Unemployment, Inequality, and Institutions, Revisited*

Robert Duval-Hernández†

Open University of Cyprus, UCY, CIDE, and IZA

July 9, 2018

Abstract

We pool European and U.S. micro-level data to analyze how employment and wages of different population groups relate to labor institutions. Taxes, the generosity of unemployment insurance, the strength of unions, and product market regulations contribute to creating a trade-off between unemployment and inequality. The institutional setting of Southern European countries magnifies the adverse effect of an output downturn on unemployment, while the opposite occurs with the regulations of Anglo-Saxon countries. However, a combination of taxes and a generous safety net that includes strong activation policies can help reduce inequality with limited impacts on unemployment.

Keywords: Unemployment, Inequality, Labor Institutions.
JEL Codes: D3, J3, J6, J8.

*I would like to thank Prof. Christopher Pissarides as well as conference participants at the International Economic Association 2017 World Congress and at the 32nd Annual Congress of the European Economic Association for their valuable comments and suggestions. Robert G. Valletta generously made available his data on the duration of unemployment insurance benefits at the State level for the United States. I also thank the generous funding from the European Research Council, Advanced Grant #323940 administered by the University of Cyprus. Needless to say, all errors and opinions are my own.

†Faculty of Economics and Management, Open University of Cyprus. P.O. Box 12794. CY-2252 Latsia, Cyprus. Phone: 357-22411882. E-mail: robert.duval@ouc.ac.cy

1 Introduction

For a long time now economists have been interested in understanding the impact of labor policies and regulations on unemployment and inequality. One of the central questions in this literature is whether strict labor regulations generate a trade-off between wage inequality and unemployment. Institutions are a natural candidate to explain the marked differences in unemployment-inequality outcomes across otherwise similar developed economies. In addition, the rise in unemployment brought by the Great Recession has renewed the debate on which are the right set of labor policies to face major aggregate shocks.

A comparison of the unemployment and inequality outcomes in the United States and Europe over the decades prior to 2008 indicates that most of the countries with high inequality, had below-average unemployment levels, and viceversa (see the left-hand panel in Figure 1). However, Nordic countries, as well as Austria, managed to maintain both low inequality and low unemployment; while the opposite was true for Spain. Furthermore, after the 2008 crisis, the economies with the largest proportional increases in unemployment were usually the ones that experienced reductions in inequality (see right-hand panel in that same Figure).

An unemployment-inequality trade-off can arise if labor institutions that compress the wage distribution, in tandem promote unemployment. For instance, regulations that limit the scope for downward wage adjustments would lead firms to cut employment in the face of demand downturns. Similarly, in a deregulated environment like the American one, technological change could lead to greater income inequality; while in Europe, that same force could manifest itself in the form of higher unemployment, due to the generosity of the welfare state, to downward wage-rigidities, and to the equalizing demands from labor unions (see Krugman, 1994, for a version of this argument).

This paper revisits the impact of institutions on wage inequality and unemployment from a cross-country perspective. It does so, however, by pooling micro-level data over many years across developed nations.

Most of the early empirical studies analyzing the impact of institutions on either unemployment or inequality relied on aggregate cross-country data.[1]

[1] Comprehensive surveys of this literature include Arpaia and Mourre (2005); Bassanini and Duval (2006); Salverda and Checchi (2015) among others.

However, several of the results from this literature have been found to be sensitive to changes in the data and/or the econometric specifications adopted (Baccaro and Rei, 2007; Howell *et al.*, 2007). A related group of studies has directly tested whether the interaction between technological change and institutions explains why on average the U.S. has experienced low unemployment and high inequality, while the opposite occurs in many European countries (Card *et al.*, 1999; Mortensen and Pissarides, 1999; Puhani, 2008; Bičáková, 2014). The evidence arising from this literature provides mixed support for this hypothesis.

The recent literature has shifted towards single-case studies where the causal impact of policies can be better established through natural experiments and randomized trials.[2] While this new wave of studies has generated many important findings, it suffers from the disadvantage of offering conclusions that apply under very specific contexts. This in turn limits their ability to offer insights on the interactions between different sets of policies and institutions.

By pooling survey data across countries and years, this paper takes a middle-way approach between macro and case-level studies. There are several advantages of doing this. In contrast to the macro cross-country literature, we can explore the heterogeneous responses across population groups to policies and aggregate changes in the economy.[3] In contrast to single-case studies, we obtain results that apply to a wider set of contexts and we are able to analyze the interactions and complementarities between institutions. Ultimately, it is precisely the combination of cross-country data that helps us understand how different institutional regimes lead to the unemployment-inequality outcomes observed across developed nations.

The empirical approach followed consists of estimating the relationship between the unemployment of different groups of the population and institutions and aggregate factors. In the case of inequality, we use Recentered Influence Function regressions (Firpo *et al.*, 2009) to analyze how institutions and other macro variables relate to individual wages, and through them shape inequality in the market.

The set of institutions we study include employment regulations, the minimum wage, the generosity of unemployment insurance, various measures re-

[2]See Boeri *et al.* (2015) for a careful survey of this literature.

[3]Few papers in the cross-country literature explore this heterogeneity. Some exceptions include Kahn (2000); Bertola *et al.* (2007); Gal and Theising (2015) and Piton and Rycx (2018).

lated to unions and collective bargaining, labor taxes, active labor market policies, and regulations in product markets. In addition to these policies, we analyze the impact of aggregate factors such as technological change, trade, and output fluctuations.

A number of messages arise from our findings. First, some institutions contribute to creating a trade-off between unemployment and inequality. In particular, the generosity of unemployment insurance, union presence, taxes, and product market regulations all contribute to such trade-off. However, other institutions affect unemployment and inequality without necessarily leading to such pattern.

Second, our results uncover a great deal of heterogeneity in the responses of employment and wages across population groups. For instance, we find that a greater labor tax wedge increases unemployment among unskilled females, while at the same time it reduces inequality by lowering the pre-tax wages of skilled workers. In fact, the heterogeneity in responses is the norm, rather than the exception.

Third, institutions do not act in isolation, but rather they interact with one another. An interesting illustration of this is the finding that the disemployment effects of taxes are moderated under an environment with a generous safety net that includes unemployment insurance benefits, as well as vigorous active labor policies. This precise combination of high taxes with a safety net can explain why Nordic economies have managed to have low levels of inequality together with moderate unemployment.

Finally, our estimations indicate that institutions also mediate the impact of aggregate shocks in the economy. In particular, we find that the institutional setting found in Southern European economies magnifies the adverse impact of output downturns on unemployment. In contrast, the institutions in the United States mitigate the impact of such downturns. This finding implies that the dismal unemployment outcomes observed in Southern European economies following the 2008 crisis was not only due to their larger output contraction, but also to their institutional setting which amplified the negative employment effects of an output downturn.

In section 2 we present the methodological approach followed. Section 3 presents the data used and reports some descriptive statistics, while in section 4 we present our results. We conclude in section 5.

2 Methodological Approach

In order to estimate the impact of institutions on unemployment and inequality, we obtain aggregate cross-country data on labor policies and institutions and relate them to household surveys containing information on unemployment and wages at the individual level.

For the analysis of unemployment, we partition the population into ten groups determined according to gender, age (3 groups), and schooling (2 groups based on college completion).[4] We then relate the unemployment rates of each group to our aggregate variables through separate linear regressions.

More specifically, let u_{pgt} be the unemployment rate of population group p in geographical area g at period t. Institutions are included in the vector Z, while other aggregate economic factors are included in the vector D. Finally, W is a vector with additional controls, and θ and τ are geographical and period fixed effects, respectively. For each population group p, we estimate through separate least-squares regressions the following model,

$$\ln u_{pgt} = Z_{pgt}\beta_p + D_{gt}\gamma_p + W_{pgt}\kappa_p + \theta_p + \tau_p + e_{pgt}. \tag{1}$$

Our geographical unit of analysis will be countries in the case of Europe, and States in the case of the United States. While traditionally macro cross-country studies have worked with the unemployment rate of the U.S. aggregated at the national level, we can exploit our micro-level surveys to obtain rates at the State level. This gives us a richer picture of unemployment fluctuations and allows us to exploit regional differences in institutions such as minimum wages, union presence, the generosity of the unemployment insurance, and the progressivity of taxes within the United States.[5]

For the analysis of inequality we capture the contribution of individual and aggregate variables to an inequality measure by using a Recentered Influence Function regression (Firpo *et al.*, 2009; Fortin *et al.*, 2011). For a given distribution function F, the Influence Function, IF, of a statistic $\nu(F)$, measures the marginal contribution of an individual observation to that statistic.

[4] We do not distinguish college status for workers younger than 25 years, as only few of them have completed a higher degree by that age.

[5] Most of the institutions included in vector Z in this regression vary only across time and geographical units. However, as we will see in the next section, we adjust the unemployment insurance replacement rate by the probability of recipiency depending on age.

This function adds-up to zero and can be computed for a wide variety of statistics, including all the standard measures of inequality.[6] A Recentered Influence Function, RIF, adds back $\nu(F)$ to the Influence Function, IF, so that it is centred around the actual value of the statistic.

In our context, if we denote by I_{ct} the inequality index for country c, at time t, then the corresponding RIF_{ict} for an individual i in such economy will be

$$RIF_{ict} = I_{ct} + IF_{ict}.$$

This variable captures both the differences in inequality across countries and periods, as well as the contribution of individual observations to this aggregate.

Recentered Influence Function regressions were first proposed by Firpo *et al.* (2009) in the context of unconditional quantile regressions. In particular, the authors used the RIFs of the quantiles of a wage distribution as a dependent variable in a linear regression against a set of covariates. It can be shown that for continuous regressors, the coefficients from these regressions measure the impact on the statistic of interest of an infinitesimal location shift in the distribution of the covariate. In the case of a binary covariate, the coefficient measures the impact on the statistic of a *ceteris paribus* marginal increase in the probability that the covariate takes value equal to one (see Firpo *et al.*, 2009). In summary, the parameters of a RIF regression measure the *ceteris paribus* impact on a statistic of interest of a marginal increase in the mean of an independent variable. Because of this reason, estimating a regression with the RIFs of an inequality measure as a dependent variable is an appealing way of approximating the relation between this inequality measure and a set of regressors.[7]

In our case, we estimate a least-squares regression on individual-level data

$$RIF_{ict} = X_{ict}\alpha + Z_{ict}\beta + D_{ct}\gamma + X_{ict}(Z_{ict}\delta + D_{ct}\pi) + W_{ict}\kappa + \theta + \tau + e_{ict}. \quad (2)$$

The vector X is a set of dummies identifying the population group to

[6] Influence functions were introduced by Hampel (1968) to the Statistics literature as a tool to analyze the robustness of a statistic to outliers. An accessible reference to its properties is Staudte and Sheather (1990). Essama-Nssah and Lambert (2012) derive the Influence Functions for a number of inequality and poverty indices.

[7] Another method that serves a similar purpose for the variance of logarithms is Fields (2003). For a discussion on how the RIF approach compares to other distributional regression methods see Fortin *et al.* (2011).

which individual i belongs.[8] As before, Z, D, and W denote vectors containing variables on institutions, aggregate factors, and other controls, respectively; while θ and τ are geographic and period fixed effects. The interactions of Z and D with the population group dummies X allow us to estimate how institutions and aggregate factors contribute to the overall inequality by altering the individual wages in specific population groups.[9]

Unlike most of the estimations in the early literature relating institutions to unemployment or inequality across countries, equations (1) and (2) also allow us to explore how institutions relate to the wages and employment of different population groups.

In addition to the above specifications, we also estimate variations of equations (1) and (2) where we allow for interactions between institutions, as well as for interactions between institutions and output fluctuations.

Following the tradition in the cross-country literature, in estimating the above models each country/period pair receives an equal weight.[10] Finally, in both the unemployment and inequality regressions, the labor regulations and most of the aggregate variables are lagged by one year relative to the household surveys, in order to reduce the risk of endogeneity.[11]

In the next section, we present our data. In particular, we discuss the explanatory variables used in each context, and report some descriptive statistics of the samples.

[8] We classify the population in the same 10 groups used for the analysis of unemployment.

[9] Unlike the unemployment regressions, where we obtain separate unemployment rates at the State level for the U.S., here we estimate inequality (and its Influence Function) at the country level. However, in equation (2), whenever possible, we allow for institutional differences across States within the U.S., and the geographical fixed effects θ are country dummies for Europe, and State dummies for the United States.

[10] In the case of the unemployment equation (1), this entails weighting U.S. State-level cells according to the State share in the sample population group under consideration. In the case of the RIF regressions (2), this means rescaling the individual sampling weights of each country/period so that they add-up to 1. The results are not very sensitive to alternative weighting schemes.

[11] The only aggregate variables that enter contemporaneously are the output gap and the group population shares that proxy for demand and supply forces, respectively.

3 Data

Our data cover a total of 15 European countries and the United States.[12] For the U.S., France, Germany, and the UK, the data go back to the early 1980s.[13]. For other countries the period of analysis goes from the early/mid-nineties to 2014. The Appendix includes more details on the data sources, periods included, as well as some basic descriptive statistics.

For most European countries the unemployment rates are constructed using the European Union Labour Force Survey, EU-LFS, (Eurostat, 2015a). For France and the UK we use their Labor Force Surveys as distributed by their national statistical agencies, since they include more details than the EU-LFS (Insee, 2014; ONS, 2015). Due to the lack of public micro-level data for Germany in the EU-LFS previous to 2002, we complement the information using the Socio-Economic Panel (Socio-Economic Panel (SOEP), 2015; Wagner *et al.*, 2007). In the case of the United States, we use the CPS Basic monthly files across all months (Flood *et al.*, 2015). Our sample includes workers with ages between 17 and 64 years, who are in the labor force.

Given our partition of the population, some of the unemployment rates are estimated on a small number of observations. To reduce the measurement error this entails, we restrict our analysis to rates estimated on at least 100 individual observations, and exclude cells that report no unemployed individuals.[14]

For the analysis of inequality, the data for most European countries between 1994 and 2001 come from the European Community Household Panel, ECHP, (Eurostat, 2003), while for the period starting in 2003 we use the cross-sectional European Union Statistics on Income and Living Conditions, EU-SILC, (Eurostat, 2015b).[15] For the case of Germany, the SOEP is used

[12]The European countries are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom.

