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# DIMENSIONS OF GENDER OCCUPATIONAL DIFFERENTIATION IN SEGREGATION AND INEQUALITY: A CROSS-NATIONAL ANALYSIS

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ABSTRACT. The present research: (a) distinguishes between measures of gender occupational segregation and measures of gender occupational inequality, and (b) examines whether occupational segregation and occupational inequality are differentially related to structural characteristics of national labor markets. Analysis of data from 56 nations shows that measures of nominal segregation are not equivalent to measures of hierarchical inequality. Nominal segregation seems to increase with industrialization and in the presence of service industries but decreases as female labor force participation increases. By contrast, occupational inequality seems to decrease with industrialization and in the presence of service industries but to increase as both female labor force participation and level of educational inequality rise. The data further demonstrate that nominal segregation and ordinal status inequality are interrelated. Where nominal segregation is high, women's relative representation in high status occupations tends to rise. We argue that occupational segregation should not be equated with occupational inequality, and that theoretical propositions regarding gender-occupational segregation may not be applicable to issues concerning occupational inequality. We obtain a better understanding of, and insight into the nature of gender-occupational differentiation by simultaneously considering these two dimensions of gender-occupational differentiation.

## INTRODUCTION

In recent years more and more sociologists have begun to study gender-linked occupational differentiation from a cross-national comparative perspective. Several researchers studied a wide range of nations (e.g., Semyonov, 1980; Nuss and Majka, 1983; Jacobs and Lim, 1995). Others focused only on a few specific countries (e.g., Shirahasi and Ishida, 1984; Charles and Grusky, 1995). Yet others performed their analyses on either less developed (e.g., Clark, 1990; Semyonov and Shenhav, 1988) or highly industrialized nations (e.g.,

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Charles, 1992). Researchers in this tradition start from the premise that occupational segregation is a characteristic of the social system – an indicator of gender inequality in the labor market. In other words, researchers view segregation as a structural mechanism through which women are denied access to lucrative jobs and prestigious occupations, and as a major source of gender inequality in the labor market.

Studies in this research tradition have identified several variables that influence the degree of gender-occupational differentiation as well as rate of occupational inequality between the two genders. The variables most often found to affect segregation and inequality include the level of industrialization, the industrial structure of a nation, its female labor force participation rate, and its world system position. For example, Semyonov (1980) and Semyonov and Shenhav (1988) suggest that gender-occupational inequality is likely to increase as the female labor force participation rate rises. Charles (1992) and Jacobs and Lim (1995) emphasize the role played by economic development, especially the rise of the service sector, in the emergence of gender-occupational segregation. Clark (1990) and Marshall (1985) stress the role of economic dependency and world-system position on levels of gender inequality.

The methodology used in these comparative studies, varies considerably, with researchers using different measures to describe gender-based occupational differentiation. However, different measures may produce different results and lead to different conclusions (Semyonov, 1992). In the present paper we extend the comparative literature on gender occupational differentiation by comparing measures used in past research and by examining their relationships to structural characteristics of national labor markets. We suggest, like other researchers (e.g., Fossett and South, 1983; Fossett et al., 1989; Blackburn et al., 1995; James and Taueber, 1985), that the range of measures used can be classified into two distinct types: measures of nominal segregation and measures of ordinal inequality. Each type reflects a different underlying concept and each is differentially related to the structural features of national labor markets. So, before proceeding with the analysis it is essential to review the properties of measures used in previous studies.

## MEASURES OF GENDER OCCUPATIONAL DIFFERENTIATION

The summary measures used in past research on gender occupational differentiation can be classified into two distinct and substantively different types: measures of nominal segregation that ignore the ranking of occupations, and measures of ordinal inequality that take the vertical ordering of jobs into account (e.g., Fossett, 1984; Fossett and South, 1983). Although the two are not mutually exclusive – without some degree of segregation there can be no gender inequality – each pertains to and reflects a different theoretical concept.

Measures of nominal segregation include various indices of dissimilarity (Duncan and Duncan, 1995; Gibbs, 1965) and the ratio index (Charles, 1992; Charles and Grusky, 1995). Measures of nominal segregation provide summary estimates of the extent to which the occupational distributions of men and women differ, regardless of occupational ranking. The index of dissimilarity (D) estimates the percent of either men or women that would have to change occupation in order for the two groups to have an identical occupational distribution.[1] Since D is affected by variation in the occupational structure of the groups compared, Gibbs (1965) proposed a size standardized version of the index of dissimilarity (DS).[2] Recently Charles (1992, also Charles and Grusky, 1995) introduced a ratio index (R). The ratio index, defined within the framework of the log-linear model, provides a margin-free estimate of the sum of occupation-specific deviations from proportional representation of the gender groups across the occupational system.[3]

Whereas indices of nominal segregation do not take into account the unequal representation in a hierarchical occupational system, measures of ordinal inequality do. Lieberson's (1976) index of net differences (ND) is one such indicator of ordinal inequality. This index (ND)[4] provides an estimate of the probability that a man would, on average, be ranked at a higher (or lower) rank category than a woman.[5]

In the analysis that follows, these four measures are estimated for nations across the world, and their relationship to structural characteristics of national labor markets are examined and compared. As a result, we are able to evaluate substantive differences between the

two concepts and to delineate the social and economic conditions that affect nominal segregation and ordinal inequality, respectively.

