Luxembourg Income Study Working Paper Series

Working Paper No. 470

Labour Market Institutions and Income Inequality

Daniele Checchi and Cecilia García-Peñalosa

January 2008

Luxembourg Income Study (LIS), asbl

LABOUR MARKET INSTITUTIONS AND INCOME INEQUALITY ♣

Daniele Checchi [a] and **Cecilia García-Peñalosa** [b]
University of Milan and IZA **CNRS and GREQAM**

January 2008

Preliminary version of a paper prepared for the 47th Panel Meeting of ***Economic Policy*** in Ljubljana

Abstract: The recent debate on trends in inequality in industrial countries has been marred by the lack of consensus about the relevant concept of inequality. Labour economists are concerned with inequality in earnings, macroeconomists with movements in the wage share, while policy-makers tend to focus on household income inequality. We provide a unifying framework to study the relationship between these three concepts of inequality and the way in which labour market institutions affect them. Institutions emerge as a key determinant of inequality, yet they play different roles depending on the extent to which they complement or substitute each other. As a result, we are able to propose a set of *inequality minimizing* institutions. Institutions that decrease inequality are, however, associated with higher unemployment, and our analysis allows us to quantify the magnitude of this trade-off.

JEL classification numbers: D31 (Personal Income, Wealth, and Their Distributions) – D33 (Factor Income Distribution)
Key words: income inequality, labour market institutions.

♣ We thank Andrea Bassanini for providing some of the data and Silvia Redaelli for excellent research assistance. Daniele Checchi gratefully acknowledges the financing of the Italian Ministry of Education (Cofin n. 2005133811); Cecilia García-Peñalosa's research was partly supported by the Institut d'Economie Publique in Marseille.

[a] University of Milan, Department of Economics, via Conservatorio 7, 20124 Milan, Italy. Email: daniele.checchi@unimi.it

[b] GREQAM, Centre de la Vieille Charité, 2 rue de la Charité, 13002 Marseille, France. Email: penalosa@ehess.univ-mrs.fr

1. Introduction

During the past two decades economists have been concerned with the apparent increase in various measures of inequality (see Atkinson, 2007). One of the striking aspects of this literature is the lack of consensus about how to measure inequality. Labour economists tend to focus on how the price of different types of labour changes over time, and hence have examined the evolution of hourly wage rates. Macroeconomists are concerned with the reward to different factors, that is, with the evolution of the shares of labour and capital in aggregate income. For policy analysts, the relevant concept is the distribution of household income adjusted for family size, which combines market income from different sources received by the household, the different labour incomes of household members, and the role of government transfers, which are often the main source of income of the poor.

Figures 1 to 3 depict the trends in three commonly used measures of inequality for the US, the UK, France and Germany over the period 1969 to 2000.[1] Figure 1 depicts the Gini coefficients of gross household income, and shows that there have been increases in income inequality in all four countries, at least during the 1980S and early 90s. Figure 2 depicts a measure of inequality in wage incomes, the ratio of the wage of the 9th decile of the wage distribution to that of the 1st decile. The figure illustrates the extensively debated differences between the evolution of wage inequality in the Anglo-Saxon countries and in continental Europe. The US and the UK have experienced an increase in wage inequality starting, respectively, in the mid and late 1970s, while France and Germany have seen little change in their wage distributions. The third measure of inequality is captured by the share of income received by labour and that awarded to capital. Figure 3 reports trends in the share of wages in aggregate income. The labour share has been remarkably stable in the US, while the UK witnessed a decline over the period.[2] France and Germany have experienced an increase in the labour share in the 1970s followed by a decline during the 1980s. In the last years of the century, the French labour share stabilized, while Germany saw a partial recovery of the share awarded to labour.

Figures 1 , 2 and 3 approximately here

These different trends in inequality have led economists to put forward a number of different hypotheses to try to explain them. A common argument in the literature has been the role of differences in labour market institutions. The aim of this paper is to analyse within a unified framework

[1] The Gini coefficient is our own computation using the LIS data, the wage differential is from OECD (Trends in earning dispersion database) and the aggregate labour share is obtained from the OECD-Stan dataset

[2] The notable exception is the sharp increase and subsequent fall of the labour share during the labour government of 1974-1976, after a period of major conflict between unions and the conservative government of Heath.

the way in which the various measures of inequality are related and the impact that labour market institutions have on them.

There is an extensive literature examining the effect of labour market institutions on labour market outcomes in industrial countries. This literature has documented that stronger institutions tend to increase unemployment rates and reduce the wage differential between high-skill and low-skill workers. By affecting the number of individuals with low incomes (the unemployed) and the relative incomes of different types of workers, labour market institutions will have an impact on the degree of household income inequality in an economy. Their effect is, however, ambiguous: higher unemployment rates will tend to increase overall inequality, while a more compressed wage distribution will tend to reduce it. Labour market institutions are also likely to affect the shares of income received by labour and capital.

In this paper we consider three sources of income: wages, unemployment benefits, and capital incomes. There are then three sources of inequality: differences in wages across workers (a sort of "within-group inequality" measure), employment versus unemployment, and the rewards to capital and labour (which measures "between-group inequality"). Using such framework allows us to express an inequality index for household incomes, the Gini coefficient, as a function of the wage (or labour) share, the distribution of wages, the unemployment benefit, and the proportions of the population in each category. These variables are, however, endogenous and affected by labour markets institutions. We hence argue that labour market institutions are an essential determinant of differences in household income inequality across countries and over time within a country, and test this hypothesis using data from the Luxembourg Income Study for 21 countries over the period 1969-2004.

Our analysis allows us to address three questions. First, we assess whether stronger institutions tend to increase or reduce income inequality. Second, we identify through which mechanism institutions affect the distribution of income, namely their effect on unemployment, on wage dispersion, or on the shares of labour and capital in aggregate output. Lastly, our results allow us to perform a number of simulation exercises to assess the effect that changes in labour market policies would have on overall income inequality.

The paper is organised as follows. The next section briefly discusses the existing evidence. Section 3 presents descriptive evidence on trends in various dimensions of inequality in our data. Section 4 derives a specification of the Gini coefficient in terms of labour market outcomes and proceeds to estimate it. We then examine in section 5 how labour market institutions affect the wage share, wage differential and unemployment, and these in turn income inequality. Section 6 presents some simulations and the last section concludes.

2. Labour market institutions and distribution: Existing evidence

Existing work has treated our variables of interest separately. On the one hand, there is an extensive literature examining the effect of labour market institutions on labour market outcomes in industrial countries. This literature has documented that stronger institutions tend to

- increase unemployment rates (see Nickell and oths. 2005, and Bassanini and Duval 2006, for recent surveys);
- reduce the wage differential between high-skill and low-skill workers (Acemoglu 2003, Card, Lemieux and Riddell 2004, Koeninger, Leonardi and Nunziata 2007);
- alter the optimal capital/labour ratio, thus modifying the long run equilibrium factor shares (Blanchard 1997, Bentolila and Saint-Paul 2003).

However this literature has not examined how labour market institutions affect household income inequality, nor the impact that the various labour market outcomes have on the latter.

An unrelated literature has sought to explain differences in personal/household income inequality across large cross-sections countries and over time. It has focused on variables such as education, the extent of civil liberties, the degree of financial development, or the distribution of land; see, for example, Li, Squire and Zou (1998) and Barro (2000). Most of these variables have no explanatory power when we examine differences in inequality within the subset of rich, industrial countries. This is not surprising as, with the exception of education levels, all other variables show little variability across this group of countries. Surprisingly, the role of labour market institutions has been generally neglected (exceptions can be found in the socio-economic literature, which, however, often mixes alternative explanations without theoretical consistency – see for example Alderson and Nielsen, 2002, and the critique reported in Atkinson and Brandolini 2003).

In a first paper (Checchi and García-Peñalosa, 2005) we have addressed the question of what is the impact of labour market institutions on income inequality using aggregate data for OECD countries. Our results indicate that stronger institutions are negatively correlated with the Gini coefficient of incomes, and that the impact of institutions occurs both through a compression of the wage differential and a higher labour share. Our analysis has, however, two important drawbacks. The first is the limited cross-country comparability of aggregate data on income inequality. The second is the fact that for each country we combine measures of inequality obtained from very different sources. In particular, the labour share is obtained from aggregate data on payments of wages and corporate value added, while wage differentials are calculated from individual data. In this paper we avoid these problems by using the data provided by the Luxembourg Income Study in order to obtain measures of all the inequality variables from the same micro-datasets.

3. Trends in inequality: Evidence from the Luxembourg Income Study

3.1. The data

The main source of our data is the Luxembourg Income Study (LIS). The Luxembourg Income Study is a research project started in 1983 by researchers in several European and American countries in order to collect income, demographic, labour market and expenditure information at the micro-economic level in a way that is consistent across countries. Surveys are conducted every few years, and member countries have expanded over time, with the project now covering 30 countries. For our purposes the advantage of using the LIS data is twofold. First, as is well known, the data on income inequality are problematic and international comparisons difficult (see Atkinson and Brandolini, 2001). Although some cross-country differences in methodology remain, the LIS data are the best source existing so far in terms of cross-country consistency. Second, we are interested measuring three sources of inequality: the distribution of total income, the distribution of wage income or earnings, and the distribution of income between capital and labour. The LIS data allows us to compute these three variables from a single dataset rather than having to rely on different sources. This avoids the consistency problems that may arise when, say, the measure of income inequality is obtained from household surveys and the measure of the wage share from aggregate national accounts.

Our data set covers 21 industrial countries over the period 1969 to 2004. Details on the data and their sources are provided in the Appendix, and descriptive statistics are reported in table A.1. The number of observations varies across countries, depending on the number and frequency of surveys, with countries having between 2 and 8 observations spread over the sample period. The US, the UK, Italy, Germany, and Canada have the most observations. All measures concern household income. We obtain the Gini indices for both gross total incomes and for factor (or market) incomes.[3] Wage income inequality is measured by the ratio between the income of the 90^{th} and the 10^{th} percentiles of the earnings distributions, denoted by p90/p10, or, in alternative specifications, by that of the 90^{th} to the 50^{th} and that of the 50^{th} to the 10^{th} percentiles, p90/p50 and p50/p10 respectively. These measures capture inequality at the top and at the bottom of the wage distribution. Lastly, the wage share is computed as total compensation per employee over total factor income.

3.2. Inequality trends

Figures 4 to 7 depict the evolution of our variables of interest computed from the LIS. Figure 4 reports our measures of income inequality, namely, the Gini index of household income inequality. We compute the Gini index over two sources of income, factor income - defined as wage income plus self-employment income plus capital income - and total gross income which adds to the former private and

[3] Factor incomes comprise wage earnings, capital income, and income from self-employment received by the household, while gross income adds to this government transfers related to employment/unemployment status.

public transfers, such as unemployment benefit, public child support, or alimonies. Figure 4 indicates that the last three decades of the 20th century witnessed an increase in income inequality in many industrial countries. The exceptions in our sample are Austria, Greece, Ireland and the Netherlands. A second feature of the data is the large impact that transfers have on inequality. On average, transfers reduce inequality by 5 Gini points, with a large variation across countries. In the US, but also in Australia, Germany and Italy, transfers reduce the Gini coefficient by only 2 points, while in Scandinavian countries inequality falls by between 7 and 9 points.

Figures 4, 5, 6, and 7 approximately here

Figure 5 reports three wage percentile ratios, which are the p90/p10, p90/p50, and p50/10. We can observe the well-known increase in the p90/p10 ratio in the US, the UK, and Canada, but also evidence of an increase in wage inequality in Germany, especially after 1990. The Scandinavian countries present very different patterns, with Denmark and Norway exhibiting rather stable p90/p10 ratios, and Sweden and Finland experiencing a sharp increase in wage inequality up to 1995 and a decline thereafter. The sources of the increase in the p90/p10 ratio differ across countries. In the US it is the result of an increase in both the p90/p50 and the p50/p10 ratios, while in Sweden it has been caused by a sharp increase of inequality at the bottom of the earnings distribution.

Figure 6 depicts the wage share obtained from two sources, the LIS micro-data and macro-data obtained by the OECD from national accounts. As is well-known the share of wage income in household income is substantially higher than the share of wages in corporate value added (see Piketty, 2003). For example, in the US, the share of wages in household income is, on average, 83 percent while the aggregate wage share is 58 percent. There are two reasons for this difference. The first one is that there are undistributed profits that are seen as capital income in national accounts but are not received by households; the second is that in micro surveys both capital income and self-employment income tend to be underreported, hence increasing the wage share in household income. There are important differences across countries. In Italy, both the aggregate and the LIS wage share show a sharp decline, while for France the reduction in the aggregate wage share is not mirrored by the share of wages in household income.

Figure 7 presents LIS and aggregate unemployment rates. This is clearly the least satisfactory of the variables obtained from LIS. In some cases the LIS data mirrors closely the aggregate unemployment rate - Canada -, in others the evolution of the two variables is the same although the LIS data gives a lower unemployment rate, as is the case for Denmark, France, Italy and Spain, but for many countries the two series seem to bear no relationship. The reason for this is that the LIS data does not provide all the relevant information. Data on employment status are available for the

household head and his/her spouse but not for other household members. We have tried to infer whether other household members were unemployed from the unemployment benefits received by the household, but the series presented in figure 7 clearly indicate that this is a very imprecise measure.

Before we proceed, it is important to emphasize a crucial aspect that we are not considering in our analysis. By focussing on gross income inequality, we are providing a very limited discussion of the redistributive role of taxation. The impact of taxes and transfers on distribution can be large, and indeed these account for a large fraction of cross-country differences in income inequality. For example, in the year 2000 the Gini coefficients of factor income were roughly the same in Germany, Sweden and the US. However, the Gini coefficient of disposable income (i.e. factor income plus transfers minus income taxes) was about 10 points higher in the US than in the other two countries (see Brandolini and Smeeding, 2007). Our income variable, gross household income, incorporates transfers but not taxation. The reason why we have chosen to do so is that we are focussing on the role of labour market institutions. An important aspect of these institutions is the provision of unemployment benefit; hence it is essential that we include transfers in our inequality measure. However, there is no reason why labour market institutions should have an impact on the degree of progressivity in taxation, especially when different countries adopt different mixes of direct, payroll and indirect taxation. Moreover, a "strong welfare state" is likely to manifests itself in both stronger labour market institutions and a higher degree of tax progressivity. Using disposable income as our dependent variable and regressing it on labour market institutions would yield biased coefficients due to omitted variables; including the degree of progressivity would have required modelling country differences in fiscal policies, which goes beyond the scope of the present paper.

4. Income inequality and labour market outcomes

4.1. The Gini coefficient in a model economy

As is common in the literature, we measure the degree of income inequality by the Gini coefficient. In order to illustrate how labour market outcomes may affect inequality, we consider a model economy with four types of agents and decompose the corresponding Gini coefficient.

Suppose the labour force (or population, which is equivalent in the present framework) consists of L unskilled individuals and H skilled individuals. Individuals may work as skilled or unskilled workers, or be unemployed. Some individuals also own capital and receive profits. For simplicity, we also suppose that the owners of capital are always skilled workers, that they are never unemployed, and that they all own the same amount of wealth. Normalising the population to one, that is, $L + H = 1$, we then have four types of agents characterised as follows:

(i) A fraction u of the labour force are unemployed, and receive the unemployment benefit B;

(ii) A fraction l of the labour force are unskilled workers earning a wage w_u;

(iii) A fraction s of the labour force are skilled workers. Of those $s-\kappa$ own no capital and have an income equal to the skilled wage w_s;

(iv) There are κ skilled worker-capitalists, each of whom earns profits π as well as the wage w_s.

Letting y denote output per capita, we can then define the wage share as $\theta \equiv (w_s h + w_u l)/y$. Our assumptions imply that $s+l+u=1$, and that the profits of each worker-capitalist depend on the capital share according to the expression $\pi = (1-\theta)y/\kappa$. All wages are subject to an employer (or employee) contribution, at rate τ, implying that the net wage or take-home pay is given by $\tilde{w}_s = (1-\tau)w_s$ and $\tilde{w}_u = (1-\tau)w_u$. These contributions are used to finance the unemployment benefit, so that $B = \tau\theta y/u$. This implies that the payment of net wages, capital income, and unemployment benefit exhausts output, and average income is equal to output per capita, y. We further impose that $\tilde{w}_u > B$, that is, the unemployment benefit is less than the unskilled wage (otherwise we would not observe employment among unskilled workers).

The degree of income inequality is measured by the Gini concentration index computed across the four groups of population. With four subgroups, the definition of the Gini concentration index is:

$$Gini = \frac{1}{2y}\sum_{i=1}^{4}\sum_{j=1}^{4}\left|y_i - y_j\right| \cdot n_i \cdot n_j \qquad (1)$$

where y_i is the income in group i, which has relative weight n_i. There are two income concepts that we can use: factor income - comprising all income received from the market as either wage income, capital income, or self-employment income - and gross income, which ads to market income the benefits and transfers received from the state.

Given our assumptions about the population and their incomes, and denoting by w the average wage, the Gini coefficient of factor income is given by

$$Gini_f = (1-\kappa)(1-\theta) + u\theta + (1-u)\theta\frac{l}{1-u}\frac{s}{1-u}\frac{w_s - w_u}{w}. \qquad (2)$$

The Gini coefficient is thus a function of population proportions (u,l,s), the number of capital owners κ, the wage share θ, and the wage differential. A greater wage differential between the skilled and the unskilled will raise the Gini coefficient as it increases inequality within the group of employed individuals, while a higher rate of unemployment increases inequality. The effect of the wage share is ambiguous. This is a standard effect when there is inequality within and between groups. The higher the wage share, the lower inequality between capital owners and non-capital owners is. However, a higher wage share raises inequality within the group of non-capital owners. First, it increases the income differential between employed and unemployed individuals, as captured by the term $u\theta$ in

equation (2); second, for any given dispersion of wages, $(w_s - w_u)/w$, a higher wage share increases the weight that the wage distribution has in total market income and raises inequality.

Turning now to gross income, we can express it as

$$Gini_g = (1-\kappa)(1-\theta) + u\left(\theta - \frac{B}{y}\right) + (1-u)\theta\frac{l}{1-u}\frac{s}{1-u}\frac{w_s - w_u}{w}. \quad (3)$$

The only difference with the Gini index on market income is that inequality now depends on the size of government transfers, which in our model economy take the form of an unemployment benefit (expressed as the replacement rate with respect to per capita income). This is the only labour market institution that enters directly into our expression for inequality. As expected, the direct effect of a high unemployment benefit is to reduce gross income inequality.

Our framework of analysis makes a number of simplifications, which are worth mentioning. First, both the distributions of wealth and of wages have been compressed, since we only have two types of workers (skilled/unskilled) and one type of wealth-owner. Second, two sources of income are missing. The first one are transfers other than the unemployment benefit, such as public pensions, child and housing benefits, etc. Note, however, that private pensions are implicitly included in our framework: they can be provided by pension funds, in which case they are capital income, or they can be paid by a firm to its former employees, in which case they are (most often) counted as labour payments in the company's balance sheet. Secondly, we are ignoring income from self-employment. Self-employment income will be either a reward to labour or to capital, and there is an ongoing controversy about how to impute this income to one or the other factor when calculating labour shares (see Gollin, 2002). Since self-employment income is unlikely to be affected by labour market institutions, we do not include it in the wage share but rather in what we term the capital share $(1-\theta)$. Lastly, note that we have focussed on gross income inequality, with the only tax we have considered being the unemployment insurance contribution. We also model the tax rate in a naïve way, considering immediate readjustments after a change in unemployment in order to maintain a balanced budget.

4.2. Empirical specification

From equations (2) and (3), the Gini coefficients of household incomes could be expressed as a function of the wage share, wage inequality, the replacement rate, and population shares. We lack data for some of the variables in these equations, notably for the number of individuals in each category. Therefore we consider the estimation of the following relationship

$$Gini_{it} = g_0 + g_1 \cdot \theta_{it} + g_2 \cdot \omega_{it} + g_3 \cdot \theta_{it} \cdot \omega_{it} + g_4 \cdot u_{it} + g_5 \cdot b_{it} + g_6 \cdot b_{it} \cdot u_{it} + \delta_i + def_{it} + \varepsilon_{it} \quad (4)$$

where θ_{it} denotes the labour share, ω_{it} is a measure of wage inequality, and u_{it} the unemployment rate for country i in year *t*. The unemployment benefit replacement ratio is denoted b_{it} and will not be

included when estimating the equation for factor income. We also control for different definitions used to compute the Gini index with the variable def_{it},[4] and include country fixed effects, δ_i.[5]

The coefficient g_1 captures the relative contribution of the factor distribution of income to household income inequality, g_2 measures the contribution of wage inequality to overall inequality, while g_3 allows for an interaction between these two variables. In our highly simplified framework, g_1, g_4, g_5 and g_6 can be interpreted as a measure of the between-group inequality, where groups are to be defined in accordance to their position in the production process: owners of capital versus those who do not, and the employed versus the unemployed. The coefficients g_2 and g_3 can be interpreted as the contribution of within-group inequality, caused by the fact that employed workers receive different incomes. For a given degree of wage inequality, the higher the wage share is, the greater the contribution of within-group inequality to total inequality will be. From equations (2) and (3) we expect g_2 and g_3 to be positive, g_1, g_5 and g_6 to be negative, while g_4 has a priori an ambiguous sign.