[13]In the case of Germany the data in the 1980s correspond to the Federal Republic of Germany. We exclude German data between the years of 1990 and 1994 to avoid the confounding effects of the reunification. In the case of France and the UK, the analysis of inequality starts in the early 90's. See Table A2 in the Data Appendix for details.

[14]In no case our partition leads to population cells where the sampled individuals are all unemployed.

[15]In certain cases, the ECHP has a large number of missing observations in the occupation and industry variables which are included as controls in equation (2). We drop all

throughout, since inequality estimates based on the German SILC show inconsistencies with other sources (see for instance Frick and Krell, 2010). For the United States, the March CPS samples are used, and for France and the UK we use their respective national Labor Force Surveys.[16]

Our inequality sample is restricted to full-time employees with ages between 17 and 64 years, who report positive hours of work and earnings. We exclude the self-employed because their earnings might capture returns to non-labor inputs. We also exclude part-time workers in order to focus on a sample of employees closely attached to the labor force, and for whom we can construct a cleaner measure of hourly wages. For these same reasons, whenever possible we exclude army personnel, students, trainees, and apprentices from the inequality sample.

Inequality is estimated for gross hourly wages using the logarithm of the 90-10, 90-50, and 50-10 Decile Ratios.[17] In most countries, the hourly wage is built using information on current monthly earnings and weekly hours of work. However, for the U.S. and selected countries in the EU-SILC survey, the hourly wage is constructed using yearly earnings from the previous calendar year.[18] For the U.S., we rely on information on the usual number of hours worked in the previous year. For the SILC countries without monthly earnings, we divide last-year's earnings by the number of months worked during that year, and by the current number of hours worked per week (times 4.33). Since we are linking last year's income to current hours, we exclude individuals who changed jobs between the income reference period and the time of the interview. Also, in the countries reporting yearly earnings only we further restrict the sample to include only Full-Year Full-Time (FYFT) employees.[19]

---

the observations in a given country/period whenever that occurs.

[16]The EU-LFS does not contain detailed earnings information.

[17]We have also performed the estimations using the Gini index as a robustness check.

[18]The European countries that only report yearly earnings on the EU-SILC are Belgium, Denmark, Finland, The Netherlands, Norway, and Sweden.

[19]When estimating the inequality regressions, we include as an additional control a dichotomous indicator of whether hourly wages in a given country went from being obtained from monthly earnings in the ECHP, to yearly earnings in SILC. Furthermore, following the previous literature, in the March CPS we exclude observations with allocated earnings.

3.1 Institutions and Other Economic Variables

As previously mentioned, our variables on policies and institutions include measures of employment protection, minimum wages, the generosity of unemployment insurance, union presence, labor taxation, expenditure on active labor policies, and regulations of product markets.

Our measures of employment protection capture restrictions on dismissals, on fixed-term contracts, on part-time work, as well as regulations on work time (duration of working week, overtime pay, etc.). The minimum wage is included in (log) real terms in the unemployment regressions, and as a fraction of the median wage for the analysis of inequality.[20] To capture union presence we include the percentage of employees covered by bargaining agreements, the union density, as well as an index capturing the degree of centralization in bargaining.[21] The generosity of unemployment insurance is measured through the gross replacement rate during the first year of unemployment, adjusted by the rate of recipiency among different age groups. We also include a weighted average of these replacement rates in years 2-5 as a percentage of the first-year's gross replacement rate, as a measure of the duration of benefits.

We include the expenditure in active labor policies per unemployed, as % of GDP per worker in the labour force.[22] We also include the labor tax wedge for an average worker, and 1 minus the elasticity of post-tax to pre-tax labor income as a measure of tax progressivity. Finally, we include an index of product market regulations capturing the degree of regulatory provisions in network sectors (Conway and Nicoletti, 2006). Indices with an arbitrary scale are standardized, so that their coefficients capture the impact of a one standard deviation increase.

[20] We don't include the Min to Median Wage (Kaitz index) in the unemployment regressions, as there could be a correlation, unrelated to the minimum wage itself, between the median wage in the denominator of the index and unemployment. In all of our econometric estimations, we include a dummy for the introduction of a minimum wage. This applies to Ireland and the United Kingdom which introduced such floors in 2000 and 1999, respectively. Furthermore, we allow the coefficient of this dummy to vary for each population group. By doing this, we ensure that the marginal effects reported for the minimum wage variables only reflect changes along the intensive margin.

[21] Whenever possible, in the analysis of inequality we separate between the coverage rate of workers in the public and private sectors.

[22] In order to avoid using the current number of unemployed when constructing this variable, we use instead the average unemployment rate over the previous five years.

In addition to variables on institutions and policies, we include proxies for technological change, trade, and demand and supply forces in the labor market.

Technological change is proxied by the business sector expenditure on R&D (as percentage of value added). To capture the impact of trade we build a measure of import penetration from low and medium income countries. In order to distinguish this import penetration from trade openness in general, we also include as an additional control the value of imports plus exports as a share of GDP. We proxy for demand fluctuations using the GDP output gap, while we include the population share of each group as a control for supply forces in the market. In addition, in the inequality regression (2) we include controls for the industry and occupation of each worker. The sources and detailed construction procedures for all variables are included in the Data Appendix.

Table 1 shows the average values of institutions by region over the two decades prior to the 2008 crisis.[23] In this table we can appreciate the considerable institutional variation across regions.[24] For instance, we observe the well-known fact that Anglo-Saxon countries, and the U.S. in particular, have less regulated labor and product markets. Save for restrictions on fixed-term contracts, which are strongest in Continental Europe, Nordic countries have regulations on par with those in the Continent. However, rather than relying on minimum wages, Nordic countries have stronger unions (as judged by the union density) and a more centralized collective bargaining system. In addition, Nordic countries also have a more generous safety net in the form of UI benefits and active policies. In contrast, Southern European economies display strong regulations in both labor and product markets, yet they have a weak safety net in place.

[23]We display statistics for the years 1992-2007 because over these years we have data for all 16 countries, and they reflect the average values before the policy adjustments that ensued the 2008 crisis.

[24]Saxon countries are the U.S., the UK, and Ireland. Continental Europe countries include Austria, Belgium, France, and Germany. Nordic countries are Denmark, Finland, Netherlands, Norway, and Sweden. Southern European countries are Greece, Italy, Portugal and Spain. This classification follows the one proposed by Bertola *et al.* (2001).

4 Results

In this section we present the estimation results for equations (1) and (2), and their extensions. In particular, we report the average marginal effects of institutional and aggregate variables for different groups of the population. For all estimations, the survey sampling weights are used, scaled so that each country/period pair counts equally. In addition, geographic and time fixed effects are included, and the standard errors reported are robust to heteroskedasticity and for two-way clustering at the geographical and period level.

4.1 Unemployment

Tables 2 and 3 present the estimations of the unemployment equation (1) for females and males, respectively.[25]

We begin by discussing the impact of various measures of employment protection. In theory, the impact of protections against dismissals on unemployment is ambiguous (see for instance, Bertola, 1990). Such regulations discourage job destruction, yet job creation falls as well, as firms expect that in the future it will be more costly to dismiss any current hire. Depending on which of these effects dominates, the equilibrium unemployment might be higher or lower under stricter regulations. However, Postel-Vinay and Turon (2014) have shown that if on-the-job search is allowed, it is likely that such regulations will reduce unemployment due to the increase in job-to-job transitions.[26] Our results are consistent with this last prediction since such regulations are associated with lower unemployment across all population groups, with the largest proportional reductions in unemployment occurring among skilled workers. Stricter work-time regulations are associated with higher youth unemployment, while the impact of restrictions on temporary and part-time contracts on unemployment is statistically insignificant for most groups.

We fail to find a statistically significant impact of minimum wages on unemployment. While more generous UI replacement rates increase unem-

[25] All coefficients are multiplied by 100 as to report the percentage change effect on unemployment.

[26] Job-to-job transitions provide a way for employers to avoid firing costs, and because of this, job creation might not be drastically reduced as a result of more stringent firing regulations.

ployment among middle-aged workers, we don't find a statistically significant effect for the duration of these benefits.[27] The lack of a statistically significant association between UI generosity and the unemployment of the young is probably due to the fact that our replacement rates are adjusted for the probability of recipiency, and many young workers do not qualify for these benefits.[28]

The theoretical impact of collective bargaining on employment depends on the assumptions made by different models (see for instance the contrasting predictions from the efficient contract literature and the "Right-to-Manage" models, Ashenfelter and Brown, 1986; Nickell and Andrews, 1983). In our results, we find that a greater union presence, either in the form of greater coverage or greater density, is associated with higher unemployment among individuals aged 45 and more and among skilled females. The degree of centralization and coordination in bargaining reduces unemployment across all population groups, except for the youngest. Furthermore, these reductions are proportionally larger among more skilled and older workers. These reductions can occur when a high degree of centralization or coordination in bargaining mitigates the wage demands of unions, since they internalize the impact of their demands on aggregate employment.[29]

A higher tax burden, as measured by the labor tax wedge, is positively associated with unemployment across most groups, though the effects are statistically significant only among unskilled females. In most regressions, the progressivity of labor taxes is positively associated with unemployment, contrary to theoretical predictions of most models (see Pissarides, 1998). This might be caused by the difficulty of constructing a consistent measure of labor tax progressivity over the years analyzed in our study.[30]

Higher expenditures in active labor market policies reduce unemployment across all groups, though statistically significant effects occur for fe-

[27] In general, the literature has found that UI benefit duration matters mostly for the length of unemployment spells (see for instance Tatsiramos and van Ours, 2014).

[28] Another possible reason is the so-called "entitlement effect" (Mortensen, 1977), whereby new entrants to the labor market reduce their reservation wages, in order to acquire experience, and subsequently qualify for UI benefits in the future.

[29] Calmfors and Driffill (1988) predict a nonlinear relationship between unemployment and centralization in bargaining. The literature has found either a negative (Nickell *et al.*, 2005), or an inverted-U (Elmeskov *et al.*, 1998; Scarpetta, 1996) relationship between these variables. Our data don't support the inverted-U relationship between these variables.

[30] Lehmann *et al.* (2016) construct a measure of tax progressivity for the years 1998 and onwards, and they find evidence suggesting that progressivity reduces unemployment.

males only. In contrast, higher product market regulations are associated with higher unemployment for selected groups women.[31] For males the coefficients are insignificant or negative, indicating that these regulations harm the employment prospects of females only.

Finally, in what concerns the effects of our aggregate variables we find a strong negative association between the output gap and unemployment. Also, our technology proxy (R&D expenditures) is positively associated with higher youth unemployment; while import penetration from low and middle income countries is not significantly related to any of the unemployment rates.

4.2 Inequality

In Tables 4-6 we present the results of estimating the Recentered Influence Function regression (2) for the different log decile ratios of wages.

A look at Table 4 reveals that several institutions reduce inequality by strengthening the bargaining position of low-wage workers. This is the case of the duration of unemployment insurance benefits, restrictions on dismissals, and minimum wages.[32]

More specifically, a greater duration of UI benefits reduces inequality by raising the wages of the young and the unskilled. This is also reflected by the reduction of the 50-10 ratio in Table 6. Similarly, restrictions on dismissals reduce the 90-10 ratio through the wages of unskilled workers. Finally, higher wage floors reduce inequality through the wage of unskilled middle-aged workers.[33]

Other institutions, like work-time regulations, bargaining centralization, and active labor policies, have a mixed impact on inequality. In the case of work-time regulations they reduce inequality by raising the wages of young workers, while at the same time they increase it through the wages of skilled

[31] The coefficients of product market regulations on the unemployment of older unskilled and middle-aged skilled women are statistically significant; while for unskilled middle-aged women the effect is borderline insignificant (with a p-value of 0.105).

[32] Koeniger *et al.* (2007) find similar results using aggregate data on inequality in an unbalanced panel of developed countries from the early seventies to the late nineties.

[33] However, we also observe a reduction in inequality operating through the wages of middle-aged skilled males, a group which is unlikely to be affected by a higher wage floor. Previous literature has also found a similar presumably spurious negative association between minimum wages and the top part of the distribution (see for instance Autor *et al.*, 2008; Koeniger *et al.*, 2007).

and older workers. This is consistent with evidence of a greater use of overtime pay as a result of such regulations (Raposo and van Ours, 2010). In contrast, greater centralization in bargaining leads to wage moderation. This increases inequality through wage cuts for the young, but it reduces it by lowering the wages of middle-aged skilled workers. The theoretical impact of active labor market policies on wages is ambiguous (see for instance Calmfors, 1994). Our estimations show that such policies increase inequality through the wages of young workers, yet they reduce it through the wages of skilled ones; this indicates that such expenditures are associated with wage reductions across different points of the distribution.[34]

We find large reductions in the 90-10 ratio associated with stricter part-time work regulations. These reductions operate through the wages of skilled women. Since this group benefits more from flexible part-time arrangements, restricting the availability of this type of jobs negatively impacts their wages and compresses the distribution from the top.[35] In contrast, stricter regulations on temporary work increase inequality through larger proportional wage gains accruing to skilled workers. These gains could be due to reduced competition as a result of such regulations. However, these conjectures deserve further study.

As expected, unions compress the wage distribution. The effects are particularly strong at the top-half of the wage distribution, as can be seen in Table 5 (Firpo *et al.*, 2009; Jaumotte and Osorio Buitron, 2015, obtain similar results). In all the tables we also find that a greater tax wedge reduces pre-tax inequality through the wages of skilled workers. This means that gross wages absorb part of the additional cost brought by taxes. A more progressive tax system is also associated with inequality reductions through the wages of skilled workers, although the effects are statistically insignificant.[36] Given the evidence in the literature that greater tax progressivity reduces pre-tax inequality (Guvenen *et al.*, 2013) this raises again the possibility that our measure of progressivity is noisy.

