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Occupational Sex Segregation in Global Perspective: Comparative Analyses of Developed and Developing Nations

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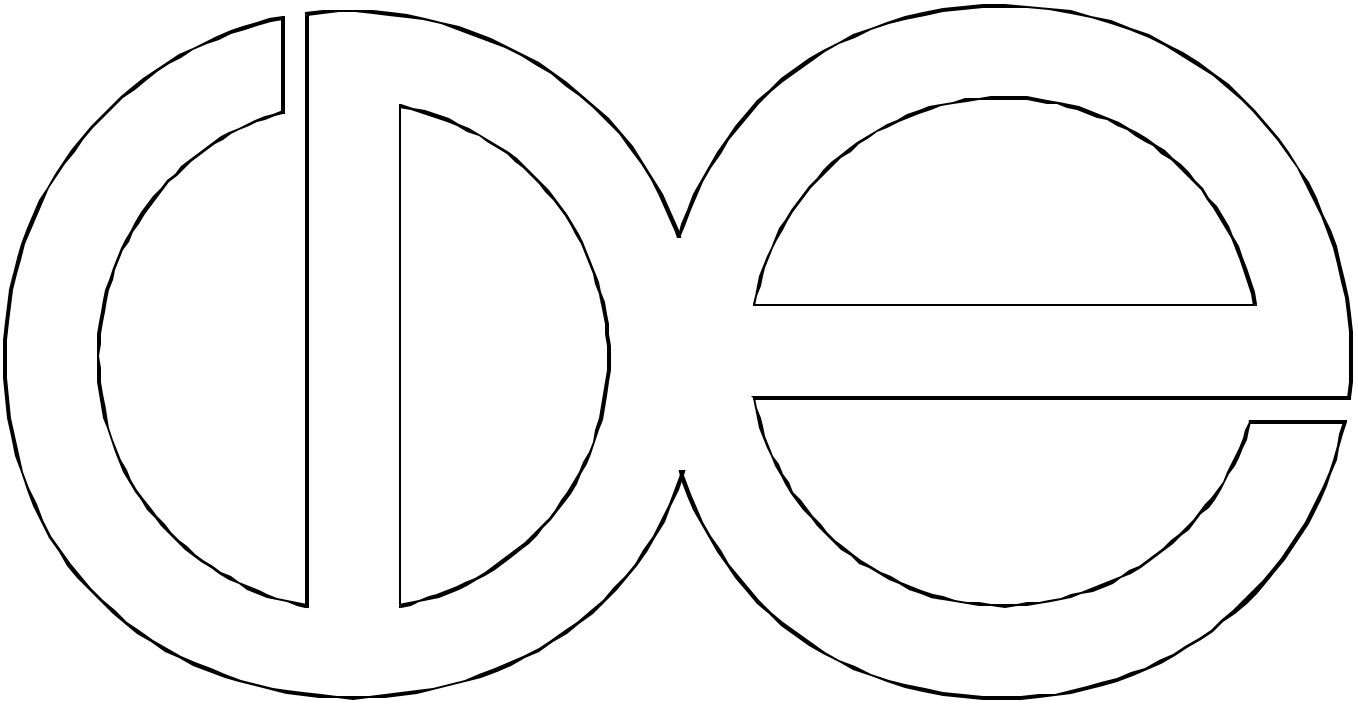

Occupational Sex Segregation in Global Perspective:

Comparative Analyses of Developed and Developing Nations

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Abstract:

This study provides the first systematic examination of patterns of occupational sex segregation in less developed countries. I apply log-linear and log-multiplicative models to six-category occupational data from 44 nations to describe and explain the segregation patterns in both industrialized and less developed countries. These analyses indicate that segregation patterns are far more variable in less developed countries than in developed nations. In most countries, women are indeed over-represented in professional, clerical, sales and service work, and men are over-represented in managerial and production occupations. However, this dominant pattern holds for only 74 percent of industrialized nations and merely 52 percent of developing countries. I identify four additional "variant patterns" of segregation that deviate from the dominant pattern in striking ways. Also, my findings cast doubt on the usefulness of index measures of sex segregation (such as *D*, the index of dissimilarity), because a model implying that patterns of segregation vary only in degree and not in shape can be rejected. I can explain 73.2 percent of the variability in segregation patterns with such covariates as relative economic development, fertility, the size of the service sector, labor force growth, and average female human capital. The effects of these variables in less-developed countries are often inconsistent with previous results for developed countries, suggesting that conventional explanatory theories of sex segregation require modification and elaboration. Of course, my results are based on highly aggregate occupational data, and future explanatory studies of occupational sex segregation in less developed countries would most likely benefit from using more disaggregated data.

Introduction:

Most studies of occupational sex segregation have focused on industrialized nations; thus, relatively little is known about the patterns of segregation in developing countries.[1] One consistent finding, however, is a great deal of variation in the level of sex segregation across less developed nations, far more than the variation across industrialized countries. Early work in this area included Boulding (1976) and Ferber and Lowry (1977) who both described a wide range in the values of the index of dissimilarity (*D*) across the 86 and 157 countries studied, respectively. Ferber and Lowry also noted that the percent female in each of seven occupational categories varied substantially across less developed nations.

A more recent version of these analyses by Blau and Ferber (1992) found that in the 1980s, *D* varied in their "advanced industrial" sample from 25.4 in Greece to 49.3 in Ireland. Among the other 80 nations in their study, this index ranged in value from 9.7 in China to 62.3 in Qatar. They also demonstrated that the percentage of workers who were female varied most widely in the clerical category (from 84.5% female in Bulgaria to 3.1% female in Pakistan) and least widely, though still dramatically, in the managerial and administrative category (from 39.2% in the U.S. Virgin Islands to 0.0% in Comoros). Of course this measure, percent female in an occupational category, cannot distinguish the degree to which women are occupationally segregated from their tendency to participate in the labor market; i.e., women's representation in every category tends to be less in

[1] In the literature, various terms are used to describe a nation's level of economic development. The appropriateness of these terms is sometimes debated, but no consensus seems has been reached on standard terminology. One influential author prefers "North" to describe industrialized nations and "South" to describe a lesser degree of development, despite the fact that Australia and New Zealand would be counted as in the "North" (Tinker, 1990). Others prefer a tripartite distinction of industrialized nations, medium developed countries (MDCs) and least developed countries (LDCs) (e.g., Faulkner and Lawson, 1991). Here I have divided my sample of nations into two groups, which I will call developed and less developed. Developed countries are those with a relatively high per capita gross domestic product and large industrial output. Less developed nations are those that have a lower per capita GDP and a smaller output. (See the data section for details on the construction of these groups.) The terms industrialized and developed will be used interchangeably to designate the former group, while the terms less developed and developing will be used to describe the latter.

nations with low rates of female labor force participation. These studies have other drawbacks, as well. The International Labour Organisation data used is of questionable comparability and quality across so many nations. Also, recent research by Charles and Grusky (1995) has cast doubt on the usefulness of *D* as a summary measure of occupational sex segregation. A more systematic study of the segregation patterns is therefore needed to understand how the sex segregation of occupations varies across developing and developed nations. This study fills that gap.

What kind of work do women do?

Cross-cultural studies of work describe the diversity of jobs that are considered appropriate for women in different cultural settings. For example, Boserup (1970) documented wide variations across Africa, Asia and Latin America in the representation of women in agriculture, trade, clerical work and administration. Other international comparisons of the sex-typing of work have shown that the tasks considered male in one society are often allocated to women in another (Rogers, 1978; Sanday, 1981). Many researchers therefore conclude that women's occupational roles are unrelated to their reproductive role or household obligations, (e.g. Jacobs, 1989). Nevertheless, the gender typing of work is an almost universal phenomenon, and one that is considered so "natural" as to be invisible to those within the cultures where it exists.

This fact may help to explain why some researchers studying occupational sex segregation have tended to assume that the Euro-American pattern of segregation is the norm in all industrialized countries. One example would be Charles (1992, p. 494) who, in a study of occupational sex segregation in twenty-five industrialized nations, describes the movement of women into clerical and

service work and out of managerial and production occupations as "segregative."[2] No one has rigorously attempted to verify, however, whether the pattern that she is assuming (in which women dominate clerical and service work and are underrepresented in managerial and production jobs) is in fact the norm across all countries or even all industrialized nations. The findings of Ferber and Lowry (1977) and Blau and Ferber (1992) would suggest that this is not the case. Also, a study of the segregation patterns in a small group of nations (six European countries, the United States and Japan) casts doubt on the idea. In this study, Charles and Grusky (1995) use log-linear and log-multiplicative modeling to compare women's representation in specific occupational categories to the average female representation across all occupational categories. They find that in one nation (Turkey) service occupations are more male dominated than the average occupation, and in another (Japan) production jobs are nearly as gender integrated as the average, at least at this broad level of occupational aggregation. On the other hand, Blau and Ferber note that "in the vast majority of countries, women are less heavily represented among administrative and managerial workers … and among production workers than in the labor force" (1992, p. 311). The question therefore remains open. How common are the characteristics of the "Euro-American" pattern of occupational sex segregation? Do the patterns of segregation in less developed countries differ from this pattern? Are the patterns in these nations more diverse overall, as previous studies would suggest? What national characteristics, if any, can explain the patterns of segregation in developed and developing nations? In this paper, I will use the methodology outlined by Charles (1992) and Charles and Grusky (1995), log-linear and log-multiplicative modeling of the segregation patterns, to answer these questions.

Why is occupational sex segregation important?

[2] To be fair, Charles is most likely describing the effects in this way for the sake of convenience. Her parameter estimates of female representation in occupations (Table 1) indicate that only a few countries deviate from the pattern that she describes, though she does not discuss these deviations or comment on the limited applicability of her generalized pattern of segregation.

In the United States, occupational sex segregation is related to the fact that women hold, on average, jobs with less desirable characteristics than men's occupations. For example, Treiman and Hartmann (1981) estimated that in the U.S. 35% to 39% of the gender difference in wages is attributable to women's segregation into lower paying occupations. Also in the U.S., occupational segregation accounts for observed differences in unsupervised break time, fairness of promotion policies and job flexibility, as well as explaining part of the gender gap in benefits and chances for promotion (Glass, 1990).

Although cross-national comparisons find no relationship between higher levels of segregation and a higher degree of gender wage inequality, these studies focus solely on industrialized nations, and their results are not conclusive. For example, Rosenfeld and Kalleberg (1990) suggest that there may be no relationship between the level of sex segregation and the gender gap in wages. The four nations in their comparison were all advanced industrial societies, however (the United States, Canada, Norway and Sweden). Blau and Ferber (1992) focus on Scandinavian nations as well (comparing them to Japan) in describing how the gender earnings gap is relatively small in nations with higher levels of sex segregation and vice versa. The fact that women are more segregated in nations with a small gender gap in wages does not exclude the possibility that women remain in the lowest paid positions in that nation's occupational structure, however, particularly if income inequality is relatively low in that nation (as is the case in Scandinavia). In addition, other occupational characteristics such as hours of work, autonomy, benefits, flexibility, and opportunities for advancement are desirable elements of jobs that may be unequally distributed to women and men.

Also, studies on the pay gap have used highly aggregated occupational data, and therefore cannot speak to the full effects of gender segregation at the job level. In the United States, segregation by gender has been found to be almost complete at the level of job titles within organizations. 84% - 92% of American workers in selected industries were found to be in job titles

completely segregated by gender (Bielby and Baron, 1984, 1986). One study indicates that this job-level segregation is very important for understanding the wage gap in the U.S. (Peterson and Morgan, 1995). It demonstrates that the segregation of women and men into different jobs was much more important than either wage differences within jobs or segregation into different establishments in determining wage levels.

In developing countries, however, few cross-national studies have examined whether women are segregated into less desirable work. Evidence from many individual societies, however, indicates that such a process is likely to be in effect in many, if not all, developing nations. For example, Lee and Nagaraj (1995) find that men have higher wage returns to hours worked, to experience and to establishment characteristics in Malaysia, a fact that they attribute to men's more favorable occupational distribution. Similarly, in a study of urban Sudan, Cohen and House (1993) find that only the more educated women work in the better-paid formal sector of the economy in this Muslim North African nation. A wage gap remains, however, which they find is explained by women's segregation into certain large occupational categories, rather than by pay discrimination within occupational groupings. In developing nations there is substantial evidence of pay discrimination within jobs as well (e.g., Joekes, 1985). Anker and Hein (1986) nevertheless generalize that in these countries, substantial evidence suggests occupational segregation is associated with less security in employment for women and fewer prospects for promotion, as well as lower wages.

Women's Work and Development

Economic development may also play a role in the segregation of women into less desirable occupations. The literature on gender and development describes a negative effect of economic growth on women's occupational status. For example, Boserup (1990) discusses how growth and foreign investment cause the decline of subsistence production (including handiworks as well as

agriculture) and the growth of small family enterprises, which are eventually followed by the growth of large modern enterprises. She has argued in her prior work (1970) that this process displaces women from traditional paid work into formal and informal work in the service sector, other work in the informal sector,[3] and unpaid labor in the home.

