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# The joint effect of ethnicity and gender on occupational segregation. An approach based on the Mutual Information Index



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## ABSTRACT

In this article, we study the effects of ethnicity and gender on occupational segregation. Traditionally, researchers have examined the two sources of segregation separately. In contrast, we measure their joint effect by applying a multigroup segregation index—the Mutual Information or *M* index—to the product of the seven ethnic groups and two genders distinguished in our 2001 Census data for England and Wales. We exploit *M*'s additive decomposability property to pose the following two questions: (i) Is there an interaction effect? (ii) How much does each source contribute to occupational segregation, controlling for the effect of the other? Although the role of ethnicity is non-negligible in the areas where minorities are concentrated, our findings confirm the greater importance of gender over ethnicity as a source of segregation. Moreover, we find a small “dwindling” interaction effect between the two sources of segregation: ethnicity slightly weakens the segregating power of gender and vice versa.

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## 1. Introduction

Since the 1970s, feminist researchers have widened the scope of their interest in gender to encompass a variety of sources of inequality. The seminal works of [Beal \(1969\)](#) and [Epstein \(1973\)](#) introduced the idea that ethnicity and gender combine as sources of disadvantage for ethnic minority women. In this article, we measure how these two variables affect occupational segregation, one feature of the labor market that contributes to disadvantages for women and minorities (see, for example, [Blau et al., 2006](#); [Kaufman, 2010](#)).

The traditional approach to studying the effects of ethnicity and gender on occupational segregation measures separately segregation by ethnic group on the one hand and segregation by gender on the other (see, *inter alia*, [Blau et al., 2012](#); [Elliott, 2005](#); [Hellerstein and Neumark, 2008](#); [Tomaskovic-Devey et al., 2006](#)). The implicit assumption is that the two variables generate some occupational segregation on their own, independent of each other. However, if the two variables interact in some way, the separate measures will fail to capture the true roles of ethnicity and gender. Other studies tackle this problem by measuring segregation by gender within ethnic categories, segregation by ethnicity for women and men separately, or segregation for pairwise combinations of ethnicity and gender groups ([Albelda, 1986](#); [Blackwell, 2003](#); [Reskin and Cassirer, 1996](#)). Neither of these approaches, however, provides a method for investigating how the two sources of occupational segregation may interact. In particular, neither makes it possible to test one tenet of the so-called theories

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of intersectionality: the idea that the combined impact of ethnicity and gender on segregation is different than the sum of their individual effects (Browne and Misra, 2003; King, 1988; McCall, 2001).

In this article, we develop a general framework for analyzing the *joint* effect of ethnicity and gender on occupational segregation. We have two goals: (i) to study the effect of each source of segregation, controlling for the effect of the other. (ii) To ascertain whether the combined impact of the two variables is greater than (as advanced in the intersectionality literature), equal to (as implicitly assumed in the traditional approach), or smaller than the sum of their individual effects (a possibility that, to our knowledge, is contemplated here for the first time).

For that purpose, we need a measurement instrument with two key properties. First, because we have two genders and at least two ethnic groups that combine to form four or more categories, we require a multigroup segregation index. Second, to study both the separate and the joint effects of ethnicity and gender, the segregation index must be strong group decomposable for any partition of the population into sub-groups (Mora and Ruiz-Castillo, 2011). The only segregation index that satisfies these requirements, together with other various desirable ordinal properties, is the Mutual Information or *M* index (Frankel and Volij, 2011), which we therefore use in our analysis.

We illustrate the usefulness of our approach with the 2001 Census of England and Wales.<sup>1</sup> The dataset covers 22.2 million people living in 521 Local Authority Districts (LADs), the smallest geographic area for which information on ethnicity is available in standard Census data. The population is classified into 81 occupations and seven ethnic groups. Although England and Wales are among the most ethnically heterogeneous countries in Europe, the six ethnic minority groups represented only 5.5% of the total population in paid work in 2001. Instead, women amounted to 45.2% of the labor force in employment.