## DATA SOURCES

Data for estimating indices of segregation and inequality were obtained from the published volumes of the *Yearbook of Labor Statistics* (ILO, 1988–1995). The analysis reported here is restricted to the 56 countries that provided occupational distributions (7 categories) of the economically active labor force by gender in 1990, and whose labor forces exceed one million persons.[6] The seven major occupational categories distinguished in the ILO publications include: (1) professional, technical and related workers; (2) administration and related workers; (3) clerical and related workers; (4) sales workers; (5) service workers; (6) production, transport equipment operators and laborers; (7) agriculture, animal husbandry, forestry, fishing and hunting.[7]

The frequency matrix of occupation by gender by country was used to compute the indices of nominal segregation and ordinal inequality discussed in the previous section. The indices of nominal segregation – D, DS, R – were estimated using all seven major occupational categories. Indices of ordinal inequality, such as Lieberson's index of net differences (ND), require that occupations be ranked. We follow the conventional approach to ranking occupations by status or prestige (for a more detailed discussion, see Fossett et al., 1989) to arrive at three ordinal scales consisting of seven, four and two categories of occupational status. The seven ordinal categories are ranked from high to low as follows: (1) professionals; (2) administration-managerial; (3) clerical; (4) sales; (5) service; (6) labor-production; (7) agriculture. The four category scale is organized (from high to low) as follows: (1 + 2) professional plus administration-managerial; (3 + 4) clerical plus sales; (5 + 6) service plus labor-production; (7) agriculture. The dichotomous scale is based on the distinction between white collar occupations (professional plus administration-managerial, clerical and sales (1 + 2 + 3 + 4) versus blue collar manual occupations (5 + 6 + 7). Indices of net differences were computed separately for seven categories ($ND_7$), for four ordinal categories ($ND_4$), and for

the dichotomous version ($ND_2$). The reader is reminded, however, that all three scales and indicators of ordinal inequality *pertain only to status or prestige* and should be understood only in these terms. Unfortunately, the data available to us do not permit the computation of scales that capture other dimensions of occupational gender inequality, like occupational wage inequality.

## ESTIMATING MEASURES OF OCCUPATIONAL NOMINAL SEGREGATION AND ORDINAL INEQUALITY

The distributions of the indicators of gender-occupational nominal segregation (D, DS, R) and the indicators of gender-occupational ordinal status inequality ($ND_7$, $ND_4$, $ND_2$) in the 56 countries included in the study are displayed in Table I. The data lead to three initial conclusions: (a) occupational differentiation between the sexes is substantial, regardless of the measure used; (b) there is considerable variation across nations with regard to both the degree of gender-segregation and the degree of gender-ordinal inequality; (c) measures of nominal segregation (D, DS, R) and measures of ordinal inequality ($ND_7$, $ND_4$, $ND_2$) do not seem to follow the same pattern.

The data in columns 1–3 pertain to the three measures of nominal segregation. The grand average of the index of dissimilarity (D) implies that, in this subset of nations, 35 percent of either men or women would have to change *major* occupational categories to equalize occupational distributions by gender. There is, however, considerable variation around this mean. In some countries (e.g., Thailand, Tunisia), occupational segregation is rather small. In others (e.g., Algeria, Syria, Panama) segregation is extreme, and the values of D over 50 percent. That is, in Algeria, Syria, and Panama, over 50 percent of either men or women have to change occupational category in order that the two genders would be equally distributed across occupational categories. Occupational dissimilarity between the sexes remains substantial even when considering variations in occupational structure across nations. In these data the average value of DS and D are not distinguishable from each other. However, variation across nations in DS is considerably lower than that of D, as the smaller size of the standard deviation shows. The distribution of

TABLE I

Distribution of Four Measures of Gender-Occupational Differentiation in 56 Nations – 1990

| Nation | Index of Dissimilarity (D) | Standardized Index of Dissimilarity (DS) | Ratio Index (R) | Summary Factor Index SEGR | Index of Net Differences ($ND_7$) | Index of Net ($ND_4$) | Index of Net ($ND_2$) | Summary Factor Index ORDI |
|---|---|---|---|---|---|---|---|---|
| Algeria | 0.55 | 0.47 | 1.17 | 5.24 | –0.56 | –0.47 | –0.47 | –4.23 |
| Australia | 0.40 | 0.37 | 0.86 | 1.00 | 0.19 | 0.27 | 0.02 | 5.01 |
| Austria | 0.44 | 0.35 | 0.83 | 0.90 | –0.25 | –0.15 | –0.37 | –0.84 |
| Bangaladesh | 0.29 | 0.47 | 1.08 | 2.54 | 0.28 | 0.29 | 0.16 | 6.32 |
| Bolivia | 0.38 | 0.31 | 0.70 | –0.76 | –0.24 | 0.02 | –0.34 | 0.14 |
| Brazil | 0.45 | 0.49 | 0.91 | 3.26 | –0.38 | –0.37 | –0.38 | –2.54 |
| Bulgaria | 0.26 | 0.36 | 0.80 | –0.56 | –0.14 | –0.10 | –0.21 | 0.68 |
| Canada | 0.38 | 0.34 | 0.78 | –0.12 | –0.34 | –0.24 | –0.36 | –1.60 |
| Chile | 0.48 | 0.42 | 0.99 | 3.03 | –0.42 | –0.30 | –0.46 | –2.79 |
| Columbia | 0.31 | 0.31 | 0.68 | 1.60 | –0.23 | –0.09 | –0.30 | –0.07 |
| Costa Rica | 0.40 | 0.34 | 0.84 | 0.37 | –0.42 | –0.33 | –0.39 | –2.53 |
| Denmark | 0.41 | 0.45 | 1.03 | 3.04 | –0.35 | –0.26 | –0.36 | –1.75 |
| Ecuador | –0.41 | 0.33 | 0.74 | –0.16 | –0.39 | –0.32 | –0.41 | –2.48 |
| Egypt | 0.32 | 0.33 | 0.74 | –0.86 | 0.20 | 0.21 | 0.06 | 5.06 |
| El Salvador | 0.33 | 0.32 | 0.70 | 1.06 | –0.27 | –0.19 | –0.32 | –0.89 |