4.3. Regression results

We estimate equation (4) using two different measures of inequality, factor incomes and in total gross incomes. Table 1 reports our estimates for factor income inequality. There are four regressors: the wage share, a measure of wage inequality, the unemployment rate, and a measure of education. The latter variable is included as there is an extensive literature that has examined the impact of education on income inequality. Education is measured by the fraction of household heads with some tertiary education. The coefficient on education is highly significant and positive in all regressions, indicating that the more educated the population is the greater factor income inequality is. This is a surprising result since empirical studies on large cross-sections of countries have found that a more educated labour force reduces inequality (see Li, Squire and Zou, 1998). A possible explanation for this is that the education variable captures some form of endogenous skill-biased technical change that increases earnings inequality. We will explore this hypothesis in the next section.

We estimate different specifications using both our measures of labour market outcomes obtained from LIS and those obtained from aggregate data. The effect of the LIS wage share is insignificant when country fixed effects are introduced. This is not surprising given that the wage share obtained from microdata accounts, on average, for almost 80 percent of factor incomes. Note, however, that the interaction term that multiplies the wage share by the wage decile ratio is significant

[4] This variable is a dummy taking the value 1 for countries that report net rather than gross wage income.

[5] In principle we could also include a time fixed effect. However, given the discontinuous nature of inequality measures obtained from LIS, it would capture almost all the variability in the data and/or exhaust the degrees of freedom. For this reason, we have not included it in the regressions.

and positive, indicating that a given degree of wage inequality will increase income inequality by more when the wage share is high. Alternatively, when we use the aggregate measure, a higher wage share has a negative impact on income inequality, implying that this variable captures distributional differences between those who own capital and those who do not. The coefficient on the wage decile on its own is positive when no interaction term is included, as expected, and insignificant when there is an interaction term (in the fixed effect specification). In order to further understand the role of wage inequality, we decompose the p90/p10 ratio into a measure of *inequality at the top* of the wage distribution –the ratio of the wage of the top 90th percentile to that of the 50th percentile, denoted p90/p50 - and a measure of *inequality at the bottom* of the wage distribution – the ratio of the wage of the 50th percentile to that of the 10th percentile, denoted p50/p10. Our results indicate that the effect of wage inequality on the distribution of factor income comes from inequality at the bottom. As discussed before, unemployment is the variable for which the LIS data provides the least satisfactory measure. Hence it is no surprise that the unemployment rate is insignificant when measured using the LIS data. When we use aggregate data we find a significant and positive coefficient, implying that the across-group effect dominates so that higher unemployment increases inequality.

Table 1 approximately here

We turn now to the determinants of total (gross) income inequality. Gross income is equal to factor income plus transfers. As discussed in section 4.1, the only transfer we consider is the unemployment benefit which is now added to the list of regressors used in table 1. Tables 2 and 3 report our estimates for total gross income inequality. In order to compare our results with those obtained for factor income inequality, table 2 reproduces the regressions reported in table 1 using as the dependent variable the Gini coefficient of total gross incomes. The most important difference is that the wage share computed from LIS now has a negative and highly significant coefficient. As in the previous table, the decile ratio on its own has a negative sign while the interacted term has a positive one, both significant. The effect of the distribution of wage income on inequality stems, as before, from inequality at the bottom. The coefficient on education, however, looses its significance in few specifications.

Tables 2 and 3 approximately here

Table 3 includes in our regressions the unemployment benefit measured by the replacement rate over the first year of unemployment, both on its own and interacted with the LIS unemployment rate. A drawback of these estimates is that three countries have to be excluded as we lack data on the replacement rate for the Czech Republic, Hungary and Poland. Most coefficients are similar to those

reported in the previous table. For example, the wage share has a negative coefficient while the interaction between the wage share and wage inequality has a positive coefficient, capturing the impact of between-group and within-group inequality. From these estimates we can compute the level of wage inequality for which changes in the wage share have no impact on inequality. Using the estimates of column 5, we find that $dG/d\theta = 0$ for $\omega = 4.79$. Most countries in our sample have decile ratios below 4.79, implying that a higher labour share reduces income inequality. In the US, wage inequality was below this level in the 1970s and above it in the 1980s and 1990s. Consequently in the latter decades increases in the wage share were associated with greater income inequality. Similarly, in Sweden in the 1990s the overall coefficient on the wage share is positive.

Education is again significant in most specifications (all but two), and the unemployment rate computed from LIS now has now a significant (but negative) sign. The replacement rate has an insignificant coefficient once we include country fixed effects, although the interacted term has a positive and significant coefficient (columns 4 and 7), contrary to our expectations. This indicates that the inequality reducing impact of higher unemployment benefit is reduced by higher rate of unemployment, yielding an overall positive derivative for unemployment rates exceeding 9%. The reason for this counterintuitive result is likely to be the fact that, as well as a direct effect, the replacement rate has an indirect effect on inequality through its impact on labour market outcomes. This suggests that in order to properly estimate the effects of the various variables on income inequality we need to understand how labour market outcomes are themselves determined.

5. Income inequality and labour market institutions

5.1. The determinants of the relative wage, the unemployment rate, and the labour share

If labour markets were competitive, there would be no unemployment and a country's capital-labour ratio and its relative supply of skills would be the sole determinants of the wage share and the relative wage. A higher relative supply of skilled labour would tend to reduce the relative wage, while a higher capital-labour ratio would increase or reduce the wage share depending on the degree of complementarity in production between the two factors. However, labour markets are not competitive. Employment levels hence differ from factor supplies, and anything that affects employment will in turn affect, u, θ and ω.

We consider the effect of nine frequently used measures of the strength of labour market institutions, namely

* union density,
* union coverage,
* centralisation of wage bargaining,
* coordination of wage bargaining,
* minimum wage,
* unemployment benefit,

* employment protection legislation,
* tax wedge,
* active labour market policies.

As we have discussed, an extensive theoretical and empirical literature has examined the effect of labour market institutions on unemployment and the relative wage, and, to a lesser extent, the labour share. Stronger labour market institutions result in a lower level of employment than would prevail with competitive markets, either because unions demand higher wages or due to higher expected costs of labour faced by employers. As a result, they tend to increase the unemployment rate, reduce wage dispersion and increase the wage share. Note that the overall impact of stronger institutions on income inequality is in principle ambiguous: they increase unemployment which tends to raise inequality, they reduce wage dispersion, which tends to lower it, and they increase the wage share which we have just seen has an ambiguous effect on income inequality.

Box 1 : Labour market institutions and labour market outcomes: An example
Consider the effect of stronger unions. In the standard wage bargaining model, the effect of greater union bargaining power is to demand higher wages and hence reduce employment for all types of workers. Unions tend to give greater weight to the welfare of those at the bottom of the wage distribution. As a result, stronger unions lead to wage compression. Furthermore, lower levels of employment imply a higher capital-labour ratio. Under the assumption that the elasticity of substitution between capital and labour is less than 1, as the data seems to indicate (see Antras, 2004), the reduction in the capital-labour ratio also implies a higher wage share.

5.2. Empirical specification

Our strategy will begin by estimating the following relationships

$$\theta_{it} = a_0 + \underset{+}{a_1 \cdot \gamma_{it}} + a_2 \cdot \mu_{it} + \delta_i + \varepsilon_{1it} \quad (5)$$

$$\omega_{it} = c_0 + \underset{-}{c_1 \cdot \gamma_{it}} + c_2 \cdot \mu_{it} + \delta_i + \varepsilon_{2it} \quad (6)$$

$$u_{it} = d_0 + \underset{+}{d_1 \cdot \gamma_{it}} + d_2 \cdot \mu_{it} + \delta_i + \varepsilon_{3it} \quad (7)$$

where γ_{it} is a measure of the strength of labour market institutions and μ_{it} captures additional factors, such as the oil price, investment, and educational attainment that have been included in previous analyses of any of these three variables. The variable δ_i denotes country or region fixed effects.[6] The signs reported below the coefficients to be estimated indicate our expected signs.

[6] Because of the limited number of observations relative to the number of countries, when we estimate the four equation system we abandon country fixed effects because we would run out of degrees of freedom, and we replace them with regional dummies.

Given the endogeneity of our different components of inequality discussed above, we aim to obtain unbiased estimates of equation (4) by estimating the simultaneous equation system given by equations (4), (5), (6) and (7) through three-stage least squares methods (3SLS). Since we are also interested in assessing the overall impact of labour market institutions on income inequality, we will estimate as well the reduced form equation obtained when we replace (5)-(6)-(7) into equation (4), which yields

$$Gini_{it} = h_0 + h_1 \cdot \gamma_{it} + h_3 \cdot \mu_{it} + \delta_i + def_{it} + \varepsilon_{4it} \quad (8)$$

In the reduced-form equation the overall effect of labour market institutions is ambiguous, due to the conflicting impact occurring through the three labour market outcomes.

5.3. Regression results

5.3.1. Descriptive analysis of the components of inequality

When we analyse the correlation between labour market outcomes and labour market institutions, we are confronted with the limited number of observation available per country, which corresponds to the waves available in the LIS data set. While using aggregate data from national accounts we found evidence of existing correlation between aggregate labour shares and macroeconomic determinants (like physical capital accumulation, oil price and average educational attainment in the population – see Checchi and García-Peñalosa, 2005), the discontinuous nature of the present dataset does not allow the detection of analogous effects. In table 4 we start by examining the pair-wise correlation between the wage share and available institutional variables, including country fixed effects. However, the inclusion of fixed effects may be too demanding since they remove most of the cross-country variations. In columns 1 to 7 of table 4 we gradually introduce alternative measures of union presence (union density, union coverage, bargaining centralisation and bargaining coordination), minimum wage (measured by the so-called Kaitz index, the ratio of the minimum wage to the median wage of an average worker), unemployment subsidy (measured by the gross replacement rate, averaged over years) and employment protection legislation. We find a positive correlation between the wage share and union coverage (which, however, is not available for the Eastern Europe economies). More interesting results emerge when we consider the possibility of institutional complementarities (see Belot and van Ours, 2004, and Blanchard and Wolfers, 2000). When we interact employment protection with unemployment benefits (column 8), two alternative institutions to cope with the risk of unemployment, we find that both exhibit a positive correlation with the wage share, and there is evidence of substitutability between the two. We can interpret them as alternative mechanisms that reinforce the pressure of wage claims since they raise the value of the outside option to workers. The macroeconomic controls introduced in column 9 (investment ratio to gross domestic product, oil price and educational attainment in the population) have no correlation with the wage share.

Tables 4, 5 and 6 approximately here

We then consider the wage differential, measured by the decile ratio. Given the limited variation overtime of this variable, the introduction of country fixed effects eliminates any significant correlation with institutional variable, as seen in table 5. For this reason, we start by leaving out these controls (columns 1 to 8). Yet even in this case most of cross-country variation in the decile ratio is accounted by differences in the educational attainment of the population. When we introduce the interaction of union density with wage bargaining coordination, we find some evidence that wage differentials are lower in countries where union membership is larger and wage bargaining is coordinated. However, even in this case some substitutability between these two measures still emerges. These effects do not survive to the introduction of country fixed effects, as reported in the final three columns of table 5. Considered in isolation, these results suggest that earnings inequality is independent from the institutional contexts, at least as captured by the available measures. This is rather surprising, especially since we consider variables like union coverage or the minimum wage.

In contrast, the unemployment rate exhibits a stronger correlation with the institutional environment, as shown in table 6. Despite the presence of country fixed effects and a negative association with domestic investment activity - a proxy for aggregate demand -, we find significant correlations with almost all institutional measures. The institutional determinants of unemployment are one of the most studied topics in labour economics (for a review of the literature see Bassanini and Duval, 2006), and many of our results are standard (positive correlation with the tax wedge and unemployment benefit generosity, negative correlation with active labour market policies). However, the negative correlation between unemployment and union density or the minimum wage goes contrary to our expectations. When we consider more than one institution at a time, we find that unemployment tends to be higher when the tax wedge and unemployment benefit are higher and wage bargaining is decentralised (see column 11 of table 6). Similar results are found in Nickell and oths. (2005) and in Bassanini and Duval (2006). Interactions between institutional variables did not prove significant in our regression analysis.

5.3.2. Econometric analysis of income inequality

In all three tables above, the correlations reported may be spurious because many institutional variables could be endogenous. The textbook example is the unemployment benefit, which typically exhibits a positive correlation with the unemployment rate. If the generosity of the benefit is decided under majority voting, the greater the risk of unemployment among voters the higher the chosen benefit will be (Saint-Paul, 2000), thus generating a revere causality link between the two variables. In

the present analysis we consider labour market institutions as exogenously given, even if we are aware of their potential endogeneity in the long run. In order to minimise the bias induced by neglecting endogeneity, one could either resort to instrumental variable estimation (as we have done in Checchi and García-Peñalosa, 2005) or use lagged values of the pre-determined variables. In this paper we have chosen to pursue the latter approach.

In order to estimate the system given by equations (4), (5), (6) and (7) we use 3-stage least square methods, using labour market institutions, educational attainment, fixed capital accumulation and regional dummies as exogenous controls.[7] Even excluding the institutional measures which are available only for a subgroup of countries (like active labour market policies), the number of observations with non missing values is limited (86), although we cover 17 countries rather evenly, with an average number of observations per country slightly exceeding five. In table 7 we report our preferred estimates. The structure of this semi-reduced form system is recursive, since all (but one) labour market institutions variables affect the intermediate inequality components only (columns 1-2-3), and these intermediate components then determine total income inequality (column 4). In the selection of the preferred model we have followed the results that we obtained in the previous estimates of the determinants of the wage share, the earnings differential, and the unemployment rate (tables 4, 5 and 6). As mentioned above, we use lagged values for labour market institutions in order to reduce the risk of potential endogeneity. Given the discontinuous nature of our dependent variables, it is impossible to assess the optimal lag length using standard criteria, such as the Akaike information criterion. We have therefore resorted to a conventional time lag of one year, but results are almost identical if we adopt a two-year time lag.

Table 7 approximately here

The results are reported in table 7. We find that the wage share is positively correlated with union presence, captured by union membership (with positive effect) and wage bargaining (with negative sign). In addition, employment security (granted by either generous unemployment benefit or employment protection legislation) tends to lower the wage pressure exerted by unions, even if a trade-off emerges between these two alternatives. Wage pressure is lower (and the wage share falls accordingly) when either the workers are protected in the workplace (higher employment protection) or in the market (higher unemployment benefit), but the co-existence of both protections tends to

[7] Given the limited number of observation available, we could not use country fixed effects estimation, because we were almost exhausting the available degrees of freedom. We have therefore identified four regions, reported in the notes to table 8. We were also forced to introduce a dummy variable for Spain in 1980, since the union density declines from 42.6 in 1979 to 18.0 in 1980. In addition, the p90p10 measure is unusually high in 1980 (11.9) compared to the subsequent observation available in 1990 (4.24).

increases wage pressure. Altogether, the estimated coefficients in column 1 of table 7 suggest that the share of wages in household incomes tends to be higher when unions are powerful but uncoordinated (Calmfors and Driffill, 1988), and when workers are less protected in the labour market, either by supportive legislation or by generous welfare provisions.

Union presence is also relevant for wage compression, as indicated by the estimated coefficients in column 2 of table 7. We also find that the top/bottom decile ratio is positively associated to the tax rate, suggesting that wage resistance to taxes may be more intense at the top than at the bottom of the earnings distribution.[8] We were surprised by the fact that we find an insignificant correlation with the presence of minimum wage legislation, since we would have expected that such legislation reduces inequality at the bottom tail of the distribution. We have also experimented with alternative decile ratios, without finding any significant effect.[9]

Concerning the determinants of unemployment (column 3 of table 7), we have followed the traditional approach of including measures of labour costs (captured by tax wedge), work incentives (proxied by unemployment benefit), union presence (including union density and wage bargaining) and institutional rigidity. Consistent with most of the literature, we find that the unemployment rate is positively correlated with the unemployment benefit and employment protection legislation. Union density is always insignificant, while wage coordination reduces unemployment (Nickell 1997).

When we bring together the co-movements of the wage share, decile ratio, unemployment rate and total income inequality, we find results that are consistent with our theoretical expectations, as they were already anticipated in tables 2 and 3. Total income inequality declines with the wage share and the decile ratio, and through them it responds to labour market institutions. We find no evidence of a statistical correlation between unemployment and income inequality (although the sign on the coefficient is positive), whereas a more generous unemployment benefit is (weakly) negatively associated to income inequality.

Our model has an overall goodness of fit, as indicated by the standard statistics (Root Mean Square Error and R^2) reported at the bottom of table 7, as well as by the average predictions reported in table A.3 in the Appendix II. However, given the discontinuous nature of our series for inequality, our model does not possess dynamic properties that can capture well the cyclical fluctuations which, for example, are evident in the evolution of the wage share and, to a lesser extent, of the unemployment

[8] We are using here a restrictive definition of tax wedge, which exclude consumption taxes (see the discussion of data sources in the Appendix). However, even when we use a different notion of tax wedge (see Nickell et al 2005), we still find a negative impact on earnings differential.

[9] Some positive correlation emerges when the minimum wage is interacted with union density (as it is done when estimating the reduced form – see table 9), suggesting some substitutability between these two measures. But this interaction renders the correlation of union density insignificant, and for this reason we have discarded this version of the model. We have also considered the possibility of introducing two separate equations for two decile ratios (the P90P50 and the P50P10), but the weakness of the statistical significances (possibly due to the difficulty to identify these two separate equations) and the limited degrees of freedom have suggested renouncing this line.

rate (graphs of the predicted values for all years available are reported in the Appendix II – see figures A.1-A.2-A.3-A.4).

5.4. Evaluating the association between labour market institutions and income inequality

The estimated coefficients reported in table 7 do not provide us with the magnitude of the correlations between the relevant variables, especially when taking into account the opposite effects associated with different intermediate inequality measures. For this reason, we have carried out two exercises, reported in table 8. In the top part of the table we consider an exogenous variation of 10% of each institutional measure, other things kept constant. In the bottom part we consider a larger variation of the same variables, corresponding to one standard deviation.[10]

Table 8 approximately here

Union density and the unemployment benefit appear as the institutional variables with the strongest overall negative correlation with income inequality, which is the joint result of a larger wage share and reduced earnings differential, even taking into account the increase in unemployment. In contrast, wage bargaining coordination seems to be inequality enhancing since it is associated with a lower wage share, suggesting that centralised wage agreements are often associated with wage moderation. A trade-off emerges here, because bargaining coordination is also associated with lower unemployment. Although the opposite sign of the impact of certain institutions on employment and average wages has already been identified (for example Bertola and oths., 2001), what is novel here is the focus on income inequality. Greater wage coordination, other things constant, is associated with higher inequality and lower unemployment, situations which is usually perceived as being typical of countries with decentralised wage settings. Similarly counterintuitive is the association between the tax wedge and greater earnings inequality and higher unemployment, since the latter two variables tend to move in opposite directions.

5.4.1 Regional variations

These conflicting results can be reconciled when we take into account the fact that institutions tend to move together, according to the principles of complementarity or substitutability. Before examining this issue in more details, we analyse our model from another perspective, the reduced form. In table 9 we report alternative models estimating the correlations between labour market institutions and the Gini coefficient of factor and of total income. We do not find a significant coefficient on the interaction between employment protection and unemployment benefit. Concerning the minimum

[10] These effects are computed by using all the estimated coefficients reported in table 8, irrespective of their statistical significance, otherwise the predicted value would be different from the sample mean.

wage, while this institutional measure was statistically insignificant in the system estimation of table 7, it becomes now significant when considered alone and interacted with union density. In this case a higher minimum wage would be associated to lower inequality in countries where unions are weak (because they gather few members), but it reverses its correlation when unions are strong. Using the estimated coefficients of column 2 of table 9, the partial derivative of income inequality with respect to the minimum wage becomes positive when union density exceeds (0.0011722/0.0000349)=33.59, which at country means is the case of France, Spain, Switzerland and US, with Canada and Germany being border-line. Thus for most of the countries minimum wage legislation is positively correlated with income inequality, possibly because it induces wage compressions from below and pushes skilled workers to bargain for higher wages, in order to preserve the same relative distance from the unskilled.

Table 9 approximately here

Columns 3 to 5 of table 9 estimate the reduced form model by regions, aggregating the countries in three regions: "Anglo-Saxon" (Australia, Canada, Ireland, Switzerland, United Kingdom, United States), "Scandinavia" (Denmark, Finland, Norway, Sweden) and "Continental Europe" (Austria, Belgium, France, Germany, Italy, Netherlands, Spain). The most remarkable result is that we find a stronger correlation between institutional measures and income inequality in continental Europe: all the coefficients are statistically significant and larger in magnitude than the estimates for other regions. It is also worth noticing that wage coordination (which we have previously argued was associated to higher inequality via lower wage share) has a negative correlation with income inequality in Scandinavia, where minimum wage institutions are absent. This may be due to an intentional policy of wage compression, achieved through centralised wage setting in Nordic countries (Agell and Lommerud 1993).

Finally, the liberal market economies (Hall and Soskice 2001) are characterised by the absence of correlation between income inequality and labour market institutions, except for union presence and the minimum wage. Among Anglo-Saxon economies, other things constant, inequality is lower whenever minimum wage and union density are higher. The same correlation seems to exist in the entire sample when we restrict the analysis to factor income inequality, as we saw in table 1.