Ward (1988) argues that these changes in women's employment result from a certain type of economic growth common in less developed countries: dependent development. According to this theory, developing countries in the periphery of the economic "world system" became dependent on industrialized nations, by exchanging a limited number of crops or raw materials with a small number of industrialized nations, who provide them with processed goods in return. In such a relationship, capital flowed to the core nations and to indigenous elites but did not lead to widespread local industrial development. These peripheral nations instead experienced structural distortions of their economies, as relatively few manufacturing jobs were created (because foreign owned factories brought in labor saving technologies) but the tertiary sector grew rapidly. Foreign investment also brought mechanization into agriculture and extractive industries, displacing many male and female workers who consequently were only able to find employment in the service and informal sectors (Ward, 1988).

The service sector occupations commonly held by women are not very desirable. The most common jobs for women in this sector are domestic service, laundry, sewing, food preparation, trading and sales (Boserup, 1970). These service and sales occupations provide only minimal wages and limited mobility (Ward, 1988), while men fill the higher status occupations and those requiring more education (Papanek, 1979).

[3] The informal sector in developing economies comprises, of course, home-based production (such as handicrafts and piece work), small-scale retail trade (such as street vending), petty food production, other services for urban workers, and domestic service. Pay and working conditions in this sector are often poor, because they are not regulated by labor legislation (Ward, 1988).

Some women in developing nations do find relatively rewarding work in export processing factories. Lim (1990) notes, however, that only a very small percentage of women in developing countries are employed in these factories, because women are only hired in selected industries, such as textile and garment production. Heavier industries -- which were developed through the investment of foreign capital in the 1960s, as part of an "import-substitution" strategy -- predominantly hire men (Lim, 1990). Also, even in the factories that do hire women, the better paid supervisory and technician jobs are reserved for men. It is only these positions which have advancement opportunities and higher wages (Fernandez Kelly, 1983).

Multi-national corporations often subcontract assembly work to small sweatshops or hire out piecework to individual women (ILO, 1985). These and other informal sector jobs are some of the worst paid in developing economies, often not providing even a subsistence income. It is estimated that 46% - 70% of workers in this sector are female (ICRW, 1980). Thus, the process of dependent development tends to displace women workers into undesirable service and informal sector jobs. An exception would perhaps be female production workers in multi-national assembly plants, who tend to be better educated and better paid than the average female worker (Lim, 1990), but the size of this group may not be significant.

Explaining differences in segregation patterns:

Other researchers have attempted to pinpoint structural causes of these cross-national differences in occupational segregation. For example, Jacobs and Lim (1992) studied change over time in the level of occupational sex segregation for 56 industrialized and less developed nations, 1960-1980. They discuss several hypotheses about the effects of development in these societies. Both neoclassical economics and modernization theory in sociology predict that segregation will decline as industrialization increases. For example, modernization theory claims that sex segregation would

decline as the institutional requirements of industrial society make it increasingly necessary for the best worker to be chosen for each job, regardless of ascriptive criteria such as gender (Smelser, 1968). Similarly, many economists expect that the imperative of economic efficiency will erode the importance of discriminatory (non-efficient) characteristics in determining an individual's labor force status (e.g., Goldin, 1990).

Charles (1992) also discusses these theories, hypothesizing a decline in segregation with increasing levels of modernization for her sample of industrial societies. Her goal is to explain why certain advanced industrial societies with egalitarian gender cultures, such as Scandinavian nations, tend to have a higher degree of sex segregation relative to societies with less egalitarian gender cultures, such as Japan. She uses log-linear modeling on six-category occupational data from 25 industrialized nations and does find a weak "integrative" effect of modernization, net of the other variables in her model.

Jacobs and Lim (1992), however, propose alternative hypotheses for the effects of modernization. For less developed nations, they discuss the stagnation or loss of women's status that accompanies industrial development (Ward, 1988) and consequently propose that sex segregation may increase in developing societies. Somewhat arbitrarily, they link this hypothesis to other "pessimistic" predictions about the persistence of sex segregation in industrial societies due to rigid labor market structures (Reskin and Roos, 1990), patriarchal institutions and ideologies (Hartmann, 1976) or other gender differences in status or labor market position. Jacobs and Lim find that modernization theory is not supported in their analyses, nor do the effects of modernization appear to vary systematically between industrialized and less-developed samples. Their use of the index of dissimilarity as the dependent variable of their regression models is problematic, though, as will be discussed in the next section.

One key element proposed by Charles (1992) to be counteracting the integrative tendencies of modernization is the size of the service sector in postindustrial economies. The service sector, of course, encompasses more than merely service occupations. Broadly defined, it includes wholesale and retail trade, entertainment and recreation, as well as educational, health and other services to businesses and individuals. It therefore includes professional, managerial, sales and service occupations. Charles notes that the growth of the service sector incorporates many of women's domestic tasks into the economy and argues that these jobs therefore tend to be gender-typed as women's work. Women are actively recruited to enter the labor market to fill these occupations, and service sector jobs are sometimes restructured so as to be more appealing to women. She finds that in her model, the size of the service sector has the expected segregative effect.

In developing countries, a large service sector covers similarly large variety of high and low status occupations. Joekes (1987) describes it as including "large modern sector enterprises" such as the hotels, restaurants and recreation activities catering to tourists, "one-to-one personal health and education services as well as services to organizations; directly traded activities … for purely local consumption; [and] national scale traders, including wholesalers and neighborhood suppliers such as … itinerant street hawkers" (p. 106). Some of these activities overlap with women's traditional domestic work, but many others do not. Ward's (1988) argument implies that a large service sector (relative to manufacturing) would indicate a higher degree of dependent development and consequently an increased likelihood of women's displacement into service and informal sector jobs. Thus, a larger service sector in less developed countries is expected to increase women's representation in service occupations, as well as low-status sales jobs and piecework production. The latter two types of jobs may be more difficult to distinguish from higher status occupations in the same categories, however. This covariate also is expected to be related to decreases in women's relative representation in professional and managerial occupations.

Both Jacobs and Lim (1992) and Charles (1992) predict that other elements of a nation's economic structure will have effects on segregation, as well. For example, Charles proposes that higher levels of female labor force participation would have an integrative effect, as women spend more of their lives working and therefore gain more similar levels of human capital to those of men. She finds that the effect of this variable in her model is neither segregative nor integrative, however. Semyonov and Shenav (1988) provide a possible explanation for this result. They propose that when relatively few women participate in the labor force, female workers tend to be highly educated and to have urban backgrounds. Thus, higher female labor force participation is related to a lower representation of women in high status professional and managerial occupations, relative to the other occupational categories. This counterintuitive effect is, indeed, what Semyonov and Shenav found using log-linear modeling on an aggregated occupational table of male and female workers in high status and lower status occupations for 53 developing countries. In these models, I will be controlling for the effect of relative female human capital, but because the only available measure represents the human capital attainment of all women, not only women workers, an effect of "elite women workers" is still likely.

Charles also predicts that women with reduced child bearing and child rearing responsibilities will be able to better compete in the labor market would therefore be less penalized by employers for their gender. Both she and Jacobs and Lim find that lower levels of fertility are in fact related to lower levels of segregation. However, an alternative hypothesis would be that in nations where fertility is high, fewer non-elite women would be able to combine work and care for their families. Thus, particularly in the sample of less developed nations (in which fertility levels are more varied than among the industrialized sample), lower average fertility could potentially increase *or* decrease women's representation in high-status occupations.

Another hypothesis proposed by Charles is that within the tight labor markets of a rapidly growing economy, women would have more opportunities to enter atypical occupations. This variable should operate the same way in developing countries, but with different effects. If women tend to be segregated into the informal sector of low-status service, sales and production jobs through the "dependent development" process described by Ward (1988), movement into atypical jobs would increase their representation in managerial, professional and potentially clerical occupations and decrease their representation in lower status service, sales and production work.

One additional factor affecting segregation was proposed by Jacobs and Lim (1992). They hypothesized that higher average levels of human capital attained by women would decrease the level of occupational sex segregation, particularly in a sample of less developed countries. They found this expected effect in their models. Therefore, higher levels of average female human capital are expected to increase women's ability to move into occupations requiring more education, specifically professional and managerial occupations, in both developed and developing nations.

Another covariate was drawn from the literature on development. As foreign capital is invested into a developing economy, it encourages dependent development and women are displaced into low-status service, sales and production occupations (Ward, 1988). As was mentioned previously, some transnational corporations also preferentially hire female workers for production jobs. Multi-national capital penetration is therefore expected both by Hahm (1991) and by Semyonov and Shenav (1988) to increase women's representation in lower-status occupations. While Semyonov and Shenav found weak evidence to support their hypothesis, Hahm's findings did not support hers.[4]

One additional variable was designed to account for differences in the quality of data collection efforts, which are likely to be large, considering the wide discrepancies in financial

[4] This result may be related to the inclusion of industrialized nations in her sample, however. Many of these nations have very high levels of foreign capital investment, but it is not clear what effect this measure would have on occupational sex segregation. For example, the recent purchase of Chrysler by Daimler-Benz, a German

resources available for data collection across these nations. Variations in data quality could have two effects. (1) It could introduce noise into the data, attenuating the effects of the covariates. (2) Less careful data collection procedures could lead to bias in occupational coding, as workers' occupations are coded into categories that fit the expectations of the interviewer or coder, i.e., the placement of women and men into gender-typical occupations. This process would be expected to occur similarly in developing and developed nations, though the occupations considered typical for women would vary. In developed nations, women would be coded into clerical and service jobs, but not into managerial and production jobs. In less developed nations, the patterns are less certain, but women would likely be coded into low-status service occupations but not into high-status professional and managerial jobs.

In my explanatory models, I use Charles's methodology of log-linear modeling to examine how structural and cultural factors affect the patterns of segregation. I expect that the effects of the covariates will differ in industrialized and less developed nations; thus, I interact all of the covariates with a dummy variable to distinguish the differing effects of these measures across the two groups of nations.

To summarize, I propose that relatively higher levels of *economic development*[5] will lead to less segregation in industrialized nations but will tend to segregate women into low-status service sector jobs in developing nations. The *size of the service sector* is expected to be related to the higher representation of women in gender-typical occupations in developed nations and to increased female representation in low status service sector occupations, such as sales and service jobs, in less developed nations. *Female labor force participation* is expected to increase women's representation in atypical occupations within industrialized nations, but may either increase or decrease

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company, would not be considered an investment in the development of the United States, only perhaps a measure of the integration of global capital across nations.

[5] Rather than the more common term, "modernization," I have chosen to describe the size of a nation's economy as "relative development." Although this term may seem unusual when applied to industrialized nations, it avoids implying that development is a linear process experienced similarly in all nations at

their representation in high-status occupations in less developed countries. In industrialized nations, higher *fertility* is expected to segregate women into gender-typical occupations, but like female labor force participation, may either increase or decrease the representation of women in high status occupations within developing nations. In both industrialized and less developed countries, women are expected to enter atypical occupations more easily in the tight labor markets related to rapid *labor force growth*. In industrialized nations, this would mean that women would be able to move into managerial and production occupations, while in developing countries, women would be expected to more easily move into managerial and professional occupations, and out of low-status sales, service and production work in the informal sector. The relative level of female *human capital* is expected to increase women's representation in professional and managerial occupations similarly in industrialized and less developed nations. *Multi-national capital penetration* is expected to be related to dependent development and the consequent displacement of women workers into low-status service jobs and informal sector sales and production occupations in developing countries. It is expected to have no important effect on the patterns of segregation in industrialized nations. Finally, more *data quality controls* are expected to either capture noise in the data, decreasing the attenuation of effects. Alternatively, it may lessen the degree to which workers are incorrectly coded into gender-typical categories. These effects are hypothesized to occur similarly in both developed and less developed nations.

Index measures of segregation:

With the exception of Charles (1992), Charles and Grusky (1995) and Semyonov and Shenav (1988), the studies discussed previously use the index of dissimilarity, *D*, as their measure of the degree to which women and men are segregated into different occupations. This index has many

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different points in time. It is therefore less likely to be misinterpreted as ranking nations according to their

benefits, namely that it is simple to calculate and is invariant to changes in the rate of female labor force participation. Typically, *D* is calculated as follows (Duncan and Duncan, 1955):

$$\boldsymbol{D} = \Sigma^{J}_{j=1} \; |(F_j/F) - (M_j/M)| \times 100 \times \tfrac{1}{2}$$

where F_j and M_j refer to the number of women and men in the *jth* occupation, and *F* and *M* refer to the number of men and women in the labor force as a whole. This index is easily interpretable, indicating the percentage of the labor force that must change occupational categories to bring about a perfect correspondence between the sex ratio within each occupation and the overall rate of female labor force participation.

However, the flaws of this index are equally well known (see James and Taeuber, 1985). *D* is not invariant under multiplicative transformations of the occupational margins, which of course means that it cannot be used to disentangle cross-national differences in sex segregation from differences in the occupational structure of nations. Also, attempts to modify *D* to correct for this problem have created indices with other drawbacks. The most notable example is the size-standardized index of dissimilarity (D_S), which loses the characteristic of scale invariance in the process of correcting for the size differences of occupational categories (Charles and Grusky, 1995).