TABLE I

Continued

| Nation | Index of Dissimilarity (D) | Standardized Index of Dissimilarity (DS) | Ratio Index (R) | Summary Factor Index SEGR | Index of Net Differences ($ND_7$) | Index of Net ($ND_4$) | Index of Net ($ND_2$) | Summary Factor Index ORDI |
|---|---|---|---|---|---|---|---|---|
| Finland | 0.43 | 0.40 | 0.88 | 1.72 | –0.35 | –0.26 | –0.40 | –1.97 |
| Germany | 0.36 | 0.29 | 0.67 | –1.36 | –0.26 | –0.18 | –0.33 | –0.82 |
| Greece | 0.25 | 0.27 | 0.66 | –2.72 | –0.06 | –0.02 | –0.14 | 1.76 |
| Guatamala | 0.45 | 0.34 | 0.81 | 0.69 | –0.52 | –0.48 | –0.45 | –3.99 |
| Haiti | 0.35 | 0.39 | 0.89 | 0.98 | –0.36 | –0.36 | –0.35 | –2.21 |
| Holland | 0.38 | 0.39 | 0.91 | 1.32 | –0.23 | –0.12 | –0.33 | –0.42 |
| Honduras | 0.49 | 0.38 | 1.03 | 2.74 | –0.57 | –0.52 | –0.49 | –4.63 |
| Hong Kong | 0.21 | 0.23 | 0.45 | –4.62 | –0.08 | –0.10 | –0.13 | 1.35 |
| Hungary | 0.32 | 0.34 | 0.73 | –0.76 | –0.28 | –0.25 | –0.32 | –1.18 |
| Iran | 0.30 | 0.39 | 0.74 | –0.29 | –0.24 | –0.24 | –0.21 | –0.39 |
| Iraq | 0.40 | 0.33 | 0.63 | –0.81 | –0.29 | –0.28 | –0.17 | –0.57 |
| Ireland | 0.44 | 0.41 | 0.96 | 2.30 | –0.43 | –0.35 | –0.41 | –2.76 |
| Israel | 0.43 | 0.42 | 0.95 | 2.41 | –0.34 | –0.23 | –0.36 | –1.60 |
| Jamaica | 0.34 | 0.25 | 0.72 | –1.95 | –0.27 | –0.18 | –0.34 | –0.87 |
| Japan | 0.23 | 0.26 | 0.65 | –3.12 | –0.11 | –0.04 | –0.15 | 1.43 |

TABLE I

Continued

| Nation | Index of Dissimilarity (D) | Standardized Index of Dissimilarity (DS) | Ratio Index (R) | Summary Factor Index SEGR | Index of Net Differences ($ND_7$) | Index of Net ($ND_4$) | Index of Net ($ND_2$) | Summary Factor Index ORDI |
|---|---|---|---|---|---|---|---|---|
| Malawi | 0.18 | 0.29 | 0.58 | –3.36 | 0.18 | 0.18 | 0.10 | 5.00 |
| Malaysia | 0.15 | 0.23 | 0.51 | –4.85 | –0.09 | –0.06 | –0.13 | 1.52 |
| Mexico | 0.43 | 0.39 | 0.90 | 1.76 | –0.40 | –0.33 | –0.42 | 2.61 |
| New Zealand | 0.37 | 0.33 | 0.72 | –0.51 | –0.17 | –0.14 | –0.30 | –0.11 |
| Nigeria | 0.35 | 0.35 | 0.75 | –0.25 | –0.20 | –0.22 | –0.26 | –0.42 |
| Norway | 0.42 | 0.41 | 0.92 | 2.00 | –0.31 | –0.19 | –0.38 | –1.35 |
| Pakistan | 0.25 | 0.35 | 0.85 | –0.54 | 0.22 | 0.23 | 0.13 | 5.57 |
| Panama | 0.54 | 0.44 | 1.20 | 4.88 | –0.53 | –0.42 | –0.52 | –4.14 |
| Peru | 0.29 | 0.29 | 0.64 | –2.11 | –0.23 | –0.21 | –0.26 | –0.48 |
| Philippines | 0.36 | 0.34 | 0.73 | –0.46 | –0.34 | –0.31 | –0.36 | –1.89 |
| Poland | 0.32 | 0.37 | 0.99 | 1.02 | –0.16 | –0.11 | –0.28 | 0.20 |
| Portugal | 0.25 | 0.26 | 0.56 | –3.37 | –0.10 | –0.02 | –0.18 | 1.41 |
| Ruwanda | 0.12 | 0.27 | 0.64 | –3.83 | 0.12 | 0.12 | 0.05 | 4.26 |
| Singapore | 0.21 | 0.31 | 0.78 | –1.92 | –0.02 | 0.01 | –0.08 | 2.39 |
| South Africa | 0.46 | 0.38 | 0.83 | 1.38 | –0.36 | –0.18 | –0.43 | –1.82 |