5.4.2. Decomposing country differences

The estimation of regional models of income inequality allows us to undertake decomposition exercises. In table 10 we have performed two types of counterfactuals: by reading the table vertically, we obtain what would be income inequality in a particular region had it experienced the institutional values of another region; by reading it horizontally, we have the inequality that one region would have

recorded if had its coefficients been estimated for another. For example, the average of Anglo-Saxon countries report an income inequality Gini index of 0.306, which is the joint outcome of regional averages for labour market institutional variables and the reduced form estimated in column 3 of table 9. The same institutional set-up applied to Nordic countries or to continental Europe would yield a rather similar measure for income inequality (0.310 and 0.308 respectively). Conversely, if we retain the structure of the Anglo-Saxon economies and we introduce the institutional set-up of other regions, we record much higher measures for income inequality (0.544 and 0.485, respectively for Scandinavia and continental Europe). This suggests that most of the differences in income inequality across world regions are attributable to differences in institutional set-up and not in the working of the economies.

Table 10 approximately here

This claim may be made more rigorous if we apply the Oaxaca (1973) decomposition of the differences in income inequality across regions in pair-wise comparisons. Given the reduced form estimates obtained in table 9, we can write it as

$$\text{Gini}_i - \text{Gini}_j = \boldsymbol{\beta}'_i \cdot \mathbf{X}_i - \boldsymbol{\beta}'_j \cdot \mathbf{X}_j = \left(\boldsymbol{\beta}'_i - \boldsymbol{\beta}'_j\right) \cdot \mathbf{X}_i + \boldsymbol{\beta}'_j \cdot \left(\mathbf{X}_i - \mathbf{X}_j\right), i \neq j \qquad (9)$$

where the $\boldsymbol{\beta}$'s denote the vector of regression coefficients and the $\mathbf{X}$'s the vector of institutional variables. This decomposition is depicted in the figures reported in table 11, which are to be read as base points of Gini inequality measures. If we are interested in the comparison between market-based economies (Anglo-Saxon) and the social-democratic economies (Scandinavia), according to the definition of Amable (2003), we find the two regions differ on average by 5.5 base points (from a Gini of 0.306 to a Gini of 0.251), which is more than completely accounted by differences in institutions, given the fact that structural differences would rather produce an inequality advantage for the more unequal region. The same result appears when we compare Anglo-Saxon economies and continental Europe, and also within Europe when comparing continental countries with Nordic ones.

Table 11 approximately here

5.4.3. Inequality minimising clustering

We can interpret our evidence as supportive for the idea that income inequality in one country/region is shaped by its institutional framework. This raises the question of whether we could devise an *inequality minimising institutional set-up, represented by strong unions* (high membership), *protection of employees* (high employment protection legislation) *and support to unemployed* (generous replacement rate).

These three aspects can be viewed as complementary, since higher employment protection and improved outside options reinforce unions bargaining power (Bertola 1990). However they also reduce the demand for union protection, thus pointing to a substitutability between union density on one side and employment protection and unemployment benefit on the other (Checchi and Lucifora 2002). What is relevant here is that these three measures are negatively correlated with income inequality. *In addition, when unions are strong, minimum wage legislation is less necessary, and can also become counterproductive if it triggers a wage spiral as high-wage workers aim to maintaining a given wage differential. For the same reason, a lower marginal tax rate may contribute to reduce income inequality, since it is likely to be associated to lower wage claims. Lastly, an intermediate level of wage bargaining coordination would be preferable*, because it would allow for significant wage pressure that would tend to raise the wage share, but also the unemployment rate, the two effects off-setting each others.

In order to investigate the potential clustering of institutional variables, we have resorted to factor analysis (principal component method). In table 12 we show that two factors are extracted, accounting for 2/3 of total variance. When applying the (orthogonal varimax) rotation, we observe that the first factor mostly correlates with union density, employment protection and minimum wage, while the second factor attracts the positive association of unemployment benefit, tax wedge and bargaining coordination. The first group of institutions concerns the process of wage setting, and with some imagination we can label the first factor as "**wage setting**". The other group of measures describes the degree of job security and its financing; for this reason we label it as "**employment security**".

Since each country/year observation is associated to a specific value on each extracted factor, in the same table we show that the North America is the poorest region in terms of institutional set-up, followed by the other Anglo-Saxons countries. At the other extreme, the Nordic countries have the strongest institutional framework with respect to wage bargaining, while continental Europe records the highest values for employment security. The average position for each country is reported in figure 8. It is interesting to note that European countries like France and Spain exhibit a level of bargaining institution comparable to the North American one, though accompanied by a higher level of employment security. Conversely, other European countries (like Austria or Norway) are characterised by strong wage bargaining institutions, although not accompanied by employment security.

If we search for trends in these institutional set-ups, we notice a tendency to a decline in the measures of wage setting institutions in both Anglo-Saxon countries and continental Europe, with the remarkable exemption of Scandinavian countries (see figure 9). Conversely we detect a rising trend in employment security institutions across all regions, more pronounced in continental Europe and less evident in North America (see figure 10). We could argue that the gradual reduction observed in union presence (with the exception of Nordic countries) is accompanied by increasing protection of workers' incomes from employment.

Figures 8, 9, 10, and 11 approximately here

An alternative way to visualise the global trends of institutions and associated dynamics of income inequality is visualised in figure 11. By using the naïve model reported at the bottom of table 13, which simply shows a negative correlation between income inequality and our two summary measures of labour market institutions, we have predicted income inequality for all years for which institutional information was available, and we have charted the dynamics of these variables by countries. These graphs suggest that the decline in wage setting institutions is associated with an increase in income inequality in most of the Anglo-Saxons countries (Australia, UK and US, but not for example Canada). In the case of Scandinavian countries the dynamics of aggregate institutional variables would not suggest a tendency to increase inequality, which on the contrary is perceivable in actual data (at least in the case of Finland and Sweden). For the other European countries the rising trend in the "employment security" factor would be expected to result in a reduction in income inequality, which is not found in the data (except in the case of Netherlands). In fact, the rising trend in actual income inequality observed in Germany, Italy and France is not captured by our models, neither the more sophisticated one estimated in table 7 (see the inequality predictions for these countries in figure A.1) nor the naïve one estimated in table 9. This discrepancy hints at other potential explanation of rising inequality that are unrelated to labour market institutions, like technological shocks or the impact of trade and foreign competition.

6. Counterfactual exercises

6.1. Changes in institution and income inequality

We have performed a number of counterfactual exercises to assess the relative importance of the various labour market variables. To illustrate the process, consider figure 12. Using the estimated coefficients in table 7 we have obtained the predicted values for the labour share, wage differential and unemployment rate for all the country/year observations available in the sample. We then use these values to further predict the Gini coefficient. In addition to the standard prediction (continuous line), we report the Gini index replacing the country's values of labour market institutions by union density observed in the US (dashed line) and by the US unemployment benefit (dot-dashed line). The figure illustrates that inequality in the two Scandinavian countries would have been between 1 and 2 points higher if one of these institutions had been at US levels. In the case of Norway, differences in the unemployment benefit have the greatest impact. In the case of Sweden, a country characterised by high density rates (due to the so called "Ghent system", where unions run unemployment benefit schemes on behalf of the state), a decline of density rates to the US level would have induced a 2 Gini points

increase in inequality throughout the period, while the impact of unemployment benefit changes is more limited, because the US-Europe gap is lower.[11] All European countries considered in this exercise would have experienced an increase in income inequality, and the impact seems stronger in Canada, which is typically considered a US-type economy but with stronger worker protection.

Figures 12, 13, 14, and 15 approximately here

In figure 13 we use the UK union density and unemployment benefit in the prediction for Germany and Italy. Union density was high in the UK in the early years in our sample, and we see that in the 1970s and 1980s inequality would have been about half a Gini point lower in Germany had it had the same union density as the UK. The difference disappears as union density declined in the UK in the Thatcher years. In contrast, the unemployment benefit replacement rate was about seven percentage points higher in Germany, and as a result reducing it to the level paid in the UK would have increased the Gini coefficient in Germany by 1 Gini point. In contrast, Italy has a relatively low replacement rate, so that UK-type benefits would have meant a reduction of the Gini index of 2 points.

In figure 14 we replace the Finish unemployment benefit and degree of employment protection legislation to predict income inequality for Canada and the US. The results indicate that while the higher unemployment benefit paid in Finland would have tended to reduce inequality, stronger employment protection legislation would have had the opposite effect, in line with discussion in the previous section. We have seen that a higher tax wedge tends to increase income inequality through its impact on earnings inequality. When substituting the tax wedge in Australia and the UK by the much higher tax wedge observed in the Netherlands (figure 15) we see indeed an increase in the Gini coefficient in the two countries.

6.2. Institutions and the trade-off between inequality and unemployment

Our empirical results indicate that although stronger labour market institutions increase the unemployment rate, the latter has no impact on inequality. Yet, lower unemployment is per se a major policy target. The model estimated in table 7 allows us explore the extent of the trade-off between income inequality and unemployment caused by the impact that institutions have on these two variables. In order to examine his trade-off we select the 12 countries in our sample that were members of the European Union prior to the recent enlargement, and consider the impact on inequality and unemployment of imposing common labour market institutions.

[11] Looking at table A.1, the sample-average replacement rate in US is 0.12, to be compared with 0.19 of Sweden, 0.22 of UK, 0.26 of Canada and 0.30 of France.

Figure 16 approximately here

Out of the various institutional measures that we have used, some, such as the minimum wage, can be legislated while others, for example union membership, cannot. Hence we suppose that the common policy consist of imposing in all 12 countries the same values for the four institutions that can be legislated, namely the unemployment benefit rate, the degree of employment protection, the minimum wage (also extended to countries that do not have it), and the tax wedge. The common institutions are set equal to the average of those observed in these 12 countries in the latest year for which we have data on inequality (i.e. at some point between 1999 and 2004).[12] Countries then differ in the other institutions (union density rate and coordination of wage bargaining) as well as in the level of education and investment rate.

Figure 16 presents the results. The upper panel presents the Gini coefficients of total income, while the bottom panel depicts the unemployment rates. The grey bars are the values predicted by our model when using the true institutions of each country, and the dashed bars represent the values obtained under common institutions. By construction, average inequality and average unemployment are the same after the common institutions are introduced as they were before, but the patterns vary enormously across countries. Consider first the two largest continental economies, France and Germany. France is a clear winner from harmonization as it experiences no change in inequality and a reduction in unemployment of 2.3 percentage points. For Germany there is no change in unemployment while the Gini coefficient falls by almost one point. Harmonization would induce a similar reduction in unemployment in Italy and Spain but have opposite effects on distribution, with inequality falling in Italy and increasing in Spain. Northern European countries exhibit very different effects in terms of distribution: inequality falls by one point in Sweden and by 0.33 points in Finland, while it rises by 1.4 and 1.5 points in Denmark and the Netherlands, respectively. The losers are the two Anglo-Saxon economies. Ireland and the UK are the only two countries for which harmonization implies an increase in the unemployment rate, of 3.5 and 5.2 percentage points, respectively. Meanwhile, inequality remains virtually unchanged in these two economies.

7. Conclusions

In this paper we provide a unified framework to examine the impact of labour market institutions on labour market outcomes, and through them on income inequality. The three measures of inequality commonly discussed in the literature are closely related, as inequality in earnings and the wage share are central components of household income inequality. Interestingly, the relationship

[12] Since some countries do not have a minimum wage, when we calculate the common minimum wage we use the mean value for those countries that do have it.

between income inequality and the wage share crucially depends on the degree of earnings inequality. The wage share measures, on the one hand, inequality between groups of individuals – those who own capital and those who don't – and, on the other, captures the importance of within-group inequality as determined by the distribution of earnings. When earnings inequality is high, a higher wage share will assign a greater weight to wage income and hence be correlated with a more unequal distribution of income.

Our results indicate that, overall, labour market institutions exhibit significant correlations with the distribution of income across countries and over time. Stronger institutions are correlated with lower inequality, with the notable exception of the tax wedge that exhibits a positive correlation with the Gini coefficient. The ambiguous effect of the wage share, together with the absence of a significant correlation between unemployment and income inequality, imply that the crucial mechanism to reduce inequality is to decrease wage dispersion. To this effect we tried to identify a set of inequality minimizing institutions. Two elements appear as crucial. The first are the "wage setting" institutions, while the second group of measures describes the degree of job security and out-o-job income, that is, is a measure of "employment security".

Our grouping of institutional measures allows for a description of regional patterns in institutions. North America is the poorest region in terms of institutional set-up, followed by the other Anglo-Saxons countries. At the other extreme, the Nordic countries have the strongest institutional framework with respect to wage bargaining, while continental Europe records the highest values for employment security. The results indicate that strong wage setting institutions are more effective at reducing inequality than the alternative policy of providing employment security implemented in continental Europe. These results also help the debate on what would be a suitable common labour market policy for European Union member countries. Institutional changes aimed at reducing unemployment will tend to increase income inequality. By quantifying this trade-off, we have provided the means to assess who will be the winners and who will be the losers from alternative common institutional setups.

References

Acemoglu, D. 2003. Cross-country Inequality, *The Economic Journal,* 113, pp. F121–F149.

Agell, Jonas, and Kjell Erik Lommerud 1993. Egalitarianism and Growth. *Scandinavian Journal of Economics* 95: 559-579.

Alderson, A. and F. Nielsen. 2002. Globalisation and the great U-turn: income inequality trends in 16 OECD countries. *American Journal of Sociology* 107: 1244-1299.

Amable, Bruno. 2003. *The diversity of modern capitalism*. Oxford University Press

Antras, P. 2004. Is the U.S. Aggregate Production Function Cobb–Douglas? New Estimates of the Elasticity of Substitution, *Contributions to Macroeconomics*, 4 (1).

Atkinson, A.B. 1997. Bringing the Income Distribution in from the Cold, *The Economic Journal,* 107(441): 297-321.

Atkinson, A.B. 2007. Distribution and growth in Europe – the empirical picture: a long-run view of the distribution of income, mimeo.

Atkinson, A.B. and A. Brandolini. 2001. Promise and Pitfalls in the Use of Secondary Data-Sets: Income Inequality in OECD Countries as a Case Study, *Journal of Economic Literature*, 39(3): 771-99.

Atkinson, A.B. and A. Brandolini. 2003. The Panel-of-Countries approach to explaining income inequality: an interdisciplinary agenda. Mimeo

Baker, D., A. Glyn, D. Howell and J. Schmitt 2004, Labor Market Institutions and Unemployment : A Critical Assessment of the Cross-Country Evidence, in D.Howell (ed.), *Fighting Unemployment: The Limits of Free Market Orthodoxy*, Oxford, Oxford University Press.

Barro, R.J. 2000. Inequality and Growth in a Panel of Countries, Journal of Economic Growth, 5: 5-32.

Bassanini, A. and R. Duval. 2006. Employment patterns in OECD countries: reassessing the role of policies and institutions. OECD Economics Department working papers no. 486

Belot, M. and J. Van Ours 2004. Does the Recent Success of Some OECD Countries in Lowering their Unemployment Rates Lie in the Clever Design of their Labour Market Reform?., *Oxford Economic Papers*, 56(4): 621-642.

Bentolila S. and G. Saint-Paul, 2003. Explaining Movements in the Labor Share, *Contributions to Macroeconomics* 3(1), article 9.

Bertola, G. 1990. Job security, employment and wages. *European Economic Review* 6, 851-886.

Bertola, G. F. Blau, and L. Kahn, 2002. Comparative Analysis of Labor Market Outcomes: Lessons for the US from International Long-Run Evidence, in A. Krueger and R. Solow (eds.), *The Roaring Nineties: Can Full Employment be Sustained?*, Russell Sage and Century Foundations, pp. 159-218.

Blanchard, O. 1997. The Medium Run. *Brookings Papers on Economic Activity,* 2: 89–158.

Blanchard, O., and J. Tirole. 2004. The optimal design of unemployment insurance and employment protection. A first pass. Massachusetts Institute of Technology, Department of Economics, Working Paper No. 04-15.

Blanchard, O. and Wolfers, J. 2000. The Role of Shocks and Institutions in the Rise of European Unemployment: the Aggregate Evidence. *The Economic Journal*, 110: C1-C33.

Brandolini, A. and T. Smeeding. 2007. Inequality Patterns in Western-Type Democracies: Cross-Country Difference and Time Changes, ChilD discussion paper 08/2007.

Calmfors, L., and J. Driffill. (1988). Centralisation of wage bargaining and macroeconomic performance. *Economic Policy* 6: 13-61.

Card, D., T. Lemieux and W.C. Riddell. 2004. Unions and Wage Inequality *Journal of Labor Research*, Vol. 25(4), pp. 519-562.

Checchi, D. and C. García Peñalosa. 2005. Labour shares and the personal distribution of income in the OECD. IZA Discussion Paper No. 1681/2005

Checchi, D. and C. Lucifora. 2002. Unions and labour market institutions in Europe. *Economic Policy* 17(2): 362-401.

Gollin D., 2002. Getting Income Shares Right. *Journal of Political Economy*, vol. 110, no. 2

Gottschalk, P., 1997. Policy Changes and Growing Earnings Inequality in the US and Six Other OECD Countries, in P. Gottschalk, B. Gustafsson and E. Palmer (eds.), *Changing Patterns in the*

Distribution of Economic Welfare. An International Perspective, Cambridge, Cambridge University Press.

Gottschalk , P. and S. Danziger, 2005. Inequality of Wage Rates, Earnings and Family Income in the United States, 1975-2002, *Review of Income and Wealth*, 51: 231-254.

Hall, P. and D. Soskice. 2001. *Varieties of capitalism: the institutional foundations of comparative advantage.* Oxford University Press

Katz L.F. and Murphy, K.M., 1992. Changes in Relative Wages, 1963-1987: Supply and Demand Factors, *Quarterly Journal of Economics*, vol. 107(1), pp. 35-78

Koeninger, W., M. Leonardi and L. Nunziata. 2007. Labour market institutions and wage inequality, *Industrial & Labor Relations Review,* 60(3), pp. 340-356.

Li, H., L. Squire and H-F. Zou. 1998. Explaining International and Intertemporal Variations in Income Inequality, *The Economic Journal* 108: 26-43.

Mahler, V. A. (2004), Economic Globalization, Domestic Politics and Income Inequality in the Developed Countries: A Cross-National Study, *Comparative Political Studies*, 37, 1025-1053.

Nickell, S. 1997.Unemployment and Labor Market Rigidities: Europe versus North America. *The Journal of Economic Perspectives,* 11(3): 55-74.

Nickell, S. and L. Nunziata. 2001. Labour market institutions database

Nickell, S., L. Nunziata and W. Ochel. 2005. Unemployment in the OECD Since the 1960s: What Do We Know?. *The Economic Journal.* 115(500): 1-27.

Oaxaca, R. 1973. Male-female Wage Differentials in Urban Labor Markets, *International Economic Review* 14(3): 693-709.

OECD 2002. *Benefits and wages – OECD indicators*. Paris.

Piketty, T. 2003. Income inequality in France, 1901-1998, *Journal of Political Economy*, 111: 1004-1042.

Saint-Paul, Gilles. 2000. *The political economy of labour market institutions*. Oxford University Press.

Summers, R. and A. Heston. 1991. The Penn World Table(Mark 5): An expanded set of international comparisons,1950–1988, *Quarterly Journal of Economics* 106(2): 327–368.

Visor, J. 2007. database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS), NEWGOV project, financed under the EU FP7 research framework, on Distributive Politics, Learning and Reform: National Social Pacts.

