Mette Deding
M. Azhar Hussain
Vibeke Jakobsen
Stefanie Brodmann

14:2007 WORKING PAPER

IMMIGRATION AND INCOME INEQUALITY

A COMPARATIVE STUDY OF DENMARK AND GERMANY, 1984-2003

RESEARCH DEPARTMENT OF CHILDREN, INTEGRATION AND EQUAL OPPORTUNITY

IMMIGRATION AND INCOME INEQUALITY:
A COMPARATIVE STUDY OF DENMARK AND GERMANY, 1984-2003

Mette Deding
M. Azhar Hussain
Vibeke Jakobsen
Stefanie Brodmann
RESEARCH DEPARTMENT OF CHILDREN, INTEGRATION AND EQUAL OPPORTUNITY
Working Paper14:2007

Immigration and Income Inequality:

A Comparative Study of Denmark and Germany, 1984-2003*

Mette Deding, M. Azhar Hussain and Vibeke Jakobsen

The Danish National Centre for Social Research, Copenhagen

Stefanie Brodmann

Universitat Pompeu Fabra, Barcelona

Abstract

Four income inequality measures (Gini-coefficient, 90/10-decile ratio, and two generalized entropy indices) are applied to analyse immigrants' income position relative to natives in a comparative perspective. Administrative data is used for Denmark, while survey data is used for Germany. We find higher inequality among immigrants than natives in Denmark, but vice versa for Germany. Over the period 1984-2003, this inequality gap has narrowed in both countries. At the same time, the contribution of immigrants to overall inequality has increased systematically, primarily caused by the increased share of immigrants in the population.

JEL-codes: D31, O15

Key words: Income distribution, immigration, comparative analysis

***Acknowledgement:** The authors thank Professor Peder J. Pedersen, University of Aarhus and The Danish National Centre for Social Research, for helpful comments. We also thank Anders B. Jonassen for excellent research assistance.

1. Introduction

During the last decades, income inequality has increased in many Western countries (Brandolini and Smeeding, 2005; Smeeding, 2006). Simultaneously, there has been an increase in the share of immigrants in these populations (Coleman, 1999). Because immigrants to a larger extent than the majority population are positioned in the lower part of the income distribution, the larger share of immigrants in itself might contribute to the increase in inequality. Our current knowledge about the relationship between these trends is however limited, as only few studies have focused on the relationship between the share of immigrants and income inequality.

The purpose of this paper is to estimate and analyse the contribution of an increased number of immigrants on the income inequality in Denmark and Germany.[1] Measured by the Gini-coefficient, both Denmark and Germany have experienced an increase in income inequality during the two decades from 1984 to 2003 (Figure 1). In Denmark, the Gini coefficient increased 14 % during this period, while the increase in Germany was 11 %. These increases are due to a variety of explanations, including changes in the welfare state systems and the booming housing markets. However, during the same period both countries have also seen a marked increase in the share of immigrants in the population, especially in Denmark (Figure 2). The question is whether the change in the composition of the populations in the two countries contributes to explaining the trend in overall income inequality and whether the impact of the increased number of immigrants on income inequality differs for the two countries.

[1] Immigration may also affect the income distribution in the host country more indirectly, e.g. through the influence on wages and prices, unemployment and on public sector redistribution. However, these indirect effects of immigration are not the issue of this paper, and the indirect effects of immigration are also in general considered to be rather small (see e.g. LaLonde and Topel ,1991; and Pischke and Velling, 1997).

Figure 1 around here

Figure 2 around here

Denmark and Germany represent different welfare states regimes: the social-democratic welfare regime and the conservative welfare regime, respectively. One of the characteristics of the social-democratic welfare regime is a low level of income inequality. In accordance with this, Figure 1 shows lower Gini coefficients for Denmark than for Germany in the period 1984-2003. Due to the greater income dispersion in Germany than Denmark, one could expect that an increased share of immigrants will increase income inequality more in Germany than in Denmark.

On the other hand, the high level of benefits and high minimum wages in Denmark compared to Germany may imply greater difficulties and lower economic incentives for immigrants to enter the labour market in Denmark compared to Germany, especially for immigrants with lower levels of qualifications.[2] According to Liebig (2007), in 2004 the gap between the labour force participation rate of natives and foreign-born in Germany was 0.3 % for men and 12.0 % for women, whereas the gap in Denmark was 11.0 % for men and 15.5 % for women. In addition, the native-foreign-born gaps in unemployment rates were at least as large in Denmark as in Germany.

Due to the greater employment gap in Denmark than in Germany, one could expect that an increased share of immigrants will increase income inequality more in Denmark than in Germany.

[2] A comparative study between Germany and Denmark shows lower work incentives for immigrants in Denmark than in Germany due to the higher benefits compared to wages in Denmark (Constant and Schultz-Nielsen, 2004).

Because the two explanations lead to contradictory predictions, we do not have an a priori expectation about how an increasing share of immigrants influences income inequality in the two countries. This is an empirical question which we address in this paper.

The main focus in previous research on immigrants' economic performance has been on topics like labour market integration of immigrants, the effect of immigration on the host country's labour markets, take-up of public transfers, and whether the host society is economically burdened by or profit from immigration (for references see Büchel and Frick, 2005; Tranæs and Zimmerman, 2004).

Concerning the distribution of incomes, most studies have focused on poverty. These studies show that immigrants in many countries experience lower average income and higher poverty rates than natives. This is for instance the case in traditional immigrant countries like Canada and the U.S. (Picot and Hou, 2003; Chapman and Bernstein, 2003) and in European countries like Sweden, Denmark and Germany (Tucci and Wagner, 2005; Pedersen, 2006; Blume et al., 2007).

On the other hand, only few studies have focused on immigration and income inequality. A study from Denmark shows that even though the mean income is lower among immigrants from Non-Western countries than among native Danes, the income inequality (applying the Gini coefficient) in 2000 is nearly the same for native Danes and immigrants from Non-Western countries, while the income inequality is higher for immigrants from Western countries (Statistics Denmark, 2006).[3] One possible explanation for the higher income inequality for Western immigrants is that this group

[3] Western countries are defined as countries in the European Union, Iceland, Norway, Switzerland, Liechtenstein, USA, Canada, Australia and New Zealand. All other countries are defined as Non-Western countries.

both includes students with low household income and highly qualified labour-migrants with high household incomes (Wadensjö and Gerdes, 2004). Looking at disposable income, two German studies find that the income inequality measured by the Gini-coefficient is higher for immigrants than natives in West-Germany (Frick et al., 1997; Grabka, Schwarze and Wagner, 1999), but one of the studies finds the opposite result when using the Theil inequality measure (Grabka, Schwarze and Wagner, 1999).

Two studies have research questions similar to this paper. A study from the U.S. focuses on the relation between immigration and poverty in the U.S. (Chapman and Bernstein, 2003) and a Canadian study focuses on the relationship between immigration and income inequality in Canada (Moore and Pacey, 2003). In the US, immigrants had a higher poverty rate than natives over the period 1994-2002. The poverty rate gap between immigrants and natives, however, decreased over this period. As a consequence, the negative effect of an increasing share of immigrants in the population on the overall poverty rate between 1994 and 2002 was more than offset by the decline in immigrants' poverty rate.

In this paper, we analyse whether and how the increasing share of immigrants has contributed to changes in income inequality in Denmark and Germany over a 20-year period (1984-2003). Compared to the study from Canada, we use several inequality measures. This makes our findings more robust towards differences across the income distribution.

Section 2 briefly describes the migration histories of Denmark and Germany. Section 3 describes the strategy of analysis. Section 4 presents data and descriptive statistics. Section 5 presents results, and section 6 summarises and motivates further research.

2. Migration history

A major focus in our analyses is the impact of changes in the share of immigrants. Consequently, it is of interest briefly to consider the two countries' migration histories.

The two countries differ with respect to the volume of net immigration. In the period after World War II, net migration to Germany has been considerably larger than net migration to Denmark (see Figure 3). But there are also similarities between the countries – for instance with regard to the causes of immigration (for more details see Bauer, Larsen and Matthiessen, 2004).

Figure 3 around here

In the immediate period after World War II, Denmark experienced net emigration (until the 1960s), while Germany experienced a large net inflow of Ethnic Germans. As a consequence of an economic boom and resulting labour shortages, Germany initiated the recruitment of guest workers in the mid-1950s, and Denmark followed about ten years later. It was primarily low-skilled migrants who came as guest workers. The guest workers in Denmark primarily came from Non-Western Countries (mainly from Turkey, Pakistan and Yugoslavia), while Germany also received many guest workers from Western countries (Italy, Spain, Greece and Portugal) besides the immigrants who came from Non-Western countries (mainly from Turkey, Morocco and Tunisia).