TABLE I

Continued

| Nation | Index of Dissimilarity (D) | Standardized Index of Dissimilarity (DS) | Ratio Index (R) | Summary Factor Index SEGR | Index of Net Differences ($ND_7$) | Index of Net ($ND_4$) | Index of Net ($ND_2$) | Summary Factor Index ORDI |
|---|---|---|---|---|---|---|---|---|
| South Korea | 0.21 | 0.28 | 0.82 | –2.06 | –0.05 | 0.00 | –0.14 | 1.89 |
| Spain | 0.40 | 0.36 | 0.86 | 0.88 | –0.32 | –0.20 | –0.38 | –1.47 |
| Sweden | 0.36 | 0.29 | 0.74 | –1.05 | –0.38 | –0.32 | –0.36 | –2.17 |
| Syria | 0.50 | 0.52 | 1.26 | 5.85 | 0.10 | 0.11 | –0.02 | 3.73 |
| Thailand | 0.09 | 0.22 | 0.48 | –5.65 | 0.00 | 0.00 | –0.06 | 2.55 |
| Tunis | 0.11 | 0.22 | 0.52 | –5.40 | –0.05 | –0.03 | –0.04 | 2.32 |
| Turkey | 0.47 | 0.44 | 0.94 | 2.89 | 0.42 | 0.43 | 0.20 | 7.77 |
| U.S.A. | 0.35 | 0.34 | 0.78 | –0.23 | –0.29 | –0.20 | –0.33 | –1.07 |
| Uruguay | 0.38 | 0.41 | 0.97 | 1.98 | –0.33 | –0.19 | –0.36 | –1.33 |
| Venezuela | 0.48 | 0.44 | 1.13 | 4.02 | –0.46 | –0.33 | –0.45 | –3.06 |
| Zimbabwe | 0.24 | 0.27 | 0.57 | –3.16 | 0.23 | 0.23 | 0.12 | 5.55 |
| Average $\overline{X}$ | 0.35 | 0.35 | 0.81 | | –0.20 | –0.14 | –0.25 | |
| (Standard Deviation) SD | (0.11) | (0.07) | (0.18) | | (0.23) | (0.21) | (0.19) | |

the margin-insensitive multiplicative ratio index (R) is very similar to that of DS, with an inter-correlation of +0.91. Indeed, all three measures of nominal segregation are highly associated with each other.

Measures of ordinal status inequality allow for the differential representation of the two genders on a rank-order prestige (or status) scale. The values for $ND_7$, $ND_4$, $ND_2$ are listed in columns 5, 6 and 7 of Table I, respectively. Their distributions differ from those observed for the indices of nominal segregation. The data reveal that, in this subset of countries, women have a higher probability than men of being ranked at the higher end of the occupational status order (20, 14, and 25 percent respectively, for seven, four and two ordinal categories of status).[8] In some countries women's over-representation in high status occupations is rather substantial (e.g., Algeria, Sweden, Ireland, Brazil, Guatemala, Honduras, Panama, Venezuela), while in others men are overrepresented in the high status occupations (e.g., Turkey, Australia, Pakistan) as evidenced in the positive sign of the index. In South Korea, Singapore and Thailand the gender differences in terms of occupational status are small or negligible. In general, regardless of how we classify occupational status, measures of ordinal inequality are similarly distributed across nations (as evidenced by the high intercorrelations between $ND_7$, $ND_4$, and $ND_2$).

## SUMMARY MEASURES OF NOMINAL SEGREGATION AND ORDINAL INEQUALITY

In order to examine systematically the extent to which the indices of nominal segregation and the indices of ordinal inequality cluster into two distinct factors and represent two distinct concepts, we factor analyzed the six measures of gender occupational differentiation.[9] The results of the factor analysis (varimax rotation to allow for oblique factors) are presented in Table II and provide firm support for this argument. The results reveal a two-factor solution (after three iterations) that explains 93.3 percent of their cumulative variance. The first factor corresponds to *ordinal inequality*, while the second factor corresponds to *nominal segregation*. That is, the first factor loads high on the measures of ordinal inequality (0.95, 0.97,

TABLE II

Rotated Factor Loadings for Six Measures of Gender Occupational Differentiation in 56 Nations

| MEASURES | Ordinal Inequality FACTOR 1 | Nominal Segregation FACTOR 2 |
|---|---|---|
| $ND_2$ | 0.9544 | –0.2300 |
| $ND_4$ | 0.9672 | –0.1318 |
| $ND_7$ | 0.9811 | –0.1729 |
| D | –0.4638 | 0.8024 |
| DS | –0.0801 | 0.9682 |
| R | –0.1281 | 0.9517 |
| Eigenvalue | 3.929 | 1.7047 |
| Percent variance | 65.5 | 28.4 |
| Cumulative percent | 65.5 | 93.9 |

0.98) while the second factor loads high on measures of nominal segregation (0.80, 0.97, 0.95).

Following the two-factor solution presented in Table II, we constructed, using the first principal component factor analysis technique, two standardized indices. The first index is based on the linear combination of three measures of ordinal inequality (ORDI) and the second index (SEGR) is based on the linear combination of three measures of nominal segregation.[10] The distributions of these two indices are displayed in columns 4 and 8 of Table I. The values of the distribution of the summary indices reveal that nominal segregation (SEGR) is highest in Algeria, Panama, Syria and Venezuela, and lowest in Thailand, Tunisia, Hong Kong and Malaysia. Ordinal status inequality (ORDI) is highest in Turkey, Bangladesh, Australia, Egypt, Pakistan and Zimbabwe, and lowest in Algeria, Honduras, Panama, and Guatemala.

The two summary indices are not independent of each other. SEGR and ORDI are associated with a correlation r = –0.405. This negative correlation (like those observed between pairs of specific measures) implies that high levels of nominal occupational segregation between the two genders are associated with greater concentration of women in high status, white collar occupations (or

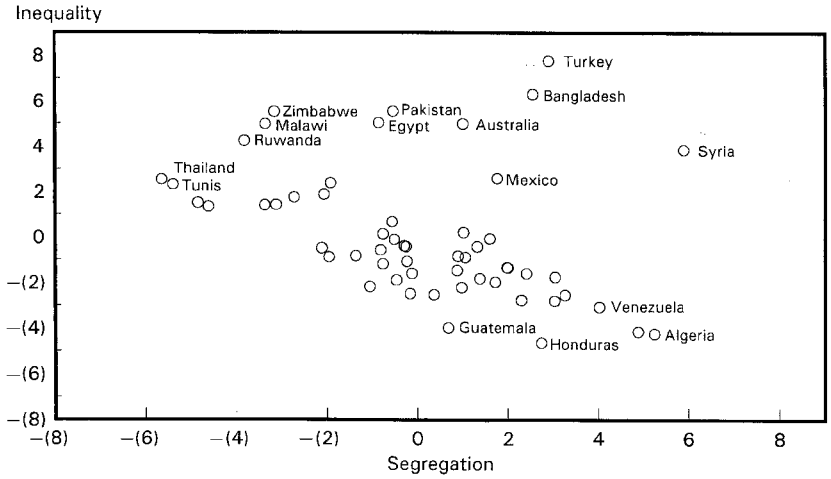


*Figure 1.* 56 Nations Clustered by Level of Nominal Segregation and Level of Ordinal Inequality.