Because the *M* index is not composition invariant—it varies when the shares of each group change—a critic could note that the differences in segregation by ethnicity and segregation by gender may be due to the unequal shares of women and minorities. More importantly, some authors argue that the outcomes of ethnic minorities in the labor market are associated with their relative weights in the population (see, for example, Clark and Drinkwater, 2002; Catanzarite, 2003; Durlauf, 2004; Huffman and Cohen, 2004). To address these concerns, we focus the analysis on the LADs where minorities concentrate. We consider as ethnically mixed areas the LADs where at least 5% of the population is non-white. More than 85% of minority workers live there. We then compare the results in mixed areas, non-mixed areas and the whole of England and Wales, where minority shares equal 11.9%, 1.2% and 5.5%, respectively. In this way, we study the robustness of our findings to changes in the demographic weights of the ethnic sub-groups.

Additionally, it is reasonable to expect that at least some of the segregation that we attribute to ethnicity and gender is attributable to differences in the stock of education and potential work experience accrued by women, men, and ethnic groups (for a similar concern, see, among others, Carmichael and Woods, 2000; Clark and Drinkwater, 2007). To address this objection, we control for differences in the age profiles and educational attainment of the working population.

The main results are the following. First, we find that the effects of ethnicity and gender on segregation are mostly independent of each other, although we find evidence of a small “dwindling” interactive effect: ethnicity slightly weakens the segregating power of gender and vice versa. Second, we rigorously substantiate the claim that gender is the predominant source of occupational segregation. Nevertheless, in areas where minorities concentrate, ethnicity contributes up to 13.5% of all segregation.

The remainder of this paper is organized as follows. First, we present three scenarios of interaction between ethnicity and gender as sources of segregation. Next, we introduce our empirical strategy based on the *M* index, and we illustrate it with British data. In the last section we summarize our argument.

## 2. The joint effect of ethnicity and gender on segregation: three scenarios

By segregation we refer to the tendency of members of different groupings to be distributed unevenly across organizational units. This is the so-called evenness dimension of segregation (Massey and Denton, 1988; Reardon and Firebaugh, 2002). Most authors focus on segregation by gender possibly because in modern society gender is “the most basic divide” along which inequality arises (Epstein, 2007). However, in ethnically heterogeneous societies we all belong to one gender and one ethnic group at the same time (Reskin, 1993). We are classified as adept or inept in certain tasks on the basis of our gender and ethnicity ascription (Jacobs and Blair-Loy, 1996), if only unwittingly (Chugh, 2004).

The literature on the mechanisms connecting people's gender and ethnicity to occupational segregation is large and well known. Demand-for-labor explanations consider how discriminatory tastes, prejudices and statistical discrimination influence recruitment, job allocation, and promotion (see, *inter alia*, Becker, 1971; Bertrand et al., 2005; Fernandez and Mors, 2008; Phelps, 1972; Reskin and Roos, 1990). On the other hand, supply-of-labor explanations mostly focus on how socialization, migration history, essentialist beliefs, and stereotypes shape human capital investment decisions (see, *inter alia*, Carmichael and Woods, 2000; Ridgeway, 2006; Parker, 2004; Phizacklea and Wolkowitz, 1995; Polachek, 1985).

We consider three alternative scenarios for the joint effect of ethnicity and gender on segregation to unfold. In what we call the traditional approach, authors examine the occupational segregation attributed to gender on the one hand and to ethnicity on the other. This approach is sound if workers' ascribed characteristics have an additive relationship—that is, if

<sup>1</sup> UK Census data are Crown Copyright. Scotlands 2001 Census is an independent statistical operation conducted by the General Register Office for Scotland, a part of the devolved Scottish Administration, and we do not use these data in this article. Following the usual convention, we use the term Great Britain as shorthand for England and Wales.

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