[34] Active labor policies can reduce equilibrium wages by creating greater competition for available regular jobs due to increased productivity among the current unemployed and due to a reduction in the number of discouraged workers. Refer to Calmfors (1994) for a more extensive description these and other possible consequences of active policies.

[35] For unskilled women the effects are statistically insignificant, although their sign also supports the hypothesis of wage losses for them.

[36] Furthermore, results in Table 5 indicate that this variable is associated with rises in the 90-50 wage ratio.

Turning now to product market regulations, we have that their potential impact on inequality is theoretically ambiguous. On the one hand, lack of competition in the product market increases the firms' mark-up and the rents associated with it (Abowd and Lemieux, 1993; Jean and Nicoletti, 2015). This, in turn, can lead to rent appropriation by insiders with a consequent rise in inequality. On the other hand, greater cost-sensitiveness due to increased competition (i.e. reduced regulations) can also raise inequality (see Guadalupe, 2007). Our results support both types of effects. In particular, in Table 6 we observe that product market regulations reduce inequality at the bottom-half of the distribution, thus supporting the cost-sensitiveness mechanism. Yet, at the top of the distribution (Table 5) we see a rising dispersion mainly operating through the wages of skilled males. This last effect is consistent with the hypothesis of rent-appropriation by this population group.

Expenditures on R&D increase overall inequality, although strong significant effects of this proxy for technological change are mainly found for the 50-10 ratio in Table 6. For the most part, import penetration from low and middle income countries is unrelated to inequality changes. Finally, an increase in the labor demand (as reflected by the output gap) has mixed effects on inequality. On the one hand it reduces inequality by increasing the wages of the young and the unskilled, but it also increases inequality by rasing the wages of skilled middle-aged workers.

4.3 Interactions

As previously mentioned, regulations and institutions do not act in isolation, but rather as part of a set of rules that interact with one another. In this section, we explore some of these interactions for both unemployment and inequality. The results of these exercises are reported in Tables 7-9.

4.3.1 Interactions between Institutions

Given the large number of institutional variables in our models, it is unfeasible to directly estimate the interactions between all relevant institutions. Instead, in this section we explore one interaction at a time between a set of institutions, through separate models. Furthermore, for space reasons we only report the marginal effects of the interactions in question.

In Table 7 we present the present the results pertaining to the analysis of unemployment. In each exercise, the marginal effect of one institutional variable is reported at two different levels of other institutions with which is interacted.

In the first interaction we examine the impact of the tax wedge on unemployment depending on the degree of union density. In block A of Table 7 we observe that taxes raise unemployment among the unskilled when unions are strong. Since unions limit the possibility of downward wage adjustments, an increase in taxes in an environment with strong unions makes firms adjust on the employment rather than on the wage margin. In contrast, the adverse impact of taxes is attenuated in an environment with a strong safety net, namely, a more generous UI and strong active labor market policies (see block B). Finally, in block C we show the impact on unemployment of a more generous UI replacement rate depending on the level of expenditures on active labor market policies. There, we observe that while more generous UI systems create unemployment, this impact can be limited by spending in active labor policies.

In Table 8 we present a set of interactions for the inequality regressions. The first of these interactions (in block A) shows the effect of protections against dismissals depending on union strength (captured by the union density). In this case, the results indicate that when unions are weak, regulations against dismissals increase inequality through the wages of skilled workers. However, such effects disappear when unions are strong. This suggests that, while firing restrictions raise wages across the distribution by enhancing the bargaining position of employees, unions limit these gains for skilled workers, due to their emphasis on a more equal pay scale.

Next, in block B we analyze the impact of taxes on inequality depending on the safety net (as defined before) in place. In this exercise we observe that the reductions in inequality brought by taxes are similar under both scenarios. This result, together with the interaction reported in Table 7.B for the case of unemployment, provides an insight as to how Nordic economies have managed to have low inequality levels together with moderate unemployment. Namely, if the proceeds of high taxes are spent in a strong safety net, including vigorous active policies, then inequality can be reduced while limiting at the same time the adverse effects of taxes on unemployment.

Our final interaction explores whether there is a differential impact of product market regulations on inequality at the bottom-half of the distribution, depending on the degree of union coverage. The results in Table 8.C

indicate that the disequalizing effects of greater competition (less regulation) are usually stronger when union coverage is weak. In other words, unions limit the inequality-enhancing effects of greater product market competition, especially among women and the young.

4.3.2 The Interactions between Output Fluctuations and Institutions

While the previous interactions are indicative of the interplay between certain institutions, in practice, they fall short of accounting for the complexity of the full institutional arrangement that an economy has. In this final subsection, we take a different approach and explore how output fluctuations impact unemployment depending on the institutional regime observed in different countries.

The idea that aggregate shocks lead to different unemployment outcomes depending on the institutional framework has been present for a long time in the literature (see for instance Bruno and Sachs, 1985; Blanchard and Wolfers, 2000). To explore this idea we interact a negative output gap with all our institution variables, and analyze the unemployment outcomes under different institutional settings. The institutional regimes we explore are given by the average values of the institutional variables in four regimes: a) deregulated environment, illustrated by the institutional setting of the United States, b) Continental European, based on the institutions of Austria, Belgium, France, and Germany, c) Nordic, based on the institutions of Denmark, Finland, Norway, and Sweden, and d) Southern European, based on the institutions of Greece, Italy, Portugal, and Spain.[37]

In Table 9 we observe that usually a negative output shock induces greater proportional increases in unemployment under the institutional setting of Southern European countries. In contrast, under U.S.-like institutions, output downturns usually lead to smaller proportional increases in unemployment. Since Southern European countries have had historically higher unemployment rates, this means that the actual change in unemployment *levels*

[37] The institutions of the UK and Ireland display hybrid features between the settings of Continental Europe and those of the United States. Dutch institutions in contrast, present hybrid features between those of Nordic countries and those of Continental Europe. For this reason we don't take into account the values of their institution variables in this exercise. In all cases, the averages of the institution variables correspond to the ones during 2007.

after a comparable output downturn is much higher in Southern Europe, while the opposite occurs for the United States.

It is important to emphasize that this greater response in unemployment under Southern European institutions is not driven because these economies have had more adverse output shocks. Instead, the exercise considers an equivalent marginal shock across regions, only altering the institutional setting with which the shock is interacted.[38]

In Figure 2 we present a final exercise where we analyze in more detail the effects of interacting the negative output gap with institutions. In particular, to better understand the overall effects reported in Table 9 we now alter only a subset of institutions at a time, and leave the rest at its existing level in the region in question.

In this exercise we estimate the impact of a negative output gap on unemployment, if we set the minimum wage and union variables at the levels present in the United States and leave the rest of the institutions variables at the levels observed in each region in 2007. We then repeat this exercise separately for employment regulations, taxes and safety net variables (UI benefits, and Active Labor Policies Expenditures), and product market regulations. The markers in the Figure report the difference in (log) unemployment resulting from the output shock should a subset of institutions take U.S. values instead of remaining at the levels present in each region. More specifically, a negative (positive) marker indicates whether the impact of an output downturn on unemployment is smaller (larger) when a subset of institutions is set at the U.S. levels, rather than at the local levels. The results indicate that the main reason why U.S. institutions cope better with output shocks is because of their more flexible employment regulations. Furthermore, these effects are stronger for women.

[38] A similar exercise for inequality, interacting our technological change proxy with institutions leads to predictions with the expected sign, but with magnitudes that are too large to be credible. This problem arises because our R&D variable is almost perfectly predicted by the other explanatory variables in the model. This leads to unreliable estimates under a highly interactive model such as this. In contrast, the demand fluctuations, proxied by the output gap, exhibit a lot of exogenous variation that remains unaccounted by the remaining variables in the model. In a related exercise, Hope and Martelli (2017) use aggregate data to show that institutions limit the inequality-enhancing impact of the employment share of "knowledge sectors", a variable which they interpret as a proxy of technological change.

4.4 Robustness Checks

Several robustness checks have been performed. Most notably, we re-estimated the unemployment equation (1) using unemployment averaged over 5-year periods. This was done to explore whether our results prevail once we eliminate the effects of short-run fluctuations. In another set of exercises we re-estimated equation (1) using the unemployment rate as a dependent variable, rather than using its logarithmic form. In both cases our conclusions are very similar to the ones here reported. In what concerns the inequality equation (2) we estimated the model using the Gini index. The results are again qualitatively similar to those reported for the 90-10 ratio in Table 4. These results are available upon request from the author.

5 Final Remarks

Our results show that certain labor market institutions create a trade-off between unemployment and wage inequality. In particular, the generosity of unemployment insurance, the strength of unions, labor taxes, and product market regulations all contribute to this trade-off.

In spite of this, we find that such trade-off is not an unavoidable equilibrium. More precisely, some institutions, like bargaining centralization, active labor policies, and firing restrictions, do not contribute to this trade-off. More importantly, there are policy combinations that can be used to combat both high unemployment and inequality. This is the case of a system that combines redistribution via taxation with a strong safety net in the form of generous UI benefits and vigorous active labor policies, that help the unemployed regain work.

Finally, our findings indicate that the institutional regime found in Southern European economies magnifies the adverse impact of output downturns on unemployment. In contrast, the institutions in Anglo-Saxon economies are the best suited to mitigate the negative impact of such downturns, especially because of their flexible employment regulations. This implies that the large rise in unemployment in Southern European countries in the aftermath of the Great Recession, was not only due to their larger drop in output (relative to other advanced economies), but also to the fact that their labor institutions amplified the negative employment effects of the crisis.

By relying on micro-level data pooled across countries and periods, our

findings also highlight the heterogeneity in the employment and wage responses across population groups to changes in policies and shocks. The methodological approach followed, illustrates how research on the effect of policies and regulations can benefit from examining the institutional framework integrally, while at the same time incorporating more detailed information at the individual level.

In future research it would be interesting to study which institutional set-up contributes to a faster employment recovery after a negative output shock and what consequences this has on wage inequality.

References

Abowd, J.M. and Lemieux, T., 1993. The effects of product market competition on collective bargaining agreements: the case of foreign competition in Canada, *Quarterly Journal of Economics*, 108 (November), 983–1014.

Adams, Z., Bishop, L., and Deakin, S., 2016. CBR Labour Regulation Index (Dataset of 117 Countries), Cambridge: Centre for Business Research.

Adema, W., Fron, P., and Ladaique, M., 2011. Is the European Welfare State Really More Expensive?: Indicators on Social Spending, 1980-2012; and a Manual to the OECD Social Expenditure Database (SOCX), *OECD Social, Employment and Migration Working Papers*, 124, 1–131, OECD Publishing, http://dx.doi.org/10.1787/5kg2d2d4pbf0-en.

Armour, P., Burkhauser, R.V., and Larrimore, J., 2016. Using the Pareto distribution to improve estimates of topcoded earnings, *Economic Inquiry*, 54 (2), 1263–1273.

Arpaia, A. and Mourre, G., 2005. Labour Market Institutions and Labour Market Performance: A Survey of the Literature, *European Comission. Economic Papers*, 285.

Ashenfelter, O. and Brown, J.N., 1986. Testing the Efficiency of Employment Contracts, *Journal of Political Economy*, 94 (3), S40–S87.

Autor, D.H. and Dorn, D., 2013. The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market, *American Economic Review*, 103 (5), 1553–1597.

Autor, D.H., Katz, L.F., and Kearney, M.S., 2008. Trends in U.S. Wage Inequality: Revising the Revisionists, *Review of Economics and Statistics*, 90 (2), 300–323.

Baccaro, L. and Rei, D., 2007. Institutional Determinants of Unemployment in OECD Countries: Does the Deregulatory View Hold Water?, *International Organization*, 61 (03), 527–569.

Bassanini, A. and Duval, R., 2006. Employment Patterns in OECD Countries: Reassessing the Role of Policies and Institutions, *OECD Social, Employment and Migration Working Papers*, No. 35.

Benabou, R., 2000. Unequal Societies: Income Dstribution and Social Contract, *American Economic Review*, 90 (1), 96–129.

Benabou, R., 2002. Tax and Education Policy in a Heterogeneous Agent Economy: What Levels of Redistribution Maximize Growth and Efficiency?, *Econometrica*, 70 (2), 481–517.

Bertola, G., 1990. Job security, employment and wages, *European Economic Review*, 34 (4), 851–879.

Bertola, G., Blau, F.D., and Kahn, L.M., 2007. Labor market institutions and demographic employment patterns, *Journal of Population Economics*, 20, 833–867.

Bertola, G., Boeri, T., and Nicoletti, G., eds., 2001. *Welfare and Employment in a United Europe. A study for the Fondazione Rodolfo Debenedetti*, MIT Press.

Bičáková, A., 2014. The Trade-Off between Unemployment and Wage Inequality Revisited, *Oxford Economic Papers*, 66 (4), 891–915.

Blanchard, O. and Wolfers, J., 2000. The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence, *Economic Journal*, 110 (462), C1–C33.

Boeri, T., Cahuc, P., and Zylberberg, A., 2015. The costs of flexibility-enhancing structural reforms: A literature review, *OECD Economics Department Working Papers*, 82.

Bruno, M. and Sachs, J.D., 1985. *Economics of Worldwide Stagflation*, Harvard University Press.

Calmfors, L., 1994. Active Labour Market Policy and Unemployment - A Framework for the Analysis of Crucial Design Features, *OECD Economic Studies*, 22, 7–47.

Calmfors, L. and Driffill, J., 1988. Bargaining Structure, Corporatism and Macroeconomic Performance, *Economic Policy*, 3 (6), 13–61.

Card, D., Kramarz, F., and Lemieux, T., 1999. Changes in the relative structure of wages and employment: a comparison of the United States, Canada, and France, *Canadian Journal of Economics*, 32 (4), 843–877.

Conway, P. and Nicoletti, G., 2006. Product Market Regulation in the Non-Manufacturing Sectors of OECD Countries: Measurement and Highlights, *OECD Economics Department Working Papers*, 530, OECD Publishing, http://dx.doi.org/10.1787/362886816127.

Elmeskov, J., Martin, J.P., and Scarpetta, S., 1998. Key lessons for labour market reforms: evidence from OECD countries' experiences, *Swedish Economic Policy Review*, 5, 205–252.

