Chicago Press.

Goldin, Claudia. 2014. "A Grand Gender Convergence: Its Last Chapter." American Economic Review. Vol. 104(4): 1091-1119.

Goldin, Claudia and Lawrence F. Katz. 2016. “A Most Egalitarian Profession: Pharmacy and the Evolution of a Family-Friendly Occupation”. *Journal of Labor Economics* 34:3, 705-746.

Goldin, Claudia, Katz, Lawrence F., 2002. “The Power of the Pill: Oral Contraceptives and Women’s Career and Marriage Decisions.” Journal of Political Economy Vol. 110 (4): 730–770.

Groshen, Erica. 1991. “The Structure of the Female/Male Wage Differential. Is it Who You Are, What You Do, or Where You Work?” Journal of Human Resources Vol. 26:457-472.

Grove, Wayne A. Andrew Hussey, and Michael Jetter (2011) “The Gender Pay Gap Beyond Human Capital – Heterogeneity in Noncognitive Skills and in Labor Market Tastes” *J. Human Resources Fall 2011 vol. 46 no. 4 827-874*

Hall, Judith A.. 1978. Gender Effects in Decoding Nonverbal Cues. Psychological Bulletin. 85: 845–857.

Herr, Jane L. and Catherine D. Wolfram. 2012. "Work Environment and Opt-Out Rates at Motherhood Across High-Education Career Paths." Industrial and Labor Relations Review. Vol. 65(4): 928-950

Hsieh, Chang-Tai, Erik Hurst, Chad Jones, and Peter Klenow. 2016. “The Allocation of Talent and U.S. Economic Growth.” Working Paper.

Jurajda Stepan and Daniel Munich. 2011. “Gender Gap in Performance Under Competitive Pressure: Admissions to Czech Universities.” American Economic Review Papers and Proceedings. Vol 101(3): 514-518.

Kirkland, R. A., Peterson, E., Baker, C. A., Miller, S., & Pulos, S.. 2013. “Meta-Analysis Reveals Adult Female Superiority in “Reading the Mind in the Eyes Test”.” North American Journal of Psychology. 15: 121–146.

Kuhn, Peter J. and Fernando A. Lozano. 2008. “The Expanding Workweek? Understanding Trends in Long Work Hours among U.S.Men, 1979–2006.” Journal of Labor Economics. Vol. 26: 311-43.

Lavy, Victor. 2013. “Gender Differences in Market Competitiveness in a Real Workplace: Evidence from Performance-based Pay Tournaments among Teachers.” Economic Journal. Vol 123: 540-573.

Levanon, Asaf, Paula England, and Paul Allison. 2009. “Occupational Feminization and Pay: Assessing Causal Dynamics Using 1950–2000 U.S. Census Data.” *Social Forces* 88 (2): 865–981.

Levanon, Asaf and David B. Grusky. 2012. “Why is Gender Segregation So Extreme?” Stanford Center on Poverty and Inequality.

Lordan, Grace, and Jorn-Steffen Pischke. 2016. “Does Rosie Like Riveting? Male and Female Occupational Choices.” NBER Working Paper 22495.

Macpherson, David A. and Barry T. Hirsch. 1995. “Wages and Gender Composition: Why Do Women’s Jobs Pay Less?” Journal of Labor Economics Vol. 13: 426-471.

Manning, Alan and Farzad Saidi. 2010. “Understanding the Gender Pay Gap: What’s Competition Got to Do With It?” Industrial & Labor Relations Review 63 (4): 681-698.

Massey, Douglas S. and Nancy A. Denton. 1993. American Apartheid: Segregation and the Making of the Underclass. Cambridge: Harvard University Press.

McGee. Andrew, Peter McGee and Jessica Pan. 2015. “Performance Pay, Competitiveness, and the Gender Wage Gap: Evidence from the United States.” Economics Letters. Vol. 128: 35-38.

Montmarquette, C., Cannings, K., Mahseredjian, S., 2002. “How do young people choose college majors?” Economics of Education Review 21, 543–556.