Figure 1 – Income inequality: Gini index on gross household income

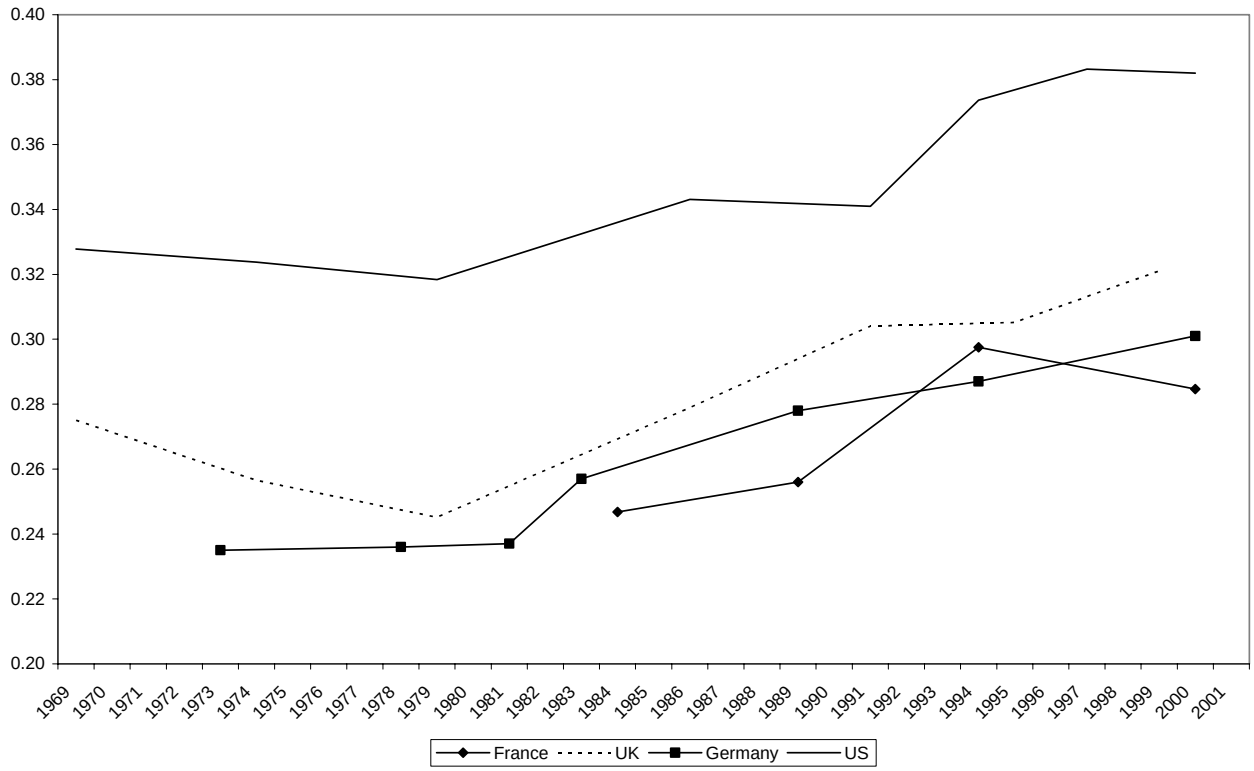

Figure 2 – Wage inequality: p90p10

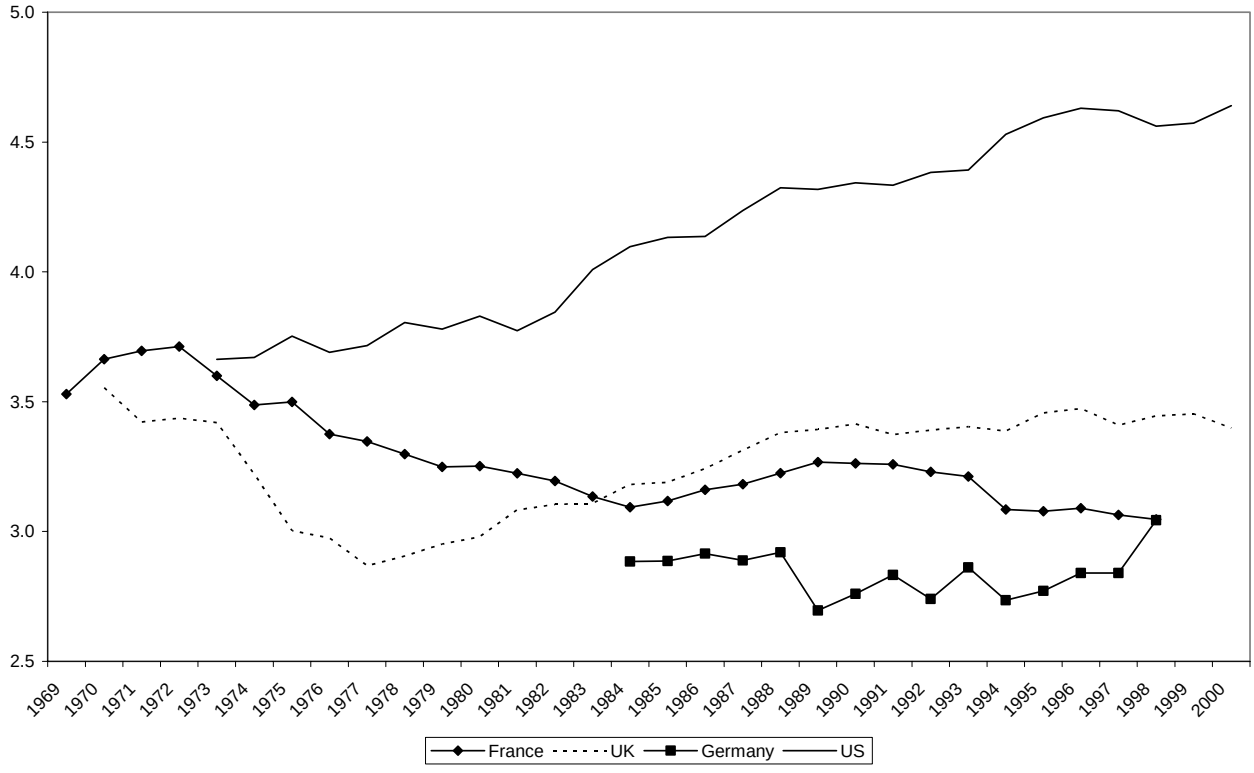

Figure 3 – The labour share

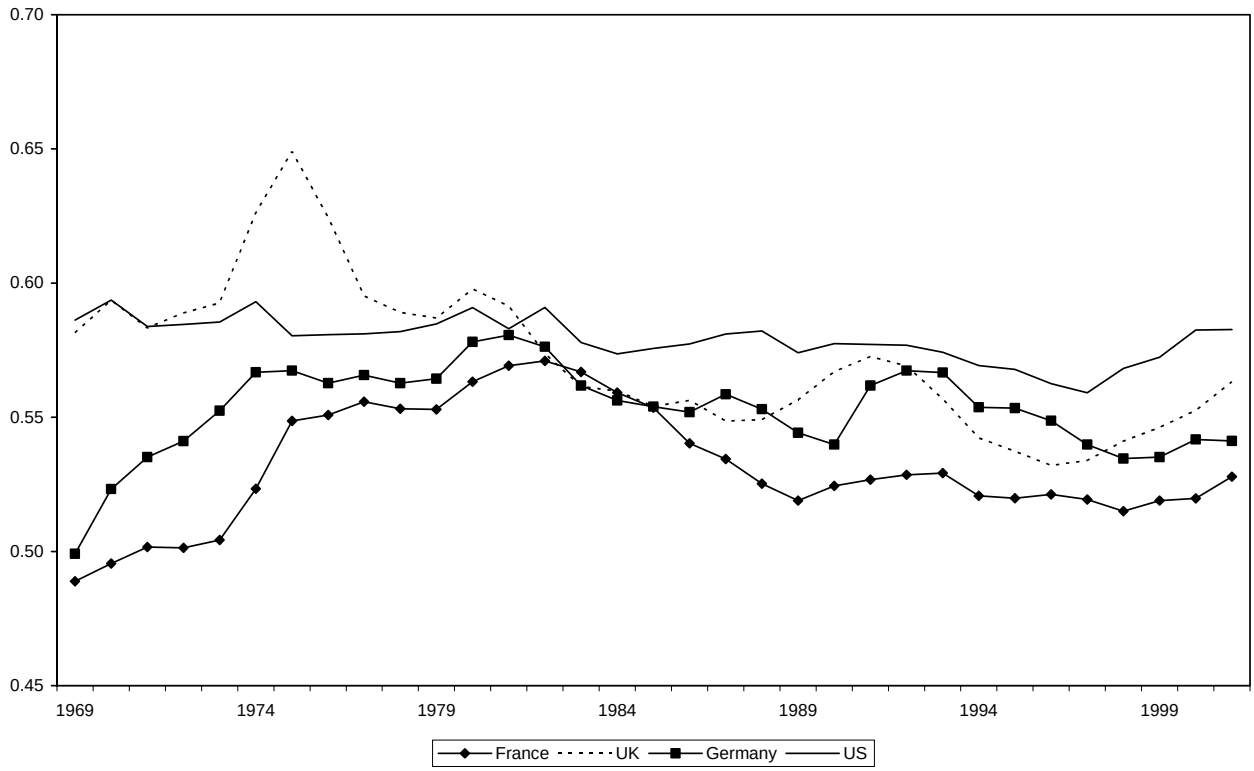

Figure 4 – Gini indices: LIS data

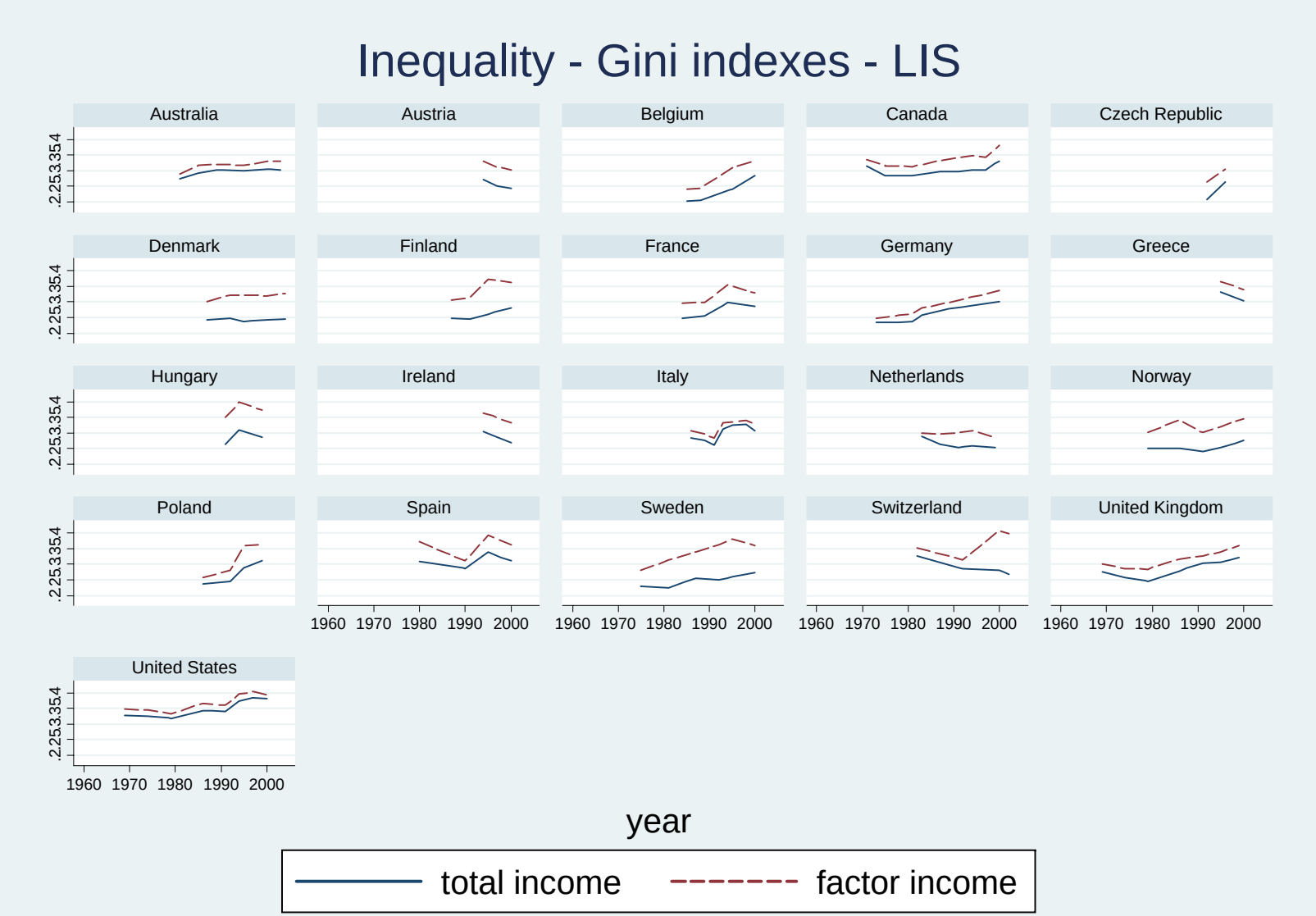

Figure 5 – Wage inequality: Wage decile ratios, LIS data

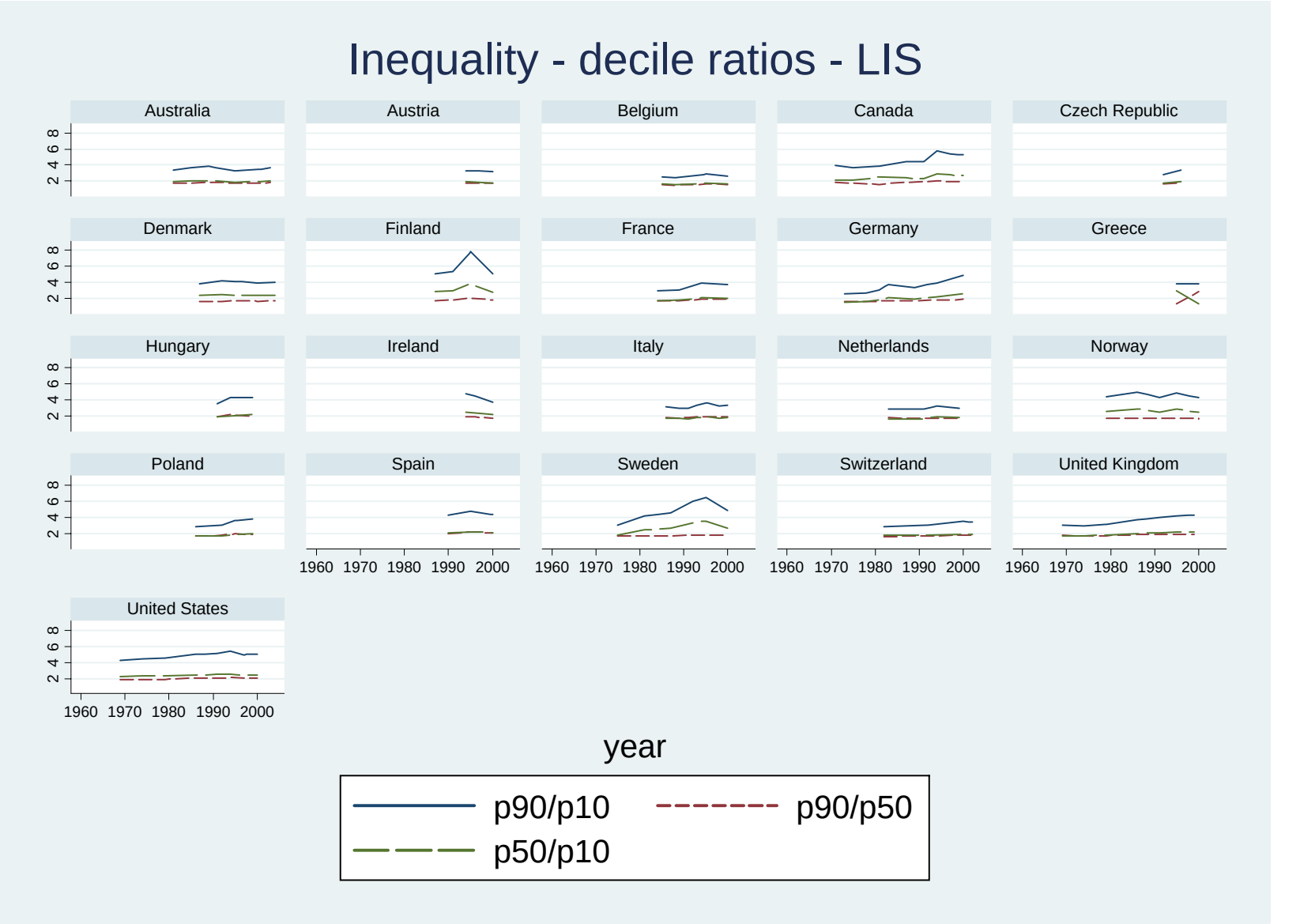

Figure 6 – Wage shares: aggregate and LIS data

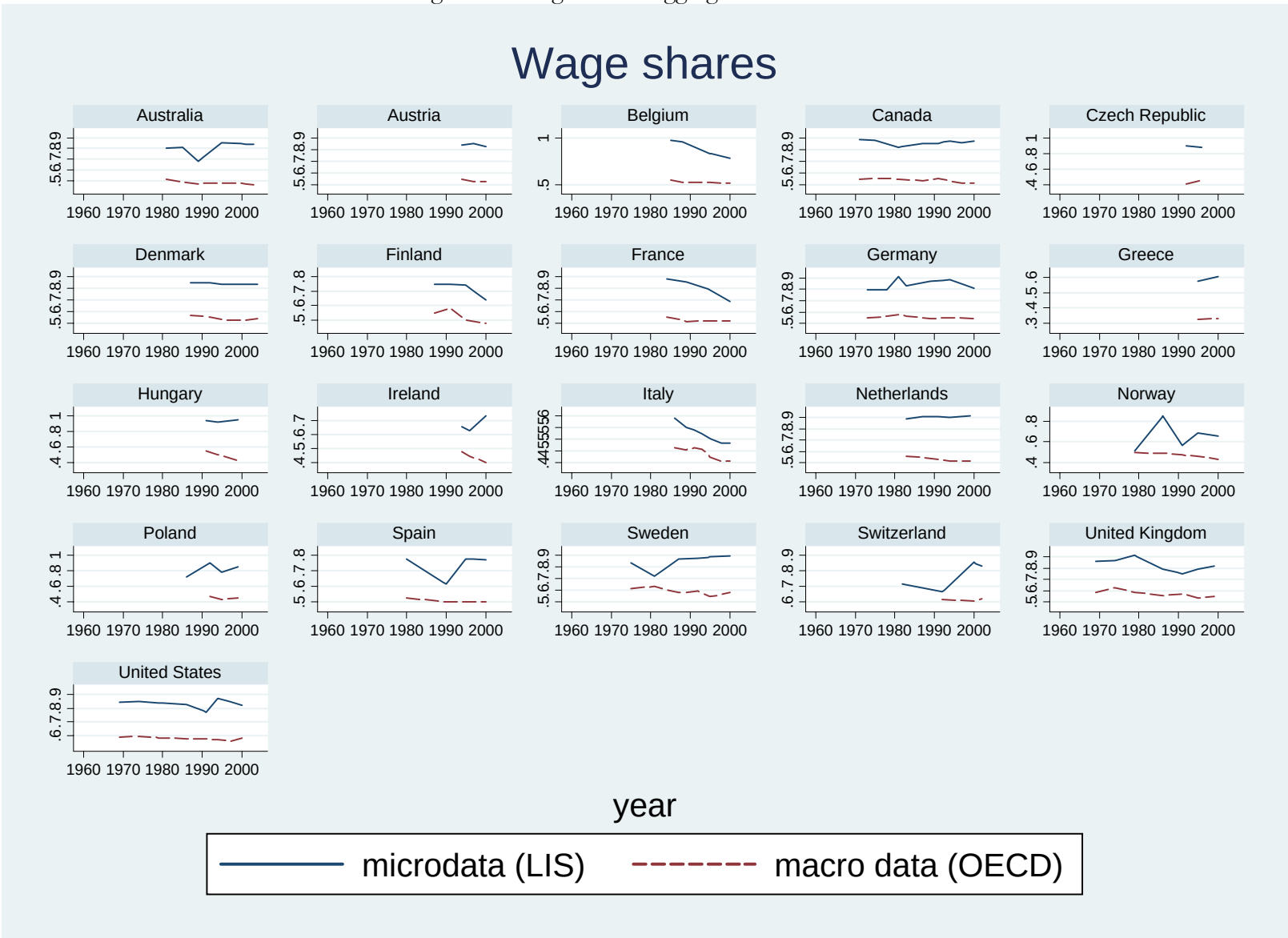

Figure 7 – Unemployment rates: aggregate and LIS data

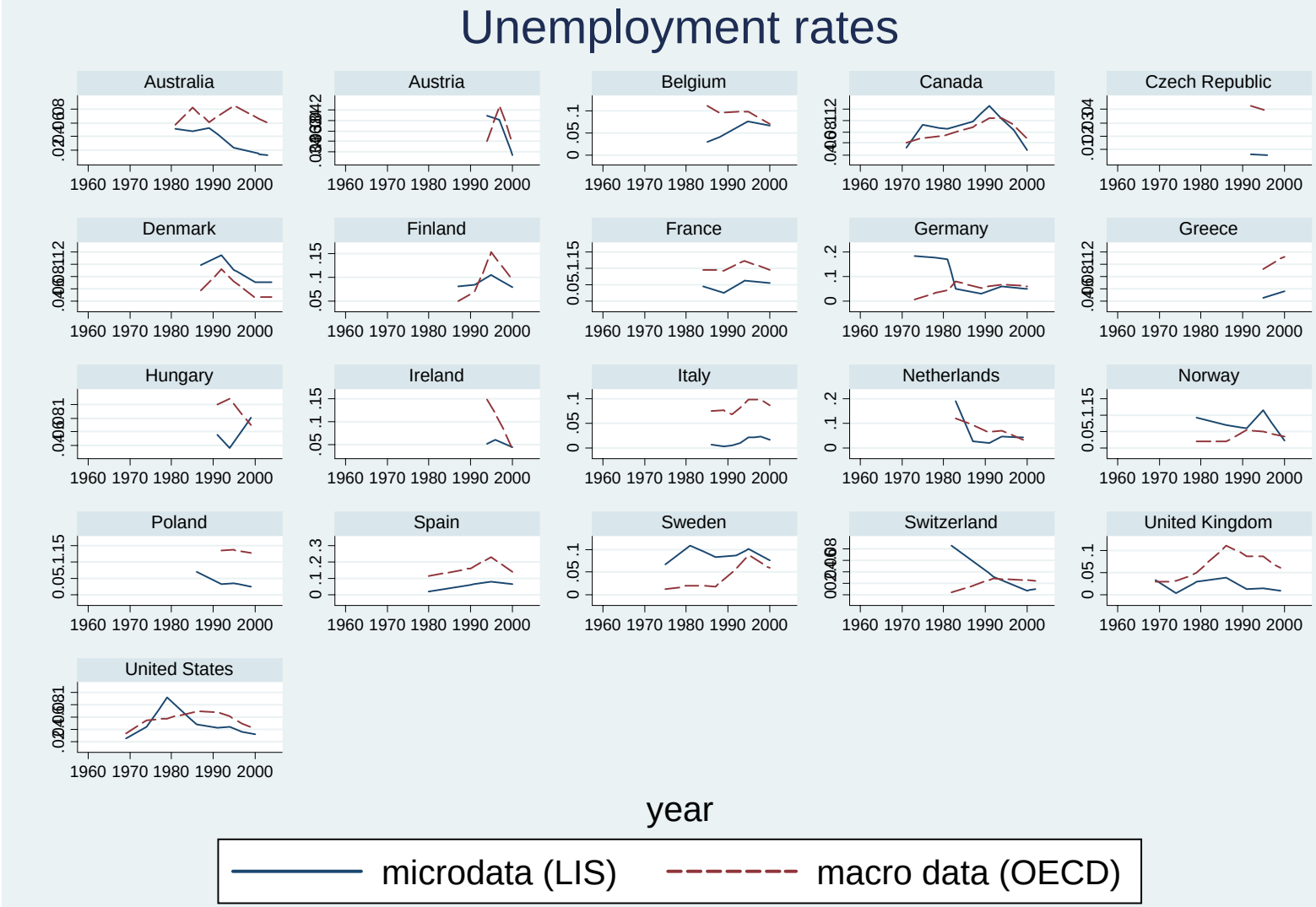

Figure 8

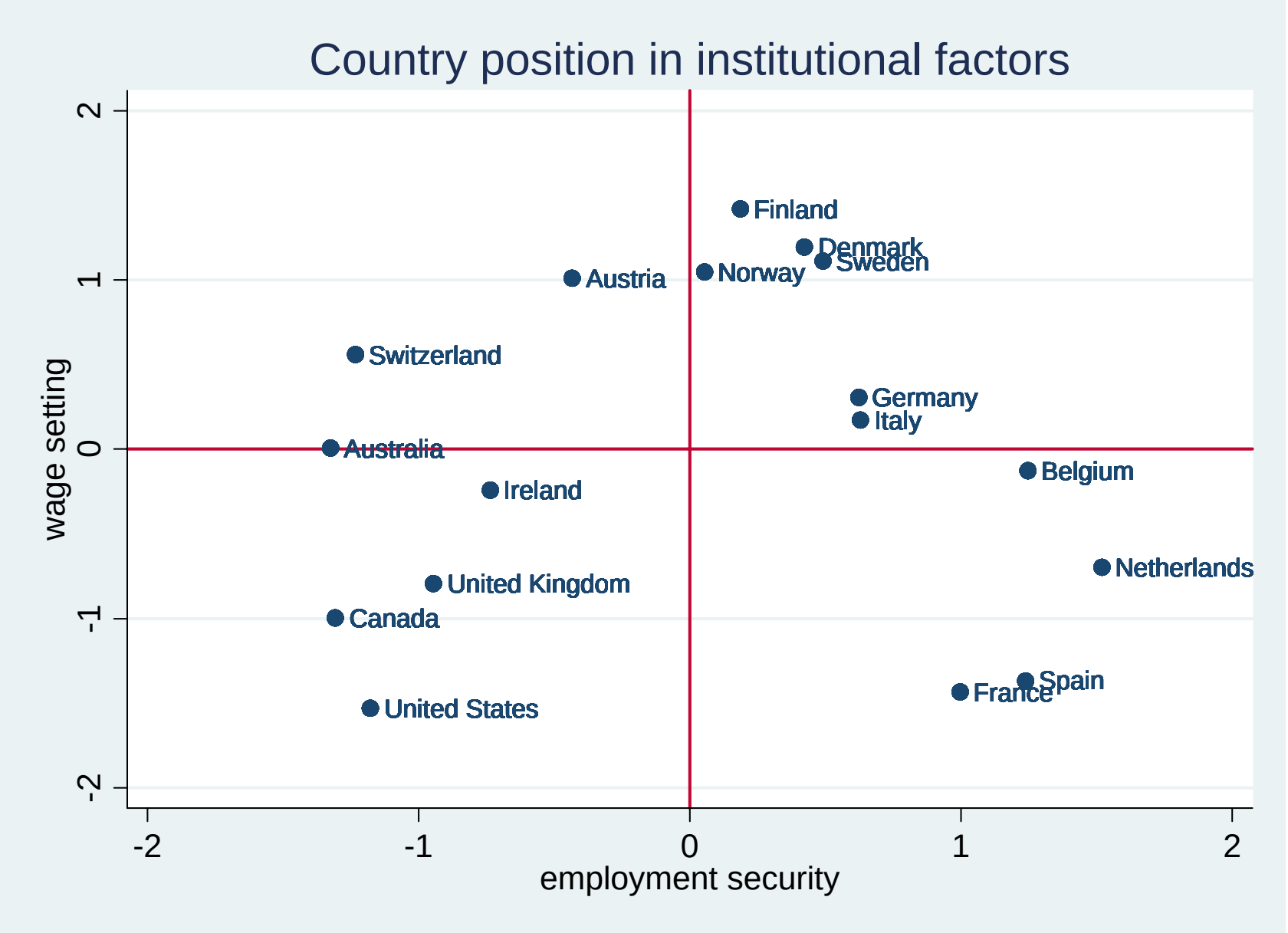
Country position in institutional factors
wage setting
employment security
2
1
0
-1
-2
-2
-1
0
1
2
Finland
Denmark
Sweden
Norway
Austria
Switzerland
Germany
Italy
Australia
Belgium
Ireland
Netherlands
United Kingdom
Canada
Spain
France
United States

Figure 9

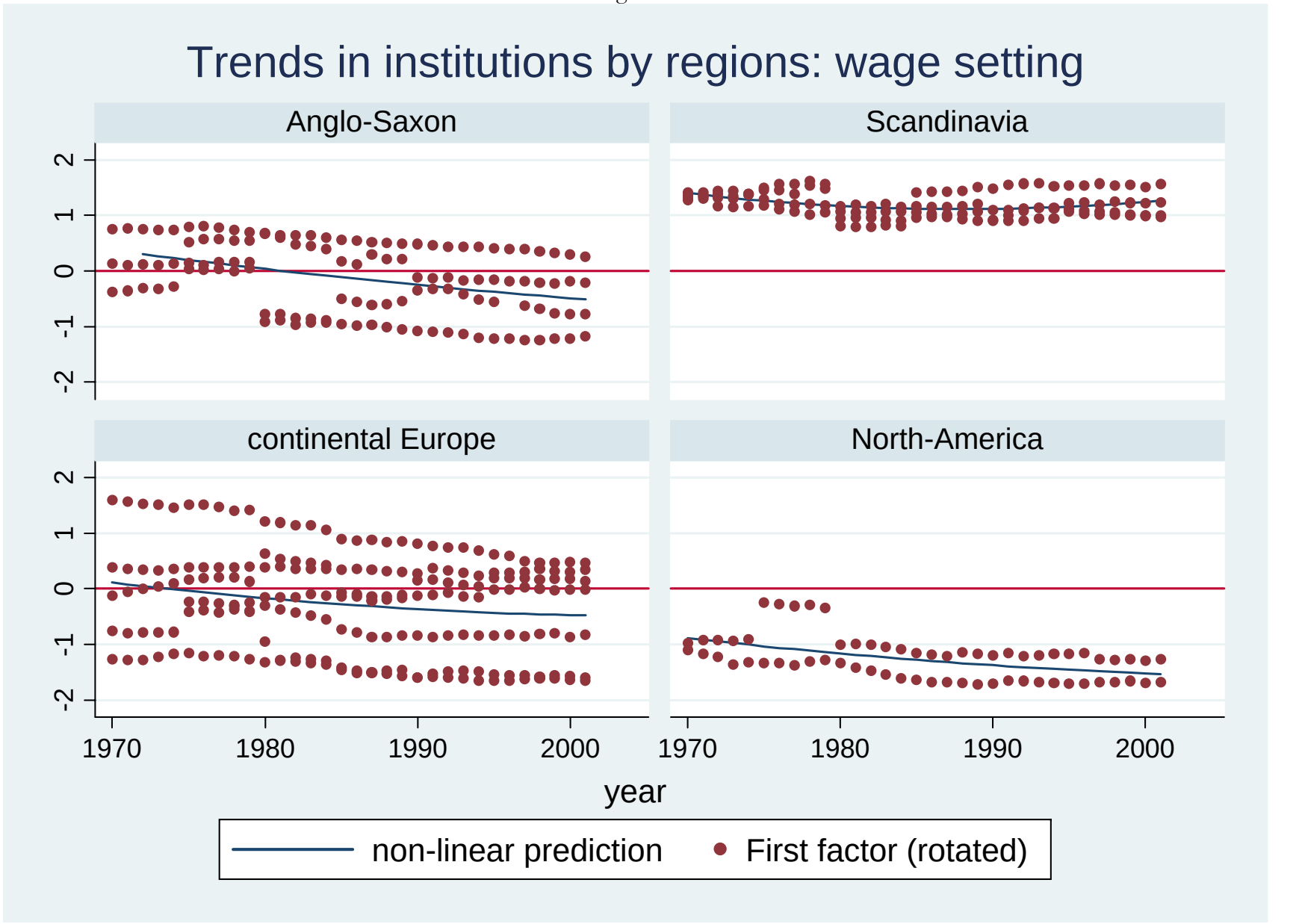
Trends in institutions by regions: wage setting
Anglo-Saxon
Scandinavia