In 1973, both countries tightened their labour recruitment policies and introduced measures to reduce the influx of foreign residents. After 1973, only two major channels of legal immigration

from Non-Western countries to Germany and Denmark remained: family reunification and asylum. The family reunification increased significantly in the 1970s and has been an important source of immigration since then. In the 1980s and 1990s the number of refugees increased significantly in the two countries. In addition to the inflow of asylum seekers, Germany received a large inflow of immigrants of German origin from Central and Eastern European countries and from the former Soviet Union in the 1990s. As a consequence of the high level of net immigration to Germany compared to Denmark, the immigrant share of the population is higher in Germany than in Denmark throughout the period 1984-2003. However, the difference between the two countries with respect to the share of immigrants narrows considerably during the period (Figure 2).

3. Strategy of analysis

When studying the distribution of incomes, it is important to consider various inequality measures because they weight different parts of the income distribution differently. We use the following income inequality measures: the Gini coefficient, the 90/10-ratio, and two members of the generalised entropy class of measures (the mean log variation and the Theil index).

We follow the standard approach in the area by looking at equivalised disposable family income, assuming equal sharing within a family (the economic unit), although all analyses are made at the individual level (the unit of analysis). Disposable income is the sum of all family members' incomes minus all taxes and mandatory contributions (e.g. to labour market or pension funds). The applied equivalence scale is the square root of the number of family members.

Firstly, we calculate and analyse the four income inequality measures for the native population and the immigrant population, respectively. The immigrant population includes immigrants as well as

the descendants of immigrants. Secondly, we decompose the generalised inequality indices into the relative contribution of natives, immigrants and the inequality between these two population groups.

3.1. Income distribution measures

In this section, we define the various income inequality measures applied in the analyses. Two often used measures of income inequality are the Gini coefficient and the 90/10-ratio. These measures are appealing because they have easy interpretations and are widely applied. The Gini-coefficient takes on values between 0 and 1 with zero interpreted as perfect equality, while the 90/10-ratio measures the relative income difference between the 90th and the 10th percentile of the distribution, i.e. the relative difference between the 'richest' and the 'poorest' ten percent of the population. The formula for the Gini coefficient is (Gini, 1912):

$$Gini = \frac{1}{2n^2\mu}\sum_{i=1}^{n}\sum_{j=1}^{n}|\, y_i - y_j \,| \tag{1}$$

where n is the number of individuals in the sample, y_i (y_j) is the income of individual i (j), and μ is the mean income.

In addition, we use the mean log deviation and the Theil index. These are two members of the Generalised Entropy (GE) class of measures that are defined as (e.g. Foster and Shneyerov, 2000):

$$I_\beta(y) = \frac{1}{\beta^2 - \beta}\left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{\mu}\right)^\beta - 1\right] \tag{2}$$

where β is an ethical parameter that represents the weight given to distances between incomes at different parts of the income distribution. The lower the β, the more weight is given to the lower tail of the distribution, and vice versa for higher β. The most often used weights are 0 and 1, where β=0 gives more weight to the lower tail of the distribution and β=1 applies equal weight across the

distribution. The GE measure with β=0 is equal to the mean log deviation and the GE measure with β=1 is equal to the Theil index. The applied inequality measure when β=0 (the mean log deviation) is:

$$I_0(y) = \frac{1}{n}\sum_{i=1}^{n} \ln \frac{\mu}{y_i} \tag{3}$$

And for β=1 (the Theil index):

$$I_1(y) = \frac{1}{n}\sum_{i=1}^{n} \frac{y_i}{\mu} \ln \frac{y_i}{\mu} \tag{4}$$

One advantage of the GE measures is that they are decomposable into within-group and between-group contributions (e.g. Mussard, Seyte and Terraza, 2003). In any given year, aggregate inequality can be decomposed into the sum of inequality within different population subgroups (weighted by the subgroups' population shares) and the inequality between the subgroups. Within a given year, the decomposition formula is:

$$I_\beta(y) = \sum_{j=1}^{k} \omega_j \left(\frac{\mu_j}{\mu}\right)^\beta I_\beta(y^j) + \sum_{j=1}^{k} \frac{\omega_j}{\beta(\beta-1)}\left[\left(\frac{\mu_j}{\mu}\right)^\beta - 1\right] \tag{5}$$

where $I(y^j)$ is a sub population specific generalised entropy inequality measure, and ω are the population shares. The first term on the right hand side represents the within-group contributions, while the second term represents the between-group contribution to aggregate inequality. By extending (5) the decomposition over time can be written as (introducing time subscripts t):

$$\begin{aligned} \Delta I_t = I_t - I_{t-s} = \sum_{j=1}^{k} \omega_{t-s}^j \Delta I_t^j + \sum_{j=1}^{k} I_t^j \Delta \omega_t^j + \Delta I_t^{Inter} = \\ (\omega_{t-s}^{Native} \Delta I_t^{Native} + \omega_{t-s}^{\mathrm{Im}migrant} \Delta I_t^{\mathrm{Im}migrant}) + (I_t^{Native} \Delta \omega_t^{Native} + I_t^{\mathrm{Im}migrant} \Delta \omega_t^{\mathrm{Im}migrant}) + \Delta I_t^{Inter} \end{aligned} \tag{6}$$

where k=2 represents natives and immigrants. I^{Inter} is the inequality component attributable to the subpopulations' differences in income levels (the inter-group inequality). The first parenthesis

represents the effect of increases in inequalities and the other parenthesis represents changes in population shares.

4. Data

The data used for the analyses are from the German Socio Economic Panel (GSOEP) and from administrative registers at Statistics Denmark. In this section, we briefly describe the two data sources and the main variables of interest, i.e. the variables concerning immigrant status, income and family size. The means of the variables used in the analyses are presented in Table 1.

Table 1 around here

The German Socio Economic Panel (GSOEP) is a longitudinal survey based on a nationally representative sample of individuals and families in Germany. We use the years from 1984-2003, i.e. the years available for both countries. In 1984, guest worker families from Turkey, (former) Yugoslavia, Greece, Italy, and Spain were over-sampled. Between 1984 and 1994, new immigrants were only included if they moved into one of the sampled households and the sample became less representative of the population. From 1994, new samples of immigrants have been added to the GSOEP and the immigrant population is thus better represented in the second half of the German data than in the first half. In 1990, the Eastern states of Germany were added to the GSOEP. However, because we analyse the period from 1984 to 2003, we only look at the Western part of Germany in this study. Throughout the analysis, we apply the survey sample weights. For a more detailed description of the GSOEP, see Burkhauser, Kreyenfeld and Wagner, 1997.

The Danish register data are longitudinal data for the period 1984-2003 that includes information on the total population of Denmark, i.e. information on the total population of immigrants and their descendants and the total population of native Danes. As the numbers for Denmark are based on population totals, we do not report standard errors for Denmark. Likewise, we do not apply sample weights for Denmark.

Using the GSOEP-data as well as the Danish register data, we can divide the populations into three groups: natives, immigrants and descendants of immigrants. In the German data, being an immigrant is defined by place of birth. Those who are foreign born are defined as immigrants. Those born in Germany with German citizenship are defined as native Germans and those born in Germany with foreign citizenship are defined as descendants of immigrants. A special problem in relation to defining immigrants in Germany is the massive inflow of "ethnic Germans" especially during the 1990s. These people become German citizens at the same time as they immigrate into Germany. In official statistics (like in Figure 2, which are based on citizenship), the ethnic Germans are not regarded as immigrants. However, in GSOEP they are still regarded as immigrants. Consequently, the share of immigrants in Germany in the analyses in this paper deviates from the official German statistics.

In the Danish data, immigrants are defined as persons who are foreign born and whose parents are foreign born or have a foreign citizenship. Descendants of immigrants are defined as persons born in Denmark, and whose parents are foreign born or have a foreign citizenship. Native Danes are defined as persons, who have at least one parent, who is Danish citizen and born in Denmark (Pedersen, 1991).

In this paper, we use the term “immigrants” for immigrants and their descendants. It is important to note that in this analysis, the group of immigrants also includes immigrants and descendants who may have obtained citizenship in the host country both in Germany and in Denmark.

