

The impact of federal social policies on spatial income inequalities in Germany: empirical evidence from social security data

Bruckmeier, Kerstin; Schwengler, Barbara

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Articles on scientific dialogue

The impact of federal social policies on spatial income inequalities in Germany

Empirical evidence from social security data

Kerstin Bruckmeier
Barbara Schwengler

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Kerstin Bruckmeier (IAB)

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Mit der Reihe „IAB-Discussion Paper“ will das Forschungsinstitut der Bundesagentur für Arbeit den Dialog mit der externen Wissenschaft intensivieren. Durch die rasche Verbreitung von Forschungsergebnissen über das Internet soll noch vor Drucklegung Kritik angeregt und Qualität gesichert werden.

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Abstract

Almost twenty years after German reunification there are still huge income disparities between western and eastern regions in Germany. The main purpose of the paper is to show how social transfer payments reduce these inter-regional disparities.

In a first step we examine inequalities in the distribution of gross income from dependent employment and self-employment at the small-area level of 439 NUTS-3 units. Our distributional analysis quantifies regional wage inequalities driven by economic disparities and different patterns of employment. A decomposition analysis reveals that large wage differentials exist not only between eastern and western Germany but also within western regions. Furthermore we estimate the income effects of the German unemployment and pension insurance using different sources of social security data at regional level. The results indicate large regional redistributive effects across areas: the share of social benefits and payments as a percentage of total net income ranges from 11 per cent to 41 per cent.

Like other European states, Germany faces several problems concerning its welfare system. Recent reforms of the welfare system in 2004 and 2005 also affected some core principles of social security. Our results show that changing parameters of eligibility, claims and financing will influence the spatial income distribution. Hence further research on this topic is recommended when data for 2005 and later years are available.

Zusammenfassung

Fast zwanzig Jahre nach der deutschen Wiedervereinigung gibt es immer noch erhebliche regionale Einkommensunterschiede zwischen West- und Ostdeutschland. Der vorliegende Artikel soll zeigen, wie die Transferzahlungen des Staates diese Einkommensdisparitäten ausgleichen.

In einem ersten Schritt untersuchen wir die Ungleichheiten der Bruttolöhne aus abhängiger und selbständiger Beschäftigung auf der Ebene der 439 Stadt- und Landkreise. Die Verteilung der Einkommen spiegelt deutlich die regionalen Disparitäten von Wirtschaftskraft und Beschäftigungsmustern wieder. Mit der Dekompositionsanalyse lässt sich zeigen, dass es nicht nur erhebliche Einkommensunterschiede zwischen West- und Ostdeutschland gibt, sondern ebenfalls zwischen westdeutschen Regionen. Darüber hinaus schätzen wir die regionalen Einkommenseffekte der Arbeitslosen- und Rentenversicherung, wobei wir auf verschiedene Datenquellen mit Sozialdaten zurückgreifen. Die Ergebnisse weisen auf einen deutlichen regionalen Umverteilungseffekt hin: Der Anteil der Sozialleistungen am gesamten Nettoeinkommen streut regional zwischen 11 % und 41 %.

Deutschland sieht sich wie andere europäische Länder mit den Problemen seines Wohlfahrtsstaates konfrontiert. Jüngste einschneidende Reformen der Jahre 2004 und 2005 betrafen dabei ebenfalls die Kernelemente der sozialen Sicherungssysteme. Unsere Ergebnisse zeigen, dass Änderungen von Anspruchsvoraussetzungen und Finanzierung die regionale Einkommensverteilung beeinflussen. Aus diesem Grund empfehlen sich weitergehende Untersuchungen, sobald geeignete Daten der Jahre 2005 und später verfügbar sind.

JEL classification: D30, D63, H55, R12

Keywords: regional income inequalities, income distribution, social insurance

1 Introduction

The redistributive effect of the federal tax and transfer system has been well analysed in the literature dealing with the personal income distribution at a microeconomic level. Actually, changes in nearly all fields of public policies have direct or indirect effects on the spatial distribution of income or resources, since the affected population or groups are not distributed equally across regions. The pre- and post-government distribution of personal income is directly linked to the spatial distribution of income and the regional variation of economic, social and political factors. However, the spatial picture of welfare and income distribution points out political and economic implications.

In Germany like in the European Union equalising cross-regional differences in living standards is an important policy goal which is anchored in the constitution. Particularly after German reunification it gained importance in political discussion as a consequence of large economic differences between eastern and western Germany. Because of eastern Germany's ailing economy the government has provided a lot of financial support to improve the economic situation and to stabilise market income. However, disparities in labour productivity and unemployment still remain high.

Several federal policy systems and instruments deal with regional economic and financial equalisation. For example from 1990 to 2007 the German "Joint Task for Improving the Regional Economic Structure" provided a total of 34,164 billion Euros for investment grants to the eastern states (BMVBS 2007: 34). Substantial structural funds have additionally been provided by the European Commission to equalise the living and working conditions in the two parts of Germany. Despite these substantial government grants, pre-government income disparities still exist between Germany's western and eastern regions. In 2003 the average wages of dependent employees in eastern Germany amounted to 72.8 per cent of average western German wages (Statistisches Bundesamt [Federal Statistical Office] 2006: 116).

Furthermore, the German welfare state influences the regional distribution of post-government income to a great extent. Social policies in Germany are mainly constituted at the federal and not at the regional level like the Federal States or *Länder*. Analyses of the benefits of federal budgets with regard to the possibility of sharing the risks of regional income shocks tell us about the regional redistributive and stabilising effect of these systems on regional income. Because economic disparities between German regions have been persistent over the last decades, we assume not only that shocks in disposable income of regions are diminished by the federal tax and transfer system but also that permanent income is affected. Thus the welfare state provides indirect regional subsidies from prospering regions to economically weak regions, which is essential for considering the transfers from west to east. Germany's federal social security system, financed mainly by contributions, plays a decisive role in this process of indirect regional income redistribution. Firstly, the social security system is the most important element of the German welfare state. In 2005 the share of contributions to social insurance as a percentage of the gross do-

mestic product in Germany was 13.9 per cent, whereas in the other OECD countries it was much lower at 9.2 per cent on average. On the other hand the share of the tax revenues (as a percentage of the gross domestic product) was lower in Germany, at 20.9 per cent, than in the OECD countries at 26.9 per cent (OECD 2007: 19, 28, 73). Expenditure on social insurance amounted to more than 80 per cent of all federal expenditure on social benefits in the year 2005. Secondly, unlike the mentioned instruments of direct financial support, the system of social security is not directly subject to the different interests of the federal subdivisions in the political process. Although the German states contribute to and benefit from the social security system to different extents, there is consensus about the basic necessity to guarantee the same amount of social insurance in all German regions.

We analyse how, due to the large regional economic disparities, payments from social insurance reduce inter-regional income differences. With regard to the total income it becomes visible that regional differences between eastern and western Germany are gradually disappearing and that low-income regions can be found in some parts of western Germany as well. Our analysis makes use of data from different sources and examines the income distribution of the year 2003. It is based on the 439 administrative districts in Germany. First of all we analyse the distribution of the pre-government earned income of employees and the self-employed and show how the gross income is regionally distributed in Germany. Next we look at the regional budget incidence of unemployment and pension insurance and compare our findings with the regional distribution of post-government income. For our purposes we analyse only the income distribution after German unemployment and pension insurance (i.e. after contributions to unemployment and pension insurance have been deducted and payments and benefits from the two insurance systems have been added) and show the effect that these two systems have on reducing income differences. We use a decomposition analysis based on commonly decomposable inequality indices such as the Theil Index. Due to the economic differences and the political relevance we decompose total inequality into eastern and western Germany. Because we are also interested in the regional income distribution within the western regions, and previous analyses have shown that regional transfers from the social security system are mainly financed by Germany's southern regions, we additionally formed three regional groups for the western part.

The paper is organised as follows. The next section describes the social security system in Germany in general. Then section 3 focuses on the theoretical background for our analysis and reviews the empirical research of other studies on this topic. In section 4 the data and methodology are described. The empirical results of our analysis are presented in section 5. We first present inequality measures for the regional earned income and then repeat the results for regional income after pension and unemployment insurance. Finally, section 6 concludes.

2 The German social security system

The German social security system consists of social insurance and tax financed welfare programs. The two dominant parts of the overall social system are the pension and unemployment insurance. In 2005 expenditure on social payments and services amounted to 241 billion Euros for pension insurance and to 53 billion Euros for unemployment insurance. Together they constituted 42 per cent of the total budget for social expenditure in 2005.

Both pension insurance and unemployment insurance are financed mainly by statutory contributions from employers and employees. The pension insurance is a pay-as-you-go system, what means that all pension payments of one year are financed by contributions¹ to the pension insurance of the same year. The contributions are calculated as a percentage of the gross wages, individual risks are not considered. In 2003 the contribution rate for pension insurance was 19.5 per cent of gross wages and 6.5 per cent for unemployment insurance.

