ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

GENDER BASED DIFFERENCES IN OCCUPATIONAL ALLOCATION IN TURKEY

M.Sc. THESIS

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Department of Management Engineering

Management Engineering Programme

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TÜRKİYE'DE MESLEKSEL DAĞILIMDA CİNSİYETE DAYALI FARKLILIKLAR

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FOREWORD

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SUMMARY

This study investigates the level of horizontal occupational segregation by gender in Turkey. The analysis period is from 1965 to 2010. For the period 1965 to 2000, data comes from population censuses. For the period 2001 to 2010, household labor force survey data is used. For the whole period, data is collected from Turkish Statistical Institute. Five different segregation indices are calculated in order to understand whether different segregation indices yield similar results. It is found that while occupational segregation has been increasing from 1965 to 2000, it follows a declining trend between 2001 and 2010. Additionally, for the time period it is possible, indices are calculated using different aggregation levels of occupational classification in order to see the effect of data aggregation on segregation level. Parallel to the former studies in literature, the more aggregated the occupational classification, the smaller the degree of occupational segregation obtained. Using labor force data, the effect of the variables age and last school finished on occupational segregation are examined. Occupational segregation increases with age as recorded by all the indices but there is no particular relationship between occupational segregation and last school finished.

Lastly, the changes in segregation as calculated by the D and the IP indices are decomposed into their components. The effect of change in the mix/size of occupations, i.e. the change in the occupational structure, is called the 'Mix' effect. The effect of change in the gender composition of occupations is called the 'Composition' effect. Composition effect is a better measure of the change in the segregation level since it eliminates the effect of changes in the occupational structure. It was found in this study by decomposing the D index that half of the decline in segregation from 2001 and 2010 was explained by the composition effect. When IP index was decomposed, composition effect accounted for 74.4 per cent of the decrease.

TÜRKİYE'DE MESLEKSEL DAĞILIMDA CİNSİYETE DAYALI FARKLILIKLAR

ÖZET

Bu çalışma, Türkiye'de cinsiyete dayalı yatay mesleksel ayrımcılığın büyüklüğünü incelemektedir. Analiz dönemi 1965 - 2010 arası olarak alınmıştır. 1965 - 2000 arası için veri nüfus sayımlarından elde edilmiştir. 2001 - 2010 dönemi için hane halkı işgücü istatistikleri verisi kullanılmıştır. Tüm analiz döneminde kullanılan veri Türkiye İstatistik Kurumu'ndan alınmıştır.

Farklı ayrımcılık endekslerinin benzer sonuçlar gösterip göstermediğini anlamak için beş farklı ayrımcılık endeksi hesaplanmıştır. Bu çalışmada yer alan tüm ayrımcılık endeksleri yatay mesleki ayrımcılığı ölçmek için kullanılmıştır. Yatay mesleki ayrımcılık, tek tek mesleklerdeki kadın ve erkek dağılımına yönelik bir göstergedir. Ayrımcılık endeksleri kadın ve erkek çalışanlar arasındaki eşitsizliği değil, kadın ve erkek işgücünün mesleksel dağılımdaki farklılığını ölçer. Bu çalışmada Duncan ve Duncan'ın ayrımcılık endeksi (*D*), Charles ve Grusky'nin *Association* endeksi (*A*), Karmel-Maclachlan endeksi (*IP*), Silber'in *G*-ayrımcılık endeksi (*S*) ve Theil ve Finizza'nın *Entropy* endeksi (*H*) kullanılmıştır. Endeks hesaplamalarının ardından *D* ve *IP* endeksleri 'Mix' ve 'Composition' bileşenlerine ayrılacak, böylece endekslerdeki değişimin, mesleklerin büyüklüğündeki değişmelerden mi yoksa mesleklerin kadın ve erkek dağılımında yaşanan farklılıklardan mı kaynaklandığı yorumlanabilecektir.

Çalışmada 1965 - 2000 yılları için hem majör hem de minör seviyede meslek datası bulunduğundan, öncelikle farklı detay seviyesindeki meslek gruplamaları kullanılarak endeksler hesaplanmış, meslek gruplamalarındaki detay seviyesinin ayrımcılık endeksleri üzerindeki etkisine bakılmıştır. Literatürdeki çalışmalarla paralel olarak, meslek gruplaması ne kadar toplulaştırılmışsa, o kadar az mesleksel ayrımcılık seviyesi elde edilmiştir. Örneğin 2000 yılı için, *D* endeksi, majör meslek grupları kullanıldığında 0.435, minör meslek grupları kullanıldığında 0.470 değerini almaktadır. Bu bulgu, nüfus sayımı ve hane halkı işgücü anketi verisi kullanılarak elde edilen sonuçları karşılaştırırken akılda tutulması gereken bir konudur çünkü bu çalışmada 1965 ve 2000 yılı arası için nüfus sayımı verisi, sonrası içinse hane halkı işgücü anketi verisi kullanılmıştır.

1965 - 2000 arasında mesleki ayrımcılıkta artış olduğu, 2001 - 2010 arasında mesleki ayrımcılığın azalma yönünde bir trend izlediği bulunmuştur. *D, IP, H* ve *S* endeksleri 1965 – 2000 dönemi arasında, bir yıldan diğer yıla hemen hemen aynı yönde değişim göstermekte ve 2000 yılında endeks değeri 1965'e göre artmış görünmektedir. Ancak *A* endeksi, bu dört endeksten daha farklı bir trend izlemekte ve 2000 yılına gelindiğinde 1965'e kıyasla endekste azalma görülmektedir. Bu farklılığın nedeni, *A* endeksinin neyi ölçtüğü ile ilgili olabilir. Ya da bu farklılık, endeksin hesaplanması sırasında, hiç kadın çalışan bulunmayan bazı mesleklerin, matematiksel işlemler gereği belli bir sayı ile doldurulması gerekliliğinden kaynaklanıyor olabilir. Nüfus

sayımı verisinin kullanıldığı son yıl olan 2000 ile hane halkı işgücü verisinin kullanıldığı ilk yıl olan 2001 arasında, endekslerde keskin düşüş gözlenmektedir. Bu azalmanın bir kısmı, meslek gruplamalarındaki detay seviyesinde yaşanan farkla açıklanabilir. Yine de, 1980'den sonra endekslerin artış hızında bir düşüş gözlenmektedir ve bu da cinsiyetlerin mesleksel dağılımında yaşanan iyileşmelerin 2001 – 2010 döneminde endekslere yansımış olabileceğini işaret etmektedir. *D* endeksinin belirttiği üzere, cinsiyete dayalı mesleksel ayrımcılığın olmaması için, 2001 yılında, kadın veya erkek çalışanların yüzde 39.2'si mesleklerini değiştirmek zorunda iken, 2010 yılında bu rakam yüzde 31.6 olarak gerçekleşmiştir. *A* endeksinin belirttiği üzere, 2001 yılında, kadın veya erkek çalışanların ortalama bir meslekte fazla temsil edilme oranı 2.296 iken, bu faktör 2010 yılında 2.192'ye gerilemiştir.

Hane halkı işgücü anketi verisinde, çalışanın yaşı ve en son bitirdiği okula dair bilgi olduğundan, bu verinin kullanıldığı yıllar için ayrımcılık endeksini bu kırılımlarda incelemek mümkün olmuştur. Hesaplara göre, cinsiyete dayalı mesleksel ayrımcılık yaşça büyük çalışanlar arasında daha fazla görülmektedir.

Hane halkı işgücü anketi verisinde, çalışanın en son bitirdiği okulu tanımlayan 7 farklı kategori bulunmaktadır. *A* endeksinin hesaplanmasında, hiç kadın çalışan bulunmayan grupların kullanılması sorun çıkardığından, bu 7 kategori 3 ana kategori altında tekrar gruplanmıştır. *D, IP, H* ve *A* endeks sonuçlarına göre, cinsiyete dayalı mesleksel ayrımcılık, en fazla eğitim seviyesi en düşük olan grup içinde görülmektedir (bu kategori okuma yazma bilmeyenlerden, okuma yazma bilip de herhangi bir eğitim kurumundan mezun olmayanlardan ve ilkokul mezunlarından oluşmaktadır). Tüm endekslere birlikte bakıldığında eğitim seviyesi ve mesleksel ayrımcılık arasında gözlenen belirli bir ilişki yoktur. Bununla birlikte *D* ve *H* endeksleri kategoriler arasında aynı yönde değişim göstermekte, bu endekslere göre en az ayrımcılık üniversite veya daha yukarı eğitim seviyesine sahip çalışanlar arasında gözlenmektedir.

Bu çalışmada, mesleksel ayrımcılığın özellikle son yıllardaki durumuna odaklanmak istenildiğinden, 2001 – 2010 yılları arasında gözlenen değişimi oluşturan karışım ve bileşim etkileri ayrı ayrı incelenmiştir. Karışım etkisi, endekste, mesleklerin büyümesinden (veya küçülmesinden) kaynaklanan etkiyi ifade ederken; bileşim etkisi, endekste, mesleklerin kadın/erkek bileşiminin değişmesinden kaynaklanan etkiyi ifade etmektedir. Bu çalışmada *D* ve *IP* endeksleri, birbirinden farklı şekillerde olmakla birlikte, onları oluşturan karışım ve bileşim etkilerine ayrılmıştır.

2001 – 2010 yılları arasında *D* endeksinde 7.6 yüzde puan azalma gözlenmiştir. Bu azalma *D* endeksi ayrıştırılıp detaylı olarak incelendiğinde; mesleklerin cinsiyet bileşimindeki değişimin toplam azalışın %52'sine; mesleklerin büyüklüklerindeki değişimin ise, toplam azalışın %48'ine neden olduğu görülmüştür. Ayrımcılık endeksindeki asıl azalışı / artışı bileşim etkisi gösterdiğinden, bu yıllar arasında *D* endeksinde yaşanan azalış, ayrımcılık seviyesinde yaşanan mutlak bir azalış gibi algılanmamalıdır. Yaşanan azalmanın yarısı mesleklerin büyüklüklerindeki değişimden kaynaklanmıştır.

Bu yıllar arasında *IP* endeksinde ise 2.8 yüzde puan azalma gözlenmiştir. Mesleklerin cinsiyet bileşimindeki değişim, toplam azalışın %74.4'üne; mesleklerin büyüklüklerindeki değişim, toplam azalışın %25.6'sına neden olmuştur. *D* ve *IP* endeksleri arasındaki bu tür farklılıklar, bu iki endeksin, ayrımcılık tanımları arasındaki farktan kaynaklanabilmektedir. Bununla birlikte her iki endeksteki değişim, büyük oranda, mesleklerin cinsiyet bileşimindeki değişimden doğmaktadır.

Ayrımcılığa farklı yönlerden yaklaşmalarına rağmen, *A* endeksi hariç tüm endeksler benzer sonuçlar üretmiştir. Endekslerin yıldan yıla değişimlerinin benzer yönde olması, birbirlerinin yerine kullanılabileceğini göstermektedir. Bununla birlikte, her bir endeks, ayrımcılığı farklı bir yönden ele almaktadır. Bu nedenle, birini diğerinden daha iyi bir ölçü olarak almak yerine, bir grup endeksi birlikte incelemek tercih edilebilir sonucuna ulaşılmıştır. Her endeksin belli avantaj ve dezavantajları söz konusudur.

Ayrımcılıkla ilgili çalışmalarda, her bir meslekteki kadın ve erkek sayıları kullanılmakta, dolayısıyla istihdamda olan bireyler için ayrımcılık ölçülmektedir. Bununla birlikte, istihdama katılmadan önce bireylerin (özellikle kadınların) katılım kararını etkileyen ayrımcılık da söz konusu olabilir ve ayrımcılıkla ilgili olarak yapılacak çalışmalar arasında bu konuya da gereken önem verilmelidir.

1. INTRODUCTION

In many countries all around the globe, some occupations are believed to be masculine whereas some are believed to be feminine. It is argued that on the supply side of the labor market, people tend to apply for jobs that are generally recognized as appropriate for their gender and on the demand side, employers tend to take into account the gender of the candidates when employing women and men into different occupations. One of the results of such tendencies is that women are employed in a limited range of female-dominated occupations, which are usually low paid. Besides, regardless of the gender concentration of an occupation, women face barriers in promoting to upper positions.[1] They also earn lower wages on average than their male counterparts who are doing the same job. This phenomenon of allocation of men and women into different occupations and/or to different levels within an occupation is known as occupational segregation by gender.[2] It is an important phenomenon in the labor market since it has many effects in work life. Because of segregation, quality of employment is lowered. It restricts labor market options for people; affects the valuation and therefore remuneration from work; and leads to increased differentials in pay. Additionally, because of segregation, women and men are given unequal opportunities in training and promotion.

Also, at the macro-level, efficiency and flexibility of the labor market as a whole is negatively affected by segregation. It prevents women from utilizing their full potential, which eventually leads to economic inefficiency. Restricting mobility between 'male' and 'female' occupations, it contributes to unemployment and skill gaps (Anker et al, 2003).

As Strober defines, occupational gender segregation has many interrelated dimensions. In the most general sense, there is segregation between paid and unpaid

[1] This phenomenon is defined as 'glass-ceiling'.
[2] As well as other forms of labor market discrimination, occupational segregation might be observed not only based on gender, but also based on some other personal characteristics such as race or ethnicity. Because this study aims to examine the gender based differences, any terminology for segregation refers to gender based differentials.

occupations, that is, the percentages of women and men in the paid labor force are not equal (as cited in Reskin, 1984). According to household labor force data, by 2011, in Turkey, only 28.8 per cent of women are in the labor force compared to 71.7 per cent of men.

Secondly, there is segregation within the paid employment across occupations. It is called *horizontal segregation* and it is the extent to which women and men are in different occupations. This is related with the general tendency mentioned before as masculine and feminine occupations. Horizontal segregation is what constitutes the main focus of this study and here it will be quantified by a set of different indices.

Lastly, within any individual occupation, women and men are not equally distributed across the occupational hierarchy. Strober refers to this phenomenon as occupational stratification (as cited in Reskin, 1984) which is also named as *vertical segregation* in the literature. Vertical segregation is about women being underrepresented in upper levels of an occupation such as managerial positions, which is also an important study area but will not be the subject of this thesis.

Becker's (1985) study of human capital and sexual division of labor actually investigates all these aforementioned aspects of occupational segregation together. The writer points out that there has been an increase in the labor force participation rate of women in Western countries in the last 3 decades. As the Western economies developed, the earning power of married women also increased which resulted in higher labor force participation rates. At this point, the writer suggests that even if the labor force participation rates for men and women were equal, their earnings would not necessarily be equal. Becker (1985) argues that many responsibilities which are identified with women all around the world such as child care, food preparation, and other household activities prevent the earning of women rising as much as men's.

Gender based differentials in occupational distributions have been the subject of many studies in various fields like sociology, economy, feminism and etc. Generally in these theories regarding occupational sex segregation, explanations are grouped into labor-supply side and labor-demand side perspectives. Labor supply side theories concentrate on the general qualities of the female labor force and locate women's own behavior as the primary cause of segregation. These theories focus on

why women ‘choose’ to work in certain kinds of occupations such as occupations with flexible working hours. On the other hand, theories related to labor demand factors present employers’ ‘choices’ as the primary cause of segregation. These theories focus on why employers choose men over women or vice versa for certain kinds of occupations and why different genders have different opportunities in terms of pay, promotion and career development. Both labor supply and demand side explanations include ‘choices’ or ‘preferences’ made by employees or employers. As Anker (1997) points out at this point, what may seem choices made freely are in fact determined and/ or influenced by learned cultural and social values that often discriminate against women and sometimes against men.

According to neoclassical - human capital theory, workers and employers are both rational and labor markets function efficiently. Thus, employees look for the jobs that pay the best considering their own personal endowments, constraints and preferences and employers aim maximizing productivity and minimizing costs. As the theory defends, females have lower human capital than that of males. This is because they have less education which is generally in less relevant fields of study. Additionally, all around the world, women take the responsibility for housework and child care which eventually results in early, temporary or permanent withdrawal from work which leads to acquiring less experience after they start working (Anker, 1997). As a result, women fail to invest in their human capital which in turn leads to lower productivity as compared to men and therefore women are concentrated only in some particular occupations and receive lower pay than men.

As the theory assumes, related to such gender roles, women would rationally choose occupations that have relatively high starting pay, relatively low returns to experience, and relatively low penalties for temporary withdrawal from the labor force. Therefore, according to this theory, it is rational for women to choose not to invest in their human capital as much as men do and to focus on their housekeeping roles (Anker, 1997). Therefore occupational segregation is an outcome of household specialization in ‘domestic’ or paid ‘market’ work.

On the other side of the coin, it is also a fact that when there is occupational segregation, families invest less in their female children. This results in females gaining less education - developing less human capital in other words - and facing difficulties in entering the labor market. Existence of such a cycle makes it hard to

conclude whether developing less human capital is the cause or an outcome of occupational segregation. If, women who were not educated enough and who therefore had to work in unqualified jobs or who were not part of the labor force at all, had not faced occupational segregation, they could utilize their full potential and contribute more to the economy. The arguments of the neoclassical theory seem to ignore such effects.