Morin, Louis-Philippe. 2015. “Do Men and Women Respond Differently to Competition? Evidence from a Major Education Reform.” Journal of Labor Economics. Vol. 33(2): 443-491.

Niederle, Muriel and Lise Vesterlund. 2007. “Do Women Shy Away from Competition? Do Men Compete Too Much?” Quarterly Journal of Economics. Vol. 122: 1067–1101.

Örs, Evren, Frederic Palomino and Eloic Peyrache. 2013. “Performance Gender-Gap: Does Competition Matter?” Journal of Labor Economics. Vol. 31(3): 443-499.

Pan, Jessica. 2015. “Gender Segregation in Occupations: The Role of Tipping and Social Interactions.” Journal of Labor Economics. Vol. 33(2): 365-408.

Paserman, Daniele, 2010. Gender Differences in Performance in Competitive Environments: Evidence from Professional Tennis Players. Working Paper.

Pertold-Gebicka, Barbara, Filip Pertold, and Nabanita Datta Gupta. 2016. "Employment Adjustments around Childbirth." IZA Discussion Paper No. 9685.

Pinker, Susan. 2008. The Sexual Paradox: Troubled Boys, Gifted Girls and the Real Difference Between the Sexes. New York: Macmillan.

Reskin, Barbara F. and Patricia A. Roos. 1990. Job Queues, Gender Queues: Explaining Women’s Inroads into Male Occupations. Philadelphia: Temple University Press.

Reuben, Ernesto, Paola Sapienza, and Luigi Zingales. 2015. “Taste for Competition and the Gender Gap Among Young Business Professionals.” NBER Working Paper 21695.

Reuben, Ernesto, Matthew Wiswall and Basit Zafar. 2016. “Preferences and Biases in Education Choices and Labor Market Expectations: Shrinking the Black Box of Gender.” Economic Journal, forthcoming.

Rosen, Sherwin. 1986. “The Theory of Equalizing Differences.” In The Handbook of Labor Economics, Vol. 1, edited by Orley Ashenfelter and Richard Layard, 641–92. Amsterdam: Elsevier-North Holland.

Schelling, Thomas C. 1971. Dynamic Models of Segregation. Journal of Mathematical Sociology 1: 143-186.

Sloane, P. and Grazier, S., 2006. “Accident Risk, Gender, Family Status and Occupational Choice in the UK.” IZA Discussion Paper No. 2302.

Strober, Myra H. and Carolyn L. Arnold. 1987. The Dynamics of Occupational Segregation among Bank Tellers. In Gender in the Workplace, eds. Clair Brown and Joseph A, Pechman. Washington, D.C.: The Brookings Institution.

Usui, Emiko. 2008. “Job Satisfaction and the Gender Composition of Jobs.” Economics Letters. 99(1): 23–36.

Wasserman, Melanie. 2015. "Hours Contraints, Occupational Choice and Fertility: Evidence from Medical Residents." MIT Working Paper.