Essama-Nssah, B. and Lambert, P.J., 2012. Influence Functions for Policy Impact Analysis, *Research on Economic Inequality*, 20, 135–159.

European Commission, 2014. Cyclical Adjustment of Budget Balances, Tech. rep., European Commission.

European Commission, 2016. Cyclical Adjustment of Budget Balances, Tech. rep., European Commission.

Eurostat, 2003. European Community Household Panel Longitudinal Users' Database, Waves 1-8 [dataset], European Comission.

Eurostat, 2008. NACE Rev.2 Statistical classification of economic activities in the European Community, Methodologies and Working Papers KS-RA-07-015-EN-N.

Eurostat, 2015a. EU Labour Force Survey, Version November 2015 [dataset], European Comission.

Eurostat, 2015b. European Union Statistics on Income and Living Conditions, (various versions) [dataset], European Comission.

Farber, H.S. and Valletta, R.G., 2015. Do Extended Unemployment Benefits Lengthen Unemployment Spells? Evidence from Recent Cycles in the U.S. Labor Market, *Journal of Human Resources*, 50 (4), 873–909.

Feenberg, D. and Coutts, E., 1993. An Introduction to the TAXSIM Model, *Journal of Policy Analysis and Management*, 12 (1), 189–194.

Feldstein, M.S., 1969. The Effects of Taxation on Risk Taking, *Journal of Political Economy*, 77 (5), 755–764.

Fields, G.S., 2003. Accounting for Income Inequality and Its Change: a New Method, With Application To the Distribution of Earnings in the United States, *Research in Labor Economics*, 22 (03), 1–38.

Firpo, S., Fortin, N.M., and Lemieux, T., 2009. Unconditional Quantile Regressions, *Econometrica*, 77 (3), 953–973.

Flood, S., King, M., Ruggles, S., and Warren, J.R., 2015. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0. [dataset], http://doi.org/10.18128/D030.V4.0, Minneapolis: University of Minnesota.

Fortin, N., Lemieux, T., and Firpo, S., 2011. Decomposition Methods in Economics, *in:* O. Ashenfelter and D. Card, eds., *Handbook of Labor Economics*, Elsevier, vol. 4, chap. 1, 1–102.

Frick, J.R. and Krell, K., 2010. Measuring Income in Household Panel Surveys for Germany: A Comparison of EU-SILC and SOEP, *SOEPpapers on Multidisciplinary Panel Data Research*, 265.

Gal, P. and Theising, A., 2015. The macroeconomic impact of structural policies on labour market outcomes in OECD countries. A reassessment, *OECD Economics Department Working Papers*, No. 1271.

Guadalupe, M., 2007. Product Market Competition, Returns to Skill, and Wage Inequality, *Journal of Labor Economics*, 25 (3), 439–474.

Guvenen, F., Kuruscu, B., and Ozkan, S., 2013. Taxation of human capital and wage inequality: A cross-country analysis, *Review of Economic Studies*, 81 (2), 818–850.

Hampel, F.R., 1968. *Contribution to the Theory of Robust Estimation*, Ph.d., University of California, Berkeley.

Heathcote, J., Storesletten, K., and Violante, G.L., 2017. Optimal Tax Progressivity: An Analytical Framework, *Quarterly Journal of Economics*, 132 (4), 1693—-1754.

Hirsch, B.T. and Macpherson, D.A., 2003. Union membership and coverage database from the Current Population Survey (CPS): Note, *Industrial and Labor Relations Review*, 56 (2), 349–354.

Hirsch, B.T., Macpherson, D.A., and Vroman, W.G., 2001. Estimates of Union Density by State, *Monthly Labor Review*, 124 (7), 51–55.

Hope, D. and Martelli, A., 2017. The transition to the knowledge economy, labour market institutions, and income inequality in advanced democracies, *LSE International Inequalities Institute Working Paper*, 18.

Howell, D.R., Baker, D., Glyn, A., and Schmitt, J., 2007. Are Protective Labor Market Institutions at the Root of Unemployment? A Critical Review of the Evidence, *Capitalism and Society*, 2 (1), 1–71.

Insee, 2014. Enquête Emploi, 1982-2014. [dataset], L'Institut national de la statistique et des études économiques.

Jaumotte, F. and Osorio Buitron, C., 2015. Inequality and Labor Market Institutions, *IMF Staff Discussion Note*, SDN/15/14, 1–31.

Jean, S. and Nicoletti, G., 2015. Product market regulation and wage premia in Europe and North America: An empirical investigation, *International Economics*, 144 (December), 1–28.

Kahn, L.M., 2000. Wage inequality, collective bargaining, and relative employment from 1985 to 1994: Evidence from fifteen OECD countries, *Review of Economics and Statistics*, 82 (4), 564–579.

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

Koeniger, W., Leonardi, M., and Nunziata, L., 2007. Labor Market Institutions and Wage Inequality, *Industrial and Labor Relations Review*, 60 (3), 340–357.

Koske, I., Wanner, I., Bitetti, R., and Barbiero, O., 2015. The 2013 update of the OECD's database on product market regulation, *OECD Economics Department Working Papers*, 1200, OECD Publishing, http://dx.doi.org/10.1787/5js3f5d3n2vl-en.

Krugman, P., 1994. Past and prospective causes of high unemployment, *Economic Review*, 4th Qr, 23–43.

Lehmann, E., Lucifora, C., Moriconi, S., and Van der Linden, B., 2016. Beyond the labour income tax wedge: the unemployment-reducing effect of tax progressivity, *International Tax and Public Finance*, 23 (3), 454–489.

Mortensen, D.T., 1977. Unemployment Insurance and Job Search Decisions, *Industrial and Labor Relations Review*, 30 (4), 505–517.

Mortensen, D.T. and Pissarides, C.A., 1999. Unemployment responses to 'skill-biased' technology shocks: The role of labour market policy, *Economic Journal*, 109 (1996), 242–265.

Musgrave, R.A. and Thin, T., 1948. Income Tax Progression, 1929-48, *Journal of Political Economy*, 56 (6), 498–514.

Neumark, D., Salas, J., and Wascher, W., 2014. More on recent evidence on the effects of minimum wages in the United States, *IZA Journal of Labor Policy*, 3 (24), 1–26.

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

Nickell, S.J. and Andrews, M., 1983. Unions, real wages and employment in Britain, 1951-79, *Oxford Economic Papers*, 35 (Supplement), 183–206.

Nickell, W., 2006. *The CEP-OECD Institutions Data Set (1960-2004)*, CEP-LSE, Centre for Economic Performance, LSE.

Nicoletti, G. and Scarpetta, S., 2005. Product Market Reforms and Employment in OECD Countries, *OECD Economics Department Working Papers*, 472, OECD Publishing, http://dx.doi.org/10.1787/463767160680.

OECD, 2016. *OECD Economic Outlook, Volume 2016*, OECD Publishing.

ONS, 2015. Labour Force Survey, 1981-2014. [data collection], Retrieved from https://discover.ukdataservice.ac.uk/series/?sn=2000026, Office for National Statistics. Social Survey Division and Northern Ireland Statistics and Research Agency. Central Survey Unit.

Pissarides, C.A., 1998. The impact of employment tax cuts on unemployment and wages. The role of unemployment benefits and tax structure, *European Economic Review*, 42 (1), 155–183.

Piton, C. and Rycx, F., 2018. The Unemployment Impact of Product and Labour Market Regulation: Evidence from European Countries, *IZA Discussion Paper Series*, No. 11582.

Postel-Vinay, F. and Turon, H., 2014. The impact of firing restrictions on labour market equilibrium in the presence of on-the-job search, *Economic Journal*, 124 (575), 31–61.

Puhani, P.A., 2008. Transatlantic differences in labour markets: Changes in wage and non-employment structures in the 1980s and the 1990s, *German Economic Review*, 9 (3), 312–338.

Raposo, P.S. and van Ours, J.C., 2010. How working time reduction affects jobs and wages, *Economics Letters*, 106 (1), 61–63.

Salverda, W. and Checchi, D., 2015. Labor Market Institutions and the Dispersion of Wage Earnings, *in:* A.B. Atkinson and F. Bourguignon, eds., *Handbook of Income Distribution*, Elsevier, vol. 2, chap. 18, 1535–1727.

Scarpetta, S., 1996. Assessing the Role of Labour Market Policies and Institutional Settings on Unemployment: A Cross Country Study, *OECD Economic Studies*, 26, 43 – 98.

Schmid, G., Reissert, B., and Bruche, G., 1992. *Unemployment Insurance and Active Labor Market Policy: An International Comparison of Financing Systems*, Detroit: Wayne State University Press.

Socio-Economic Panel (SOEP), 2015. SOEP data for years 1984-2013, version 30, SOEP, doi:10.5684/soep.v30.

Staudte, R.G. and Sheather, S.J., 1990. *Robust Estimation and Testing*, John Wiley & Sons.

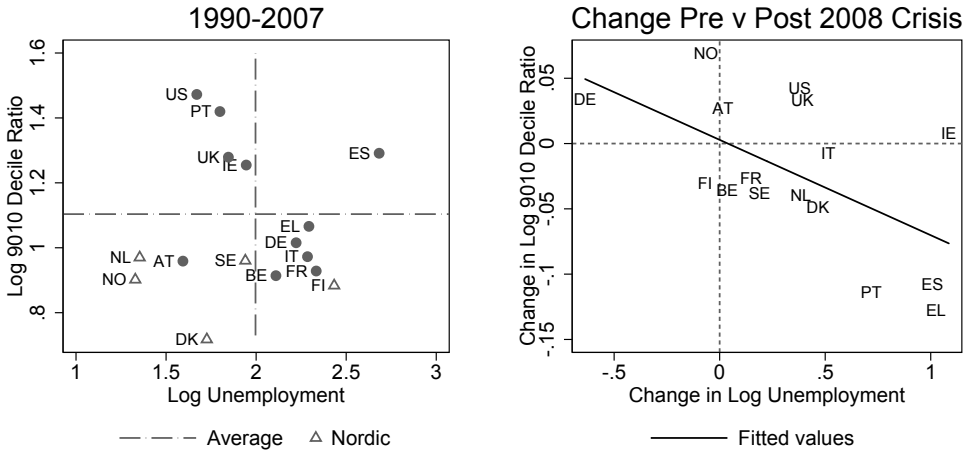
Tatsiramos, K. and van Ours, J.C., 2014. Labor market effects of unemployment insurance design, *Journal of Economic Surveys*, 28 (2), 284–311.

Visser, J., 2015. Data Base on Insititutional Charachteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts, 1960-2014 (ICTWSS) Version 5.0, Tech. rep., University of Amsterdam. Amsterdam Institute for Advanced Labour Studies.

Wagner, G.G., Frick, J.R., and Schupp, J., 2007. The German Socio-Economic Panel Study (SOEP) - Scope, Evolution and Enhancements, *Schmollers Jahrbuch*, 127 (1), 139–169.

Tables and Figures

Figure 1: Inequality-Unemployment Trade-off



Source: Author's calculation. The left figure averages information across all years with available information in the 1990-2007 period. The figure on the right plots the change in average values between 2004-07 and the 2012-14 period. See Data Appendix for details on the sample construction procedures. In particular, see Table A2 for details on years with available information and for a list of country acronyms.

Table 1: Average Values of Institutions/Policy Variables. 1992-2007.

	Saxon		Continental	Nordic		Southern
		U.S.	Europe		w/o NL	Europe
Regulations on:[a]						
Firings	0.32	0.15	0.52	0.56	0.54	0.68
Temporary Employment	0.16	0.08	0.65	0.44	0.44	0.59
Part-Time Work	0.68	0.67	0.81	0.78	0.73	0.77
Work Time	0.21	0.17	0.67	0.67	0.67	0.55
Minimum Wage[b]	7.39	7.11	9.45	9.42		4.48
Min to Median Wage (%)	45.06	37.73	54.78	50.04		49.09
Unemployment Insurance						
Replacement Rate[c]	15.71	15.22	29.46	39.38	41.67	11.00
Duration[d]	52.28	0.01	63.60	53.93	55.51	17.29
Unions						
Coverage[e]	31.05	15.38	89.95	83.32	83.73	81.35
Density[f]	28.87	13.81	30.88	61.03	70.67	26.05
Bargaining Centralization[g]	2.39	1.00	3.88	4.06	4.08	3.57
Labor Taxes						
Tax Wedge (%)	32.20	31.32	51.54	43.18	44.03	41.24
Tax Progressivity[h]	0.16	0.12	0.15	0.22	0.22	0.14
Active Labor Mkt Exp[i]	6.32	3.01	11.57	21.16	18.95	5.32
Product Mkt Regulation[j]	2.65	2.11	3.29	2.90	2.97	4.12

Saxon countries are the U.S., the UK, and Ireland. Continental Europe countries include Austria, Belgium, France, and Germany. Nordic countries are Denmark, Finland, Netherlands, (NL), Norway, and Sweden. Southern European countries are Greece, Italy, Portugal and Spain.
a Index 0-1
b US PPP 2014=100. Averages for countries/years with non-zero wage floors.
c Gross RR during 1st year of unemployment (%) adjusted by recipiency rate.
d Gross RR in years 2-5 as % of RR during 1st year.
e % of employees covered by collective bargaining.
f % of employees which are union members.
g Index 0-5.
h 1-elasticity of post-tax to pre-tax labor income.
i ALMP expenditure per unemployed as % of GDP per worker in the labor force.
j Index 0-6.