high concentration of men in low-status, manual occupations). That is, the division of labor between men and women is affected by the status hierarchy of occupations. This finding is clearly illustrated in Figure 1, in which the two summary indices – SEGR and ORDI – are plotted against each other.

Figure 1 illustrates rather clearly the nature of the association between nominal segregation (SEGR) and ordinal status inequality between economically active men and women. Specifically, higher levels of nominal segregation are associated with the concentration of women in high status occupations (and the concentration of men in low status, manual occupations). Most countries included in the analysis follow this basic pattern. For example, countries such as Zimbabwe, Rwanda, Malawi, Thailand, and Egypt lie at one end of the distribution (low levels of nominal segregation and a concentration of men in high status occupations). At the other end of the distribution, we find such countries as Algeria, Panama, Venezuela, Honduras, Chile, Guatemala and Brazil, with high levels of nominal segregation and stronger representation of women in high status jobs. In between (moderate segregation and ordinal inequality) are such countries as Bulgaria, Poland, Peru, Holland, Columbia and Bolivia. Nations that deviate from the basic pattern include such countries as Tunis, Bangladesh, Australia, and Syria. These countries are characterized by high levels of nominal segregation and

high concentration of men in white collar, high-status occupations. These nations can be viewed as outliers.

## DETERMINANTS OF NOMINAL SEGREGATION AND ORDINAL INEQUALITY

In the final section of the analysis we examine the extent to which nominal segregation (SEGR) and ordinal status inequality (ORDI) reflect structural characteristics of the national labor market. We have assembled a series of variables that have been used in the comparative-crossnational literature to explore determinants of gender segregation and gender inequality. They include: level of economic development, industrial composition, female labor force participation, social inequality, and world-system position. We emphasize again, however, that the theoretical basis for analyzing these variables has not before differentiated segregation from inequality, but has used these two terms interchangeably.

Level of economic development (ENERGY) was measured by energy consumption per capita in 1985 (Source: World Development Report). According to modernization theory, occupational segregation by sex should decline with industrialization (e.g., Treiman, 1970). Modern labor markets should operate according to universalistic criteria and assign persons to positions according to skill, regardless of gender (or any other ascriptive characteristic). The rise of modern economies is therefore likely to enhance the integration of women into all segments of the labor force. Moreover, economic development should decrease segregation by increasing the supply of educated women, and by technological advances that remove barriers associated with physical strength (Singelmann, 1978). Thus, we expect to find a negative association between level of economic development and gender occupational segregation (e.g., Jacobs and Lim, 1995).

The industrial structure of the labor market (SERVICE) was measured by the proportion of the labor force employed in service industries (Source: World Development Report). It has been repeatedly shown that in post-industrial economies the service sector predominates (e.g. Bell, 1973; Singelmann, 1978). Industries in the service sector are composed mostly of white collar occupations

(clerical, sales, professional and semi-professional). Historically, many of these jobs are "female-demanding." So the rise of service industries provides women with employment opportunities, albeit mostly in female-type occupations. As Charles (1992) has demonstrated, a large service sector is associated with a greater concentration of women in clerical, sales, and service occupations.

Female labor force participation (FLFP) was measured by women's share of the economically active labor force (Source: *Yearbook of Labor Statistics*). Their level of participation is expected to have significant consequences for occupational inequality. Since labor markets are segmented along gender lines and occupations are "sex-typed", an influx of women to the labor force is likely to occur in "female-type" low-status, and low-paying jobs (e.g. Oppenheimer, 1970). Or, to quote Semyonov and Shenhav (1988), "When countries recruit a large number of women to their economically active labor force, this results in an increase in supply of cheap labor force to be used in the low-status, poorly paid occupations" (see also Lewin-Epstein and Semyonov, 1992; Semyonov, 1980). Thus, gender occupation inequality is expected to rise with increased rates of female labor force participation.

Social inequality (EDINEQ) was estimated by the ratio of men to women in primary and secondary level education in 1984 (World Development Report).[11] This variable represents gender inequality in access to educational opportunities (Jacobs and Lim, 1995). Researchers have long expected that "social equality" would exert a significant impact on rate of gender occupational segregation. To put it in Charles' (1995) words, "sociological arguments and common wisdom suggest that sex occupational segregation should be less pronounced in countries characterized by ideologies that emphasize gender equality." Although previous empirical examinations fail to provide firm support for this expectation (e.g., Charles, 1992; Jacobs and Lim, 1995; Semyonov, 1980), it cannot be dismissed and deserves serious consideration.