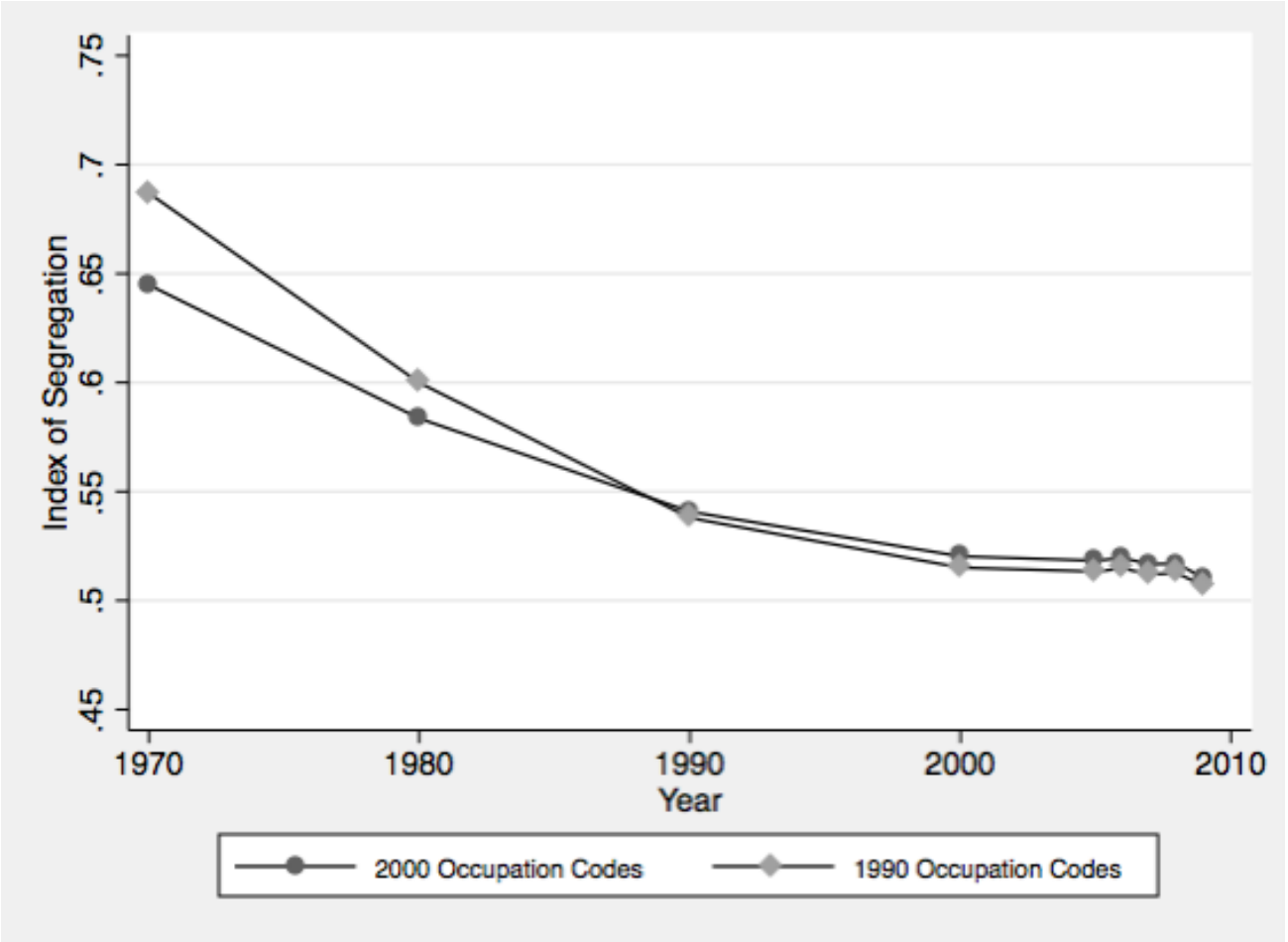
Welch, Finis. 2000. “Growth in Women's Relative Wages and in Inequality among Men: One Phenomenon or Two?” American Economic Review. Vol. 90(2): 444-449.

Wiswall, Matthew and Basit Zafar. 2016. “Preference for the Workplace, Investment in Human Capital, and Gender.” Working Paper.

Woolley, Anita Williams, Christopeher F. Chabris, Alex Pentland, Nada Hashmi, and Thomas W. Malone. 2010. “Evidence of a Collective Intelligence Factor in the Performance of Human Groups.” Science. Vol. 330(6004): 686–88.