There are some studies on occupational segregation in Turkey. One of them is a qualitative study of the Turkish professorial employment in higher education which compares Turkey with European countries (Healy et al, 2005). As a result of interviews with Turkish professors, the authors conclude that it is not the legal frameworks of equal opportunities that laid the foundations for women's hierarchical achievements in Turkey. It is rather the state feminism resulted from the rupture with the Ottoman Empire in 1923. In another study, Rich and Palaz (2008) use segregation indices to determine the level and trend of occupational gender segregation in Turkey between 1975 and 2000. Using the IP index, they find that occupational gender segregation has increased in these 25 years and they discuss the possible reasons underlying such an increase.

This study uses the index approach to assess the degree of occupational segregation in Turkey between 1965 and 2010. Duncan and Duncan's Dissimilarity Index D, Charles and Grusky's Association Index A, Karmel-Maclachlan's Index IP, Silber's G-segregation Index S and Theil and Finizza's Entropy Index H will be calculated. For the years 1965 to 2000, census data will be used. For the years 2001 to 2010, household labor force survey data will be used. One major contribution of this study is that for the household survey data, it will be possible to calculate indices for different age and education groups (i.e. level of education successfully completed by the individual) to indicate whether segregation differs among different age and education groups. In the literature, there have been many attempts to decompose indices into their components. These components are generally the mix and the composition effects. Mix effect occurs due to the changes in the size of occupations. Composition effect occurs due to the changes in the sex composition of occupations which therefore better reflects actual changes in the segregation. In this study, D and IP indices will be decomposed into their components to better understand the details of the changes in gender based occupational segregation.

It is important to keep in mind some points throughout this study. First of all, segregation indices are used to measure horizontal or vertical gender segregation. Frehill (2006), for example, calculates the D index to measure both horizontal and vertical segregation. Blackburn et al. (2001), on the other hand, utilize Somer's D for vertical segregation. In this study, since no ranking of an occupation according to some criteria such as pay, prestige or etc. is considered, what will be measured by indices is horizontal segregation. Secondly, "what is measured by indices and therefore what will be measured in this study is not inequality; rather it is the extent of the difference between the occupational distributions of employment for women and men" (Watts, 2005, p. 482).

The rest of the study is organized as follows: In the second section, literature on occupational segregation will be presented. Both qualitative and quantitative studies will be mentioned but the main focus will be on quantitative ones. Third section will explain some notes about the data used and present some numbers regarding Turkish employment. Fourth section explains the indices and the decomposition procedures used to analyze the level of occupational segregation. The last sections are dedicated to the findings about segregation in the Turkish labor market, conclusion and recommendations.

2. LITERATURE REVIEW

In any country there can easily be found female or male dominated occupations. It is also common, over the world, that women are employed in a limited number of low-paid occupations or jobs. Therefore occupational segregation by gender is a global issue which has been studied widely. Some of these studies are descriptive studies discussing the occupational segregation. Some others follow a qualitative approach where they reach conclusions after conducting interviews with people or doing some other qualitative research. For example, Yodanis (2000) uses data from in-depth interviews and field work in rural fishing communities in order to understand what keeps women from one of the most paying industries in a rural area - fishing. She examines what role the social construction of gender play in the gender segregation in the fishing industry.

Healy et al. (2005) examine the paradox of women's academic employment in Turkey. The paradox is that Turkey has one of the lowest rates of female labor market participation in the formal sector yet the proportion of women professors are among the highest in the 25 EU countries. In this study, findings from two qualitative studies of 30 male and 27 female Turkish full professors are presented. As the writers conclude, it is ideological state support rather than legal frameworks of equal opportunities that helped Turkish women gain hierarchical achievements in Turkey.

In addition to these, there are also empirical studies using quantitative analysis which aim to quantify the level of occupational segregation. According to the methods they use, there are mainly two approaches for measuring occupational segregation: (i) Applying econometric techniques (ii) Calculation of segregation indices.

Three of the studies using econometric techniques are: Spriggs and Williams (1996), Barone (2011) and Brown et al. (1980). In their study of measuring occupational segregation by race and gender, Spriggs and Williams (1996) criticize the segregation indices as not controlling for population differences in education and experience. They argue that to be able to control simultaneously for the several hypothesized determinants of the occupational distribution, a multivariate analysis

should be run. Using multinomial logit analysis, they develop an index called the L index which measures the extent to which race (or sex) affects the probability of being in an occupation. They find that occupational segregation by race decreased during the period 1983-1989 whereas it increased for women. Barone (2011) prefers to use loglinear techniques in a cross-country study of gender segregation in fields of study in higher education. In this study the effect of being female on field of study choice is modeled. The interesting finding of Barone is that more than 90 per cent of the association between gender and fields of study is constant across the eight countries under examination. Brown et al. (1980) use multinomial logit analysis. By using a set of human characteristics, the writers forecast the occupational attainment for men, after which they simulate an occupational distribution for women which would exist if their occupational determination structure was same as men's. Many other studies using similar kind of analysis are present in literature (Bridges, 2003; Hofacker et al, 2012).

Since this study utilizes segregation indices, this literature review will focus on the quantitative studies that have used indices in order to measure occupational segregation.

2.1 Empirical Studies Using Segregation Indices

There are different types of indices developed by several researchers. Most widely used one is the *Index of Dissimilarity* (D) developed by Duncan and Duncan (1955). *Somer's* D *Index* is the standardized version of the D index. Among other indices are *IP Index* (Karmel and Maclachlan, 1988), the *G-segregation Index* (Silber, 1989), *Coefficient of Variation Type Index* (Hutchens, 1991), *J-Divergence Measure of Segregation* (Mukherjee, 2002), the *Index of Association* (A) (Charles and Grusky, 1995) and the *Representation Ratio* (RR). Indices are a quick and efficient way to measure segregation. An important restriction of most of these indices is that they are dichotomous measures, that is, it is possible to compare only two groups at a time. Still, this is not a problem when measuring gender based occupational segregation because there are only two groups to be considered - females and males. In addition, there are also multi-group indices which allow comparison among more than two groups at a time, such as *Entropy Index of Segregation*, the H *index* developed by Theil and Finizza (as cited in White, 1986).

Most widely used index for segregation is the index of Dissimilarity (D), which was proposed by Duncan and Duncan (1955). Index of Dissimilarity was first introduced to understand to what extent the black and white people lived together in a particular area. In the case of gender based occupational segregation, what is quantified by D index is the degree to which the distributions of women and men in a society across the different occupations are different from each other.

One of the recent studies that uses the Duncan Dissimilarity index is King (2009) where the author calculates the indices for different racial and gender groups as well as for cross-pairs of race and gender by using 2001 Brazilian national level data. The author then repeats the same analysis for different years of education, age groups, and sector of employment. D index calculations show that the occupational segregation is much more pronounced by sex than by race in 2001. As the results reveal, occupational segregation by race is greater at higher levels of education, whereas by sex it reaches its lowest levels among the most educated. The writer also uses this index to make a comparison over two time periods, 1989 and 2001, and finds a 0.051 percentage point decline in sex segregation, from 0.578 to 0.527.

In another study, Frehill (2006) aims to discover the trends of horizontal occupational segregation in eight academic science and engineering disciplines in the USA. The author also studies vertical occupational segregation in five levels of academic employment. These levels are; (1) Professors and Associate Professors (2) Assistant Professors (3) All other full-time positions (4) Post-docs and (5) Part-time positions. In addition to the D index, she also uses the index of Association and the representation ratio. She calculates the indices both for vertical and horizontal segregation and finds that the level of vertical segregation is higher than horizontal segregation for the three time periods analyzed in the study. In her study, Frehill (2006) also assesses how institutions have performed after they joined a program called the ADVANCE, which aimed at transforming institutions towards less segregation between sexes in academic disciplines; both across disciplines and within the levels of a discipline. For six institutions that have joined the ADVANCE in 2001, she examines the level of segregation in 2001 and 3 years after the program.

Association index, which is also mentioned above, was first developed by Charles and Grusky (1995). The writers first document some disadvantages of the D index and of its size-standardized version D_S . Then, relying on log-linear techniques, they

derive a new scalar index which is not affected by the multiplicative transformations of the occupational margins. They calculate both D, D_S and A indices for major occupational ILO categories for 8 countries. Then they rank countries according to each of these indices separately. The result is that some countries are ranked the same but some are ranked differently under different indices. For example, Greece registers the lowest segregation level under A and D_S but not so under D. Switzerland is the most segregated country under A, but has a middle position under D. D and D_S for Japan are really low but according to A, segregation is quite high in Japan.

Charles and Grusky (1995) also look at each major occupational group and find that in all eight countries women are overrepresented in clerical work while men are overrepresented in managerial and production occupations. Turkey stands out as having the highest female overrepresentation in professional work (females in Turkey are 3.6 times more likely than men to be in a professional occupation) and the highest male overrepresentation in sales (males in Turkey are 2.75 times more likely than females to be in a sales related occupation). Male overrepresentation in managerial, service and production occupations in Turkey are low in comparison to other countries.

In a study of analyzing occupational segregation by gender Mukherjee (2002) proposes some axioms which the author claims any reasonable measure of occupational segregation should satisfy. Mukherjee then evaluates some popular indices according to these axioms and finds that none of the indices satisfies all the axioms proposed except for Jeffreys (1946)'s J - Divergence measure. In this study, J - Divergence measure is used both for Indian labor force data for different years and also for 12 countries employment data again for different years of evaluation.

There are also studies that examine which segregation index is superior to others and it what ways. One such study is by White (1986) who reviews the D index, Gini index, Entropy index and some other indices. The writer first introduces some criteria already defined in the literature and then examines each segregation index in the light of these criteria. He also provides information on each index's empirical performance by numerical examples and makes a recommendation about which index to be used in the conclusion. Because it satisfies most of the criteria presented,

handles polytomies and because it is easy to calculate, the writer proposes those who study segregation should pay more attention to the H index.

Rich and Palaz (2008) use segregation indices to determine the level and trend of occupational gender segregation in Turkey between 1975 and 2000. Using census data and calculating the D and the IP indices they find that occupational gender segregation has increased in these 25 years and they discuss the possible reasons underlying such an increase. They also decompose the changes in the IP index into Mix and Composition effects. Mix effect shows the changes in the index that occur due to changes in the size of occupations and composition effect shows the changes in the index that occur due to changes in the gender composition of individual occupations. The findings of the authors suggest that the main reason for the increase in occupational segregation in these 25 years is the increase in sex segregation in individual occupations. For most of the period, among all other effects, the composition effect plays the most important role in the change in the level of occupational segregation.

This study also uses these two indices mentioned. In addition to them, the Association, G - segregation and the Entropy indices are also calculated. The aim in doing so is to analyze whether different segregation measures yield similar results or not. The analysis period is from 1965 to 2010. For the years 1965 to 2000, census data is used. For the years 2001 to 2010, household labor force survey data will be used. One major contribution of this study is that for the household survey data, it will be possible to calculate indices for different age and education groups. Since it is decided to concentrate more on D and IP indices in this study, calculations for different age and school groups will only be carried out for these two indices. Also in this paper, D and IP indices will be decomposed into their components for the period 2001 to 2010. These components are the composition and the mix effects. The aim in calculating different effects is to understand whether the change in the indices occur due to changes in the sex composition of individual occupations (composition effect) or due to changes in the size of occupations, also referred to as structural changes (mix effect). Composition effect better reflects the actual change in occupational segregation; the change which occurs due to sex composition variations but not due to structural changes. Composition effect takes into account the changes in the male / female distribution of each individual occupation.

3. DATA

3.1 Notes About the Data Used

Before any calculations were made, one of the issues to be determined was the aggregation level of the data. It is claimed that the more aggregated the data is, the less segregation it will reveal (Anker, 1997; King, 2009). Therefore the most detailed available occupational data is utilized for the segregation index calculations for the time period between 1965 and 2000 which is obtained from population censuses. Due to a change in regulation to conduct population censuses once every ten years after 2000, there was no census data available for the years after 2000 when this thesis is written. For years from 2001 to 2010, data comes from the yearly household surveys. There is only one-digit[3] occupational data available in household labor force surveys. Therefore it becomes possible to compare index calculations of all years only at one-digit level. Still the census data can be compared at two-digit[4] level for the years 1965 to 2000. Therefore both one-digit and two-digit calculations will be given. Both census and household data are obtained from the Turkish Statistical Institute (TURKSTAT).[5]

There are two different types of two-digit occupational data available in TURKSTAT. In one classification, data is collected according to the main profession of the individuals that is gained by their education, training and/or experience. Whereas in the second classification, the information is gathered by considering the observed occupation of the individual at the time of the census. The latter classification is used in this study.

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[3] One-digit occupational groups are also referred to as *major* occupational categories which show data in the aggregated form.

[4] Two-digit occupational groups are also referred to as *minor* occupational categories which show data in the detailed form.

[5] Data for this study are compiled from the following sources: Data for years 1965 and 1970 are downloaded from the online library on TURKSTAT website. Data for years 1975, 1980 and 1985 are compiled from SIS general population census publications. Data for years 1990 and 2000 are obtained from TURKSTAT website with a request. Household labour force survey data are also obtained from TURKSTAT delivered in CD format.

Over the period 1975 – 2000, each year's data shows the number of people aged 12 and over for 7 major occupational groups divided into 80 two-digit occupations, defined by the ILO's International Standard Classification of Occupations (ISCO-68)[6]. Therefore data is directly comparable for these years. For the years 1965 and 1970, there are, respectively, 9 and 7 major occupational groups. The two-digit classification includes 33 occupations in 1965 and 70 in 1970. Additionally, differently from other years, the 1965 data has information on individuals aged 15 years and over. Therefore comparisons of results of 1965 and 1970 with other years must be made with care. Major occupational groups regarding the census years are given in Table 3.1.[7]

For the years 2001 to 2010, household labor force survey data will be used. Since TURKSTAT shifted to the ISCO 88 scheme in 2001, there are 9 one-digit occupations for these years. These major occupations are also given in Table 3.1. Household data has information on individuals aged 15 years and over. When using household data in calculations of segregation, it was decided to eliminate people aged 65 and over. This is because, at the age of retirement, Turkish women have a tendency towards getting out of the labor force more than men do, which could affect the randomness of the data used.

3.2 Some Numbers Regarding the Turkish Employment

Occupational sex segregation has many interrelated dimensions. As stated by Strober, in the most general sense, there is segregation between paid and unpaid occupations, that is, the percentages of women and men in the paid labor force are not equal (as cited by Reskin, 1984). Therefore, in a segregation study, it is first needed to demonstrate to what extent women are excluded from the labor market.

Table 3.2 shows the percentages of women and men in the labor force. Since 1975, there have been decreases both in female and male participation rates. Especially for women, participation rate in 2000 has nearly decreased to its half in 1975 (from 47.3 per cent to 25.7 per cent). In fact such declines are not very surprising in developing countries where women are initially driven out of the labor force.

[6] The numbers capture both full-time and part-time employment.
[7] Detailed list of occupational groups and employment numbers by gender are given in the Appendices.

Table 3.1 : Major occupational groups.*

Year	Major Occupational Group
1965	Technical, professional and related workers (*10*) Managerial, administrative and clerical workers (*1*) Salesmen and related workers (*1*) Farmers, lumbermen, fishermen, hunters and related workers (*1*) Miners, quarrymen and related workers (*1*) Workers in transport and communication occupations (*5*) Craftsmen, production process workers and laborers (*10*) Manual workers n.e.c. (Except laborers, mine workers and street sweepers) (*1*) Service workers (*3*)
1970	Scientists, technical, professional and related workers (16) Administrative and managerial workers (2) Clerical and related workers (10) Commercial and sales workers (7) Service workers (10) Agricultural, animal husbandry, forestry workers, fishermen and hunters (5) Craftsmen, production process workers and laborers (nonagricultural) (20)
1975 - 2000	Scientific, technical, professional, and related workers (16) Administrative and managerial workers (2) Clerical and related workers (10) Commercial and sales workers (7) Service workers (10) Agricultural, animal husbandry, forestry workers, fishermen and hunters (5) Nonagricultural production and related workers, transport equipment operators and laborers (30)
2001 - 2010	Legislators, senior officials and managers Professionals Technicians and associate professionals Clerks Service workers and shop and market sales workers Skilled agricultural and fishery workers Craft and related workers Plant and machine operators and assemblers Elementary occupations

The numbers in parenthesis show the number of minor occupations within each occupational category.
*Some of the census data also has a major group called the 'Unidentified / Other' addressing people with name of the occupation not specified. Considering that this group is not homogeneous, it is not included in the calculations.

The transformation from an agriculture economy to an industrial economy also affected the structure of the labor force. Women who had been working in agricultural jobs mostly as unpaid family workers in the rural parts found it difficult

to participate in the labor force in the urban (Rich and Palaz, 2008). Although there are further decreases in the following years, female labor force participation rate started increasing in 2008, reaching 28.8 per cent in 2011 which is still very low, especially compared to male participation rate, 71.7 per cent.

Table 3.2 : Labor force participation rates (per cent).