The applied income concept is equivalised disposable family income. This means that all incomes minus all income taxes and mandatory contributions are included (e.g. wages, capital income, rents, labour market contributions and pension contributions). The equivalence scale applied is equal to the square root of the number of family members. An equal intra family distribution of income is assumed, meaning that each family member has the same equivalised family income. Although the family is the economic unit, all analyses are based on individuals. In the Danish case, tax register information is the basis for the income calculations, while self reported income is used for Germany. This may lower cross country comparability, but for both countries these are the best available sources of income information. Furthermore comparability is more of a concern regarding levels and less so for distributions, which is the focus here.

The equivalised family income depends on family size and hence on the definition of families in the Danish and German data. In the Danish data, any individual belongs to one of the three main types of families: (1) singles, (2) married or cohabitating couples or (3) children younger than 18 years not living with their parents. Children living with their parents are included in the parents’ family (whether single or couple) regardless of age, unless the children themselves are married, cohabiting or have their own children (in this case they are defined as a new family). In the German data, the family is defined as the household. A household can include: spouses, life-partners, children, foster children, siblings, parents, in-laws, grandchildren, other relatives, and unrelated persons.

5. Results

5.1. Income inequality for natives and immigrants

We begin the analysis by looking at income inequality for natives and immigrants, respectively, in the two countries. The Gini coefficient and the 90/10-ratio are presented in Figure 4 and 5 (standard errors for Germany are reported in the Appendix). The Gini coefficient for natives in Denmark varies between 0.210 and 0.235 in the 1984-2003-period, while immigrants' Gini coefficient is in the interval 0.232-0.258, see Figure 4. So the inequality among immigrants in Denmark is systematically larger than for natives. The opposite is the case for native Germans who have higher Gini coefficients than immigrants in Germany for most of the period. The gap, however, is closing at the end of the period (no significant difference from 2000 and onwards, cf. standard errors in the Appendix). The immigrants in Germany thus to a remarkable degree seem to be much more homogeneous with respect to income than German natives whereas the opposite is the case in Denmark.

Figure 4 around here

The 90/10-ratio tells almost the same story as the Gini coefficient despite scaling differences, see Figure 5. In fact the correlation is very high between the Gini coefficient and the decile ratio, since 91 % of the variation in the decile ratio in Figure 5 can be explained by the variation in the Gini coefficient and a dummy for Germany and a dummy for immigrant. This is also confirmed by bootstrapping which shows a correlation coefficient between the decile ratio and the Gini coefficient of 0.68 (for German incomes).

Figure 5 around here

The inequality structure in the two countries is also measured applying the generalized entropy index for β=0 (the mean log deviation) and β=1 (the Theil index), see Figure 6 and 7 (standard errors for Germany are found in Appendix). In general, these figures show more variation over time than the other measures. But the within-country native-immigrant rankings are maintained, thus immigrants in Denmark still have higher inequality than natives, while the opposite is true for Germany. The national rankings are thus quite robust to the applied measures.

Figure 6 and 7 around here

Another relatively robust finding is the increase in income inequality throughout the period. For all groups and all measures – except for Danish natives and immigrants using the 90/10-decile ratio – inequality is rising. Consistent with findings from other studies and from other countries, overall income inequality thus has an increasing time trend.

In Tables 2a and 2b, we look more closely into the ratios between immigrants' and natives' inequality measures to study whether the gap is widening or closing over time. In line with the national rankings, the gap is greater than one in Denmark and smaller than one in Germany with a few exceptions. However, it is clear from Tables 2a and 2b that the gap is getting smaller over time – at the end of the 20-year period all gaps are closer to one than in the beginning of the period and

especially so in Germany. For instance looking at the Gini and 90/10-decile immigrant/native ratio in Denmark (Table 2a): Danish immigrants' relative inequality decreases slightly (decrease between 2 and 5 %) when comparing the last year (2003) to the first year (1984). However, this result is sensitive to choice of start and end year and, thus, the decrease is bigger when comparing the average over three start years and three end years (decrease between 5 and 7 %). German immigrants' relative inequality on the other hand increases between 15 and 16 % when looking at the three year averages. The narrowing of the gap is even stronger when applying the generalized entropy measures (Table 2b): relative inequality levels (immigrant index divided by native index) falls more in Denmark and rises even more in Germany. Especially in Germany, but also in Denmark, the gap between immigrants' and natives' income inequality measures is thus closing over time.

Table 2a and 2b around here

5.2. Inequality decomposition

In the second step of the analysis, we decompose aggregate inequality using the generalized inequality indices (the mean log deviation and the Theil index). These inequality measures' correlation with the Gini coefficient is 94 and 96 % respectively using regressions (R^2 from regressions including country and immigrant dummies) and 93 and 94 % using bootstrapping (15,000 replications for German incomes). As described in Section 3, the GE index is easily decomposable into a weighted sum of subpopulation inequality (intra-group inequality) and inequality between subpopulations (between-group inequality).

Figure 8 shows the results of inequality decomposed into the relative contribution of natives, immigrants, and the inequality between these two groups. Take figure 8a as an example: Here, the contribution to the generalized entropy inequality measure with the ethical parameter β=0 (mean log deviation) in 2003 is 10.6 % from immigrants and 2.1% of the inequality can be attributed to between-group inequality. The remaining part of the inequality measure is the contribution of native Danes (87.3% = 100% – 10.6% - 2.1%). An overall commonality (regardless of country and β) is that the inequality contribution of immigrants and the between-group inequality contribution to total inequality have clearly increased from the mid-1980s to the beginning of the new millennium. The contribution of the immigrants and between group inequality is a little greater for $I_{\beta=0}$ (13-14% in 2003) than for $I_{\beta=1}$ (9-12% in 2003), and it is a little higher in Germany (12-14% in 2003) than in Denmark (9-12% in 2003).

Figure 8 around here

In Table 3, we see how the composition of inequality levels affects changes in total inequality. At the aggregate level Danish inequality with β=0 rose from 0.091 in 1984 to 0.106 in 2003, which represents an increase of 17 %. The $I_{\beta=1}$ rose from 0.079 to 0.119, representing a 50 % increase. Inequality among Danish natives increased 12 % (48 % for β=1), while inequality among immigrants increased 3 % (24 % for β=1). Immigrants' contribution to total inequality was 3.9-4.6 % in 1984, but almost doubled over the two decades to a contribution of 6.8-10.6 % in 2003. Thus, the changing composition of the Danish population towards a greater share of immigrants seems to have increased inequality.

Table 3 around here

In Germany, an almost identical development took place. In 1984, immigrants' contribution to inequality was 4.7-5.3 %, while in 2003 it had doubled to 10-12.1 %. Thus, it also holds for Germany that immigrants' impact on inequality increased over time. Consequently, in both countries immigrants have affected inequality in similar ways primarily due to the increased population share.

5.3. Inequality change decomposition

In this last step of the analysis, we decompose the change in aggregate inequality applying the two generalized inequality indices again (the mean log deviation and the Theil index). The decomposition outlined in (6) is followed by taking 1984 as the first year (t-s=1984) and 2003 as the last year (t=2003), and by decomposing into population share changes and inequality changes for natives and immigrants, and the change in inequality between the two groups (see Table 4).

The total change in inequality over the 20-year period is 17 or 50 % in Denmark and 26 or 18 % in Germany, according to the measure used (see Table 4). This inequality change is decomposed into the contribution of each of the five terms in the decomposition equation: The change in the population share of natives, the change in inequality among natives, the change in the population share of immigrants, the change in inequality among immigrants, and the change in the between-group inequality. A change can contribute both positively and negatively to the overall change in inequality. For instance, in both Denmark and Germany the population share of natives has

decreased over the period and so this change contributes negatively to the overall change in inequality (-31 and -14 % for Denmark, and – 30 and -40 % in Germany).

Table 4 around here

Looking at each of the five contribution terms, we find that inequality change among natives has contributed most to the change in overall inequality (70 and 91 % in Denmark and 84 and 79 % in Germany). However, the contribution of the natives is partly offset by the negative contribution from the natives' population share. The total contribution of natives to the change in the overall inequality is then 39 and 77 % in Denmark and 54 and 39 % in Germany.

For the immigrant populations in the two countries, we find that both changes in population shares and changes in inequality have contributed positively to the overall change in inequality. However, it is very clear that the main contribution of the immigrants is through the changing population share. The total contribution from the immigrants (both from changes in population share and changes in inequality) is 46 and 18 % in Denmark and 38 and 52 % in Germany.

Finally, we find that changes in the between-group inequalities also have contributed positively to the overall change in inequality. This contribution is 15 and 5 % in Denmark and 8 and 10 % in Germany. We can thus conclude that immigrants have contributed significantly to the increased income inequality in both Denmark and Germany over this 20-year period, primarily due to the relatively large increase in population shares.

