

Workplace segregation among employed with immigrant background versus natives in firms in Norway

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Abstract: This paper describes analysis of workplace segregation among employed with immigrant background versus natives in Norway. With political ambitions to achieve an improved integration of immigrants in the society through lower segregation relatively to natives, we investigate how the segregation at workplaces has evolved in a period from 2005 to 2015.

Immigrants' participation in work is considered an important factor to be as integrated as possible in the society. However, participation in working life may reflect a necessary, but not necessarily a sufficient, condition for immigrants to be better integrated into a society. High or increasing accumulation of immigrants in firms in some industries and regions does not necessarily reflect increased integration but may have segregating effects despite a working relationship.

We thus raise questions about the degree of homo- and heterogeneity in the composition of the workforce in the firms, how this composition has evolved and whether we can observe an increasing or decreasing workplace segregation among employed with immigrant background? Initially, all firms in Norway are examined, but then specified to firms with both foreign and native employment, by their size, industrial affiliation and regional localization. Employed immigrants are further specified by selected characteristics as gender, age, level of education, country background as well as their duration of residence in the host country.

As a methodological basis we use individual matched employer-employee data covering the entire employment to investigate how workplace segregation has evolved between selected years. We use different methods for analyzing the detailed data, but with most focuses on the D index, the dissimilarity index, and in particularly cases also the Gini coefficient.

Preliminary results indicate a decline of workplace segregation when employed in all firms are included. Despite an increase of firms with only immigrant workers, an even stronger decrease in the number of firms with only native employed may reflect this finding. However, when the analysis is specified to firms that have both foreign and native employed, the workplace segregation increases. Furthermore, male immigrants show higher workplace segregation than female immigrants, segregation falls with increasing educational level and with increasing duration of residence. Industries such as construction and business services contribute to increase workplace segregation, and immigrants from EU countries in East Europe contribute to keep up segregation. Workplace segregation increases with declining regional centralization generally, but when assuming firms with mixed foreign and native employment the regional differences are more evenly distributed.

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1. Introduction and background

That immigrants participate in working life is considered an important factor for immigrants to be as integrated as possible in a society. Previous research in Norway shows that there are large differences in labour force participation among immigrants depending on gender, age, education, reason for immigration, country background and duration of residence (see, among others, Cappelen et al. 2017a,b, Stambøl 2015, 2016a,b, 2017). Participation in working life reflects a necessary, but not necessarily a sufficient, condition for immigrants to be better integrated into a society. We analyse in this paper the degree of homogeneity and heterogeneity in the composition of the workforce in each of the firms, and how this composition has evolved over time. High or increasing accumulation of immigrant groups in firms in some industries does not necessarily reflect increased integration but may have segregating effects despite a working relationship.

The analysis is based on micro data, and we can measure changes in workforce in the firms being investigated, as well as how the composition of the workforce is at different times in the different firms. The country background (country of birth) of the employed may here be an even better variable as the reason for immigration, as we can expect that possible segregating tendencies in the workplaces may be due to the fact, that immigrant groups with a common background, culture and language may have tendencies to gather in some firms more than in others. The project is focused on employed immigrants, but in some contexts also included employed born in Norway to immigrant parents, given the parents' country background. Otherwise, it is accounted for different individual characteristics of employed immigrants.

This project can to some extent be seen in the context of a recently completed project on development of residential segregation in selected major and central municipalities (see Kornstad et al 2018, Stambøl et al, 2018), but the current project includes analysis of workplace segregation throughout the entire country. With regard to integration, however, low residential segregation can be offset by the fact that immigrants can be employed in firms with high levels of segregation, but also vice-versa. However, some of the literature in the field indicates a positive correlation between residential segregation and workplace segregation. In this paper, however, we put the attention on descriptive analyses investigating the historical development of workplace segregation in Norway.

The main question to be answered in this paper is whether we can see an increasing or decreasing workplace segregation among immigrants and others with an immigrant background relatively to the natives in the period 2005-2015. The project is initially based on all firms in Norway with known organization numbers, and in the statistical basis the size of the firms is included according to the number of employed, industrial affiliation and regional locations. We measure how the labour force is composed in the firms through an observation period of ten years by the participants gender, age, educational level, country background and for immigrants also by their duration of residence in the host country.

Internationally, there are literatures that deal with issues concerning immigrants and workplace segregation, but then often seen in the context of residential segregation as well as on differences in wages between employed with immigrant background and natives. In Norway, there are examples of analyses of immigrants and others in the workplaces, but also here with most focus on the importance of socio-economic differences and differences in wages more than on segregation based on the actual composition of the workforce at the different workplaces (see e.g. Barth, Bratsberg and Raaum (2012)). However, the results give some indications of composition, in that immigrants from countries outside Europe and the western world tend to be employed in jobs with lower than average wage levels, and that labor mobility among these immigrants is weaker with regards to achieving wage increases through job-to-job mobility than among similar groups of natives. The results show that there appears to be small or no convergence in wage growth over time between immigrants from these countries and employed natives.

Moreover, analyses of segregation among immigrants in the sense of composition have usually been linked to analyses of residential segregation, where the local neighborhoods are regarded as important

arenas for the formation of environments that affect social interaction and individual life careers (see, among others, Galster (2012), Musterd et al (2012)). In recent times, however, attention has increasingly been directed to segregation in the workplaces, where immigrants can come into contact and interact with natives. Contacts with natives in local neighborhoods have a positive effect on wage levels of immigrants (Musterd et al. (2008)), but even higher wage growth have immigrants achieved by being employed in workplaces where there are several natives (Tammaru et al. (2010, 2016)).

There is, however, a growing literature that in various ways attempts to explain the formation and maintenance of segregation in the workplaces associated with residential segregation. In a comparison of segregation between persons with and without an immigrant background in Los Angeles, Ellis et al. (2004) found that about half of the workplace segregation was linked to residential segregation. Furthermore, Hellerstein et al. (2011) found that in the United States, segregated neighborhoods led to a significant degree of segregation in the workplaces. In an article that examines factors that create segregation in the workplaces between immigrants and natives, Strømgren et al (2014) has analyzed Swedish register-based time series data, where the focus is, among others, on immigrants' choice of both workplace and place of residence, and whether spouse/partner is an immigrant or not. They find that the level of workplace segregation is somewhat lower than for residential segregation. Furthermore, that a low level of residential segregation leads to a reduced level of workplace segregation.

The part of the international literature in this field that focuses on residents and gender expects that female immigrants can be employed more locally, while male immigrants may have a somewhat higher probability of spreading their working conditions to somewhat larger geographical areas (see Wang (2010) and Wright et al (2010)), thus expecting that residential segregation can lead to higher workplace segregation among female immigrants than among male immigrants.

Examples of analyses that focus more directly on the topic of workplace segregation are Hellerstein and Neumark (2008), who study segregation in the workplaces in the US on linked employer-employee data. The focus is on education-related and linguistic segregation with regards to race and ethnicity. They find that education-related segregation can occur if well-educated labour is more complementary with other well-educated than with unskilled and those with low education. They find high segregation in the workplaces both in terms of education and language. However, they find that only a small proportion of segregation with respect to race can be linked to differences in educational level, but that a significant proportion of segregation with regards to ethnicity can be linked to language differences.

The same authors have also conducted analyses of developments in workplace segregation in the USA based on changes between the years 1990 and 2000 (Hellerstein et al. (2008)). They find no sign of a reduction in workplace segregation by race and ethnicity during the period, but rather that the segregation increased between the "white" and "black" part of the employed. The same happened to the segregation by education, while the gender segregation in the workplaces fell during the period.

Glitz (2014) analyses ethnic segregation in Germany from 1975 to 2008 based on linked employer-employee data. It is shown that both segregation in the workplaces and residential segregation is very widespread, but with small changes in the level during the period of investigation. Low-skilled employees are more segregated than highly educated employees between workplaces. Furthermore, in addition to segregation between minority groups and those without immigrant backgrounds in the workplaces, there is also extensive segregation between minority groups, albeit less if they have a common language background. The segregation in the workplaces, on the other hand, decreases with the period during which the employees have been working, while high segregation in the workplaces is associated with low income. Furthermore, segregation in the workplaces is most prevalent in industries such as agriculture and mining, in construction and civil engineering, and in the service industries, and most widely among those with low education. On the other hand, the probability of being employed on segregated jobs is falling with the duration of residence of immigrants in Germany.

