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CHANGE OR STABILITY? SEX SEGREGATION IN CANADA'S SERVICE ECONOMY, 1971-1986

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Introduction

Two perspectives dominate in North American research on the transformation of work. With its emphasis on the changing organization of production, the first perspective focuses attention on segmentation, using class, industry, firms and labour markets as bases of differentiation (Tigges, 1988:281). In contrast to how the organization of production changes, the second perspective emphasizes changes in what is produced. As Tigges (1988: 281) observes, the broader intellectual legacy of this approach is a focus on change from a manufacturing to a service economy and on the skill-elevating potential of a post-industrial economy.

Both perspectives have influenced research on the labour market position of North American women. In Canada, most gender oriented studies of jobs, firms and industries emphasize the role of capitalism in creating and maintaining sex segmented labour markets in which women are allocated to low-wage, low-skill work (see: Armstrong, 1984; Armstrong and Armstrong, 1984; Gannage, 1986). As well, a handful of researchers have examined the relation between the dual economy and female-male wage gaps (Boyd and Humphreys, 1979; Denton and Hunter, 1982; Ornstein, 1982).

The second perspective also is evident in research which examines trends over time in the occupational distributions of men

and women and in their industries of employment[1]. Although organizations have gained ascendency as a way of organizing work rather than occupations (Abott, 1989), the fact remains that the work world for women is overwhelmingly that of performing clerical tasks. As a result, occupational segregation, in which men and women are employed in different occupations is high in both the United States and Canada. In both Canada and the United States, research shows moderate post-war declines in the levels of occupational segregation by gender with the largest declines occurring in the 1940s and 1960s for the United States (England, 1981: Table 10.2) and in the 1960s and 1970s for Canada (Fox and Fox, 1987: Table 1).

Research also confirms gender specificity in the move to the service economy in Canada (Connelly, 1978; Boyd, Mulvihill, and Myles, 1991; Smith, 1978). Because most of Canada's employed

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[1]. Not surprisingly, the second perspective also is evident in Canadian studies which examine changes in the skill levels of jobs in the service economy. These studies, however, fail to embrace the optimistic version of Daniel Bell's post industrial economy, concluding that women relative to men are in the low-wage, low-skill sectors of the economy (Armstrong, 1984; Connelly, 1977; Fox and Fox, 1987). Most Canadian studies which discuss gender differences in job skills employ indirect measures in which occupational (or industrial) categories are equated with skill levels. However, the number of studies which use direct measures of skill is growing (see: Boyd, 1990b; Economic Council of Canada, 1990, 1991; Hunter and Manley, 1986; Krahn, 1992; Myles, 1988; Myles and Fawcett, 1990). As in the United States, conclusions regarding changes over time in skill vary with the measure used and basis of comparison (eg between industries or within industries). However, virtually all the studies which examine gender differences using direct measures of skill find that women are more likely than men to be employed in jobs or occupations with lower skill requirements.

population currently work in service industries (69 percent in 1986 and 70 percent in 1989), the term "service economy" is used to describe Canada's economic structure (Boyd, Mulvihill and Myles, 1991; Krahn, 1992). However women more than men are employed in service industries. By the time of the 1986 census of population, employment in service industries[2] accounted for 82 percent of the female labour force and 59 percent of the male labour force.

This differential concentration of male and female employment reflects gender specific processes associated with the shift in employment from goods producing industries to service industries. Growing employment in service industries reflected increased demand for workers in the traditionally female sex typed clerical, health and teaching occupations, which in turn fuelled the post-war rise in female labour force participation. Thus, for women, the move to the service economy meant a shift from unpaid domestic labour into paid employment in services (Boyd, Mulvihill and Myles, 1991). For men, the shift was from employment in the goods producing industries to employment in service industries.

Although service sector employment now is a common destiny for both women and men, here too the structure of employment is gender specific. Women are more likely to be employed in industries providing social services such as education and health and in consumer services, such as personal service, accommodation and food. As well, an increasing number are employed in retail

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[2]. Based on the classification of industries into five sectors (distributive, producer or information, social services, consumer services and retail). See Appendix A.

enterprises. While men also are found in retail trade services, they are likely to be employed in industries associated with transportation, communication, post office, utilities and wholesale trade and in business oriented services such as financial institutions, real estate, law offices and the like (see Appendix A, and see: Boyd, Mulvihill, and Myles, 1991: Table 1).

These gender specific sites of employment have implications for investigations into occupational segregation. Data limitations force most studies of occupational segregation to compare the occupational distributions of men and women undifferentiated by industrial location. Left unexplored are two related questions: 1) to what extent does sex segregation of occupations reflect sex differences in the industrial site of employment; and 2) to what extent does the shift of employment to the service economy diminish (or enhance) sex segregation of occupations.

The first question arises because occupational profiles of industries vary considerably. As a result, aggregated levels of occupational segregation can reflect occupational differences between men and women within industries as well as differences in the industrial location of men and women. The second question arises from a broader literature on the implications of the service economy for workers. Much of this literature focuses on the "good jobs-bad jobs" implications of growing employment in service industries. However, embedded within this larger controversy is the concern over the persistence of the pink collar ghetto alongside major changes in the structure of the economy. This persistence

suggests that sex segregation of occupations will remain relatively high regardless of shifts of employment out of extractive and manufacturing activities and into service industries.