As Charles and Grusky (1995) argue, the field of sex segregation research is therefore ripe for a new margin-free index based on log-linear modeling of the gender distributions across occupations. They develop such an index, the index of association (*A*), which is defined by the following formula.

$$\boldsymbol{A_k} = \exp\left(1/J \times \Sigma^{J}_{j=1} \{\ln(F_{jk}/M_{jk}) - [1/J \times \Sigma^{J}_{j=1} \ln(F_{jk}/M_{jk})]\}^2 \right)^{1/2}$$

"stage" in this process.

Here, k indexes countries, j indexes occupations and F_{jk} and M_{jk} are, correspondingly, the number of women and men in a particular occupational category for a certain nation. Charles and Grusky prove that A is invariant under multiplicative transformations of the gender ratio and point out that it is not affected by differences in occupational structure. They therefore suggest that it can be safely used to compare the degree of segregation across a diverse group of countries.

Of course, segregation indices are only summary measures of a pattern of segregation across occupational groups, a pattern that is also called a "segregation curve" (Charles and Grusky, 1995). Most segregation scholars admit that no single index is appropriate for all purposes (see Lieberson, 1980), but many ignore the fact that Duncan and Duncan (1955) found D to be a useful index of residential segregation only because there seemed to be a "characteristic form for the segregation curves of most large American cities." If D is to be used for analyses of sex segregation, one must likewise assume a "characteristic form" of segregation that prevails in all countries. This assumption was not supported, however, by the results of Charles and Grusky (1995). On a small sample of eight nations, they compared the fit of a model that would be implied by the use of a single index of segregation -- one in which the segregation curves were constrained to vary only in degree and not in shape -- to that of a contrasting model in which segregation patterns were permitted to vary in a limited way. They found that the second model fit far better and concluded that the use of any segregation index is not supported. In this paper, I will similarly test this assumption using a broader sample of nations.

Data:

Labor Force Data

This study uses occupational data from 44 nations published in the International Labour Organisation's *Yearbook of Labour Statistics*. Specifically, these data are the number of men and

women in 7 broad occupational categories, as defined by the International Standard Classification of Occupations (ISCO-68). The classification categories are (1) professional, technical and related workers, (2) administrative and managerial workers, (3) clerical and related workers, (4) sales workers, (5) service workers, (6) agriculture, animal husbandry and forestry workers, fishermen, and hunters and (7) production and related workers, transportation equipment operators, and laborers.

The sixth category is excluded in the following analyses, however, because nations vary widely in the degree to which women living on farms are counted as employed agricultural workers. Dixon (1982) describes how the strict definition of economic activity used in the International Labour Office guidelines for data collection (ILO, 1976) and the selective application of these guidelines in labor force surveys both contribute to the problem. Although the ILO has since changed its guidelines to include unpaid family workers among the employed (and all of the countries in this study explicitly state in the documentation for their labor force surveys that they are following this guideline) (ILO, 1990), nations continue to vary in the degree to which women are counted within the agricultural category. For example, in the vast majority of countries, most unpaid family workers are women, even in the agricultural industry (see the Yearbook of Labour Statistics, table 2A for details.) In the United States, 65% of unpaid family farm workers were female in 1993. In Central American and Caribbean countries, however, the number of unpaid family farm workers was often much lower. In Panama, for example, 5.7% of those counted as unpaid family farm workers were female. Mexican women, on the other hand, comprised 23% of this group, and in Puerto Rico and the Netherland Antilles, no female unpaid family farm workers were counted at all. It therefore seems likely that the data on women farm workers remains problematic. When an explanatory model was run with the farm category included, only one minor difference in the effect of the covariates was found. (These results can be found in footnote 5, p. 30.)

A related question is the degree to which informal sector work is included in the labor force data for these countries. While the documentation for the vast majority of countries states they have not attempted to differentiate informal sector employment from work in the formal sector, most definitions of employment would capture informal sector work. These definitions are based on a small number of hours worked in the survey period and count unpaid family workers in small enterprises and home-based workers as employed, unless the latter are solely engaged in unpaid domestic labor. The degree to which informal sector labor is captured, however, most likely still varies across nations, though it is impossible to guess how much.

The countries in this sample are all nations which fit the following criteria: (1) the occupational data are presented in ISCO-68 form (as opposed to the updated version, ISCO-88), (2) the nation's labor force survey does not exclude any significant portion of the population (e.g., rural residents) and (3) the sources of the data are documented sufficiently so that the original sample sizes can be ascertained. Published ILO estimates are inflated as if the entire national labor force were surveyed; however, for this type of analysis, it is necessary to deflate the numbers back down to the original sample sizes in order to produce correct fit statistics and standard errors. (See Appendix A for a table of the deflated occupational data by country and gender.)

Forty-four nations meet these requirements, though Bermuda and Macedonia were subsequently dropped from the multivariate analyses because of a large amount of missing data on the independent variables. These nations represent nearly all regions of the world, levels of economic development, levels of female labor force participation and other factors of interest.

Covariates

One important covariate in the model is a dummy variable indicating which nations were "less developed." I based my definition upon two indicators of industrialization, gross domestic product per

capita and estimated industrial output (energy consumption per capita), both for 1993. Gross domestic product was measured in standard "purchasing power" units to correct for the effect of shifting monetary exchange rates. These data were found in the United Nations Development Programme's *Human Development Report, 1995* (UNDP, 1995) and in World Bank data publicly available on the world-wide web (Social Indicators of Development, 1999), respectively. I used principal components factor analysis, creating a single factor with little residual variation, and chose an arbitrary cutoff point in the factor scores. This cutoff divided the sample into groups that fit "common-sense" definitions of developed and developing nations, with one exception. A Caribbean island nation, the Netherland Antilles, was included in the industrialized category despite the fact that its economy is far from industrial. The predominant industry in this nation is tourism, and it also serves as a tax haven. Thus, because it shares few of the characteristics of developed nations, this country was moved into the less developed category. (See Appendix B for an exact list of the nations in each group.) The nineteen industrialized nations include two newly industrialized countries (NICs), Hong Kong and Singapore. A few European nations that are occasionally considered industrialized (see Blau and Ferber, 1992; Charles, 1992) were excluded from the group of developed nations, however, specifically Greece, Portugal and Turkey.

Many of the covariates used in the multivariate analyses are operationalized similarly to those in the studies discussed above. (The values of these covariates for each country can be found in appendix C.)

The relative level of economic development was operationalized as the natural log of the nation's 1993 gross domestic product, measured in standard "purchasing power" units. *Service sector size* was defined as the percentage of all non-agricultural workers who were employed within the service industry in 1994. Here, the service industry is broadly defined to include wholesale and retail trade, restaurants, hotels, financial services (including real estate and insurance), entertainment

and recreation, public administration, social services (including education and medical services) and personal services (such as work in private households and hairdressing.) This measure essentially indicates the size of the service industry relative to the manufacturing sector, because agricultural sector work was excluded from consideration. These data were reported in the United Nations Development Programme's *Human Development Report, 1995* (UNDP, 1995).

Due to restrictions in available data, *female labor force participation* was operationalized as the female share of the non-agricultural labor force. Obviously, for the sake of comparability with previous studies, data on the percent of females working would be preferable, but these data are unavailable except in the form of a measure including agricultural employment (a measure which would be misleading for many less developed nations, as it conflates female agricultural employment with the concept of interest.) These data were found in the *Yearbook of Labour Statistics* (ILO, various years.)

Fertility rates were operationalized as the logged total fertility rate for a single year, 1990 - 1992 as available, and were found in *The World's Women, 1995* (United Nations, 1995). *Labor force growth* was defined as the average annual growth in the labor force (in percent) in the ten years prior to the time the occupational data were collected. This information is in the World Bank data publicly available on the world-wide web (Social Indicators of Development, 1999).

I followed Jacobs and Lim (1992) in using a measure of the relative level of women's educational attainment (percentage of women enrolled in secondary and higher education as compared to the percentage of men enrolled) as an indicator of *average female human capital.* While a measure of the human capital possessed by working women (rather than all women in the population) would obviously provide a better test of the hypothesis discussed above, unfortunately, such data are not available for all nations. This measure was found for the years 1990-1992 in *The World's Women, 1995* (United Nations, 1995).

Multi-national capital penetration is operationalized as in Hahm (1991). It is measured as the total stock of foreign direct investment in 1993, or the nearest available year, weighted by total labor force size and total energy consumption (as a proxy for the total stock of capital in the "penetrated" country). The indicator was computed as follows.

MNCP = (foreign direct investment)/ SQRT(energy cons. * labor force size)

Data on the stock of foreign direct investment were published in the *World Investment Directory* (UN, various years)[6] and in the Organisation for Economic Co-operation and Development's *International Direct Investment Statistics Yearbook* (OECD, 1998). Information on energy consumption and labor force size were found in publicly available World Bank data on the web (Social Indicators of Development, 1999).

An index of *data quality controls* was also created, using information from the published documentation for each nation's labor force survey (ILO, 1990). To construct this index, I allocated one point for completing field checks of data or other supervision of interviewers in the field, another point for repeating the interviews of a small number of respondents to check the quality of interviewers' work, and yet another point for checking the data during processing. Thus, this measure ranges from zero to three.

Two additional data quality measures were also constructed but were not included in the models. These measures, which will be discussed in the next section with regard to the effects of data quality on the patterns of segregation, were created as follows. One indicates the level of non-response in the survey, including whether or not adjustment weights are used to correct for non-response. Nations with very high response rates (less than 5% non-response) are given the maximum

[6] In the case of Asian and Pacific nations, these data had to be converted from local currency to U.S. dollars. Data on currency exchange rates were found in the *United Nations Statistical Yearbook, 1995* (UN, 1997).

value of three points. Countries with slightly lower rates (under 10% non-response) who adjust the data to correct for the response rate are also given 3 points. If a nation has a nonresponse rate of 5-10% and does not make adjustments, it is given 2 points. Similarly, countries with nonresponse rates of 11-20%, with adjustments, are given 2 points. Nations with response rates in this range (11-20% non-response) who do not make adjustments and countries who correct for a very high nonresponse rate (over 20%) are given one point. All nations with over twenty percent non-response and no adjustments are given zero points.

The final measure indicates the degree of specificity used in coding the occupational data. Coding into a greater number of categories is assumed to create a more accurate representation of occupational diversity and more precise estimates of the occupational distribution when aggregated into a smaller number of categories. Thus, countries which code occupations into more than 100 categories are given 3 points. If a nation used 11 to 99 categories in coding, it was given 2 points. Finally, nations which code into 10 or fewer occupational categories are given one point.

Methods:

The analyses for this paper were completed in four parts. First, indices of association (*A*) were calculated for each nation, using the formula described above.

Secondly, parameters indicating the degree to which women were over- or under-represented in the occupational categories were estimated. This was done using a saturated model on a two-way table of gender and occupation. A separate model was run for each country. The model took the following form:

$$m_{ij} = \alpha\, \beta_i\, \gamma_j\, e^{(Z_i v_j)}$$

where i indexes gender and j indexes occupations. Under this model, m_{ij} is the expected frequency in a cell (i, j), α is the grand mean, β_i is the marginal effect for gender i, γ_j is a marginal effect for occupation j, Z_i is an indicator variable for gender, and ν_j is the scale value for the jth occupation. (See Charles and Grusky, 1995, for more details about all of the models in this paper.)

The scale values are constrained to sum to zero and may therefore be treated as contrasts with the average level of female representation. In the present case, positive values indicate female over-representation, and negative scale values indicate male over-representation in an occupational category. Profiles of sex segregation describing the patterns of these scale values will be discussed in the next section.

Third, log-multiplicative models were fit to test the assumption (made by those using summary measures of sex segregation) that a characteristic segregation pattern exists across nations, with segregation thus varying only in degree. This claim is tested by fitting a multiplicative shift model of the following form:

$$m_{ijk} = \alpha_k \beta_{ik} \gamma_{jk} e^{(\phi_k Z_i \nu_j)}$$

where k indexes countries, and the other subscripts are defined as before. m_{ijk} is the expected frequency in cell (i, j, k), α_k is the grand mean in country k, β_{ik} is the country-specific marginal effect for gender i, γ_{jk} is a country-specific marginal effect for occupation j, Z_i is an indicator variable for gender, and ν_j is again the scale value for the jth occupation. ϕ_k is the multiplicative shift parameter for country k. Note that the scale value ν_j is not indexed by k, indicating that the shape of the segregation profile is constant across countries under this model. The test statistic of the model (L^2) indicates to what degree the data violate this assumption (Goodman, 1981; Featherman and Hauser, 1978, pp. 180-84).

An alternative model would be one in which a limited set of *P* "characteristic segregation patterns" were found to exist, each differing from one another both in the shape and in the degree of segregation. A model testing this assumption would take the following form:

$$m_{ijk} = \alpha_k \beta_{ik} \gamma_{jk} e^{(Z_i \nu_{jP})}$$

where the letters and subscripts are defined as before, except that the scale values (ν_{jP}) are constrained to vary only between these *P* "characteristic patterns." If this model fits well, it would provide evidence against using a single index measure of sex segregation.