Table 2: Dep. Var.: Log Unemployment Rate. Females. OLS Regressions

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	-22.9**	-26.1***	-37.5***	-40.7***	-35.9***
	(9.22)	(7.52)	(6.57)	(8.16)	(9.90)
Temp. Emp. Restrictions	4.10	3.02	6.82	11.6**	3.45
	(5.09)	(4.24)	(5.65)	(5.15)	(7.09)
Restrictions Part-Time Work	-6.68	-2.46	-5.04	-6.99	4.44
	(5.29)	(4.54)	(4.46)	(4.81)	(4.48)
Work Time Restrictions	18.2*	1.06	-0.39	-16.1***	-9.25
	(9.05)	(9.70)	(9.76)	(4.91)	(11.95)
log(Min Wage + 0.1)	-32.4	-27.6	-6.54	0.26	-86.7
	(45.37)	(42.38)	(47.25)	(48.64)	(52.29)
UI Replacement Rate	0.51	0.68**	0.52	0.10	0.75
	(0.38)	(0.28)	(0.52)	(0.43)	(0.51)
UI Duration	0.081	-0.12	-0.066	0.028	0.33
	(0.11)	(0.14)	(0.18)	(0.16)	(0.23)
Union Coverage	-0.046	0.43	0.033	1.13**	1.85***
	(0.30)	(0.37)	(0.40)	(0.55)	(0.50)
Union Density	-0.14	-0.77	1.28	-0.47	2.16***
	(0.88)	(0.68)	(0.77)	(0.82)	(0.66)
Bargaining Centralization	-4.86	-8.92*	-12.0**	-13.9***	-16.4***
	(5.93)	(4.44)	(4.96)	(4.61)	(5.09)
Labor Tax Wedge	1.10	2.89**	1.84*	0.57	-1.34
	(0.94)	(1.15)	(0.93)	(1.00)	(1.24)
Tax Progressivity	162.0	213.8***	244.1***	196.0*	236.0**
	(102.55)	(65.24)	(79.07)	(115.77)	(92.59)
Active Labor Mkt Expnd	-1.08*	-0.79*	-1.19**	-0.46	-1.91***
	(0.61)	(0.45)	(0.51)	(0.54)	(0.57)
Product Mkt Regulations	-3.84	17.3	16.4**	21.0*	-7.27
	(11.72)	(10.41)	(7.76)	(12.04)	(11.88)
R&D Expenditure	16.5*	0.73	0.74	27.1*	11.8
	(9.69)	(10.93)	(9.11)	(15.53)	(14.41)
Import Penetration LMIC	-2.07	-2.22	-0.67	-2.08	-2.76
	(3.12)	(1.89)	(2.33)	(2.55)	(2.26)
Output Gap	-3.69***	-3.79***	-4.26***	-4.37***	-4.47***
	(0.66)	(0.65)	(0.71)	(0.96)	(1.01)
No. Obs.	2133	2133	2133	2133	2088
R-Squared (w/o Fixed Effects)	0.39	0.51	0.57	0.47	0.38

All coefficients are in multiplied by 100. * p<.1, ** p<.05, *** p<.01. U.S. unemployment rates are estimated at the State level. LMIC stands for Low and Middle Income Countries. All models control for the introduction of minimum wages, the population share of the group in question, trade openness, as well as period and country (State for U.S.) fixed effects. All variables except the population share and the output gap are lagged by one year. We exclude unemployment rates equal to zero and those estimated on less than 100 obs. Employment and Product Market Regulations, as well as Bargaining Centralization variables are standardized. For variable definitions see Table 1. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for U.S.).

Table 3: Dep. Var.: Log Unemployment Rate. Males. OLS Regressions

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	-21.6**	-21.7**	-22.9***	-35.9***	-30.1***
	(9.17)	(8.41)	(7.84)	(8.87)	(10.33)
Temp. Emp. Restrictions	0.89	2.48	10.9**	8.31	1.68
	(4.85)	(5.61)	(4.80)	(5.92)	(7.90)
Restrictions Part-Time Work	-1.83	0.16	-3.56	-0.36	0.99
	(4.98)	(4.95)	(5.32)	(5.69)	(5.18)
Work Time Restrictions	27.1***	4.67	-9.45	-2.74	-12.8
	(6.96)	(9.21)	(16.50)	(12.25)	(12.89)
log(Min Wage + 0.1)	-3.14	28.8	-11.8	61.2	-45.4
	(39.44)	(35.46)	(53.26)	(46.71)	(63.07)
UI Replacement Rate	0.52	1.41***	0.80	1.00**	-0.050
	(0.33)	(0.36)	(0.62)	(0.47)	(0.72)
UI Duration	-0.059	-0.26	-0.22	0.21	0.30
	(0.14)	(0.20)	(0.23)	(0.14)	(0.20)
Union Coverage	-0.45	-0.065	-0.10	0.42	1.47**
	(0.37)	(0.44)	(0.42)	(0.54)	(0.70)
Union Density	0.78	0.78	2.21**	0.31	2.06**
	(0.82)	(0.87)	(0.82)	(0.74)	(0.78)
Bargaining Centralization	-4.96	-8.38*	-12.4**	-10.9**	-16.9***
	(4.71)	(4.52)	(5.49)	(4.07)	(5.86)
Labor Tax Wedge	1.25	1.74	0.70	0.053	-1.48
	(1.18)	(1.15)	(1.34)	(0.91)	(1.19)
Tax Progressivity	178.4*	262.2***	304.7**	57.9	296.1***
	(93.30)	(91.92)	(128.84)	(68.11)	(107.51)
Active Labor Mkt Expnd	-0.73	-0.20	-0.27	-0.0061	-0.22
	(0.58)	(0.58)	(0.50)	(0.60)	(0.60)
Product Mkt Regulations	-7.73	10.5	6.47	15.4	-24.2*
	(12.34)	(11.42)	(8.69)	(9.90)	(12.65)
R&D Expenditure	27.1**	4.71	5.40	11.5	9.49
	(11.28)	(14.15)	(12.77)	(13.90)	(15.82)
Import Penetration LMIC	-3.30	-0.33	0.25	0.53	-2.33
	(2.74)	(2.96)	(3.45)	(2.47)	(2.63)
Output Gap	-4.71***	-6.25***	-6.22***	-5.28***	-5.73***
	(0.86)	(1.06)	(1.17)	(0.92)	(1.17)
No. Obs.	2133	2133	2133	2133	2113
R-Squared (w/o Fixed Effects)	0.45	0.55	0.52	0.42	0.35

All coefficients are in multiplied by 100. * p<.1, ** p<.05, *** p<.01. U.S. unemployment rates are estimated at the State level. LMIC stands for Low and Middle Income Countries. All models control for the introduction of minimum wages, the population share of the group in question, trade openness, as well as period and country (State for U.S.) fixed effects. All variables except the population share and the output gap are lagged by one year. We exclude unemployment rates equal to zero and those estimated on less than 100 obs. Employment and Product Market Regulations, as well as Bargaining Centralization variables are standardized. For variable definitions see Table 1. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for U.S.).

Table 4: Recentered Influence Function Regression for (log) 90-10 Ratio of Wages. Average Marginal Effects by Population Group. Females.

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	-7.39	-8.26***	-3.34	15.57	19.75
	(6.48)	(3.01)	(3.77)	(9.68)	(17.99)
Temp. Emp. Restrictions	-6.74	-0.45	-3.25	3.37	21.00***
	(7.74)	(2.57)	(2.44)	(2.87)	(6.92)
Restrictions Part-Time Work	9.66	1.70	-0.27	-5.34*	-26.45*
	(9.58)	(3.72)	(3.82)	(3.12)	(14.57)
Work Time Restrictions	-10.83**	-0.67	1.36	11.34***	46.64***
	(5.13)	(3.49)	(2.75)	(3.26)	(16.75)
Min to Median Wage	-0.35	-0.65*	-0.43	-0.59	-0.16
	(0.79)	(0.38)	(0.37)	(0.58)	(1.26)
UI Replacement Rate	0.71	-0.18	-0.17	0.51	1.18
	(0.64)	(0.13)	(0.17)	(0.36)	(1.09)
UI Duration	-0.38**	-0.25**	-0.13*	-0.23***	0.01
	(0.19)	(0.10)	(0.07)	(0.09)	(0.12)
Union Coverage	0.08	-0.05	-0.21*	-0.40*	-0.77
	(0.14)	(0.08)	(0.12)	(0.23)	(0.53)
Union Density	-0.78	-0.70*	-0.74**	0.37	0.20
	(0.60)	(0.36)	(0.37)	(0.58)	(1.02)
Bargaining Centralization	11.89**	1.25	1.90	-6.41*	-13.35
	(5.82)	(1.64)	(1.81)	(3.39)	(11.15)
Labor Tax Wedge	0.35	0.56	0.22	-1.74***	-6.93***
	(0.70)	(0.56)	(0.56)	(0.58)	(2.67)
Tax Progressivity	172.99	0.20	8.07	-180.77	-364.18
	(150.43)	(58.99)	(45.45)	(113.83)	(307.16)
Active Labor Mkt Expnd	1.00	0.20	-0.03	-0.93**	-2.79***
	(0.62)	(0.29)	(0.32)	(0.40)	(1.03)
Product Mkt Regulations	-13.87*	-2.79	0.21	-8.90**	-7.51
	(7.10)	(3.70)	(3.32)	(4.33)	(6.43)
R&D Expenditure	8.85	8.22	10.04**	1.31	1.33
	(7.99)	(5.06)	(3.96)	(4.96)	(15.56)
Import Penetration LMIC	0.28	-0.60	0.31	-0.23	8.17*
	(2.09)	(1.16)	(1.03)	(0.94)	(4.55)
Output Gap	-1.50**	-0.61**	-0.48**	0.49	0.94
	(0.62)	(0.28)	(0.23)	(0.45)	(1.00)
No. Obs.	3,681,533				
R-Squared	0.14				

Dependent variable is the RIF of the log 90-10 decile ratio of wages, expressed in % points. * p<.1, ** p<.05, *** p<.01. LMIC stands for Low and Middle Income Countries. Regression includes dummies for industry and occupation, as well as for changes in industry and occupational classifications. Also, it includes a dummy for post-2002 data from Belgium, Denmark, Finland, and The Netherlands, as they go from reporting monthly earnings in ECHP to yearly earnings in SILC. Additional controls include a dummy for the introduction of a minimum wage, the population share of each individual's group (age/gender/schooling), trade openness, as well as period and country (State for U.S.) fixed effects. Aggregate variables except the population share and the output gap are lagged by one year. Employment and Product Market Regulations, as well as Bargaining Centralization variables are standardized. For variable definitions see Table 1. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for U.S.).

Table 4 Continued: Recentered Influence Function Regression for (log) 90-10 Ratio of Wages. Average Marginal Effects by Population Group. Males.

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	0.88	-5.68**	-6.58**	6.01	7.63
	(6.02)	(2.28)	(2.94)	(7.69)	(7.75)
Temp. Emp. Restrictions	-9.28	-0.01	-1.02	5.47***	6.37***
	(6.39)	(2.43)	(2.03)	(2.04)	(2.43)
Restrictions Part-Time Work	6.30	2.79	4.82**	-2.35	-3.08
	(10.53)	(3.49)	(2.44)	(2.83)	(6.17)
Work Time Restrictions	-16.30**	0.95	5.23**	3.88	15.56*
	(6.51)	(2.56)	(2.64)	(4.45)	(9.27)
Min to Median Wage	0.37	-0.29**	-0.03	-1.36**	-1.42
	(0.47)	(0.14)	(0.25)	(0.62)	(0.89)
UI Replacement Rate	0.45	-0.21	-0.23	0.34	0.43
	(0.53)	(0.14)	(0.17)	(0.51)	(0.96)
UI Duration	-0.66***	-0.25***	-0.22***	0.04	0.004
	(0.17)	(0.08)	(0.07)	(0.08)	(0.10)
Union Coverage	-0.16	-0.10	-0.04	-0.48	-0.45
	(0.27)	(0.11)	(0.13)	(0.30)	(0.39)
Union Density	-0.59	-0.59*	-0.55*	-0.11	-0.92*
	(0.54)	(0.34)	(0.34)	(0.46)	(0.53)
Bargaining Centralization	10.09**	1.12	-0.07	-6.69**	-3.90
	(4.91)	(1.29)	(1.38)	(3.37)	(6.92)
Labor Tax Wedge	0.96	0.32	0.01	-1.18**	-2.48**
	(0.79)	(0.47)	(0.41)	(0.48)	(1.01)
Tax Progressivity	94.85	51.82	-15.97	-115.92	-61.88
	(109.35)	(52.97)	(37.60)	(104.38)	(176.31)
Active Labor Mkt Expnd	1.69***	-0.03	-0.30	-0.08	-1.27***
	(0.60)	(0.19)	(0.21)	(0.29)	(0.47)
Product Mkt Regulations	-14.58**	-2.70	-2.28	3.51	6.65
	(6.03)	(3.36)	(2.74)	(4.09)	(6.10)
R&D Expenditure	10.75	8.73**	3.01	5.86	2.38
	(8.79)	(4.03)	(3.43)	(5.77)	(10.93)
Import Penetration LMIC	-1.32	-0.24	-0.46	0.82	3.96
	(1.63)	(0.84)	(0.60)	(0.76)	(3.08)
Output Gap	-1.85***	-0.51**	-0.03	0.73**	0.97
	(0.71)	(0.23)	(0.16)	(0.37)	(0.75)

Table 5: Recentered Influence Function Regression for (log) 90-50 Ratio of Wages. Average Marginal Effects by Population Group. Females.