6. Summary and comments

In this paper, we have analysed income inequality measures for natives and immigrants in Denmark and Germany for the 20-year period 1984-2003. We apply four different inequality indices – the Gini-coefficient, the 90/10-decile ratio, the mean log deviation and the Theil index (the latter two are members of the generalised entropy class measures). Our findings are rather robust regardless of measure and reveal interesting differences and similarities across the two countries.

Income inequality is generally lower in Denmark than in Germany, a finding related to differences in welfare state typology between the countries: A social-democratic welfare state values income equality more than a more conservative welfare state regime. However, the ranking of immigrants relative to natives is very different in the two countries: In Denmark, income inequality of immigrants is consistently larger than for natives, while the opposite is the case for Germany. The universal importance put on income equality in Denmark is not extended to immigrants to the same extent as to the natives.

The opposite rankings of immigrants relative to natives imply that the group of immigrants in Denmark is more heterogeneous than natives with respect to income, and vice versa in Germany. As mentioned in the introduction to the paper, an explanation for this can be that the barriers to entering the labour market is greater in Denmark than is the case in Germany, for instance created by the relatively high level of benefits and the high minimum wage.

It is important to note, however, that immigrants' employment rate and income not only depend on labour market structures but also on the composition of the immigrants, e.g. with respect to educational level, country of origin and years since migration (Picot and Hou, 2003; Tucci and

Wagner, 2005; Blume et al. 2007). Consequently, differences in the composition of immigrants in the two countries will also contribute to explain the different patterns of income inequality in the two countries. For instance, because immigration into Germany started earlier than in Denmark, one may expect that immigrants in Germany in general are better integrated in terms of employment than in Denmark. Constant and Larsen (2004) for instance show that immigrants in Denmark from Non-Western countries have less education upon arrival than immigrants in Germany. But on the other hand, immigrants in Denmark invest more in host country education than immigrants in Germany. Looking at relative skill levels, it is not clear whether immigrants in Denmark or in Germany are better off.

Interestingly, the time trend in the data only partly supports the hypothesis of earlier labour market integration in Germany. Throughout the period, inequality is increasing for both immigrant and natives in both countries and for all four inequality indices (with a few exceptions). But inequality increases at a lower rate for immigrants in Denmark than for Danish natives implying a closening of the immigrant native inequality gap, while the opposite is true for Germany, i.e. inequality is increasing faster for immigrants than for natives again implying a closening of the inequality gap. This suggests that in terms of income, immigrants in Denmark are getting more homogeneous over time while immigrants in Germany are getting less homogenous.

Another main finding of the analyses in the paper is that immigrants play an increasing role in the determination of aggregate inequality over time in both countries. By decomposing the general entropy measures (mean log deviation and the Theil index), we find that in 1984 4-6% of aggregate inequality both in Denmark and in Germany is explained by the presence of immigrants (the contribution of within-immigrant group inequality and between-immigrant and native group

inequality). By 2003, the share of inequality explained by the presence of immigrants had increased to 8-14%. The main reason for the increase is that the share of immigrants in the populations has increased in both countries – and because the population share is higher in Germany than in Denmark, a larger share of the inequality in Germany can be explained by the presence of immigrants. But also between-group inequality has increased in both countries – from being negligible to about 2 %.

It is obvious that the key to explaining the inequality trends lies in the labour market. One of the main reasons for the differences in employment rates are skill differences between immigrants and natives. Furthermore, employment rate differences should also be looked at in relation to average duration of residence in the host country and work incentives (benefits relative to wages). Future work will explore these explanations to widen our understanding of the role immigrants play for aggregate income inequality in Denmark and in Germany.

References

Bauer, T., C. Larsen, and P.C. Matthiessen, 2004, Immigration policy and Danish and German immigration, in: Tranæs, T. and Zimmermann, K.F., eds., Migrants, work, and the welfare state (University Press of Southern Denmark, Odense).

Blume, K., B. Gustafsson, P. Pedersen and M.Verner, 2007, At the lower end of the table: determinants of poverty among immigrants to Denmark and Sweden, Journal of Ethnic and Migration Studies, vol. 33, 373-396.

Brandolini, A. and T.M. Smeeding, 2005, Inequality patterns in Western democracies: cross-country differences and time changes, unpublished conference paper.

Büchel, F. and J.R. Frick, 2005, Immigrants' economic performance across Europe – does immigration policy matters? Population Research and Policy Review, vol. 24, 175-212.

Burkhauser, R.V., M. Kreyenfeld and G.G. Wagner, 1997, The German socio-economic panel: a representative sample of reunited Germany and its parts, DIW Vierteljahreshefte zur Wirtschaftsforschung, vol. 1997(1).

Chapman, J. and J. Bernstein, 2003, Immigration and poverty: how are they linked? Monthly Labor Review, April 2003, 10-15.

Coleman, D., 1999, International migration to Europe in the late 1990s, in: Coleman, D. and E. Wadensjö (ed.), Immigration to Denmark (Aarhus University Press, Aarhus).

Constant, A. and C. Larsen, 2004, The educational background and human capital attainment of immigrants, in: T. Tranæs and K.F. Zimmerman (ed.), Migrants, work and the welfare state (University Press of Southern Denmark, Odense).

Constant, A. and M.L. Schultz-Nielsen, 2004, Labour force participation and unemployment: incentives and preferences, in: T. Tranæs and K.F. Zimmerman (ed.), Migrants, work and the welfare state (University Press of Southern Denmark, Odense).

Gini, C., 1912, Variabilitá e Mutabilitá, (Tipografia di Paolo Cuppini, Bologna).

Grabka, M., J. Schwarze and G. Wagner, 1999, How unification and immigration affected the German income distribution, European Economic Review, vol. 43, 867-878.

Foster, J., and A. Scheyerov, 2000, Path independent inequality measures, Journal of Economic Theory, vol. 91(2), 199-222.

Frick, J.F., F. Büchel, P. Krause and G.G. Wagner, 1997, Immigration has increased income inequality and poverty in Germany slightly, Economic Bulletin, vol. 34, 25-32.

LaLonde, R.J. and R.H. Topel, 1991, Immigrants in the American Labor market: Quality, Assimilation, and Distributional Effects, American Economic Review, vol. 81, 297-302.

Liebig, T., 2007, The labour market integration of immigrants in Germany, OECD social, employment and migration working papers 47.

Moore, E.G. and M.A. Pacey, 2003, Changing income inequality and immigration in Canada 1980-1995, Canadian Public Policy, vol. 29, 33-49.

Mussard, S., F. Seyte and T. Terraza, 2003, Decomposition of Gini and the generalised entropy inequality measures, Economics Bulletin, vol. 4(7) p 1-6.

Pedersen, L., 1991, Immigrants and their Descendents in Denmark (in Danish) (Statistics Denmark, Copenhagen).

Pedersen, P.J, 2006, Indkomstmobilitet eller fastlåsning i lavindkomst? Danske erfaringer 1983-2004 (in Danish), in: T. Tranæs Skat, arbejde og lighed. (Gyldendal, Copenhagen).

Picot, G. and F. Hou, 2003, The rise in low-income rates among immigrant in Canada, Statistics Canada, Business And Labour Market Analysis Division, Ottawa.

Pischke, J. and J. Velling, 1997, Employment effects of immigration to Germany: an analysis based on local labor markets, the Review of Economics and Statistics, vol. 79, 594-604.

Smeeding, T., 2006, Poor People in Rich Nations: The United States in a Comparative Perspective, Journal of Economic Perspectives, vol. 20(1), 69-90.

Statistics Denmark, 2006, Income 2004 (in Danish) (Statistics Denmark, Copenhagen).

Tranæs, T. and K.F. Zimmerman, 2004, Migrants, work and the welfare state (University Press of Southern Denmark, Odense).

Tucci, I. and G.G. Wagner, 2005, Above-average rise in immigrant poverty: poverty often concomitant with other types of deprivation, DIW Weekly Report No.5/2005

Wadensjö, E. and C. Gerdes, 2004, Some socioeconomic consequences of immigrations, in: T. Tranæs and K.F. Zimmerman (eds.), Migrants, work and the welfare state (University Press of Southern Denmark, Odense).