As an example of important factors behind the formation of segregation shows e.g. Garcia-Pérez (2009) studies that immigrant-controlled businesses are largely inclined to recruit other immigrants, thus largely excluding non-immigrants. Bygren (2013) also draws on the importance of the recruitment process, and that segregation in the workplaces seems to be maintained primarily because employees who are recruited to a workplace usually have many similarities with those who are previously employed, and not because underrepresented groups are systematically replaced.

Andersson et al. (2014) also question the extent to which immigrants and non-immigrants work in separate workplaces? They find that immigrants are clearly more likely to have immigrants as colleagues than non-immigrants, and in particular this applies to immigrants with the same country background and language more than when the investigation is linked to the same reason for immigration. They also find that such concentration is more common for smaller businesses than for larger companies but is clearly dependent on which industries you look at. They also find a clear connection between residential segregation and workplace segregation.

2. D index on rate form

In this analysis, we primarily use the dissimilarity index (D index) to study workplace segregation among employed immigrants and employed born in Norway to immigrant parents. In the following we explain the calculation of the index as used in this paper. The calculation is based on the formulation of the D index on rate form, as opposed to as a weighted average of immigrant shares¹. In order to simplify the presentation, we assume that it is workplace segregation among employed immigrants we are going to study.

When calculating the D index, the total number of workplaces that are to be studied is divided into smaller non-overlapping units, which here mean each individual firm that is part of the total number of firms that make up the framework for each of the calculations.

The D index is given by:

$$D(t) = \frac{1}{2} \sum_{i=1}^N \left| \frac{I_{it}}{I_t} - \frac{P_{it}}{P_t} \right| = \frac{1}{2} \sum_{i=1}^N |D_{it}| * 100 \quad (1)$$

where N indicates the number of firms in which the employed are divided, while t represents the current year one is looking at. The variable I_{it} indicates the stock of employed immigrants in firm i at the beginning of year t , while P_{it} is the stock of employed without immigrant background. Finally, the variables I_t and P_t express, respectively, the total stock of employed immigrants and non-immigrant employment in the beginning of year t in the total number of firms we consider. Furthermore, we have

$$I_t = \sum_{i=1}^N I_{it}$$

and

$$P_t = \sum_{i=1}^N P_{it}$$

The interpretation of the D index as specified in Equation (1) is that it is a sum of contributions from each firm. The contribution from firm i is the numerical value of the difference between the rate of all employed immigrants that are employed in the firm and the rate of all employed without immigrant background that are employed in the total number of firms we are looking at (D_{it}) divided by 2. We divide by 2 to get the index to be within the range of 0 to 1 (or in percent 0 to 100). If the rate of employed immigrants in one firm is higher than the rate of employed without immigrant background, the contribution to the D index is positive even before we take the absolute value. On the other hand, if there are relatively more employed without than with immigrant background in the firm, the contribution is negative before we take the absolute value. This explains why we in parts of the

¹ For the D index written on rate form, see Duncan and Duncan (1955, p. 211). See also Fossett (2017, p. 19). Here, the D index on rate form is scaled by having multiplied by 100, which is also done in this paper.

analysis show so-called negative and positive contributions depending on whether the workplace segregation turns towards employed immigrants or those without an immigrant background.

A value 0 for the D index equals the absence of segregation, while the value 1 (or 100) equals the maximum segregation. The former case corresponds to the situation when one has

$$I_{it} = \frac{I_t}{N} \quad (2)$$

and

$$P_{it} = \frac{P_t}{N}. \quad (3)$$

If we insert from Eqs. (2) and (3) into Eq. (1) we get

$$D(t) = \frac{1}{2} \sum_{i=1}^N \left| \frac{1}{N} - \frac{1}{N} \right| = 0.$$

We have thus shown that the D index takes the value 0 when the proportion of employed immigrants is distributed evenly across all the firms we are looking at.

3. Definitions of some central variables and data

In this section we collect some definitions and descriptions of the most central concepts and variables used in the paper, as well as a description and short discussion of categories of workplaces used in the analyses. Basically, we use matched employer-employee micro-data derived from individual-based registries at Statistics Norway for the years 2005, 2011 and 2015.

3.1. Definition of workplaces

In an analysis of workplace segregation, it is of importance to define what is meant by a workplace. In the analyses, we use firms (establishments) as a definition of workplaces, where each firm constitutes a workplace. All firms in Norway that are registered in the employers-employees' registry with a known organization number are basically included. There are, however, far from all firms that have employed with immigrant background. On the other hand, we must also expect that there are firms that only have employed with immigrant background. Since both the number and change of firms in each of these groups also says something about segregation in the labor market as a whole, we have initially chosen to include all firms as one of the main categories. These include, in addition to all "heterogeneous" firms that have employed both with and without an immigrant background, also "homogeneous" firms with regards to labour, that have only employed natives and firms that have only employed with an immigrant background. In the paper we have called this main category (A) of firms.

This main category will thus consist of all firms that may be divided into the following three groups:

- (1) Firms that have only employed without an immigrant background
- (2) Firms that only have employed with an immigrant background
- (3) Firms that have employed both with and without an immigrant background

Since the main focus of the analysis is to measure segregation in the workplaces between employed with and without an immigrant background, it is of interest to focus at the workplaces where we find elements of both groups of employed simultaneously. In the "homogeneous" firms with regards to labour, where there are only employed natives or only employed with an immigrant background, the segregation is decided in advance, in that the contribution to segregation is maximal, either in the direction of employed with an immigrant background or in the direction of employed natives. Thus, in the next main category of firm, we have retained the firms from the main category (A) that have employed both with and without an immigrant background for each of the years covered by the analysis (cf. group (3) of firms above). Throughout the analysis, we have called this main category (B) of firms.

However, many firms cease to exist after a certain period, partly because of closures, but also because of mergers, so that they no longer keep their former organization number. On the other hand, there constantly will be established new firms. Both the firms that are established and the firms that are closed down/merged will, in part of the investigation period contribute to the overall changes in the composition of the labour in the firms that is included in the analyses. In order to account for these changes of firms over time, we have included a separate main category for those firms that existed both in the first year of the analysis in 2005, as well as in 2011 and also in the last year 2015. We have called this main category (C) of firms, also referred to as "all consistently existing firms during the period of investigation".

But in this main category (C), we will again find firms that have only employed natives and firms that only have employed with an immigrant background. We thus repeat the same delimitation as we did for all firms above, by including a final separate main category of firms where we retain only those of the consistently existing firms in the period that have employed both with and without an immigrant background. We have called this main category (D) of firms, also referred to as "all consistently existing firms during the investigation period that have employed both with and without an immigrant background". Figure 2.1 shows a schematically overview of the four main categories of firms that we use as a frame for the segregation analyses.

Figure 2.1. A schematic overview of the four main categories of firms that are used as the framework for the segregation analyses

Four main categories of firms:	The main categories of firms include more specifically:
(A) All firms	"Homogeneous" and "heterogeneous" firms with regard to labour that existed in all years of the investigation period, but also all firms that were established, closed down and both established and closed down during the period of investigation
(B) All firms that have employed both with and without an immigrant background	"Heterogeneous" firms with regard to labour that existed in all years of the investigation period, but also "heterogeneous" firms with regard to labour that were established, closed down or both established and closed down during the period of investigation
(C) All consistently existing firms during the period of investigation	"Homogeneous" and "heterogeneous" firms with regard to labour that existed in all years during the period of investigation
(D) All consistently existing firms during the period of investigation that have employed both with and without an immigrant background	"Heterogeneous" firms with regard to labour that existed in all years during the period of investigation

3.2. Institutional setting and definition of different concepts:

An immigrant is defined by Statistics Norway as a person who has immigrated to Norway and has been registered as living in the country, and who is born abroad with two foreign-born parents and four foreign-born grandparents. To be registered as resident in Norway, one must generally have the intention to stay in Norway for at least six months and have acquired legal residence of the country. This means that seasonal workers and others staying short term in Norway are not included. The same is the case for asylum seekers waiting to have their cases processed. In this analysis, we also partly include second-generation immigrants, that is Norwegian-born employed with two immigrant parents.