Due to obligatory contributions to the pension and unemployment insurance only employees are eligible for payments of these insurances while self-employed and civil servants have no entitlements. The **pension payments** depend on the amount of former wages and the duration of the former employment. Besides, social elements of the pension insurance are the acknowledgement of a contribution period for parenting, and early retirement pensions. The height of **unemployment benefits** also depends on former wage income. Unemployed with children are entitled to unemployment benefits of 67 per cent of their last net income and unemployed without children are entitled to 60 per cent. In 2003 these benefits could be paid for at least 6 months up to 32, depending on age and duration of the former employment.

3 Recent literature

3.1 Studies on spatial income inequalities

In recent years several studies have been conducted on income distributions and wage inequalities in Germany. Most of these studies comparing western and eastern Germany are based on survey data for individuals or households such as the German Socio-Economic Panel (SOEP) or the German Income and Expenditure Survey (EVS) (Bach et al. 2007; Gernandt and Pfeiffer 2007; Frick and Goebel 2008; Biewen 2005; Becker and Hauser 2003; Schwarze 1996). Studies focussing on small areas like district level use gross domestic product (GDP) per capita, gross value added (GVA) (Colavecchio et al. 2005; Brakman et al. 2004) or disposable income (Kosfeld et al. 2007; Brenke 2006).

Although Becker and Hauser (2003) and Schwarze (1996) distinguish between “pre-government” and “post-government” income for western and eastern Germany in

¹ Besides contributions from employers and employees the state pension insurance is additionally financed by federal grants.

their studies there are still no spatial analyses at small-area level that split gross income into its different components. Existing spatial analyses focus solely on gross measures at district level. A disadvantage of these gross measures is that they are recorded at state level and disaggregated to district level by samples afterwards. This implies inaccuracies at district level. Further problems with these measures are due to time lags and changes caused by revised figures. The intention of our paper is to take a more detailed look at the different components that make up the total income for all 439 NUTS-3 regions in Germany. Therefore we focus on the effects that social transfer payments have on income differences at district level.

Similar studies at small-area level are available for Great Britain and Denmark: Rice et al. (2006) analysed the regional income and productivity inequalities due to the quality of jobs for NUTS-3 regions in Great Britain and found that productivity depends to a large extent on the density of the working-age population in the same area. Another recent study focuses on the within-region earnings inequalities that have increased in contrast to the inequalities between regions in Great Britain (Dickey 2007). Jensen-Butler and Madsen (2005) examined the changes in regional income distribution in Denmark from 1980 to 1998 using a decomposition method. They were able to show that changes in earned income were influenced by export growth and price changes whereas changes in population and tax rates had a significant effect on disposable income.

For Germany Colavecchio et al. (2005) examined GDP per capita for all 439 districts from 1992 to 2001. Their main result was that the cross-regional income disparity grew during this period of time (Colavecchio et al. 2005: 8). Although in 2001 the poorest districts were still in eastern Germany, in some western German districts GDP decreased significantly from 1992 to 2001. For example, in 2001 some regions in the northern and south-western parts of Germany counted among the poorest regions as well.

Frick and Goebel (2008) analysed the income distribution by Gini decomposition for eastern and western Germany using data from the German Socio-Economic Panel Study (SOEP) from 1992 to 2003. They differentiated between pre-government and post-government income and found that the distribution of eastern German incomes had increased from a low level of inequality in the early 1990s to a high level in 2003. The between-inequality of individuals' pre-government income was lower in eastern Germany than in western Germany after reunification but has risen since then and is still rising because of high unemployment rates on the one hand and well-paid jobs on the other hand. In contrast to this result, individuals' post-government income also increased in eastern Germany until 1995, but inequality remained lower than in western Germany mainly because of public transfers to unemployed people.

Kosfeld et al. (2007) analysed disparities in prices and income across German NUTS-3 regions between 1995 and 2004. They estimated separate regional price indices, a consumer price index (CPI) and a housing rent index (HRI). Their results show that CPI price disparities are relatively small within eastern Germany. For west-

ern and eastern Germany the CPI with and without housing converges to the unique steady state (β -convergence), whereas in western Germany the HRI disparities have increased (characterized by σ -divergence) and in eastern Germany they have decreased (characterized by σ -convergence). Moreover, the gap in housing rents widened from 1995 to 2004 across German regions. They also found that “*real income convergence across all German districts turns out to be stronger than nominal income divergence*” (Kosfeld et al. 2007: 24).

Gatzweiler and Milbert (2003) examined the different income components at district level. They used the number of long-term unemployed people as an indicator for unemployment benefits and purchasing power as an indicator for total net income. They pointed out that there is a considerable wage gap between western and eastern Germany and between core and peripheral regions. But more regional disparities exist when comparing unemployment benefits. They dominate in eastern Germany and in structurally weak areas in western Germany with sunset industry. Transfers were three times higher in eastern Germany than in western Germany. Most social assistance recipients can be found in agglomerations in the northern and western part of the former West German states (Gatzweiler and Milbert 2003: 129 ff.).

The main results of these studies can be summarised as follows: in the first years following reunification, disposable income and income disparities between regions in eastern Germany were low and have increased since then. Nevertheless substantial income disparities still exist between western and eastern Germany because eastern German incomes have not yet reached the western German level. These regional inequalities become even larger when regional price indices are taken into account. Although the poverty rate has increased, the differences between western and eastern Germany have declined and income inequalities are still higher between western German regions than between eastern German regions.

The research cited is a valuable source of information, but in contrast to all these studies we focus here on the different components of income in one year instead of analysing the development of the income distribution. Following the study of Brenke (2006), who focused on primary income and disposable income at state level, we differentiate between income components from employees and the self-employed and the expenditure and financing of unemployment and pension insurance at regional level. Before we proceed with our empirical analysis, we discuss the expected redistributive effects of these two elements of social insurance in the next section.

3.2 Regional redistributive effects of social insurance

Studies analysing the redistributive effects of public policies often focus on aspects of personal income distribution. From the microeconomic perspective Becker (2003) distinguishes three dimensions of interpersonal redistribution: firstly, a system of private insurance with equivalence of premium and insured risk. Secondly, the state tax and transfer system, which includes no equivalence for paid taxes and contributions and finally a system of social insurance, which combines both elements in Germany:

while recipients have to pay contributions to be eligible for payments, their entitlement is not determined by actuarial means only, but also by social criteria. Our purpose is to analyse how the redistributive effect of social security is also reflected in the regional redistribution of income.

The spatial dimension of central public policies is mainly discussed in the context of fiscal equalisation schemes of economic and monetary unions. The federal budget creates an inter-regional insurance against regional asymmetric shocks when regional incomes are not perfectly correlated. Hence, in a fiscal federation the fiscal system automatically provides transfers from prospering regions to non-prospering regions, which stabilize a region's permanent income. Fatás (1998) distinguishes between the effect on the periodic disposable income of a region (stabilisation) and the effect on a region's permanent income (insurance). Using data of the European countries he estimates the risk-sharing potential of a Europe-wide fiscal federation. Assuming an amount of disposable income stabilisation of 30 per cent as a result of the given tax structure, he estimates an amount of interregional insurance of approximately 10 per cent. Whereas stabilisation is defined as the reduction of volatility of regional disposable income, insurance is defined as the reduction of volatility of regional permanent income. Additionally he estimates the insurance benefits that European regions can obtain from the national fiscal system. Under the same assumption about disposable income stabilisation, his results for the western German states indicate a potential of national insurance of approximately 9 per cent. Similar to the personal income distribution, not only the tax-transfer system of a federations' central government is important for regional income and consumption smoothing, but also a federal social security system has a redistributive effect on the spatial income distribution. Based on Fatás' (1998) model of a federation with two regions, Kurz (2002) expands the theoretical analysis of the insurance and stabilisation potential of a fiscal federation to include a federal unemployment insurance. If economic shocks are directly expressed in unemployment, a federal system of unemployment insurance provides a regional stabilisation system, she concludes. Furthermore, if regional economic asymmetries exist constantly, permanent income transfers result from regions with below-average unemployment to regions with unemployment that is higher than the national average.

The mentioned studies focus on the benefits associated with creating a fiscal federation. It allows the regions to share macroeconomic risks. In our analysis we look explicitly at the consequences that interregional transfers, produced by federal social insurance, have on the spatial income distribution. Irrespective of whether the personal or the regional income distribution is analysed, the distribution of primary income is usually compared with the distribution of net income as a measure of the redistributive impact of tax and transfer policies. The data we use allows us to focus on two elements of social insurance in Germany: pension insurance and unemployment insurance. We choose these two systems not only because of their weight in the federal budget, but also because they mainly provide income payments, which are the subject of our distribution analysis, and not social services.