World system position (or level of dependency) is based on the distinction between the core and the peripheral and semi-peripheral nations. Following the classification suggested by Snyder and Kick (1979), three dummy variables were constructed to distinguish among the highly industrialized (core) countries, the less developed

countries (or peripheral nations), and the semi-peripheral nations. According to the world system dependency paradigm, the world capitalist system, driven by the core of highly industrialized nations, expands into the periphery in order to exploit its cheap labor and resources. This expansion, in turn, has detrimental consequences for the social, political and economic order of the less developed countries in general, and for women's employment opportunities in particular (e.g., Boserup, 1970; Greenhalgh, 1985; Marshall, 1985; Clark, 1990; Semyonov and Shenhav, 1988). It has been argued that the introduction of modern capital-intensive technologies to less developed countries benefits men more (or at least harms them less) than women. First, because they are more mobile, men are more successful than women in leaving the farm economy and finding jobs in the city. Second, the relocation of manufacturing industries to developing countries (in search of low-cost, disciplined, easy to replace labor force) makes women an easy target for economic exploitation (e.g. Boserup, 1970; Greenhalgh, 1985; Cho and Koo, 1983). For these reasons, it is important to control for world system position when rates of occupational segregation and occupational inequality are analyzed and compared across countries.

Table III presents two regression equations which examine the impact of structural characteristics of national labor markets separately on nominal segregation and ordinal inequality. In each equation the summary measures of nominal segregation (SEGR) and ordinal inequality (ORDI) are taken as a function of level of industrialization (ENERGY), industrial structure (SERVICE), female labor force participation (FLFP), educational inequality (EDINEQ), and two dummy variables for world system position (the core nations are the omitted category and used as the basis of comparison).[12]

The regression analysis suggests that the level of nominal segregation (SEGR) is mostly affected by the level of female labor force participation. Nominal segregation, tends to be lower in countries characterized by higher levels of female labor participation (FLFP has a negative and significant effect on SEGR). The effect of either economic development or service industry on SEGR is not significant by conventional statistical standards because both SERVICE and ENERGY share common variance with SEGR. Nei-

TABLE III

Coefficients (Standard Errors) of Regression Equations Predicting Nominal Segregation (SEGR) and Ordinal Status Inequality (ORDI) in 56 Countries

| | Nominal Segregation Index SEGR | Ordinal Inequality Index ORDI |
|---|---|---|
| ENERGY[a] | 1.993 | –1.491 |
| | (2.233) | (1.974) |
| SERVICE | 0.066 | –0.041 |
| | (0.035) | (0.030) |
| FLFP | –0.083* | 0.093** |
| | (0.037) | (0.033) |
| EDINQ[a] | 0.384 | 11.168** |
| | (2.762) | (2.442) |
| World System Periphery | 2.243 | –2.162* |
| | (1.180) | (1.044) |
| Semiperiphery | 0.599 | –0.230 |
| | (1.051) | (0.929) |
| Constant | –1.322 | –0.708 |
| $R^2$ | 0.254 | 0.520 |
| $\overline{R}^2$ | 0.163 | 0.461 |

[a]Coefficient multiplied by 10,000.
[b]Core nations is the omitted category.
*$p < 0.05$
**$p < 0.01$

ther EDINEQ, nor world system position significantly affects SEGR in the model examined.

The findings regarding gender-occupational status inequality (ORDI) are substantively different from those observed for nominal segregation (SEGR). The difference is especially evident with regard to the impact of female labor force participation (FLFP) and educational inequality (EDINEQ). First, unlike the effect of FLFP on nominal segregation, the data for the measure of ordinal inequality suggest that countries that recruit more women to their economically active labor force are less likely to provide them with

employment opportunities in the high status occupations. That is, while high rates of female labor force participation go with low rates of nominal occupational segregation, they nonetheless tend also to increase gender-occupational inequality (i.e., increase the relative representation of men in high status occupations). Second, gender educational inequality (EDINEQ) exerts a significant effect on ORDI (although its effects on SEGR were insignificant). In countries where women lack equal access to educational opportunities, they are less likely to enter high-status occupations and are more likely to be channeled into lower-status jobs. Finally, other things being equal, level of gender occupational inequality is somewhat lower in the less developed-peripheral countries than in the highly industrialized core countries.

The difference between the model that predicts nominal segregation and the model that predicts ordinal inequality is also evident in the size of the coefficients of determination (both adjusted and unadjusted). The coefficient of determination is considerably greater in the equation that predicts inequality than in the equation that predicts segregation. That is, the ability to predict variation across nations is considerably greater for occupational inequality than for nominal segregation. Apparently, occupational inequality is more dependent on structural characteristics of nations (such as gender composition of the labor force, educational inequality, and position in the world systems) than nominal segregation.

## CONCLUSIONS

Measures of nominal occupational segregation provide information on the degree to which men and women are differentially distributed across occupational categories. Measures of occupational inequality provide information on the degree to which men and women are differentially distributed in a stratified occupational structure. Although nominal segregation and status inequality are not independent, each represents a different theoretical concept and is differentially affected by structural characteristics of national labor markets.

The data presented in this paper reveal high rates of both gender-occupational segregation and gender occupational inequality in a

wide range of countries. The data also reveal considerable variation across nations in both segregation and inequality. Analysis of how structural characteristics of the labor market relate to segregation and inequality enables us to highlight differences in social and economic conditions that increase or reduce gender-occupational segregation and gender-occupational inequality. Occupational segregation seems to decline as the rate of female labor force participation rises. That is, an increase in the number of economically active women is likely to increase participation of women in all occupational domains, even in occupational domains traditionally dominated by men. By contrast, gender rank inequality in occupational status rises with the rate of female labor force participation. When many women join the economically active labor force, they are less likely to enter high-status (i.e., professional and managerial) jobs but are relegated disproportionately to low-status occupations. It seems that the increase in female labor force participation weakens their selective recruitment in the labor market, on the one hand, and enlarges the potential pool of candidates channeled into lower status occupations, on the other hand.

The data also highlight the significant impact of educational inequality on occupational inequality. Gender-linked occupational inequality is more pronounced in countries characterized by high rates of gender-based inequality in education. Apparently, access to educational opportunities serves as an effective mechanism through which men and women are channeled into and out of low and high status occupations, and as a major determinant of gender-based inequality in occupations.