continental Europe
North-America
-2
-1
0
1
2
1970
1980
1990
2000
year
non-linear prediction
First factor (rotated)

Figure 10

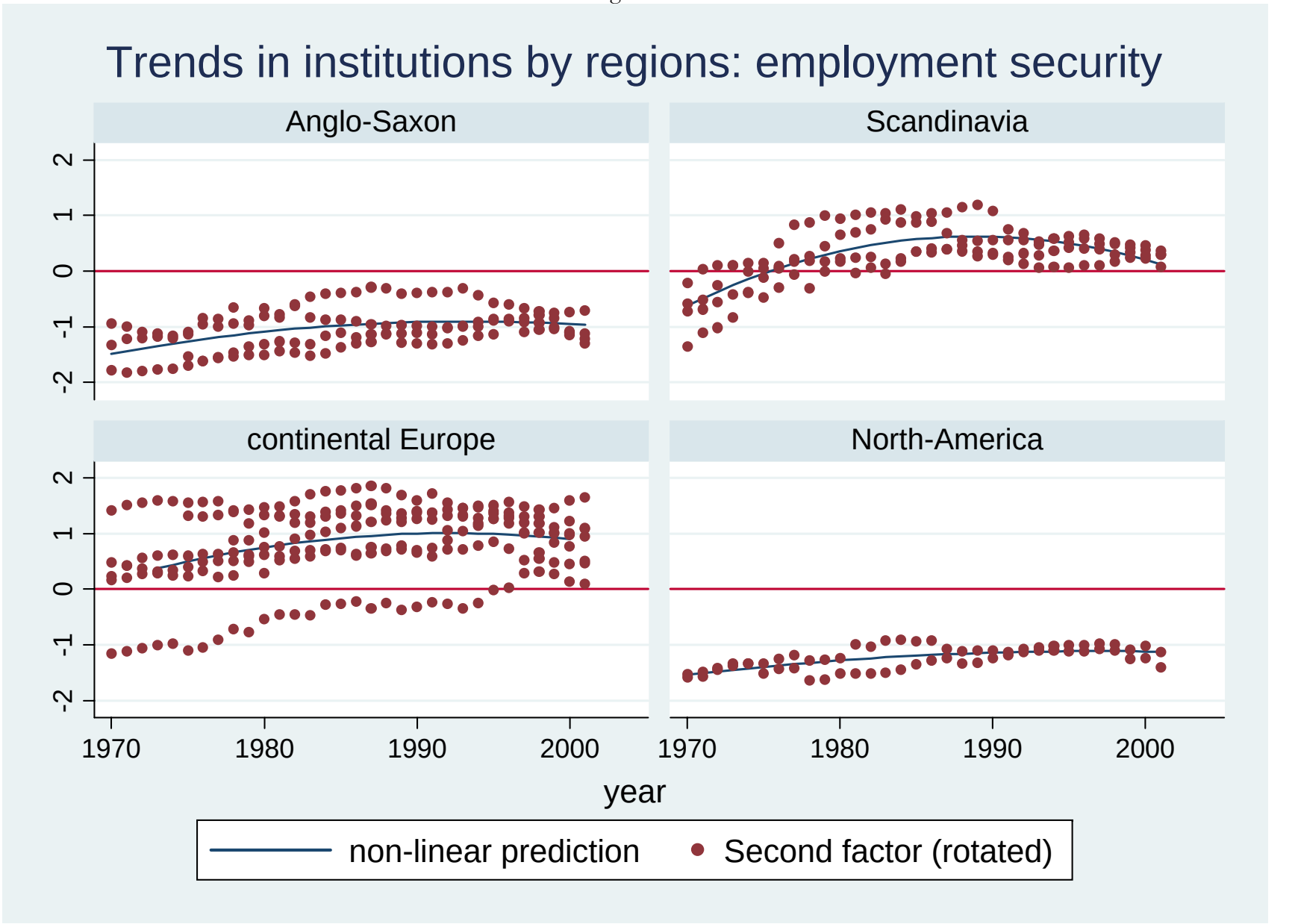
Trends in institutions by regions: employment security
Anglo-Saxon
Scandinavia
continental Europe
North-America
-2
-1
0
1
2
1970
1980
1990
2000
year
non-linear prediction
Second factor (rotated)

Figure 11

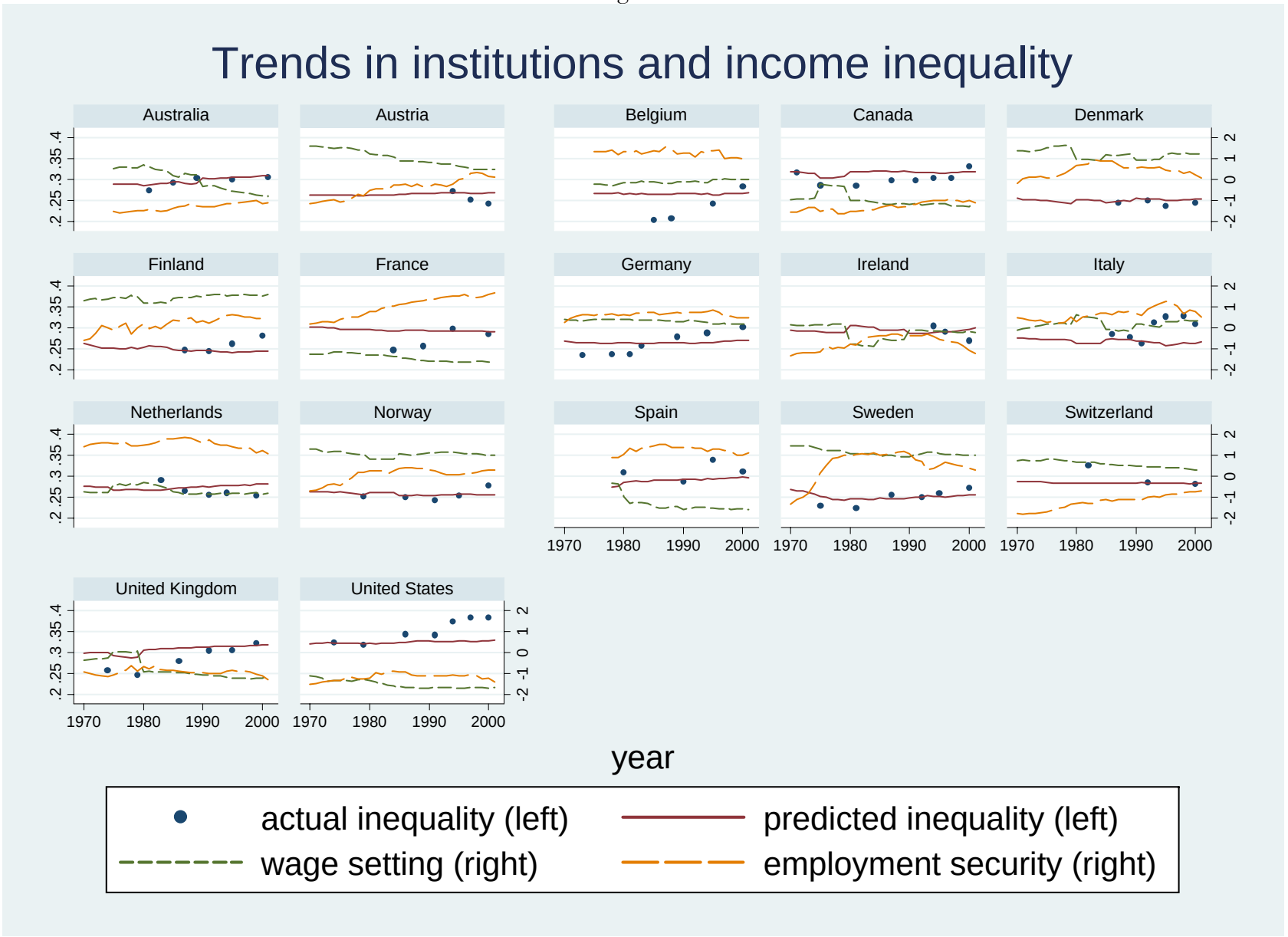
Trends in institutions and income inequality
Australia
Austria
Belgium
Canada
Denmark
Finland
France
Germany
Ireland
Italy
Netherlands
Norway
Spain
Sweden
Switzerland
United Kingdom
United States
.2 .25 .3 .35 .4
-2 -1 0 1 2
1970 1980 1990 2000
year
actual inequality (left)
predicted inequality (left)
wage setting (right)
employment security (right)

Figure 12

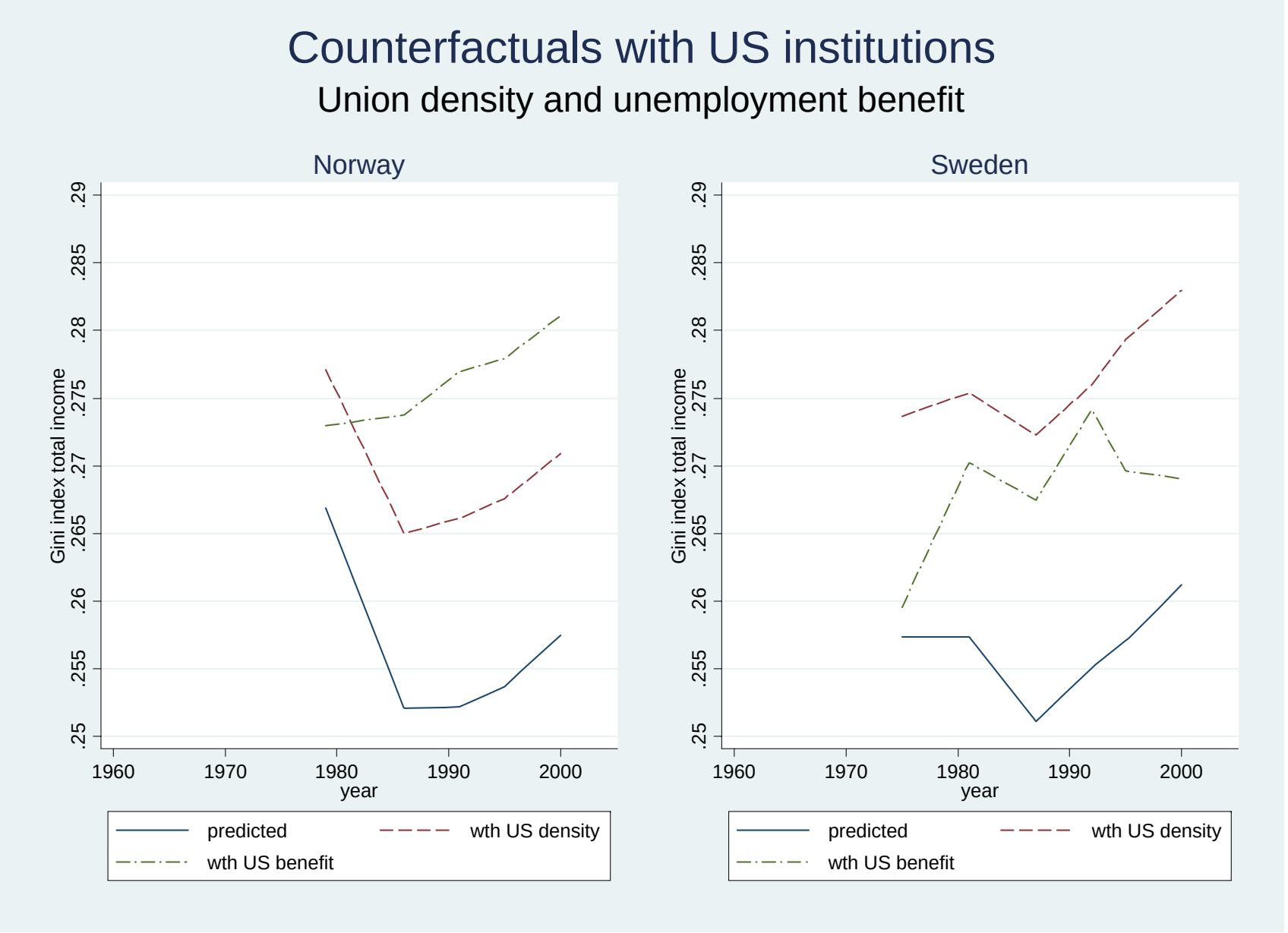
Counterfactuals with US institutions
Union density and unemployment benefit
Norway
Sweden
Gini index total income
.25
.255
.26
.265
.27
.275
.28
.285
.29
1960
1970
1980
1990
2000
year
predicted
wth US density
wth US benefit