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	-7.85***	-4.15**	-0.73	14.90	24.02
	(2.32)	(1.68)	(3.08)	(9.34)	(17.31)
Temp. Emp. Restrictions	0.57	0.71	-1.01	1.30	19.77***
	(2.19)	(1.31)	(1.73)	(3.06)	(6.37)
Restrictions Part-Time Work	2.12	0.66	1.38	-3.80	-24.77*
	(3.73)	(1.53)	(2.08)	(2.92)	(13.54)
Work Time Restrictions	-9.54***	-4.46	-4.52	6.34*	38.38**
	(1.78)	(2.94)	(2.79)	(3.78)	(17.37)
Min to Median Wage	-0.09	-0.10	0.09	-0.45	-0.001
	(0.26)	(0.24)	(0.21)	(0.43)	(1.09)
UI Replacement Rate	-0.27	-0.10	-0.08	0.45**	1.29
	(0.21)	(0.09)	(0.09)	(0.20)	(0.92)
UI Duration	-0.002	-0.10**	-0.03	-0.18**	0.01
	(0.08)	(0.05)	(0.04)	(0.07)	(0.12)
Union Coverage	0.15*	0.01	-0.13*	-0.51***	-0.94**
	(0.08)	(0.04)	(0.07)	(0.17)	(0.47)
Union Density	-0.58**	-0.39**	-0.08	0.48	0.78
	(0.23)	(0.17)	(0.15)	(0.36)	(0.84)
Bargaining Centralization	4.93**	1.45	0.90	-2.27	-10.81
	(1.93)	(1.15)	(1.21)	(2.66)	(10.08)
Labor Tax Wedge	0.21	0.02	-0.13	-0.82**	-5.98**
	(0.52)	(0.33)	(0.39)	(0.36)	(2.43)
Tax Progressivity	102.72***	67.64**	2.75	-95.66	-380.67
	(38.42)	(32.31)	(25.24)	(94.84)	(279.69)
Active Labor Mkt Expnd	-0.02	0.06	0.13	-0.24	-2.05**
	(0.24)	(0.12)	(0.15)	(0.34)	(0.90)
Product Mkt Regulations	-0.20	3.33	4.42**	1.86	-1.24
	(2.48)	(2.58)	(2.11)	(5.07)	(5.32)
R&D Expenditure	3.77	3.22	3.13	-5.20	-5.18
	(2.59)	(2.39)	(1.94)	(3.96)	(13.32)
Import Penetration LMIC	-0.33	0.28	0.64	0.36	7.22*
	(0.68)	(0.64)	(0.70)	(0.59)	(4.14)
Output Gap	-0.61***	-0.36**	-0.34***	0.46	0.99
	(0.22)	(0.15)	(0.13)	(0.45)	(0.95)
No. Obs.	3,681,533				
R-Squared	0.11				

Dependent variable is the RIF of the log 90-50 decile ratio of wages, expressed in % points. * p<.1, ** p<.05, *** p<.01. LMIC stands for Low and Middle Income Countries. Regression includes dummies for industry and occupation, as well as for changes in industry and occupational classifications. Also, it includes a dummy for post-2002 data from Belgium, Denmark, Finland, and The Netherlands, as they go from reporting monthly earnings in ECHP to yearly earnings in SILC. Additional controls include a dummy for the introduction of a minimum wage, the population share of each individual's group (age/gender/schooling), trade openness, as well as period and country (State for U.S.) fixed effects. Aggregate variables except the population share and the output gap are lagged by one year. Employment and Product Market Regulations, as well as Bargaining Centralization variables are standardized. For variable definitions see Table 1. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for U.S.).

Table 5 Continued: Recentered Influence Function Regression for (log) 90-50 Ratio of Wages. Average Marginal Effects by Population Group. Males.

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	-5.31**	-1.77	0.27	10.63	12.84*
	(2.38)	(1.86)	(2.15)	(7.55)	(7.40)
Temp. Emp. Restrictions	-0.25	1.50	-0.48	4.35***	6.66***
	(2.22)	(1.78)	(1.11)	(1.53)	(2.01)
Restrictions Part-Time Work	2.10	1.09	1.86	-3.55	-3.36
	(4.63)	(3.25)	(1.96)	(2.74)	(6.10)
Work Time Restrictions	-10.32***	-1.56	1.66	3.84	11.81
	(2.08)	(1.73)	(2.21)	(4.12)	(10.24)
Min to Median Wage	-0.11	-0.32	0.14	-1.06**	-1.20
	(0.20)	(0.22)	(0.21)	(0.53)	(0.77)
UI Replacement Rate	-0.06	-0.28*	-0.27***	0.33	0.52
	(0.20)	(0.16)	(0.09)	(0.35)	(0.82)
UI Duration	-0.05	-0.11*	-0.05	-0.01	-0.004
	(0.09)	(0.06)	(0.04)	(0.06)	(0.08)
Union Coverage	0.18	-0.13	-0.15	-0.61***	-0.59*
	(0.14)	(0.13)	(0.10)	(0.24)	(0.34)
Union Density	-0.70***	-0.32	-0.11	0.40	-0.29
	(0.24)	(0.23)	(0.16)	(0.27)	(0.34)
Bargaining Centralization	6.18***	0.99	-1.01	-5.52**	-2.38
	(2.32)	(1.99)	(0.98)	(2.58)	(6.34)
Labor Tax Wedge	0.08	0.53	0.27	-0.39	-1.61*
	(0.46)	(0.36)	(0.26)	(0.30)	(0.92)
Tax Progressivity	135.58***	78.59	-13.52	-142.97	-106.12
	(37.77)	(52.33)	(29.27)	(88.39)	(155.28)
Active Labor Mkt Expnd	-0.06	0.20	0.20*	0.32*	-0.70*
	(0.23)	(0.15)	(0.11)	(0.19)	(0.38)
Product Mkt Regulations	-3.03	2.67	2.02	7.84**	10.68**
	(2.68)	(3.18)	(2.27)	(3.32)	(5.02)
R&D Expenditure	4.20	2.35	-2.17	-4.33	-6.59
	(3.04)	(3.58)	(2.00)	(3.99)	(9.68)
Import Penetration LMIC	-0.56	-0.49	-0.26	0.23	2.57
	(0.78)	(0.81)	(0.52)	(0.58)	(2.86)
Output Gap	-0.82***	-0.30	-0.04	0.89**	1.20
	(0.30)	(0.24)	(0.12)	(0.39)	(0.74)

Table 6: Recentered Influence Function Regression for (log) 50-10 Ratio of Wages. Average Marginal Effects by Population Group. Females.

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	0.46	-4.11*	-2.60	0.67	-4.27*
	(5.53)	(2.45)	(2.39)	(2.05)	(2.43)
Temp. Emp. Restrictions	-7.31	-1.16	-2.24**	2.07	1.24
	(6.20)	(1.55)	(1.14)	(1.51)	(1.42)
Restrictions Part-Time Work	7.54	1.04	-1.64	-1.53	-1.67
	(7.11)	(2.70)	(2.46)	(1.93)	(2.28)
Work Time Restrictions	-1.29	3.79	5.87**	5.00**	8.26***
	(4.34)	(3.09)	(2.92)	(2.52)	(3.00)
Min to Median Wage	-0.26	-0.55***	-0.52**	-0.14	-0.16
	(0.57)	(0.20)	(0.25)	(0.31)	(0.23)
UI Replacement Rate	0.98	-0.09	-0.10	0.06	-0.11
	(0.61)	(0.11)	(0.14)	(0.19)	(0.22)
UI Duration	-0.38***	-0.15**	-0.10**	-0.05	-0.004
	(0.13)	(0.06)	(0.05)	(0.03)	(0.05)
Union Coverage	-0.06	-0.06	-0.08	0.12	0.17**
	(0.13)	(0.10)	(0.10)	(0.08)	(0.08)
Union Density	-0.20	-0.30	-0.65**	-0.11	-0.58*
	(0.42)	(0.26)	(0.29)	(0.29)	(0.30)
Bargaining Centralization	6.96*	-0.20	1.00	-4.14***	-2.54
	(4.00)	(0.80)	(1.21)	(1.37)	(1.59)
Labor Tax Wedge	0.14	0.54	0.35	-0.92**	-0.95**
	(0.40)	(0.34)	(0.30)	(0.40)	(0.40)
Tax Progressivity	70.26	-67.44*	5.32	-85.11**	16.48
	(121.34)	(40.14)	(33.09)	(40.86)	(43.98)
Active Labor Mkt Expnd	1.01**	0.15	-0.16	-0.69***	-0.74***
	(0.43)	(0.19)	(0.23)	(0.18)	(0.27)
Product Mkt Regulations	-13.66**	-6.12***	-4.21**	-10.76***	-6.27**
	(5.84)	(2.09)	(2.03)	(2.78)	(2.92)
R&D Expenditure	5.08	5.00	6.92**	6.51***	6.51*
	(6.82)	(3.57)	(2.72)	(2.47)	(3.44)
Import Penetration LMIC	0.60	-0.87	-0.33	-0.60	0.96
	(1.73)	(0.79)	(0.76)	(0.60)	(0.64)
Output Gap	-0.89*	-0.25	-0.14	0.03	-0.05
	(0.46)	(0.18)	(0.16)	(0.13)	(0.18)
No. Obs.	3,681,533				
R-Squared	0.06				

Dependent variable is the RIF of the log 50-10 decile ratio of wages, expressed in % points. * p<.1, ** p<.05, *** p<.01. LMIC stands for Low and Middle Income Countries. Regression includes dummies for industry and occupation, as well as for changes in industry and occupational classifications. Also, it includes a dummy for post-2002 data from Belgium, Denmark, Finland, and The Netherlands, as they go from reporting monthly earnings in ECHP to yearly earnings in SILC. Additional controls include a dummy for the introduction of a minimum wage, the population share of each individual's group (age/gender/schooling), trade openness, as well as period and country (State for U.S.) fixed effects. Aggregate variables except the population share and the output gap are lagged by one year. Employment and Product Market Regulations, as well as Bargaining Centralization variables are standardized. For variable definitions see Table 1. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for U.S.).

Table 6 Continued: Recentered Influence Function Regression for (log) 50-10 Ratio of Wages. Average Marginal Effects by Population Group. Males.

	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
Firing Restrictions	6.19	-3.91**	-6.85***	-4.63**	-5.21***
	(4.41)	(1.75)	(1.90)	(1.93)	(1.98)
Temp. Emp. Restrictions	-9.03**	-1.51	-0.54	1.12	-0.29
	(4.58)	(1.33)	(1.31)	(1.29)	(1.21)
Restrictions Part-Time Work	4.20	1.70	2.96*	1.21	0.28
	(6.52)	(1.92)	(1.59)	(1.74)	(1.98)
Work Time Restrictions	-5.98	2.51	3.57*	0.04	3.75
	(4.82)	(1.86)	(2.08)	(2.38)	(2.46)
Min to Median Wage	0.48	0.02	-0.17	-0.30**	-0.21
	(0.33)	(0.18)	(0.15)	(0.15)	(0.16)
UI Replacement Rate	0.51	0.07	0.04	0.01	-0.09
	(0.41)	(0.18)	(0.16)	(0.18)	(0.19)
UI Duration	-0.60***	-0.14***	-0.17***	0.05	0.01
	(0.10)	(0.04)	(0.04)	(0.04)	(0.04)
Union Coverage	-0.34**	0.03	0.11	0.14**	0.14**
	(0.15)	(0.10)	(0.07)	(0.07)	(0.06)
Union Density	0.10	-0.27	-0.44	-0.51**	-0.63**
	(0.35)	(0.27)	(0.27)	(0.25)	(0.27)
Bargaining Centralization	3.91	0.13	0.94	-1.17	-1.53
	(2.83)	(0.96)	(1.11)	(1.36)	(1.09)
Labor Tax Wedge	0.87*	-0.21	-0.27	-0.79**	-0.87***
	(0.47)	(0.33)	(0.33)	(0.33)	(0.34)
Tax Progressivity	-40.73	-26.77	-2.45	27.05	44.23
	(80.95)	(27.42)	(25.16)	(33.98)	(40.28)
Active Labor Mkt Expnd	1.75***	-0.23**	-0.51***	-0.40**	-0.57***
	(0.38)	(0.12)	(0.14)	(0.18)	(0.18)
Product Mkt Regulations	-11.55**	-5.37***	-4.30*	-4.33**	-4.03**
	(4.56)	(1.79)	(2.26)	(1.81)	(2.00)
R&D Expenditure	6.55	6.38***	5.18**	10.19***	8.97***
	(6.32)	(2.46)	(2.24)	(2.65)	(2.98)
Import Penetration LMIC	-0.77	0.25	-0.20	0.60	1.39**
	(1.25)	(0.48)	(0.56)	(0.49)	(0.62)
Output Gap	-1.04**	-0.21*	0.01	-0.17*	-0.23
	(0.49)	(0.12)	(0.13)	(0.10)	(0.19)

Table 7: Unemployment Regressions. Average Marginal Effects of Interactions between Institutions.

	Females					Males				
	Age lt 25	Less than College		College +		Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+		Age 25-44	Age 45+	Age 25-44	Age 45+
A. Marginal Effect of Tax Wedge										
Low	0.069	2.18	0.40	-0.40	-2.16	1.23	1.13	-0.33	-0.84	-2.54*
Union Density	(1.06)	(1.44)	(1.13)	(1.19)	(1.66)	(1.52)	(1.57)	(1.76)	(1.09)	(1.43)
High	1.63	3.34***	2.67***	1.19	-1.01	1.26	2.15*	1.36	0.65	-0.66
Union Density	(1.31)	(1.14)	(1.01)	(1.10)	(1.13)	(1.25)	(1.14)	(1.30)	(0.93)	(1.00)
Signif. of Difference			**						*	***
B. Marginal Effect of Tax Wedge										
Low	1.22	2.78**	0.24	-0.13	-3.15	2.48*	3.79**	0.25	2.92**	-2.79
Safety Net	(1.67)	(1.35)	(1.15)	(1.67)	(2.21)	(1.37)	(1.49)	(1.76)	(1.34)	(1.79)
High	0.53	2.57**	3.03***	-0.58	-1.57	0.0030	0.13	0.33	-1.75	-2.39
Safety Net	(0.82)	(1.13)	(1.14)	(1.76)	(1.13)	(1.06)	(1.58)	(1.57)	(1.77)	(1.60)
Signif. of Difference			*			*			*	
C. Marginal Effect of UI Replacement Rate										
Low	0.89	0.78**	0.46	-0.21	0.86	0.94	1.78***	1.82***	1.56***	1.36*
ALMP	(0.68)	(0.39)	(0.53)	(0.55)	(0.74)	(0.59)	(0.44)	(0.59)	(0.54)	(0.77)
High	0.50	0.67**	0.53	0.14	0.74	0.51	1.36***	0.68	0.93**	-0.19
ALMP	(0.37)	(0.28)	(0.54)	(0.44)	(0.49)	(0.31)	(0.36)	(0.59)	(0.46)	(0.65)
Signif. of Difference								***	*	***

Each block reports the marginal effect of one institution at two different levels of another one with which is interacted. In all exercises the "Low" levels of the interacting variables are selected based on values observed at the U.S. over 1990-2007. The "High" values for the union density in block A are selected based on values observed in non-Saxon countries over the same period. The term "Safety Net" in block B refers to UI replacement rates and duration, plus Expenditures in Active Labor Policies (ALMP). In blocks B and C the "High" levels of the interacting variables are selected based on values observed at Nordic countries over 1990-2007, excluding The Netherlands. Each interaction is estimated in separate models using a specification similar to the one from Tables 2-3. At the bottom of each block we report whether the marginal effects are statistically different between the "High" and "Low" scenarios. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for U.S.). All coefficients are multiplied by 100. * p<.1, ** p<.05, *** p<.01.