In this paper, unpublished data from the 1971, 1981 and 1986 Canadian census provide information on sex segregation between employed men and women in the labour force, differentiated by sectors of employment. Overall, two conclusions emerge from the analysis. First, increased employment in the service sectors of the Canadian economy does not dramatically alter previous findings on the high levels of sex segregation of occupations. Second, although declines in the levels hypothetically may be anticipated as the sex composition of occupations becomes more mixed, the high concentration of female employment in clerical occupations creates a floor below which the magnitude of sex segregation in the occupational structure cannot drop. Substantial declines in sex segregation in the future depend on a) employment declines in clerical work and/or b) substantial declines in the female sex typing of clerical work.

Data Sources and Analytical Tools

Two data requirements exist for temporal analyses of occupational segregation in various sectors of Canada's economy. First, the classification of occupations and industries must be the same over time. If occupational and/or industrial classifications change over time, then temporal comparisons are affected and results are more tenuous (see England, 1982 for a good discussion).

Second, data must include cross-classifications of industry and occupation if industry specific analyses of occupational segregation are to be undertaken.

Past analyses of occupational segregation in Canada have been plagued by both sets of requirements. In the most detailed analysis of occupational segregation to date, Fox and Fox (1988) painstakingly match occupations over a fifty year period, but ultimately are forced to present their findings decade by decade as a function of discrete and different occupational groupings. Similarly, published occupational data, cross-classified by industry and sex, do not exist prior to 1961. Thereafter such matrices also are affected by changes in the occupational classification scheme (and to a lesser extent by industry classification changes)[3].

In this paper, data requirements are met through the use of unpublished data compiled from the 1971, 1981 and 1986 census of populations. These data are cross-classified by industry and occupation groupings using the 1971 classification systems, thus producing a "common metric" over time. Because the data were obtained before all of the economic data from the 1986 census was certified for release, the population is that of the employed

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[3]. In an innovative approach, Armstrong (1984) relies on unpublished tabulations from Statistics Canada's Labour Force Survey. However, her analysis covers a short time period (1980-1982), and the analysis is handicapped by the suppression of data for cells in which there were few respondents (reflecting the size of the Labour Force Survey).

labour force in 1971, 1981, and 1986[4]. Further, changing definitions of "unpaid family labour" in the 1971-1986 censuses caused the deletion of farm occupations from the analysis. Continuing the practice of the 1961 census, the 1971 census excludes from the labour force domain those persons who are unpaid family workers or worked as farm labourers and did less than 20 hours of unpaid family work a week. The 1981 and 1986 censuses include these persons in the labour force population (Statistics Canada, 1972:5; Statistics Canada, 1982:12). Earlier practices are likely to affect the count of women more than men, typically leading to an under-count of women in farming in 1971, and an increase in 1981 relative to 1971. As a result of the decision to omit farm occupations in the analysis, the entire occupational array consists of 476 occupational titles, using the 1971 classification[5].

Industrial data are obtained by collapsing of the 1971

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[4]. The experienced labour force is a preferred population for temporal analyses of labour force trends if different business cycles characterize different time trends. However, the recession of the early 1980s peaked between 1981 and 1986, and it would not substantially affect conclusions based on the 1981 and 1986 employed labour force populations.

[5]. The 1971 occupational classification system has a total of 500 occupational titles. Deletion of farm occupations removes 7 occupational titles. In the census data available to the author, codes 1151 through 1158, representing 8 titles, are collapsed to code 1149, other managers not elsewhere classified. Similarly, codes 9921 through 9926 are collapsed to code 9918, other labouring occupations not elsewhere classified. Codes 3131 and 3133 (graduate nurses excluding supervisors and nursing assistants) are combined, as are codes 5135 and 5137 (salesmen and sales persons, commodities not elsewhere classified and sales clerks, commodities not elsewhere classified) and codes 6130 and 6131 (supervisors: occupations, lodging and other accommodations; managers: hotels, motel and other accommodation).

Standard Industrial Codes (S.I.C.) into a typology found in previous research on the shift in Canadian employment away from goods producing industries to service industries (Boyd, Mulvihill and Myles,1991; Singelmann, 1978). This typology of a service economy is based on the classification of Singelmann (Browning and Singelmann, 1978; Singelmann, 1978) in which the economy is divided into seven broad sectors (Appendix A). The extractive sector includes agriculture, forestry, fishing, and mining. The transformative sector is composed of all manufacturing industries, construction and utilities. Distributive services include transportation, communication, and wholesale and retail trade. Producer services are composed of industries that mainly provide services to the goods producing sector and include banking and finance, insurance, real estate, accounting and miscellaneous business services. In contrast to distributive and producer services, which can be thought of as goods-oriented services, the remaining service industries are primarily consumption oriented. These include social services, consisting of health, education and welfare services,as well as public administration (federal, provincial and local administration, and defense). Finally, consumer services represent the low wage "servant" industries including accommodation and food, cleaning repair and other personal services typically provided in the commercial sector, as does retail trade.

Sex differences in employment location can be measured in a variety of ways (see: England, 1981; Reskin, 1986). Two common

approaches are: 1) calculating the sex composition of each occupation (sex typing) and 2) comparing the occupational distributions of women and men. The latter approach is used in this study. However, the task is a daunting one when the level of occupational detail is large (eg 476 titles), and even more so when the comparisons are repeated for numerous industrial sectors. Fortunately, the index of dissimilarity is a well recognized summary measure of differences between percentage distributions[6]. In this paper, it indicates the percentage of one group that would have to change their occupations to have a occupational distribution that is the same as the second group (and vice versa).