Tables and figures

TABLE 1

Summary statistics for Denmark and Germany

	Denmark			Germany		
	Natives	Immigrants	All	Natives	Immigrants	All
1984:						
Equivalised income*)	132,388	126,353	132,209	15,872 (8,904)	14,336 (6,825)	15,773 (8,793)
Family size	2.82	2.95	2.82	3.06 (1.42)	3.51 (1.62)	3.08 (1.44)
Population share	0.97	0.03	1.00	0.94 (0.25)	0.06 (0.25)	1.00 (0.00)
2003:						
Equivalised income*)	185,053	142,272	181,764	20,279 (11,837)	16,198 (9,187)	19,761 11,614)
Family size	2.67	3.33	2.72	2.77 (1.38)	3.20 (1.54)	2.83 (1.41)
Population share	0.92	0.08	1.00	0.87 (0.33)	0.13 (0.33)	1.00 (0.00)

Note: *Standard errors for German measures are reported in parentheses.*
**) National currencies at current prices (DKK and EURO). The income concept is equivalised household income.*

TABLE 2a

Gini-coefficient and 90/10-ratio: relative levels and changes

	Denmark		Germany	
	Gini	90/10-ratio	Gini	90/10-ratio
1984 level for natives	*0.210*	*2.61*	*0.262*	*3.23*
Immigrants' level as a fraction of natives' level:				
1984	1.16	1.10	0.91	0.89
1985	1.15	1.11	0.84	0.85
1986	1.15	1.09	0.86	0.94
1987	1.13	1.09	0.86	0.98
1988	1.12	1.07	0.90	0.95
1989	1.12	1.09	0.88	0.92
1990	1.12	1.08	0.89	0.90
1991	1.13	1.08	0.85	0.89
1992	1.12	1.07	0.86	0.84
1993	1.11	1.08	0.87	0.81
1994	1.08	1.04	0.93	0.95
1995	1.07	1.02	0.91	0.98
1996	1.07	1.01	0.90	0.93
1997	1.06	1.01	0.91	0.87
1998	1.05	1.02	0.89	0.87
1999	1.06	1.02	0.88	0.89
2000	1.04	1.02	0.99	0.95
2001	1.05	1.03	1.00	1.01
2002	1.07	1.03	1.02	1.07
2003	1.10	1.07	0.99	1.03
2003 level for natives	*0.235*	*2.68*	*0.287*	*3.77*
Absolute change in fractions :				
1984-2003	-0.05	-0.02	0.08	0.14
1984/1986-2001/2003	-0.08	-0.06	0.13	0.14
1984/1993-1994/2003	-0.07	-0.06	0.07	0.06
Relative change in fractions, %:				
1984-2003	-5.4	-2.0	8.9	16.1
1984/1986-2001/2003	-7.2	-5.1	15.4	16.0
1984/1993-1994/2003	-6.0	-5.3	8.0	6.6

Note: *1984/1986-2001/2003 states the change in the average of the first three years of the period compared the average of the last three years. 1984/1993-1994/2003 states the same for averages of ten years. Standard errors for German measures are reported in the Appendix, Tables A1.1.-A1.3.*

TABLE 2b

Generalized entropy inequality indices: relative levels and changes

	Denmark		Germany	
	β=0	β=1	β=0	β=1
1984 level for natives	*0.0893*	*0.0784*	*0.1221*	*0.1236*
Immigrants' level as a fraction of natives' level:				
1984	1.58	1.39	0.82	0.79
1985	1.56	1.17	0.67	0.64
1986	1.54	1.31	0.72	0.67
1987	1.46	1.28	0.77	0.70
1988	1.42	1.22	0.82	0.77
1989	1.44	1.19	0.74	0.75
1990	1.48	1.24	0.71	0.72
1991	1.49	1.34	0.68	0.69
1992	1.52	1.28	0.68	0.71
1993	1.50	1.18	0.73	0.75
1994	1.39	1.18	0.79	0.85
1995	1.47	1.14	0.83	0.80
1996	1.43	1.17	0.78	0.77
1997	1.41	1.15	0.86	0.81
1998	1.41	1.08	0.73	0.77
1999	1.37	1.08	0.75	0.78
2000	1.32	1.04	0.91	0.97
2001	1.35	1.05	0.95	0.99
2002	1.37	1.12	1.01	1.03
2003	1.46	1.16	0.97	0.98
2003 level for natives	*0.1003*	*0.1157*	*0.1499*	*0.1423*
Absolute change in fractions :				
1984-2003	-0.13	-0.22	0.15	0.18
1984/1986-2001/2003	-0.17	-0.18	0.24	0.30
1984/1993-1994/2003	-0.10	-0.14	0.12	0.15
Relative change in fractions, %:				
1984-2003	-8.1	-16.1	17.7	23.2
1984/1986-2001/2003	-10.9	-13.6	32.2	42.6
1984/1993-1994/2003	-6.9	-11.1	16.8	21.2

Note: *1984/1986-2001/2003 states the change in the average of the first three years of the period compared the average of the last three years. 1984/1993-1994/2003 states the same for averages of ten years. Standard errors for German measures are reported in the Appendix, Tables A1.1.-A1.3.*

TABLE 3

Decomposition of GE inequality: level and change, 1984 to 2003

	Denmark				Germany			
	Natives	Immig rants	Inter-group	All	Natives	Immig rants	Inter-group	All
β=0								
Inequality within group:								
1984	0.089	0.141		0.091	0.122	0.100		0.121
2003	0.100	0.146		0.106	0.150	0.145		0.152
Absolute change	0.011	0.004		0.015	0.028	0.045		0.031
Relative change,%	12	3		17	23	44		26
Contribution to inequality:								
1984	0.087	0.004	0.000	0.091	0.114	0.006	0.000	0.121
2003	0.093	0.011	0.002	0.106	0.131	0.018	0.003	0.152
Contribution to inequality,%:								
1984	95.3	4.6	0.0	100	94.4	5.3	0.2	100
2003	87.3	10.6	2.1	100	86.2	12.1	1.7	100
β=1								
Inequality within group:								
1984	0.078	0.109		0.079	0.124	0.098		0.122
2003	0.116	0.135		0.119	0.142	0.139		0.145
Absolute change	0.037	0.026		0.040	0.019	0.041		0.022
Relative change,%	48	24		50	15	42		18
Component of total inequality:								
1984	0.076	0.003	0.000	0.079	0.116	0.006	0.000	0.122
2003	0.109	0.008	0.002	0.119	0.128	0.015	0.002	0.145
Contribution to inequality,%:								
1984	96.1	3.9	0.0	100	95.1	4.7	0.2	100
2003	91.4	6.8	1.8	100	88.2	10.0	1.7	100

Note: *GE refers to the generalised entropy class of measures with parameter β. Standard errors for German measures are reported in the Appendi , Tables A1.1.-A1.3.*