Figure 13

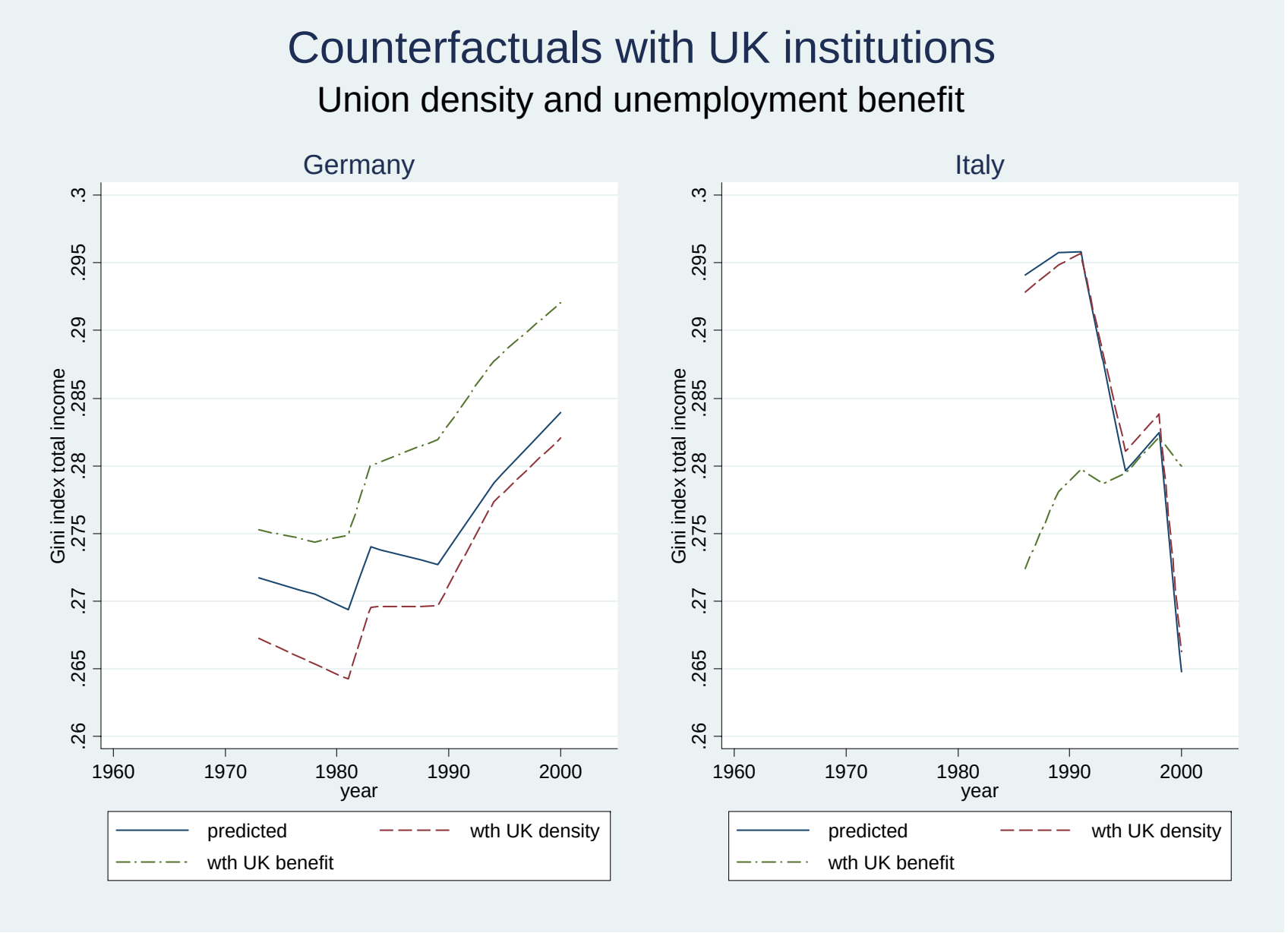
Counterfactuals with UK institutions
Union density and unemployment benefit
Germany
Italy
Gini index total income
.26
.265
.27
.275
.28
.285
.29
.295
.3
1960
1970
1980
1990
2000
year
predicted
wth UK density
wth UK benefit

Figure 14

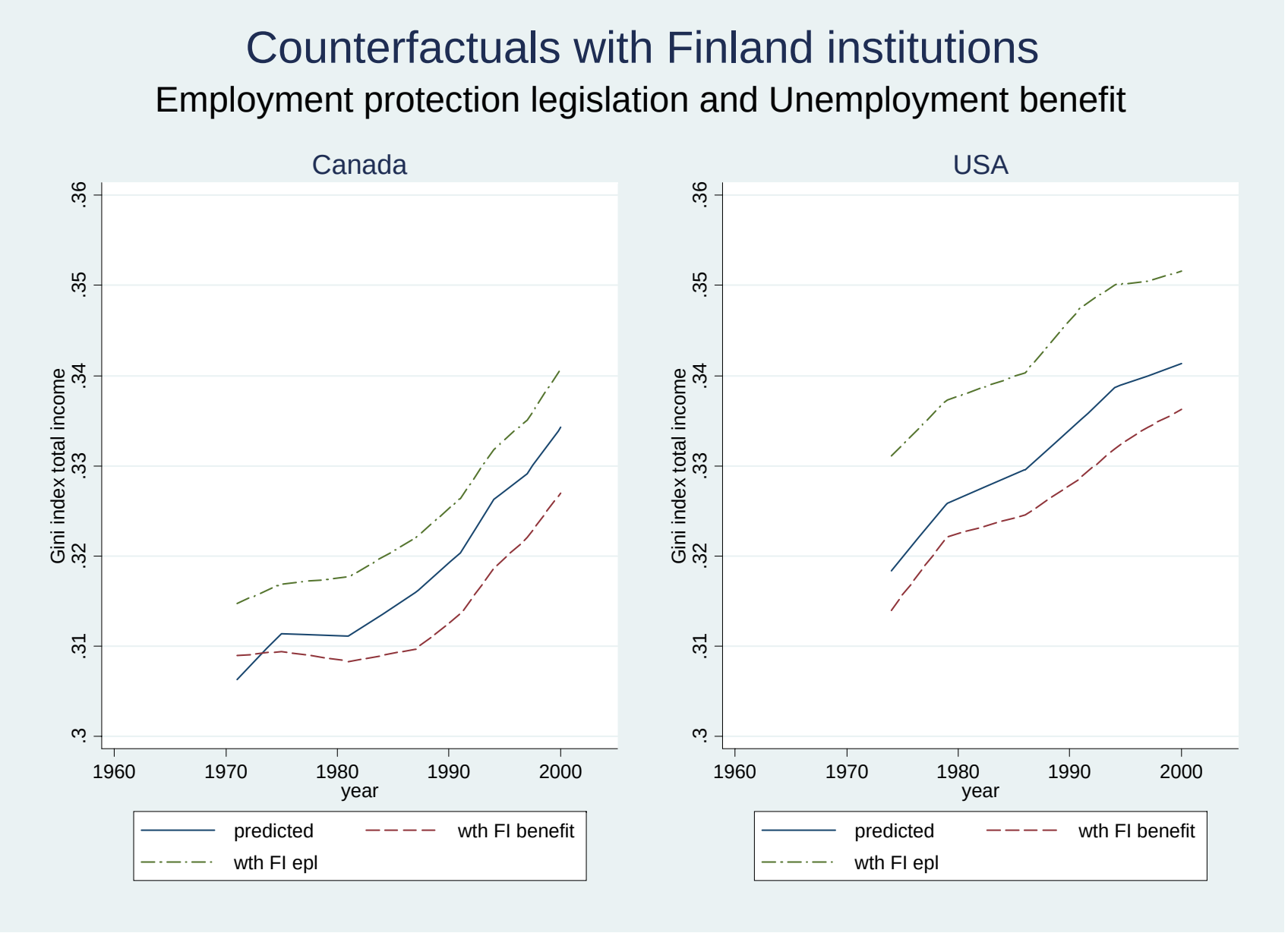
Counterfactuals with Finland institutions
Employment protection legislation and Unemployment benefit
Canada
USA
Gini index total income
.3
.31
.32
.33
.34
.35
.36
1960
1970
1980
1990
2000
year
predicted
wth FI benefit
wth FI epl

Figure 15

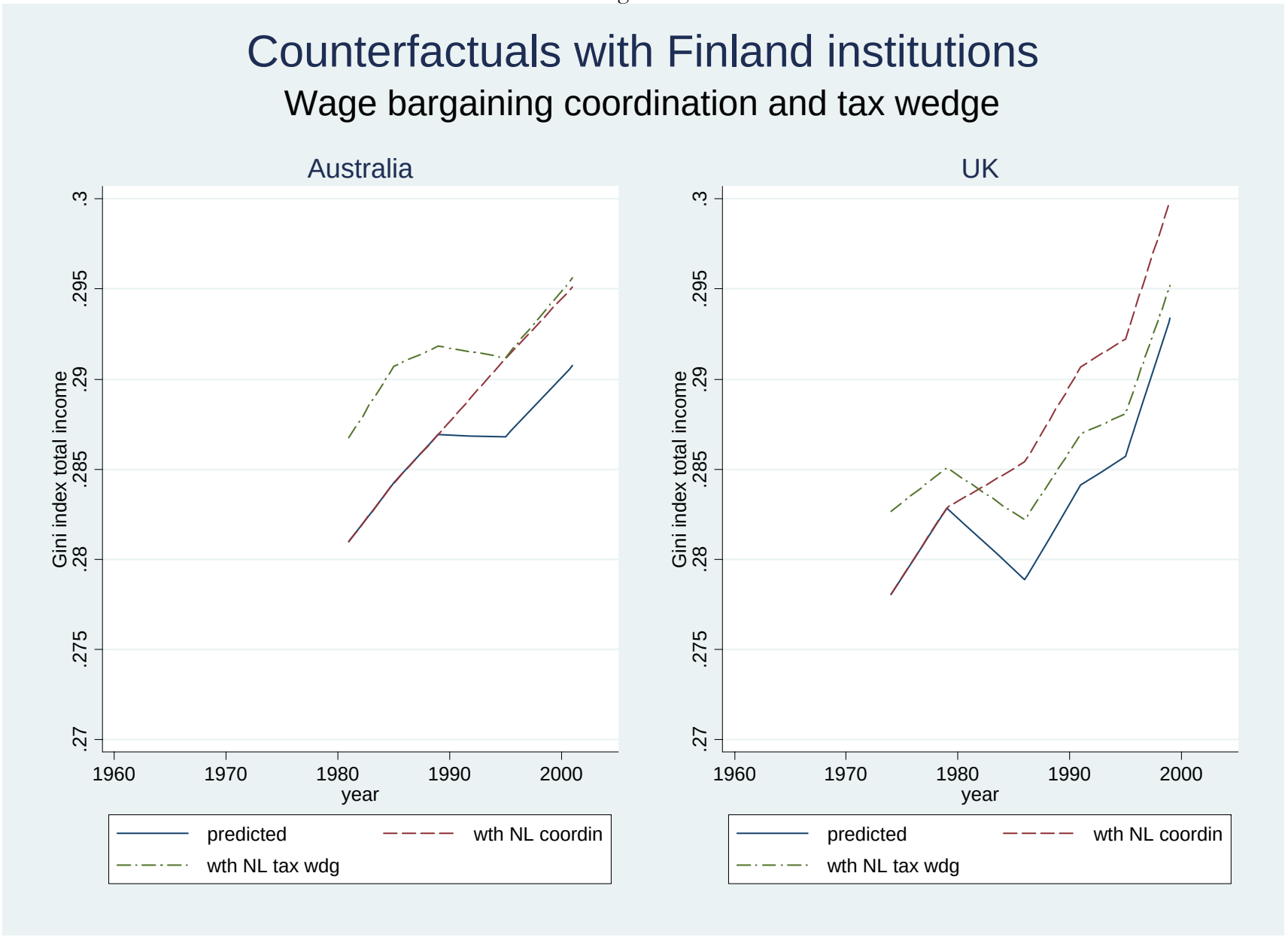
Counterfactuals with Finland institutions
Wage bargaining coordination and tax wedge
Australia
UK
Gini index total income
.27
.275
.28
.285
.29
.295
.3
1960
1970
1980
1990
2000
year
predicted
wth NL coordin
wth NL tax wdg

Figure 16: Inequality and unemployment under common institutions

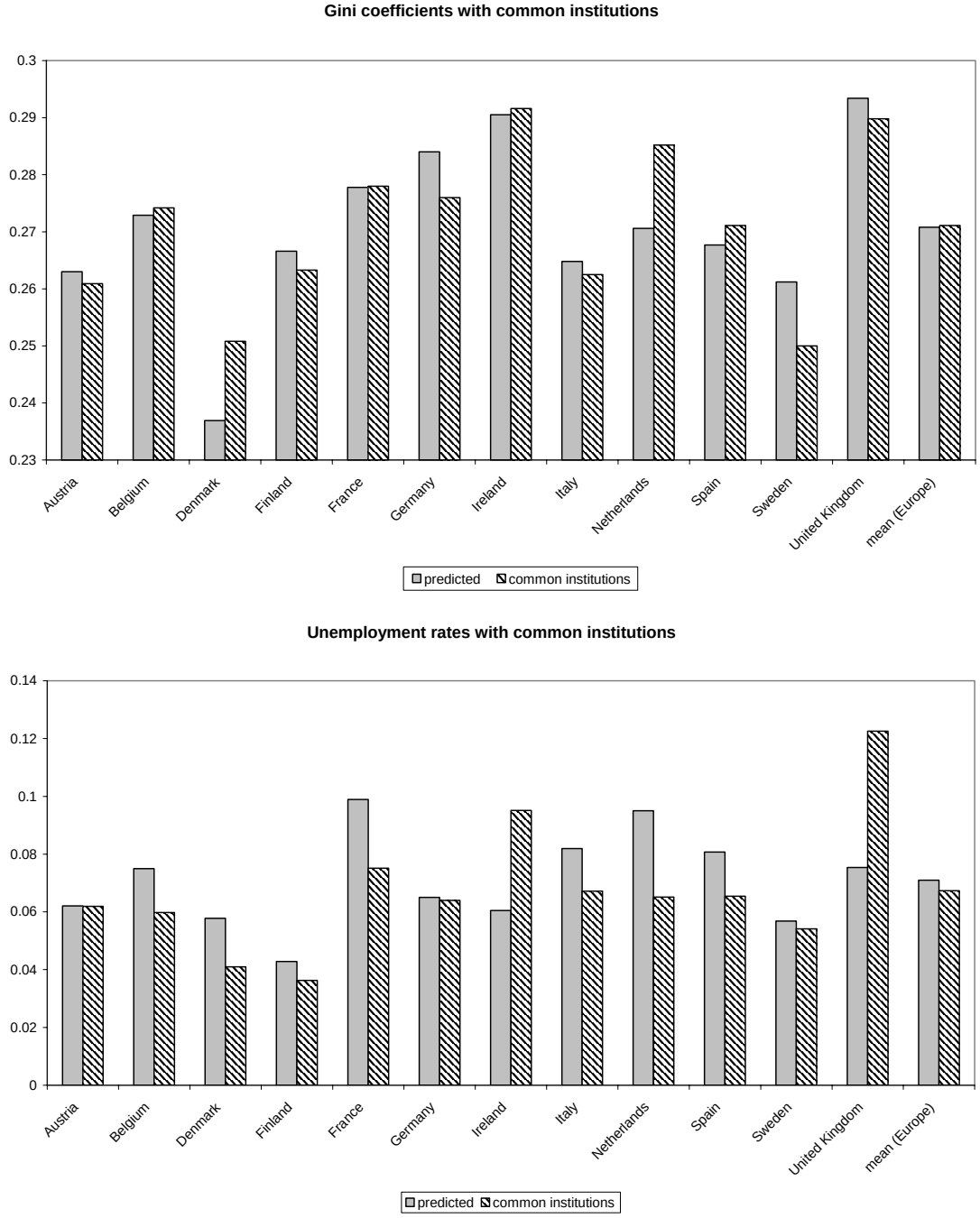

Table 1 - Determinants income inequality - OLS regressions – FACTOR INCOME

	1	2	3	4	5	6	7	8	9
wage income share on factor income (averaged over households)	-0.353 [2.27]**	-0.41 [2.82]***		-0.345 [1.53]	-0.335 [1.57]		0.009 [0.21]	0.011 [0.24]	
wage share not corrected for self-employed, VA calculated at market price – source: OECD			-0.046 [0.84]			-0.216 [1.99]*			-0.228 [2.06]**
decile ratio (p90/p10)	-0.059 [1.91]*	-0.071 [2.47]**	0.012 [3.09]***	-0.062 [1.44]	-0.061 [1.61]	0.01 [3.40]***			
wage share × decile ratio (p90/p10)	0.092 [2.39]**	0.105 [2.89]***		0.092 [1.76]*	0.089 [1.87]*				
upper decile ratio (p90/p50)							0.051 [1.68]*	0.025 [1.02]	0.032 [1.28]
lower decile ratio (p50/p10)							0.022 [2.08]**	0.021 [3.32]***	0.02 [3.14]***
unemployment rate computed over household head and spouse and others family members	-0.163 [2.20]**			-0.059 [0.65]			-0.038 [0.45]		
(aggregate) unemployment rate - source: Nickell-Nunziata 2005		0.156 [1.69]*	0.121 [1.27]		0.293 [3.50]***	0.274 [2.89]***		0.283 [2.68]***	0.234 [2.17]**
fraction of household head with some tertiary education	0.12 [4.08]***	0.121 [4.20]***	0.143 [4.69]***	0.185 [3.49]***	0.175 [3.99]***	0.162 [3.01]***	0.188 [3.32]***	0.191 [4.08]***	0.15 [2.63]**
Observations	101	100	99	101	100	99	101	100	99
Countries	21	21	21	21	21	21	21	21	21
Country fixed effects	no	no	no	yes	yes	yes	yes	yes	yes
R-squared	0.56	0.54	0.5	0.74	0.79	0.78	0.75	0.78	0.79

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Controls for definitions included

Table 2 - Determinants income inequality - OLS regressions – TOTAL INCOME

	1	2	3	4	5	6	7	8	9
wage income share on factor income (averaged over households)	-0.467 [2.85]***	-0.555 [3.27]***		-0.503 [2.83]***	-0.489 [2.75]***		-0.089 [2.44]**	-0.087 [2.27]**	
wage share not corrected for self-employed, VA calculated at market price – source: OECD			-0.099 [1.59]			-0.201 [1.84]*			-0.218 [2.00]**
decile ratio (p90/p10)	-0.079 [2.40]**	-0.099 [2.78]***	0.004 [1.26]	-0.079 [2.20]**	-0.077 [2.23]**	0.004 [2.27]**			
wage share × decile ratio (p90/p10)	0.106 [2.49]**	0.126 [2.80]***		0.107 [2.41]**	0.103 [2.38]**				
upper decile ratio (p90/p50)							0.034 [1.33]	0.019 [0.80]	0.022 [0.89]
lower decile ratio (p50/p10)							0.011 [1.50]	0.011 [2.10]**	0.009 [1.90]*
unemployment rate computed over household head and spouse and others family members	-0.215 [2.33]**			-0.061 [0.58]			-0.036 [0.36]		
(aggregate) unemployment rate - source: Nickell-Nunziata 2005		0.272 [3.41]***	0.201 [2.20]**		0.183 [2.01]**	0.206 [2.09]**		0.173 [1.57]	0.168 [1.55]
fraction of household head with some tertiary education	0.146 [4.71]***	0.152 [4.08]***	0.171 [4.58]***	0.079 [1.59]	0.076 [1.58]	0.089 [1.67]	0.092 [1.75]*	0.096 [1.90]*	0.077 [1.37]
Observations	101	100	99	101	100	99	101	100	99
Countries	21	21	21	21	21	21	21	21	21
Country fixed effects	no	no	no	yes	yes	yes	yes	yes	yes
R-squared	0.47	0.47	0.36	0.79	0.8	0.8	0.77	0.78	0.8

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Controls for definitions included