To account for the effect of age we include three age-groups as follows: 15-29 years, 30-49 years and finally 50-74 years.

To consider the impact of education we have used the codes from the Norwegian Standard Classification of Education and aggregated with four levels of education for immigrants and natives plus a group of unspecified/none education. These are as follows: (1) persons with primary education, (2) persons with secondary school education, (3) persons with 1-4 years of higher education, (4) persons with 5 years or longer higher education, and finally (5) those with no or unspecified education.

Employed are defined as to be in employment in November each year with an occupational status codes as wage earner or self-employed in the regional employment statistics. Employed who have also been unemployed during the calendar year are classified as employed if the work circumstance has lasted seven months or longer during the same calendar year.

We also operate with a variable for immigrants depending on what year they arrived in Norway as immigrants and for their duration of residence in the country. The arrival year is recognized by the variable "first year of immigration," which renders the year immigrants arrived in Norway as an immigrant first time. Immigrants retain their value for the "first year of immigration" as long as they are registered as immigrants in the country. The same applies to immigrants who have emigrated and then again later make a return immigration. These will thus retain the value of their "first year of immigration" regardless of whether they have been migrated from the country for a period.

Finally, we divide immigrants according to their country of birth. Those from country group 1 consist of immigrants from EU/EEA countries in Europe and Switzerland, USA, Canada, Australia and New Zealand. Immigrants from new EU countries in Eastern Europe form the country group 2, and finally immigrants from the countries of Eastern Europe that are not members of the EU, Asia, Africa, Latin America and Oceania, except Australia and New Zealand, constitute country group 3. Persons born in Norway to immigrant parents are also allocated to these country groups in accordance with their immigrant parents' country background.

3.3. Regional divisions:

The workplace segregation analyses are basically linked to all workplaces throughout the country. It is also useful to see how the level of segregation and especially the changes in the level of segregation has developed by different geographical divisions. In the analyses we look at workplace segregation by two geographical divisions; the first following an aggregated county division, while the other follows a division where all the municipalities of the country are divided by levels centrality. In this paper, we concentrate the geographical dimension to apply to the municipalities by centrality where we operate with the four levels of centrality that was used by Statistics Norway up to 2017. These levels of centrality consist of an aggregation of all municipalities, which are grouped by 1) Central municipalities, 2) Somewhat central municipalities, 3) Less central municipalities and finally 4) Least central municipalities. There are, however, differences in the number of municipalities that are included in each level of centrality, which also mean difference with regards to the number of firms that are localized and the number of workers that are employed in each levels of centrality. The highest number of the firms are localized in the central municipalities, while the somewhat central municipalities have the lowest number of firms.

4. Some basic figures for workplaces and employment

As described in the chapter above, the workplaces in this analysis are defined as each of the firms that are registered with known organization numbers in the statistical basis. As shown in Figure 4.1a, all the firms of the whole country consisted of almost 270,000 units in 2005, and then increased to just below 285,000 units in 2011 and to almost 295,000 units at the beginning of 2015. We thus observe an increase in number of firm units during the investigation period.

Before investigating segregation between employed with and without an immigrant background, an important basis for the analysis is to see how the firms are distributed with respect to the employed with and those with no immigrant background. We have first divided all the firms in the country into three groups, as follows: 1) all firms that have only employed without an immigrant background, 2) all firms that have only employed with an immigrant background and 3) all firms that have employed both with and without an immigrant background. The two first "homogeneous" groups of firms will contribute with maximal segregation in the workplaces, either in the direction of employed with an immigrant background or in the direction of employed without an immigrant background. The third group of firms provides perhaps a better basis for more nuanced measurements of segregation in the workplaces, where the firms consist of employed both with and without an immigrant background. However, the same firms can vary between the three groups according to the composition mentioned

above during a period of investigation. Most typically, this can be expected to apply to firms that previously had only employed without an immigrant background, and due to large increases in immigration to the country have received employed with an immigrant background.

Figure 4.1a,b. Total number of firms in Norway per 1.1. 2005, 2011 and 2015, and percentage distribution on firms with only native employed, only employed with immigrant background and with both immigrant and native employed

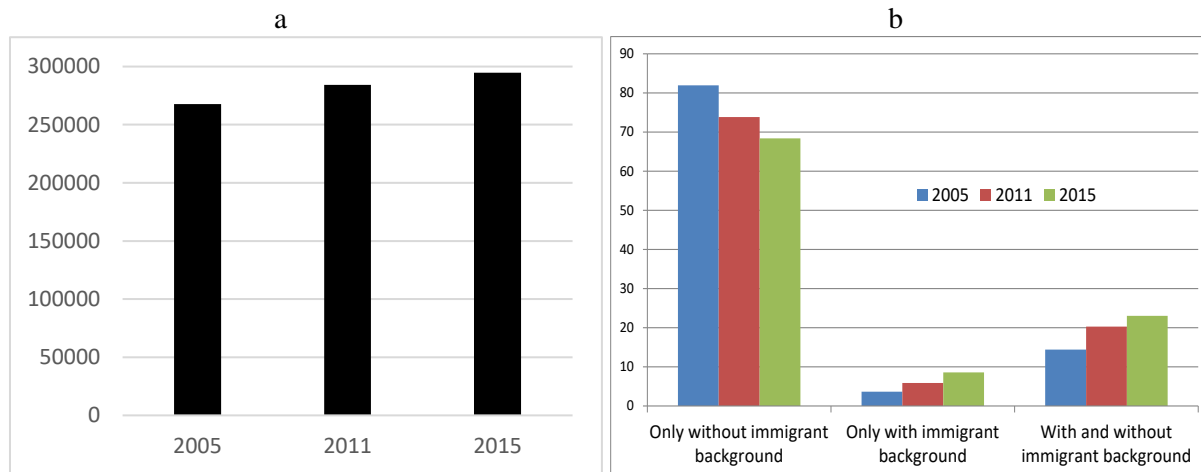


Figure 4.1b shows how all firms are distributed among each of the three groups of firms in 2005, 2011 and 2015 respectively. About 82 per cent of all firms in 2005 had only employed without immigrant background, while corresponding shares were about 3.5 per cent for firms that had only employed with an immigrant background, and about 14.5 per cent for firms with a mixture of employed with and without an immigrant background. As expected due to high immigration, the share of the firms that have only employed without an immigrant background during the investigation period falls to just above 68 per cent when we arrive at 2015. Firms that have only employed with an immigrant background, increase their share to 8.5 per cent of all firms, while the “heterogeneous” firms, that have employed both with and without an immigrant background, increase their share to above 23 per cent when we arrive at 2015. Despite a clear increase of the proportion of firms that have only employed with an immigrant background, the last category of firms that have employed both with and without an immigrant background increases even more.