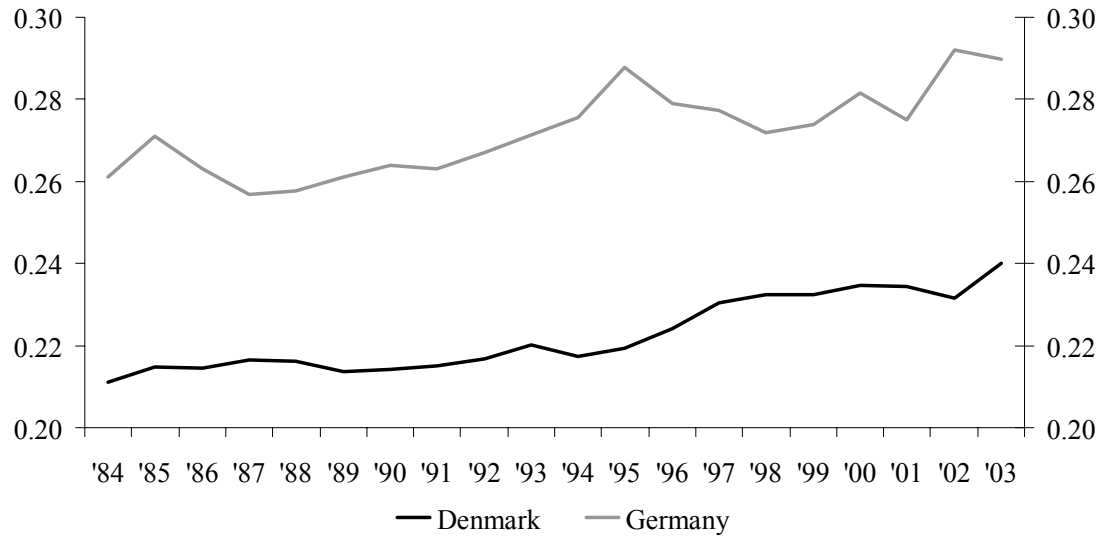
TABLE 4

Population share and inequality levels and changes, 1984 and 2003

	Natives		Immigrants		Inter group	Total
	Population ω^{Nati}	Inequality I^{Nati}	Population ω^{Immi}	Inequality I^{Immi}	Inequality I^{Inter}	Inequality I_{β}
Denmark						
β=0						
1984	0.970	0.0893	0.030	0.1415	0.0000	0.0909
2003	0.923	0.1003	0.077	0.1460	0.0023	0.1061
Change	-0.047	0.0110	0.047	0.0045	0.0022	0.0152
- % change	-5	12	159	3	7274	17
Decompostion	-0.005	0.0106	0.007	0.0001	0.0022	0.0152
- % contribution	-31	70	45	1	15	100
β=1						
1984	0.970	0.0784	0.030	0.1088	0.0000	0.0793
2003	0.923	0.1157	0.077	0.1348	0.0021	0.1193
Change	-0.047	0.0373	0.047	0.0260	0.0021	0.0400
- % change	-5	48	159	24	6838	50
Decompostion	-0.005	0.0362	0.006	0.0008	0.0021	0.0400
- % contribution	-14	91	16	2	5	100
Germany						
β=0						
1984	0.936	0.1221	0.0642	0.1002	0.0003	0.1210
2003	0.873	0.1499	0.1270	0.1448	0.0026	0.1519
Change	-0.063	0.0278	0.063	0.0446	0.0023	0.0309
- % change	-7	23	98	44	775	26
Decompostion	-0.009	0.0260	0.009	0.0029	0.0023	0.0309
- % contribution	-30	84	29	9	8	100
β=1						
1984	0.936	0.1236	0.0642	0.0983	0.0003	0.1223
2003	0.873	0.1423	0.1270	0.1394	0.0025	0.1444
Change	-0.063	0.0187	0.063	0.0411	0.0022	0.0221
- % change	-7	15	98	42	751	18
Decompostion	-0.009	0.0175	0.009	0.0026	0.0022	0.0221
- % contribution	-40	79	40	12	10	100

FIGURE 1

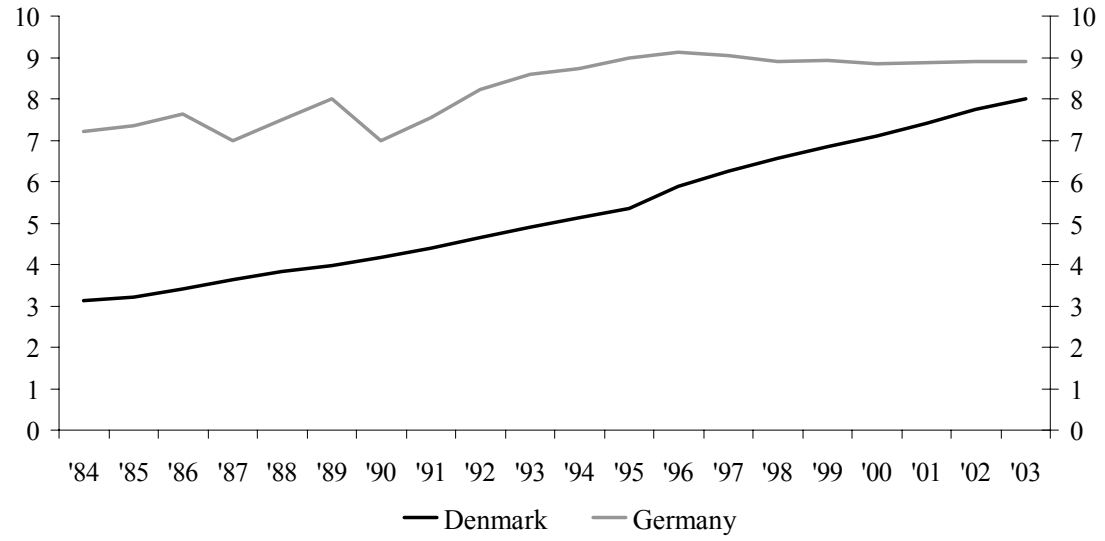
Gini-coefficients



Note: *The income concept is equivalised household disposable income. Standard errors for German measures are reported in the appendix, table A1.3.*

FIGURE 2

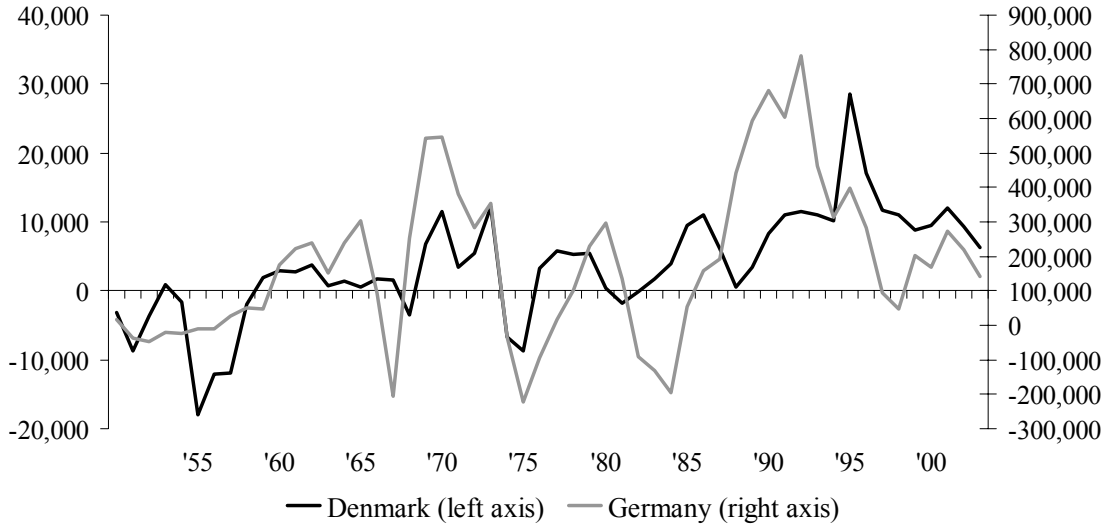
The share of immigrants in total population in %



Source: *Statistics Denmark; Beauftragte der Bundesregierung für Migration, Flüchtlinge und Integration.*
Note: *The numbers for Denmark include immigrants and their descendants, among these immigrants and descendants who have obtained Danish citizenship. The numbers for Germany include all with foreign citizenship. In the GSOEP-data used for the analyses in this paper, immigrants with German citizenship are included in the immigrant group (see section 4).*

FIGURE 3

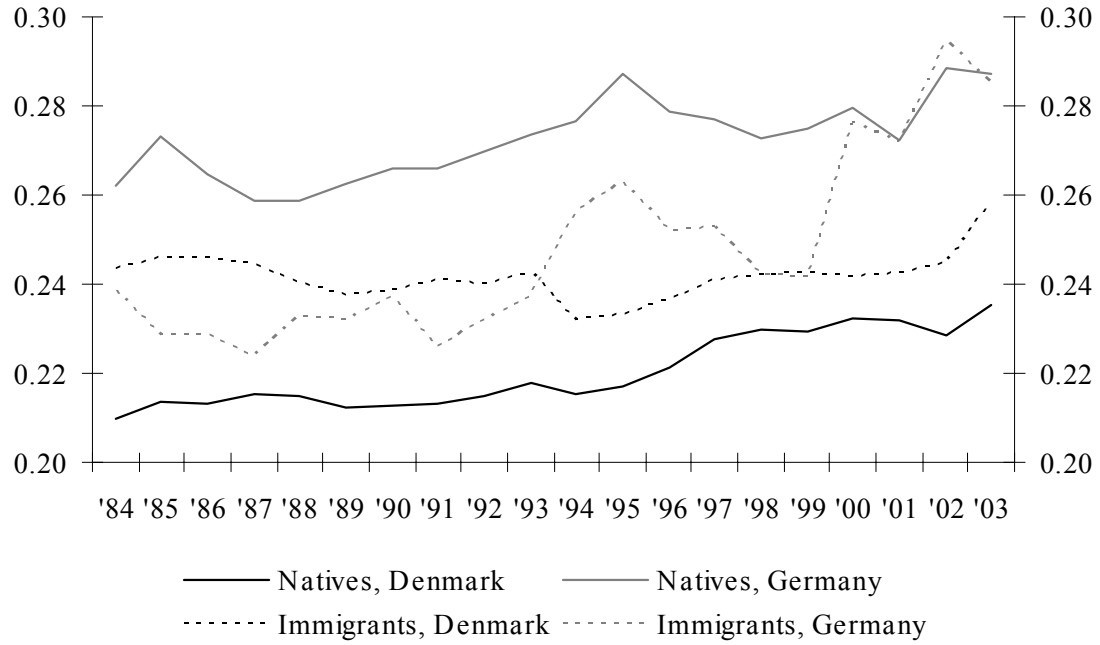
Net migration to Denmark and Germany (1950-2003)