The index of dissimilarity is sensitive to the size of more or less segregated occupations (England, 1982; Reskin and Hartmann, 1986). As Reskin and Hartmann (1986:19) state, if most occupations which could be labelled as predominantly male or predominately female employed relatively few workers and most occupations had balanced numbers of men and women, as well as a major share of the work force, the index would be low in magnitude. Conversely a few

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[6]. Duncan and Duncan (1955) describe this index in detail along with members of the Lorenz curve. It is calculated by first obtaining percentage distributions for each group to be compared. Thus, in this paper the female population is distributed across 476 occupations and the results are be displayed as a percentage distribution. This is also done for the male population. Differences in the percentage distributions are then calculated for each occupational category. The absolute value of these differences are then summed and divided by 2, using the following formula:

$$\sum \frac{(X_i - Y_i)}{2}$$

large, highly sex segregated occupations could dominate a small number of "integrated" occupations to produce a large index. When comparing changes in the magnitude of occupational segregation over time, often it is of interest to know whether the changes in the indices of dissimilarity from one decade to the next reflect shifts in the structure of employment or in the actual degree of segregation within an occupation. In the former case, shifts in the degree of dissimilarity may reflect increased employment in occupations which are more "balanced" and declines in those which are viewed as "sex typed" but without any change occurring in the sex ratio for any of these occupations. In the latter case, the index of dissimilarity might decline not because the structure of employment changed, but rather because occupations became more - or less- gender specific. Over the years, methodologies have developed to decompose changes over time into these components of change[7]. Recently, Das Gupta (1987) has presented an alternative formula to that first published by Blau and Hendricks (1979), and his method of calculating the components is used in this paper.

Occupational Segregation: A First Look

According to the 1986 census, women represent two out of five

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[7]. It also is possible to treat occupational categories as if each employs the same number of people (size standardized index) instead of allowing each occupation to contribute to the index of dissimilarly value in proportion to the number of people employed in them. In reviewing these procedures, England (1981:279-281) argues convincingly for using the latter (weighted) method when undertaking comparisons over time rather than relying on the size standardized index. The weighted method is used in this paper.

workers (43.3 percent) in the employed population (up from one out of three, or 34.3 percent, in 1971). Despite their approaching parity with men in numbers and proportions, women and men are dissimilar in their occupational locations. Over one third of women are employed in clerical occupations (34.7 percent in 1986, down slightly from 1971) and together employment in clerical, sales and service occupations accounts for almost two thirds (61.3 percent) of the employment of women. In contrast, men are more dispersed throughout the occupational structure and they do not concentrate in clerical occupations. Approximately one out of ten men are found in each of the following occupational categories: managerial and administrative occupations, sales, services, fabrication, and construction, accounting for 54.1 percent of the employed male population in 1986 (Appendix B).

Such patterns indicate considerable differences in the occupations held by men and women. Furthermore, as shown in Table 1, column 1, for the 476 occupational titles, occupational segregation remains a major characteristic of Canada's late twentieth century economy. The index of dissimilarity declines 9 percentage points between 1971-1986 (Table 1, rows 1-4)[8]. However, even in 1986, over half of employed women (men) in Canada would have to change their occupational location in order to attain an

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[8]. In their analysis, Fox and Fox (1987) found a decline in the index from 67.2 to 60.0 over the same time period. Their analysis included farm occupations, and occupational information for the experienced labour force (as opposed to the employed), as well as for persons for whom industry data were not available

occupational distribution like that observed for men (women)[9].

Table 1 here

Decomposition of the index of dissimilarity reveals that much of the decline between 1971 and 1986 reflects changes in the sex composition of occupations rather than changes in the distribution of employment toward less segregated occupations. In turn, unpublished data indicate that the changes in the sex composition of occupations primarily reflects the movement of women into previously male-dominated occupations rather than the movement of men into female dominated occupations or shifts in the overall structure of employment to less segregated occupations. This conclusion was also reached by Fox and Fox (1987) in their analysis.

The shift of female employment into occupations which are "male sex-typed" also is illustrated by examining temporal shifts in employment, characterized by various gender mixes (see Bianchi and Rytina, 1986). Table 2 shows that in 1971 2.8 percent of women

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[9]. Both the index of dissimilarity and the magnitude of decline are lower when comparisons are made using the two digit CCDO aggregations of occupations, typically found in many publications and frequently used by researchers. Indices for eighteen major occupational categories (see Appendix B) are 48.8, 44.4 and 47.1 for 1971, 1981, and 1986 respectively, representing a decline of 1.8 percentage points between 1971-1986. The figures are lower than observed in Table 1 because the considerable variability within major occupational groupings cannot be captured by the index of dissimilarity when data are aggregated. Thus, the fact that men in medicine are disproportionately physicians and dentists while women are nurses is lost when a single category of "medicine and health" is created by collapsing these more detailed occupational titles.

were employed in occupations in which females were between 0 - 9.9 percent of that occupation(s) workforce[10]. Another 5.9 percent were employed in occupations where women represented between 10 to 19.9 percent of the entire workforce. Conversely, nearly one third (31.4 percent of employed women in 1971 were employed in occupations in which over 90 percent of the (occupational specific) workforce was female. By 1986 the pattern has altered somewhat. Occupations in which fewer than 10 percent of the 1971 incumbents were female and which had employed less than three percent of the female population employed 6.7 percent of the female population by 1986. Similarly in 1986 slightly over one fourth (26.4 percent) of the female employed population was employed in occupations in which 90 percent or more of the workforce was female, down slightly from the 1971 figures.