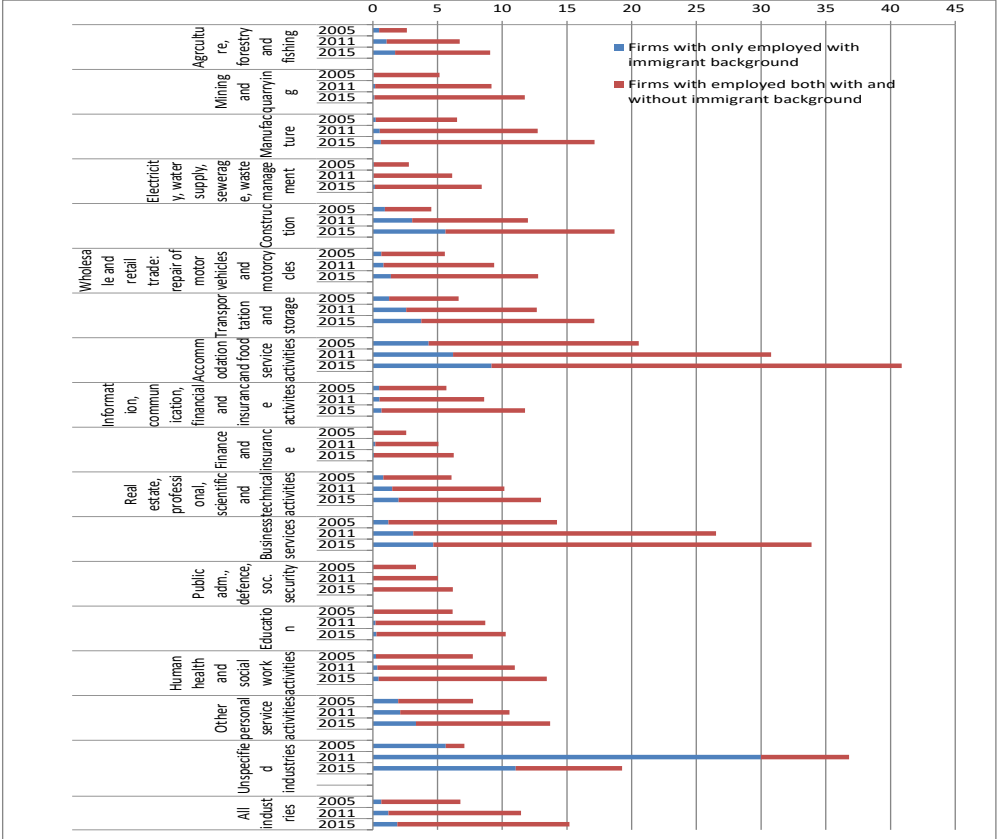
In Figure 4.2, we look at how employed with an immigrant background in these two last groups are distributed among industries, and how much employed with an immigrant background makes up of the total employment in each of these industries. Generally, the proportion of employed with an immigrant background has increased in all industries both from 2005 to 2011 and from 2011 to 2015. The only deviation is to be found in the group of firms with unspecified industry, where the scope of employment is both small and varies with time due to statistical reasons.

The clearly highest proportion of employed with an immigrant background is to be found in industries like accommodation and food service activities and in business services. But in industries such as manufacturing, construction and transport and storage, the proportion of employed with immigrant background is higher than the average for all industries. Measured in percentage points, it is also in these industries that we find the highest increase in the employment share among those with an immigrant background during the investigation period 2005-2015.

At the opposite end of the scale, we find the lowest employment rates of those with immigrant background in industries such as finance and insurance and public administration, defense and social insurance. There are also these industries that show the lowest increase in employment rate among those with immigrant background during the period of investigation from 2005-2015.

When we look at the share of employment that is employed in firms where there are only employed with an immigrant background, this is both highest and most increasing in industries such as accommodation and food service activities, construction, business services, transport and storage and in personal service provision. This is also the same industries where we found the highest shares of firms that only had employed with immigrant background (see Stambøl 2019). Corresponding employment shares in Figure 4.2 are, however, somewhat lower than the corresponding firm shares, which confirms that firms that only have employed with an immigrant background are smaller than the average firm size measured by the number of employed.

Figure 4.2. Percentage of employed with immigrant background distributed at firms in Norway that have employed with only immigrant background and firms that have employed both with and without an immigrant background by industry per 1.1. 2005, 2011 and 2015. Percent

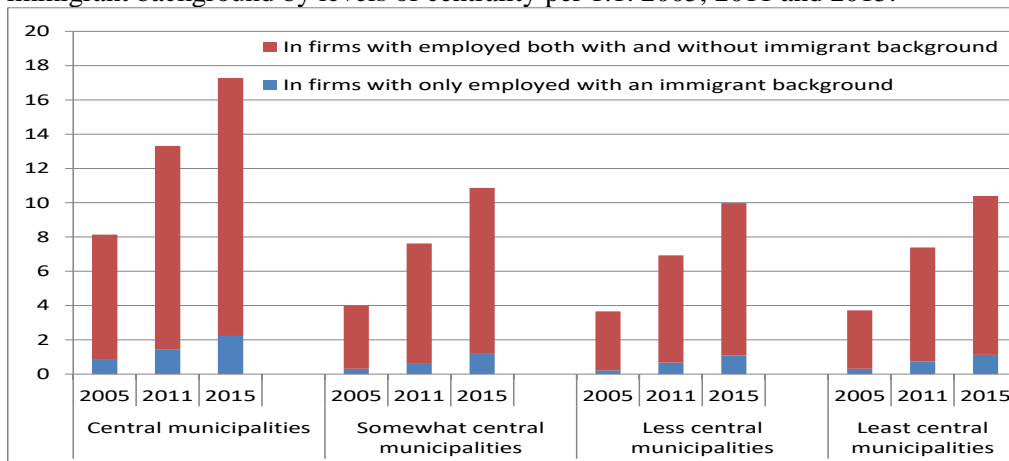


Finally, a corresponding distribution of employed with an immigrant background is shown by four levels of centrality, where all firms located in each of the municipalities are grouped together in a) the central municipalities, b) the somewhat central municipalities, c) the less central municipalities and finally in d) the least central municipalities (see Figure 4.3). The proportion of employed with immigrant backgrounds is highest in the central municipalities followed by somewhat central municipalities, while this proportion is slightly higher in the least central municipalities, at the lowest level of centrality, than in the less central municipalities with the second lowest level of centrality.

There has, however, been an increase in the number of employed with immigrant backgrounds in the firms at all levels of centrality during the period. Measured in percentage points the proportion of employed with an immigrant background increases mostly in the central municipalities, while the lowest growth was found in the less central municipalities. Measured in per cent the highest growth was in the somewhat central municipalities, while the lowest percentage growth was in the central municipalities, which is due to the facts that the number of employed with immigrant background was initially high.

The central municipalities also distinguish themselves with the highest employment shares in firms that have only employed with an immigrant background, while the share of this group of employed is initially relatively similar across the three other levels of centrality. The number of employed with an immigrant background in firms that have employed both with and without an immigrant background is also highest in the central municipalities, while the least central municipalities initially had slightly lower employment shares than the less central municipalities, but this become reversed during the period of investigation.

Figure 4.3. Percentage of employed with immigrant background distributed by firms that have only employed with immigrant background and firms that have employed both with and without an immigrant background by levels of centrality per 1.1. 2005, 2011 and 2015.



5. Main results of the workplace segregation analyses

In this section we show some results of workplace segregation based on calculations using the dissimilarity index, the D index, on rate form and initially also the Gini coefficient. We start with calculations according to four different main categories of firm divisions that are described in more detail in section 3.

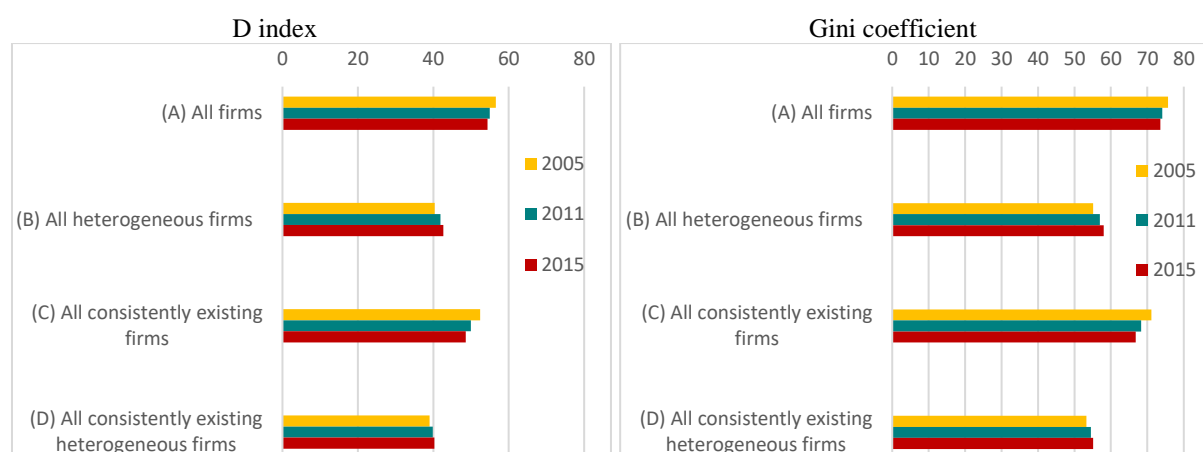
Figure 5.1 gives the main impression that both the D index and the Gini-coefficient are significantly higher for firms in the main categories (A) and (C) than for firms in the main categories (B) and (D). This is not surprising, as the main categories (A) and (C) also includes firms that are maximally segregated for those with only employed without an immigrant background, and those firms that have only employed with immigrant backgrounds. The index values are, however, somewhat higher for the calculations using the Gini coefficient than when using the D index on rate form. The structural differences in segregation between the main categories of firms are, however, roughly the same for the results with the Gini coefficient and the D index.