Finally, analyses of the association between national characteristics and the pattern of occupational sex segregation were performed. The full multivariate model took the following form:

$$m_{ijk} = \alpha_k \beta_{ik} \gamma_{jk} e^{(Z_i \nu_{jk})}$$

where the country-specific scale values (ν_{jk}) are constrained as follows.

$$\nu_{jk} = a_j + b_{1j}C_{1k} + b_{2j}C_{2k} + \ldots + b_{10j}C_{10k} + b_{11j}L_k + b_{12j}C_{1k*}L_k + b_{13j}C_{2k*}L_k + \ldots + b_{21j}C_{10k*}L_k$$

Here C_{1k} is the value of covariate 1 for country k, b_{1j} is the parameter estimate for the effect of covariate 1 on sex segregation in occupation j, and L_k is a dummy variable for whether country k is less developed. To permit the effects of the covariates to differ in industrialized and less developed nations, each covariate was interacted with L_k; thus, note that b_{1j} through b_{11j} are parameter estimates for the effects of the covariates on sex segregation in occupation j in industrialized nations. b_{12j} through b_{21j} are estimates of the difference between the effects of the covariates on sex segregation in occupation j for less developed nations and these effects for industrialized nations.

Results:

Wide variation in segregation patterns

Table 1 shows the results of the first two parts of the analyses. In this table, nations are ranked by the overall level of segregation found in their occupational distributions, as measured by the margin-free index, *A*. The parameter estimates in the second through seventh columns of the table are the scale values for each occupational category, indicating the degree to which women are over- or under-represented in that category. For example, the nation with the highest level of segregation is Puerto Rico (*A*=3.93), where women are strongly under-represented in production work and over-represented in sales and managerial occupations. The pattern for Puerto Rico is also unusual in that it is one of six nations in which women are under-represented in clerical work.

As expected, there is a very large amount of variability in the scale value estimates. Chart 1 shows how widely dispersed the parameter estimates are for each occupational category. Although in the majority of countries women are over-represented in professional, clerical, sales and service occupations and under-represented in managerial and production work, these patterns are by no means universal. In every occupational category, at least a few countries have parameters that are in the opposite direction.

In charts 2-9, countries are grouped into patterns of segregation with similar shapes. These patterns are classified into two types. Dominant patterns have the "Euro-American" profile of occupational sex segregation, in which women dominate clerical and service work and men are over-represented in managerial and professional occupations. The representation of women in professional and sales work varies within dominant pattern countries. Variant patterns deviate in some important way from the dominant pattern, such as women being over-represented in managerial work in pattern B or men being over-represented in clerical positions in pattern D. Again, the variation in these patterns is startling. While nearly seventy-five percent of industrialized nations (14 of 19) have

segregation profiles which fall into the dominant pattern, a smaller percentage (12 of 23, or 52%) of less developed countries share the characteristics of this pattern. Developing countries are found in each of the patterns, while no industrialized countries have the characteristics of two of the variant patterns. Thus, the naïve assumption of a universal pattern of segregation conforming to Euro-American expectations is not supported, even for industrialized nations.

To permit comparisons of the variability in patterns for industrialized and developing nations, the variance and range of the parameter estimates in each occupational category can be found in Table 2. They show that for the two high status occupational categories (professional and managerial) the parameter estimates vary more in developed nations. For the managerial category, this variation is considerably larger in industrialized nations, with an s^2 value of 0.457 compared to 0.361 in less-developed nations. In the other four categories, however, the variance is larger within the group of developing nations, and in the case of sales, service and production occupations, the variability of the parameter estimates is much larger. (s^2 is equal to 0.545, 0.312 and 0.566, compared to 0.330, 0.182 and 0.300 for industrialized nations.) Less developed nations therefore do show greater variability in the patterns of segregation, though predominantly in the lower status occupational categories

One obvious question to be asked, however, is whether these varied patterns only reflect differences in data quality. Table 3 shows the distributions of three data quality measures in "dominant pattern" and "variant pattern" nations. While variant pattern nations do tend to have lower data quality on average, the chi-square tests of independence for each measure indicate that there is no significant difference between these two groups of nations in the distributions of the data quality measures. I therefore tentatively conclude that data quality played no role in creating the diversity of patterns found here, but acknowledge that a larger sample of variant pattern nations would be necessary for a more rigorous test of this hypothesis.

Should index measures of segregation be used?

Turning to a different issue, these profiles are useful in testing whether the continued use of index measures of segregation is valid. Table 4 shows the relative fit of several models: (1) the model of conditional independence, which serves as the baseline; (2) the model of constant sex segregation, which implies that segregation does not vary across countries; (3) the multiplicative shift model, which implies that segregation has a characteristic pattern and only varies in its degree; and (4) the model of segregation profiles, which permits segregation to vary across countries in a limited way. The relative fit of the models can be compared using various measures. The likelihood ratio statistic (L^2) (column 2) and BIC (column 5) both indicate that all of these models fit inadequately. At the same time, the L^2 ratio measure indicates that the profile model accounts for 78.4% of the total cross-national variability in sex segregation, which is quite impressive. These measures all indicate that model 4 fits better than model 3, thereby casting more doubt on the usefulness of sex segregation indices.

Explanations for segregation patterns

Table 5 contains descriptive statistics on the covariates used in the explanatory models. Statistics on the fit of the multivariate model can be found in Table 6. Again, BIC and L^2 indicate poor fit, but the improvement in fit for the multivariate model compared to the baseline is nevertheless dramatic. The L^2 ratio measure indicates that 73.2% of the total variability is explained by adding the covariates. Similarly, the index of dissimilarity (Δ) indicates that nearly 60% of the misallocated cases under the baseline are allocated correctly under the multivariate model.

Table 7 contains measures of the degree to which each covariate improves the model's fit. While occasionally the ratio of L^2s and Δ indicate that different amounts of variability are explained, the largest improvements in fit are due to data quality, fertility and female labor force participation. In comparing the fit of my models to those of Charles (1992), the main differences are a larger

improvement in fit for including "relative economic development" and relatively less improvement related to including "size of the service sector." The larger improvement for "economic development" is not surprising, as the nations in my sample vary far more in their values of this covariate. The lesser impact of service sector size is more surprising because this covariate also has a larger range in my sample. This finding most likely reflects differences in the other covariates included in our two models.

The standardized parameter estimates for the effects of the covariates can be found in table 8. The main effect terms in the model can be interpreted as the effects of the covariates on women's representation in occupations for industrialized nations only. These estimates are therefore comparable to Charles's findings. The effects of the interaction terms describe how the effects of the covariates differ for less developed countries.

In discussing these results, however, I am hesitant to use the terms "integrative" and "segregative" in an unqualified way. As I noted previously, 74% of the industrialized nations share the dominant pattern; thus, it is only slightly misleading to describe changes that increase the representation of women in clerical and service occupations and decrease their representation in managerial and professional occupations as "segregative into the dominant pattern." Changes in the opposite direction will be called "integrative out of the dominant pattern." The essential meaning of these terms will be the same as Charles's "segregative" and "integrative," allowing me to easily make comparisons of our findings.

In the case of less developed nations, only 52% of the sample share the dominant pattern, however. Thus, even a modified use of the terms segregative and integrative is misleading. I will describe the effects of covariates for individual occupational categories in this set of nations.

The effect of less-developed countries relative to industrialized nations can be found in the second row of table 8. The effects are higher female representation in managerial and production

occupations and lesser representation in the other categories. These effects are similar to the main effects of relative economic development for industrialized nations. These effects indicate that a one-unit increase in logged GDP per capita is related to a significant decrease of 0.914 in the scale value of women's representation in professional occupations. Thus, the positive estimates in the managerial and production categories and negative estimates for clerical and service work indicate that higher levels of economic development have an integrative effect, out of the dominant pattern. The predictions of modernization theory and neoclassical economics are supported.

The effects of relative economic development for less developed nations are significantly different from those for industrialized countries in every occupational category. The significant net effects of economic development (adding the parameter estimates in rows 3 and 4) are increases in the representation of women in the clerical, sales and (to a small degree) managerial categories and decreases in their representation in professional, service and production work. Thus, it seems that higher levels of economic development are related to decreased female representation in service occupations and increased their representation in some formal sector occupations, notably clerical and managerial work. These findings are contrary to the theory discussed by Ward (1988). It may be the case that her theory cannot be adequately tested with cross-sectional data, however, since it describes a process that plays out differently in varied nations (Kincaid and Portes, 1994).

The effects of fertility in industrialized nations can be found in row 5. Higher fertility levels are related to increased female representation in managerial and production occupations and decreased representation in clerical and service jobs, shifts which represent integration out of the dominant pattern. This finding is contrary to the expectation that higher fertility is related lower levels of work experience for women and consequently more segregation. The theory that women workers have more elite characteristics in societies with higher fertility levels is partially supported, as women increase their representation in managerial positions but lose ground in the professional category.

The effects of fertility in less developed countries are more supportive of the "elite characteristics of women workers" argument, however. Higher fertility is related to an increased representation of women workers in professional, managerial, clerical and sales work and decreased representation in service and production jobs.[7] While the finding for clerical and sales work may seem counterintuitive, these jobs may be in the formal sector and therefore have more desirable characteristics than many of the positions that women fill in less-developed countries.

The expected effect of female labor force participation, integration out of the dominant pattern, is not found in industrialized nations. A larger female share of the non-agricultural labor force is related to higher female representation in clerical and sales occupations and lower representation in professional, managerial, service and production. While my findings differ from those of Charles (1992) -- perhaps reflecting the alternative operationalizations of this variable that we used, she suggests that the argument for the integrative tendencies of this covariate is not supported. My findings add weight to her conclusion.

The effects of female labor force participation in developing nations are significantly different in every category except service. The net effects are a small negative impact on women's representation in managerial and clerical occupations, a negative effect in the professional, service and production categories and a positive effect in sales. Thus, the expectation of relatively fewer elite women workers (Semyonov and Shenav, 1988) is only partially fulfilled. While higher levels of women's labor force participation are related to decreases in female representation in the professional and managerial categories, the only category with increased representation is sales (not service or production). It is possible that in developing economies with higher rates of female labor force participation, the two proposed theories are acting at cross purposes. As some women spend more

[7] When the models were run with the category of agricultural workers included, the net effect for managerial occupations was negative and the net effect for production work was positive, however. The effect of this covariate on women's representation in agricultural occupations was positive. I can think of no substantive

time in the labor force and gain more similar levels of experience relative to men, they may be more able to compete for high status occupations. At the same time, larger numbers of non-elite inexperienced women may be entering the labor force and decreasing the relative proportion experienced workers. But, there is no reason to prefer this explanation over the possibility that the theories are merely incorrect.

The effects of service sector size are as expected for industrialized nations, segregative into the dominant pattern. In less developed countries, the effects are significantly different in every category and do not conform to the expected pattern, however. Contrary to the hypothesis that service sector size is related to women's displacement into service and informal sector jobs, a net positive effect is found for the professional and clerical categories, and a net negative effect is found for service and sales occupations. The expected positive effects for production occupations is found, however, as is a net negative effect for managerial. These findings may reflect the heterogeneity of the service sectors in developing countries. For example, increased female representation in service occupations could either be related to the growth of informal sector employment for women or reflect the fact that women were making inroads into formal employment in educational work, the tourist trade or other types of modern service work. I suspect that in tourism-based developing economies, the service sector would be very large but the sex segregation patterns would differ a great deal from those related to the relatively large service sector in a "dependently developed" nation. Better data could permit me to disentangle these elements and more definitively test the theories related to service sector size, but unfortunately no comparable data on the size of each nation's tourism industry are available for this entire sample.

As for labor force growth, in industrialized nations the expected effects of this variable are found for the two categories with significant effects, showing integration out of the dominant pattern

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reason why this would be the case. If the use of agricultural data is considered valid, it would decrease the

for service and production occupations only. Thus, it seems that, controlling for the other covariates in the model, labor force growth only helps to integrate blue-collar occupations. This finding differs from that of Charles (1992) who found integration in for managerial and clerical occupations as well. The segregation patterns in industrialized nations with particularly large samples (such as Japan and Germany) may be overly influential in determining this effect, however.[8] Size-standardized analyses showed a positive effect for managerial occupations. One explanation for this discrepancy may be related to the human capital development systems (Brinton, 1988) of these two nations. Both Japan and Germany have systems that restrict the ability of women to attain managerial jobs even in times of labor shortage, for example through the institution of relatively closed job ladders which require apprenticeships for entry (Germany) or discriminatory job placement systems into a limited number of coveted "lifetime employment" jobs with potential for intra-firm advancement (Japan). Also, low maternal employment in both nations tends to limit the experience attained by women in each.

The effects of labor force growth in less developed nations differ significantly in every category except managerial occupations. The net effects are unexpected: a significant decrease in women's representation within clerical, sales and production occupations and an increase in their representation in professional and service jobs. Women do not seem to be better able to compete for all high-status occupations in developing nations with tight labor markets, perhaps because other discriminatory factors are at work. I would hesitate to reject this theory outright, however. Women may move from informal sector work to formal sector work in rapidly growing economies (and thereby increase their status), but this form of occupational categorization cannot capture such changes unless they coincide with changes in women's representation across the large occupational categories in the labor force data.

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plausibility of the theory that women workers in nations with higher fertility have more elite characteristics.