Source: *Statistics Denmark and Statistisches Bundesamt.*

FIGURE 4

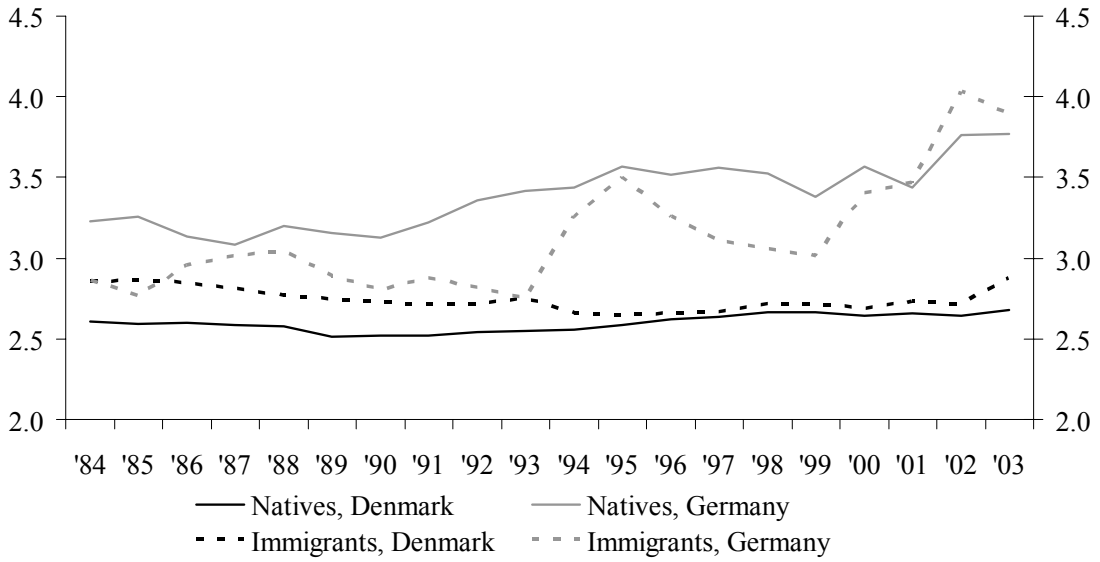
Gini-coefficients for natives and immigrants



Note: *Standard errors for German measures are reported in the Appendix, Tables A1.1.-A1.2.*

FIGURE 5

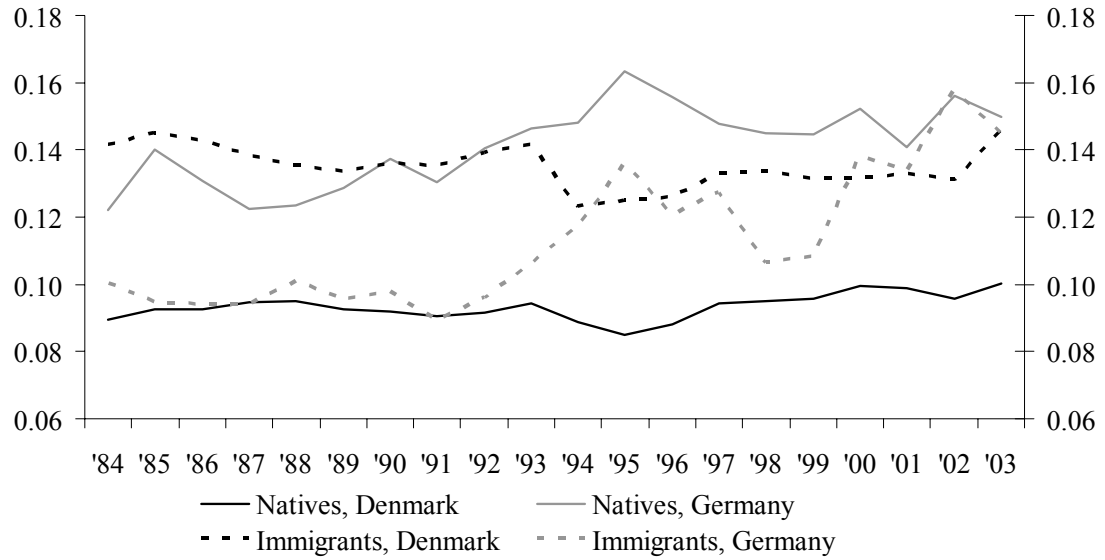
90/10-ratio for natives and immigrants



Note: *Standard errors for German measures are reported in the Appendix, Tables A1.1.-A1.2.*

FIGURE 6

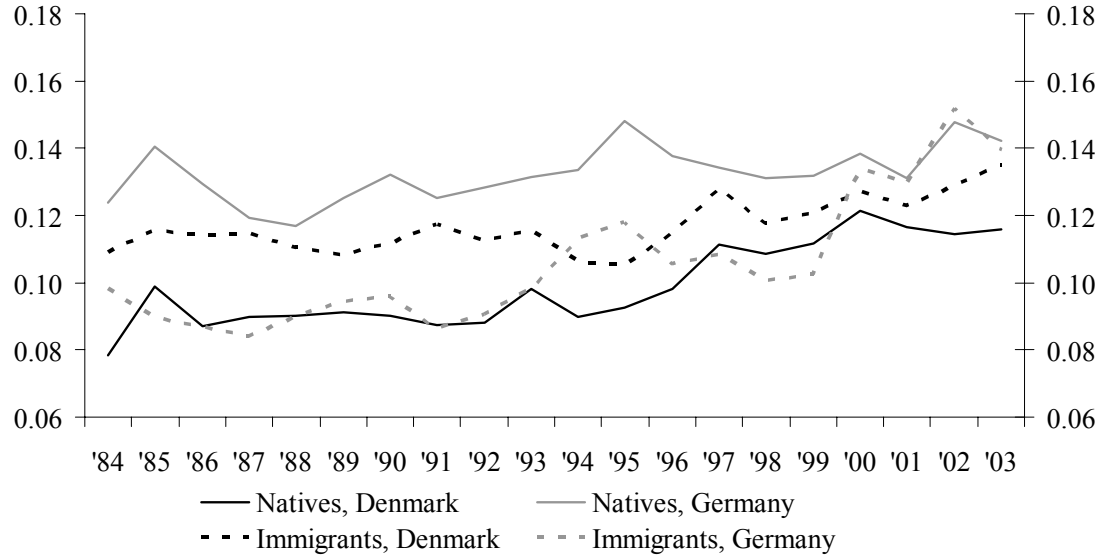
Mean log deviation (GE measure, β=0) for natives and immigrants



Note: *Standard errors for German measures are reported in the Appendix, Tables A1.1.-A1.2.*

FIGURE 7

Theil index (GE measure, β=1) for natives and immigrants



Note: *Standard errors for German measures are reported in the Appendix, Tables A1.1.-A1.2.*

FIGURE 8

Immigrants' and between-groups' contribution to the coefficient of variation and the Theil index (GE measure, β={0,1}). Native population's contribution is the remaining percentage up to 100 %