The results in Figure 5.1 show a moderate decline in workplace segregation over time when employed in all firms or in all consistently existing firms are included in the framework of the analysis. An important reason for this is a decrease in the proportion of firms that have only employed without an immigrant background, with a subsequent increase in the proportion of firms that have employed both with and without an immigrant background. Admittedly, there was a clear increase in the proportion of firms that have only employed with an immigrant background, but this increase was less than the decline in the proportion of firms with only employed natives. This, in turn, resulted in less “homogeneous” firms with regards to labour, and thus less firms with a maximal contribution to segregation.

When the framework for the analyses is based on all firms or all consistently existing firms, that have employed both with and without an immigrant background, the results show an increase in the workplace segregation from 2005 to 2015. However, these alternatives provide perhaps the best basis for measuring the workplace segregation, since we here do not include “homogeneous” firms with

regards to labour composition. Although the scope of these "homogeneous" firms also says something about the segregation image in the entire society. However, the increase in segregation for the "heterogeneous" firms may, among others, be due to the facts that several firms that previously did not have employed with an immigrant background have received a few immigrant workers, and thus changed to the group of "heterogeneous" firms. This in turn may contribute to increased segregation in this group.

Figure 5.1. Workplace segregation calculated by D indexes and Gini coefficients based on four main categories of firms per 1.1. 2005, 2011 and 2015. Norway



5.1 Segregation by firm size and industries

Furthermore, we look more closely at workplace segregation when the firms are divided by size defined by the number of employed and by industries. The segregation is calculated using the D index on rate form, where the segregation is measured between employed with an immigrant background relatively to employed natives. The analyses are made by calculating the index values separately for each interval of firm sizes and for each of the industries. We concentrate the analyses to all consistently existing firms that have employed both with and without an immigrant background (c.f. main category (D) of firms).

Figure 5.2 shows that the calculated increases in segregation throughout the period is generally for all groups by firm size for the entire period. The only exception is the group of firms with 50-99 employed, where the segregation has a near-negligible decline in the last period from 2011 to 2015. Considering the levels, the segregation tends to increase with increasing firm size with a visible exception for the largest firms. Partly, this may be related to the fact that the proportion of firms that have employed both with and without an immigrant background increases with the size of the firms.

Among the industries, it is initially in the primary industries that we find the highest D index value, followed by business services, transport and storage and accommodation and food service activities (see Figure 5.3). The lowest initial D index shows the industry of finance and insurance.

There are differences between the industries also with regards to changes in the segregation over time. The trend is an increase in the segregation throughout the period. The highest increase shows the industries of construction, business services and transport and storage. Some industries are showing a tendency of declining segregation. This applies, among others, to the primary industries during the first period, but also mining and quarrying, accommodation and food serving activities, public administration, defense and social insurance and health and social services show a moderate decline in segregation during the period.

Figure 5.2. D index based on consistently existing heterogeneous firms by size of firms per 1.1. 2005, 2011 and 2015. Employed with immigrant background measured relatively to employed natives. Norway (Main category (D) of firms)

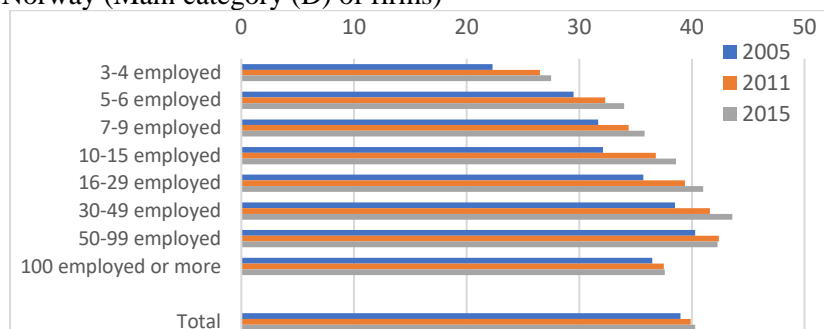
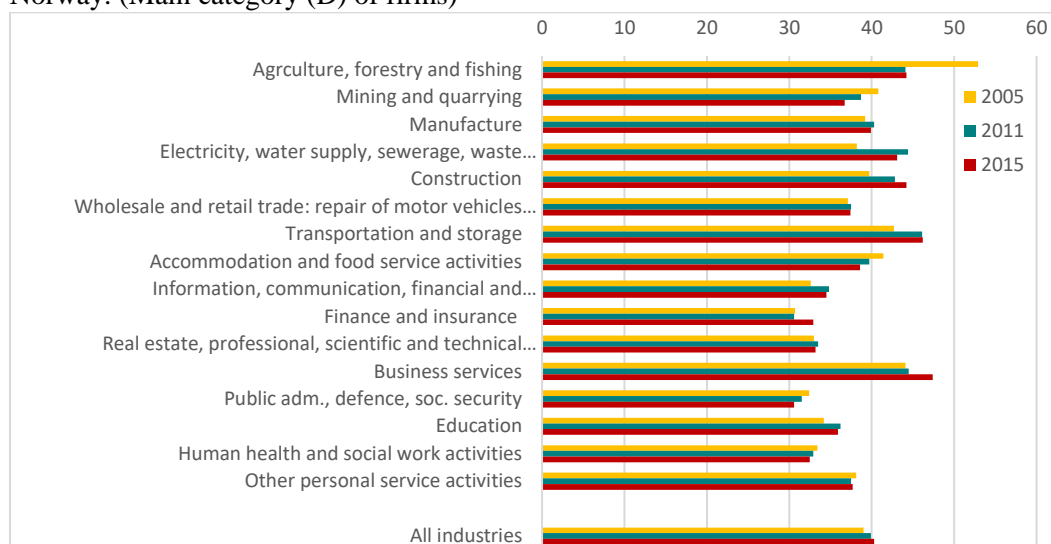


Figure 5.3. D index based on consistently existing heterogeneous firms by industry per 1. 1. 2005, 2011 and 2015. Employed with immigrant background measured relatively to employed natives. Norway. (Main category (D) of firms)



5.2. Segregation by individual characteristics

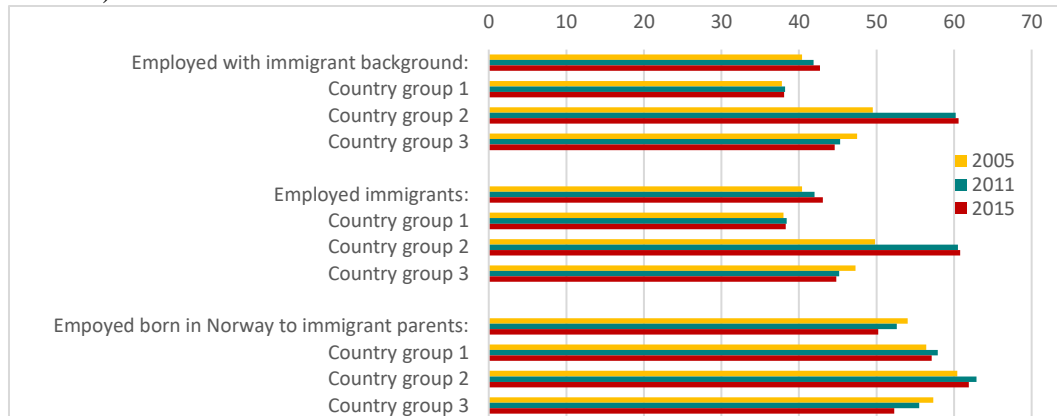
Furthermore, we show some results of workplace segregation based on the D index where employed with immigrant background are divided by different individual characteristics. First, employed with an immigrant background are divided by employed immigrants and employed born in Norway to immigrant parents. Thereafter, all groups of employed with an immigrant background are divided by country background. The calculations of segregation are also here made separately for each group when the firms included in the framework only include those that have employed both with and without an immigrant background.