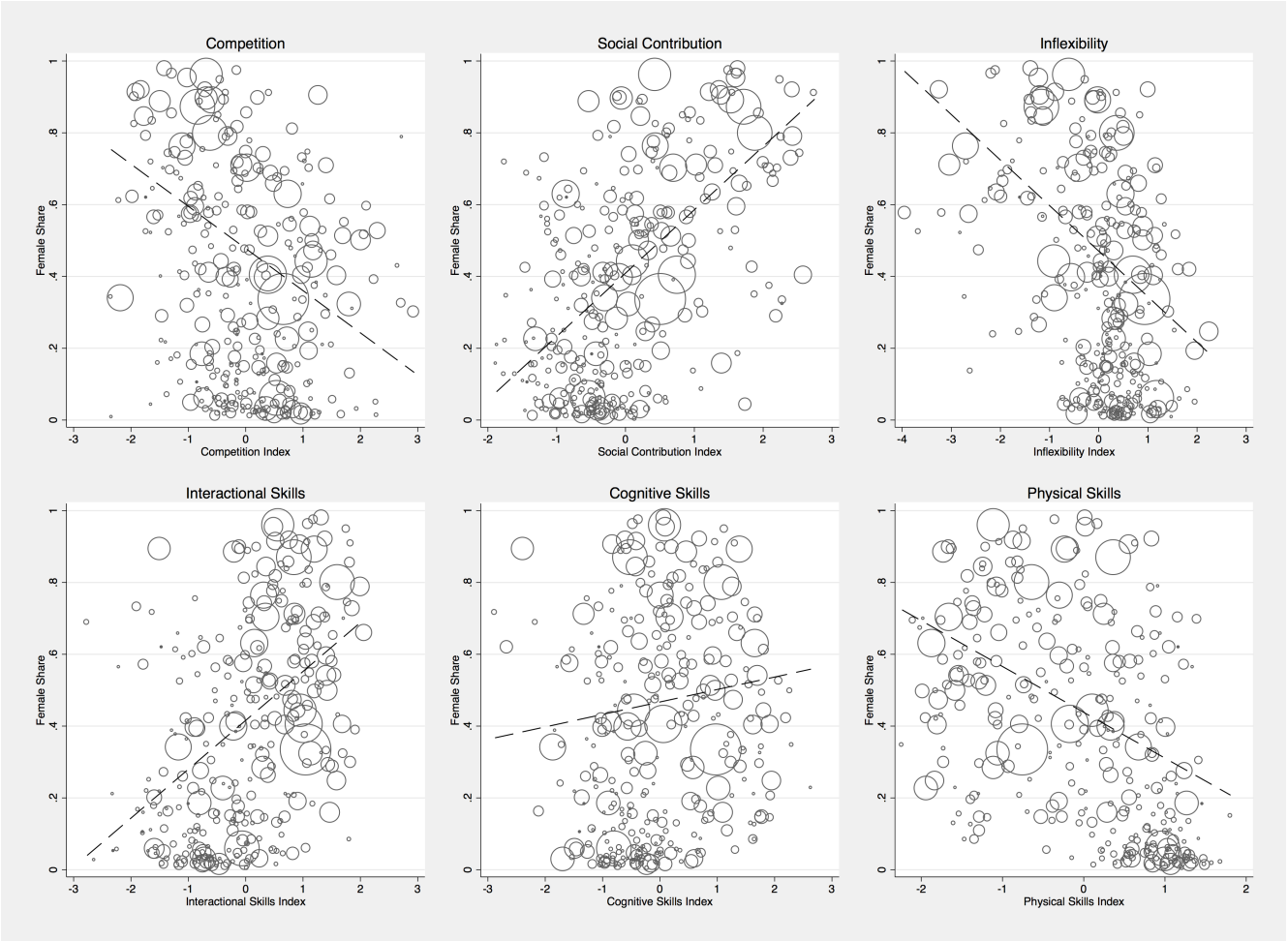
Zafar, Basit. 2013. “College Major Choice and the Gender Gap.” Journal of Human Resources. Vol. 48(3): 545-595.

Figure 1: Trends in Occupational Segregation by Gender - 1970 to 2009



Notes: The figure is based on Table 2 from Blau, Brummund and Liu (2013). The index of segregation is computed using Census data and the gender-specific, CPS-based crosswalk using year 2000 occupational codes and year 1990 occupational codes.