Table 3 - Determinants income inequality - OLS regressions – TOTAL INCOME

	1	2	3	4	5	6	7	8	9
wage income share on factor income (averaged over households)	-0.349 [1.94]*	-0.399 [2.44]**		-0.351 [2.08]**	-0.34 [2.01]**		-0.083 [2.07]**	-0.057 [1.61]	
wage share not corrected for self-employed, VA calculated at market price – source: OECD			-0.021 [0.35]			-0.259 [2.12]**			-0.26 [2.12]**
decile ratio (p90/p10)	-0.059 [1.69]*	-0.072 [2.16]**	0.005 [2.03]**	-0.049 [1.39]	-0.052 [1.56]	0.004 [2.27]**			
wage share × decile ratio (p90/p10)	0.083 [1.86]*	0.096 [2.32]**		0.068 [1.57]	0.071 [1.70]*	0.083 [1.86]*			
upper decile ratio (p90/p50)							0.018 [0.86]	0.004 [0.21]	0.01 [0.49]
lower decile ratio (p50/p10)							0.011 [1.78]*	0.01 [2.45]**	0.008 [2.09]**
unemployment rate computed over household head and spouse and others family members	-0.06 [0.25]			-0.392 [1.70]*			-0.432 [1.94]*		
(aggregate) unemployment rate - source: Nickell-Nunziata 2005		0.28 [2.73]***	0.261 [2.32]**		0.219 [2.39]**	0.212 [2.06]**		0.241 [2.24]**	0.202 [1.83]*
replacement rate (1st year)	-0.068 [1.96]*	-0.082 [7.54]***	-0.092 [8.29]***	-0.061 [1.45]	-0.048 [1.42]	-0.037 [1.25]	-0.073 [1.66]	-0.058 [1.64]	-0.036 [1.22]
replacement rate (1st year) × unemployment rate	-0.106 [0.18]			0.693 [1.47]			0.807 [1.80]*		
fraction of household head with some tertiary education	0.135 [5.20]***	0.136 [4.59]***	0.148 [5.02]***	0.091 [2.00]**	0.085 [1.95]*	0.071 [1.30]	0.104 [2.19]**	0.104 [2.32]**	0.068 [1.19]
Observations	91	91	90	91	91	90	91	91	90
Countries	18	18	18	18	18	18	18	18	18
Country fixed effects	no	no	no	yes	yes	yes	yes	yes	yes
R-squared	0.59	0.63	0.59	0.81	0.81	0.82	0.8	0.81	0.83

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Controls for definitions included

Countries excluded: Czech Republic, Hungary, and Poland

Table 4 - Determinants of wage share on factor incomes (averaged over households) – LIS - OLS regressions

	1	2	3	4	5	6	7	8	9
union density(t-1)	0.001								
	[0.75]								
union coverage (workers with bargaining rights)(t-1)		0.002							
		[2.54]**							
centralisation of wage bargaining(t-1)			-0.026						
			[1.67]*						
coordination of wage bargaining(t-1)				-0.006					
				[0.43]					
ratio of minimum to median wage(t-1)					0.001				
					[0.89]				
unemployment benefit gross replacement rate(t-1)						0.195		0.694	0.806
						[1.28]		[3.20]***	[3.21]***
employment protection legislation overall index (t-1)							0.001	0.064	0.067
							[0.03]	[1.77]*	[1.75]*
unempl.benefit(t-1) × empl.protection legislation(t-1)								-0.193	-0.222
								[2.28]**	[2.25]**
gross investment / gdp ppp values									0.001
									[0.13]
fraction of household head with some tertiary education									-0.103
									[1.06]
oil price in national currency									0
									[0.42]
Observations	96	77	94	94	100	92	99	92	90
Countries	21	18	20	20	21	21	21	18	18
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
R-squared	0.8	0.76	0.79	0.78	0.8	0.79	0.8	0.8	0.81

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5 - Determinants of decile ratio (p90/p10) – LIS - OLS regressions

	1	2	3	4	5	6	7	8	9	10	11
union density(t-1)	0.016						0.018	-0.026	0.078	0.095	0.05
	[3.01]***						[3.05]***	[1.71]*	[1.63]	[1.77]*	[1.15]
union coverage (workers with bargaining rights)(t-1)		0.002									
		[0.29]									
centralisation of wage bargaining(t-1)			0.291								
			[2.80]***								
coordination of wage bargaining(t-1)				0.065			-0.031	-0.589		-0.264	-1.095
				[0.79]			[0.37]	[3.39]***		[1.44]	[1.26]
ratio of minimum to median wage(t-1)					0.001						
					[0.19]						
unemployment benefit gross replacement rate(t-1)						-0.751					
						[0.92]					
union density(t-1)×coordination wage barg.(t-1)								0.014			0.018
								[2.98]***			[1.02]
fraction of household head with some tertiary education	4.392	5.248	4.816	4.071	3.879	3.511	4.304	2.829	7.121	6.957	6.827
	[4.11]***	[3.51]***	[5.43]***	[3.91]***	[3.05]***	[3.08]***	[3.80]***	[2.39]**	[4.08]***	[4.01]***	[3.91]***
Observations	96	77	94	94	100	92	90	90	96	90	90
Countries	21	18	20	20	21	18	20	20	20	20	20
Country fixed effects	no	no	no	no	no	no	no	no	yes	yes	yes
R-squared	0.17	0.3	0.18	0.11	0.11	0.11	0.17	0.21	0.66	0.68	0.69

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 - Determinants of unemployment rate (aggregate definition) – OECD - OLS regressions

	1	2	3	4	5	6	7	8	9	10	11	12
union density(t-1)	-0.001									0		
	[2.01]**									[0.52]		
union coverage (workers with bargaining rights)(t-1)		0										
		[1.03]										
centralisation of wage bargaining(t-1)			-0.017							-0.01	-0.012	-0.005
			[2.67]***							[1.47]	[1.69]*	[1.47]
coordination of wage bargaining(t-1)				-0.009								
				[2.42]**								
ratio of minimum to median wage(t-1)					-0.001					-0.001		
					[2.47]**					[1.10]		
unemployment benefit gross replacement rate(t-1)						0.083				0.053	0.076	0.137
						[1.96]*				[1.49]	[1.92]*	[1.94]*
employment protection legislation overall index (t-1)							-0.014			-0.017		
							[1.47]			[1.66]		
tax wedge (couple with 2 children)(t-1)								0.289		0.297	0.28	0.166
								[3.48]***		[3.48]***	[2.87]***	[1.49]
(log) active labour market policies/gdp(t-1)									-0.021			-0.02
									[3.62]***			[2.76]***
gross investment / gdp ppp values	-0.007	-0.007	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.008	-0.007	-0.006	-0.008
	[5.18]***	[5.84]***	[4.84]***	[4.74]***	[5.08]***	[4.61]***	[4.83]***	[5.07]***	[5.18]***	[5.99]***	[5.28]***	[4.31]***
Observations	95	76	94	94	99	91	98	94	65	86	86	59
Countries	21	18	20	20	21	18	21	20	20	17	17	17
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
R-squared	0.75	0.81	0.78	0.77	0.76	0.74	0.75	0.78	0.9	0.83	0.81	0.91

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7 - Determinants of total income inequality – 3SLS regressions

dependent variable	1 wage share	2 p90p10	3 unempl.rate	4 gini
labour income share on factor income (averaged over households)				-0.085
				[1.91]*
p90p10				0.006
				[2.16]**
unemployment rate				0.015
				[0.14]
unemployment benefit gross replacement rate(t-1)	-0.153		0.105	-0.035
	[0.59]		[3.34]***	[1.02]
union density(t-1)	0.003	-0.015		
	[3.28]***	[2.60]***		
employment protection legislation overall index (t-1)	-0.099		0.016	
	[3.07]***		[2.12]**	
unempl.benefit(t-1) × empl.protection legislation(t-1)	0.281			
	[2.99]***			
coordination of wage bargaining(t-1)	-0.027		-0.007	
	[2.41]**		[1.75]*	
tax wedge (couple with 2 children)(t-1)		3.704	0.09	
		[2.50]**	[1.20]	
ratio of minimum to median wage(t-1)		0.004		
		[1.08]		
Observations	86	86	86	86
Countries	17	17	17	17
RMSE	0.09	0.69	0.03	0.02
R2	0.45	0.72	0.26	0.66

Absolute value of z statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Controls for region, education and investment included - Spain1980 dummy in 2nd column.

Regional controls include “Anglo-Saxon” (Australia, Ireland, Switzerland, United Kingdom), “Scandinavia” (Denmark, Finland, Norway, Sweden), “Continental Europe”

(Austria, Belgium, France, Germany, Italy, Netherlands, Spain) and “North America” (Canada, United States).

Countries (observations) included are: Australia (5), Austria (3), Belgium (4), Canada (8), Denmark (4), Finland (4), France (4), Germany (7), Ireland (3),

Italy (7), Netherlands (5), Norway (5), Spain (4), Sweden (6), Switzerland (4), United Kingdom (6), United States (7).

Table 8 – The impact of changes in labour market institutions (using the model estimated in table 7)

	wage share	decile ratio p90/p10	unemploym rate	Gini index total income
sample means	0.786	4.063	0.072	0.281
sample sd	0.115	1.307	0.037	0.037
the effect of 10% increase in institutional variables				
union density	1.46%	-1.56%		-0.47%
coordination of wage bargaining	-1.06%		-2.85%	0.24%
unemployment benefit gross replacement rate	1.69%		4.15%	-0.74%
employment protection legislation overall index	-0.32%		4.48%	0.09%
ratio of minimum to median wage		0.65%		0.05%
tax wedge (couple with 2 children)		2.73%	3.75%	0.23%
the effect of 1 standard deviation increase in terms of standard deviation of the dependent variable				
union density	0.492	-0.238		-0.179
coordination of wage bargaining	-0.311		-0.237	0.079
unemployment benefit gross replacement rate *	-0.174		0.368	-0.074
employment protection legislation overall index *	-0.992		0.489	0.272
ratio of minimum to median wage		0.077		0.015
tax wedge (couple with 2 children)		0.254	0.216	0.054

* neglecting the interaction between EPL and unemployment benefit

Table 9 - Determinants of income inequality – reduced form – OLS regressions

	1	2	3	4	5	6	7
	Gini total income					Gini factor income	
	entire sample	entire sample	Anglo-Saxon NorthAmerica	Scandinavia	Continental Europe	entire sample	entire sample
union density(t-1)	-0.003	-0.003	-0.006	-0.001	-0.009	-0.003	-0.003
	[4.38]***	[4.38]***	[3.31]***	[2.79]**	[3.85]***	[3.37]***	[3.42]***
unemployment benefit gross replacement rate(t-1)	-0.055	-0.089	-0.386	-0.129	-1.039	0.141	0.135
	[0.87]	[3.12]***	[1.65]	[2.21]*	[2.71]**	[1.39]	[1.35]
employment protection legislation overall index (t-1)	-0.005	-0.009	-0.015	-0.029	-0.119	0.014	0.013
	[0.49]	[1.21]	[0.38]	[2.32]**	[2.74]**	[1.20]	[1.12]
unempl.benefit(t-1) × empl.protection legislation(t-1)	-0.015		0.281	0.07	0.261	-0.066	-0.061
	[0.55]		[1.24]	[2.36]**	[1.88]*	[1.58]	[1.52]
coordination of wage bargaining(t-1)	0.006	0.005	0.001	-0.008	0.033	0.003	
	[1.75]*	[1.72]*	[0.18]	[2.18]*	[3.80]***	[0.72]	
ratio of minimum to median wage(t-1)	-0.001	-0.001	-0.003		-0.004	-0.001	-0.001
	[3.09]***	[3.07]***	[3.48]***		[3.28]***	[2.15]**	[2.10]**
ratio of minimum to median wage(t-1) × union density(t-1)	0.00001	0.00003	0.00001		0.0001	0.00003	0.00003
	[3.31]***	[3.30]***	[2.74]**		[2.76]**	[2.76]***	[2.71]***
tax wedge (couple with 2 children)(t-1)	0.087	0.094	0.231	0.195	0.661	0.079	0.081
	[1.39]	[1.53]	[1.51]	[4.01]***	[3.33]***	[0.98]	[1.00]
Observations	86	86	33	19	34	86	86
R2	0.7	0.7	0.86	0.82	0.7	0.57	0.56

Robust t statistics in brackets - * significant at 10%; ** significant at 5%; *** significant at 1%
Regional controls, education and investment included – Spain80 dummy included

Table 10 – Counterfactuals: Gini index on total incomes computed using labour market institutions under different regional impacts (using the model estimated in table 9)

including constants, education and investment

coefficients → ↓ labour market institutions variables	Anglo-Saxons (incl.North America)	Scandinavia	Continental Europe
Anglo-Saxons (incl.North America)	0.306	0.323	0.324
Scandinavia	0.539	0.251	0.338
Continental Europe	0.479	0.288	0.272

excluding constants, education and investment

coefficients → ↓ labour market institutions variables	Anglo-Saxons (incl.North America)	Scandinavia	Continental Europe
Anglo-Saxons (incl.North America)	0.306	0.310	0.308
Scandinavia	0.544	0.251	0.334
Continental Europe	0.485	0.299	0.272

Table 11 – Oaxaca decomposition for Gini index on total incomes (using the model estimated in table 8)

	$\text{Gini}_i - \text{Gini}_j$	$(\boldsymbol{\beta}'_i - \boldsymbol{\beta}'_j)\cdot \mathbf{X}_i$	$\boldsymbol{\beta}'_j \cdot (\mathbf{X}_i - \mathbf{X}_j)$
Anglo-Saxons – Continental Europe	0.034	-0.002	0.036
Continental Europe – Scandinavia	0.021	-0.027	0.048
Anglo-Saxons – Scandinavia	0.055	-0.004	0.059

Table 12 – Factor extraction from labour market institutions variables

factor extraction – principal components method

	factor loading (before rotation)		factor loading (after rotation)		uniqueness
	factor 1	factor2	factor 1	factor2	
union density	0.6035	-0.5237	0.7972	0.0540	0.3615
unemployment benefit gross replacement rate	0.4937	0.3650	0.0928	0.6069	0.6230
employment protection legislation overall index	0.7699	0.4451	0.2322	0.8584	0.2092
coordination of wage bargaining	0.7446	-0.3343	0.7637	0.2878	0.3339
ratio of minimum to median wage	0.7131	-0.4768	0.8419	0.1646	0.2641
tax wedge (couple with 2 children)	0.6990	0.5466	0.1104	0.8804	0.2127
Variance explained	0.4587	0.2072	0.3337	0.3322	

Note: factor extracted from 525 observations concerning 18 countries

correlation with regional dummies

	factor loading (after rotation)	
	factor 1	factor2
region==Anglo-Saxon	-0.123	-1.047
	[2.15]**	[32.55]***
region==Scandinavia	1.193	0.289
	[61.96]***	[6.95]***
region==continental Europe	-0.27	0.807
	[4.49]***	[17.17]***
region==North-America	-1.263	-1.242
	[26.84]***	[49.73]***
Observations	525	525
R-squared	0.57	0.73

Robust t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

correlation with relevant variables

	factor loading (after rotation)	
	factor 1	factor2
Correlation with Gini index on total income	-0.0196	-.0128
	[7.08]***	[4.14]***
Observations	85	
R-squared	0.48	

Appendix I: Data source and descriptive statistics

Factor incomes

Data on incomes are obtained from the Luxemburg Income Study (www.lisproject.org, results obtained between 1/12/2007 and 18/12/2007). In LIS there are two files per country/year, a household file and a personal file. Only the former contains information on capital income, hence we have focused on household income.

In the LIS household file there is an aggregate variable for labour income (V1/V1NET = gross/net wages and salaries) to which we add payroll taxes (V2 = mandatory employer contributions + V3 = non mandatory employer contributions) and in kind earnings (V6= In-kind income as a substitute or complement for cash wages - includes, for example, the value of company cars, meals, housing, electricity, medical expenses, child care etc. paid or partly paid by the employer) in order to get LABOUR INCOME.

Within the same household file there is an aggregate variable for capital income (V8=cash property income: Cash interest, rent, dividends, annuities, private individual pensions, royalties, etc. Excludes capital gains, lottery winnings, inheritances, insurance settlements, and all other forms of one-off lump sum payments) to which we sum self-employment income (V4=farm self-employment income + V5= non-farm self-employment income: Profit/loss from unincorporated enterprises; the income is recorded gross of social insurance contributions, but net of expenses), payroll taxes (V7=mandatory contribution for self-employment: mandatory social insurance contributions paid by the self-employed: social security, medical insurance, unemployment, etc.) and non-cash property income (V9= estimates of imputed rental income from own home.), in order to get CAPITAL INCOME.

Finally, we consider BENEFIT INCOME (variable V21= Full or partial unemployment insurance benefits, vocational training benefits, relocation benefits, and other benefits from unemployment insurance). The following definitions are then adopted:

FACTOR INCOME=LABOUR INCOME + CAPITAL INCOME, and

TOTAL INCOME= LABOUR INCOME + CAPITAL INCOME + BENEFIT INCOME.

Each type of income is rescaled at per capita values using an equivalence scale given by the square root of the number of family members. All missing or negative values are set equal to zero.[13]

The WAGE SHARE is then computed at the household level from the following definition:

WAGE SHARE=LABOUR INCOME/(LABOUR INCOME + CAPITAL INCOME),

and then averaged across households. The DECILE RATIOS are computed across households with positive labour income. The GINI INEQUALITY INDEX is also computed across households' factor incomes and total incomes. These measures are weighted using the original sample weights available in LIS multiplied by the number of earners in the household.[14]

Descriptive statistics are reported in table A.1.

[13] Since we include self-employment incomes (which record negative values in a fraction of the population), this leads to an underestimate of the inequality measures produced by our data.

[14] LIS project suggests using internal weights, which we used at the beginning of our analysis. But since household incomes are rescaled using equivalence scale, each household becomes equivalent to a representative individual with labour and capital incomes equivalent to the (equivalised) mean value in the family. But families still differ in terms of how many earners are in the family. Thus we decided to use as weights the product of the original sample weights in the survey × the number of earners in the family. This procedure gets closer to being representative of the working population in the country.

Table A.1 – Descriptive statistics – Luxemburg income study – 1969-2004
(first line: mean – *second line: standard deviation*)

country	obs	Gini index on total incomes	Gini index on factor incomes	decile ratio (p90/p50)	decile ratio (p50/p10)	wage share on factor incomes	unemplo-yment rate
Australia	6	0.30	0.32	1.79	1.99	0.81	0.03
		0.01	*0.01*	*0.03*	*0.07*	*0.06*	*0.02*
Austria	3	0.26	0.31	1.77	1.83	0.84	0.04
		0.01	*0.01*	*0.02*	*0.07*	*0.01*	*0.00*
Belgium	4	0.23	0.28	1.56	1.66	0.88	0.05
		0.04	*0.05*	*0.06*	*0.06*	*0.09*	*0.02*
Canada	8	0.30	0.34	1.86	2.47	0.86	0.09
		0.02	*0.02*	*0.15*	*0.28*	*0.02*	*0.03*
Czech Republic	2	0.24	0.28	1.70	1.82	0.88	0.01
		0.04	*0.03*	*0.09*	*0.13*	*0.01*	*0.00*
Denmark	5	0.24	0.32	1.68	2.41	0.84	0.09
		0.00	*0.01*	*0.04*	*0.08*	*0.01*	*0.02*
Finland	4	0.26	0.34	1.87	3.10	0.72	0.09
		0.02	*0.03*	*0.13*	*0.48*	*0.05*	*0.01*
France	4	0.27	0.32	1.81	1.90	0.81	0.05
		0.02	*0.03*	*0.09*	*0.16*	*0.09*	*0.02*
Germany	7	0.26	0.28	1.74	1.97	0.84	0.10
		0.03	*0.03*	*0.09*	*0.35*	*0.05*	*0.07*
Greece	2	0.32	0.35	2.09	2.14	0.59	0.05
		0.02	*0.02*	*1.08*	*1.12*	*0.02*	*0.01*
Hungary	3	0.29	0.37	2.02	2.00	0.94	0.06
		0.02	*0.02*	*0.15*	*0.15*	*0.01*	*0.02*
Ireland	3	0.29	0.35	1.83	2.36	0.67	0.05
		0.02	*0.02*	*0.11*	*0.15*	*0.05*	*0.01*
Italy	7	0.30	0.32	1.84	1.75	0.53	0.01
		0.03	*0.02*	*0.06*	*0.09*	*0.04*	*0.01*
Netherlands	5	0.26	0.30	1.72	1.72	0.90	0.07
		0.01	*0.01*	*0.06*	*0.13*	*0.01*	*0.07*
Norway	5	0.25	0.32	1.71	2.67	0.65	0.07
		0.01	*0.02*	*0.02*	*0.18*	*0.13*	*0.03*
Poland	4	0.27	0.31	1.83	1.80	0.82	0.04
		0.03	*0.05*	*0.14*	*0.12*	*0.08*	*0.02*
Spain	4	0.31	0.36	2.10	2.99	0.73	0.06
		0.02	*0.03*	*0.07*	*1.71*	*0.08*	*0.02*
Sweden	6	0.25	0.34	1.76	2.75	0.85	0.09
		0.02	*0.04*	*0.07*	*0.62*	*0.06*	*0.02*
Switzerland	4	0.29	0.37	1.74	1.84	0.77	0.03
		0.02	*0.04*	*0.10*	*0.08*	*0.09*	*0.04*
United Kingdom	7	0.28	0.32	1.83	1.96	0.83	0.02
		0.03	*0.03*	*0.09*	*0.22*	*0.06*	*0.01*
United States	8	0.35	0.37	2.01	2.41	0.83	0.05
		0.03	*0.03*	*0.10*	*0.09*	*0.03*	*0.02*
Total	101	0.28	0.33	1.82	2.19	0.79	0.06
		0.04	*0.04*	*0.18*	*0.56*	*0.12*	*0.04*

Other variables

Adjusted coverage
Employees covered by wage bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining. Source: Visser (2007).

Education
This measure is computed from LIS-Household file, as the proportion of household heads (unweighed) with some tertiary education (ISCED 5a and 5b)

Coordination of wage bargaining
Indicators of the degree of centralisation and/or coordination of the wage bargaining processes, which take value 1 for decentralised and uncoordinated processes, and up to 5 for high degrees of centralisation/co-ordination, respectively. Source: Bassanini and Duval (2006), which in turn is based on reclassification of original data proposed in OECD, *Employment Outlook* 2004.