Year	Females	Males
1975	47.3	80.9
1980	45.8	79.8
1985	43.6	78.3
1990	34.2	79.7
2000	25.7	72.9
2001	27.1	72.9
2002	27.9	71.6
2003	26.6	70.4
2004	23.3	70.3
2005	23.3	70.6
2006	23.6	69.9
2007	23.6	69.8
2008	24.5	70.1
2009	26.0	70.5
2010	27.6	70.8
2011	28.8	71.7

The distribution of the female and male labor forces by occupational groups are given in Table 3.3 and Table 3.4. From 1975 to 2010, agriculture has been the group where the maximum percentage of women was employed in. Still in 2000, three quarters of employed females were in agricultural work as compared to one third of the male employees. This is one of the important differences in the distribution of the female and male employees; whereas a very high portion of female employment is in the low-paying agricultural sector, male employment is relatively less clustered in only one major occupational group. Looking at household labor force survey data, employment in agriculture is following a declining trend for both genders. Percentage of women in agriculture has declined to 31.4 per cent in 2010. Looking at other major categories, there is an increasing trend in female distribution percentages except for production (corresponding to craft and related occupations in census years). But the female percentages are still very low in these sectors; almost all are one-digit numbers. Although in most of the period 1975 to 2010 agriculture has been the group where the maximum percentage of men was employed in, the distribution of male employment is changing. In the late 2000s, craft and related occupations becomes the group where most of the males are employed in.

In 1975 - 2010 period, the biggest differences in female and male employment distributions happen to be in agriculture and production. In the former, females have a higher distribution rate and in the latter males have. Another big difference is seen in elementary occupations. In 2001, 6 per cent of female employment was in elementary occupations. This share has tripled as of 2010 (18.3 per cent). In 2001, share of male employment in elementary occupations was higher than females (9.8 per cent) but in 2010 it is 4.5 percentage points lower than that of females (13.8 per cent of male employment compared to 18.3 per cent of female).

Table 3.5 presents the female shares in major occupational groups over the period 1975-2000. It is seen that the total female share of employment has remained constant in this period around 36 per cent. Yet women have increased their representation significantly among administrative, clerical, sales and service major groups. Largest increase is recorded in the sales group by 130.2 per cent (share increasing from 5.9 to 13.5 per cent). Still in 2000, female shares remain very low in groups like administrative, production, sales and service (shares in production have even declined by 16.8 per cent across the whole period). Considering that female share in employment is about 36 per cent, women were well represented in agricultural, clerical and professional occupations. Across the whole period, agriculture is the group where the female share is the highest. It is the only group where half of the employees are women (even more than half in 1990 and 2000).

Table 3.6 presents the female shares in major occupational groups over the period 2001-2010. There is a dramatic decline in the total female share of employment in the last decade. Yet women have increased their representation among all major occupations in 2001 - 2010 period except for agriculture and fishery. Largest increases are seen in elementary occupations (83.3 per cent) and sales and service occupations (69.8 per cent). Female shares remain very low among managers, craft workers and machine operators. Considering the female share in total employment, in 2010, women were well represented among professionals, technicians, clerks and obviously in agriculture. Across this period, again agriculture is the group where the female share is the highest.

Table 3.3 : Percentage distribution of the female and male employees by occupational group from 1975 to 2000 (per cent).

Occupational group	1975		1980		1985		1990		2000	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Administrative	0.1	0.6	0.1	1.3	0.1	1.2	0.2	1.5	0.4	2.0
Agriculture	87.5	52.8	87.1	43.9	85.6	42.6	82.1	37.6	75.7	33.0
Clerical	2.1	3.6	3.1	3.8	3.2	3.8	3.9	4.2	6.5	5.6
Production	6.0	29.3	4.5	32.3	5.2	32.0	6.4	34.0	5.5	33.3
Professional	2.8	4.2	3.7	5.0	4.0	5.5	4.8	5.9	6.9	7.5
Sales	0.5	4.8	0.5	6.5	0.8	7.1	1.1	8.1	2.3	8.4
Service	0.9	4.7	1.0	7.2	1.2	7.8	1.6	8.7	2.8	10.1
Total	100	100	100	100	100	100	100	100	100	100

Table 3.4 : Percentage distribution of the female and male employees by occupational group from 2001 to 2010 (per cent).

Occupational group	2001		2004		2007		2010	
	Female	Male	Female	Male	Female	Male	Female	Male
Legislators, senior officials and managers	2.4	10.3	2.2	10.9	3.0	10.9	3.0	10.5
Professionals	7.2	5.5	7.6	5.7	9.9	5.4	10.1	6.1
Technicians and associate professionals	5.5	4.9	5.5	4.8	7.9	6.6	7.0	5.7
Clerks	5.8	4.1	7.5	4.5	10.7	5.1	10.6	5.5
Service workers and shop and market sales workers	4.5	11.0	6.3	11.8	10.0	13.5	10.1	13.4
Skilled agricultural and fishery workers	59.8	24.6	46.7	21.2	32.0	13.4	31.4	14.5
Craft and related workers	6.8	19.2	6.2	17.0	5.4	18.3	6.0	17.1
Plant and machine operators and assemblers	2.1	10.6	3.4	12.3	4.4	13.9	3.7	13.3
Elementary occupations	6.0	9.8	14.6	11.8	16.7	13.0	18.3	13.8
Total	100	100	100	100	100	100	100	100

Table 3.5 : Change in female shares within major occupational groups, 1975 to 2000 (per cent).

Occupational group	1975	1980	1985	1990	2000	Change in female share (1975 – 1980)	Change in female share (1980 – 1990)	Change in female share (1990 – 2000)	Change in female share (1975 – 2000)
Administrative	5.8	5.4	6.0	7.2	9.9	-7.4	34.7	36.2	70.0
Agriculture	47.9	53.7	53.5	55.1	56.6	12.0	2.6	2.9	18.2
Clerical	24.9	32.5	32.3	33.8	39.4	30.3	4.0	16.8	58.3
Production	10.3	7.5	8.5	9.6	8.5	-27.2	27.9	-10.7	-16.8
Professional	27	30.3	29.4	31.3	34.3	12.2	3.2	9.7	27.1
Sales	5.9	4.3	5.8	7.2	13.5	-26.4	66.5	87.9	130.2
Service	9.5	7.3	7.9	9.3	13.6	-23.4	27.9	45.6	42.6
Total female share	35.7	36.1	36.4	36.0	36.3	1.0	-0.3	0.9	1.6

Table 3.6 : Change in female shares within major occupational groups, 2001 to 2010 (per cent).

Occupational group	2001	2004	2007	2010	Change in female share (2001 – 2004)	Change in female share (2004– 2007)	Change in female share (2007– 2010)	Change in female share (2001– 2010)
Legislators, senior officials and managers	8.1	6.7	8.7	10.1	-17.5	30.5	16.2	25.0
Professionals	33.3	32.4	38.9	39.5	-2.7	20.1	1.6	18.8
Technicians and associate professionals	30.1	29.1	29.5	32.5	-3.3	1.4	10.2	8.0
Clerks	34.7	37.7	42.2	43.1	8.7	11.8	2.3	24.3
Service workers and shop and market sales workers	13.6	16.1	20.4	23.0	18.5	27.2	12.7	69.8
Skilled agricultural and fishery workers	48.0	44.1	45.3	46.2	-8.1	2.7	2.0	-3.8
Craft and related workers	11.8	11.6	9.3	12.2	-1.7	-19.9	31.4	3.4
Plant and machine operators and assemblers	6.9	9.0	10.0	10.0	29.1	11.3	0.0	43.6
Elementary occupations	18.8	30.8	30.9	34.6	63.2	0.4	11.9	83.3
Total	27.5	26.4	25.8	28.4	-4.2	-2.4	10.4	3.3

4. SEGREGATION INDICES

Before moving on further with the indices used in this study, it is worth to stress some points. First of all, segregation indices are used to measure horizontal or vertical gender segregation. Presser and Kishor (1991) use D index only to measure horizontal segregation whereas Frehill (2006) calculates the D index to measure both horizontal and vertical segregation. Vieira et al. (2005) use both Gini and D index for horizontal segregation. Elliot (2005) uses H for comparing horizontal occupational segregation in two countries. Blackburn et al. (2001), on the other hand, utilize Somer's D for vertical segregation. In this study, since no ranking of an occupation according to some criteria such as pay, prestige or etc. is considered, what will be measured by indices is horizontal segregation. Secondly, what is measured by indices and therefore what will be measured in this study is not inequality; "rather it is the extent of the difference between the occupational distributions of employment for women and men" (Watts, 2005, p.482).

To determine the level and estimate the trend of horizontal occupational segregation, the index approach will be used. The indices used in this study are Duncan and Duncan's Dissimilarity index D, Charles and Grusky's Association index A, Karmel-Maclachlan's index IP, Silber's G-segregation index S and Theil and Finizza's Entropy index H. Following that, the D index and the IP index will be decomposed into 'Mix' and 'Composition' effects so that it is possible to distinguish whether variations in these indices are caused by the changes in the size of occupations or by the changes in the gender composition of individual occupations.

4.1 Index of Dissimilarity

Index of Dissimilarity, proposed by Duncan and Duncan (1955), quantifies the degree to which the distributions of women and men in a society across the different occupations are different from each other. The Dissimilarity index is calculated as shown in Equation 4.1:

$$D = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{M_i}{M} - \frac{F_i}{F}\right| \qquad \textbf{(4.1)}$$

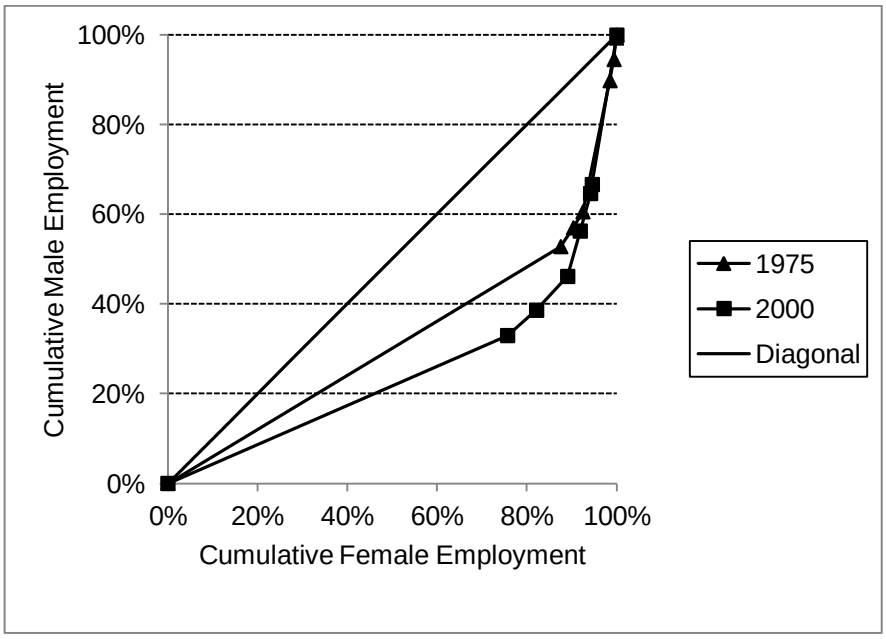
Here, M_i (F_i) represents the number of males (females) in the i^{th} occupation and M (F) represents the total number of males (females) in the employment. n is the number of occupations (where $\sum_{i=1}^{n} M_i = M$ and $\sum_{i=1}^{n} F_i = F$).

It is also possible to define the Dissimilarity index geometrically. To do so, female shares for each occupation are calculated by dividing the number of females in the i^{th} occupation (F_i) by the total number of employees in that occupation (T_i). The occupations are then sorted by their female shares and the cumulative proportions of females and males are computed for each occupation. The segregation curve, or the Lorenz curve, plots cumulative fraction of females on the x axis and cumulative fraction of males on the y axis. In the figure, the 45 degree diagonal shows the situation where there is no segregation between the genders. Geometrically, Dissimilarity or the Displacement index is defined as the maximum vertical distance between the diagonal and the Lorenz curve.

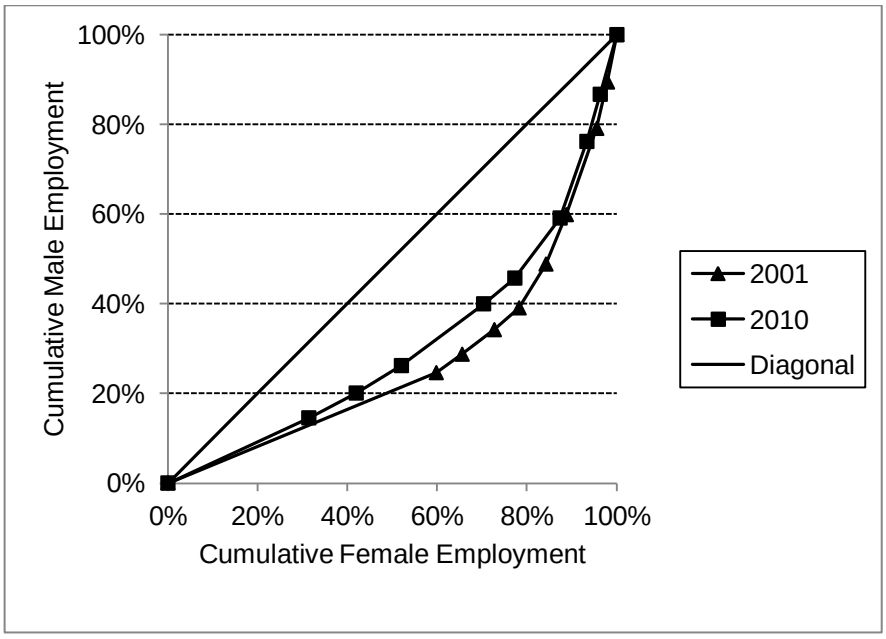
According to Duncan and Duncan (1955) analysis of occupational segregation should be based on the segregation curve. They stress that the segregation curve, used together with the percentage of employed women, gives the relevant information needed to calculate any segregation index. In Figure 4.1 four different segregation curves are given. Figure 4.1(a) shows two segregation curves belonging to 1975 and 2000 census years. These curves suggest that there have been an increase in the level of occupational segregation from 1975 to 2000. In Figure 4.1(b) segregation curves belonging to 2001 and 2010 household labor force survey data are shown. These curves suggest that there have been a decrease in the level of occupational segregation from 2001 to 2010. The distance between the curves in these two graphs reveal that the magnitude of change in the 1975 - 2000 period is bigger than the magnitude of change in the 2001 - 2010 period.

D index gives the percentage of either group (males or females) who must change their occupations in order to generate identical occupational distributions among males and females. It takes values between ‘ 0 ’ and ‘1’ (100 on the percentile scale), where ‘ 0 ’ shows a situation of perfect integration (this is the case when the

segregation curve is the diagonal itself) and '1' shows the situation of perfect segregation. D index is preferential because of its easiness in calculation and interpretation. The extensive use of D index is also related with its 'scale invariance'



(a)



(b)

Figure 4.1 : Segregation curves for some selected years: (a) 1975 and 2000. (b) 2001 and 2010.

which means that simple multiplicative transformations of the sex ratio doesn't change the value of D index. This property makes it safe to use D index in comparing countries, cities, or time periods with differing rates of female labor force participation (Charles and Grusky, 1995).

4.1.1 Decomposing the index of Dissimilarity

With all of its benefits on one side, D index is sensitive to changes in the occupational margins i.e. it is affected by the changes in the occupational distribution structure. For example, the services industry has become more important than manufacturing due to developments in technology, transportation and communication systems, globalization, increase in overall wealth and etc. This resulted in an increase of the economic share of this sector and also in the share of people employed in the services sector causing a decrease in the number of people employed in manufacturing or production sectors. Such changes in the occupational distribution structure may affect the D index which makes it difficult to interpret the actual changes in segregation.

To overcome such misinterpretation problems, many writers have decomposed the index. Bianchi and Rytina (1986) decompose the difference between the indices of two time periods into three components: (i) the mix effect, (ii) the composition effect, and (iii) the interaction effect. The effect of change in the mix/size of occupations, i.e. the change in the occupational structure, is called the 'Mix' effect. This is related to what was mentioned before about the growing services sector. The effect of change in the sex composition of occupations is called the 'Composition' effect. Third component is the interaction between these two effects which is computed by subtracting these main effects from the total change between the indices.

Stating that since it is not easy to interpret the interaction effect, Gupta (1987) uses an alternative set of formulas to decompose the difference between two indices into mix and composition effects only, eliminating the interaction effect. By doing so, the author finds similar results to that of Bianchi and Rytina (1986). Queneau (2009) follows the technique developed by Gupta (1987) to assess the trends in occupational segregation by race and ethnicity in the USA over the period 1983 to 2002. The author finds that almost all the changes in segregation were due to the composition

effect, which truly measures the change in segregation eliminating the effect of changes in the occupational structure.

This study also follows Gupta (1987)'s technique for decomposing the Dissimilarity index. For each consecutive time period analyzed, change in the D index is decomposed by the following formula. y_1 and y_2 indicate two time periods where $y_2 > y_1$:

$$D_{y2} - D_{y1} = 50\sum_{i=1}^{n}\left[\frac{\left|\left(\frac{P_i}{P}\right)-\left(\frac{Q_i}{Q}\right)\right|+\left|\left(\frac{p_i}{p}\right)-\left(\frac{q_i}{q}\right)\right|}{2}\right]\times\left[\left(\frac{t_i}{t}\right)-\left(\frac{T_i}{T}\right)\right]$$

$$+50\sum_{i=1}^{n}\left[\frac{\left(\frac{T_i}{T}\right)+\left(\frac{t_i}{t}\right)}{2}\right]\times\left[\left|\left(\frac{p_i}{p}\right)-\left(\frac{q_i}{q}\right)\right|-\left|\left(\frac{P_i}{P}\right)-\left(\frac{Q_i}{Q}\right)\right|\right] \quad \textbf{(4.2)}$$

Definitions of symbols newly introduced are as follows: $T_i = M_i + F_i$, $T = \sum_{i=1}^{n} T_i$, $P_i = M_i/T_i$, $P = M/T$, $Q_i = F_i/T_i$ and $Q = F/T$ where M_i, F_i are the number of males and females employed in occupation i. Lower case letters p, q, t denote the corresponding symbols for Year 2. First expression on the right side of Equation 4.2 is the 'Mix' effect which indicates the change in the D index due to the change in the occupational structure assuming the sex composition of occupations constant. The second expression is the 'Composition' effect which indicates the change in the D index due to the change in the sex composition of individual occupations assuming the occupational structure remained the same.