First of all we look at the economic, social and political determinants of the budget of pension and unemployment insurance. We consider only interpersonal redistributive effects in a given time period and disregard intertemporal redistributive effects in the long run. Because the German system of social insurance is very complex and includes several financial relations, we only mention the main parts of expenditure and financing. The results help us to derive the determinants of the distribution of expenditure and financing across regions.

However, the way in which social insurance is financed, results in income transfers from insured individuals with low risks to individuals with high risks. Thus we concentrate on the regional distribution of risks when we focus on the distribution of expenditure. For pension insurance we do not have any references for a meaningful regional variance in mortality risks but we can add some other political and social explanations for the spatial distribution of state pension payments. An important social or political element is the legal approach to dealing with the employment biographies of inhabitants of the former German Democratic Republic (GDR) after reunification. As a result of a generous acceptance and acknowledgement of employment periods, along with nearly full employment in the former GDR and a large share of working women in contrast to the share of working women who lived in West Germany, up to now the average of state pensions is still higher in the eastern part of Germany than in the western federal states. Finally we can mention the intergenerational redistribution within the pension insurance. This is a result of demographic, economic and social trends.

What conclusions can now be drawn from the elements listed above for the impact of federal pension insurance on the regional income distribution in a given period of time? Although the equivalence of contributions and entitlements is still high in pension insurance, we expect some trends in the regional distribution. For political and historical reasons we assume higher net income transfers from the western regions to regions in eastern Germany, enforced by high unemployment and lower wages in eastern Germany and thus lower contributions. Due to the fact that we can only observe the year 2003 in our empirical analysis, we also assume a spatial picture of distribution within the western regions. Regions which have experienced structural change in the last decades, such as regions with an important mining industry in the past, such as the Ruhr area, and are now suffering from high unemployment, could also have a positive balance of regional contributions and regional pension payments. On the other hand, prospering regions in the south which used to have an important agricultural sector may have payments below and contributions above the national average.

Through the unemployment insurance system, income is redistributed between individuals with high unemployment risks and those with low risks. Groups with above-average unemployment risks are the low-skilled, older employees and women. As was also pointed out in the analysis by Kurz (2002), the spatial distribution and correlation of economic risks and employment opportunities have a great effect on income

payments across regions resulting from the federal unemployment insurance (see also Blos 2006). Across German regions the variance of the unemployment rate as an expression of employment opportunities is very high. Whereas at the beginning of 2008 the southern states of Bavaria and Baden-Wuerttemberg report low unemployment rates of 4.8 and 4.3 per cent respectively, the north-eastern states of Mecklenburg-Western Pomerania and Saxony-Anhalt are confronted with unemployment rates of 15.6 and 15.3 per cent. Additionally, unemployment insurance also has some social elements in its constitution. What is important for the stabilising effect on regional income is the mechanism by which the expenditure on active labour market policies is distributed across regions. In 2003 the expenditure on these policies amounted to 20.9 billion Euros or 37 per cent of the total budget for unemployment insurance. The formula allocation of this expenditure results in eastern regions receiving more funds for active labour market policies than for benefit payments from unemployment insurance (Blien and Hirschenauer 2006).

To sum up, we expect unemployment insurance to have a large redistributive and stabilising effect across the regions and the federal pension insurance to have an observable but smaller effect, since the relationship between contributions and benefits is stronger for the latter.

4 Data and methodology

4.1 Data

Our analysis is based on the 439 NUTS-3 units² in Germany (326 in western Germany and 113 in eastern Germany); these are districts or towns with autonomous administration. On the basis of the district data we analyse regional disparities between western and eastern Germany. Furthermore we distinguish three regional groups (north, central and south) within western Germany following the study by Frick and Goebel (2008) because of significant regional differences within western Germany.³

Most of the data we use come from different sources originating from the year 2003. The employment statistics of the Federal Employment Agency (*Bundesagentur für Arbeit*) contains information about all 29.398 million employees that are subject to the

² NUTS is the abbreviation of Nomenclature of Statistical Territorial Units, as reported by Eurostat. It is a three-level hierarchical classification that subdivides each Member State into a whole number of NUTS 1 regions, NUTS 2 regions and NUTS 3 regions. In Germany NUTS 3 regions are similar to 439 districts (*“Kreise”*), NUTS-2 level represents 29 units (*“Regierungsbezirke”*) and NUTS-1 level 16 German Federal States (*“Länder”*). The map in Figure A1 in the Appendix shows the 16 Federal States and the 439 districts in Germany.

³ North = Schleswig-Holstein, Hamburg, Lower Saxony, Bremen; Central = North-Rhine Westfalia, Rhineland-Palatinate, Saarland; South = Hesse, Baden-Wuerttemberg, Bavaria; East = Berlin, Brandenburg, Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt, Thuringia. A map of the sixteen German states and the four groups is presented in Figure A 1 in the Appendix.

compulsory social security scheme and their wages up to an income threshold⁴. Wages above the upper earnings limit for social security contributions, which are not measured quantitatively in this database, were estimated for each region⁵. With this statistics we have information about 83 per cent of all employees in Germany⁶. For every dependent employee we know the exact place of his residence and his work at the smallest territorial unit for administrative purposes (“*Gemeinden*”) in the Federal Republic of Germany⁷.

The wage incomes of over 4.1 million self-employed individuals, which are not recorded in these statistics, were obtained from the national income tax statistics. To determine their regional income we use only positive incomes of the national income tax statistics of the year 2001 collected by the German Federal Statistical Office (*Statistisches Bundesamt*)⁸. The share of self-employed people as a percentage of all working people that are liable to tax was around 11 per cent in 2001 and their incomes made up 16.5 per cent of all the positive incomes of dependent employees and the self-employed.

To estimate the redistributive effect of unemployment and pension insurance we use data of national social security agencies. These data provide information about 1.770 million recipients of unemployment benefits and 18.313 million pensioners and the average payments of these insurances on district level. Earned income and disposable income both depend on contributions to and payments from the social security system. On the one hand contributions to these insurances decrease the height of earned income and on the other hand payments from these insurances increase disposable income. Due to high unemployment rates especially in eastern Germany, these payments are of great importance in this part of Germany.

The data allow us to assess the contributions paid to the unemployment and pension insurance by the individuals of a region. Thus we are able to estimate the regional budget incidence of these two systems as follows:

$$Y = \sum_{i=1}^n (ED_i + ES_i) - (CU_i + CP_i) + (PU_i + PP_i) \quad (1)$$

⁴ In Germany the upper earnings limit for social security contributions was 61,200 Euros for western Germany and 51,000 Euros for eastern Germany in 2003. For higher wages no contributions have to be paid.

⁵ A detailed description of the method used to estimate wages above the upper earnings limit for social security contributions that are not recorded can be found in Binder and Schwengler (2006).

⁶ The employment statistics of the Federal Employment Agency do not include 1.722 million civil servants, soldiers and employees in military and civilian service. Although workers in marginal employment are recorded in these statistics we omitted them because they often do marginal part-time work in addition to a regular job, so they are sometimes recorded twice.

⁷ These more than 12,000 municipalities can be aggregated to 439 districts.

⁸ Due to long assessment procedures tax data are only available every three years.

The total income Y contains earnings from dependent employment (ED) and of self-employment (ES), reduced by contributions to unemployment insurance (CU) and to pension insurance (CP) plus payments of unemployment insurance (PU) and pensions (PP) for each region i with $n=439$ districts.

4.2 Methodology

For analysing the regional disparities we use some commonly used measures of income inequality. These are the Gini coefficient (G), the mean logarithmic deviation (I_0), Theil's measure (I_1), half the squared coefficient of variation (I_2), the Atkinson indices and their within- and between-group components.

The Gini coefficient is commonly used in empirical work for measuring inequality. It represents the area between the Lorenz curve and the line of complete equality and is defined as:

$$G(Y) = \frac{2}{n^2 \mu} \sum_i \left(i - \frac{n+1}{2} \right) Y_i \quad (2)$$

where Y_i is the income for $n=439$ regions with $i = 1, \dots, n$ and μ the mean income.

If the Gini coefficient is zero, the distribution is completely equal and as the Gini coefficient rises the distribution becomes more and more unequal. While the Gini coefficient is most sensitive to differences around the mode of the distribution, the mean logarithmic deviation, Theil's measure and the "half the squared coefficient of variation"-measure are more sensitive to changes at the top of the distribution.

For analysis at the regional level it is helpful to have inequality measures that are decomposable. This means that the total inequality in a given population is the sum of the inequality within subgroups of the population (within-group component) and the inequality between subgroups (between-group component) (Shorrocks 1980).