[8] Size-standardized analyses were run with the occupational data for each country deflated or inflated so that each nation would have an equal sample size. These analyses permitted me to check if the nations with

Higher levels of relative female human capital have the expected effect in industrialized nations, with the exception of the professional category (where the parameter estimate is negative). More specifically, the higher women's average educational attainment is, relative to men's attainment, the higher women's representation is in managerial occupations and the lower it is in clerical, service and production occupations. The effect for sales occupations is not significant. However, the size-standardized analyses showed a positive effect for professional and service categories. It is not clear why this would be the case. Perhaps the social structures in Japan and Germany, where many women attend post-secondary institutions despite intending to leave the labor force to bear children, prevent high aggregate human capital from being translated into high occupational status. The effect for service occupations remains puzzling, however, since these occupations are highly female dominated even in the two nations suspected of being overly influential.

In developing nations, the net effects of relative female human capital are negative in clerical, sales and production occupations, positive in professional, managerial and service. These findings are as expected,[9] with the exception of the service category. It may be that the mismatch between average human capital measured across all women in the population and the variable of interest, human capital of women in the labor force, has caused this unexpected finding.

The net effects of multi-national capital penetration are mixed in less-developed nations. Women's representation in managerial, service and production occupations is diminished at higher levels of foreign capital investment, while women's representation in professional, clerical and sales

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large sample sizes were overly influential in determining the multivariate findings. Three significant differences in the effects of the covariates were found, which are described in the text and footnotes below.

[9] However, in the size standardized analyses a small net negative effect in the professional category and a positive effect in the clerical category were found. In the less-developed sample, two of the nations with the largest samples were Bangladesh and Pakistan, where clerical work is male dominated and women have low average educational attainment due to the Muslim custom of secluding girls in the home at puberty. Thus, relative to these two nations, the others would have relatively high education and female representation in clerical work. The finding for professional occupations is less easy to understand, but it is very small (.001). It could perhaps better be viewed as a non-significant net effect, casting doubt on the human capital hypothesis for the professional category when the effects of overly influential nations are reduced.

occupations is increased. The effect for the production category indicates that, as Lim (1990) suggested, the percent of women working production assembly jobs for transnational corporations is not large enough to affect the overall patterns of women's employment in developing nations. The strong positive effect on women's representation in the sales category indicates that multi-national investment does increase women's representation in formal or informal sector sales employment, and possibly both. But the negative net effect in the service category is surprising, as is the small positive effect in the professional category. Contrary to Ward's (1988) theory, "dependent development" may not be entirely bad for female workers.

The measure of data quality controls partially supports the "noise" hypothesis for industrialized nations. Women's representation in "typical" occupations is increased for service and clerical work and their representation in managerial occupations is decreased. This suggests that the underlying "dominant" pattern may be less strongly attenuated when the data quality measure is included in the model. The positive effect for production occupations is unexpected, however. In less developed nations, the findings are mixed, and do not seem to support the noise or the bias hypotheses. These findings indicate that the hypothesized bias due to poor data collection does not exist in either group of nations. Considering the large amount of variation accounted for by this variable (see table 7) and the effects for industrialized nations, however, it is likely that it controls for a sizable amount of noise.

Discussion:

Although this study uses a different methodology than prior research on occupational sex segregation in less developed countries, a similarly wide variation in the degree to which jobs are gender segregated was found. It is the diversity in *patterns* of segregation, however, that is most remarkable. Even the most natural-seeming generalizations from an American perspective, such as

"clerical jobs are women's work" or "management is always male-dominated," have been shown to be false.

While the majority of both industrialized and less developed nations share the "dominant pattern" of segregation -- in which women *are* over-represented in clerical and service jobs, and men are over-represented in managerial and production work, far more of the industrialized nations, (74%, compared to 52% of less developed countries) share this pattern. This finding may reflect the diversity of "paths" to industrialization. Nations draw on pre-existing cultural and institutional arrangements in the process of economic change (Jacobs and Lim, 1992), as the very different success stories of Japan, Germany and Norway attest. The divergent patterns of sex segregation in these nations (see charts 6, 2 and 4, respectively) could plausibly reflect the consequences of these cultural and institutional differences. The widely discrepant patterns of segregation in newly industrialized nations such as Hong Kong and Singapore (charts 4 and 10) and rapidly industrializing countries (Puerto Rico and South Korea, charts 7 and 10) suggest that new strategies of industrialization are being created today, as well.

A large amount of the variation in these patterns was accounted for by the multivariate model, though the effects of the covariates were not always as expected. For industrialized nations, relative economic development does tend to decrease "dominant pattern" segregation, as modernization theory and neoclassical economics propose. Also, a relatively large service sector has the expected effect of increasing dominant pattern segregation. The tight labor markets of rapidly growing economies tend to increase women's ability to compete for male-dominated occupations and decrease segregation, as well, though not in all of the expected categories.

In industrialized nations, I find mixed support for the theory that higher fertility rates are related to lower average levels of experience among women and consequently a lesser ability to compete for male-dominated jobs. Similarly, the expectation that higher average levels of female

human capital would improve women's representation in managerial and professional occupations is only partially supported within industrialized nations. Higher levels of female labor force participation, however, were not found to increase women's experience and consequent ability to compete for high status jobs, however. Many of these findings are similar to those of Charles (1992), although the nations in our samples differ.

One other important finding is the fact that data quality does not appear to bias the parameter estimates in the expected way for developing or industrialized nations. Including a data quality measure in the model does account for noise that might otherwise attenuate the effects of the covariates, however.

For developing countries, the effects of covariates are less often as expected. Ward's (1988) theory of dependent development proposes that covariates such as relative economic development, service sector size and multi-national capital penetration would be related to increased female segregation into low-status service and informal sector jobs (sales, service and piece-work production.) These effects are not found, however. In fact, both relative economic development and multi-national capital penetration are related to an increased presence of women in some high-status formal sector work. The globalization of capital thus may not have a negative effect on the status of all working women in less developed countries. The fact that women's representation in the production category is decreased at higher levels of multi-national investment is not so surprising, though. Lim (1990) pointed out that despite the large amount of attention paid to female "maquiladora" workers, they comprise a small proportion of female workers in less developed nations.

Contrary to the findings for industrialized nations, women in less-developed nations with tight labor markets do not seem to be better able to compete for relatively high-status professional, managerial and clerical occupations. On the other hand, higher average female human capital was found to increase women's ability to compete for managerial and professional occupations. Higher

fertility also was found to be related to increased female representation in managerial and professional, as well as clerical and sales jobs. This effect may indicate that the group of women who are able to combine work and childbearing in high-fertility nations tend to have relatively higher education and more elite characteristics. The hypothesis that higher female labor force participation would have the reverse effect, however, was not supported.

With a few exceptions, it is therefore clear that existing theories on the causes of sex segregation patterns do not provide an adequate explanation for many aspects of segregation in developing countries. Theories directly speaking to the structure of developing economies, such as that of Ward (1988), are helpful, but these data only permit their predictions to be partially tested, as shifts from informal to formal sector work are not well captured. Unfortunately, better data on informal sector work are difficult to collect and therefore do not exist for a broad sample of nations. The use of more disaggregated occupational data would be a step in the right direction, however, permitting more accurate characterizations of high-status and low-status occupations within these large categories.

Finally, a test of the assumption necessary for indices of segregation to be useful showed that they are misleading and unwarranted in the study of occupational sex segregation. The assumption of a "characteristic pattern of segregation" across nations is clearly *not* met at this level of occupational aggregation. This finding adds weight to Charles and Grusky (1995)'s original rejection of this method.

All in all, these analyses provide more information about cross-national patterns of occupational sex segregation than did the previous studies using the more common index of dissimilarity, *D*. It is nevertheless unfortunate that only such highly aggregated data can be found that is comparable across so many nations. Future work which focuses on a group of less developed nations for which better data are available, perhaps for nations with similarly "variant" national

segregation patterns, could provide a more nuanced picture of how economic, political and social forces may shape the jobs that men and women hold.

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Table 1: **Index of Association (*A*) measures of total occupational sex segregation and parameter estimates of women's over- or under-representation in each occupational category, 1993**

Country	*A*	professional	managerial	clerical	sales	service	production
Puerto Rico	3.93	0.28	0.96	-0.11	1.61	0.12	-2.86
Syria	3.56	2.18	-0.80	1.08	-1.62	-0.15	-0.69
Korea	3.35	0.56	-2.53	0.34	0.63	1.23	-0.24
Bermuda	3.23	0.25	-0.48	1.69	0.68	0.02	-2.15
Netherland Antilles	3.17	0.51	-1.24	0.82	1.06	0.81	-1.95
Bangladesh	2.89	0.71	-0.31	-0.81	-1.51	1.80	0.11
Australia	2.84	-0.53	0.27	0.44	-1.62	1.80	-0.37
Netherlands	2.77	0.30	-1.08	0.90	0.38	1.15	-1.64
Norway	2.77	0.31	-0.86	1.27	0.05	0.94	-1.71
Austria	2.76	0.19	-1.11	0.80	0.60	1.14	-1.62
Finland	2.75	0.56	-1.09	1.08	0.23	0.87	-1.64
Botswana	2.74	0.88	-0.66	0.50	1.09	0.05	-1.86
Israel	2.68	0.56	-1.04	1.30	-0.10	0.75	-1.48
Denmark	2.68	0.68	-1.35	0.78	0.20	1.04	-1.35
United Kingdom	2.65	-0.21	-0.66	1.20	0.64	0.71	-1.68
Canada	2.64	0.32	-0.24	1.47	-0.12	0.35	-1.78
Panama	2.64	0.35	-0.58	1.36	-0.01	0.61	-1.73
Spain	2.62	0.58	-1.34	0.69	0.44	0.98	-1.35
Venezuela	2.57	0.76	-0.78	0.94	-0.12	0.82	-1.61
Belgium	2.57	0.42	-1.06	0.66	0.47	1.03	-1.53
Chile	2.51	0.49	-0.92	0.31	0.32	1.28	-1.47
Japan	2.50	0.30	-1.80	1.00	0.10	0.75	-0.36
Egypt	2.47	1.00	-0.17	1.24	0.07	-0.92	-1.22
Trinidad and Tobago	2.46	0.60	-0.73	1.20	0.07	0.39	-1.55
Ireland	2.41	0.46	-1.03	1.16	0.06	0.62	-1.28

Table 1: **Index of Association (*A*) measures of total occupational sex segregation and parameter estimates of women's over- or under-representation in each occupational category, 1993 (continued)**

Country	*A*	professional	managerial	clerical	sales	service	production
New Zealand	2.38	-0.80	0.24	-0.18	1.30	0.70	-1.26
Germany	2.37	0.10	-1.05	0.84	0.68	0.71	-1.29
United States	2.34	0.11	-0.28	1.33	-0.03	0.39	-1.52
Pakistan	2.26	1.28	-0.52	-0.98	-0.77	0.62	0.37
Philippines	2.20	0.68	-0.79	0.25	0.85	0.34	-1.32
Macedonia	2.17	0.39	-1.31	0.74	0.01	0.85	-0.68
Hong Kong	2.16	0.29	-0.87	1.21	-0.09	0.48	-1.02
Greece	2.15	0.52	-1.23	0.82	0.24	0.51	-0.87
Barbados	2.12	0.13	-0.48	0.98	0.36	0.39	-1.38
Turkey	2.07	0.93	-0.43	1.06	-0.79	-0.17	-0.61
Portugal	2.06	0.50	-1.18	0.39	0.10	0.91	-0.71
Fiji	2.00	0.75	-1.28	0.77	0.03	0.03	-0.30
Malaysia	1.99	0.45	-1.33	0.82	0.05	0.32	-0.31
Italy	1.97	-1.10	0.76	-0.07	0.62	0.44	-0.64
Costa Rica	1.86	0.28	-0.59	0.46	-0.04	0.85	-0.97
Honduras	1.86	0.00	-0.81	0.39	0.32	0.88	-0.79
Mexico	1.83	0.28	-0.85	0.67	0.52	0.17	-0.79
Thailand	1.81	0.28	-1.10	0.24	0.58	0.47	-0.47
Singapore	1.49	0.05	0.22	-0.70	0.55	-0.31	0.19

Table 2: **Variability of occupational parameter estimates for developed and less developed countries, 44 nations**

	Prof.	Manag.	Cler.	Sales	Service	Prod.
Developed						
s^2	0.231	0.457	0.329	0.330	0.182	0.300
minimum	-1.10	-1.80	-0.70	-1.62	-0.31	-1.78
maximum	0.68	0.76	1.47	1.30	1.80	0.19
Less Developed						
s^2	0.194	0.361	0.373	0.545	0.312	0.566
minimum	0.00	-2.53	-0.98	-1.62	-0.92	-2.86
maximum	2.18	0.96	1.69	1.61	1.80	0.37

Table 3: **Data quality measures for dominant pattern and variant pattern countries, 39 classifiable nations**

	coding specificity		quality controls		non-reponse	
value	% dom.	% var.	% dom.	% var.	% dom.	% var.
0	---	---	0.0	9.1	3.6	9.1
			(0)	(1)	(1)	(1)
1	7.1	27.2	25.0	0.0	14.3	37.4
	(2)	(3)	(7)	(0)	(4)	(4)
2	46.4	27.2	42.9	54.5	17.8	37.4
	(13)	(3)	(12)	(6)	(5)	(4)
3	46.4	45.4	32.1	36.4	64.3	18.2
	(13)	(5)	(9)	(4)	(18)	(2)
total	100.0	100.0	100.0	100.0	100.0	100.0
	(28)	(11)	(28)	(11)	(28)	(11)
chi-square	3.2228		5.5714		6.5563	

Table 4: **Relative fit of log-linear and log-multiplicative association models, 44 nations (N=4,316,111)**

Fit of models	L^2	d.f.	L^2 / L^2	BIC	D
(1) Conditional independence (O x N + G x N)	390978	220	100.0	387634	12.90
(2) Constant sex segregation (O x N + G x N + C)	160866	215	41.1	157598	7.21
(3) Multiplicative shift effect (O x N + G x N + C + A x N)	81098	172	20.7	78484	3.35
(4) Segregation profiles (O x N + G x N + C x P)	34841	175	8.9	32181	2.33
Contrasts:					
Total variability (model 2)	160866	215	100.0		
Explained variability, model 3 vs. model 2	81098	172	49.6		
Explained variability, model 4 vs. model 2	34841	175	78.4		

Note: Δ = the index of dissimilarity, indicating the percentage of cases that would have to be reallocated to bring the observed and expected values into perfect correspondence.