4.2 Association Index

It is mentioned above that D index is criticized for being sensitive to changes in the occupational distribution structure and thus there have been efforts to decompose the changes in the index. Association index was proposed by Charles and Grusky (1995) as a superior measure in comparison to D index because it was marginal independent. That is, A index is not dependent on the changes in the occupational distribution structure. The association index is calculated as shown in Equation 4.3:

$$A=\exp\left(\frac{1}{n}\times\sum_{i=1}^{n}\{\ln(F_i/M_i)-[\frac{1}{n}\times\sum_{i=1}^{n}\ln(F_i/M_i)]\}^2\right)^{1/2} \quad \textbf{(4.3)}$$

where F_i, M_i, F, M and n are as explained before.

Association index also remains unchanged under multiplicative transformations of the sex ratio like the D index (property of 'scale-invariance'). That is, when the ratios (F_i/M_i) in equation 4.3 are multiplied by a factor c, for all occupations i, A index doesn't change. To put it differently, even if the number of females (males) in the workforce increased (decreased) in a way that there is an equal amount of percentage change in the sex ratio in each and all of the individual occupations, A index is unchanged. This can easily be proved algebraically as in (Charles and Grusky, 1995, p.945).

What makes Association index superior to Dissimilarity index is this characteristic. Charles and Grusky (1995) benefit from this property in comparing countries with different occupational distributions. In their study, A index for Turkey is calculated as 2.64. This implies that males or females are overrepresented in the average Turkish occupation by a factor of 2.64 (Charles and Grusky, 1995).

4.3 Karmel-Maclachlan's IP Index

Another index used in this study is the IP index proposed by Karmel and Maclachlan (1988) and its calculation is shown in Equation 4.4:

$$IP=(1/T)\sum_{i=1}^{n}\left|M_i-a(M_i+F_i)\right|=(1/T)\sum_{i=1}^{n}\left|(1-a)M_i-aF_i\right| \quad \textbf{(4.4)}$$

Here, T denotes the total number of employed people, a is the male share of total employed people and other terms are as given before. This index is a modified version of the D index (as explained by Karmel and Maclachlan (1988), $IP = 2a(1-a)D$). Since IP index takes into account the relative size of the female and male labor forces, there is a major difference in the interpretation of IP index compared to the D index. IP index denotes the percentage of *people* who must change occupations in order to generate a sex-ratio for each occupation that is identical to the male/ female ratio (gender ratio) for the total employment, while

keeping the occupational structure constant. Watts (1993) argues in his study that IP index is the most appropriate measure to measure both dimensions of segregation, together with case studies and some summary statistics.

4.3.1 Decomposing the IP index

Similar to the decomposition of the D index, IP index can also be decomposed into its components, only with some difference. In the decomposition procedure, the difference in the IP index can be first divided into Composition and Mix effects and then the latter effect can also be subdivided into gender, occupation and gender/ occupation (interaction) effects.

To decompose the IP index, Karmel and Maclachlan (1988) first consider the index as a summary statistic matrix of occupation by gender. They then transform the matrix at the first (initial) time period to the matrix in the second time period. The transformation procedure requires a number of steps where the index recalculated at each step.

First the occupation by gender matrices for time 1 and time 2 are constructed where occupations are located in the rows and genders are located in the columns. Then, the transformation steps in the decomposition procedure are as follows: (1) Transform the occupation totals of the matrix at time 1 to those of the matrix at time 2. This requires dividing each row of the matrix at time 1 by the row total of this matrix and then multiplying that row by the corresponding row total of the matrix at time 2. (2) Transform the gender totals of the matrix at time 1 to those of the matrix at time 2. This requires dividing each column of the matrix at time 1 by that column total of this matrix and then multiplying that column by the corresponding column total of the matrix at time 2. (3) Transform the matrix at time 1 so that the occupation and gender totals are both equal to those of the matrix at time 2. This last step is done iteratively by alternately transforming the matrix at time 1 to have occupation and then gender totals equal to those of the matrix at time 2 (Karmel and Maclachlan, 1988), p. 190). An illustrative example with numbers can be found in (Karmel and Maclachlan, 1988), p. 194).

Together with the three matrices formed after each transformation and those belonging to time 1 and time 2, there are five matrices from which five indices are calculated. Using these five values, the change in the index is calculated due to a

number of effects. Let I_1 refer to the index at time 1 and I_2 refer to the index at time 2. Also define the indices corresponding to the three transformation steps, consecutively, as $I^*_{(a)}$, $I^*_{(b)}$ and $I^*_{(c)}$. Then the effects are calculated as:

$$\text{Mix effect} = I^*_{(c)} - I_1 \quad \textbf{(4.5)}$$

$$\text{Occupation effect} = I^*_{(a)} - I_1 \quad \textbf{(4.6)}$$

$$\text{Gender effect} = I^*_{(b)} - I_1 \quad \textbf{(4.7)}$$

$$\text{Gender by occupation effect} = (I^*_{(c)} - I_1) - (I^*_{(a)} - I_1) - (I^*_{(b)} - I_1) \quad \textbf{(4.8)}$$

$$\text{Composition effect} = I_2 - I^*_{(c)} \quad \textbf{(4.9)}$$

$$\text{Total change} = I_2 - I_1 \quad \textbf{(4.10)}$$

As in the case of decomposition of the D index, the focus here is also on the composition effect. This is because composition effect identifies the changes in the index due to the changes in the sex composition (sex ratios) of individual occupations. It is a measure that shows how integrated occupations are in terms of gender. If women's share becomes higher (lower) in a male-dominated (female-dominated) occupation, this points to a more-integrated (less-segregated) situation. Accordingly, a negative composition effect means that fewer people had to change occupations over the time period which is to say that occupations became more-integrated (less-segregated) from the first to the second year in the analysis.

In decomposing the IP index, there are three new components defined within the mix effect. Gender effect is caused primarily by a change in the overall gender mix; occupational effect is caused primarily by a change in the overall occupational mix and a gender by occupation interaction effect is part of the mix effect that cannot be explained by the two former effects.

4.4 Silber's G -segregation Index

The G -segregation index is in fact a statistic used in income inequality analysis and it measures the average difference in income shares. It has found application in the

study of inequalities in many diverse disciplines. Mathematically, G-segregation index is defined as the ratio of the area between the Lorenz curve and the diagonal over the total area under the diagonal shown in Figure 4.1. G-segregation index is proposed by Silber (1989) as a measure of occupational segregation and is calculated as:

$$S = w_h^{'} G(s_h^F - s_h^M) \qquad \textbf{(4.11)}$$

Here, w_i is the employment share of occupation i, $w = T_i/T$. s_i^F is the female share of occupation i in total female employment (i.e. $s_i^F = F_i/F$). s_i^M is the male share of occupation i in total male employment (i.e. $s_i^M = M_i/M$). G is a square matrix whose elements g_{ij} are equal to 0 when $i = j$, to -1 when $j > i$ and to $+1$ when $j < i$. Although not used directly in the calculation of the G-segregation index, $h_i = (F_i/T_i)/(F/T)$ is the feminization index. In fact, the subscript h in Equation 4.11 indicates that the shares w_i, s_i^F and s_i^M are ranked by decreasing value of h_i before they are used in the calculation of the G-segregation index. It is assumed that $w^{'}$ gives the expected shares of the genders in an occupation, whereas s^F and s^M refer to the actual shares.

In the case of occupational gender segregation, G-segregation index measures the average difference in proportion males (females) experienced by females (males). Transfers from female dominated occupations to the male dominated occupations are the most effectual in reducing measured segregation (White, 1986).

4.5 Theil and Finizza's Entropy Index

The *Entropy Index* was previously used as a diversity measure. Theil and Finizza introduced the index into the segregation case in an analysis of racial entropy in the Chicago public schools (as cited by White, 1986). The index is calculated as follows:

$$H = (H^* - \overline{H}) / H^* \qquad \textbf{(4.12)}$$

where

$$H^* = (-1)\sum_{k=1}^{k} P_k \log P_k \qquad \textbf{(4.13)}$$

and

$$\overline{H} = (-1)\sum_{i=1}^{I} \frac{n_i}{N} \sum_{k=1}^{K} p_{ik} \log p_{ik} \qquad \textbf{(4.14)}$$

Here, k indexes groups (which is gender in this case) and i indexes occupations. H^* refers to the diversity for the whole population classified by K and $\overline{H}$ is the weighted average of the occupation-specific diversity. The other terms are; P_k is the ratio of the k^{th} group in the whole population; p_{ik} is the ratio of people in the k^{th} group of the i^{th} occupation to the total number of people in the i^{th} occupation; n_i is the number of people in the i^{th} occupation and N is the size of the total employment. Also it is defined that when $p_{ik} = 0$, $p_{ik} \log p_{ik} = 0$, (White, 1986).

Unlike the other indices introduced so far, H index is not limited to dichotomies i.e. k can be equal or greater than two. This property is very useful in cases of calculating the index for different age groups or for different levels of education. The formulae above will be used with this form when calculating the index for groups of three or more. But when calculating the index for, the formulae can be simplified. Equation 4.13 and Equation 4.14 can be rewritten as indicated below:

$$H^* = (-1)[(F/T).\log(F/T) + (M/T).\log(M/T)] \qquad \textbf{(4.15)}$$

and

$$\overline{H} = (-1)\sum_{i=1}^{n} (T_i/T).[(F_i/T_i).\log(F_i/T_i) + (M_i/T_i).\log(M_i/T_i)] \qquad \textbf{(4.16)}$$

When all of the occupations have the same gender composition as the total employment ($H^* = \overline{H}$), zero segregation is achieved. Segregation reaches its maximum when each occupation consists of only one gender group ($\overline{H} = 0$). Different indices present different information about occupational segregation. Yet an crease in any of the indices corresponds to a more segregated situation.

5. RESULTS

5.1 Segregation Indices

As it has been mentioned before in Section 4, all the quantitative measures in this study, as well as the segregation indices that will be presented below, are a measure of horizontal segregation. Horizontal segregation is related with segregation across individual occupations, without considering any ranking of occupations according to any criteria such as pay, prestige or other. It is also important to keep in mind that "what is measured by indices and therefore what will be measured in this study is not inequality; rather it is the extent of the difference between the occupational distributions of employment for women and men" (Watts, 2005, p. 482).

The indices used in this study are Duncan and Duncan's Dissimilarity Index D, Charles and Grusky's Association Index A, Karmel-Maclachlan's Index IP, Silber's G-segregation Index S and Theil and Finizza's Entropy Index H. Following that, the D index and the IP index will be decomposed into 'Mix' and 'Composition' effects so that it is possible to distinguish whether variations in these indices are caused by the changes in the size of occupations or by the changes in the gender composition of individual occupations.

Since the data coming from censuses for the period 1965-2000 is available in detailed and aggregated forms, it was first desired to look at whether there was considerable difference in the indices calculated for detailed and aggregated levels of data. Table 5.1 demonstrates the five indices for each census year. First columns under each index show the results that use data from aggregated occupational classification i.e. data belonging to major occupational groups. There are 9 major occupational groups in 1965 and 7 major occupational groups in the following census years. Second columns under each index name show the results that use data from detailed occupational classification i.e. data belonging to minor occupational groups. There are 33 minor groups in 1965, 70 in 1970 and 80 minor occupational groups in the rest of the census years.

Table 5.1 : Horizontal occupational segregation indices calculated for different levels of occupational classification, 1965 – 2000.

Census Year	*D*		*IP*		*H*		*S*		*A*	
	Aggregated	Detailed	Aggregated	Detailed	Aggregated	Detailed	Aggregated	Detailed	Aggregated	Detailed
1965	0.324	0.325	0.155	0.155	0.124	0.139	0.333	0.339	4.627	5.692
1970	0.268	0.297	0.145	0.145	0.084	0.122	0.279	0.318	2.858	7.799 (3)
1975	0.347	0.367	0.168	0.168	0.112	0.149	0.363	0.397	2.585	4.654
1980	0.432	0.458	0.213	0.213	0.174	0.219	0.461	0.502	3.253	11.536 (5)
1985	0.430	0.452	0.209	0.209	0.166	0.207	0.460	0.500	2.973	8.646 (3)
1990	0.445	0.484	0.223	0.223	0.172	0.230	0.483	0.537	2.805	8.743 (3)
2000	0.435	0.470	0.217	0.217	0.168	0.220	0.493	0.548	2.569	4.144

Note: There were occupations with no female occupants. These zero cells were substituted by "1". The numbers of zero cells are shown in parentheses next to the A index results.

This study also showed that the more aggregated the occupational classification, the smaller the degree of occupational segregation obtained. As presented in Table 5.1, without any exceptions, all indexes yield a higher level of segregation when detailed occupational groups are used. This is a point worth paying attention to when comparing census and household survey results in this study because the former uses minor groups and the latter uses major groups because data is available only in aggregated form in the latter one.

D, IP, H and S indices calculated for aggregated and detailed occupational groups for 1965 - 2000 period almost follow the same trend - disregarding a few exceptions, the same indexes have changed in the same direction throughout the period from one census year to the next. Additionally, fluctuating throughout the whole period, these four indices point a higher level of segregation in 2000 than in 1965, both when major and minor groups are used. But looking at aggregated and detailed results, Association index is lower in 2000 than it is in 1965, opposite to the other four indices, and it also differs in the pattern of change from one census year to the other. The pattern of change is even more different than the other four indices when minor groups are used.

The difference in the pattern of change in the A index might be intrinsic in what the index measures but this could also be attributed to the computation difference. The computation difference is that, when there are no people in an occupation, most often women, there is a problem with the calculation of the A index (i.e. $F_i = 0$ and $ln\,(F_i/M_i) \to \infty$). In detailed census data, there were a total of 14 'zero' cells (3 in 1970; 5 in 1980; 3 in 1985 and 3 in 1990) where there were no female occupants. To overcome the problem, substitution of these cells with a number was needed. Frehill (2006) used a substitution of 0.01 where in this study it is set to 1. This is because, when 0.01 was used, this resulted in an Association index that was a lot larger than the former or the latter census year indices. For example, when three zero cells out of 70 in 1970 were substituted by 0.01, the A index estimate was 16.657. Therefore it seemed reasonable to substitute zero cells with 1 in this study, a number small enough not to distort the results greatly when compared to the indices belonging to census years with no zero cells. As Frehill (2006) also noted, it was observed that these zero cell substitutions increase the size of the estimate of the A index. As a

conclusion, the other four indices are more reliable indicators in calculations with detailed data for years where zero cells are present.

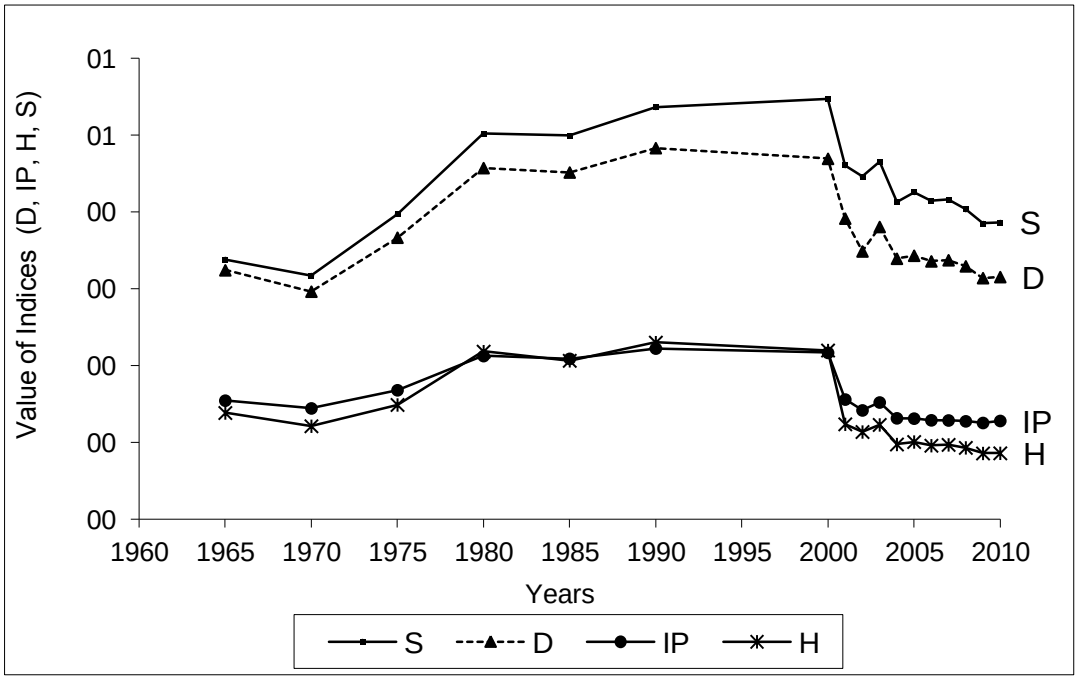
Table 5.2 shows the different indices of occupational segregation for the whole period of analysis in the study, 1965 to 2010. The same results are also shown in Figure 5.1. For the census years, detailed occupational classification is used in calculations.