The mean logarithmic deviation I_0 , respectively the Generalized Entropy class of inequality indices $GE(0)$, is given by:

$$I_0 = \frac{1}{n} \sum_{i=1}^n \log \left(\frac{\mu}{y_i} \right) \quad (3)$$

and can be decomposed into the "within-group" component I_w as weighted sum of inequalities within each regional subgroup k , and the "between-group" component I_B as inequality between the regional subgroups:

$$I_0 = I_w + I_B \quad (4)$$

$$I_0 = \sum_k w_k I_{0k} + \sum_k v_k \log \left(\frac{1}{\lambda_k} \right) \quad (5)$$

with weight w for k subgroups.

Theil's measure (T) = I_T :

$$T = \frac{1}{n} \sum_{j=1}^k \sum_{i=1}^n \left(\frac{y_{ij}}{\mu} \right) \log \left(\frac{y_{ij}}{\mu} \right) \quad (6)$$

can be decomposed into inequalities within (T_W) and between (T_B) the k subgroups:

$$T_W = \sum_{j=1}^k \frac{n_j \mu_j}{n \mu} \frac{1}{n_j} \sum_{i=1}^{n_j} \frac{y_{ij}}{\mu} \log \frac{y_{ij}}{\mu} \quad (7)$$

as a weighted average of Theil's ratios within each subgroup weighted by the income shares of the subgroup, and:

$$T_B = \sum_{j=1}^k \frac{n_j}{n} \frac{\mu_j}{\mu} \log \frac{\mu_j}{\mu} \quad (8)$$

The decomposition into a within-group component and a between-group component for half the squared coefficient of variation given by:

$$I_2 = \frac{1}{n} \sum_{i=1}^n \frac{[(y_i/\mu)^2 - 1]}{2} \quad (9)$$

can be written as:

$$I_2 = \sum_k w_k (\lambda_k)^2 I_{2k} + \sum_k w_k [(\lambda_k)^2 - 1] \quad (10)$$

Another common measure used for analysing income inequalities is the Atkinson index. The Atkinson index measures the social welfare function for the inequality aversion parameter e and - in contrast to the indices presented before - is more sensitive to changes at the bottom of the income distribution.

The Atkinson index $A(e)$ is defined as 1 minus the ratio of the equally distributed equivalent level of income Y to the mean income μ in the population:

$$A(e) = 1 - \frac{Y}{\mu} \quad (11)$$

The measure $A(e)$ indicates if the distribution is complete equal ($A(e)=0$) or complete unequal ($A(e)=1$) (Atkinson 1970: 250). The Atkinson indices are decomposable too, not additively decomposable but multiplicatively however (Dayiođlu/Başlevent 2006: 893 f.):

$$A(e) = A_W + A_B - A_W \cdot A_B \quad (12)$$

The within-group inequality A_W is related to the population-weighted average p of k subgroups of equally distributed equivalent (EDE) incomes:

$$A_W = 1 - \frac{\left(\sum_{k=1}^K p_k Y_k \right)}{\mu} \quad (13)$$

According to this the between-group inequality A_B can be expressed as:

$$A_B = 1 - \frac{Y}{\left(\sum_{k=1}^K p_k Y_k \right)} \quad (14)$$

With these measures a detailed inequality analysis is possible and biased results driven by a particular inequality measure can be prevented.

5 Empirical results

5.1 Income geography in Germany

Before analysing the income distribution for earned income and transfers in Germany in more detail we take a look at some summary statistics. Table 1 shows the different income components for western Germany, eastern Germany and Germany in total. As can be seen in Table 1, earned income is still unequally distributed between western and eastern Germany. In western Germany the highest wage incomes are earned by employees and self-employed. In both parts of Germany the wages of the self-employed are much higher than wages per employee, but in western Germany the difference is 1.5 times higher and in eastern Germany 1.3 times higher. The range of mean wages earned by the self-employed at regional level is also larger than that of mean wages earned by employees. The maximum wage per employee is more than twice the minimum wage, and the maximum wage per self-employed person is more than three times the minimum wage.

As a consequence of higher wages in western Germany, unemployment benefit and unemployment assistance payments per recipient are higher there. On the other hand and as a result of nearly full employment – particularly of women - before reunification and thus longer periods of employment and contribution, pension payments per recipient are higher in eastern Germany. Hence in 2003 women in eastern Germany received an average pension per month of 850 Euros compared to 690 Euros for women in western Germany, while men in eastern Germany received less money (1,042 Euros per month) than men in western Germany (1,054 Euros per month). When we focus on transfers per inhabitant the result changes. The sum of these public transfers per inhabitant in eastern Germany is 1.5 times higher than in western Germany, because of the still high labour market disparities between the two parts of Germany.

Table 1
Regional income characteristics in 2003 in Euros on av. per year⁹

	Germany	Western Germany	Eastern Germany	Minimum	Maximum	Standard deviation
Mean wage per employee ¹⁰	25,405	26,730	19,942	15,695	35,488	3,832
Mean wage per self-employed 2001	37,905	40,413	25,981	20,481	69,628	9,375
Mean wage income per gainfully employed person (employees, self-employed and civil servants)	27,321	28,910	21,212	16,961	40,405	4,251
Mean wage income per inhabitant	11,662	12,318	9,118	6,946	18,332	2,066
Unemployment benefit per recipient	16,407	17,050	14,950	13,935	22,458	1,597
Unemployment assistance per recipient (financed by taxes)	8,220	8,763	7,618	6,880	10,046	635
State pension payments per recipient	10,378	10,168	11,033	6,298	29,761	1,546
Public social transfers per inhabitant	3,191	2,875	4,418	1,862	5,933	911
Total income per inhabitant	14,854	15,193	13,536	11,083	21,283	1,575

Source: Employment and unemployment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001, statutory pension scheme 2003; authors' calculations.

5.2 Spatial wage income distribution

Our data confirm the results of other studies according to which in Germany there are income inequalities between western and eastern Germany as well as between western German regions, as is illustrated in Table 2. Due to the different sizes and functions of the underlying districts (urban vs. rural) we use the size of the population and the numbers of employees and self-employed as a suitable indicator for comparing measures of income. As Table 2 shows, 80 per cent of the whole population live in western Germany, but the share of the overall gross income is much higher in western Germany (83 per cent for employees and 88 per cent for the self-employed) than in eastern Germany. Although eastern Germany's share of all employees in Germany is equal to its share of the population (21 per cent), eastern German employees only contribute 17 per cent to the total gross income. The share of self-employed people is smaller in eastern Germany than in the total population but it must be taken into account that there were no entrepreneurs or self-employed people in eastern Germany before reunification. Moreover, the share of self-employed people in eastern Germany is the same as that in the northern part of western Germany.

⁹ Differences between the sum of the mean wage per inhabitant plus the public transfers per inhabitant and the total income per inhabitant are due to rounding.

¹⁰ Including the estimate for wages above the upper earnings limit for social security contributions.

As can be seen in Table 2, 35 per cent of the total population live in the southern part of Germany but a higher percentage of income is generated there (40 per cent of all employees and 42 per cent of all self-employed income in the country as a whole) in prosperous metropolitan areas such as Munich, Frankfurt and Stuttgart. On the other hand there is hardly any difference between the shares of income and the percentage of employees, self-employed and population in the northern and central parts of western Germany.

Table 2
Regional shares of income components

Regional group	Population	Earned income of employees	Employees	Income of self-employed people	Self-employed
Eastern Germany	21%	17%	21%	12%	17%
Western Germany	79%	83%	79%	88%	83%
North	16%	15%	15%	17%	17%
Central	28%	28%	27%	29%	27%
South	35%	40%	37%	42%	39%
Total in million	82.5	743,285	29.3	155,743	4.1

Source: Employment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001; authors' calculations.

Wages per employee

In a first step we look at the wages of all employees including the estimated wages above the upper earnings limit for social security contributions. By comparing mean wages per employee in western and eastern Germany in Table 3 it is obvious that income differences in wages per employee are stronger between western German regions than between eastern German regions. Moreover, income inequalities are stronger at the bottom of the distribution and they are dominated by between-group inequalities.

Table 3
Decompositions of wages per employee for western and eastern Germany

Regional group	Gini coefficient per cent	Theil's Indices			Atkinson Indices		
		1000 I_0	1000 I_1	1000 I_2	1000 $A_{0.5}$	1000 A_1	1000 A_2
Germany	8.9	13.06	12.76	12.63	6.43	12.97	26.31
Eastern Germany	4.3	2.95	2.96	2.98	1.48	2.94	5.85
Western Germany	5.5	4.91	4.98	5.09	2.47	4.90	9.62
North	5.3	4.42	4.49	4.59	2.23	4.41	8.66
Central	4.1	2.72	2.72	2.72	1.36	2.71	5.42
South	6.0	5.71	5.81	5.95	2.88	5.69	11.15
Within-group inequality		4.16	4.31	4.55	2.14	4.25	8.36
Between-group inequality		8.90	8.45	8.05	4.30	8.76	18.10

I_0 = mean logarithmic deviation; I_1 = Theil's measure; I_2 = half the squared coefficient of variation;
 $A(e)$ = Atkinson indices with $e = 0.5, 1$ and 2

Source: Employment statistics of the Federal Employment Agency 2003; authors' calculations.