Table 2 here

At the same time, shifts were less noticeable for employed males. In 1971 55.3 percent of employed men held jobs in which women represented less than 10 percent of the workforce for those occupations. By 1986 54.1 percent of employed men held jobs in

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[10]. For example, in 1971 females represented 8.1 percent of persons employed in aerospace engineering (CCDO 2155). They represent 5.3 percent of persons employed as athletes (CCDO 3373) and 2.7 percent of all workers employed in TV and Radio repair occupations (CCDO 8537). One can perform similar calculations for the workforce in each of the 476 occupational titles. The array of occupational titles can then be divided into deciles representing a range of percentages from 0-9.99, 10-19.9 etc. Having devised this classification, one can then determine the percentage distribution across this classification scheme for the employed female (or male) labour force in any census year.

these highly male dominated occupations. Conversely, in 1971 only 0.9 percent of all employed men were in occupations which were highly female sex typed and where at least 90 percent of the workforce was female. By 1986, 1.1 percent of men were in occupations which in 1971 had a workforce of at least 90 percent women.

Sex Segregation in Canada's Service Economy

If the entire employed population is studied, the analysis shows modest declines in sex segregation of occupations, brought about largely by increased employment of women in occupations where men held employment. But as the previous discussion noted, occupational location is only one dimension of labour market segmentation. Women and men also are dissimilar with respect to the type of industry in which they are employed, with women more likely to be employed in service industries. As aggregations of firms, industries typically vary in their occupational employment profiles (see Appendix A). Thus, it is possible that occupational segregation at a highly aggregated level in part reflects gender differences in industrial distributions.

As Browning and Singelmann (1978) note, this is not a specious possibility. Envision a society in which half of the male population is employed in extractive industries where agricultural, forestry, fishing and mining activities dominate and in which half of the female population work in the consumer service sector where domestic work and restaurant jobs concentrate. In such

circumstances, the occupational differences observed between men and women will reflect the employment profiles of the industries in which they work. However, as it turns out, these gender differences in industrial location do not account for very much of the occupational segregation between women and men. Unpublished research based on 1961-1981 data for the experienced farm and non-farm labour force reveals that differences in industrial location accounted for about 20 percent of the index of (occupational) dissimilarity between men and women at any given time point[11].

Data in Tables 1 and 2 (and Appendix B) also support the argument that gender differences in industrial employment are not important factors underlying the overall level of sex segregation. The data reveal persisting occupational segregation between men and women within industrial sectors. Although indices of dissimilarity are highest in the goods producing and distribution sectors of Canada's economy, they are only slightly lower for men and women employed in other service industries (see Appendix C regarding comparisons of indices across sectors). They are lowest in consumer services (Amusement and Recreation, Personal Services, Accommodation and Food) simply because service occupations dominate this sector (see Appendix B). As was true for the overall index for the employed population (Table 1, column 1), the magnitude of occupational segregation has declined between 1971 and 1986 with

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[11]. This analysis was conducted while the author was a Visiting Scholar at Statistics Canada. Because of variations between this analysis and that reported in this paper (years, population and level of detail), the data are not reported in a table although they can be obtained from the author.

changes in sex composition of occupations being a primary cause in most sectors.

Although sex segregation of occupations is relatively high across all industrial sectors, it is nonetheless true that they are slightly lower in the producer, social, public administration, consumer and retail service sectors, particularly by 1986. Does this suggest that we can expect future declines in the overall index of dissimilarity as part of future growth in service sector employment? The answer depends on the evidence used, but at best the answer is "possibility" and at worst the reply is "probably not."

The optimistic response arises out of the finding (Tables 1 and 2) that changes between 1971 and 1986 are largest for workers in producer and public administration sectors. However, declines in the index of dissimilarity are modest for workers employed in the social services, consumer services and retail services. Much then depends on two factors: 1) future trends in each sector regarding the occupations held by men and women and 2) future trends in the growth of employment in each sector. For example, employment gains between 1971 and 1986 occurred primarily in producer, social, consumer and retail services (Boyd, 1990a: Table 6). If employment increases dramatically in the public administration sector and if strong employment equity initiatives exist, then further declines in occupational segregation might be expected. On the other hand, if employment grows in the social, consumer and retail service sectors, and if occupational segregation remains stable, then

little change in the overall level of occupational segregation can be expected.

The Clerical Ghetto: Implications for Sex Segregation in Canada

The pessimistic view additionally is fuelled by the very different occupational profiles which characterize the female and male employed population within each industrial sector (see Appendix B). Throughout all segments of the Canadian economy, women are concentrated in clerical occupations in a way which men are not. Table 3 shows the percentage of females and males who hold clerical occupations, for Canada and for each of the eight main industrial sectors. Considerable variation exists between industrial sectors in the magnitude of occupations which are clerical. But in all sectors, women are far more likely to be employed in clerical occupations.

Table 3 here

Excluding the retail trade sector, percentages in clerical employment declined between 1971-1986 for men. The decline has been especially noteworthy for women in three service sectors - the distributive services, producer and information services and public administration. However, percentages have remained stable or actually increased for women not only in retail trade services but in two other service industries as well - social services and consumer services.