The findings revealed by the analysis suggest rather strongly that occupational segregation and occupational inequality should be viewed as two distinct concepts. Empirical indicators of these concepts are differentially related to structural characteristics of the labor market. Indeed, theoretical propositions regarding inequality cannot be routinely translated into propositions regarding nominal segregation. Nor can we readily draw inferences from rates of nominal occupational segregation about patterns of gender-based inequality in occupational rank.

Our findings further clarify the nature of the relationship between nominal segregation and ordinal status inequality. High levels of

nominal segregation tend to be associated with a greater concentration of women (lower concentration of men) in high status, white collar occupations. In other words, in countries with an extensive gender-based occupational division of labor, women are more likely to be allocated to high status, white-collar positions, and men are more likely to be employed in blue-collar, manual and low-status jobs. That is, when segregation is rigid women are more likely to enter high status occupations. When segregation is less rigid women are allocated in disproportionate numbers to low status occupations. At this point we can only speculate why most countries follow this pattern, and why a few deviate from the basic pattern. It is highly possible that politics, affirmative action programs, and competitive exams into the civil service can be added to the set of factors that explain the relations between level of gender occupational segregation and inequality Indeed, we need further analysis of the social and economic conditions that generate specific configurations of gender occupational segregation and inequality.

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## NOTES

[1] Among all indicators of nominal segregation, the most widely used measure is the index of dissimilarity (Duncan and Duncan, 1955). The index of dissimilarity is defined as follows:

$$D = \sum_{j=1}^{i} \mid (F_j / \sum_{j=1}^{j} F_j) - (M_j / \sum_{j=1}^{j} M_j) \mid \cdot \frac{1}{2}$$

where F and M are the respective frequency of women and men in occupational category j. The index measures the proportion of either men or women who would

have to change occupational categories in order for the two gender groups to have an equal occupational distribution.

[2] The size standardized index of dissimilarity (e.g. Gibbs, 1965; Jacobs and Lim, 1995) is defined as follows:

$$DS = \sum_{j=1}^{i} \left| \left[ (F_j/T_j) / \sum_{j=1}^{j} (F_j/T_j) \right] - \left[ (M_j/T_j) / \sum_{j=1}^{j} (M_j/T_j) \right] \right| \cdot \frac{1}{2}$$

where M, F, and j are the same as in equation 1, and T = M + F. Although the DS resolves problems associated with variations in occupational structure across places, it treats each category as if it is of the same size. Thus, it inflates the impact of small occupational categories and devalues the impact of large occupational categories. Furthermore, as observed by Charles and Grusky (1995), the DS is also dependent on the female labor force participation rate. So its value will change when this rate changes, but all else remains the same.

[3] The ratio index is defined as follows:

$$R = 1/J \sum_{j=1}^{j} \left| \ln(F_l/M_j) - \left[ 1/J \sum_{j=1}^{j} \ln(F_j/M_j) \right] \right|$$

where M, F and j are the same as in the previous equations. The values of the ratio index (R) represent the sum of occupational-specific deviations from proportional representation of the two sexes. In other words, the value represents the factor by which women in a specific country are disproportionately represented in an average occupational category. In a fully integrated market R = 0 (exp R = 1); in a fully segregated market R is undefined because $M_j = 0$ in all female-type occupations (Charles, 1992). Despite its apparent advantage, the R index, like DS, gives each category equal weight.

[4] The ND index has been extensively used to study racial-occupational inequality (Fossett, 1984), but it has seldom been applied to the study of gender occupational inequality (one exception is the study by Lewin-Epstein and Semyonov, 1992). The ND index is defined as follows:

$$ND = \sum_{i=2}^{n} M_i \left( \sum_{j=1}^{n-i-1} F_j \right) - \sum_{i=2}^{n} F_i \left( \sum_{j=1}^{n-i-1} M_j \right)$$

where M and F represent the male and female distributions, respectively, and i and j are the counters used to cumulate the relative frequencies in rank-order sequence. The values of the index represent the probability that a randomly selected man (M) would be ranked in higher order categories in comparison to a randomly selected woman (F). When ND = 0, the two groups are equally distributed over the rungs

of the occupational ladder; a value of 1 indicates that all men are ranked higher than all women, and a value of –1 indicates the opposite.

[5] Odds-ratios can be also used as indicators of gender-occupational inequality (Semyonov, 1980; Semyonov and Shenhav, 1988). When pertaining to the differential placement of the two gender groups in a high-status (i.e., professional and managerial) occupational category versus other occupational groupings, odds-ratios provide a margin-free indicator of gender inequality. Similarly, Clark (1990) has suggested the proportion of women in high-status occupations as an indicator of occupational inequality.

[6] The data were restricted to circa 1990 in order to provide a constant historical context. In a few cases, data were available only within three years before or after 1990. Puerto Rico and Slovenia were omitted because they lack information on the set of independent variables. When East Germany is included as an additional country, results are not materially affected.

[7] The decision to include the agricultural labor force in the analysis, despite problems associated with its definition, stems from two main reasons. First, in many countries, especially in developing nations, agricultural workers comprise most of the labor force. Agricultural jobs in such countries play a major role in the allocation of women to the labor force (Boserup, 1970; Semyonov and Shenhav, 1988). Second, we wanted to reduce any errors due to applying parameters of the total national economy (e.g., GNP per capita), which are obviously affected by the agricultural population, to the non-agricultural segment of the labor force only. Results for the non-agricultural labor force are similar, for the most part, to those reported here and can be obtained from the first author upon request. For five countries data were classified only for six major occupational groupings, and in one country data were organized in five major occupational categories.

[8] This finding is not surprising in light of the hierarchical order of prestige scales. Women are concentrated in high status (professional and semiprofessional) occupations and in intermediate jobs (clerical and to some extent, sales), while occupations at the bottom of the prestige scale (manual and agricultural) are male-dominated.