Definitions of parameters in the models:

O = occupation
N = nation
G = gender
C = a constant
A = the index of association, representing the degree of segregation in a model where the shape does not vary
P = profiles of segregation, which vary in shape and degree.

Table 5: **Descriptive statistics on covariates**

Variable Name	N	mean	std. dev.	minimum	maximum
less-developed country	42	.548	.503	0	1
logged GDP per capita	42	9.163	.759	7.162	10.113
relative female educational attain't	42	92.129	24.986	38	149
logged total fertility	42	.837	.429	.1906	1.800
female labor force participation	42	36.395	11.361	6.1	50
size of service sector	42	53.050	14.344	18	71
average annual labor force growth	42	1.723	1.045	- 0.21	3.88
multi-national capital penetration	42	23.087	32.195	-1.324	125.977
data quality controls	42	2.100	.790	1	3

Table 6: **Statistics on relative fit of covariate models, 42 countries, 1993 (N=4,276,833)**

Fit of models	L^2	d.f.[8]	BIC	$L_{(2)}^{2/} L_{(1)}^{2}$	D
(1) Baseline Model: All 2-way interactions (OxG, GxN, OxN)	157346	205	154216	100.0	7.19
(2) Covariate model:	42237	100	40710	26.8	2.93
Explained variability (1 vs. 2)	115109	105	--	73.2	4.26

Note: Δ = the index of dissimilarity, indicating the percentage of cases that would have to be reallocated to bring the observed and expected values into perfect correspondence.

[10] The covariate model includes three flag variables for a small amount of missing data in the human capital, data quality and multi-national capital measures. Although the results for these flag variables are not meaningful and are therefore not reported, the residual degrees of freedom are consequently smaller.

Table 7: **Partitions of covariate effects on occupational distributions by gender, 42 countries, 1993**

Trimmed covariate model	L^2	***d.f.***[9]	$L^2 - L^2_{CM}$[10]	***% of total variability***	*D*
Deleting economic development	50691	110	8454	7.34	3.16
Deleting fertility	49835	110	7598	6.60	3.34
Deleting female l.f. participation	51974	110	9737	8.45	3.34
Deleting labor force growth	46389	110	4152	3.60	3.16
Deleting human capital	46958	115	4721	4.10	3.17
Deleting multi-national capital	44092	115	1855	1.61	2.95
Deleting service sector	45476	110	3242	2.81	2.98
Deleting data quality	48864	120 [11]	6627	5.76	3.36

Note: Δ = the index of dissimilarity, indicating the percentage of cases that would have to be reallocated to bring the observed and expected values into perfect correspondence.

[11] see footnote 10.

[12] L^2 is the likelihood ratio chi-square statistic for the full covariate model.

[13] When the data quality measure and its missing data flag were deleted from the model, the missing data flag for human capital became collinear and was dropped from the model as well. Hence 15 degrees of freedom (5 per covariate) were gained by the deletion of this measure instead of the expected 10 degrees of freedom.

Table 8: **Log-linear parameter estimates for covariates' effect on female representation in occupations, 42 countries, 1993 (*standard errors in parentheses*)**

variable name	Prof.	Manag.	Cleric.	Sales	Serv.	Prod.
Intercept	**7.129**	**-23.05**	**21.44**	**1.47**	**16.19**	**-23.18**
	(.500)	**(.847)**	**(.561)**	**(.652)**	**(.582)**	**(.516)**
Less-developed country (LDC)	**-5.860**	**21.35**	**-28.63**	**-10.40**	**-4.19**	**27.73**
	(.548)	**(.995)**	**(.611)**	**(.693)**	**(.622)**	**(.549)**
Economic development	**-0.914**	**2.658**	**-2.910**	-0.016	**-1.828**	**3.011**
	(.058)	**(.099)**	**(.065)**	(.076)	**(.068)**	**(.060)**
Econ. dev't. * LDC	**0.773**	**-2.607**	**3.660**	**.914**	**.725**	**-3.466**
	(.065)	**(.120)**	**(.073)**	**(.083)**	**(.074)**	**(.075)**
Fertility	**-1.214**	**1.810**	**-1.315**	**-0.702**	**-0.189**	**1.611**
	(.053)	**(.097)**	**(.054)**	**(.061)**	**(.055)**	**(.051)**
Fertility * LDC	**1.378**	**-0.917**	**3.010**	**2.523**	**-3.634**	**-2.359**
	(.082)	**(.179)**	**(.082)**	**(.091)**	**(.083)**	**(.071)**
Female labor force participation (FLFP)	**-0.062**	**-0.097**	**0.101**	**0.119**	**-0.014**	**-0.169**
	(.003)	**(.004)**	**(.003)**	**(.004)**	**(.003)**	**(.003)**
FLFP * LDC	**-0.086**	**0.090**	**-0.109**	**-0.054**	0.005	**0.155**
	(.003)	**(.005)**	**(.004)**	**(.004)**	(.003)	**(.003)**
Size of service sector	**0.004**	**-0.055**	**0.087**	**-0.089**	**0.059**	**-0.007**
	(.002)	**(.003)**	**(.002)**	**(.003)**	**(.002)**	**(.002)**
Service sector * LDC	**0.017**	**0.035**	**-0.047**	**0.071**	**-0.108**	**0.031**
	(.004)	**(.008)**	**(.004)**	**(.004)**	**(.004)**	**(.004)**
Labor force growth	**.0300**	0.018	0.012	**-0.205**	**-0.233**	**0.107**
	(.014)	(.026)	(.014)	**(.017)**	**(.015)**	**(.014)**
Labor force growth * LDC	**-0.221**	-0.026	**-0.614**	**-0.328**	**1.512**	**-0.321**
	(.030)	(.070)	**(.030)**	**(.033)**	**(.031)**	**(.026)**
Human capital	**-0.002**	**0.027**	**-0.007**	0.000	**-0.007**	**-0.011**
	(.000)	**(.001)**	**(.000)**	(.000)	**(.000)**	**(.000)**
Human capital * LDC	**0.003**	**-0.023**	**-0.004**	**-0.006**	**0.027**	**0.004**
	(.000)	**(.001)**	**(.001)**	**(.001)**	**(.001)**	**(.001)**
Multi-national capital	**-0.004**	**0.008**	**-0.007**	**0.003**	**0.002**	**-0.002**
	(.000)	**(.000)**	**(.000)**	**(.000)**	**(.000)**	**(.000)**
Multi-national capital * LDC	**0.006**	**-0.016**	**0.010**	**0.023**	**-0.005**	**-0.017**
	(.002)	**(.004)**	**(.002)**	**(.003)**	**(.002)**	**(.002)**
Data quality	**-0.041**	**-0.172**	**0.132**	**-0.123**	**0.159**	**0.044**
	(.007)	**(.013)**	**(.007)**	**(.009)**	**(.008)**	**(.007)**
Data quality * LDC	**-0.032**	**0.402**	**-0.156**	**0.065**	**-0.027**	**-0.026**
	(.010)	**(.023)**	**(.011)**	**(.014)**	**(.011)**	**(.011)**