The percentage of male and female workers employed in clerical occupations is of interest for two reasons. First, it illuminates

one of the key features of sex segregated occupational structures (also see Appendix B). Second, the actual percentage of the workforce in clerical occupations is highly associated with the overall index of dissimilarity. Industrial sectors in which a large percentage of women hold clerical positions are also those sectors in which sex segregation is high (Spearman rho correlation=.74 for 1986). As well, Table 4 shows the proportion of the index of dissimilarity which can be attributed to the differential concentration of men and women in clerical work for 1971 and 1986[12]. The percentage contribution varies by sector, reflecting the importance of clerical occupations in each sector[13]. However, with the exception of employment in social and in consumer services (where the percentages in clerical employment are also lower), the clustering of women rather than men in clerical occupations accounts for between one-fourth to nearly one half of the sector specific index of dissimilarity.

Table 4 here

Conclusion and Commentary

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[12]. The share produced by differential concentration in clerical occupations is calculated as

$$\sum_{i=1}^{k} \frac{|X_i - Y_i|}{2}$$

where clerical occupations are in the kth subset but where the Xi and Yi are the percentages of the populations falling in the ith occupations for the entire work force. See footnote 6.

[13]. For example, the Spearman rho between the clerical occupations contribution to the 1986 index of dissimilarities for industries (Table 4, row 2) and the percentage of women in clerical occupations (Table 3, row 2) is .99.

segregation (measured by the index of dissimilarity) reflects the movement of women into previously male-dominated occupations rather than the movement of men into female dominated occupations or shifts in the overall structure of employment to less segregated occupations. Third, occupational differences exist between men and women within industrial sectors. The move to a service economy does not bring with it an inherent desegregating tendency. Indeed, as the fourth finding shows, female employment in clerical occupations has not altered substantially between 1971 and 1986. This concentration is highly correlated with the magnitude of sex segregation.

Overall, two implications for future trends emerge from the analysis. First, increased employment in the service sectors of the Canadian economy may modestly dissipate, but not dramatically alter, the high levels of sex segregation of occupations. Second, although declines in the levels may be anticipated as the sex composition of occupations becomes more mixed, the high concentration of female employment in clerical occupations creates a floor below which the magnitude of sex segregation in the occupational structure cannot drop. Substantial declines in sex segregation in the future depend on a) employment declines in clerical work and/or b) substantial declines in the female sex typing of clerical work. Without these changes, the transformation of work, which has captured the attention of so many, will remain gendered into the twenty-first century.

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Appendix A
Industrial Sector Classification

Goods Sector
Extractive
- Agriculture[1]
- Fishing
- Forestry
- Mining

Transformative
- Manufacturing
- Construction

Service Sector
Distributive services
- Transportation
- Communication
- Post Office
- Utilities
- Wholesale Trade

Producer/Information
- Financial
- Insurance Carriers
- Insurance and Real Estate Agencies
- Lawyers Offices
- Labour and Trade Unions
- Miscellaneous Business Services
- Miscellaneous Services, excl. Labour

Social Services
- Education
- Health and Welfare
- Health offices
- Religious organizations

Public Administration
- Federal Administration
- Provincial Administration
- Local and Other Administration

Consumer Services
- Amusement and Recreation
- Personal Services
- Accommodation and Food

Retail Trade

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[1]. Analysis presented in this paper excludes all farming occupations

Appendix B: Occupational Distributions by Industrial Sector and Sex, Employed Population, In Canada

	Total (1)	Extractive (2)	Transformation (3)	Distributor Services (4)	Producer/ Information (5)	Social Services (6)	Public Administration (7)	Consumer Services (8)	Retail Trade (9)
Females	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Managerial	6.6	7.7	6.2	8.6	13.2	4.0	15.8	1.8	3.0
Science Mathematics	1.6	7.8	2.4	1.8	3.2	0.7	3.9	0.1	0.2
Social Science, Religion	2.8	0.6	0.2	0.4	2.9	6.3	7.6	0.4	0.1
Teaching	6.6	0.1	0.1	0.3	0.4	24.1	1.2	0.4	0.1
Medicine	9.7	5.3	0.7	0.3	0.6	33.7	3.2	0.3	1.7
Art, Sport	1.6	0.6	1.7	2.1	2.9	0.4	2.0	2.5	1.1
Clerical	34.7	52.8	33.4	63.0	57.6	18.4	54.0	11.9	35.8
Sales	10.5	3.0	3.7	8.6	9.9	0.2	0.4	2.6	49.6
Service	16.1	4.8	1.8	3.5	7.2	11.0	9.6	77.5	3.2
Forestry, Fishing Mining	0.2	10.1	0.1	(a)	(a)	(a)	0.1	(a)	(a)
Processing	1.9	2.7	10.7	0.7	0.1	0.1	0.1	0.5	1.1
Machinery	0.4	0.1	2.3	0.2	0.1	(a)	(a)	0.1	0.1
Fablication	4.2	0.6	25.3	1.3	0.3	0.2	0.2	1.2	1.9
Construction	0.3	0.3	1.5	0.7	0.1	(a)	0.2	0.1	0.1
Transportation	0.7	1.1	0.2	6.2	0.4	0.3	0.3	0.1	0.2
Materials	1.6	1.5	7.2	1.9	0.8	0.2	0.3	0.1	1.3
Misc, NEC	0.8	1.6	2.2	0.6	0.5	0.4	0.9	0.4	0.6

Appendix B: (continued)