Table 5.2 : Occupational segregation indices, 1965 – 2010.

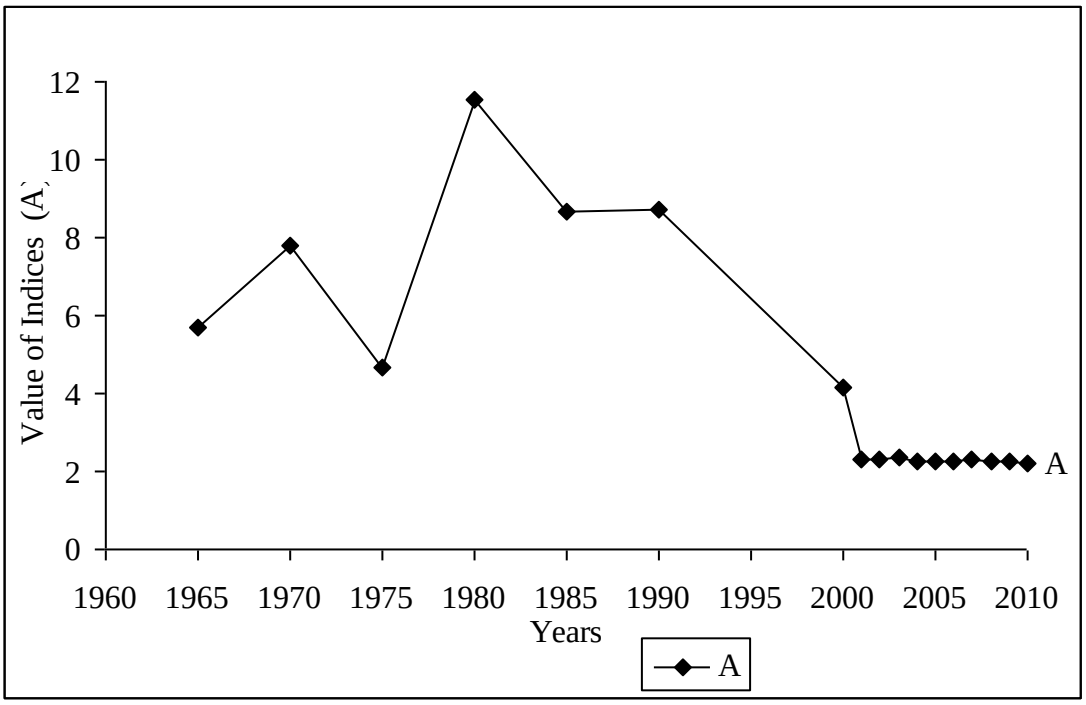
Year	*D*	*IP*	*H*	*S*	*A*
1965	0.325	0.155	0.139	0.339	5.692
1970	0.297	0.145	0.122	0.318	7.779
1975	0.367	0.168	0.149	0.397	4.654
1980	0.458	0.213	0.219	0.502	11.536
1985	0.452	0.209	0.207	0.500	8.646
1990	0.484	0.223	0.230	0.537	8.743
2000	0.470	0.217	0.220	0.548	4.144
2001	0.392	0.156	0.124	0.461	2.296
2002	0.349	0.142	0.114	0.446	2.331
2003	0.381	0.153	0.123	0.466	2.340
2004	0.340	0.132	0.098	0.413	2.259
2005	0.343	0.132	0.101	0.426	2.242
2006	0.336	0.129	0.096	0.415	2.237
2007	0.338	0.129	0.097	0.416	2.285
2008	0.330	0.128	0.093	0.404	2.268
2009	0.314	0.126	0.086	0.385	2.243
2010	0.316	0.129	0.086	0.387	2.192

Level of segregation is generally lower in the 2001 - 2010 period than 1965 - 2000 period, as expressed by all the indices. There are sharp decreases in the segregation indices from the last year when census data is used, 2000, to the first year when the labor force household survey data is used, 2001. Part of the decline in segregation can be attributed to the change in the aggregation level of data since calculations using labor force household survey data are based on major occupational groups. As shown above in Table 5.1, the more aggregated the data, the smaller the level of segregation observed. Still, while all the indices, except for Association index, have increased in the 1965 - 2000 period, there is a declining trend in segregation in the 2001-2010 period. Also, it can be seen in Figure 5.1, that after 1980, there is a slowdown in the increase of the indices, which suggest that, further improvements in the occupational distribution of the genders may have resulted in a decrease in segregation in the 2001 - 2010 period. While in 2001 39.2 per cent of men or women

had to change occupations in order to achieve zero segregation, in 2010 this number was 31.6 per cent, as indicated by the Dissimilarity index. When looked at the *A* index, while in 2001, males or females were overrepresented in the average Turkish occupation by a factor of 2.296, this factor has decreased to 2.192 in 2010.



(a)



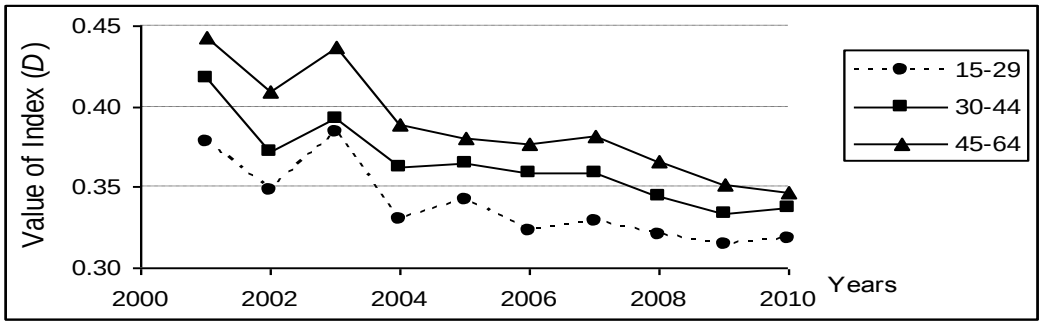
(b)

Figure 5.1 : Occupational segregation indices, 1965 – 2010.

As household survey data was available for different age and school groups, it was possible to look at the level of segregation at these breakdowns. In household survey data, there are 10 age categories (excluding the categories $12-14$ and $64+$), which in this study have been regrouped under three new groups which are $15-29$, $30-44$ and $45-64$. Figure 5.2 presents D, IP, H and A indices for different age groups. According to the results of these four indices, level of occupational segregation is highest among the oldest. When looked at D, H and A indices, it is possible to say that occupational segregation increases with age because level of segregation is the lowest among the age group $15-29$ and highest among the age group $45-64$, which takes values in between for the middle age group $30-44$. IP index does not follow a similar trend; occupational segregation is the highest for the age group $45-64$ like the other three indices but it is lowest for the middle age group $30-44$. Occupational segregation among the oldest age group is quite big in magnitude. In 2001, according to the D index, among the people aged between 45 and 64, 44.3 per cent of female or male employees had to change their jobs to achieve no segregation. This number decreased by 9.6 percentage points to 34.7 in 2010.

As Campos et al. (2011) suggest in their study of occupational segregation in the hospitality industry, if employees from the older age groups came into the labor market with a lower educational level, this pattern of occupational segregation observed might include the effect of human capital. The fact that segregation is higher among people aged between 30 and 44 might be related to women leaving their jobs permanently or temporarily for reasons of child care. When looked in detail to the female shares of each age group for the period 2001 - 2010, it is seen that, without any exceptions, female shares in the age group $30-44$ are lower than the other two age groups. Although the $30-44$ age group is the most crowded among these three groups, women have not increased their share accordingly. The female shares and the total number of workers in each age group are given in the Appendices in Table A.9 and Table A.10.

In household labor force survey data there are seven categories related to highest level of education successfully completed. These are: (0) Illiterate (1) Literate but haven't finished any educational institution (2) Primary school (3) Secondary school, vocational school at secondary school level or primary education (4) High school (5)



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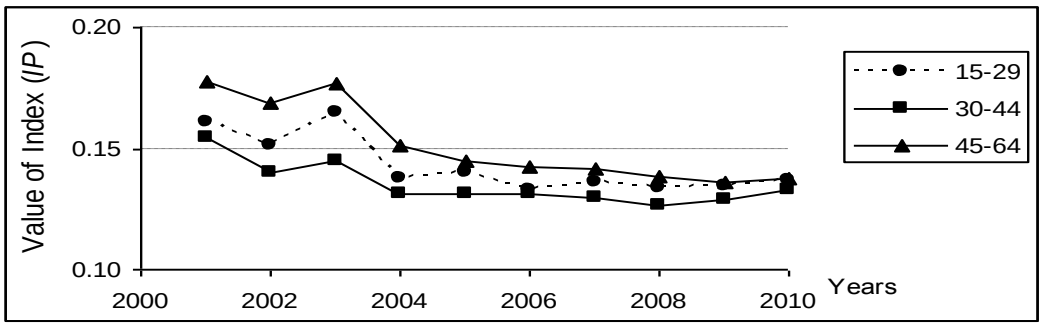

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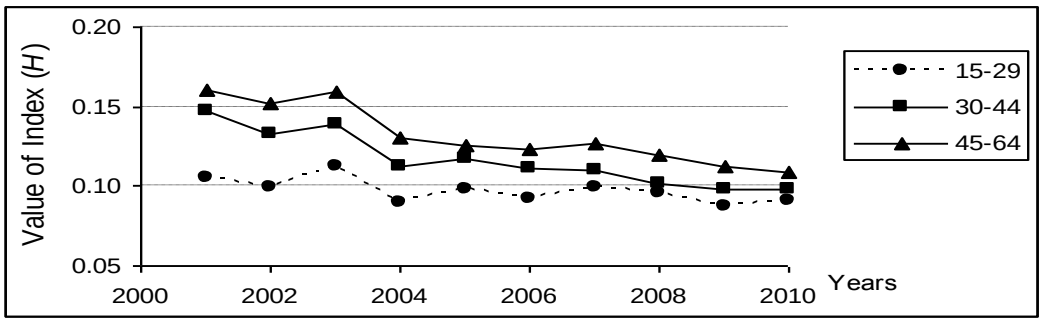

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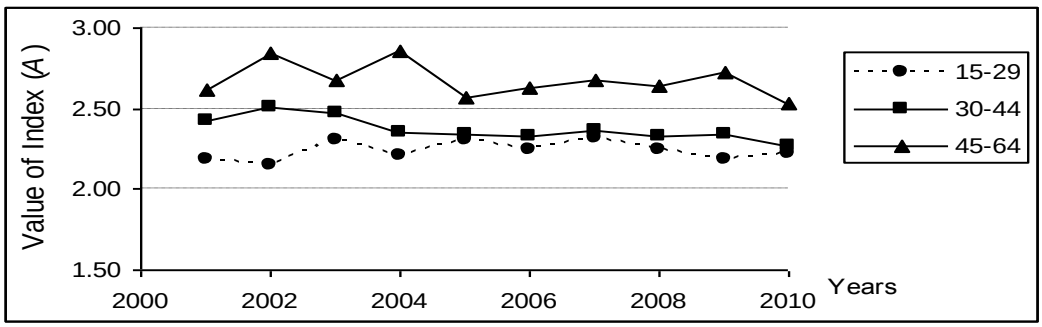


(d)

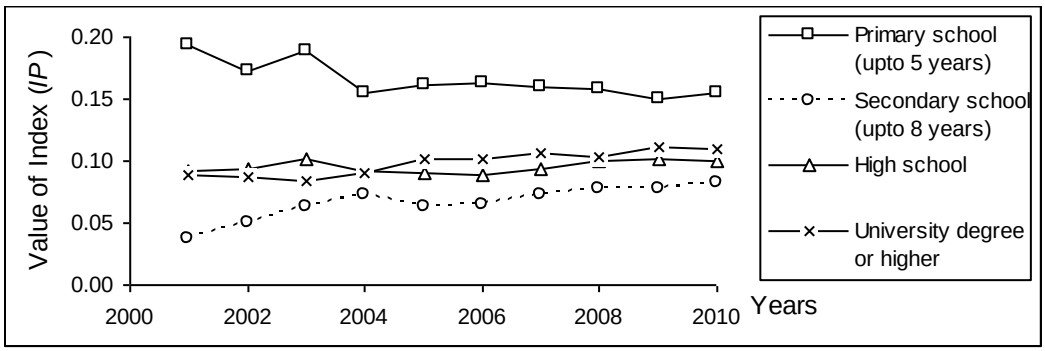
Figure 5.2 : Occupational segregation indices by age groups, 2001 - 2010: (a) *D* index. (b) *IP* index. (c) *H* index. (d) *A* index.

Vocational or technical high school (6) Higher education (university, faculty or upper). To avoid zero cells, these categories were regrouped. Categories 0,1 and 2 were grouped together as 'primary school', categories 4 and 5 were grouped together as 'high school' and categories 3 and 6 were used as they are. Occupational segregation by employee's highest level of education successfully completed is given in Figure 5.3. As revealed by all of the indices, occupational segregation is highest among workers whose highest level of education completed is primary school. There is no particular trend observed in the level of occupational segregation. D and H indices show a similar pattern of change from one school category to other; segregation is lower for secondary school graduates, increases among high school graduates and finally reaches its lowest value for workers with a university or higher degree.

5.2 Decomposition of the Dissimilarity Index

Since it was desired to concentrate on the 2001 - 2010 period in this study, the changes in the D index was decomposed into its effects in order to understand what role the effects played in the declining trend observed in the level of occupational segregation. Changes in the D index are decomposed and presented in Table 5.3. From 2001 to 2010, there is 7.6 percentage point decrease in the D index. This means, percentage of females (or males) who have to change their occupations in order to achieve zero segregation in 2010 is 7.6 percentage points lower than it was in 2001. The two components of the overall change are the composition effect (changes in the gender composition of occupations) and the mix effect (changes in the occupational distribution). In this period, examining year-to-year changes, there are fluctuations in the index both in increasing and decreasing directions. Composition and mix effects have had both decreasing and increasing effects on the index from time to time but mix effect had a decreasing effect on a bigger portion of the period than the mix effect. Looking at changes from 2001 to 2010, changes in the gender composition of occupations accounted for the 52 per cent of the decrease in occupational segregation, while structural changes accounted for 48 per cent of the decrease. Since composition effect truly measures the change in the segregation, and composition effect here accounts for only half of the decline, the decline in segregation between 2001 - 2010 should not be perceived as an absolute decrease

(a)



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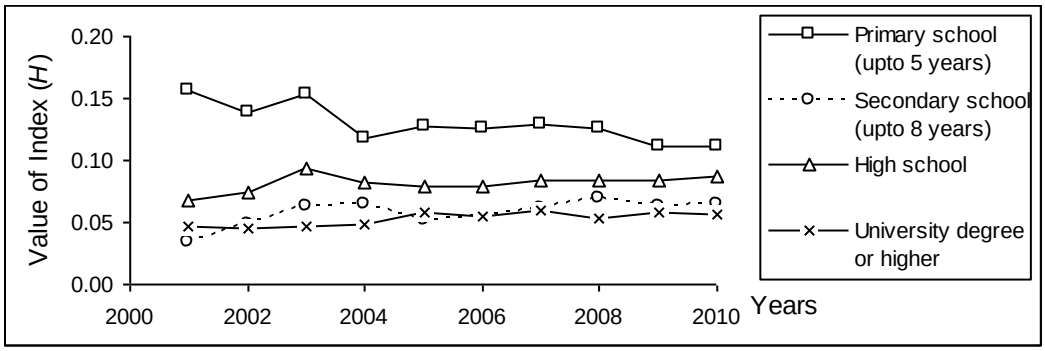

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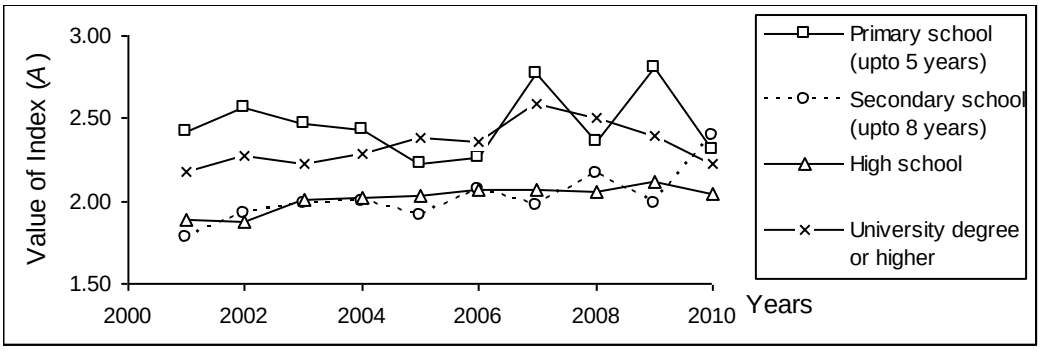

(d)

Figure 5.3 : Occupational segregation indices by level of education successfully completed, 2001 - 2010: (a) D index. (b) IP index. (c) H index. (d) A index.

and therefore not as a big improvement on behalf of women. Half of the decline in the level of occupational segregation happened only because of the changes that occurred in the size of occupations.