Note: figures shown are standardized parameter estimates

Chart 1: **Dispersion of occupational scale values, 44 nations**

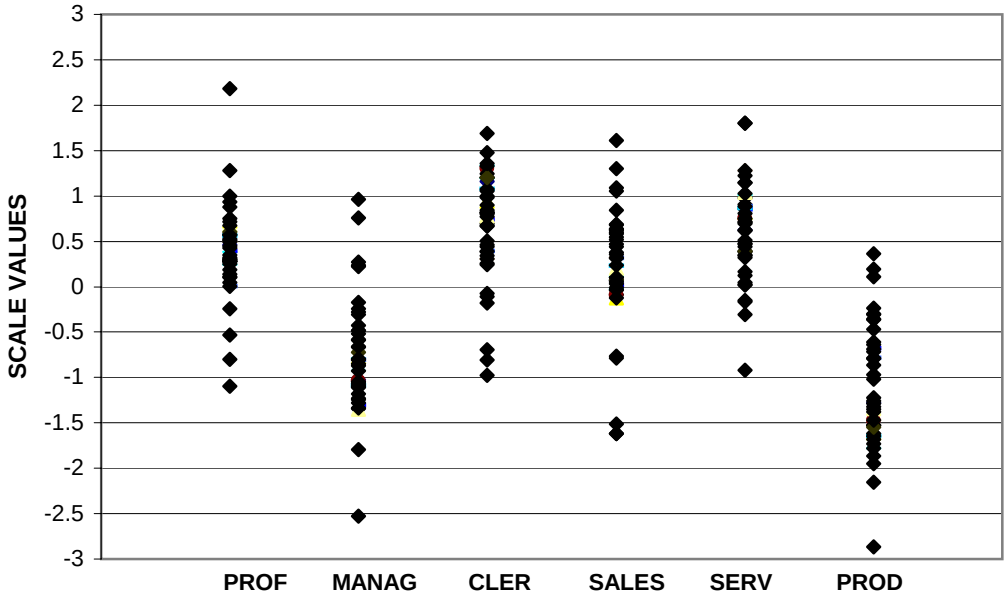


Chart 2: **Dominant Pattern A, sales over-representation**

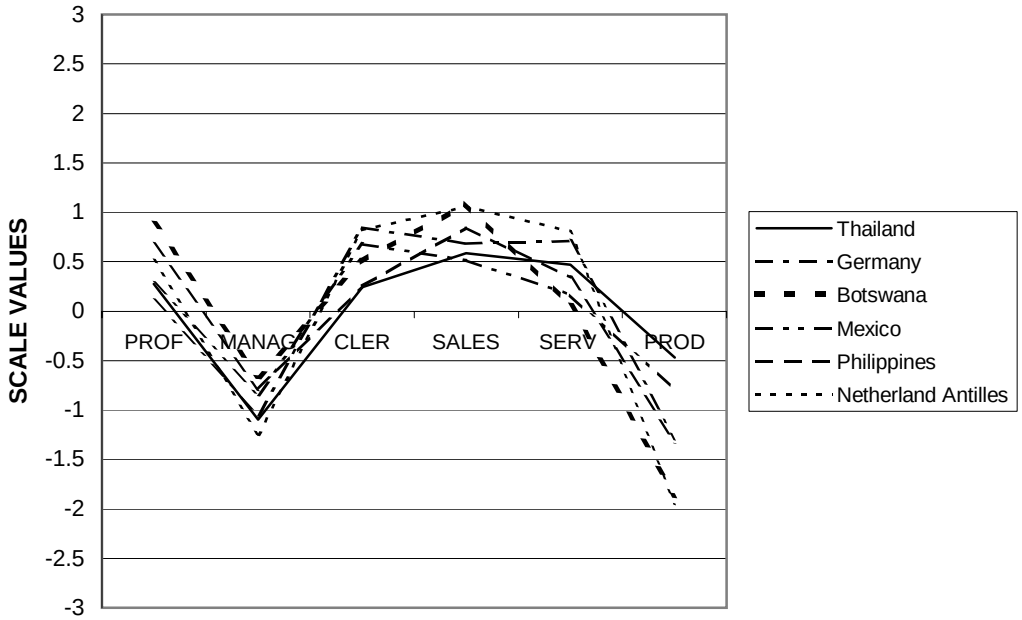


Chart 3: **Dominant Pattern B, moderate sales over-representation**

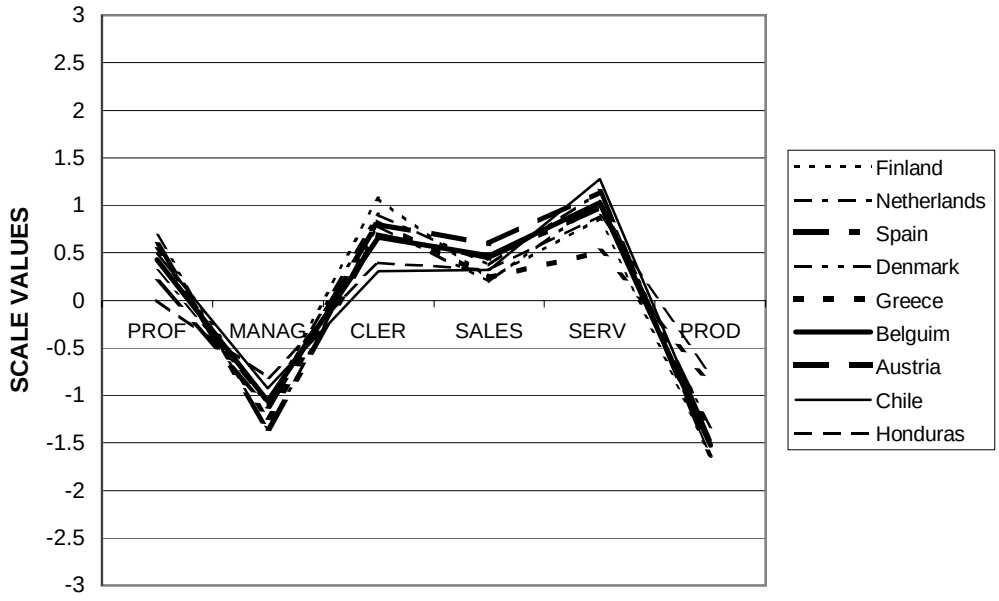


Chart 4: **Dominant Pattern C, sales integration**

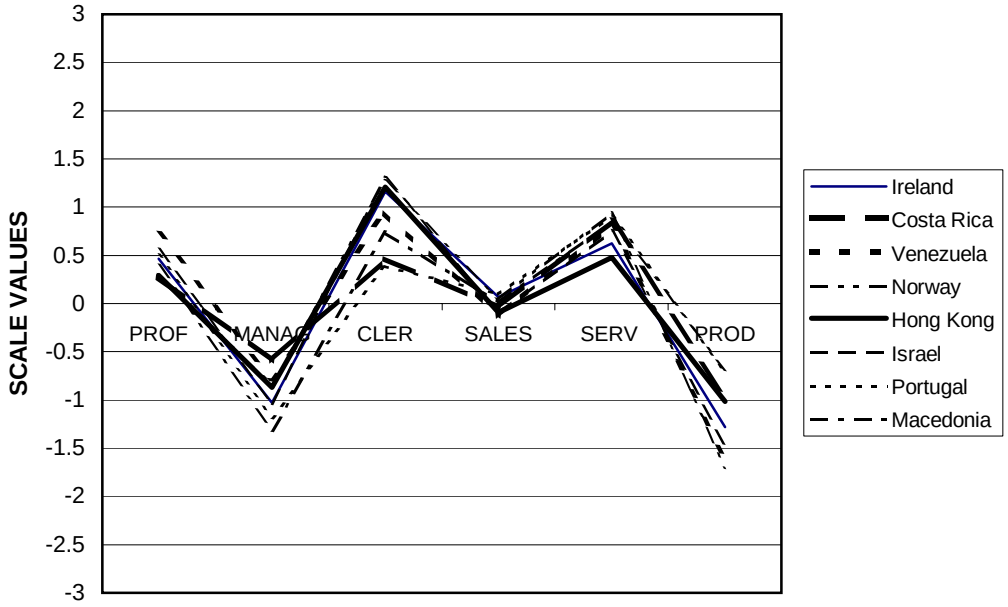


Chart 5: **Dominant Pattern D, clerical over-representation**

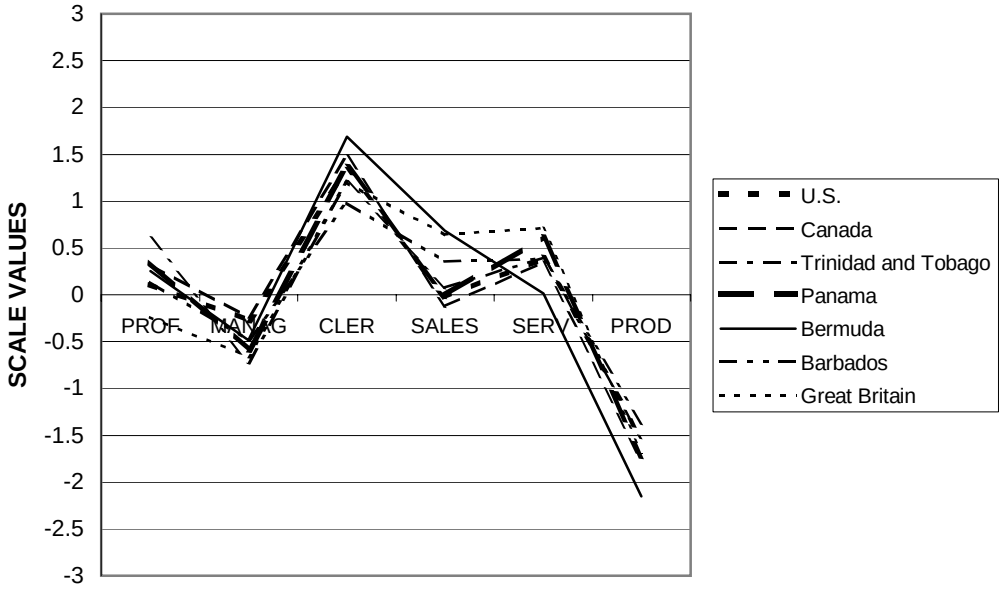


Chart 6: **Variant Pattern A, production integration**

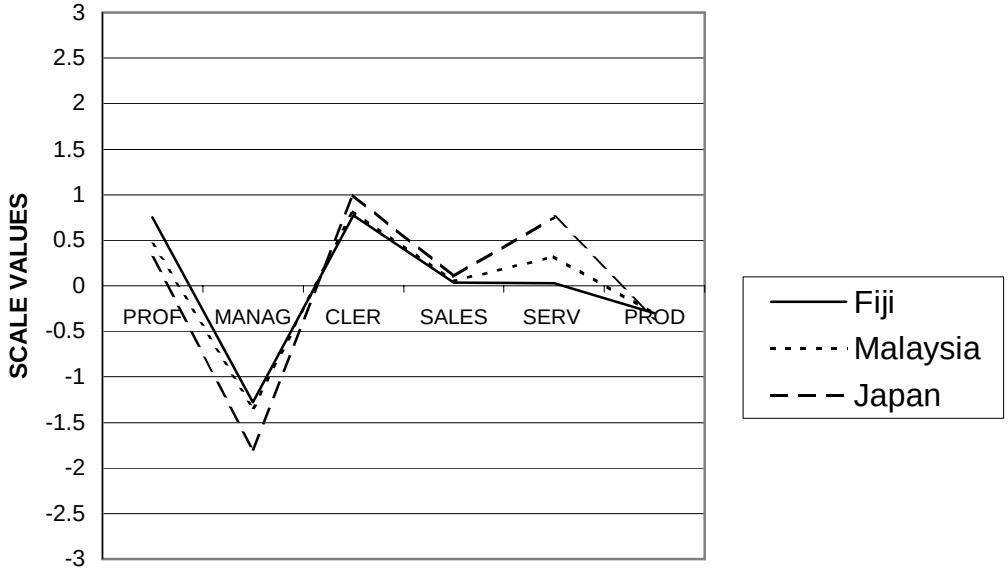


Chart 7: **Variant Pattern B, managerial over-representation**

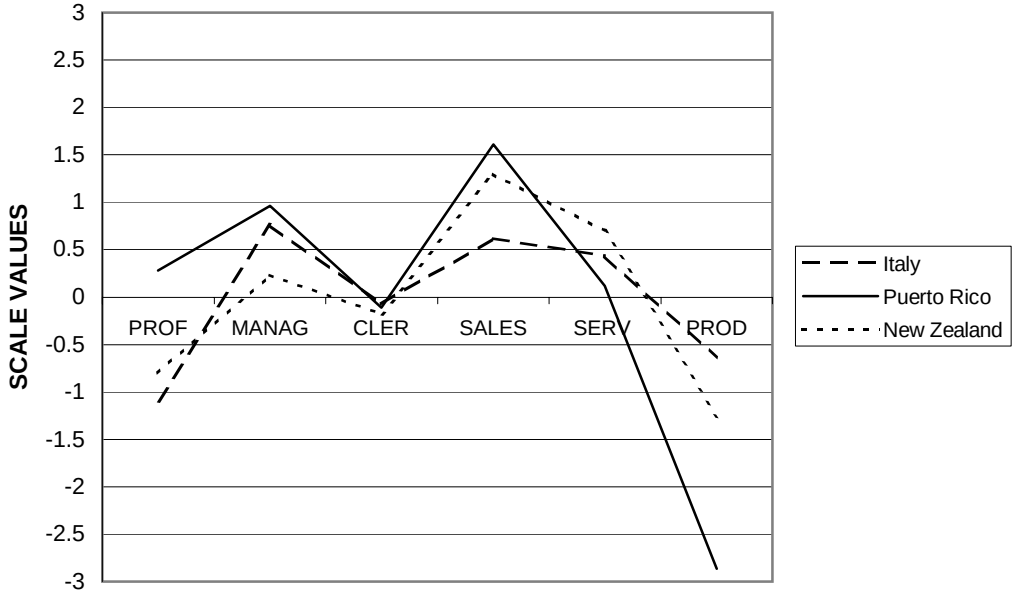


Chart 8: **Variant Pattern C, sales and service under-representation**

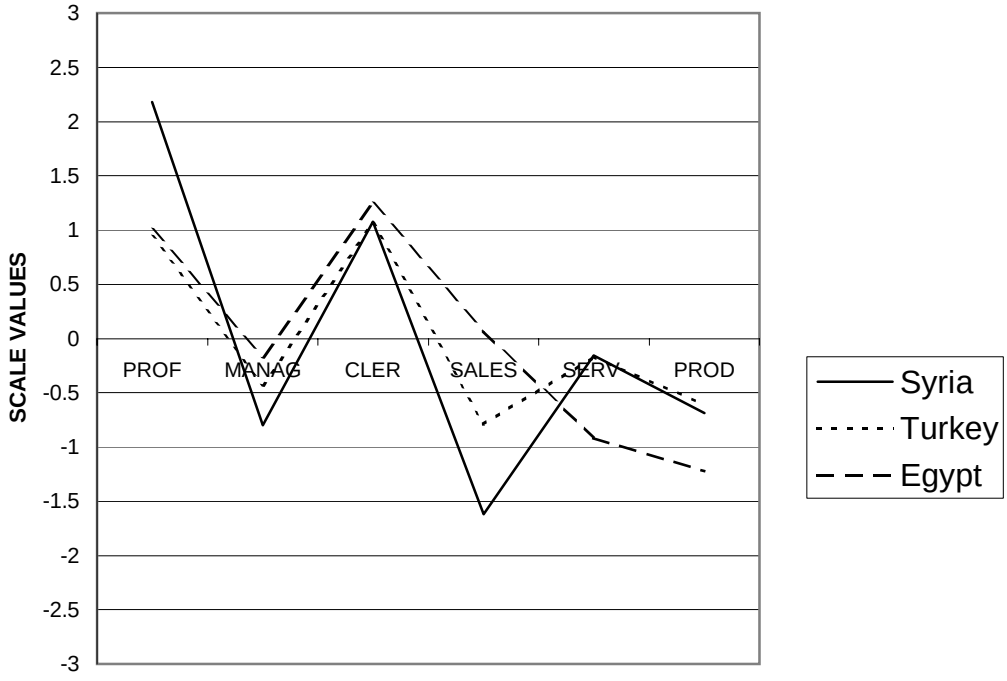


***Chart 9*: Variant Pattern D,**
routine non-manual under-representation

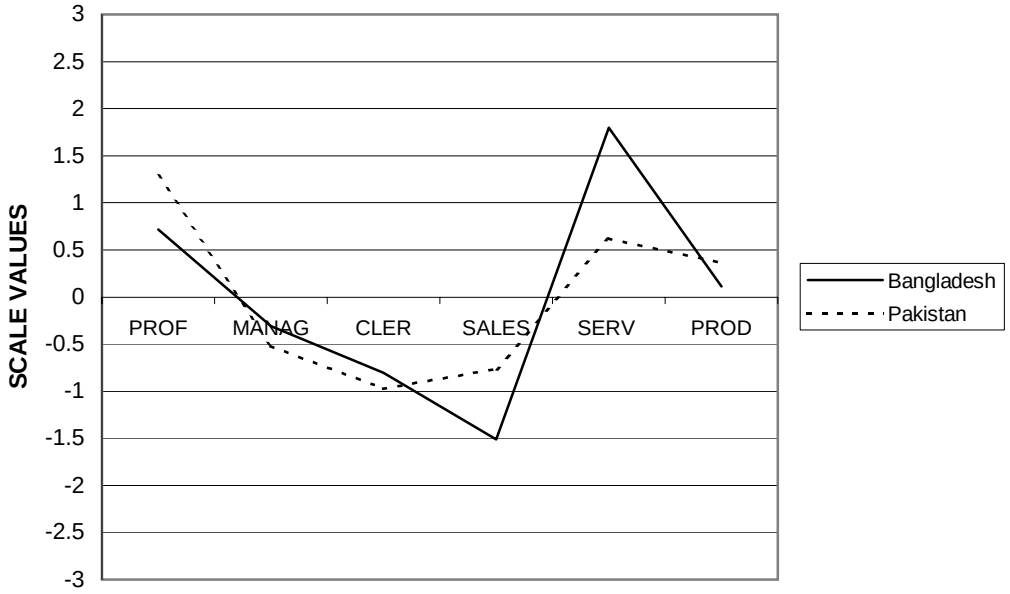
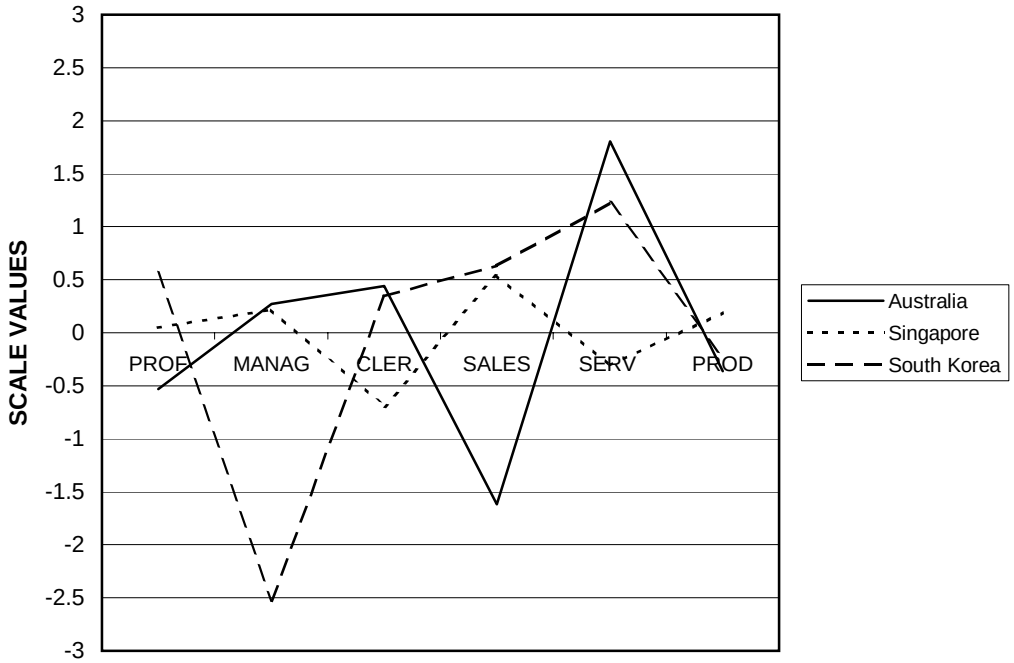


***Chart 10:* Unclassified segregation patterns**



Appendix A

Observed counts in occupational categories by gender, deflated to account for sample sizes

Country	Gender	professional	managerial	clerical	sales	service	agriculture	production
Australia	Male	4403	3919	1607	6825	1876	2865	7963
	Female	1505	2993	1449	788	6636	5172	3217
Austria	Male	2819	1483	1942	1224	1092	1282	9180
	Female	2859	413	3643	1872	2885	1148	1537
Bangladesh	Male	16102	2417	14758	55656	12770	242828	85914
	Female	4776	257	958	1788	11197	248434	13957
Barbados	Male	90	58	96	72	190	52	466
	Female	98	34	244	98	266	34	112
Belgium	Male	4201	1180	3154	1670	1356	795	10507
	Female	4286	274	4085	1775	2529	370	1524
Bermuda	Male	2376	2491	1282	868	3944	776	5397
	Female	2900	1461	6572	1635	3806	39	596
Botswana	Male	143	46	191	57	227	80	1035
	Female	210	15	193	103	145	8	99
Canada	Male	3602	3392	1344	2331	2587	1470	8911
	Female	4603	2475	5450	1915	3399	469	1393
Chile	Male	2964	1851	5237	4564	2671	10140	19153
	Female	3154	477	4626	4074	6222	1177	2853
Costa Rica	Male	3707	1714	2774	5154	3977	12992	16424
	Female	3043	588	2731	3075	5786	648	3852
Denmark	Male	1907	780	1280	776	708	757	4261
	Female	3121	168	2315	788	1665	182	922
Egypt	Male	9117	684	4557	5216	5021	19133	16992
	Female	3821	89	2434	867	309	7198	771
Fiji	Male	8080	3020	7190	2850	7970	1460	28320
	Female	6540	320	5930	1120	3130	70	8020
Finland	Male	636	204	225	264	192	333	1230
	Female	1071	66	633	318	438	174	228

Appendix A: continued

Country	Gender	professional	managerial	clerical	sales	service	agriculture	production
Germany	Male	28700	7940	24080	11540	14000	6150	79800
	Female	21650	1890	38070	15470	19300	4460	14950
Greece	Male	4017	917	3033	4233	3081	7107	13334
	Female	3188	126	3242	2519	2414	5063	2634
Honduras	Male	950	314	342	1279	713	7948	3776
	Female	943	138	500	1737	1704	229	1702
Hong Kong	Male	1585	1073	2123	2568	2888	138	7397
	Female	1138	240	3791	1256	2493	40	1432
Ireland	Male	4360	1518	2622	3164	2724	6380	11660
	Female	4022	317	4858	1958	2948	519	1879
Israel	Male	1759	601	689	834	874	408	3452
	Female	2052	142	1687	506	1238	70	527
Italy	Male	1347	6423	12610	10360	12388	4640	45325
	Female	244	7437	6371	10427	10434	2168	12980
Japan	Male	35360	17120	39120	46400	22000	16160	129680
	Female	26880	1600	59920	29040	26240	13440	51120
Korea	Male	2825	1040	5389	4904	2746	5198	15266
	Female	2366	40	3620	4396	4455	4594	5739
Macedonia	Male	554	198	367	444	196	837	2257
	Female	708	46	665	390	398	613	988
Malaysia	Male	5077	2771	5234	7176	7373	15716	26063
	Female	484	44	719	459	618	811	1165
Mexico	Male	24060	6661	17691	35995	42389	110951	87230
	Female	18600	1666	20262	35191	29264	16148	23073
Netherland Antilles	Male	192	203	241	100	207	15	798
	Female	202	37	346	183	295	0	73
Netherlands	Male	17720	4740	9660	7320	5720	4040	25940
	Female	14360	960	14160	6380	10780	1220	3000
New Zealand	Male	1402	815	931	457	668	1092	3009
	Female	608	996	752	1623	1296	466	827

Appendix A: continued

Country	gender	professional	managerial	clerical	sales	service	agriculture	production
Norway	Male	314	140	62	144	112	113	610
	Female	433	60	221	153	290	35	112
Pakistan	Male	1222	300	1343	3841	1340	12755	7437