	Total	Extraction	Transportation	Distributor	Producer Services	Social Services	Public Admin	Consumer Services	Retail Trade
Males	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Managerial	10.9	7.6	8.8	10.0	22.4	9.4	21.8	4.1	5.1
Science Mathematics	5.8	10.3	5.7	3.2	15.1	2.9	10.1	0.4	0.5
Social Science Religion	2.0	0.4	0.1	0.2	5.4	9.1	4.7	0.5	(a)
Teaching	3.2	0.1	0.1	0.2	0.5	33.1	0.9	0.2	0.1
Medicine	2.1	1.1	0.3	0.4	0.1	17.8	0.8	0.1	1.3
Art, Sport	1.7	0.2	0.8	1.6	3.8	0.9	1.3	7.6	0.5
Clerical	7.3	2.8	5.0	12.9	8.8	3.4	9.6	4.1	9.7
Sales	11.2	1.3	3.9	15.2	18.0	0.2	0.2	3.1	44.7
Service	11.1	1.7	1.4	2.0	12.2	13.6	34.5	69.1	2.7
Forestry Fishing Mining	2.3	44.2	0.9	0.2	0.2	(a)	0.6	0.1	(a)
Processing	5.0	3.6	12.3	1.0	0.2	0.2	0.2	1.0	3.7
Machining	3.8	2.7	9.0	1.7	2.2	0.2	0.4	0.1	0.5
Fabrication	10.8	7.6	16.5	10.0	2.9	1.5	2.8	2.1	22.3
Construction	10.1	5.4	22.7	7.9	2.0	1.9	4.4	1.3	1.2
Transportation	6.3	5.0	2.8	25.9	2.8	1.5	2.5	2.1	2.6
Materials	4.3	3.9	7.1	5.6	1.5	1.4	1.8	0.9	2.7
Misc, NEC	2.7	2.2	2.8	1.9	2.1	2.8	3.5	3.4	2.4

(a) Less than .05 percent

Source: Statistics Canada Unpublished Tabulations.

Appendix C
Comparing Indices of Dissimilarities Across Sectors

As aggregations of industries, industrial sectors in turn capture firm activities regarding production inputs and outputs. By their very definition, the employment profiles of industrial sectors reflect certain activities and not others. As a consequence, some occupations may dominate certain sectors. And they may even be absent from certain sectors, either because of classification schemes or because the activities characterizing sectors do not require certain kinds of work related activities. For example, industrial classification schemes ensure that members of legislative bodies (CCDO=111) and postmasters (CCDO=1115) are found only in the public administration sector. Alternatively, while classification schemes hypothetically do not preclude employment as newspaper carriers or vendors (CCDO=5143) in the public administration sector, the current structure of government based employment is such that these positions are not created and filled.

The end result is that the number of occupational titles which have incumbents varies by sector. For example, let us require that incumberts must fill a given occupational title in either 1971 or 1981 or 1986. This requirment is premised on the argument that incumbency indicates that the work activity subsumed by the occupation is hypothetically possible. Under this rule, employment is distributed across 448 occupational titles in the public administration sector. These 448 occupational titles represent 91.4 percent of the full array of 476 occupational titles found in the census classification system for the entire employed labor force, undistinguished by sector (Table C1, column 7, rows 1 through 4). In constrast, employment in the extractive sector is spread across 462 occupational titles, reprenting 97.1 percent ofthe 476 occupatonal titles.

Indices of dissimilarity are sensitive to the number of categories in a classification scheme, with the index tending to be smaller the fewer the number of categories. Thus, variations in the number of occupational titles for each sector question the advisability of comparing the magnitude of indices across sectors. There are a number of responses to this cautioning, each with its own "for and against" set of arguments. One approach argues that even though some occupations may lack incumbents in any given sector, hypothetically there is a full array of occupations which could be filled. This line of reasoning suggests that comparisons could be made across sectors since all 476 occupational titles are possible and some simply have no incumbents. The drawback to this approach, however, arises from the fact that certain types of occupations (such as members of legislative bodies) are part of the very definition of select sectors, and that the "hypothetical" array in fact consists of a smaller number of possible occupational titles.

The opposite approach argues for comparing indices across sectors only for a set of empirically defined common occupational titles. This approach is common in studies of occupational segregation over time, where researchers must work with changing occupational classification systems. Here, occupational classifications common to each time period are developed, and occupations which cannot be situated within such a classification system are omitted from the study. The result is that comparisons in the indices of dissimilarity are then made across an indentical number of occupations, albeit with the loss of some of the labour force in occupations not included in the classification scheme.

Using the database in this paper, an array of 352 occupations results for Canada using two rules: 1) that an occupational title had to have an incumbent in either 1971, 1981 or 1986 is adopted, and 2) only those occupational titles which are common to all sectors are selected. These selection rules remove a small segment of the employed population overall, but the sector specific impacts vary substantially. For example, in 1986 working only with 352 occupational titles instead of 476 omitted 7.6 percent of the 1986 employed women and 9.6 percent of employment men. However, because many agricultural, fishing and mining occupations do not have incumbents in industries subsumed by the service based industries, this restriction to 352 common occupational titles removes about 18 percent of the male employed labour force in the extractive sector. Even larger percentages of the employed labour force are omitted from the social service and public administration sectors under the requirement that occupational titles be filled across all sectors (Table C1, columns 2, 6 and 7; rows 5 and 6).