The results provide an increase in workplace segregation for employed with an immigrant background (see Figure 5.4). The segregation also increases for employed immigrants in both periods. On the other hand, employed born in Norway to immigrant parents show a moderate decline in the segregation in both periods. But we see that the level of the D index, and thus also the segregation, is somewhat higher for employed born in Norway to immigrant parents than for immigrants.

Measured by country groups (see definition in section 3.2), employed immigrants from country group 2 stand out with a strong increase of the D index in the first period, followed by a moderate increase in the last period. Immigrants with background from country group 1 also show an increase in segregation in the first period, but with small changes in the last period. On the other hand, immigrants

from country group 3 show a moderate decline in segregation throughout the period. The same also applies to employed born in Norway to parents with a background from country group 3.

Figure 5.4. D index based on all «heterogeneous» firms in Norway per 1.1. 2005, 2011 and 2015. Measured separately for employed with immigrant background (immigrants and those born in Norway to immigrant parents) by country group, measured relatively to employed natives (Main category (B) of firms)



We have then looked at workplace segregation when the immigrant employment is divided by gender. The segregation calculations are made so that the employed male immigrants are compared to employed men without an immigrant background, and correspondingly, that employed female immigrants are measured in relation to employed women without an immigrant background.

The results in Figure 5.5 indicate that the level of the D index is generally lower for employed female immigrants than for employed male immigrants regardless of which main category of firms that is used as the framework for the analyses.

We get a fall in segregation when we look at all firms in the main category (A), and the fall in the D index is slightly higher for male immigrants than for female immigrants. For all firms that have employed both with and without an immigrant background (main category (B)), the D index increases moderately stronger for male immigrants than for female immigrants. When we use employment for all firms that have been consistently existing throughout the period (main category (C)), we get a somewhat stronger fall in segregation among employed male immigrants than among employed female immigrants. Finally, the increase in segregation is moderately stronger for employed female immigrants than for employed male immigrants when we assume the employment in consistently existing firms during the period that have employed both with and without an immigrant background (main category (D)). The results thus indicate a slight convergence in workplace segregation by gender during the period, but no more that female immigrants still have the lowest workplace segregation at the end of the period of investigation.

In this section we also measure the level and change in workplace segregation when the employed are grouped by age. The workplace segregation is higher among younger employed immigrants than among employed immigrants in the middle and older age groups when the segregation is generally measured in relation to employed without an immigrant background (see Figure 5.6). However, the differences in segregation between the age groups are somewhat moderated when the segregation is measured relatively to similar age groups among employed without an immigrant background.

The changes in segregation during the investigation period show some convergence between the age groups when the younger employed immigrants have the strongest decline in segregation when all firms and all consistently existing firms in the period are used as the framework for the analyses (main

categories (A) and (B) of firms). Similarly, we find that the younger employed immigrants show relatively less increase in workplace segregation over time at the workplaces with both employed immigrants and natives (main categories (B) and (D) of firms).

Figure 5.5. D index based on four main categories of firms per 1.1.2005, 2011 and 2015. Employed immigrants by gender measured relatively to employed natives by gender

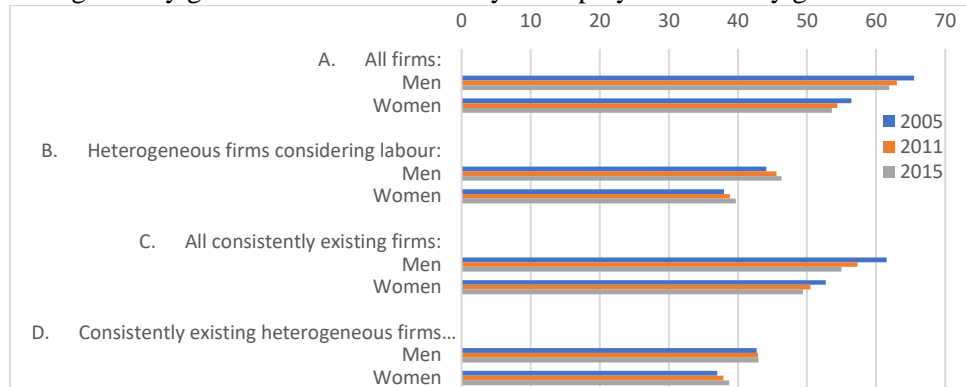
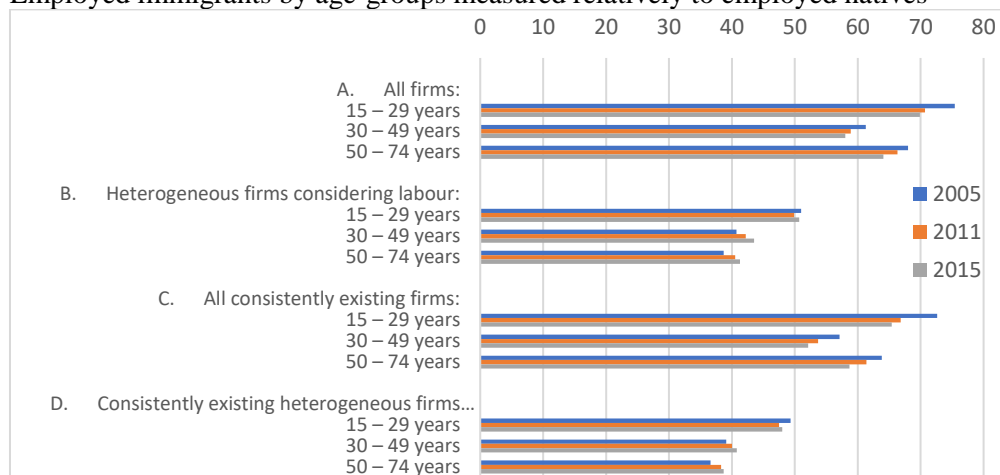


Figure 5.6. D index based on four main categories of firms per 1. January 2005, 2011 and 2015. Employed immigrants by age-groups measured relatively to employed natives



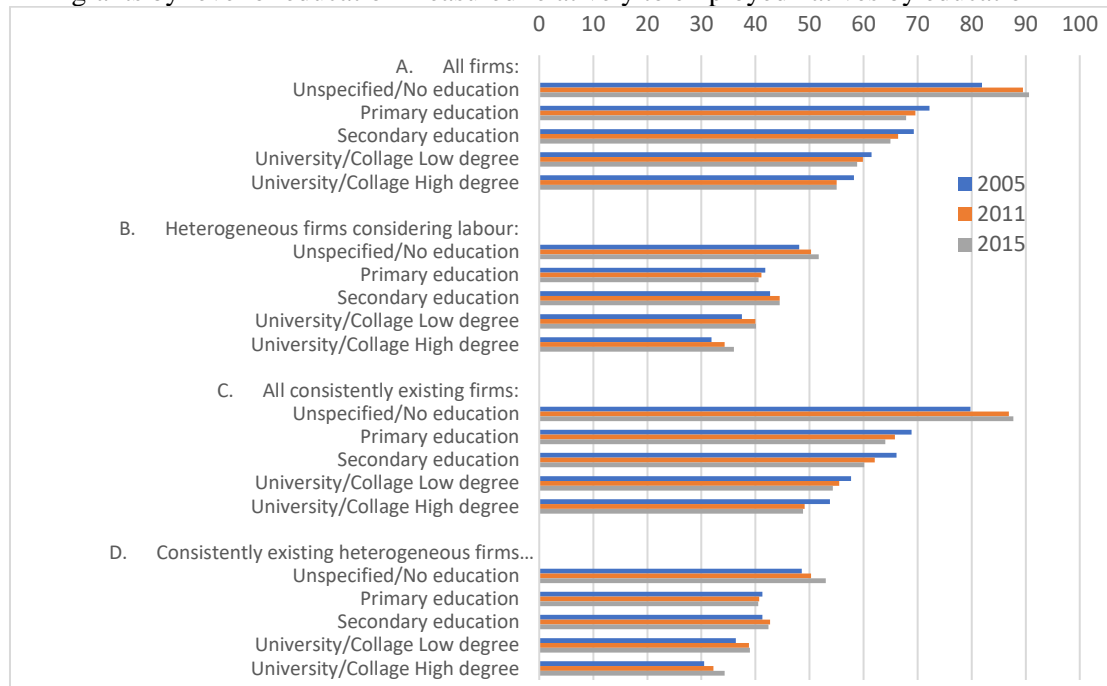
When the workplace segregation is measured by the employed immigrants’ level of education relatively to employed natives generally in “heterogeneous” firms that have both employed immigrants and natives, there are those with only primary or secondary education or unspecified/no education that show the highest segregation, while those with long higher education and especially those with a short higher education show the lowest workplace segregation.