If we split the western regions into the northern, central and southern parts, two main results are visible: first of all the largest income inequalities can be found in the southern part of Germany with the highest income per capita. Second, wages in the central part of western Germany are less unequally distributed than in eastern Germany, presumably because of low wages there.

Wages per self-employed person

As shown in Table 4 wages earned by the self-employed are distributed more unequally in Germany than the wages of employees. The wages of the self-employed differ more between regions in western Germany, which is proven by a Gini coefficient that is twice as high in western Germany as it is in eastern Germany. The distribution of the wages of the self-employed is more sensitive among the lower wages as well. In contrast to the results for wages per employee, where the aggregate inequality was dominated by the between-group inequality, the aggregate inequality for the self-employed is determined almost equally by the within-group and the between-group inequality.

Table 4
Decompositions of wages per self-employed person for western and eastern Germany

Regional group	Gini coefficient per cent	Theil's Indices			Atkinson Indices		
		1000 I_0	1000 I_1	1000 I_2	1000 $A_{0.5}$	1000 A_1	1000 A_2
Germany	14.82	34.16	34.04	34.94	16.92	33.59	65.78
Eastern Germany	5.31	4.57	4.66	4.78	2.31	4.56	8.93
Western Germany	11.58	18.99	19.37	20.12	9.54	18.81	36.5
North	9.54	14.47	14.29	14.3	7.16	14.37	28.88
Central	10.16	15.82	15.91	16.18	7.9	15.69	30.84
South	11.79	21.61	22.19	23.23	10.89	21.38	41.09
Within-group inequality		14.92	16.34	18.41	8.07	15.93	31.01
Between-group inequality		19.25	17.7	16.45	8.92	17.94	35.89

I_0 = mean logarithmic deviation; I_1 = Theil's measure; I_2 = half the squared coefficient of variation;

$A(e)$ = Atkinson indices with $e = 0.5, 1$ and 2

Source: National income tax statistics of the Federal Statistical Office 2001; authors' calculations.

When comparing the different regional groups, the order of the Gini inequality index changes for the wages of self-employed people compared to the wages of employees. The highest income inequalities of the self-employed exist between districts in southern Germany, as was the case for employees. But the second unequally distributed group is central western Germany, which was the least unequally distributed regional group for wages per employee.

These results are consistent with those of Becker and Hauser (2003), who analysed the income distribution of the self-employed in western and eastern Germany using time series from 1969 to 1998 of German Household Income Surveys (EVS). They were able to show that there has been an increase in income differences especially

at the bottom of the distribution of “pre-government income”, because more and more people have little or no income – whereas there has been no substantial change in the middle of the income distribution. In Germany inequalities in earned wages are dominated by income from self-employment as it is in the UK, as Jenkins found on the basis of the Family Expenditure Survey (FES) for 1971, 1976, 1981 and 1986 (Jenkins 1995).

Wages per inhabitant

In order to compare the regional distribution of earned income and transfers we relate both to the number of inhabitants in the particular region. The mean wages per inhabitant include the sum of all wages earned by employees, self-employed people and civil servants. Regarding the total earned income distribution in Table 5, income inequalities are stronger in western Germany, especially at the bottom of the distribution. Also, there is only a slight domination of between-group inequalities.

When comparing the different regional groups in Germany there seems to be no difference between the income inequality in the northern part of western Germany and that in central western Germany regarding the total mean wages per inhabitant. As seen before, income inequalities are stronger at the bottom of the distribution throughout all groups. Furthermore, the largest earned income inequalities can be identified among regions in the southern part of western Germany while between-group inequality is stronger than the within-group inequality, especially at the bottom of the distribution, as is shown in Table 5.

Table 5
Decompositions of mean wages per inhabitant for western and eastern Germany in 2003

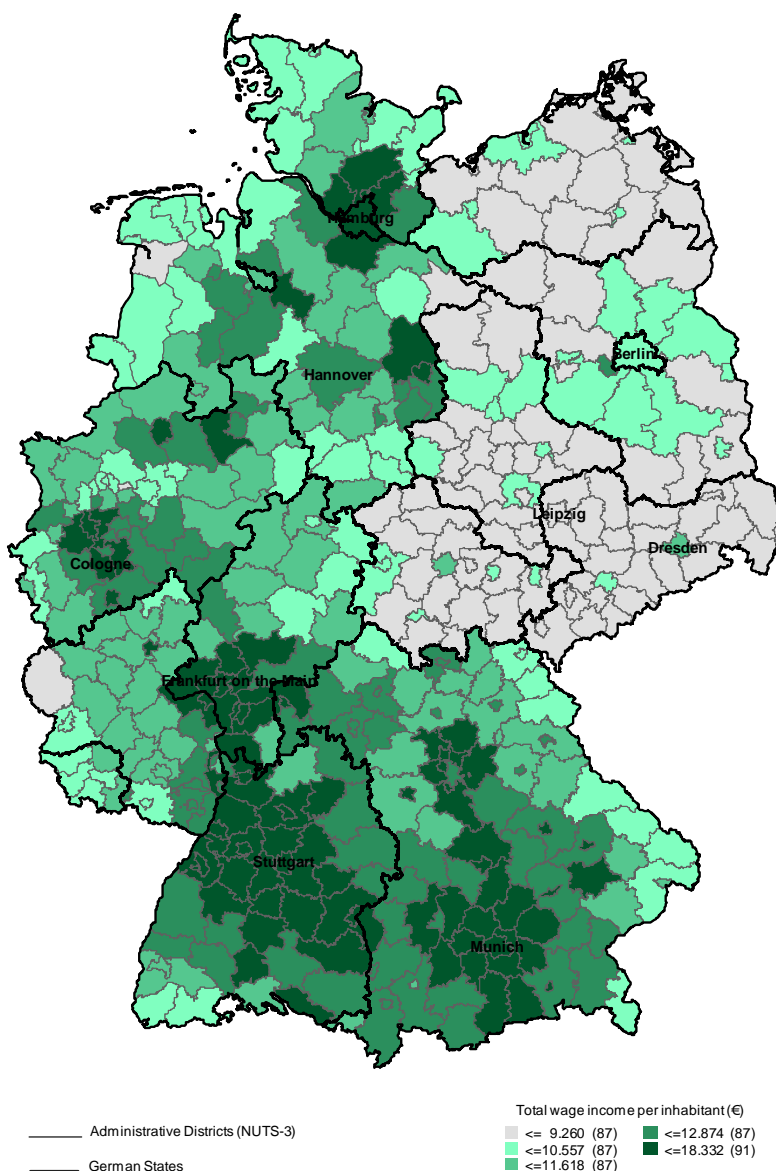
Regional group	Gini coefficient per cent	Theil's Indices			Atkinson Indices		
		1000 I_0	1000 I_1	1000 I_2	1000 $A_{0.5}$	1000 A_1	1000 A_2
Germany	10.4	17.26	17.07	17.18	8.55	17.11	34.23
Eastern Germany	5.9	5.42	5.47	5.56	2.72	5.40	10.65
Western Germany	7.5	8.88	9.04	9.28	4.47	8.84	17.32
North	6.1	5.94	5.96	6.02	2.97	5.92	11.75
Central	6.1	5.91	5.97	6.06	2.96	5.89	11.62
South	7.3	8.65	8.77	8.98	4.34	8.61	16.91
Within-group inequality		6.82	7.07	7.51	3.51	6.96	13.71
Between-group inequality		10.44	10.00	9.64	5.06	10.22	20.81

I_0 = mean logarithmic deviation; I_1 = Theil's measure; I_2 = half the squared coefficient of variation;
 $A(e)$ = Atkinson indices with $e = 0.5, 1$ and 2

Source: Employment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001; authors' calculations.

To visualise the income distribution in Germany at regional level, Figure 1 shows the wages per inhabitant. The map illustrates the overall income situation in all regions including wages of employees, self-employed people and civil servants – but now based on inhabitants. As can be seen very clearly the lowest wages are earned in eastern Germany and the highest are earned in western Germany, especially in the southern part. In western Germany there is a wider range of wages: lower wages dominate in rural areas and higher wages in urban, metropolitan areas around cities like Hamburg, Cologne, Frankfurt, Stuttgart or Munich. The surroundings of Berlin benefit from employment opportunities in the capital, so regional income is higher there – as it is in some of eastern Germany’s prospering cities – than in the rest of eastern Germany.

Figure 1
Regional distribution of wages per inhabitant



Source: Employment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001; authors’ calculations.

5.3 Distributional effects of social insurance

Spatial distribution of expenditure and contributions

As argued in section 2.2, we expect an asymmetric spatial distribution both of contributions to unemployment and pension insurance and of pension payments and unemployment benefits. Table 6 shows the shares of payments and benefits received from these two systems of social insurance for our four regional groups.