Table 8: Recentered Influence Function Regression for (log) Decile Ratios of Wages. Average Marginal Effects of Interactions between Institutions.

	Females					Males				
	Age lt 25	Less than College		College +		Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+		Age 25-44	Age 45+	Age 25-44	Age 45+
A. Marginal Effect of Firing Restrictions on (log) 90-10 Ratio										
Low	-10.47	-9.67*	-1.42	17.83**	33.25**	-0.50	-4.57	-5.20	12.10*	16.86**
Union Density	(7.19)	(5.07)	(5.78)	(8.68)	(15.45)	(6.58)	(3.82)	(4.08)	(6.69)	(7.13)
High	-1.51	-6.30**	-3.83	14.83	15.56	3.97	-5.67**	-7.06**	2.55	3.81
Union Density	(8.65)	(2.59)	(3.31)	(10.33)	(18.84)	(7.69)	(2.74)	(3.29)	(8.58)	(9.23)
Signif. of Difference									*	
B. Marginal Effect of Tax Wedge on (log) 90-10 Ratio										
Low	4.64	1.33	1.45	-3.33***	-11.46*	6.19**	2.64*	1.04	-2.06	-4.72
Safety Net	(3.49)	(1.59)	(1.19)	(1.13)	(6.61)	(2.62)	(1.41)	(1.07)	(1.83)	(4.50)
High	-0.16	0.15	-0.93	-2.11**	-7.08***	1.75	-1.05	-0.81	-1.79**	-1.09
Safety Net	(1.35)	(0.89)	(0.85)	(0.90)	(2.45)	(1.15)	(0.74)	(0.61)	(0.83)	(1.09)
Signif. of Difference			*				**			
C. Marginal Effect of Product Market Regulations on (log) 50-10 Ratio										
Low	-36.81***	-14.98***	-7.77**	-15.58***	-14.65**	-37.79***	-4.43	-1.09	-4.18**	-6.91***
Union Coverage	(8.45)	(3.45)	(3.30)	(3.91)	(5.73)	(4.04)	(3.21)	(3.43)	(1.95)	(2.40)
High	-7.49	-5.27***	-4.06**	-10.62***	-6.73**	-3.16	-5.70***	-4.97**	-4.72***	-3.84**
Union Coverage	(5.43)	(1.69)	(1.89)	(2.63)	(2.84)	(3.97)	(1.72)	(2.18)	(1.77)	(1.84)
Signif. of Difference	***	***			*	***				

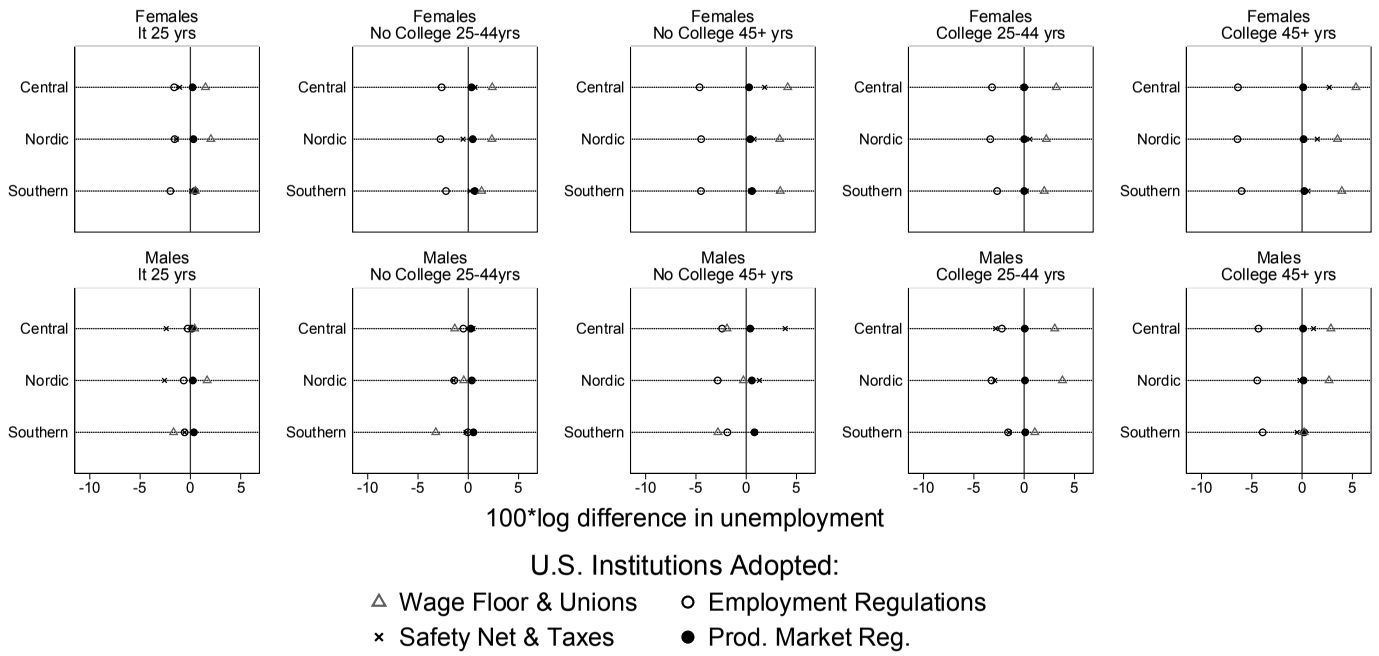
Each block reports the marginal effect of one institution at two different levels of another one with which is interacted. The levels for the variables in blocks A and C are selected based on values observed at the U.S. vs non-Saxon countries over the years 1990-2007. The term "Safety Net" in block B refers to UI replacement rates and duration, plus Expenditures in Active Labor Policies. The levels for these variables are selected based on values observed at the U.S. vs Nordic countries over the years 1990-2007, excluding The Netherlands. Each interaction is estimated in separate models using a specification similar to the one from Tables 4-6. At the bottom of each block we report whether the marginal effects are statistically different between "High" and "Low" scenarios. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for U.S.). All coefficients are in % terms. * p<.1, ** p<.05, *** p<.01.

Table 9: Average Marginal Effects of Negative Output Gap on Log Unemployment Under Different Institutional Settings.

Institutional Regime	Age lt 25	Less than College		College +	
		Age 25-44	Age 45+	Age 25-44	Age 45+
			Females		
U.S.	4.13***	4.83***	5.65***	4.57***	4.81***
	(0.65)	(0.89)	(0.99)	(0.86)	(1.24)
Continental Europe	6.18***	3.63*	2.78	5.06**	1.57
	(1.49)	(2.11)	(2.14)	(2.15)	(3.33)
Nordic	5.51***	6.04***	5.92***	6.01***	7.58***
	(1.57)	(1.63)	(1.69)	(1.76)	(2.78)
Southern Europe	6.12***	5.20***	6.19***	5.76***	7.61***
	(1.29)	(1.18)	(1.60)	(1.09)	(1.68)
			Males		
U.S.	3.83***	4.96***	6.24***	4.44***	3.98***
	(0.72)	(0.92)	(1.18)	(1.13)	(1.23)
Continental Europe	8.05***	7.27***	6.55**	8.58***	4.89
	(1.64)	(2.32)	(3.04)	(2.39)	(3.03)
Nordic	6.58***	10.9***	8.98***	9.25***	8.06***
	(1.56)	(1.82)	(2.02)	(1.97)	(3.04)
Southern Europe	8.84***	11.0***	12.4***	8.54***	12.3***
	(0.97)	(1.09)	(1.57)	(0.91)	(1.78)

Separate models are estimated for each population group. Each model interacts the negative output gap with institutional variables using a specification similar to those in Tables 2-3. The values of the institutions variables in Continental Europe are based on those observed in Austria, Belgium, France, and Germany. For the Nordic scenario we use the institutions of Denmark, Finland, Norway, and Sweden. Southern European institutions are those of Greece, Italy, Portugal and Spain. The value of institutions are set to those observed in 2007. Std. errors in parentheses robust to heteroskedasticity and for two-way clustering by period and country (State for US). All coefficients are multiplied by 100. * p<.1, ** p<.05, *** p<.01.

Figure 2: Difference in Marginal Effects of Negative Output Shock Under U.S. Institutions vs Local



A Data Appendix

In this appendix we present more details on the data, including how the variables used in the analysis were constructed and their sources.

A.1 Unemployment Sample

For most European countries, we use the European Union Labour Force Survey (EU-LFS) from 1992-2014 for the analysis of unemployment (Eurostat, 2015a). Our samples start in 1992, as prior to that year the public-use files do not report information on the highest level of education attained.[39] In the case of Germany, we complement the EU-LFS with the Socioeconomic Panel (Socio-Economic Panel (SOEP), 2015; Wagner *et al.*, 2007) due to the lack of German data in the public EU-LFS files previous to 2002. For France and the United Kingdom, we use their respective Labor Force Surveys as provided by their national statistical agencies (Insee, 2014; ONS, 2015). Finally, for the United States we use the Basic samples of the Current Population Survey across all months (Flood *et al.*, 2015). The detailed source and years available for each sample is reported in Table A2.[40]

In all cases, we exclude individuals in the military or living in group quarters. In addition, in European countries we exclude the information of individuals working abroad.

A.2 Inequality Sample

We construct gross hourly wage rates using the Labor Force Surveys for France and the UK, the Socioeconomic Panel (SOEP) for Germany, and the March CPS for the United States. For the remaining countries we use the European Community Household Panel (ECHP) (Eurostat, 2003), and the European Union Statistics on Income and Living Conditions (EU-SILC) (Eurostat, 2015b). In all cases, wages are estimated using the earnings of

[39] In Austria, Finland, and Sweden the samples begin in 1995, while in Norway and The Netherlands they start in 1996. In addition, Ireland does not report schooling information in 1998.

[40] As mentioned in the text, for Germany the data pre-reunification pertains to the Federal Republic of Germany only, and we exclude the years immediately after the reunification.

employees only, as the earnings of the self-employed might include returns to capital as well.

In most cases, these surveys provide a measure of current monthly earnings, which is converted to hourly wages by dividing by 4.33 times the weekly hours of work. However, for the U.S. and some countries in SILC, the hourly wage is constructed using yearly earnings from the previous calendar year.[41] For the U.S. we rely on information on the usual number of hours and weeks worked in the previous year. For the SILC countries without monthly earnings, we divide last year's earnings by the number of months worked during that year, and by the current number of weekly hours worked (times 4.33). Since for these SILC countries we are linking last year's income to current hours of work, we exclude individuals who changed jobs between the income reference period and the time of the interview.[42]

Similar to other papers in the literature, we have excluded observations with wages that are unusually high/low. In addition, we have followed country-specific procedures to adjust for the top-coding of earnings consistently across years.[43] The methodological differences across countries for adjusting top/bottom outliers do not affect the estimation results due to the inclusion of country fixed-effects. Furthermore, since our preferred measures of inequality are the decile ratios, in practice these adjustments make little difference for the estimation results.[44]

In order to obtain cleaner wage measures we focus in a sample of workers with a more stable composition through time, thus we restrict our analysis to full-time workers, as they have a closer attachment to the labor force (see for instance, Katz and Murphy, 1992). In the case of the U.S. and the SILC

[41] In SILC these countries are Belgium, Denmark, Finland, The Netherlands, Norway, and Sweden.

[42] On average between 5-10% of the sample workers change jobs in these countries. However, in Denmark and The Netherlands, this number increases to 20% following the 2008 crisis.

[43] In countries that have minimum wages we exclude observations with wages smaller than half the wage floor. In countries where no statutory floor exists, we exclude wages smaller than one-half of the 1st-percentile of the distribution. For the U.S., we exclude hourly wages smaller than 1 1982 USD. For the top code, in most countries we exclude wages higher than twice the 99th percentile. The exceptions are France were we use weights provided by the survey that exclude outliers, and the U.S., where top-coded earnings are adjusted following the procedures outlined in Armour *et al.* (2016).

[44] These adjustments however, allow for cleaner estimations in RIF regressions of the Gini, since this index is more sensitive to values at the extremes of the distribution.

countries reporting only yearly earnings, we further limit our analysis to Full-Year Full-Time workers.[45] Full-time workers are those working at least 35 hours a week, and Full-Year workers are those working 9+ months a year (or 40+ weeks in the U.S.). For similar reasons, we exclude individuals in the military or living in group quarters, as well as working students, trainees, and apprentices.

In the inequality regressions we add controls for occupation and industry. Since industrial and occupational classifications have changed over the years, we have tried to standardize these classifications as much as possible in order to avoid biases due to changes in these codings. The occupational categories included are: Manager, Professional, Technician, Clerical, Services and Sales, Craft, Operators, and Elementary Occupations.[46] The sector dummies are: Agriculture, Manufacture-Mining-Energy, Construction, Trade and Repair, Hotel and Restaurant, Transport and Communications, Financial, Real Estate and Business Services, Public Administration, Education, Health, and Other Services.[47] To further limit the inherent misclassifications that remain after the standardization of classifications, we include dummy variables for country/periods with transitions in such classifications.

[45]For the European countries with yearly earnings in SILC we also restrict their corresponding ECHP sample to include only Full-Time Full-Year workers. In the U.S. we exclude in addition workers with allocated earnings.