The education groups mainly follow the pattern with a decline in segregation when all the firms and all consistently existing firms are used as the framework for the analysis, and increased workplace segregation when we consider firms that have both employed immigrants and natives. However, employed immigrants with unspecified/no education stand out with a sharp increase in the workplace segregation in all major categories of firms.

When the segregation among immigrants by education is measured relatively to the corresponding education groups among employed natives, the workplace segregation falls systematically with an increasing level of education (see Figure 5.7). In addition, a lower level of workplace segregation is observed than when the segregation was measured relatively to all employed natives generally. This means that there is a tendency for employed with similar levels of education, both among immigrants

and natives, to search for equal workplaces, and mainly then among employed with short and especially long higher education.

Figure 5.7. D index based on four main categories of firms per 1.1. 2005, 2011 and 2015. Employed immigrants by level of education measured relatively to employed natives by education



Furthermore, the workplace segregation among immigrants falls when one turns from groups with short duration of residence in the host country to groups with longer duration of residence, with the highest segregation found among those with 0-2 years of residence and the lowest segregation among those with 16 years and longer duration of residence (see Figure 5.8). In most alternatives, however, employed immigrants with 11-15 years of residence differ somewhat from the main trend, because they have slightly higher workplace segregation than those with 6-10 years duration of residence.

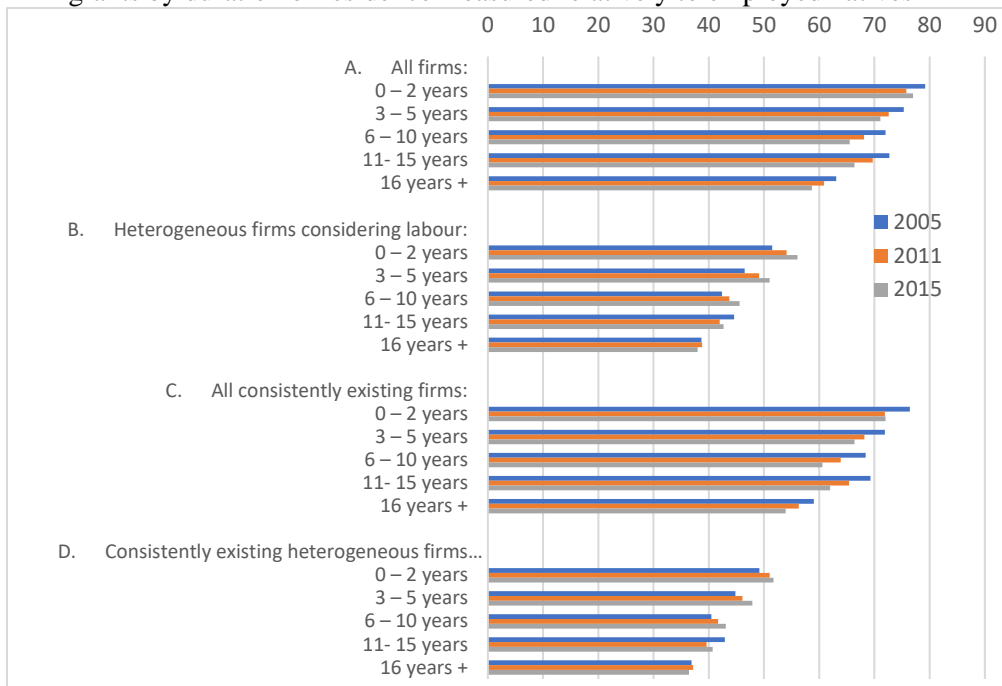
With regards to changes in the segregation over time, employed immigrants in most groups follow the general trend with a decline of segregation when all firms and all consistently existing firms in the period are used as the framework for the analyses. The only exception was employed immigrants with short duration of residence (0-2 years) towards the end of the period.

Similarly, employed immigrants in most of the groups also follow the general trend with an increase in workplace segregation when all firms and all consistently existing firms with both employed immigrants and natives are used as the framework for the analyses. The exceptions were employed immigrants with 11-15 years of residence at the beginning of the period, and those with long duration of residence (16 years and longer) towards the end of the period.

5.3. Segregation by geographical levels of centrality

Measured separately by geographical levels of centrality for employed in all firms, the workplace segregation increases with falling levels of centrality, but where the least central municipalities reduce the segregation most over time (see Figure 5.9). In this regard, there is some convergence in workplace segregation between the levels of centrality throughout the period, but not more than the workplace segregation is increasing with falling levels of centrality also at the end of the period of investigation. One central explanation is that the proportion of firms with only employed natives increases with falling levels of centrality.

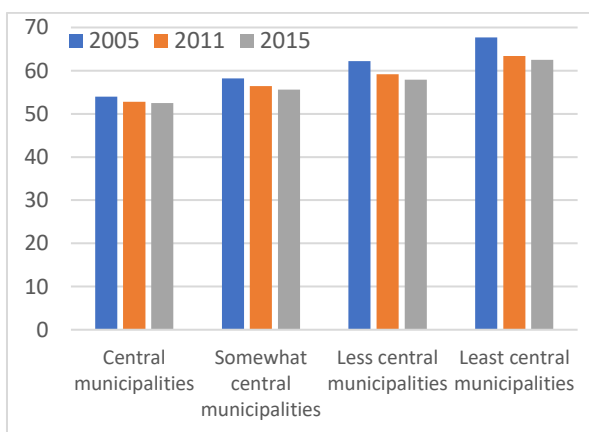
Figure 5.8. D index based on four main categories of firms 1.1.2005, 2011 and 2015. Employed immigrants by duration of residence measured relatively to employed natives



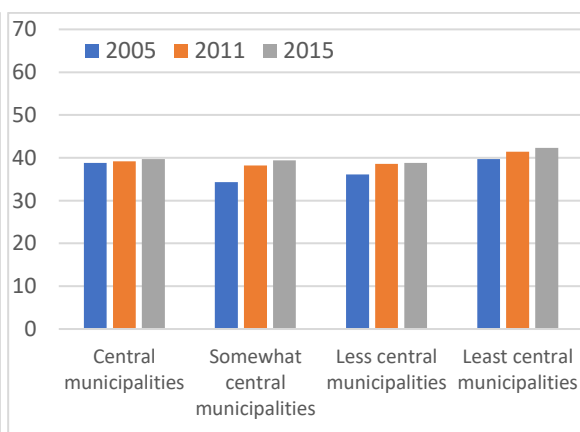
When we consider the consistently existing firms in the period that have employed both with and without an immigrant background, the differences in workplace segregation are more evenly distributed between the levels of centrality, with a slight tendency for employed in the central and in the least central municipalities to show a slightly higher level of segregation than the others (see Figure 5.9).