Indices of dissimilarity can be calculated for the population that is employed in these set of 352 occupations. Such indices do not represent the full array of occupations in which men and women are employed, and from one perspective they give a misleading picture of the degree of sex segregation in occupations (for example, in the extractive sector, some blue collar occupations in which men concentrate are omitted). However, such indices do allow comparisons to be made across sectors which are free from fluctuations introduced by variations in the numbers of occupational titles found in each sector. Such indices appear in the last two rows of Table C1.

A comparison of these indices with those produced in Table 1 indicate little change in either the magnitudes of the indices or the conclusions drawn, based on Table 1. Given the general similar conclusions to be drawn and the drawback of omitting occasionally sizable segments of the male and female populations when comparisons are restricted to 352 occupational titles, the analysis in the paper presents findings based on the sector specific (and thus variable) number of occupational titles.

Table C1: Variations in Occupational Titles by Sector, Canada 1971-1986

	Total (1)	Extractive (2)	Transformative (3)	Distributive (4)	Producer (5)	Social Services (6)	Public Administration (7)	Consumer Services (8)	Retail Trade (9)
Number of Titles									
Occupational Titles with more than zero cases[a]									
N	476	435	462	462	453	435	448	399	431
Percent Distribution, Occupational Titles									
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Zero cases	-	8.6	2.9	2.9	4.8	8.6	5.9	16.2	9.5
More than zero	100.0	91.4	97.1	97.1	95.2	91.4	90.5	83.8	90.5
352 Occupational Titles, Common to All Sectors									
Percent population omitted, 1986									
Female	7.6	2.8	5.6	2.4	0.7	20.9	9.7	1.4	0.9
Male	9.6	18.4	6.3	3.9	2.6	26.9	35.1	2.8	2.0
Index of Dissimilarity (352 occupational titles)									
1971	66.6	78.6	67.5	71.0	67.6	62.3	65.4	47.6	59.1
1986	57.8	67.8	60.4	60.5	53.5	57.2	54.6	46.8	51.1

(a) Number of occupational titles out of 476 that had incumbents in either 1971 or 1981 or 1986. Numbers were specific for each sector.

Table 1: Decomposition of Change in Indices of Dissimilarity, Female-Male Occupational Distributions[a], Employed Non-Farm Population[a], Canada 1971-1986

	Total (1)	Extractive (2)	Trans-formative (3)	Distrib-utive (4)	Producer (5)	Social Services (6)	Public Admin-istration (7)	Consumer Services (8)	Retail (9)
Females vs Males									
1971	66.5	79.9	66.9	71.0	67.7	57.4	70.6	48.0	59.0
1981	61.3	71.9	64.2	63.3	59.3	55.3	61.5	47.5	54.7
1986	57.5	69.1	60.0	60.2	53.4	53.5	56.5	46.8	51.0
Decomposition of Chance 1986-1971[b]									
Amount	-9.05	-10.79	-6.94	-10.79	-14.36	-3.89	-14.13	-1.23	-7.97
Occupation	-.20	16.03	-0.28	-3.48	-2.21	-0.26	-2.40	-0.37	0.36
Sex Composition	-7.15	-16.53	-5.89	-7.18	-11.39	-3.30	-9.71	-.02	-7.34
Both	-1.69	-10.29	-0.77	-0.13	0.76	-0.33	-2.03	-.84	-0.90

(a) 476 detailed CCDO titles. See text.
(b) After Das Gupta (1987)

Table 2: Female and Male Employed Nonfarm Population by Percent Female 1971 Occupational Distribution[a]

	Total		Extractive		Transformative		Distributive		Producer Information		Social Services		Public Administration		Consumer Services		Retail	
	1971	1986	1971	1986	1971	1981	1971	1981	1971	1981	1971	1981	1971	1986	1971	1986	1971	1986
Females																		
% Females[b]	34.3	43.3	8.2	20.5	18.7	24.0	19.2	26.9	43.5	51.5	64.1	69.1	26.0	39.8	59.0	61.8	41.5	49.0
Distribution % Female[c]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0- 9.9	2.8	6.7	9.3	20.8	8.3	15.1	8.6	19.3	2.4	9.0	0.6	1.4	4.2	13.2	0.4	0.9	1.3	1.0
10-19.9	5.9	9.5	11.5	14.8	9.3	12.8	6.1	10.9	6.5	14.6	0.9	1.6	5.8	12.3	1.4	4.7	1.7	1.5
20-29.9	2.4	3.3	1.3	1.6	9.2	8.3	4.7	3.4	3.4	6.8	1.9	3.5	4.2	5.8	1.4	1.5	11.3	3.5
30-39.9	6.4	6.2	4.9	4.1	7.3	8.4	6.3	10.6	0.7	1.3	3.9	4.3	6.6	8.4	4.6	6.3	1.9	12.5
40-49.9	6.4	6.7	12.9	30.8	6.1	5.5	6.7	5.9	8.4	6.5	8.9	7.0	2.8	4.3	13.9	14.6	2.1	1.6
50-59.9	11.0	10.2	3.0	1.5	11.4	7.8	14.5	10.4	3.7	3.8	1.3	1.8	17.2	17.2	5.5	4.6	3.2	2.0
60-69.9	15.3	14.1	8.0	6.1	11.9	12.9	18.6	20.9	1.9	3.0	3.3	5.5	16.2	8.9	11.8	11.6	42.4	37.4
70-79.9	7.6	7.6	1.0	0.5	8.5	8.0	3.1	1.1	23.4	23.2	17.7	17.3	7.4	5.1	7.5	7.3	4.7	3.0
80-89.9	11.2	9.2	1.8	0.9	12.3	8.8	2.6	2.8	2.8	1.2	24.8	20.5	4.1	5.1	30.5	32.6	8.1	13.9
90-100	31.4	26.4	36.7	19.0	15.9	12.3	28.6	14.8	46.8	30.7	36.7	37.0	31.5	19.7	23.0	16.0	23.4	23.6
Males																		
% Males[b]	65.7	56.6	91.8	79.5	81.3	76.0	80.8	73.0	56.5	48.9	35.9	30.9	74.0	60.2	41.0	38.2	58.5	50.3
Distribution % Female[c]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0- 9.9	55.3	54.1	89.2	87.0	71.4	72.4	76.8	76.0	41.5	44.7	19.2	18.6	65.1	62.3	14.5	12.3	38.6	36.9
10-19.9	17.8	17.2	6.6	9.2	13.1	13.2	8.9	11.7	29.8	26.2	9.0	8.7	14.1	18.6	12.2	11.8	6.1	7.7
20-29.9	4.1	4.4	0.4	0.6	6.0	5.1	3.5	2.6	8.0	10.5	11.1	14.7	5.2	4.6	5.5	3.0	27.6	22.9
30-39.9	6.0	5.6	0.8	0.6	3.2	4.2	2.8	3.9	1.1	1.4	13.71	11.3	4.0	3.9	13.4	13.7	2.9	4.6