[46]Most surveys classify occupations following the International Standard Classification of Occupations (ISCO), first in its 88 version and then in the 08 version. In the year 2011 the EU-SILC and the French LFS classify occupations under both ISCO versions. Hence, we use that year to generate country-specific cross-walks between versions. These cross-walks are then applied to the earlier surveys as to generate a more consistent occupational grouping over time. For the UK, we use cross-walks provided by the Office for National Statistics to convert their Standard Occupational Classification in versions 1990 and 2000 to its 2010 version, and this last classification is in turn converted to the ISCO-08 standard. Finally, for the U.S. we use the standardized occupational classification of David Dorn as used in Autor and Dorn (2013). This classification is in turn converted to ISCO-08 codes following a cross-walk provided by the Bureau of Labor Statistics (`http://www.bls.gov/soc/ISCO_SOC_Crosswalk.xls`).

[47]Most countries classify their sectors according to the European Classification of Economic Activities (NACE) in their versions 1.1 and 2. To have a consistent classification across versions we follow the broad correspondence presented in Eurostat (2008, p. 47). In the U.K. and the U.S., we assign the detailed industries to the above broad sector groupings.

A.3 Institutions and Regulations

A.3.1 Employment Regulations

We construct four indices of employment regulations using the detailed indices of Adams *et al.* (2016). Using 24 out of their 40 detailed measures we construct indicators for regulations on dismissals, on temporary contracts, on part-time work, as well as regulations on working time (e.g. overtime pay, holidays, etc.). The detailed indices range between 0-1, with higher values indicating stricter *de jure* restrictions. We construct our four indicators by averaging the corresponding components relevant to each category.

A.3.2 Minimum Wages

Minimum wages are used in two forms, first in log terms for the analysis of unemployment, and then as a percentage of the median wage for the analysis of inequality.[48] The data for European countries come from the OECD, while data for the U.S. is obtained at the State level from Neumark *et al.* (2014) and complemented with published data from the U.S. Department of Labor (DOL).[49]

A.3.3 Unemployment Insurance

The generosity of unemployment insurance is measured with two variables: the 1st-year benefit replacement rate adjusted for the probability of recipiency, and the duration of benefits.

For European countries we use information provided by the OECD to estimate the gross replacement rates for an average worker.[50] For the U.S.,

[48]Before performing the logarithmic transformation, all wage floors are expressed in constant 2014 USD PPPs.

[49]`https://www.dol.gov/whd/state/stateMinWageHis.htm`

[50]Originally, the OECD reported gross replacement rates for average production workers, i.e. average full-time workers in Manufacturing. From 2001 to 2011 they provide the corresponding information for so-called *average workers* (average full-time workers in industry and in professional services). In tandem, they started reporting *net* replacement rates for different household types. Currently, it is these net rates that are updated. In order to get a variable that is more consistent over time, we splice and interpolate the different rates to the gross rate of average workers. The net replacement rates we use in the most recent years are those of individuals in households without children and we do not take into account income supplements.

we estimate replacement rates at the State level using administrative records from the U.S. Department of Labor.[51]

The first-year rates are adjusted by the probability of recipiency depending on age. In particular, using our household surveys we estimate the probability of benefit recipiency among the unemployed, separately for individuals younger than 25 years of age, and everyone else. For the U.S. we obtain the age composition of the insured population (under regular programs) from the DOL administrative data.[52] As expected, in all countries young workers are less likely to qualify for UI benefits, and hence they have a lower recipiency rate. The adjusted 1st-year UI benefit rate is the product of the statutory replacement rate and the age-dependent recipiency rate.

The duration of benefits is estimated as the gross replacement rates in years 2-5 as a % of the 1st-year rate. For European countries the source is again the OECD. For the United States we construct a similar measure at the State level using information generously provided by Robert Valletta as used in Farber and Valletta (2015).

A.3.4 Union Presence

We include three measures of union presence. The first measure is the fraction of workers covered by collective bargaining. For European countries we obtain this variable from Visser (2015). In the unemployment sample the aggregate coverage for all employees is used. However, whenever possible, in the inequality sample we distinguish between the coverage of workers in the public vs the private sector.[53] For the United States, we obtain rates at the State and sector level from the data compiled by Hirsch *et al.* (2001) and Hirsch and Macpherson (2003). In countries where the sectoral coverage information is missing on a few years, we predict the missing values based on linear regressions of the sector-specific coverage rates on the aggregate

[51] http://oui.doleta.gov/unemploy/frs.asp

[52] In practice, the administrative information on the age composition of the insured population at the State level goes back as far as the early nineties. For previous years, we assume that the age-specific recipiency rates equal their respective average observed after 1992. For these early years in the State of NY we use instead recipiency information from the March CPS, because in this State the fraction of covered young workers changed substantially over time.

[53] In Belgium, Italy, and Portugal this distinction by sector is not possible. Furthermore, in Ireland we don't have sufficient observations on coverage and thus we use instead values on union density without distinction of sector.

coverage rate.

Our second measure of union presence is the union density. This variable is obtained from the OECD and the State-level data compiled by Hirsch *et al.* (2001) and Hirsch and Macpherson (2003) for the United States.

Finally, we include an estimator on the degree of centralization in collective bargaining. To construct this variable we use the indices on the level at which bargaining takes place, as well as the degree of coordination between parties created by Visser (2015). These indices range from 1 to 5, with larger values indicating greater centralization/coordination. Our index takes the maximum value between both variables.

A.3.5 Taxes

We include the labor tax wedge and the progressivity of labor taxes as measures of taxation. The tax wedge comes from the OECD Tax Models in several of their versions, as well as from the OECD-CEP dataset (Nickell, 2006).[54]

In order to obtain a measure of tax progressivity we follow the approach originally proposed by Feldstein (1969), and recently adopted in the macro literature by Benabou (2000, 2002); Heathcote *et al.* (2017), among others. This assumes that after-tax income y_a can be expressed as a function of pre-tax income y as

$$y_a = \lambda y^{1-\tau} \quad \lambda > 0. \tag{A.1}$$

The advantage of assuming this tax model is that it is amenable to estimation with disaggregated income information. In particular, if we have disaggregated before and after-tax income data we can estimate

$$\ln y_{ai} = \ln \lambda + (1-\tau) \ln y_i + e_i \tag{A.2}$$

with a linear regression, and τ is a natural measure of the progressivity of the tax system.

In order to estimate equation (A.2) we use data from several sources. For European countries in 2001-14 we use the OECD Tax-Benefit Model.[55]

[54] The latter dataset is used to obtain information for the earliest years in France. In this case, we use the variable "TW_Nicol" from the OECD-CEP dataset, which is computed using national accounts data.

[55] `www.oecd.org/els/social/workincentives`. Results obtained from the OECD tax-benefit models, as well as any errors in their use and interpretation, are my sole responsibility, not of the OECD.

From this model we obtain net earnings for a full-time single-earner household without children at various levels of gross earnings. We perform a similar exercise at the State level for the United States using the NBER's TAXSIM model (Feenberg and Coutts, 1993). For earlier years in European countries we use information on tax rates from 1996-2000 for six income levels provided by Eurostat, and for years prior to that, we use statutory rates from the OECD.[56]

The above procedure cannot be applied in Germany, Finland, Norway, and Sweden, hence the pre-1996 data for these countries is created based on a comparison between average and marginal tax rates as obtained from the OECD Taxing Wages-Model A. More specifically, if we assume that net and gross income are related as in (A.1), then we can recover τ by using information on average (AT) and marginal (MT) tax rates, through the relation

$$\tau = 1 - \frac{1 - MT(y)}{1 - AT(y)}.$$

This measure is known in the literature as the Coefficient of Residual Income Progression, and was originally proposed by Musgrave and Thin (1948). Due to data limitations in the aforementioned country/years, we only estimate this coefficient at the average income level of a single earner.[57]

Both in the case of the tax wedge, as well as the progressivity parameter τ, the series from different sources are spliced to their most recent values.

A.3.6 Active Labor Policies

We express expenditures on Active Labor Market Policies (ALMP) per unemployed worker as a % of the GDP-per-worker in the labor force. This is estimated by dividing the ALMP as % of GDP by the unemployment rate. In order to avoid endogenously introducing the unemployment rate in the right-hand side of the estimating equations, instead of dividing by current unemployment, we divide by the average unemployment over the previous 5 years.

The expenditure data comes from the standardized series published by the OECD. In the case of Italy, Greece, and the UK, we complement these

[56] `http://www.oecd.org/ctp/tax-policy/tax-database.htm`. With these rates we can predict net earnings for different gross earnings levels, and thus estimate (A.2).

[57] In contrast, using data for later years, Lehmann *et al.* (2016) estimate the impact of tax progressivity on unemployment using this index over three levels of income.

series with the corresponding series from the OECD-SOCX database (Adema *et al.*, 2011).[58]

A.3.7 Product Market Regulation

Our product markets regulation index is generated by the OECD (Nicoletti and Scarpetta, 2005; Koske *et al.*, 2015). This index ranges from 0 to 6, with higher values indicating a greater degree of regulation. In order to have consistent data for all the years analyzed, we use only the index of regulation in network sectors.[59] In the case of the U.S., we intrapolate the values in between the years with available data.[60]

A.4 Macro Variables

A.4.1 Research and Development

Our measure of investment in R&D by the Business Sector comes from the OECD and Eurostat, and it is expressed as a % of value added.

A.4.2 Trade Variables

Trade openness (i.e. imports plus exports as a % of GDP) is obtained from The World Bank World Development Indicators. The import penetration from non-high income countries is constructed using information on trade by partner from the OECD. High-income countries are those classified as such by the World Bank for the 1995-2007 period.[61] The import penetration variable is calculated as imports as a % of the domestic demand, excluding trade with high-income countries.

[58] In the case of France data pre-1985 is obtained from the French Ministry of Labor (`http://dares.travail-emploi.gouv.fr/IMG/xls/La_depense_pour_l_emploi_-_anciennes_series_-_1973-2006_BML.xls`), while for Germany and the U.S., pre-1985 data is based on Schmid *et al.* (1992).

[59] Network sectors include telecoms, electricity, gas, post, rail, air passenger transport, and road communications.

[60] For the United States, the series reported in the 2013 version of the data (Koske *et al.*, 2015), contain information for 1998, 2003, and 2008 only. For this reason, we complement our series with earlier data published in Nicoletti and Scarpetta (2005). Furthermore, in all countries the series are extrapolated to obtain values for 2014.

[61] However, we exclude from this group oil-producing countries, Hong Kong, Macau, and small colony islands.

A.4.3 Output Gap

The output gap is the difference between the actual and the potential GDP expressed as a % of the potential GDP. For European countries, this variable comes from the European Commission Cyclical Adjustment of Budget Balances (European Commission, 2014, 2016), and from the OECD Economic Outlook (OECD, 2016) for Norway.

In order to estimate the output gap for the different States in the U.S., we obtain the real GDP by State from the Bureau of Economic Activity,[62] and apply HP filters to estimate the potential GDP for each State.[63]

[62] `http://www.bea.gov/regional/downloadzip.cfm`

[63] From 1979-1986 the State-level GDP series exist only in current prices. In this case, we express the current GDP of each State as a share of the national, and multiply this fraction times the national real GDP (2009=100).

Table A1: Descriptive Statistics

	Unemployment Sample	Inequality Sample
Population Groups (%)		
Young Females	9.1	3.6
Females, Age 25-44, No College	14.1	12.3
Females, Age 45+, No College	10.1	8.5
Females, Age 25-44, College	7.5	8.6
Females, Age 45+, College	3.6	4.0
Young Males	11.1	4.9
Males, Age 25-44, No College	19.1	24.4
Males, Age 45+, No College	13.6	16.6
Males, Age 25-44, College	7.2	10.7
Males, Age 45+, College	4.5	6.5
Industry (%)		
Agriculture		1.5
Manufacture, Mining, Energy		24.5
Construction		8.0
Trade and Repair		12.6
Hotel and Restaurant		3.2
Transport and Communications		8.5
Financial		4.5
Real Estate and Business		7.8
Public Admininstration		9.1
Education		6.6
Health		9.4
Other Services		4.2
Occupation (%)		
Manager		7.0
Professional		17.4
Technician		16.1
Clerical		12.9
Services and Sales		12.6
Craft		15.6
Operators		9.3
Elementary Occupations		9.1
Aggregate Variables		
R&D (% of VA)	1.4	1.3
Trade Openness	71.6	70.6
Import Penetration LMIC	6.3	6.6
Output Gap (% Potential Y)	-0.4	-0.3

Trade Openness is measured as Exports plus Imports as % of GDP. Import penetration of Low and Middle Income Countries (LMIC) is measured as the Imports from these countries as % of domestic demand excluding trade with high-income countries.

Table A2: Sample Periods and Sources

		Unemployment	**Inequality**
Austria	AT	EU-LFS 1995-2014	ECHP (1995-2001) EU-SILC (2004-13)
Belgium	BE	EU-LFS 1992-2014	ECHP (1994-98, 2001) EU-SILC (2003-12)
Denmark	DK	EU-LFS 1992-2014	ECHP (1994-96, 1998, 2001) EU-SILC (2003-12)
Finland	FI	EU-LFS 1995-2014	ECHP (1996-98) EU-SILC (2003-12)
France	FR	LFS (Enquête Emploi) 1982-2014	1990-2014
Germany	DE	SOEP (1984-89 1995-2001) EU-LFS (2002-14)	SOEP 1984-89 1995-2013
Greece	EL	EU-LFS 1992-2014	ECHP (1994-2001) EU-SILC (2004-13)
Ireland	IE	EU-LFS 1992-97, 1999-2014	ECHP (1994-99) EU-SILC (2004-13)
Italy	IT	EU-LFS 1992-2014	EU-SILC 2004-13
Netherlands	NL	EU-LFS 1996-2014	ECHP (1994-2000) EU-SILC (2004-12)
Norway	NO	EU-LFS 1996-2014	EU-SILC 2003, 2006-07,2009-12
Portugal	PT	EU-LFS 1992-2014	ECHP (1994-2001) EU-SILC (2004-13)
Spain	ES	EU-LFS 1992-2014	ECHP (1994-2001) EU-SILC (2004-12)
Sweden	SE	EU-LFS 1995-2014	EU-SILC 2003-06 2011-12
United Kingdom	UK	UK LFS 1981,1983-2014	1993-14
United States	US	CPS Basic 1980-2014	March CPS Supp. 1982-2014