Table 6
Regional shares of social payments

Regional group	Population	Pension payments	Recipients of pension payments	Unemployment benefits	Recipients of unemployment benefits
Eastern Germany	21%	26%	25%	28%	31%
Western Germany	79%	74%	75%	72%	69%
North	16%	15%	16%	15%	15%
Central	28%	28%	27%	25%	25%
South	35%	31%	32%	32%	29%
Total in million	82.5	190,048	18.3	29,048	1.7

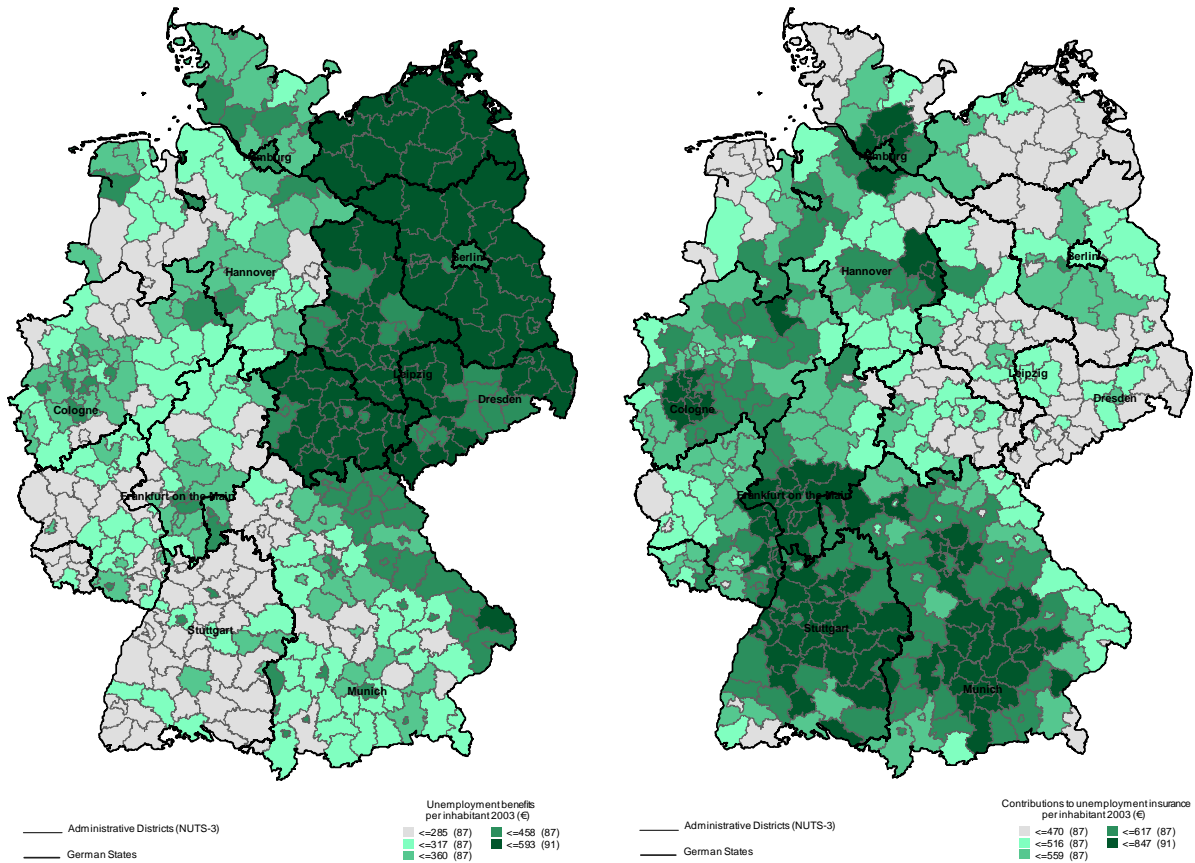
Source: Unemployment statistics of the Federal Employment Agency 2003, statutory pension scheme 2003; authors' calculations.

Neither entitlements to unemployment benefit nor to a state pension are distributed in proportion to the population share across the four regional groups. Differences are particularly high for unemployment insurance. As argued before, expenditure and financing of unemployment insurance are connected to the economic performance of the regions. Following the regional economic disparities, the redistributive effect of unemployment insurance seems high. For pension insurance the results also confirm our considerations about differences between eastern and western Germany. The expenditure in eastern Germany is disproportionately high compared to the population share. 25 per cent of retired people eligible for a state pension live in eastern Germany, while only 20 per cent of the overall population live there. Almost the same share of total benefits is passed into the eastern regions. Driven by high unemployment rates, the share of recipients of unemployment benefits (31 per cent) is also larger than the population share. Here, however, the share of the total expenditure (28 per cent) is lower. The values for eastern Germany indicate that entitlements to a state pension are near or above the average of total entitlements and, as a consequence of lower wages in the eastern regions, entitlements to unemployment benefits are lower than the average of total entitlements. For the southern part of western Germany we find the opposite relationship.

Figure 2 shows the distribution of unemployment benefits per inhabitant for NUTS-3 units on the left-hand map. At first glance the disparities between western and eastern Germany emerge clearly. The variance of benefits paid per inhabitant in eastern Germany seems to be small, while the picture for the western regions differs. Regions with unemployment rates above the western German average in the north east

of Bavaria, the Ruhr area, parts of Schleswig-Holstein and in northern Lower Saxony also benefit disproportionately highly from unemployment insurance. While the economic performance of metropolises often leads to higher income in neighbouring regions, mainly driven by commuting, the metropolises are often affected by high unemployment among their own residents. This effect emerges clearly in the metropolitan areas of Bavaria and Baden-Wuerttemberg in the south.

Figure 2
Regional distribution of unemployment benefits and contributions to unemployment insurance per inhabitant in 2003 (NUTS-3)



Source: Unemployment and employment statistics of the Federal Employment Agency 2003; authors' calculations.

Before proceeding with the spatial distribution of contributions to social insurance we have to make some assumptions about their incidence. We assume that the burden of employers' contributions is passed entirely onto the employees and therefore that both the employee and the employer contributions are actually paid by the employee. The right-hand map in Figure 2 shows the regional distribution of contributions paid into unemployment insurance per inhabitant. The distribution follows the economic performance and labour market conditions of the regions and therefore reflects the opposite distribution of unemployment benefits. To conclude, our descriptive results provide strong evidence of a regional redistribution effect of unemployment insurance. Additionally Figure A2 in the Appendix gives an impression of the regional distribution of expenditure on active labour market policies and state pension payments.

Redistributional effects

In this section we look at the budget incidence of unemployment and pension insurance. To assess the redistributive effect of these two systems on the regional earned income we construct a new income variable C. We use the primary income A described in section 5.2, deduct contributions to social insurance B1 and add social insurance benefits B2 for each region (Table 7).¹¹

Table 7

Primary income, transfers from and contributions to pension and unemployment insurance (in million €)

	Wages earned by employees	743,285
	Income earned by the self-employed	155,743
	Earnings of civil servants	63,488
A	= Primary income	962,516
	Contributions to state pension insurance	-169,560
	Contributions to unemployment insurance	-47,146
B1	= Contributions to social insurance	-216,724
	State pension payments	190,048
	Unemployment benefits	29,048
	Expenditure on active labour market policies	21,874
B2	= Social insurance benefits and payments	240,970
C	Income after pension and unemployment insurance	1,002,008

Source: Employment and unemployment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001, statutory pension scheme 2003; authors' calculations.