5.3 Decomposition of the *IP* Index

Changes in the *IP* index are decomposed and presented in Table 5.4. Columns 2 and 3 demonstrate the level of *IP* index in the first and second year of the corresponding time period in analysis. The two main components of the overall change are the composition effect (changes in the gender composition of occupations) and the mix effect (changes in the occupational structure). Mix effect is then further divided into gender, occupation and gender by occupation effects. All these effects are given as percentage points. For example, from 2001 to 2010, there was a 2.8 percentage points decrease in the *IP* index (From 0.156 to 0.129). This means that in 2010, 2.8 per cent fewer people would have had to change occupations as compared with 2001 (which indicates that individual occupations became more integrated). This total change is then divided into a composition effect of -2.1 percentage points and a mix effect of -0.7 percentage points. Looking at these two main effects, from 2001 to 2010, changes in the gender composition of occupations accounted for the 74.4 per cent of the decrease in occupational segregation, while structural changes accounted for 25.6 per cent of the decrease. These numbers tell that for the period 2001 to 2010, there is an actual decrease in the level of gender based occupational segregation. Whether due to actions performed intentionally or not, occupations have become less segregated during this period. This is a far better picture than the decomposition of the *D* index presents. As White (1986) mentions, such a difference in what the results of these indices suggest may be because they are showing a different aspect of the occupational distribution.

While decomposing the *IP* index, the mix effect can be further decomposed into other components. The component Occupation under the mix effect reflects the pattern of changes in the employment structure. The Gender component under the mix effect gives the impact of the changing participation of women in the workforce. Looking at changes from one year to another, these effects have remained very small in size; they have not played an important role in the changes in the level of gender based occupational segregation.

Table 5.3 : Decomposition of the index of Dissimilarity.

Period	D_1	D_2	Total change	Contribution of Effects in total Change		Total change	Contribution of Effects in total Change	
				Composition effect	Mix effect		Composition effect	Mix effect
			(% points)			(per cent)		
2001-2002	0.392	0.349	-0.043	-0.028	-0.014	-10.91	66.31	33.69
2002-2003	0.349	0.381	0.032	0.028	0.004	9.12	88.79	11.21
2003-2004	0.381	0.340	-0.041	-0.034	-0.007	-10.85	83.21	16.79
2004-2005	0.340	0.343	0.004	0.009	-0.005	1.15	234.95	-134.95
2005-2006	0.343	0.336	-0.007	0.004	-0.012	-2.13	-60.70	160.70
2006-2007	0.336	0.338	0.001	0.010	-0.008	0.43	678.82	-578.82
2007-2008	0.338	0.330	-0.008	-0.005	-0.003	-2.35	60.83	39.17
2008-2009	0.330	0.314	-0.015	-0.013	-0.002	-4.66	87.37	12.63
2009-2010	0.314	0.316	0.001	-0.003	0.004	0.44	-185.36	285.36
2001-2010	0.392	0.316	-0.076	-0.039	-0.037	-19.42	51.81	48.19

Table 5.4 : Decomposition of the *IP* index.

Period	IP_1	IP_2	Total Change (% points)	Total Change (per cent)	Composition effect (% points)	Mix effect (% points)	Occupation effect (% points)	Gender effect (% points)	Gender by Occupation effect (% points)
2001-2002	0.156	0.142	-0.014	-9.1	-0.016	0.002	-0.005	0.003	0.004
2002-2003	0.142	0.153	0.010	7.3	0.011	-0.001	0.002	-0.002	0.000
2003-2004	0.153	0.132	-0.021	-13.5	-0.015	-0.005	-0.004	-0.005	0.003
2004-2005	0.132	0.132	0.000	-0.3	-0.002	0.001	-0.001	-0.002	0.004
2005-2006	0.132	0.129	-0.002	-1.6	0.000	-0.002	-0.004	0.001	0.001
2006-2007	0.129	0.129	0.000	-0.2	0.001	-0.001	-0.003	-0.001	0.003
2007-2008	0.129	0.128	-0.001	-0.9	-0.001	0.000	-0.001	0.002	0.000
2008-2009	0.128	0.126	-0.002	-1.7	-0.004	0.002	-0.001	0.004	-0.001
2009-2010	0.126	0.129	0.003	2.1	-0.001	0.004	0.002	0.002	0.000
2001-2010	0.156	0.129	-0.028	-17.8	-0.021	-0.007	-0.024	0.003	0.014

6. CONCLUSIONS AND RECOMMENDATIONS

The approach adopted in this study in order to measure gender based horizontal occupational segregation in Turkey was to utilize segregation indices. As White (1986) mentions, segregation indices summarize the unevenness in the distribution of the female and male workers across occupations. There are many segregation indices independently developed in several fields of science out of which five different indices were calculated in this study. The aim in doing so was to see if similar results would be obtained since different indices present different aspect of the occupational distribution.

The analysis period was chosen as 1965 to 2010. For the period 1965 to 2000, census data was used. For the period 2001 to 2010 yearly household labor force data was used. As recorded by all the indices except the Association index, occupational segregation followed an increasing trend in the first period. For the second period, all indices pointed to a declining trend in segregation. From the last census year 2000 to 2001, there were significant declines in the indices. Since aggregation level of data were different for the two periods, it was said that aggregated classification in the second period could have underestimated the actual level of segregation.

In order to understand the different dimensions of the change in the level of segregation, the change in the D and IP indices were decomposed into their components for the period 2001 to 2010. According to the D index, only half of the decline could be attributed to the change in the gender composition of occupations, which is a better indicator of the changes, where the other half was caused by the changes in the size of occupations. In the decomposition of the IP index, these numbers were 74.4 and 25.6 per cent, respectively.

Segregation was also measured for different age and highest level of education successfully completed breakdowns. All indices showed the similar trend by age: the older the workers, the more segregation they face. In terms of education, there was no particular trend found. Yet, the D, IP and H indices showed similar patterns of change, again A index differing from them from time to time. So in this study it was

seen that although most of the time different segregation indices recorded similar results, there were also situations when they did not which is also observed in other studies in literature.

For example, in a study of 8 nations, Charles and Grusky (1995) calculate both Dissimilarity and Association indices for each of the countries and rank the countries according to these indices separately. This rank ordering exhibits some major differences. For example, Switzerland happens to be the most segregated country according to A index, whereas it is ranked in the middle under D index. It is also found that Japan and Turkey are outliers under D but not under A. Additionally, Japan records the lowest segregation level under D, but a middle level under A.

Another study that shows inconsistencies between the results of indices is Karmel and Maclachlan (1988). The writers compare IP and D indices calculated at every 5^{th} year from 1961 to 1981, for four different levels of data aggregation (6, 10, 71 and 292 occupational categories respectively). They see that D index has decreased, whereas IP index has increased in this time period, irrespective of the aggregation level of the data.

As pointed in Karmel and Maclachlan (1988), D index has two main shortcomings. First of all, it measures the percentage of 'females' or 'males' who have to change their occupations rather than the percentage of the total employed people. Secondly, these changes have an effect on the total number of workers in individual occupations which results in changes in the total occupational distribution. At this point, IP index is proposed by Karmel and Maclachlan (1988) as a better measure than the D index since it gives the percentage of 'people' (men and women) who have to change their occupations, but without changing the total occupational distribution. To achieve zero segregation according to the IP index, all individual occupations should have a distribution equal to that of the total occupational distribution. That is, if each occupation had a female/ male ratio (F_i/M_i) that is equal to the total female/ male ratio (F/T), there will be no segregation. When this is the case, what may be suggested in this study as a disadvantage of the IP index is that, while the percentage of women in the total employment in today's Turkey is still very low, it might not be very useful to use male or female shares as given. Because occupational segregation, in the most general sense, is about women not participating

actively in the employment as much as men do. H index also shows zero segregation when all of the occupations have the same gender composition as the total employment. Therefore the same commentary can be made about the H index. G -segregation index, on the other hand, is a very appropriate measure of segregation by means of easy interpretation related to its geometric background.

As White (1986) mentions, segregation indices summarize the unevenness in the distribution of the female and male workers across occupations. Since different indices present different aspects of the occupational distribution, and since each index comes with its advantages and disadvantages, it is not right to say some particular index is better than the others in all ways. There is no one measure or an index that can analyze both vertical and horizontal dimensions of occupational segregation (Charles and Grusky, 1995).

Also, in any study of segregation it must be kept in mind that these indices take the male and female participation rates as given and measures segregation for individuals who are already in the labor market. There might also be pre-entry segregation influencing the participation decision of females which must also be the subject of other related studies regarding gender based segregation.

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APPENDICES

APPENDIX A: Data used in the study

APPENDIX A

Table A.1 : Total number of workers by gender, 1965.

Major groups (One-digit classification)	Minor groups (Two-digit classification)	Female	Male	Total
Technical, professional and related workers	Architects, engineers, topographers, and cartographers	452	13.590	14.042
	Technicians and surveyors	454	27.738	28.192
	Agriculture, forestry and related workers	456	7.502	7.958
	Physics, chemistry and related workers	2.133	9.074	11.207
	Medical and related workers	15.635	29.606	45.241
	Professors and teachers	37.301	82.309	119.610
	Specialized legal workers	1.516	12.070	13.586
	Artists, musicians, writers, entertainers and related workers	2.860	14.524	17.384
	Religion related professions	235	32.759	32.994
	Other professional, technical and related workers	969	6.376	7.345
Managerial, administrative and clerical workers	Managerial, administrative and clerical workers	45.542	304.249	349.791
Salesmen and related workers	Salesmen and related workers	5.221	373.313	378.534
Farmers, lumbermen, fishermen, hunters and related workers	Farmers, lumbermen, fishermen, hunters and related workers	4.835.427	4.893.577	9.729.004
Miners, quarrymen and related workers	Miners, quarrymen and related workers	507	66.253	66.760
Workers in transport and communication occupations	Workers in water transport occupations	54	19.880	19.934
	Workers in railroad transport occupations	111	14.809	14.920
	Workers in air transport occupations	29	794	823
	Workers in road transport occupations (Except railroad transport occupations)	434	218.977	219.411
	Workers in communication occupations	3.144	16.068	19.212
Craftsmen, production process workers and laborers	Furnacemen, rollers, drawers and molders	100	18.603	18.703
	Occupations related to manufacturing and repairing of metallic goods	1.393	211.251	212.644
	Occupations related to manufacturing and repairing of electrical machines and apparatus	727	35.049	35.776
	Weavers and other textile making occupations	61.052	88.359	149.411

Table A.1 (continued): Total number of workers by gender, 1965.

Craftsmen, production process workers and laborers	Tailors, cutters, furriers, shoe makers and textile and leather goods makers	43.135	176.799	219.934
	Occupations in the production of furniture and other products of wood, rush and cane	3.960	130.916	134.876
	Laborers of food, beverage and tobacco manufacturing	22.317	116.587	138.904
	Occupations related to construction	262	116.210	116.472
	Occupations related to cutting and finishing of stones and marble and ceramic workers	990	28.161	29.151
	Other craftsmen and workers	10.112	108.057	118.169
Manual workers n. e. c. (Except form laborers, mine workers and street sweepers)	Manual workers n. e. c. (Except form laborers, mine workers and street sweepers)	6.774	308.091	314.865
Service workers	Servants, cooks, hostesses, ship stewards and other related workers	25.135	198.372	223.507
	Personal service workers	6.516	98.011	104.527
	Protective service workers	659	143.975	144.634
	Workers in occupations unidentified or not reported	1.419	498.920	500.339
	TOTAL	5.137.031	8.420.829	13.557.860

Table A.2 : Total number of workers by gender, 1970.

Major groups (One-digit classification)	Minor groups (Two-digit classification)	Female	Male	Total
Scientists, technical, professional	Physicists, chemists and related workers	2.225	5.137	7.362
and related workers	Architects, engineers and related technicians	5.256	67.964	73.220
	Aircraft and ships officers	97	3.353	3.450
	Life scientists and related technicians	474	2.123	2.597
	Medical, dental, veterinary and related workers	34.831	54.770	89.601
	Statisticians, mathematicians, systems analysts and related technicians	171	1.643	1.814
	Economists	818	5.766	6.584
	Accountants	14.717	52.319	67.036
	Jurists	3.026	15.971	18.997
	Teachers	69.059	127.134	196.193
	Workers in religion	1.014	40.169	41.183
	Authors, journalists and related writers	697	3.895	4.592
	Sculptors, painters, photographers and related creative artists	2.821	12.589	15.410
	Composers and performing artists	2.848	12.819	15.667
	Athletes, sportsmen and related workers	137	3.528	3.665
	Professional, technical and related workers n.e.c.	1.501	6.265	7.766
Administrative and managerial workers	Legislative officials and government administrators	1.485	24.148	25.633
	Managers	3.428	56.083	59.511
Clerical and related workers	Clerical supervisors	1.721	10.134	11.855
	Government executive officials	33.013	144.717	177.730
	Stenographers, typists and card and tape punching machine operators	12.271	14.194	26.465
	Bookkeepers, cashiers and related workers	18.163	47.608	65.771
	Computing machine operators	112	1.339	1.451
	Transport and communications supervisors	154	2.232	2.386
	Transport conductors	81	6.776	6.857
	Mail distribution clerks	364	8.103	8.467
	Telephone and telegraph operators	2.605	6.432	9.037
	Clerical and related workers n.e.c.	4.478	31.672	36.150
Commercial and sales workers	Managers (wholesale and retail trade)	128	2.499	2.627

Table A.2 (continued): Total number of workers by gender, 1970.

Commercial and sales workers	Working proprietors	7.577	292.452	300.029
	Sales supervisors and buyers	101	1.095	1.196
	Technical salesmen, commercial travelers and manufacturers agents	5.056	60.620	65.676
	Insurance, real estate securities and business services,	1.044	7.174	8.218
	salesmen and auctioneers			
	Salesmen, shop assistants and demonstrators	2.643	81.226	83.869
	Sales workers n.e.c.	391	1.250	1.641
Service workers	Managers (catering and lodging services)	271	2.476	2.747
	Working proprietors (catering and lodging services)	4.201	69.985	74.186
	Housekeeping and related service supervisors	158	1.768	1.926
	Cooks, waiters, bartenders and related workers	4.641	107.993	112.634
	Maids and related workers	11.565	17.358	28.923
	Building caretakers, char workers, cleaners and related workers	15.948	112.868	128.816
	Launderers, dry cleaners and pressers	1.837	5.478	7.315
	Hairdressers, barbers, beauticians and related workers	4.545	58.277	62.822
	Protective service workers	1.427	97.064	98.491
	Service workers n.e.c.	2.607	36.919	39.526
Agricultural, animal husbandry, forestry workers,	Farm managers and supervisors	4.018	4.797	8.815
fishermen and hunters	Farmers	4.970.818	4.578.592	9.549.410
	Agricultural and animal husbandry workers	175.047	330.788	505.835
	Forestry workers	2.751	19.685	22.436
	Fishermen, hunters and related workers	0	15.362	15.362
Craftsmen, production process workers	Production supervisors and general foremen	537	7.332	7.869
and laborers (nonagricultural)	Miners, quarrymen, well drillers and related workers	769	80.028	80.797
	Metal processers	568	28.606	29.174
	Wood preparation workers and paper makers	917	17.443	18.360
	Chemical processers and related workers	226	6.796	7.022
	Spinners, weavers, knitters, dyers and related workers	96.402	92.503	188.905
	Tanners, fell mongers and pelt dressers	347	4.727	5.074
	Food and beverage processers	8.466	134.318	142.784

Table A.2 (continued): Total number of workers by gender, 1970.

Craftsmen, production process workers and laborers (nonagricultural)	Tobacco preparers and tobacco product makers	11.149	12.574	23.723
	Tailors, dressmakers, sewers, upholsterers and related workers	130.139	124.944	255.083
	Shoemakers and leather goods makers	1.993	71.848	73.841
	Cabinet makers and related wood workers	2.276	125.751	128.027
	Stone cutters and carvers	0	4.671	4.671
	Blacksmiths, toolmakers and machine tool operators	3.180	124.952	128.132
	Machinery, fitters machine assemblers and precision instrument makers (except electrical)	0	81.578	81.578
	Electrical fitters and related electrical and electronics workers	2.213	62.682	64.895
	Broadcasting station and sound equipment operators and cinema projectionists	78	2.016	2.094
	Plumbers, welders, sheet metal and structural metal preparers and erectors	28	85.492	85.520
	Jewellery and precious metal workers	348	9.172	9.520
	Glass formers, potters and related workers	2.202	28.282	30.484
	Workers in occupations unidentified or not reported	116.366	1.526.018	1.642.384
	TOTAL	5.812.545	9.306.342	15.118.887

Table A.3 : Total number of workers by gender, 1975.