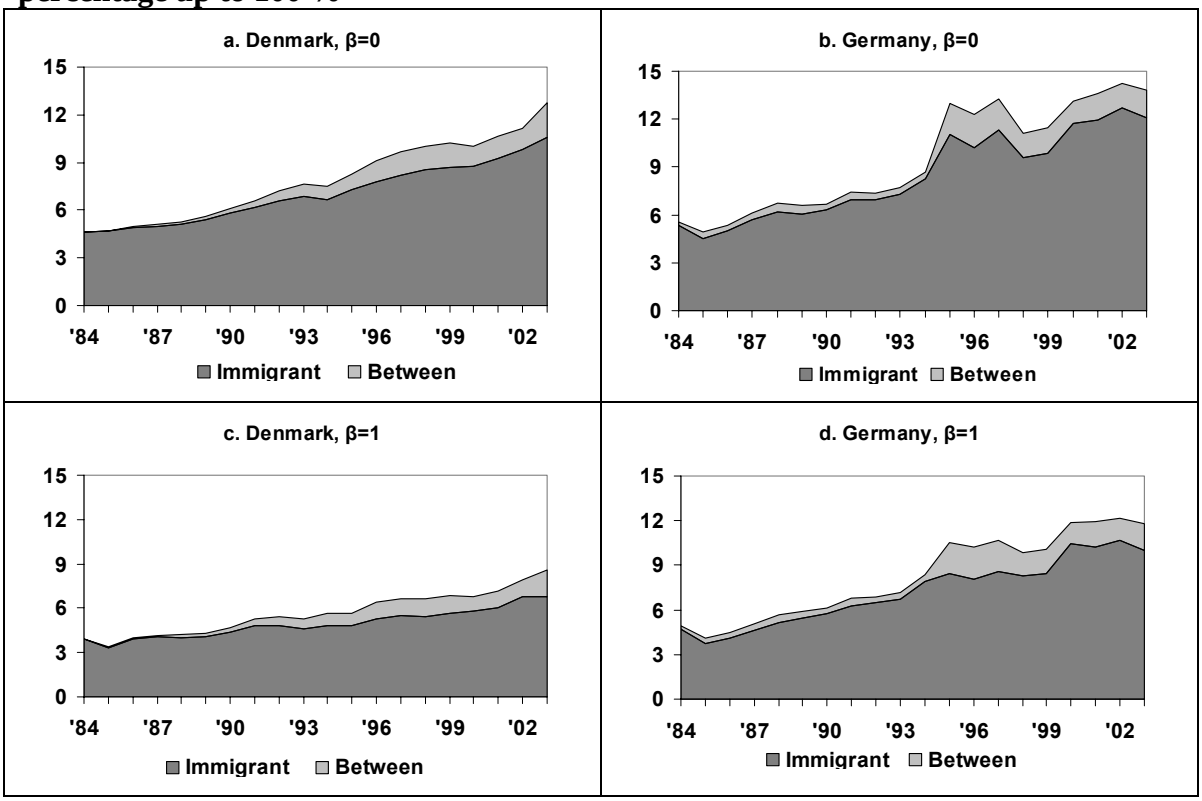


TABLE A1.1

Estimates and standard errors of inequality indices for Germany: Natives

	Gini-coefficient		90/10-ratio		GE, β=0		GE, β=1	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
1984	0.2621	0.0030	3.2282	0.0373	0.1221	0.0031	0.1236	0.0039
1985	0.2731	0.0041	3.2590	0.0370	0.1402	0.0050	0.1405	0.0070
1986	0.2648	0.0038	3.1358	0.0464	0.1307	0.0044	0.1292	0.0058
1987	0.2588	0.0032	3.0826	0.0413	0.1225	0.0036	0.1195	0.0040
1988	0.2588	0.0030	3.1971	0.0598	0.1234	0.0038	0.1168	0.0036
1989	0.2624	0.0041	3.1537	0.0454	0.1287	0.0049	0.1250	0.0069
1990	0.2658	0.0044	3.1288	0.0584	0.1372	0.0057	0.1322	0.0073
1991	0.2659	0.0036	3.2241	0.0486	0.1305	0.0041	0.1253	0.0048
1992	0.2699	0.0037	3.3599	0.0704	0.1403	0.0048	0.1282	0.0051
1993	0.2737	0.0038	3.4161	0.0638	0.1465	0.0054	0.1313	0.0052
1994	0.2767	0.0040	3.4365	0.0703	0.1481	0.0053	0.1336	0.0053
1995	0.2874	0.0048	3.5678	0.0828	0.1633	0.0062	0.1482	0.0073
1996	0.2786	0.0042	3.5179	0.0861	0.1556	0.0072	0.1379	0.0057
1997	0.2770	0.0044	3.5601	0.1102	0.1477	0.0058	0.1341	0.0054
1998	0.2728	0.0042	3.5212	0.0852	0.1450	0.0055	0.1312	0.0062
1999	0.2749	0.0037	3.3772	0.0661	0.1446	0.0050	0.1317	0.0046
2000	0.2795	0.0025	3.5661	0.0565	0.1523	0.0044	0.1385	0.0035
2001	0.2721	0.0028	3.4378	0.0524	0.1407	0.0038	0.1310	0.0041
2002	0.2886	0.0028	3.7624	0.0726	0.1561	0.0041	0.1478	0.0044
2003	0.2871	0.0028	3.7729	0.0559	0.1499	0.0032	0.1423	0.0035

TABLE A1.2

Estimates and standard errors of inequality indices for Germany: Immigrants

	Gini-coefficient		90/10-ratio		GE, β=0		GE, β=1	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
1984	0.2387	0.0070	2.8623	0.1076	0.1002	0.0063	0.0983	0.0063
1985	0.2284	0.0078	2.7692	0.1168	0.0945	0.0094	0.0894	0.0080
1986	0.2286	0.0064	2.9559	0.1067	0.0940	0.0061	0.0866	0.0054
1987	0.2237	0.0065	3.0102	0.1164	0.0939	0.0064	0.0841	0.0051
1988	0.2330	0.0074	3.0435	0.2006	0.1008	0.0073	0.0898	0.0057
1989	0.2318	0.0097	2.8867	0.1206	0.0954	0.0083	0.0942	0.0100
1990	0.2369	0.0090	2.8011	0.1007	0.0979	0.0078	0.0958	0.0085
1991	0.2261	0.0071	2.8718	0.1119	0.0892	0.0062	0.0863	0.0067
1992	0.2318	0.0076	2.8191	0.1134	0.0960	0.0067	0.0905	0.0076
1993	0.2376	0.0088	2.7509	0.0970	0.1064	0.0085	0.0981	0.0084
1994	0.2564	0.0107	3.2567	0.1554	0.1177	0.0097	0.1131	0.0103
1995	0.2628	0.0066	3.5001	0.1847	0.1361	0.0088	0.1178	0.0065
1996	0.2521	0.0057	3.2561	0.1389	0.1208	0.0075	0.1056	0.0050
1997	0.2527	0.0063	3.1060	0.0974	0.1274	0.0095	0.1081	0.0060
1998	0.2420	0.0061	3.0524	0.1293	0.1065	0.0064	0.1005	0.0055
1999	0.2415	0.0072	3.0106	0.1245	0.1082	0.0073	0.1022	0.0066
2000	0.2760	0.0065	3.4022	0.1426	0.1381	0.0070	0.1338	0.0069
2001	0.2721	0.0068	3.4662	0.1326	0.1338	0.0069	0.1297	0.0072
2002	0.2943	0.0078	4.0304	0.2678	0.1577	0.0100	0.1518	0.0085
2003	0.2849	0.0069	3.8824	0.1730	0.1448	0.0070	0.1394	0.0067

TABLE A1.3

Estimates and standard errors of inequality indices for Germany: All

	Gini-coefficient		90/10-ratio		GE, β=0		GE, β=1	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
1984	0.2610	0.0029	3.2031	0.0379	0.1210	0.0029	0.1225	0.0037
1985	0.2710	0.0039	3.2157	0.0363	0.1378	0.0047	0.1381	0.0066
1986	0.2630	0.0036	3.1131	0.0402	0.1287	0.0041	0.1272	0.0055
1987	0.2569	0.0031	3.0729	0.0423	0.1209	0.0034	0.1176	0.0038
1988	0.2577	0.0029	3.1933	0.0540	0.1223	0.0036	0.1156	0.0034
1989	0.2610	0.0039	3.1597	0.0416	0.1267	0.0045	0.1235	0.0065
1990	0.2641	0.0042	3.1124	0.0533	0.1343	0.0053	0.1298	0.0069
1991	0.2630	0.0033	3.1664	0.0455	0.1270	0.0038	0.1224	0.0044
1992	0.2671	0.0034	3.3408	0.0618	0.1365	0.0044	0.1254	0.0047
1993	0.2712	0.0036	3.3383	0.0591	0.1431	0.0050	0.1289	0.0049
1994	0.2755	0.0037	3.4033	0.0645	0.1456	0.0048	0.1322	0.0049
1995	0.2877	0.0044	3.6551	0.0890	0.1630	0.0057	0.1480	0.0067
1996	0.2790	0.0039	3.5577	0.0651	0.1543	0.0064	0.1376	0.0053
1997	0.2772	0.0041	3.5452	0.0782	0.1479	0.0053	0.1340	0.0050
1998	0.2719	0.0037	3.4995	0.0628	0.1423	0.0048	0.1300	0.0056
1999	0.2740	0.0034	3.4216	0.0652	0.1422	0.0045	0.1307	0.0042
2000	0.2815	0.0024	3.6476	0.0508	0.1526	0.0040	0.1400	0.0033
2001	0.2749	0.0025	3.4952	0.0567	0.1422	0.0035	0.1331	0.0038
2002	0.2919	0.0027	3.8400	0.0757	0.1588	0.0039	0.1505	0.0041
2003	0.2898	0.0027	3.8521	0.0593	0.1519	0.0030	0.1445	0.0033