	Female	295	12	34	120	168	3459	721
Panama	Male	888	569	399	863	1082	3133	3141
	Female	861	217	1064	587	1369	107	382
Philippines	Male	952	500	928	2140	1992	16654	8764
	Female	1782	216	1140	4750	2666	5570	2222
Portugal	Male	2884	1106	4312	3794	3066	5866	16268
	Female	3500	252	4690	3108	5628	5978	5894
Puerto Rico	Male	516	556	302	302	503	208	1729
	Female	690	255	771	174	456	7	415
Singapore	Male	12751	7811	15525	8087	13455	490	34735
	Female	7894	5748	4575	8246	5831	414	24833
Spain	Male	4575	1241	4777	4547	4333	5114	21967
	Female	4238	169	4966	3690	5987	1900	2971
Syria	Male	18447	489	19177	24462	11060	44676	79541
	Female	10841	15	3723	321	628	21214	2650
Thailand	Male	1183	996	1098	2820	1199	23249	8194
	Female	1302	278	1170	4225	1596	20009	4272
Trinidad and Tobago	Male	704	264	588	928	1192	1392	5056
	Female	804	80	1224	624	1108	300	676
Turkey	Male	17320	8120	12260	34920	28560	95800	109660
	Female	8000	960	6400	2880	4380	83900	10820
United Kingdom	Male	8172	7923	2808	2133	2589	3186	14628
	Female	6342	3900	8928	3867	5049	3477	2598
United States	Male	6085	5579	2354	4526	4104	1757	15466
	Female	6758	4208	8812	4364	6043	421	3353
Venezuela	Male	3966	1727	2783	7776	4468	9871	19449
	Female	5090	476	4278	4127	6068	365	2339

Appendix B

Industrialized and Less Developed Countries

INDUSTRIALIZED COUNTRIES	LESS DEVELOPED COUNTRIES
Australia	Bangladesh
Austria	Barbados
Belgium	Bermuda
Canada	Botswana
Denmark	Chile
Finland	Costa Rica
Germany	Egypt
Great Britain	Fiji
Hong Kong	Greece
Ireland	Honduras
Israel	Korea
Italy	Macedonia
Japan	Malaysia
Netherlands	Mexico
New Zealand	Netherland Antilles
Norway	Pakistan
Singapore	Panama
Spain	Philippines
United States	Portugal
	Puerto Rico
	Syria
	Thailand
	Trinidad and Tobago
	Turkey
	Venezuela

Appendix C

Values of covariates, 42 countries

Country	less developed country	logged per capita GDP	logged total fertility	average annual labor force growth	female L. F. participation	percent in service sector	relative female educational attainm't	data quality controls	multinational capital
Egypt	1	8.24	1.33	2.617	16.6	48.57	59	3	8.521
Barbados	1	9.27	0.60	1.478	46.7	45.41	149	2	1.294
Canada	0	9.95	0.63	0.978	46.5	67.42	127	3	60.873
Costa Rica	1	8.64	1.13	2.537	36.1	57.60	85	3	5.311
Chile	1	9.09	0.92	2.045	37.0	56.03	93	3	2.500
Mexico	1	8.86	1.14	3.137	37.4	60.64	76	3	1.823
Netherland Ant.	1	9.11	0.74	1.723	39.5	59.49	--	2	0.000
Panama	1	8.68	1.04	2.765	39.2	64.73	120	2	-1.324
Puerto Rico	1	9.21	0.77	1.999	41.4	68.71	144	3	--
United States	0	10.11	0.73	0.876	46.8	67.84	119	3	29.393
Venezuela	1	9.03	1.17	3.135	35.8	61.35	93	2	1.999
Hong Kong	0	9.98	0.19	1.696	37.0	54.87	71	2	12.860
Israel	0	9.62	1.04	2.247	42.8	58.57	97	1	21.704
Japan	0	9.94	0.41	0.745	40.2	57.66	66	3	6.259
South Korea	1	9.18	0.55	2.213	39.1	50.99	53	1	3.535
Malaysia	1	9.03	1.26	2.781	6.1	61.16	99	3	1.477
Pakistan	1	7.68	1.80	2.726	8.0	46.25	38	2	0.105
Philippines	1	7.86	1.35	2.505	45.5	52.18	113	2	0.853
Syria	1	7.82	1.76	3.619	10.6	52.72	68	2	3.112
Thailand	1	8.76	0.74	2.166	45.3	54.40	86	2	1.172
Austria	0	9.86	0.43	0.311	42.7	52.18	84	2	37.479
Belgium	0	9.88	0.50	0.332	39.6	57.63	93	1	49.141
Denmark	0	9.91	0.53	0.456	48.0	61.65	105	1	5.283
Spain	0	9.52	0.21	1.018	34.7	52.45	100	3	60.255
Finland	0	9.70	0.62	0.468	50.0	58.54	139	2	15.575
Greece	1	9.10	0.34	0.437	33.0	50.84	97	2	3.423
Italy	0	9.81	0.24	0.418	35.1	52.20	90	--	27.623
Netherlands	0	9.76	0.48	0.851	41.1	61.52	81	1	125.977
Norway	0	9.92	0.66	0.800	47.9	64.58	116	1	66.278
Portugal	1	9.28	0.44	0.809	42.3	56.33	123	3	0.367
Turkey	1	8.35	1.19	2.077	13.7	43.99	55	2	0.615
United Kingdom	0	9.75	0.59	0.211	44.5	65.34	99	2	79.719
Australia	0	9.83	0.63	1.493	38.4	63.68	113	3	85.786
Fiji	1	8.62	1.08	1.987	30.4	50.90	79	0	0.491
New Zealand	0	9.72	0.77	1.400	45.6	57.25	104	2	99.670
Botswana	1	8.56	1.56	3.265	31.0	43.95	74	1	59.754
Ireland	0	9.62	0.74	1.631	38.0	48.16	99	3	2.997
Germany	0	9.84	0.26	-0.212	40.1	57.72	85	1	32.918
Trinidad & Tob.	1	9.07	0.86	2.333	34.1	56.73	69	2	1.463
Singapore	0	9.87	0.55	1.476	38.2	53.68	86	2	29.181
Bangladesh	1	7.16	1.45	2.918	14.9	42.95	68	--	0.018
Honduras	1	7.65	1.57	3.882	47.7	59.28	62	3	1.097

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