Major groups (One-digit classification)	Minor Groups (Two-digit classification)	Female	Male	Total
Scientific, technical, professional,	Physicists, chemists and related workers	1.399	3.091	4.490
and related workers	Architects, engineers and related technicians	9.397	107.185	116.582
	Aircraft and ships officers	169	4.002	4.171
	Life scientists and related technicians	174	593	767
	Medical, dental, veterinary and related workers	38.110	52.358	90.468
	Statisticians, mathematicians, systems analysts and related technicians	231	1.561	1.792
	Economists	1.637	6.020	7.657
	Financial counselors and accountants	3.840	20.744	24.584
	Jurists	4.296	20.838	25.134
	Teachers	105.954	175.640	281.594
	Workers in religion	831	36.696	37.527
	Authors, journalists and related writers	947	5.834	6.781
	Sculptors, painters, photographers and related creative artists	1.779	13.361	15.140
	Composers and performing artists	2.980	10.841	13.821
	Athletes, sportsmen and related workers	263	3.556	3.819
	Professional, technical and related workers n.e.c.	1.207	5.412	6.619
Administrative and managerial workers	Legislative officials and government administrators	2.422	27.740	30.162
	Managers	1.969	43.551	45.520
Clerical and related workers	Clerical supervisors	2.924	9.373	12.297
	Government executive officials	71.955	261.681	333.636
	Stenographers, typists and card and tape punching machine operators	22.387	23.323	45.710
	Bookkeepers, cashiers and related workers	27.081	68.345	95.426
	Computing machine operators	1.165	2.910	4.075
	Transport and communications supervisors	210	1.486	1.696
	Transport conductors	13	4.939	4.952
	Mail distribution clerks	1.326	10.020	11.346
	Telephone and telegraph operators	3.206	4.211	7.417
	Clerical and related workers n.e.c.	2.743	14.533	17.276

Table A.3 (continued): Total number of workers by gender, 1975.

Commercial and sales workers	Managers (wholesale and retail trade)	865	3.254	4.119
	Working proprietors	14.317	375.626	389.943
	Sales supervisors and buyers	103	774	877
	Technical salesmen, commercial travelers and manufacturers agents	11.821	54.643	66.464
	Insurance, real estate securities and business services, salesmen and auctioneers	1.137	10.670	11.807
	Salesmen, shop assistants and demonstrators	5.184	90.569	95.753
	Sales workers n.e.c.	112	781	893
Service workers	Administrators of hotels, cafes, place for gambling, restaurants, casino, pastry-shop, cinema, theatre and related	240	898	1.138
	Administrative and managerial owners of hotel, cafe, place for gambling, restaurant, casino, pastry-shop, cinema, theatre and related	2.854	92.268	95.122
	Housekeeping and related service supervisors	128	1.139	1.267
	Cooks, waiters, bartenders and related workers	6.248	108.441	114.689
	Maids and related workers	13.699	18.613	32.312
	Building caretakers, char workers, cleaners and related workers	17.246	105.454	122.700
	Launderers, dry cleaners and pressers	2.751	5.255	8.006
	Hairdressers, barbers, beauticians and related workers	6.922	51.136	58.058
	Protective service workers	2.843	130.972	133.815
	Service workers n.e.c.	2.651	13.844	16.495
Agricultural, animal husbandry, forestry	Farm managers and supervisors	502	940	1.442
workers, fishermen and hunters	Farmers	5.332.696	5.657.211	10.989.907
	Agricultural and animal husbandry workers	94.654	216.394	311.048
	Forestry workers	1.432	13.932	15.364
	Fishermen, hunters and related workers	756	16.406	17.162
Nonagricultural production and related workers,	Production supervisors and general foremen	202	3.995	4.197
transport equipment operators and laborers	Miners, quarrymen, well drillers and related workers	303	85.336	85.639
	Metal processers	75	42.509	42.584

Table A.3 (continued): Total number of workers by gender, 1975.

Nonagricultural production and related workers, transport equipment operators and laborers	Wood preparation workers and paper makers	1.442	17.912	19.354
	Chemical processers and related workers	656	8.561	9.217
	Spinners, weavers, knitters, dyers and related workers	96.733	103.005	199.738
	Tanners, fell mongers and pelt dressers	250	4.089	4.339
	Food and beverage processers	12.960	153.744	166.704
	Tobacco preparers and tobacco product makers	12.137	12.000	24.137
	Tailors, dressmakers, sewers, upholsterers and related workers	63.662	101.395	165.057
	Shoemakers and leather goods makers	2.657	79.584	82.241
	Cabinet makers and related wood workers	1.676	195.936	197.612
	Stone cutters and carvers	6	4.826	4.832
	Blacksmiths, toolmakers and machine tool operators	5.942	173.340	179.282
	Machinery, fitters machine assemblers and precision instrument makers (except electrical)	3.570	120.255	123.825
	Electrical fitters and related electrical and electronics workers	8.334	91.206	99.540
	Broadcasting station and sound equipment operators and cinema projectionists	762	2.404	3.166
	Plumbers, welders, sheet metal and structural metal preparers and erectors	2.861	119.547	122.408
	Jewellery and precious metal workers	1.413	14.235	15.648
	Glass formers, potters and related workers	2.899	32.363	35.262
	Plastic and rubber material workers	1.714	14.345	16.059
	Paper, paper-board and binding material workers	600	2.264	2.864
	Compositors, printers, binders and related workers	4.186	21.042	25.228
	House painters and white washers	336	49.902	50.238
	Production and related workers n.e.c.	28.267	151.615	179.882
	Master builder, carpenter and other construction workers	491	447.160	447.651
	Fixed installment machinery operators	506	6.019	6.525
	Loading and unloading workers and construction equipment operators	501	32.028	32.529
	Transport equipment operators	2.855	464.978	467.833
	Unskilled workers n.e.c and occupation not classifiable or not reported	116.550	714.847	831.397
	TOTAL	6.204.322	11.179.506	17.383.828

Table A.4 : Total number of workers by gender, 1980.

Major groups (One-digit classification)	Minor groups (Two-digit classification)	Female	Male	Total
Scientific, technical, professional,	Physicists, chemists and related workers	1.127	2.377	3.504
and related workers	Architects, engineers and related technicians	10.109	126.839	136.948
	Aircraft and ships officers	17	1.757	1.774
	Life scientists and related technicians	297	375	672
	Medical, dental, veterinary and related workers	63.846	82.841	146.687
	Statisticians, mathematicians, systems analysts and related technicians	518	1.027	1.545
	Economists	586	2.497	3.083
	Financial counselors and accountants	9.358	18.485	27.843
	Jurists	4.644	22.477	27.121
	Teachers	146.177	232.781	378.958
	Workers in religion	1.062	47.441	48.503
	Authors, journalists and related writers	843	3.853	4.696
	Sculptors, painters, photographers and related creative artists	5.540	16.864	22.404
	Composers and performing artists	3.323	11.840	15.163
	Athletes, sportsmen and related workers	84	3.106	3.190
	Professional, technical and related workers n.e.c.	7.071	10.743	17.814
Administrative and managerial workers	Legislative officials and government administrators	4.270	49.426	53.696
	Managers	4.215	99.936	104.151
Clerical and related workers	Clerical supervisors	21.923	29.558	51.481
	Government executive officials	59.993	152.003	211.996
	Stenographers, typists and card and tape punching machine operators	45.516	31.521	77.037
	Bookkeepers, cashiers and related workers	58.803	143.231	202.034
	Computing machine operators	571	467	1.038
	Transport and communications supervisors	74	1.731	1.805
	Transport conductors	0	5.498	5.498
	Mail distribution clerks	514	12.624	13.138
	Telephone and telegraph operators	11.413	12.716	24.129
	Clerical and related workers n.e.c.	12.008	49.081	61.089
Commercial and sales workers	Managers (wholesale and retail trade)	783	5.460	6.243
	Working proprietors	12.156	457.650	469.806
	Sales supervisors and buyers	294	3.768	4.062

Table A.4 (continued): Total number of workers by gender, 1980.

Commercial and sales workers	Technical salesmen, commercial travelers and manufacturers agents	15.164	132.975	148.139
	Insurance, real estate securities and business services, salesmen and auctioneers	2.640	23.387	26.027
	Salesmen, shop assistants and demonstrators	2.974	131.747	134.721
	Sales workers n.e.c.	271	2.295	2.566
Service workers	Administrators of hotels, cafes, place for gambling, restaurants, casino, pastry-shop, cinema, theatre and related	257	2.503	2.760
	Administrative and managerial owners of hotel, cafe, place for gambling, restaurant, casino, pastry-shop, cinema, theatre and related	1.094	90.923	92.017
	Housekeeping and related service supervisors	6	572	578
	Cooks, waiters, bartenders and related workers	6.776	171.757	178.533
	Maids and related workers	13.467	16.689	30.156
	Building caretakers, char workers, cleaners and related workers	31.102	286.248	317.350
	Launderers, dry cleaners and pressers	2.004	7.771	9.775
	Hairdressers, barbers, beauticians and related workers	6.770	43.161	49.931
	Protective service workers	2.321	208.574	210.895
	Service workers n.e.c.	2.824	18.328	21.152
Agricultural, animal husbandry, forestry workers,	Farm managers and supervisors	153	672	825
fishermen and hunters	Farmers	5.741.942	4.770.083	10.512.025
	Agricultural and animal husbandry workers	185.171	286.712	471.883
	Forestry workers	4.435	46.453	50.888
	Fishermen, hunters and related workers	372	19.225	19.597
Nonagricultural production and related workers,	Production supervisors and general foremen	431	18.242	18.673
transport equipment operators and laborers	Miners, quarrymen, well drillers and related workers	0	97.821	97.821
	Metal processers	0	58.735	58.735
	Wood preparation workers and paper makers	851	26.420	27.271
	Chemical processers and related workers	148	11.653	11.801
	Spinners, weavers, knitters, dyers and related workers	140.440	139.693	280.133

Table A.4 (continued): Total number of workers by gender, 1980.

Nonagricultural production and related workers,	Tanners, fell mongers and pelt dressers	580	7.117	7.697
transport equipment operators and laborers	Food and beverage processers	15.607	210.677	226.284
	Tobacco preparers and tobacco product makers	28.200	23.954	52.154
	Tailors, dressmakers, sewers, upholsterers and related workers	43.288	138.352	181.640
	Shoemakers and leather goods makers	1.853	84.359	86.212
	Cabinet makers and related wood workers	3.134	200.787	203.921
	Stone cutters and carvers	0	6.039	6.039
	Blacksmiths, toolmakers and machine tool operators	4.438	192.074	196.512
	Machinery, fitters machine assemblers and precision instrument makers (except electrical)	3.396	221.924	225.320
	Electrical fitters and related electrical and electronics workers	5.249	131.963	137.212
	Broadcasting station and sound equipment operators and cinema projectionists	25	1.251	1.276
	Plumbers, welders, sheet metal and structural metal preparers and erectors	698	130.900	131.598
	Jewellery and precious metal workers	161	9.632	9.793
	Glass formers, potters and related workers	6.522	64.461	70.983
	Plastic and rubber material workers	2.661	31.873	34.534
	Paper, paper-board and binding material workers	478	2.920	3.398
	Compositors, printers, binders and related workers	977	23.746	24.723
	House painters and white washers	0	68.982	68.982
	Production and related workers n.e.c.	12.446	74.589	87.035
	Master builder, carpenter and other construction workers	3.390	583.575	586.965
	Fixed installment machinery operators	228	9.560	9.788
	Loading and unloading workers and construction equipment operators	218	77.520	77.738
	Transport equipment operators	3.081	521.184	524.265
	Unskilled workers n.e.c and occupation not classifiable or not reported	26.880	607.294	634.174
	Unknown	1.251	31.468	32.719
	TOTAL	6.813.509	11.708.813	18.522.322

Table A.5 : Total number of workers by gender, 1985.

Major groups (One-digit classification)	Minor groups (Two-digit classification)	Female	Male	Total
Scientific, technical, professional,	Physicists, chemists and related workers	849	2.115	2.964
and related workers	Architects, engineers and related technicians	17.788	185.585	203.373
	Aircraft and ships officers	19	2.268	2.287
	Life scientists and related technicians	577	551	1.128
	Medical, dental, veterinary and related workers	84.484	93.728	178.212
	Statisticians, mathematicians, systems analysts	1.406	2.013	3.419
	and related technicians			
	Economists	999	3.257	4.256
	Financial counselors and accountants	8.524	39.406	47.930
	Jurists	5.825	23.889	29.714
	Teachers	164.494	250.790	415.284
	Workers in religion	1.364	53.624	54.988
	Authors, journalists and related writers	1.245	5.317	6.562
	Sculptors, painters, photographers and related creative artists	2.963	22.839	25.802
	Composers and performing artists	3.235	12.899	16.134
	Athletes, sportsmen and related workers	225	5.543	5.768
	Professional, technical and related workers n.e.c.	3.867	10.017	13.884
Administrative and managerial workers	Legislative officials and government administrators	3.818	43.751	47.569
	Managers	6.304	114.197	120.501
Clerical and related workers	Clerical supervisors	9.369	24.044	33.413
	Government executive officials	72.693	184.738	257.431
	Stenographers, typists and card and tape punching	61.692	43.283	104.975
	machine operators			
	Bookkeepers, cashiers and related workers	68.715	165.095	233.810
	Computing machine operators	2.155	1.422	3.577
	Transport and communications supervisors	82	1.098	1.180
	Transport conductors	0	2.238	2.238
	Mail distribution clerks	770	12.511	13.281
	Telephone and telegraph operators	11.131	13.084	24.215
	Clerical and related workers n.e.c.	9.759	48.202	57.961
Commercial and sales workers	Managers (wholesale and retail trade)	896	6.713	7.609
	Working proprietors	21.003	549.300	570.303
	Sales supervisors and buyers	340	3.594	3.934

Table A.5 (continued): Total number of workers by gender, 1985.

Commercial and sales workers	Technical salesmen, commercial travelers and manufacturers agents	29.069	218.078	247.147
	Insurance, real estate securities and business services, salesmen and auctioneers	2.014	14.298	16.312
	Salesmen, shop assistants and demonstrators	3.100	127.814	130.914
	Sales workers n.e.c.	92	1.253	1.345
Service workers	Administrators of hotels, cafes, place for gambling, restaurants, casino, pastry-shop, cinema, theatre and related	232	3.359	3.591
	Administrative and managerial owners of hotel, cafe, place for gambling, restaurant, casino, pastry-shop, cinema, theatre and related	1.746	108.184	109.930
	Housekeeping and related service supervisors	117	215	332
	Cooks, waiters, bartenders and related workers	10.215	226.236	236.451
	Maids and related workers	17.420	20.415	37.835
	Building caretakers, char workers, cleaners and related workers	36.964	326.023	362.987
	Launderers, dry cleaners and pressers	1.946	9.719	11.665
	Hairdressers, barbers, beauticians and related workers	12.592	60.956	73.548
	Protective service workers	3.129	251.706	254.835
	Service workers n.e.c.	3.603	16.341	19.944
Agricultural, animal husbandry, forestry workers,	Farm managers and supervisors	23	330	353
fishermen and hunters	Farmers	6.227.813	5.230.580	11.458.393
	Agricultural and animal husbandry workers	181.501	284.090	465.591
	Forestry workers	5.492	29.988	35.480
	Fishermen, hunters and related workers	434	21.839	22.273
Nonagricultural production and related workers,	Production supervisors and general foremen	1.474	21.543	23.017
transport equipment operators and laborers	Miners, quarrymen, well drillers and related workers	20	106.299	106.319
	Metal processers	0	59.023	59.023
	Wood preparation workers and paper makers	1.041	26.313	27.354
	Chemical processers and related workers	305	13.757	14.062
	Spinners, weavers, knitters, dyers and related workers	133.314	171.378	304.692

Table A.5 (continued): Total number of workers by gender, 1985.

Nonagricultural production and related workers,	Tanners, fell mongers and pelt dressers	1.259	11.767	13.026
transport equipment operators and laborers	Food and beverage processers	19.059	245.473	264.532
	Tobacco preparers and tobacco product makers	16.646	18.960	35.606
	Tailors, dressmakers, sewers, upholsterers and related workers	74.992	177.619	252.611
	Shoemakers and leather goods makers	2.869	99.929	102.798
	Cabinet makers and related wood workers	3.907	220.982	224.889
	Stone cutters and carvers	204	9.098	9.302
	Blacksmiths, toolmakers and machine tool operators	6.583	228.914	235.497
	Machinery, fitters machine assemblers and precision instrument makers (except electrical)	4.554	256.279	260.833
	Electrical fitters and related electrical and electronics workers	6.729	149.957	156.686
	Broadcasting station and sound equipment operators and cinema projectionists	49	1.112	1.161
	Plumbers, welders, sheet metal and structural metal preparers and erectors	1.638	145.072	146.710
	Jewellery and precious metal workers	489	21.675	22.164
	Glass formers, potters and related workers	5.907	62.221	68.128
	Plastic and rubber material workers	2.672	35.627	38.299
	Paper, paper-board and binding material workers	334	2.164	2.498
	Compositors, printers, binders and related workers	1.581	31.017	32.598
	House painters and white washers	0	77.089	77.089
	Production and related workers n.e.c.	10.215	55.754	65.969
	Master builder, carpenter and other construction workers	4.380	549.727	554.107
	Fixed installment machinery operators	170	7.903	8.073
	Loading and unloading workers and construction equipment operators	264	75.345	75.609
	Transport equipment operators	4.454	592.832	597.286
	Unskilled workers n.e.c and workers not classifiable by occupation or not reporting any occupation	83.049	704.264	787.313
	Unknown	482	6.425	6.907
	TOTAL	7.492.733	13.064.053	20.556.786

Table A.6 : Total number of workers by gender, 1990.