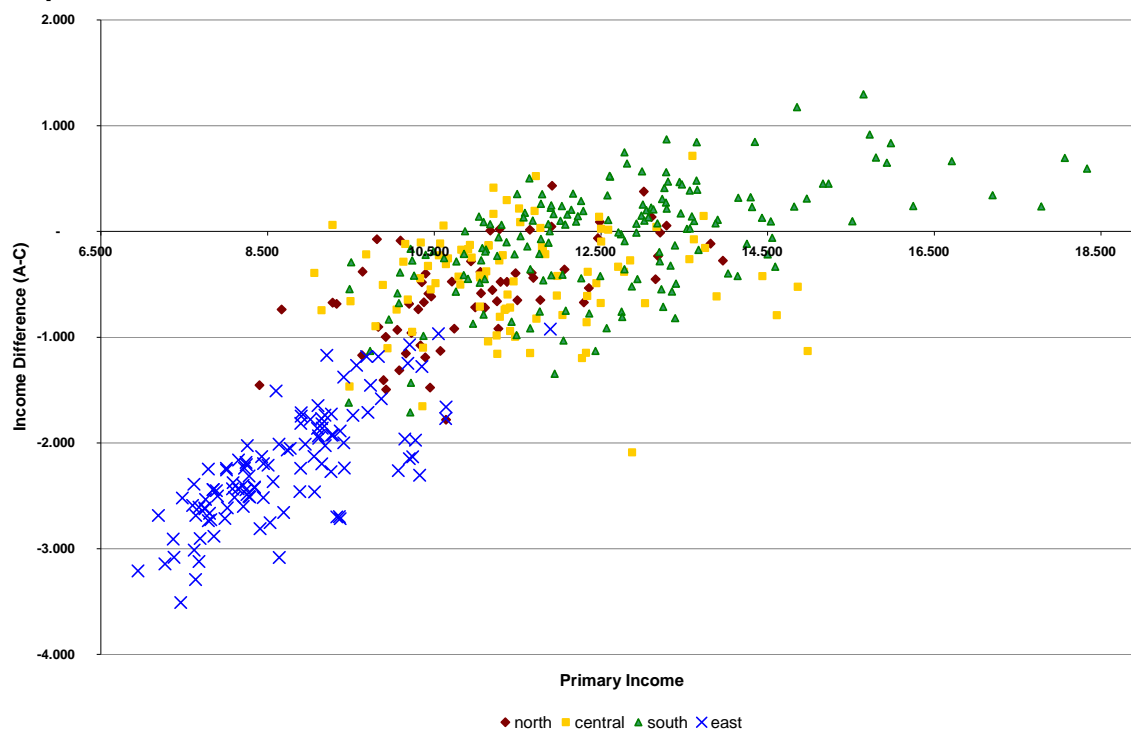
In total there should be no difference between the income before (A) and after social insurance (C) at the federal level. The difference in Table 6 is explained by parts of social insurance which are financed from taxes (not included in B1) and expenditure other than benefits (not included in B2) being disregarded. These two factors are minor parts of the total expenditure and financing, but the tax-financed elements especially of the pension insurance are larger than the disregarded expenditure such as administration costs. Due to the fact that there is no valid information about the regional tax incidence in Germany, we underestimate the regional budget incidence for pension and unemployment insurance. We assume that taking into account the regional contributions to total national tax revenues would not change our results.

Although there should be no effect of social insurance at the federal level because of the balanced budget of expenditures and revenues, there is an effect at regional level. Figure 3 shows the difference between regional incomes A and C per inhabitant for 439 administrative units. The general structure follows the expected correla-

¹¹ Note that the income variable measured is not equal to the disposable income because we do not consider capital income, taxes or other social payments besides social insurance such as housing benefits.

tion. Regions with higher primary income per inhabitant show a higher and positive difference between our two income variables. While the variance of primary income per inhabitant seems high for all regions, it is lower for the income differences (between A and C) within and between the three western regions. Particularly the picture for the northern and central regions looks similar. Most regions in the south have a positive income difference and a high primary income. For the three western regions the picture points to the north-south divide within western Germany, which is a well-established fact in the empirical literature on income distribution. Figure 3 also shows that the eastern regions are predominantly distinct from the western regions; all of them have negative income differences and low primary incomes per inhabitant. This means that the regional income per inhabitant is higher after the redistribution process of pension and unemployment insurance. With regard to the economic disparities and the discussion about the public transfers from western to eastern Germany, the result was as expected. However, there are some western regions in all three groups which are comparable to some eastern regions.

Figure 3
Average difference between primary income (A) and income after social insurance (C) in € per inhabitant 2003 for 439 districts



Source: Employment and unemployment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001, statutory pension scheme 2003; authors' calculations.

Table 8 compares the Gini coefficients of regional primary income per inhabitant (see section 5.2) and income after social insurance per inhabitant for our four regional groups. For all four groups we find a noticeable reduction of the Gini index. The reduction is highest for eastern Germany and lowest for the southern part of western Germany. The results confirm our findings for the distribution of primary income but at a lower level. Income inequalities are still stronger in the southern part of western Germany and lowest in eastern Germany.

Table 8
Decompositions of mean income per inhabitant for regional groups

Regional group	Primary income (A)		Income after social insurance (C)					
	Gini coefficient (per cent)		Theil's Indices			Atkinson Indices		
			1000 I_0	1000 I_1	1000 I_2	1000 $A_{0.5}$	1000 A_1	1000 A_2
Germany	10.4	6.2	5.99	6.15	6.37	3.03	5.97	11.61
Eastern Germany	5.9	3.1	1.57	1.59	1.62	0.79	1.57	3.08
Western Germany	7.5	6.0	5.83	5.94	6.10	2.94	5.81	11.38
North	6.1	4.7	3.64	3.64	3.65	1.82	3.63	7.26
Central	6.1	5.0	4.06	4.10	4.16	2.04	4.06	8.03
South	7.3	6.3	6.38	6.49	6.65	3.21	6.36	12.46

I_0 = mean logarithmic deviation; I_1 = Theil's measure; I_2 = half the squared coefficient of variation;

$A(e)$ = Atkinson indices with $e = 0.5, 1$ and 2

Source: Employment and unemployment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001, statutory pension scheme 2003; authors' calculations.

Inequality within and between the groups is also lower for our new income variable, especially at the bottom of the income distribution. Table 9 and Table 10 show that the reduction of inequality is mainly driven by the reduction of between-group inequality. In contrast to the results for the primary income A in Table 9, the within-group inequality is now greater than the between-group inequality. Transfers from the prospering regions in the south lead to a higher income level in the east. In eastern Germany the average income C increases by about 22 per cent compared to primary income A (from 9,118 to 11,103 Euro), while the average income C in the southern part of western Germany is slightly lower than primary income A (13,108 in comparison to 13,157). Within the regions the redistributive effect is smaller. The result for the indirect regional transfer system is in line with the regional structure of direct financial support, suggesting that the financing of payments is regionally concentrated in Germany's prospering southern regions.

Table 9
Decompositions of primary income (A) for regional groups

	Theil's Indices			Atkinson Indices		
	1000 I_0	1000 I_1	1000 I_2	1000 $A_{0.5}$	1000 A_1	1000 A_2
Aggregate inequality	17.26	17.07	17.18	8.55	17.11	34.23
Within-group inequality	6.82	7.07	7.51	3.51	6.96	13.71
Between-group inequality	10.44	10	9.64	5.06	10.22	20.81

I_0 = mean logarithmic deviation; I_1 = Theil's measure; I_2 = half the squared coefficient of variation;

$A(e)$ = Atkinson indices with $e = 0.5, 1$ and 2

Source: Employment and unemployment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001, statutory pension scheme 2003; authors' calculations.

Table 10
Decompositions of income after pension and unemployment insurance (C) for regional groups

	Theil's Indices			Atkinson Indices		
	1000 I_0	1000 I_1	1000 I_2	1000 $A_{0.5}$	1000 A_1	1000 A_2
Aggregate inequality	5.99	6.15	6.37	3.03	5.97	11.61
Within-group inequality	4.23	4.43	4.62	2.19	4.34	8.53
Between-group inequality	1.76	1.74	1.73	0.85	1.64	3.1

I_0 = mean logarithmic deviation; I_1 = Theil's measure; I_2 = half the squared coefficient of variation;
 $A(e)$ = Atkinson indices with $e = 0.5, 1$ and 2

Source: Employment and unemployment statistics of the Federal Employment Agency 2003, national income tax statistics of the Federal Statistical Office 2001, statutory pension scheme 2003; authors' calculations.

6 Summary and conclusion

In this paper we have examined the effects of the federal unemployment and pension insurance on regional income inequalities in Germany. In a first step we analysed the regional distribution of the wages of employees and the self-employed. Furthermore we estimated the redistribution by comparing regional income before and after activities of the statutory social insurance.

For earned income, which is the most important regional income source, our results illustrate the still large income differences between western and eastern Germany. In addition to the wage gap between the two parts of Germany, there are large labour market disparities. The decomposition analysis reveals further income disparities within western Germany. Especially in the prospering southern part of Germany more and higher wages are earned but there also exist the highest regional income inequalities. Furthermore, income earned by the self-employed is more unequally distributed than wages earned by employees. These results are in line with previous studies on wage and income distribution in Germany. Although other studies have shown that income inequalities are lower in eastern Germany, we found that when differentiating between three regional groups in western Germany, wages are even less unequally distributed in central western Germany than in eastern Germany. Another remarkable result is that the inequality of wages is dominated by between-group inequality. With regard to the considerable financial support to enhance economic growth in eastern Germany and the still large income disparities, the question about the efficiency of these transfers arises.

The redistributive effect of the welfare state at regional level is usually analysed for the entire social insurance and the tax and transfer systems. In our analysis we wanted to look at the redistributive effect of unemployment and pension insurance. We selected these two systems not only because of their financial importance in relation to total social expenditure, but also because of their stabilising effect. In a further step we estimated the regional budget incidence of these two social systems. The

results confirm our hypotheses about the regional stabilising effects of expenditure and contributions. The effect was stronger for unemployment insurance, but we still find regional patterns in the distribution of state pension payments. After adding unemployment benefits and pension payments and deducting contributions to social insurance from the primary income we obtain the regional income after social insurance per inhabitant. We were able to illustrate that inequality was reduced substantially, with the largest reduction in eastern Germany and the lowest in the southern part of western Germany. Another result is that within-group and between-group inequalities are lower for income after social insurance.