Table 2: Female and Male Employed Nonfarm Population by Percent Female 1971 Occupational Distribution[a]

	Total		Extractive		Transformative		Distributive		Producer Information		Social Services		Public Administration		Consumer Services		Retail	
	1971	1986	1971	1986	1971	1981	1971	1981	1971	1981	1971	1981	1971	1986	1971	1986	1971	1986
40-49.9	4.0	4.9	2.1	1.7	1.6	1.6	2.3	1.7	8.6	6.9	19.7	16.7	1.2	2.3	23.1	31.2	1.7	2.1
50-59.9	4.9	6.3	0.3	0.3	2.0	1.2	2.7	1.6	2.1	2.0	2.0	2.6	5.5	4.1	6.4	6.5	2.0	1.6
60-69.9	4.4	3.2	0.4	0.5	1.6	1.1	2.3	2.1	.9	2.3	3.1	3.9	2.7	2.2	10.7	5.2	18.0	20.0
70-79.9	1.3	1.6	(c)	(c)	0.7	0.8	0.3	0.1	6.5	4.6	10.3	10.4	0.9	0.8	3.6	4.9	1.0	0.8
80-89.9	1.2	1.6	(c)	(c)	0.3	0.2	0.1	0.1	0.3	0.3	8.9	9.0	0.3	0.7	8.8	9.9	1.3	1.3
90-100	0.9	1.1	0.1	0.1	0.1	0.1	0.3	0.2	1.3	1.1	3.0	4.1	0.7	0.4	1.8	1.5	1.0	2.3

(a) Specific to each sector. For example in 1971 9.3 percent of women employed in the extractive sector were in occupations containing sex ratios fewer than 10 percent women (column 3). By 1986, 20.8 percent of the women employed in the extractor sector were in occupations which in 1971 had fewer than ten percent women (column 4).

(b) Overall percent specific to each sector. For example in 1971, women represented 34.3 percent of the entire employed population while men represented 65.7 percent. In the extractive sector, however, women represented 8.2 percent of the 1991 employed population there, while men were 89.2 percent of the total employed population in that sector.

(c) Less than 0.05 percent.

Table 3: Percent in Clerical Occuptions by Industrial Sector and Sex, Employed Population, Canada, 1971-1986

	Total (1)	Extraction (2)	Transformative (3)	Distributive (4)	Producer/ Information (5)	Social Services (6)	Public Administration (7)	Consumer Services (8)	Retail Trade (9)
Percent in Clerical Occupations									
Females,									
1971		58.04	35.32	75.37	76.48	18.17	72.35	9.15	34.99
1986		52.75	33.44	63.01	57.60	18.35	54.01	11.93	35.85
Ratio 1986/1971		.91	.95	.84	.75	1.01	.75	1.30	1.02
Males									
1971		3.57	7.12	16.18	12.87	4.08	12.64	4.60	7.15
1986		2.76	4.95	12.87	4.08	3.45	9.60	4.09	9.74
Ratio 1986/1971		.77	.70	.80	.68	.85	.76	.89	+1.36

Table 4: Clerical Occupations Contribution to the Index of Dissimilarity Between Men and Women, by Industrial Sector and Sex, Non-farm Employed Population, Canada, 1971-1986

	Total (1)	Extractive (2)	Transformative (3)	Distributive (4)	Producer/ Information (5)	Social Services (6)	Public Administration (7)	Consumer Services (8)	Retail Trade (9)
Percent Contribution[a]									
1971	24.2	34.6	23.6	46.9	48.6	13.8	43.7	7.0	26.8
1986	27.0	36.2	25.2	45.5	47.3	15.4	40.4	9.2	32.3
Difference, 1986-71	2.8	1.6	1.6	-1.4	-1.3	1.6	-3.3	2.2	5.5

(a) Calculated as the share of the index of dissimilarity due to clerical occupations divided by the overall index.