Major groups (One-digit classification)	Minor groups (Two-digit classification)	Female	Male	Total
Scientific, technical, professional,	Physicists, chemists and related workers	1.352	3.020	4.372
and related workers	Architects, engineers and related technicians	29.871	250.777	280.648
	Aircraft and ships officers	37	4.374	4.411
	Life scientists and related technicians	1.282	1.013	2.295
	Medical, dental, veterinary and related workers	118.229	109.570	227.799
	Statisticians, mathematicians, systems analysts and related technicians	3.779	4.771	8.550
	Economists	1.265	3.101	4.366
	Financial counselors and accountants	15.974	45.646	61.620
	Jurists	8.226	26.909	35.135
	Teachers	201.198	290.163	491.361
	Workers in religion	1.845	67.927	69.772
	Authors, journalists and related writers	2.249	8.635	10.884
	Sculptors, painters, photographers and related creative artists	5.982	28.179	34.161
	Composers and performing artists	4.627	17.136	21.763
	Athletes, sportsmen and related workers	530	9.330	9.860
	Professional, technical and related workers n.e.c.	4.712	10.190	14.902
Administrative and managerial workers	Legislative officials and government administrators	6.201	53.066	59.267
	Managers	10.866	165.508	176.374
Clerical and related workers	Clerical supervisors	9.447	24.291	33.738
	Government executive officials	97.747	254.214	351.961
	Stenographers, typists and card and tape punching machine operators	89.541	61.338	150.879
	Bookkeepers, cashiers and related workers	96.755	207.294	304.049
	Computing machine operators	9.016	7.352	16.368
	Transport and communications supervisors	272	1.611	1.883
	Transport conductors	0	2.492	2.492
	Mail distribution clerks	944	15.225	16.169
	Telephone and telegraph operators	9.267	12.573	21.840
	Clerical and related workers n.e.c.	10.891	48.359	59.250
Commercial and sales workers	Managers (wholesale and retail trade)	2.575	13.146	15.721
	Working proprietors	26.497	680.201	706.698
	Sales supervisors and buyers	564	4.007	4.571

Table A.6 (continued): Total number of workers by gender, 1990.

Commercial and sales workers	Technical salesmen, commercial travelers and manufacturers agents	53.283	329.530	382.813
	Insurance, real estate securities and business services, salesmen and auctioneers	6.478	30.149	36.627
	Salesmen, shop assistants and demonstrators	4.905	157.274	162.179
	Sales workers n.e.c.	172	1.308	1.480
Service workers	Administrators of hotels, cafes, place for gambling, restaurants, casino, pastry-shop, cinema, theatre and related	988	7.131	8.119
	Administrative and managerial owners of hotel, cafe, place for gambling, restaurant, casino, pastry-shop, cinema, theatre and related	2.618	127.261	129.879
	Housekeeping and related service supervisors	63	418	481
	Cooks, waiters, bartenders and related workers	21.080	313.006	334.086
	Maids and related workers	22.337	25.233	47.570
	Building caretakers, char workers, cleaners and related workers	54.201	430.677	484.878
	Launderers, dry cleaners and pressers	2.333	11.871	14.204
	Hairdressers, barbers, beauticians and related workers	21.622	90.606	112.228
	Protective service workers	4.422	276.622	281.044
	Service workers n.e.c.	3.769	13.933	17.702
Agricultural, animal husbandry, forestry workers, fishermen and hunters	Farm managers and supervisors	25	166	191
	Farmers	6.702.336	5.294.433	11.996.769
	Agricultural and animal husbandry workers	192.227	286.495	478.722
	Forestry workers	4.130	26.629	30.759
	Fishermen, hunters and related workers	385	21.254	21.639
Nonagricultural production and related workers, transport equipment operators and laborers	Production supervisors and general foremen	5.246	28.660	33.906
	Miners, quarrymen, well drillers and related workers	48	100.944	100.992
	Metal processers	0	59.854	59.854
	Wood preparation workers and paper makers	1.773	23.479	25.252
	Chemical processers and related workers	365	15.118	15.483
	Spinners, weavers, knitters, dyers and related workers	206.178	204.403	410.581

Table A.6 (continued): Total number of workers by gender, 1990.

Nonagricultural production and related workers,	Tanners, fell mongers and pelt dressers	2.329	13.421	15.750
transport equipment operators and laborers	Food and beverage processers	26.851	257.490	284.341
	Tobacco preparers and tobacco product makers	11.952	17.468	29.420
	Tailors, dressmakers, sewers, upholsterers and related workers	189.978	258.313	448.291
	Shoemakers and leather goods makers	4.234	108.358	112.592
	Cabinet makers and related wood workers	4.941	284.269	289.210
	Stone cutters and carvers	467	23.284	23.751
	Blacksmiths, toolmakers and machine tool operators	7.294	257.435	264.729
	Machinery, fitters machine assemblers and precision instrument makers (except electrical)	5.591	315.217	320.808
	Electrical fitters and related electrical and electronics workers	9.079	190.107	199.186
	Broadcasting station and sound equipment operators and cinema projectionists	51	600	651
	Plumbers, welders, sheet metal and structural metal preparers and erectors	1.796	163.631	165.427
	Jewellery and precious metal workers	930	32.038	32.968
	Glass formers, potters and related workers	7.931	68.676	76.607
	Plastic and rubber material workers	3.741	42.275	46.016
	Paper, paper-board and binding material workers	635	3.390	4.025
	Compositors, printers, binders and related workers	2.593	41.062	43.655
	House painters and white washers	0	99.211	99.211
	Production and related workers n.e.c.	14.602	69.613	84.215
	Master builder, carpenter and other construction workers	7.592	927.518	935.110
	Fixed installment machinery operators	332	8.573	8.905
	Loading and unloading workers and construction equipment operators	246	68.439	68.685
	Transport equipment operators	4.200	750.255	754.455
	Unskilled workers n.e.c and occupation not classifiable or not reported	17.679	659.916	677.595
	Unknown	645	5.048	5.693
	TOTAL	8.408.414	14.973.479	23.381.893

Table A.7 : Total number of workers by gender, 2000.

Major groups (One-digit classification)	Minor Groups (Two-digit classification)	Female	Male	Total
Scientific, technical, professional,	Physicists, chemists and related workers	4.835	12.575	17.410
and related workers	Architects, engineers and related technicians	64.891	386.379	451.270
	Aircraft and ships officers	300	4.771	5.071
	Life scientists and related technicians	2.547	2.176	4.723
	Medical, dental, veterinary and related workers	204.926	176.508	381.434
	Statisticians, mathematicians, systems analysts and related technicians	6.049	12.730	18.779
	Economists	3.059	6.430	9.489
	Financial counselors and accountants	18.926	50.031	68.957
	Jurists	14.794	38.722	53.516
	Teachers	291.056	391.454	682.510
	Workers in religion	2.454	69.730	72.184
	Authors, journalists and related writers	15.482	19.141	34.623
	Sculptors, painters, photographers and related creative artists	3.957	27.298	31.255
	Composers and performing artists	10.320	25.709	36.029
	Athletes, sportsmen and related workers	1.349	13.464	14.813
	Professional, technical and related workers n.e.c.	8.090	11.586	19.676
Administrative and managerial workers	Legislative officials and government administrators	12.810	71.569	84.379
	Managers	23.318	258.649	281.967
Clerical and related workers	Clerical supervisors	13.107	22.002	35.109
	Government executive officials	71.862	170.245	242.107
	Stenographers, typists and card and tape punching machine operators	119.482	44.415	163.897
	Bookkeepers, cashiers and related workers	241.568	340.732	582.300
	Computing machine operators	28.481	36.180	64.661
	Transport and communications supervisors	1.080	3.815	4.895
	Transport conductors	35	903	938
	Mail distribution clerks	3.311	23.672	26.983
	Telephone and telegraph operators	9.200	15.262	24.462
	Clerical and related workers n.e.c.	120.736	277.411	398.147
Commercial and sales workers	Managers (wholesale and retail trade)	15.866	48.840	64.706
	Working proprietors	43.160	696.606	739.766
	Sales supervisors and buyers	4.228	12.911	17.139

Table A.7 (continued): Total number of workers by gender, 2000.

Commercial and sales workers	Technical salesmen, commercial travelers and manufacturers agents	120.949	409.253	530.202
	Insurance, real estate securities and business services, salesmen and auctioneers	24.972	63.312	88.284
	Salesmen, shop assistants and demonstrators	7.888	154.652	162.540
	Sales workers n.e.c.	146	530	676
Service workers	Administrators of hotels, cafes, place for gambling, restaurants, casino, pastry-shop, cinema, theatre and related	5.670	19.851	25.521
	Administrative and managerial owners of hotel, cafe, place for gambling, restaurant, casino, pastry-shop, cinema, theatre and related	7.115	144.778	151.893
	Housekeeping and related service supervisors	4	303	307
	Cooks, waiters, bartenders and related workers	61.450	409.031	470.481
	Maids and related workers	83.018	105.227	188.245
	Building caretakers, char workers, cleaners and related workers	43.657	230.974	274.631
	Launderers, dry cleaners and pressers	6.146	22.688	28.834
	Hairdressers, barbers, beauticians and related workers	37.265	124.881	162.146
	Protective service workers	15.427	596.848	612.275
	Service workers n.e.c.	3.725	21.344	25.069
Agricultural, animal husbandry, forestry workers, fishermen and hunters	Farm managers and supervisors	29	260	289
	Farmers	6.992.202	5.167.512	12.159.714
	Agricultural and animal husbandry workers	140.028	260.160	400.188
	Forestry workers	1.080	13.175	14.255
	Fishermen, hunters and related workers	312	18.292	18.604
Nonagricultural production and related workers, transport equipment operators and laborers	Production supervisors and general foremen	5.062	28.303	33.365
	Miners, quarrymen, well drillers and related workers	456	53.847	54.303
	Metal processers	751	38.191	38.942
	Wood preparation workers and paper makers	896	22.995	23.891
	Chemical processers and related workers	360	11.253	11.613
	Spinners, weavers, knitters, dyers and related workers	115.770	238.837	354.607

Table A.7 (continued): Total number of workers by gender, 2000.

Nonagricultural production and related workers,	Tanners, fell mongers and pelt dressers	2.015	13.105	15.120
transport equipment operators and laborers	Food and beverage processers	26.736	271.364	298.100
	Tobacco preparers and tobacco product makers	5.582	12.516	18.098
	Tailors, dressmakers, sewers, upholsterers and related workers	242.414	381.662	624.076
	Shoemakers and leather goods makers	6.219	112.898	119.117
	Cabinet makers and related wood workers	4.276	254.473	258.749
	Stone cutters and carvers	649	41.807	42.456
	Blacksmiths, toolmakers and machine tool operators	7.778	261.727	269.505
	Machinery, fitters machine assemblers and precision instrument makers	6.364	301.401	307.765
	(except electrical)			
	Electrical fitters and related electrical and electronics workers	12.385	257.658	270.043
	Broadcasting station and sound equipment operators and cinema projectionists	396	1.860	2.256
	Plumbers, welders, sheet metal and structural metal preparers and erectors	5.279	257.998	263.277
	Jewellery and precious metal workers	2.283	46.879	49.162
	Glass formers, potters and related workers	6.240	59.483	65.723
	Plastic and rubber material workers	4.986	87.387	92.373
	Paper, paper-board and binding material workers	440	3.556	3.996
	Compositors, printers, binders and related workers	3.909	47.998	51.907
	House painters and white washers	832	129.692	130.524
	Production and related workers n.e.c.	2.974	20.164	23.138
	Master builder, carpenter and other construction workers	5.651	831.455	837.106
	Fixed installment machinery operators	753	45.608	46.361
	Loading and unloading workers and construction equipment operators	3.329	138.121	141.450
	Transport equipment operators	6.404	801.238	807.642
	Unskilled workers n.e.c and occupation not classifiable or not reported	34.367	744.454	778.821
	Unknown	1.818	14.488	16.306
	TOTAL	9.429.736	16.567.405	25.997.141

Table A.8 : Total number of workers by gender, 2001 – 2010.

Major groups (One-digit classification)		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Legislators, senior officials	Male	1.556.284	1.592.575	1.691.691	1.691.578	1.960.315	1.824.215	1.635.302	1.634.845	1.620.589	1.656.076
and managers	Female	137.086	118.461	113.594	121.011	148.351	156.263	156.093	182.561	186.851	186.483
	Total	1.693.370	1.711.036	1.805.285	1.812.589	2.108.666	1.980.478	1.791.395	1.817.406	1.807.440	1.842.559
Professionals	Male	822.540	874.565	934.713	886.428	862.674	873.671	806.801	792.346	787.657	964.209
	Female	410.116	441.977	442.507	424.596	469.757	510.173	513.609	521.733	594.007	630.461
	Total	1.232.656	1.316.542	1.377.220	1.311.024	1.332.431	1.383.844	1.320.410	1.314.079	1.381.664	1.594.670
Technicians and associate	Male	732.880	734.377	759.021	751.612	911.920	988.169	985.497	1.032.139	916.114	902.792
professionals	Female	315.682	299.212	299.995	308.806	364.663	408.514	412.745	471.172	436.456	435.132
	Total	1.048.562	1.033.589	1.059.016	1.060.418	1.276.583	1.396.683	1.398.242	1.503.311	1.352.570	1.337.924
Clerks	Male	620.482	713.976	715.903	693.535	738.079	819.703	764.215	817.847	800.026	870.746
	Female	329.726	424.837	477.835	419.901	447.207	499.633	557.107	584.191	601.062	660.734
	Total	950.208	1.138.813	1.193.738	1.113.436	1.185.286	1.319.336	1.321.322	1.402.038	1.401.088	1.531.480
Service workers and shop	Male	1.658.495	1.823.397	1.819.948	1.835.256	1.855.342	2.043.955	2.030.993	1.993.040	2.042.113	2.110.948
and market sales workers	Female	260.025	338.882	348.702	351.187	404.172	482.145	521.525	545.600	590.858	631.201
	Total	1.918.520	2.162.279	2.168.650	2.186.443	2.259.514	2.526.100	2.552.518	2.538.640	2.632.971	2.742.149
Skilled agricultural and	Male	3.702.073	3.142.316	3.125.924	3.295.529	2.817.301	2.542.802	2.008.171	2.037.522	2.150.515	2.286.849
fishery workers	Female	3.418.757	3.064.107	3.057.914	2.599.959	2.351.539	2.125.070	1.663.261	1.663.935	1.721.423	1.963.977
	Total	7.120.830	6.206.423	6.183.838	5.895.488	5.168.840	4.667.872	3.671.432	3.701.457	3.871.938	4.250.826
Craft and related workers	Male	2.896.668	2.649.633	2.586.084	2.648.861	2.832.257	2.833.636	2.744.541	2.719.101	2.531.896	2.688.979
	Female	387.207	414.738	344.175	347.100	347.610	331.273	280.595	284.095	333.797	373.339
	Total	3.283.875	3.064.371	2.930.259	2.995.961	3.179.867	3.164.909	3.025.136	3.003.196	2.865.693	3.062.318
Plant and machine operators	Male	1.590.297	1.623.036	1.636.087	1.913.152	2.027.427	2.106.896	2.077.345	2.067.441	1.870.425	2.094.846
and assemblers	Female	118.535	136.509	160.698	188.163	219.137	223.605	229.844	207.112	182.691	231.706
	Total	1.708.832	1.759.545	1.796.785	2.101.315	2.246.564	2.330.501	2.307.189	2.274.553	2.053.116	2.326.552
Elemantary occupations	Male	1.470.256	1.622.014	1.535.855	1.827.850	1.881.183	2.066.326	1.945.970	2.097.573	2.185.653	2.170.259
	Female	341.478	644.925	422.475	811.684	772.568	919.754	869.399	979.189	1.060.829	1.145.795
	Total	1.811.734	2.266.939	1.958.330	2.639.534	2.653.751	2.986.080	2.815.369	3.076.762	3.246.482	3.316.054
TOTAL	Male	15.049.975	14.775.889	14.805.226	15.543.801	15.886.498	16.099.373	14.998.835	15.191.854	14.904.988	15.745.704
	Female	5.718.612	5.883.648	5.667.895	5.572.407	5.525.004	5.656.430	5.204.178	5.439.588	5.707.974	6.258.828
	Total	20.768.587	20.659.537	20.473.121	21.116.208	21.411.502	21.755.803	20.203.013	20.631.442	20.612.962	22.004.532

Table A.9 : Female share in each age group by years, 2001 – 2010.

	Age Groups			
	15-29	30-44	45-64	Overall
2001	0,307	0,244	0,277	0,275
2002	0,319	0,250	0,290	0,285
2003	0,311	0,245	0,282	0,277
2004	0,296	0,237	0,264	0,264
2005	0,288	0,235	0,256	0,258
2006	0,290	0,240	0,254	0,260
2007	0,292	0,236	0,247	0,258
2008	0,298	0,243	0,252	0,264
2009	0,309	0,261	0,263	0,277
2010	0,314	0,271	0,271	0,284

Table A.10 : Number of total employment in each age group, 2001 – 2010.

	Age Groups		
	15-29	30-44	45-64
2001	7.965.109	8.311.897	4.491.581
2002	7.675.449	8.433.572	4.550.516
2003	7.321.402	8.633.678	4.518.041
2004	7.459.460	8.946.548	4.710.200
2005	7.459.658	9.185.631	4.766.213
2006	7.391.043	9.512.620	4.852.140
2007	6.872.660	8.745.347	4.585.006
2008	6.935.321	8.911.925	4.784.196
2009	6.633.493	8.989.581	4.989.888
2010	6.919.024	9.673.505	5.412.003

CURRICULUM VITAE

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