Due to high unemployment rates the welfare state has come under pressure in Germany during recent years, as it has in other European states. In 2004 and 2005 significant reforms in the welfare system were implemented which also affected parts of social insurance. Our results show that changing parameters of eligibility, claims and financing will directly influence the spatial income distribution (see also Blos and Schwengler 2007). On the other hand, despite the recent upturn in the economy, economic differences between the regions, especially between eastern and western Germany, will remain. In this context further research based on data for 2005 and later years will show, whether the stabilising function of social insurance has improved or not.

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Appendix

Figure A1
German states, regional groups and districts

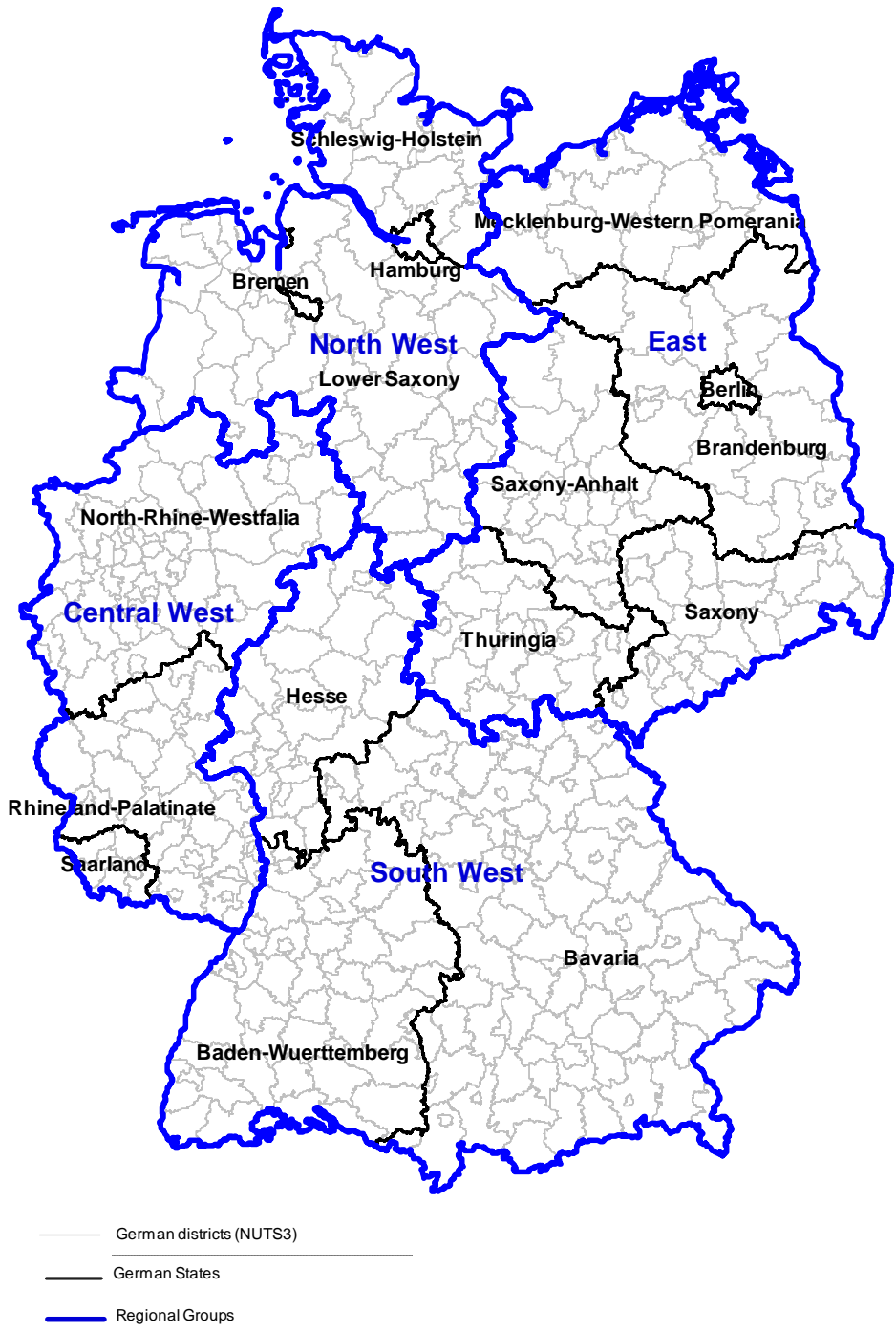
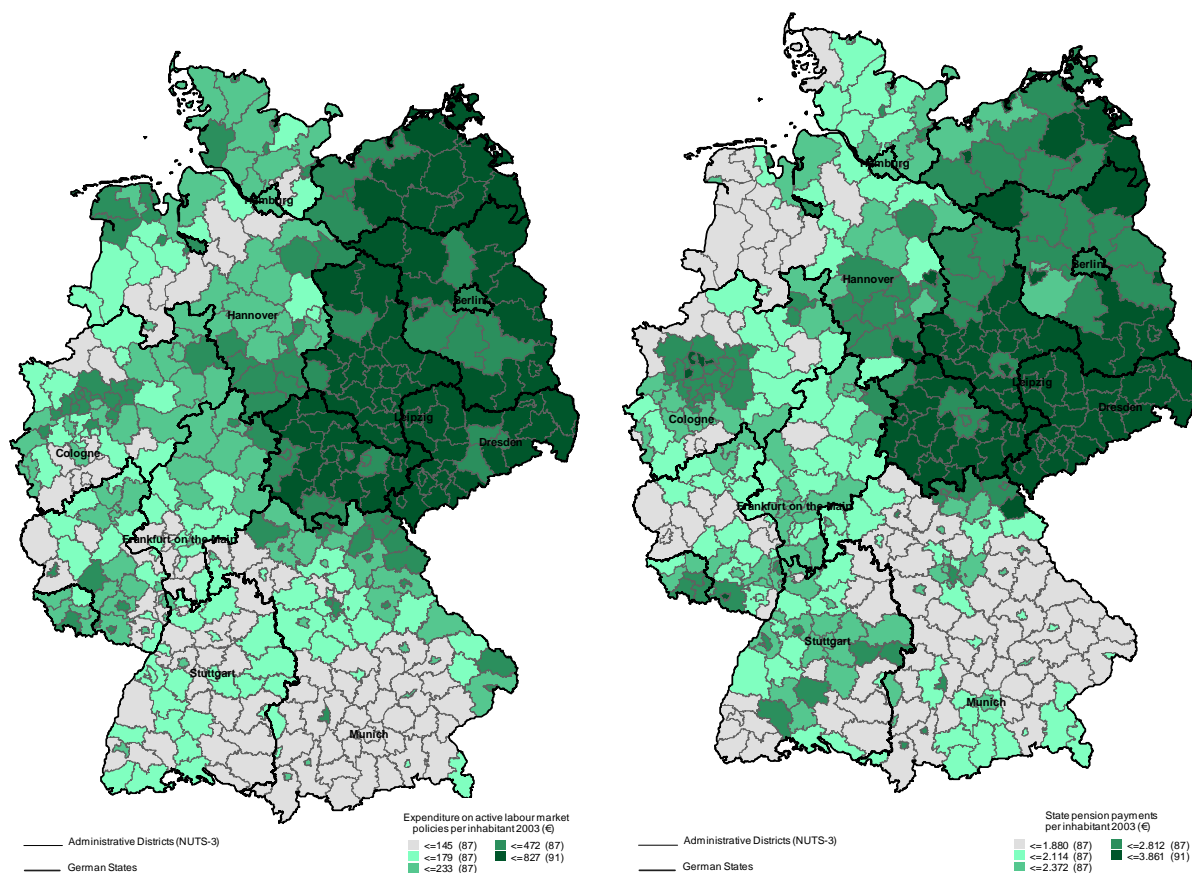


Figure A2
Regional distribution of expenditure on active labour market policies and state pension payments per inhabitant 2003 (NUTS-3)



Source: Unemployment statistics of the Federal Employment Agency 2003, statutory pension scheme 2003; authors' calculations.

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Institute for Employment Research
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Regensburger Str. 104
D-90478 Nuremberg

Editorial staff

Regina Stoll, Jutta Palm-Nowak

Technical completion

Jutta Sebald

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For further inquiries contact the authors:

Kerstin Bruckmeier
Phone +49.911.179 4432
E-mail kerstin.bruckmeier@iab.de

Barbara Schwengler
Phone +49.911.179 3029
E-mail barbara.schwengler@iab.de