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Preferences, constraints, and the process of sex segregation in college majors: A choice analysis

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ABSTRACT

The persistence of horizontal sex segregation in higher education continues to puzzle social scientists. To help resolve this puzzle, we analyze a sample of college entrants in Germany with a discrete choice design that allows for social learning from the experiences of others. We make at least two contributions to the state of research. First, we test whether essentialist gender stereotypes affect major selection mostly through internalization or rather as external constraints that high school graduates adapt their behavior to. Empirically, we find that internalized vocational interests better explain gendered major choices than conformance with friends' and parents' expectations does. Second, we scrutinize whether segregation results from women's anticipation of gendered family roles or from their anticipation of sex-based discrimination, but we find no evidence for either of these hypotheses. As in most previous studies, differences in mathematics achievement fail to explain gendered patterns of selection into college majors.

1. Introduction

Over the past decades, women have made considerable inroads into higher education, employment, and professional careers aided by the institutionalization of egalitarian gender norms across states, organizations and families. However, this dramatic social change has not been paralleled by a comparable integration of women into traditionally male-dominated occupations to date. This presents a puzzle to social scientists partly because occupational segregation is among the key remaining obstacles that prevent the achievement of full economic gender equality (Petersen and Morgan, 1995; Gartner and Hinz, 2009). Since the choice of a college major strongly determines a person's occupational trajectory, and the distribution of women and men across disciplines is both remarkably unequal and inert (Gerber and Cheung, 2008; Barone, 2011; DiPrete and Buchmann, 2013), sex segregation across fields of study contributes significantly to the separation of women from men in the labor market (Smyth and Steinmetz, 2008). In this paper, we test competing explanations of why women and men continue to select different majors in college and thereby contribute to resolving the puzzle presented by persistent occupational sex segregation.

Much of the segregation literature is structured along the distinction between supply-side and demand-side factors. Although this distinction has been criticized (Charles and Grusky, 2004), distinguishing between behavioral differences that stem from differences in preferences and differences in constraints individuals face (Gambetta, 1987; Zeng and Xie, 2008) is key for informing policy about whether to direct efforts towards schools and the way they shape aspirations

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(Legewie and DiPrete, 2014a) or instead towards removing constraints women face in the labor market (Reskin and Roos, 1990; Goldin, 2014). Distinguishing between preferences and constraints also renders our study informative for interpreting the large number of studies on gender wage gaps that decompose gender differences into 'explained' and 'unexplained' parts where authors routinely interpret results under the assumption that the explained part was more acceptable than the residual part, from a normative perspective (Blau and Kahn, 2007). Such conclusions would be invalidated if we were to find that the separation of women from men in college majors occurred due to external constraints and against their preference for other potentially more lucrative fields. Furthermore, distinguishing between constraints and preferences allows for connecting the narrower question about major choices to the larger debate in social theory concerning the role of norms (i.e. constraints) versus values (i.e. preferences) for social order (Parsons, 1935; Wrong, 1961; Stigler and Becker, 1977; Vaisey, 2010).

For the past decade, sociologists have argued that advanced industrial societies combine an essentialist gender culture with liberal individualism such that students come to interpret the choice of their college major as an opportunity for self-realization and expressive assertion of their male or female gender identity (Correll, 2001; Charles and Bradley, 2002, 2009; Charles and Grusky, 2004; Cech, 2014). Based on the argument that sex segregation results from the "*indulgence of gendered selves*" (Charles and Bradley, 2009), rather than from normative or material constraints, scholars predict that sex segregation will stay at its current high levels because, in a culture that celebrates individual choice, sex segregation as a result of internalized preferences is regarded a legitimate form of inequality that does not conflict with principles of gender egalitarianism (Grusky and Levanon, 2008; Cech, 2014). In line with this argument, recent studies show that differences in men's and women's occupational and educational plans (Mann and DiPrete, 2013; Morgan et al., 2013) account for a large share of horizontal segregation in college.

Although informative, these explanations beg the question *why* it is that women's plans diverge from men's. It could be that women expect to work in other vocational domains because they have a preference to do other jobs than men, but it could just as well be that they anticipate specific external constraints they will face later in life and *therefore* decide against domains they would otherwise aspire to work in (Kerckhoff, 1976; Vaisey, 2010). Even though the premise that sex segregation in college majors does not result from constraints is central to essentialism theory, we know of no study that would explicitly scrutinize this claim. To fill this research gap, we here present a model of college major selection that includes three distinct constraints as predictors:

First, we test whether certain fields are perceived as less hospitable to women and avoided by them for that reason. Second, we scrutinize whether women and men anticipate the demands imposed by gender-specific parenthood roles and eschew majors that are incompatible with these either because majors do not provide the desired work-family balance, or not the earnings level necessary to fulfill the breadwinner role. Third, we test whether women's and men's choices are constrained by friends' and parents' potential disapproval for sex-atypical choices. We here provide empirical tests for these hypotheses but – to foreshadow our results – find that these explanations wield much less explanatory power than preference-based essentialism theory.

Methodologically, we apply direct measures of vocational interests and job values that allow us to distinguish between differences in choices that result from gendered preferences and differences that result from gendered constraints whereas most previous studies that use large surveys were bound by data limitations to infer to differences in preferences from stated choices (Xie and Shauman, 1997; Shauman, 2006; Beffy et al., 2012; Morgan et al., 2013; but see Legewie and DiPrete, 2014b).

The bulk of earlier research has analyzed women's and men's choices by reducing them to decisions for or against a field in the science, technology, engineering, and mathematics (STEM) group (Correll, 2001; Xie and Shauman, 2003; Legewie and DiPrete, 2014b; Glass and Sassler, 2013) or only slightly less broad fields of study (Ma, 2011; Beffy et al., 2012; Morgan et al., 2013; Gabay-Egozi et al., 2014), reflecting the fact that this is where women are most underrepresented. Although this strategy has produced a significant body of insights, dichotomizing the decision between majors in this vain (1) glosses over potential differences within the STEM group of subjects as well as (2) within the non-STEM group and (3) exaggerates differences between STEM and non-STEM fields in segments where they overlap. We address this shortcoming by adopting a discrete-choice modeling strategy that allows us to effectively generalize our research question from women's underrepresentation in STEM to the unequal distribution of women and men across all college majors whilst preserving the information that is usually lost when majors are merged into broad groups.

Furthermore, previous studies either measured major (or occupation) characteristics and *assumed* that individual-level mechanisms correspond to observed choices (Xie and Shauman, 1997; Shauman, 2006, 2009; Beffy et al., 2012) or they measured individual-level characteristics and *assumed* that major characteristics correspond to stated choices (Ma, 2011; Mann and DiPrete, 2013; Morgan et al., 2013; Cech, 2014; Legewie and DiPrete, 2014b). Our strategy of measuring both characteristics of majors and of individuals and specifying their match in the model combines the strengths of the two approaches to provide an even more rigorous analysis of the micro-level processes that underlie horizontal sex segregation.

2. Explanations

To account for the startling persistence of sex segregation in college, social scientists have suggested a wealth of theories. Some explain the phenomenon primarily on the basis of gender stereotypes (gender essentialism), others on the basis of the household division of labor (separate spheres), while again others focus on unfair treatment in the labor market (anticipated