[9] Indirect confirmation of this observation gains additional support from the intercorrelations among the six measures. The data reveal that D, DS, and R are highly related to each other (with correlations between pairs of measures ranging between r = 0.91 to r = 0.76) while $ND_7$, $ND_4$, and $ND_2$ are highly associated with each other (with correlations ranging between r = 0.91 to r = 0.26). The correlations between pairs of measures representing different types, however, are much lower, ranging between r = –0.63 ($ND_4$ and D) to r = –0.23 (DS and $ND_7$). We will return to the meaning of the negative association between the two types of measures later in the paper.

[10] The index SEGR was computed as the linear combination of the three measures of nominal segregation (D, DS, R) using principal component factor analysis. The equation from the principal component solution for nominal segregation is:

$$\mathrm{SEGR} = 0.89656\mathrm{zD} + 0.95743\mathrm{zDS} + 0.95116\mathrm{zR}$$

The index ORDI was computed as the linear combination of the three measures of ordinal inequality ($ND_7$, $ND_4$, $ND_2$), using principal component factor analysis. The equation from the principal component solution for ordinal inequality is:

$$\text{ORDI} = 0.99747\text{z}ND_7 + 0.97904\text{z}ND_4 + 0.97867\text{z}ND_2$$

The letter, z, indicates that measures were expressed in terms of standardized, or z, scores.

[11] For 11 countries data were not available for 1984. For these countries 1984 values were imputed from data for 1965, based on a regression equation for 72 countries on which data are available for both 1965 and 1984. The EDINEQ variable was expressed in terms of the average of two indicators: (1) (percent men in primary education) minus (percent women in primary education) divided by (percent women in primary education); and (2) (percent men in secondary education) minus (percent women in secondary education) divided by (percent men in secondary education).

[12] Regression equations were also estimated for each one of the six measures separately. The equations for the specific measures produced results similar to those reported here for the summary measures. To avoid repetition and in the interests of parsimony, we present only the results for the summary measures.

## REFERENCES

Bell, D.: 1973, The Coming of Post-Industrial Society (Basic Books, New York).

Boserup E.: 1970, Women's Role in Economic Development (St. Martins, New York).

Charles M.: 1992, 'Cross-national variation in occupational sex segregation', American Sociological Review 57, pp. 483–502.

Charles M. and D. B. Grusky: 1995, 'Structure of sex segregation', American Journal of Sociology 100(4), pp. 931–971.

Cho, U. and H. Koo: 1983, 'Economic development and women's work in a newly industrializing country: the case of Korea', Development and Change 14, pp. 515–531.

Clark, R.: 1990. 'Contrasting perspectives on women's access to prestigious occupations: a cross-national investigation', Social Science Quarterly 72, pp. 20–23.

Duncan O. D. and B. Duncan: 1955, 'A methodological analysis of segregation indexes', American Sociological Review 20, pp. 210–217.

Fossett, M. and S. J. South: 1983, 'The measurement of intergroup income inequality: a conceptual review', Social Forces 69, pp. 855–871.

Fossett, M.: 1984, 'City differences in racial occupational differentiation: a note on the use of odds ratios', Demography 21, pp. 655–666.

Gibbs J. P.: 1965, 'Occupational differentiation of negroes and whites in the United States', Social Forces 44, pp. 159–165.

Greenhalgh S.: 1985, 'Sexual stratification: the other side of 'growth with equity' in East Asia', Population and Development Review 11(2), pp. 265–314.
Jacobs J. A. and S. T. Lim: 1995, 'Trends in occupational and industrial sex segregation in 56 countries, 1960-1980', in J. A. Jacob (ed.), Gender Inequality at Work (Sage Publications).
Lewin-Epstein N. and M. Semyonov: 1992, 'Modernization and subordination: Arab women in the Israeli labor-force', European Sociological Review 8(1), pp. 39–51.
Lieberson S.: 1976, 'Rank-sum comparisons between groups', Sociology Methodology 7, pp. 276–291.
Marshall S. E.: 1985, 'Development, dependence and gender inequality in the third world', International Studies Quarterly 29, pp. 217–240.
Nuss S. and L. Majka: 1983, 'The economic integration of women: a cross-national investigation', Work and Occupations 10, pp. 29–48.
Oppenheimer V. K.: 1970, The Female Labor Force in the U.S.A. (Berkeley Institute of International Studies, University of California).
Semyonov M.: 1980, 'The social context of women's labor force participation: a comparative analysis', American Journal of Sociology 86, pp. 534–550.
Semyonov M.: 1992, 'Women's labor force participation and occupational differentiation: does the measure make the findings?', Social Science Quarterly 73(4), pp. 947–949.
Semyonov M. and R. I. Scott: 1983, 'Industrial shifts, female employment and occupational differentiation: a dynamic model for American cities, 1960–1970', Demography 20, pp. 163–176.
Semyonov M. and Y. Shenhav: 1988, 'Investment dependence, economic development, and female employment opportunities in less developed countries', Social Science Quarterly 69(4), pp. 961–978.
Shirahasi S. and H. Ishida: 1994, 'Gender inequality in the Japanese occupational structure', International Journal of Comparative Sociology 35, pp. 188–206.
Singelmann J.: 1978, From Agriculture to Services: The Transformation of Industrial Employment (Sage Publications, Beverly Hills).
Snyder, D. and E. L. Kick: 1979, 'Structural position in the world system and economic growth 1955–70: multiple-network analysis of transnational interactions', American Journal of Sociology 84, pp. 1096–1126.
Treiman, D.: 1970, 'Industrialization and social stratification', in E. O. Laumann (ed.), Social Stratification (Bobbs-Merrill, Indianapolis), pp. 207–234.

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