Figure 2: Relationship between Various Occupational Characteristics and the Share of Females in Each Occupation



Notes: The composite indices are constructed using data from O*NET. The female share in an occupation is computed from the 2009-2011 American Community Survey (ACS) and is based on employed workers between the ages of 25 to 54. The sample includes 318 occupations. The composite indexes have been normalized to have a mean of zero and standard deviation one in the full unweighted sample of occupations. The size of the circles indicates the relative employment size of each of the occupations. The dashed line is a fitted line based on a weighted regression of female share on each of the occupational characteristics, using employment size as weights.

Table 1: Relationship between Various Occupational Characteristics and the Share of Females in an Occupation

	Dependent Variable: Female Share in an Occupation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Occupational Characteristics:								
Competition Index	-0.118***						-0.076***	-0.068***
	[0.028]						[0.021]	[0.020]
Social Contribution Index		0.176***					0.144***	0.127***
		[0.023]					[0.031]	[0.032]
Inflexibility Index			-0.127***				-0.068***	-0.058***
			[0.019]				[0.015]	[0.016]
Interactional Skills Index				0.136***			-0.003	-0.000
				[0.030]			[0.032]	[0.031]
Cogntive Skills Index					0.035		-0.047*	-0.043
					[0.030]		[0.027]	[0.031]
Physical Skills Index						-0.128***	-0.168***	-0.166***
						[0.027]	[0.023]	[0.026]
Additional Controls for Share with HS Degree, Some College, and College; Average Age; Share of Whites, Blacks, and Hispanics	No	No	No	No	No	No	No	Yes
Observations	318	318	318	318	318	318	318	318
R-squared	0.152	0.312	0.212	0.171	0.014	0.175	0.674	0.698

Notes: The unit of observation is an occupation. The data is from O*NET and the 2009-2011 three-year aggregate ACS. The ACS sample is restricted to employed workers between the ages 25 to 54. See text for details on how the various composite indexes are constructed. The composite indexes are normalized to have a mean of zero and standard deviation one in the unweighted sample of occupations. All regressions are weighted by the employment size in each occupation. Robust standard errors are reported in brackets. ***significant at 1% level, **5%, *10%.

Table 2: Occupational Characteristics and the Gender Wage Gap

	Dependent Variable: Log Hourly Wage							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-0.224***	-0.172***	-0.213***	-0.163***	-0.253***	-0.250***	-0.275***	-0.193***
	[0.019]	[0.017]	[0.018]	[0.017]	[0.019]	[0.013]	[0.020]	[0.013]
Competition Index		0.126***						0.051***
		[0.016]						[0.016]
Social Contribution Index			-0.021					-0.029
			[0.023]					[0.026]
Inflexibility Index				0.131***				0.050***
				[0.015]				[0.015]
Interactional Skills Index					0.076***			0.002
					[0.024]			[0.027]
Cognitive Skills Index						0.200***		0.151***
						[0.014]		[0.021]
Physical Skills Index							-0.114***	-0.019
							[0.017]	[0.016]
Controls for Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
% of Gender Gap Explained		23.2%	4.9%	27.2%	-12.9%	-11.6%	-22.8%	13.8%
Observations	1,862,951	1,862,951	1,862,951	1,862,951	1,862,951	1,862,951	1,862,951	1,862,951
R-squared	0.299	0.330	0.300	0.335	0.307	0.359	0.321	0.375

Notes: The data is from the 2009-2011 three-year aggregate ACS. The sample is restricted to individuals age 25 to 54 who report working full-time (35 hours or more per week), full-year (40 weeks or more per year). The unit of observation is an individual. The occupational indices are constructed using data from O*NET and are normalized to have a mean of zero and standard deviation one in the unweighted sample of occupations. The individual-level controls include race dummies, a quadratic in age, education dummies (high school degree, some college, college), dummies for marital status (married and single), and number of children. Standard errors clustered at the occupation-level (318 occupations) are reported in brackets. ***significant at 1% level, **5%, *10%.