Employment Protection Legislation (EPL)
OECD summary indicator of the stringency of Employment Protection Legislation, overall index. Source: OECD, *Employment Outlook* 2004. It has been backward projected before 1982 using the EPL measure taken from Nickell and oths. (2005), which in turn was based on Blanchard and Wolfers (2000).

Gross investment in gross domestic product
Ratio of gross investment to Gross Domestic Product, measured at PPP. Source: Penn World Tables 6.2.

Oil price
Oil prices in national currency. Source: Bassanini and Duval (2006)

Public expenditures on active labour market policies (ALMP)
Definition: public expenditures on active labour market programmes as a share of GDP. Source: Bassanini and Duval (2006).

Minimum wage
Ratio of statutory minimum wage to median wage, in percentage. Source: OECD Minimum Wages Database (downloadable). For countries where minimum wage provision is absent we have considered predicting a value based on union coverage, but this information is not available for few countries (Ireland, Greece) or only available in recent years. For this reason we have preferred to impose a unitary value when minimum wage is absent, except for Ireland and UK, where it was introduced in 2000; in such a case it has been replaced by country sample average in order not to distort the estimated coefficient.

Tax wedge
The measure of the tax wedge used in the text is from Bassanini and Duval (2006), and is derived from OECD tax models and therefore only captures *labour* taxes (social security contributions and income taxes), but not consumption taxes. It is defined as the wedge between the labour cost to the employer and the corresponding net take-home pay of the employee for a single-earner couple with two children earning 100% of APW (average productive wage) earnings. The tax wedge expresses the sum of personal income tax and all social security contributions as a percentage of total labour cost. It has been backward projected before 1982 using the tax wedge measure taken from Nickell and oths. (2005).

Union Density
Trade union density rate, *i.e.* the share of workers affiliated to a trade union, in percentage. Source: OECD, *Employment Outlook* 2004.

Unemployment benefit
The OECD summary measure is defined as the average of the gross unemployment benefit replacement rates for two earnings levels, three family situations and three durations of unemployment. Since the data is originally produced every two years, the missing values have been replaced by the average of two contiguous values. We use two alternative definitions: one measures the benefit received during the first year of unemployment, which is likely to have a direct impact onto income inequality (used in table 3). The other is an average over different years, and is more likely to affect the bargaining power of unions (used in table 4 and thereafter). Source: OECD 2007, *Benefit and wages*, Paris.

Unemployment rate
We use two alternative definitions of unemployment rate. The first one is computed from LIS-Household file as the average of an household variable, which is 1 if the household head is unemployed in a single member family, or is 0.5 (1) if the household head or (and) the spouse are unemployed in a cohabiting couple. When both parents are working, but there are other earners in the family and it is recorded some positive earnings from unemployment benefits, then a third unemployed person in the family is added. The other measure, which we use in the core analysis of the paper, is the (aggregate) unemployment rate, taken from Nickell et al (2005). The first measure in general provides an underestimate of the unemployment rate, as can be grasped from figure 4.

Descriptive statistics are reported in table A.2.

Table A.2 – Descriptive statistics – labour market institutions

first value: mean – second value: standard deviation – third value: observations available

country	union density	union coverage	unem.ben. repl.rate	rmin.wage/ med.wage	centralis. wage barg.	coordin. wage barg.	empl.protec. legislat.	tax wedge couple	act.labour mark.polic.
Australia	41.56	83.41	0.22	59.33	3.25	3.33	0.96	0.13	6.56
	8.98	2.25	0.04	5.03	0.98	1.06	0.12	0.03	1.95
	45	41	44	28	32	32	45	45	18
Austria	51.19	96.27	0.26	100.00	3	4.39	1.74	0.24	30.40
	9.42	1.80	0.06	0.00	0.00	0.45	0.50	0.04	4.83
	45	41	44	45	32	32	45	45	18
Belgium	49.48	90.93	0.41	53.48	3.23	4.03	2.76	0.37	46.33
	6.29	6.52	0.04	3.47	0.38	0.31	0.63	0.03	6.62
	45	41	44	29	32	32	45	45	18
Canada	32.24	37.12	0.17	44.06	1	1.31	0.80	0.16	3.67
	2.95	0.50	0.03	4.39	0.00	0.74	0.00	0.05	0.85
	45	17	44	39	32	32	45	45	18
Czech Republic	43.52	36.02	0.06	33.36	1	1	1.90	0.26	0.40
	18.82	3.60	0.00	9.04	0.00	0.00	0.00	0.03	0.25
	15	10.00	4	13	12	12	11	12	10.00
Denmark	70.82	70.38	0.44	100.00	3.41	4	2.05	0.29	9.83
	8.20	2.81	0.14	0.00	1.16	0.80	0.38	0.06	2.74
	45	41	44	45	32	32	45	45	18
Finland	63.38	94.39	0.25	100.00	4.84	4.84	2.25	0.33	81.36
	15.06	1.48	0.13	0.00	0.37	0.37	0.11	0.06	43.73
	45	45	44	45	32	32	45	45	18
France	15.59	77.76	0.31	55.49	2	2	2.32	0.35	4.49
	5.09	3.86	0.06	5.91	0.00	0.00	0.82	0.04	0.63
	45	26	44	43	32	32	45	45	18
Germany	31.74	74.98	0.29	100.00	3	4	2.61	0.32	5.06
	3.83	5.02	0.01	0.00	0.00	0.00	0.83	0.03	1.66
	45	41	44	45	32	32	45	45	18
Greece	32.16	.	0.09	65.04	.	.	3.50	0.28	.
	5.10	.	0.04	13.06	.	.	0.16	0.10	.
	28	.	44	41	.	.	22	26	.
Hungary	33.80	44.17	0.13	40.34	1	1	1.31	0.36	0.40
	15.94	4.22	0.00	4.29	0.00	0.00	0.05	0.04	0.39
	9	6	4	15	12	12	14	10	11
Ireland	48.76	.	0.25	39.72	3.30	3.30	0.69	0.22	109.81
	7.46	.	0.06	0.40	1.14	1.14	0.33	0.06	15.12
	45	.	44	44	32	32	45	45	18

country	union density	union coverage	unem.ben. repl.rate	rmin.wage/ med.wage	centralis. wage barg.	coordin. wage barg.	empl.protec. legislat.	tax wedge couple	act.labour mark.polic.
Italy	38.02	85.96	0.09	100.00	2.23	2.83	3.39	0.39	2.59
	7.80	2.83	0.12	0.00	0.55	0.85	0.50	0.03	0.21
	45	37	44	45	32	32	45	45	5
Netherlands	31.65	81.22	0.47	57.99	3	3.92	2.63	0.38	40.51
	6.56	5.02	0.10	5.77	0.00	0.44	0.21	0.04	15.88
	45	45	44	40	32	32	45	45	18
Norway	56.66	67.36	0.24	100.00	4.34	4.34	2.86	0.26	13.91
	2.16	2.53	0.16	0.00	0.37	0.37	0.12	0.03	3.77
	45	33	44	45	32	32	45	40	18
Poland	23.66	41.50	0.11	41.45	1	1	1.50	0.39	1.66
	10.86	1.50	0.00	4.69	0.00	0.00	0.09	0.01	1.58
	11	3	4	14	12	12	14	10	10
Spain	15.29	75.96	0.26	41.11	3.70	3.70	3.74	0.29	4.25
	8.79	4.31	0.10	8.55	0.71	0.71	0.42	0.05	1.94
	27	25	44	38	32	32	45	41	18
Sweden	76.21	77.53	0.20	100.00	3.86	3.39	2.16	0.37	16.03
	5.68	9.50	0.10	0.00	0.94	0.45	1.35	0.08	12.36
	45	45	44	45	32	32	45	45	18
Switzerland	27.49	60.80	0.16	100.00	2.63	4	1.10	0.18	27.79
	4.93	5.87	0.13	0.00	0.49	0.00	0.00	0.02	17.42
	45	37	44	45	32	32	45	45	18
United Kingdom	41.06	57.77	0.22	42.94	1.31	1.78	0.53	0.23	5.20
	6.73	14.25	0.04	0.30	0.47	1.21	0.14	0.04	2.43
	45	45	44	44	32	32	45	45	18
United States	20.41	24.46	0.12	42.14	1	1	0.20	0.22	0.31
	6	7.76	0.02	6.50	0.00	0.00	0.00	0.03	0.09
	45	45	44	44	32	32	45	45	18
Total	41.81	72.28	0.25	71.94	2.77	3.16	1.95	0.28	22.65
	18.60	20.47	0.14	26.89	1.26	1.36	1.13	0.09	32.04
	810	624	804	792	580	580	826	814	324

Appendix II: Model predictions for the system estimates in table 7

Table A.3 – Model predictions – 3SLS estimates from table 7

	Entire sample					Anglo-Saxon		Scandinavia		Continental Europe		North America	
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean
Gini index total income (actual)	86	0.281	0.037	0.203	0.383	18	0.289	19	0.251	34	0.273	15	0.326
Gini index total income (predicted)	86	0.281	0.027	0.225	0.341	18	0.289	19	0.251	34	0.273	15	0.326
Wage share (actual)	86	0.786	0.115	0.485	0.970	18	0.777	19	0.768	34	0.774	15	0.848
Wage share (predicted)	86	0.786	0.077	0.561	0.925	18	0.777	19	0.768	34	0.774	15	0.848
Decile ratio p90/p10 (actual)	86	4.063	1.307	2.391	11.903	18	3.651	19	4.813	34	3.552	15	4.768
Decile ratio p90/p10 (predicted)	86	4.063	1.076	2.779	11.461	18	3.651	19	4.813	34	3.552	15	4.768
Unemployment rate (actual)	86	0.072	0.037	0.004	0.230	18	0.065	19	0.057	34	0.085	15	0.071
Unemployment rate (predicted)	86	0.072	0.018	0.022	0.109	18	0.065	19	0.057	34	0.085	15	0.071

Figure A.1 – Actual and predicted values of the Gini coefficient

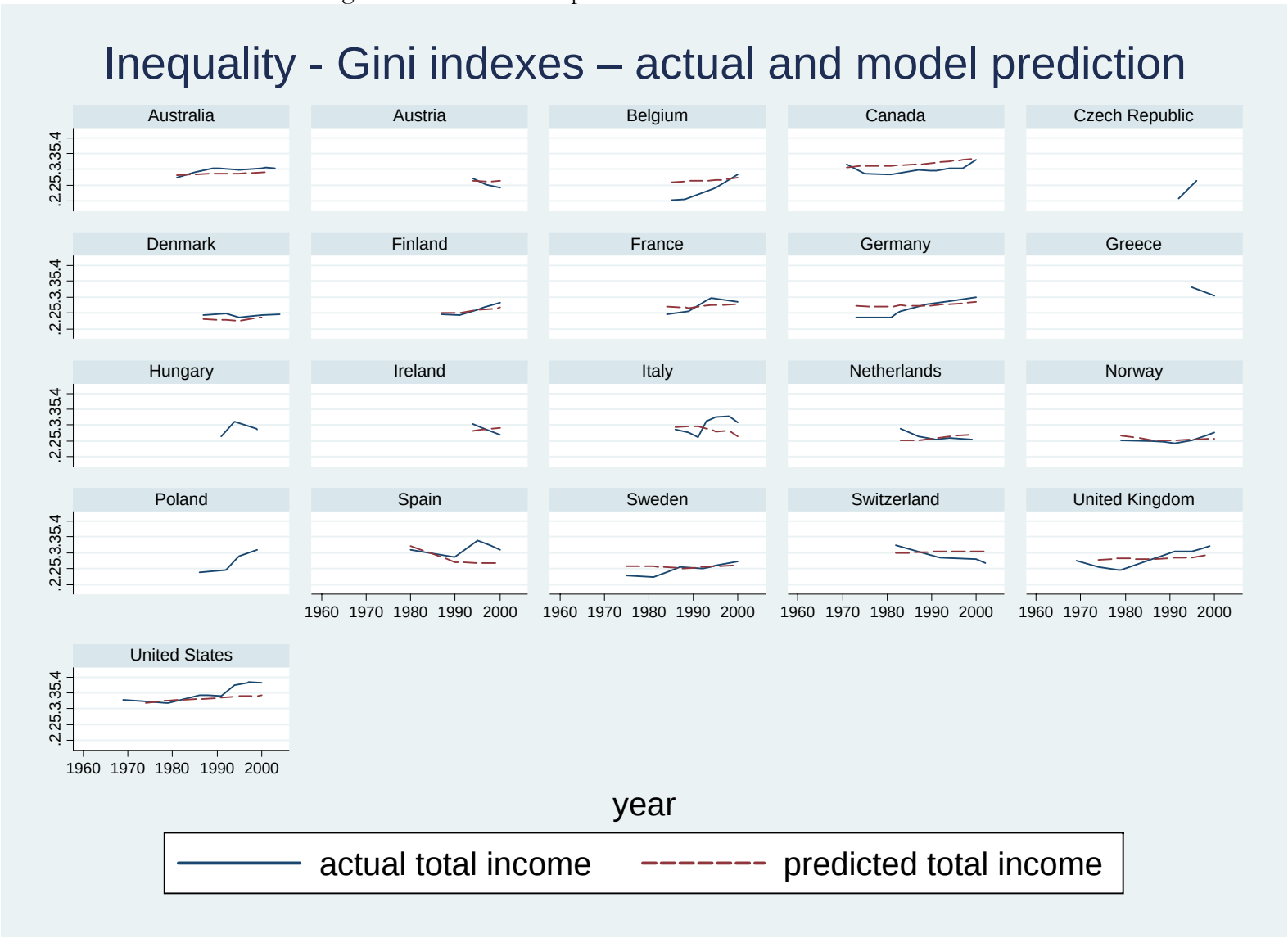

Figure A.2 – Actual and predicted values of the wage share

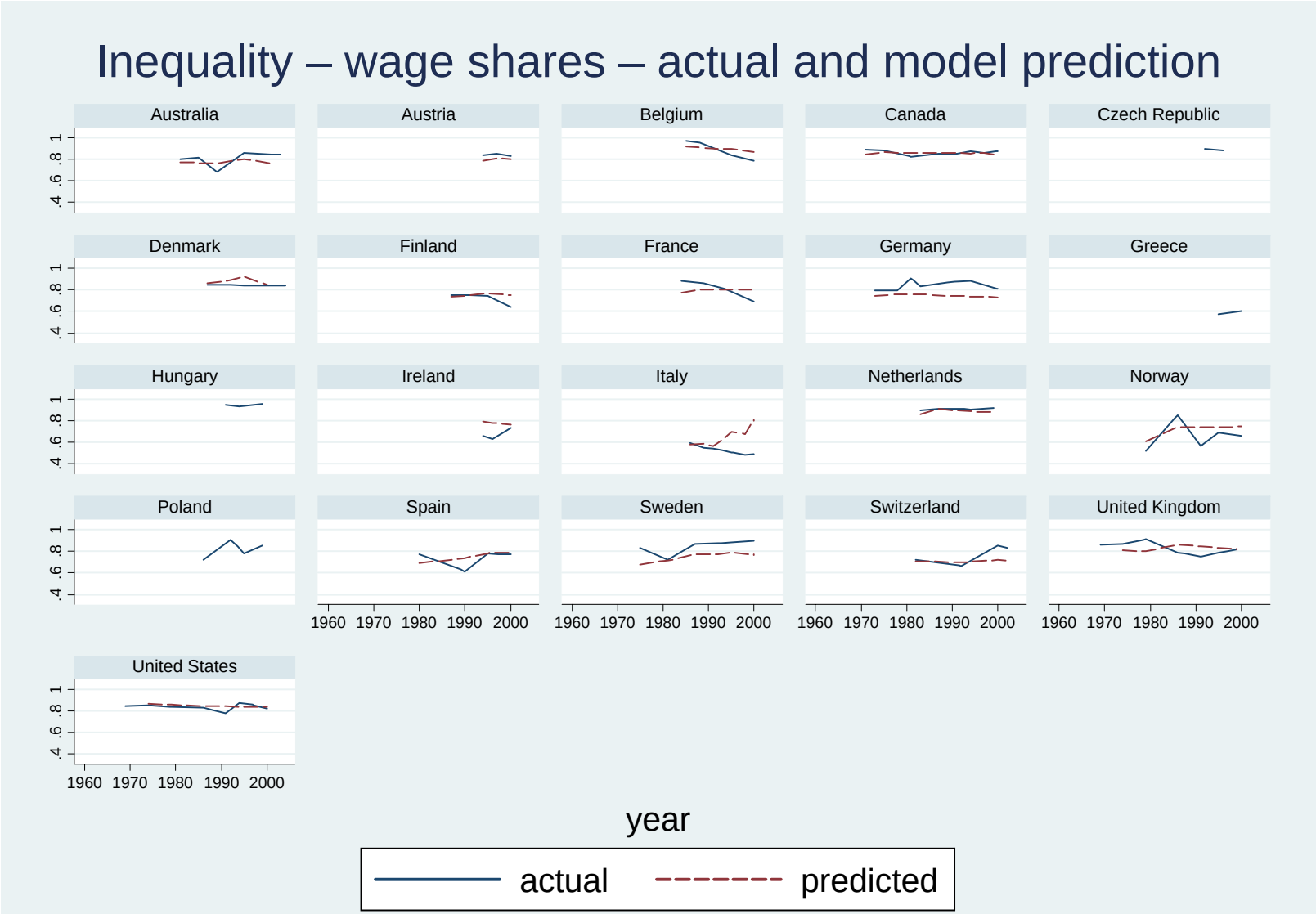

Figure A.3 – Actual and predicted values of the decile ratio

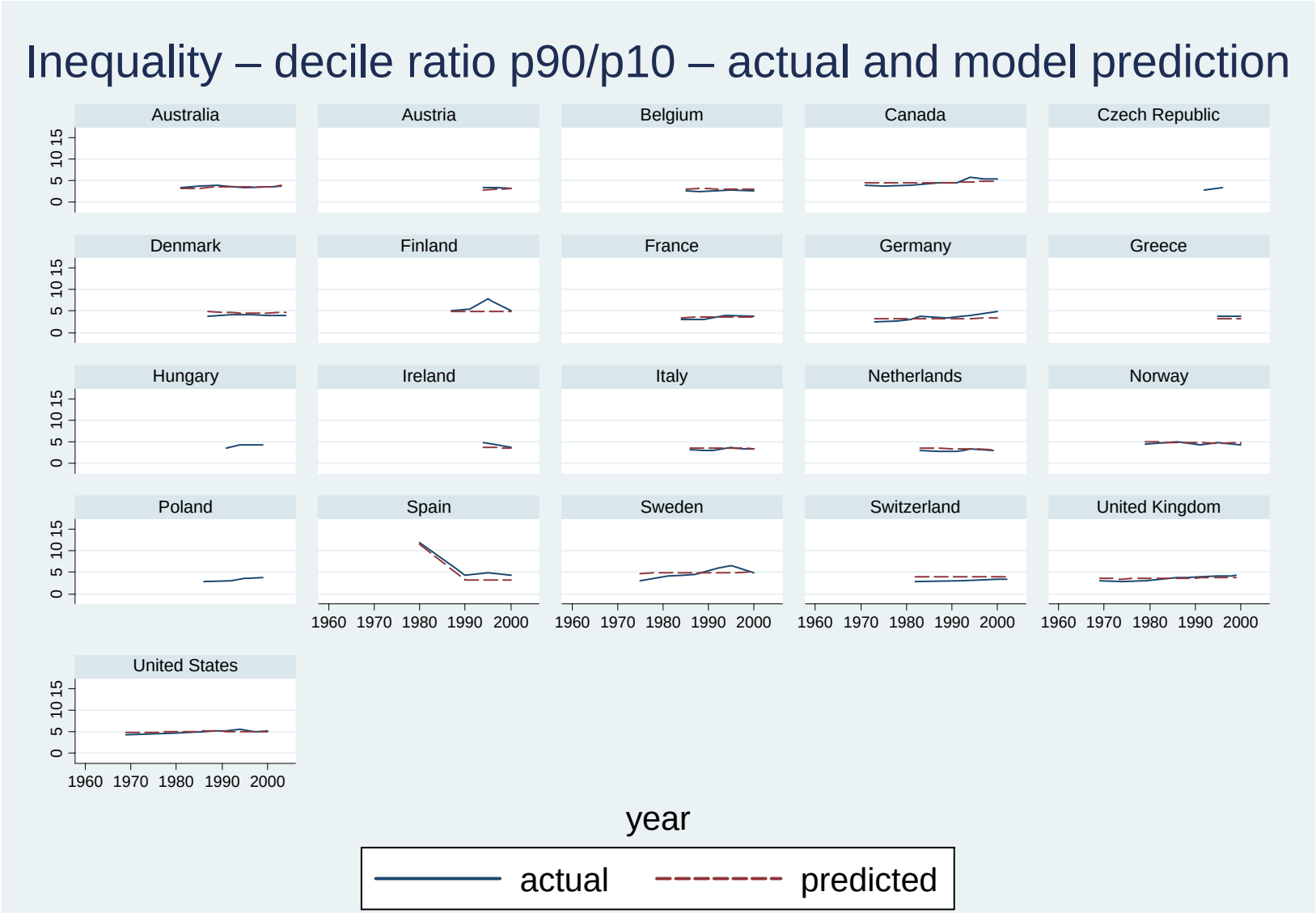

Figure A.4 – Actual and predicted values of the unemployment rate