Fig 5.9. D index based on all firms and all consistently existing «heterogeneous» firms by each level of centrality as a frame per 1.1. 2005, 2011 and 2015. Employed with immigrant background measured relatively to employed natives

Main category (A) of firms: (All firms)



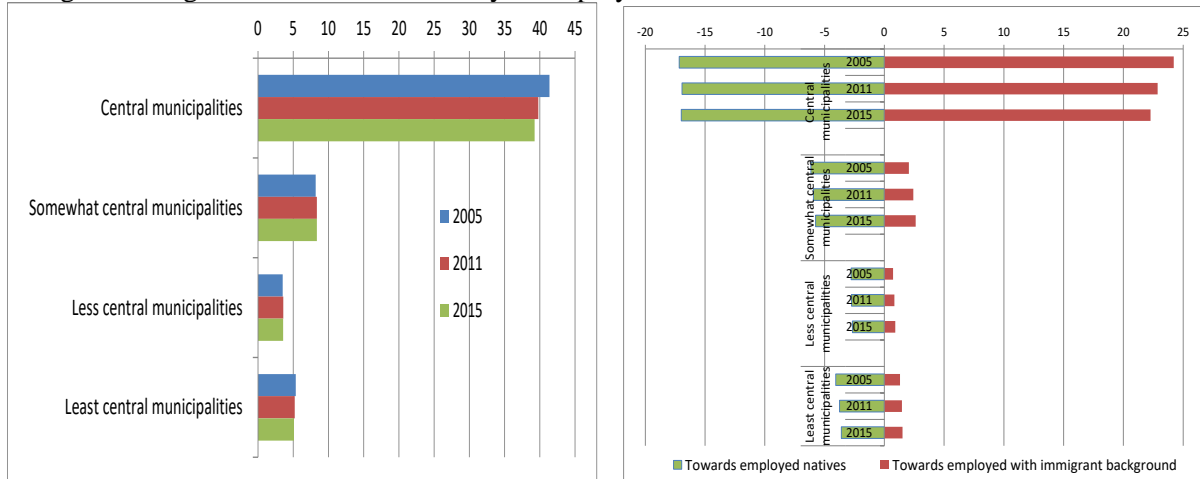
Main category (D) of firms: (Consistently existing «heterogeneous» firms)



When the contributions to the D index from all firms at all levels of centrality are examined simultaneously, there is higher segregation towards employed with an immigrant background than towards employed natives in the central municipalities, while the situation is opposite in the other levels of centrality. There is a slightly declining segregation in the central municipalities over time, while the segregation in the somewhat and less central municipalities turns moderately in the opposite

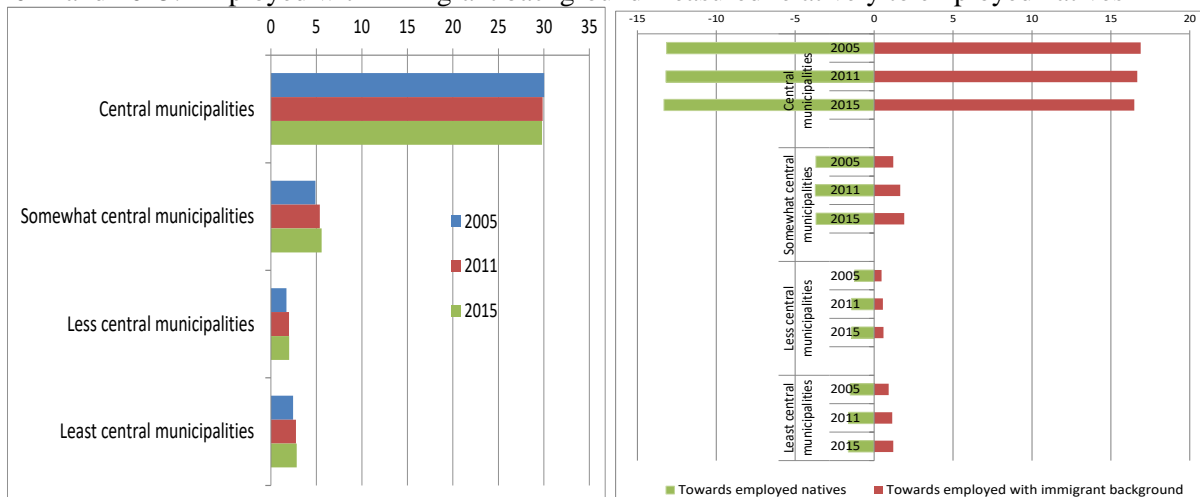
direction (see Figure 5.10). It is segregation towards employed with an immigrant background that pulls the segregation slightly down in the central municipalities, while the segregation increases moderately in the direction of employed with an immigrant background in the other levels of centrality.

Figur 5.10. Contributions to the D index based on all firms in Norway, distributed by municipalities by level of centrality and direction of segregation per 1.1. 2005, 2011 and 2015. Employed with immigrant background measured relatively to employed natives



Finally, when the contributions to the D index from consistently existing “heterogeneous” firms in all levels of centrality are calculated simultaneously, there is also a higher segregation towards employed with an immigrant background than towards employed natives in the central municipalities, while the situation is opposite at the other levels of centrality. There is almost no change in segregation in the central municipalities over time, while the segregation at the other levels of centrality shows a slight increase (see Figure 5.11). In the central municipalities, there is a moderate reduction in segregation towards employed with an immigrant background during the period, while a corresponding increase in the segregation towards employed natives contributes to small changes in the total contribution to the D index. The increasing contribution to the D index that was observed in the firms in the somewhat central municipalities and in the least central municipalities is related to an increased contribution to segregation towards employed with an immigrant background. In the less central municipalities, an increased contribution to the D index correlates with increased contributions to segregation both in the direction of employed with and without an immigrant background.

Figure 5.11. Contributions to the D index based on consistently existing “heterogeneous” firms in Norway, distributed by municipalities by level of centrality and direction of segregation per 1.1. 2005, 2011 and 2015. Employed with immigrant background measured relatively to employed natives



6. Summary

The fact that persons with an immigrant background participate in working life is considered as an important factor in ensuring that they are as integrated as possible in the society. Nevertheless, a skewed composition of employed with an immigrant background in workplaces can moderate the effects on integration despite being in work. The analysis thus questions the degree of homogeneity and heterogeneity in the composition of labor with immigrant backgrounds in the workplaces, and how this composition has developed over time.

The dissimilarity index (D index), and in part the Gini coefficient, is used to investigate segregation in the workplaces among employed with an immigrant background in the period 2005-2015. The D index measures the uniformity of the distribution of employed immigrants and descendants of immigrants versus the native employed provided various divisions of workplaces. Initially, all workplaces in the country, defined as all firms with known organizational numbers in the statistical basis are included, but then limited to workplaces that have employed both with and without an immigrant background. Furthermore, the analyzes are concentrated on firms that have existed coherently during the period covered by the analyzes. The main findings can briefly be described as follows:

Workplace segregation generally: There is a fall in workplace segregation when all firms are used as a framework. An important reason is a stronger decline of firms with only employed natives than increases of firms with only immigrant labour. When firms that have employed both with and without an immigrant background are taken into consideration, there is an increasing workplace segregation.

By firm size: The segregation tends to increase with increasing firm size with an exception for the largest firms when all consistently existing heterogeneous firms are taken into consideration.

By industries: Industries such as business services, construction and transport and storage contribute to high and increasing workplace segregation, while finance and insurance show low segregation.

By country background: We find the lowest segregation among immigrants from country group 1 (EEA countries in Western Europe, Switzerland, North America and central Oceania), but highest segregation among immigrants from EU countries in Eastern Europe (country group 2). Employed from other countries (country group 3) show a moderate decline of segregation, especially among those from early immigration countries.

By gender: There is a higher workplace segregation among male immigrants than among female immigrants, although with a slight converging trend during the period of investigation.

By age: The workplace segregation is higher among younger employed immigrants than among employed immigrants in the middle and older age groups, although with a slight converging trend during the period of investigation.

By education: The workplace segregation among employed immigrants is falling with an increasing level of education.

By duration of residence: The workplace segregation is highest among employed immigrants with short duration of residence, while lower segregation is found among employed immigrants with longer duration of residence.

By geographical levels of centrality: Measured separately for all firms the workplace segregation increases with declining level of centrality, while measured separately for "heterogeneous" firms there are small differences in segregation between the levels of centrality, but with a moderate increase in segregation over time for the levels of centrality outside the central municipalities. When the contribution to segregation from all firms at all levels of centrality are measured simultaneously, employed with an immigrant background show a slight decrease in the contribution to segregation in the central municipalities, while the segregation increases moderately in direction of employed with an immigrant background in the other levels of centrality.

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