CHAPTER 10:

INEQUALITY AND THE LABOUR MARKET: UNIONS

Jelle Visser (University of Amsterdam, Amsterdam Institute for Advanced Labour Studies, AIAS)
Daniele Checchi (Università degli Studi di Milano and IZA Bonn)

1. Introduction

Throughout their existence, trade unions have been an important force tempering inequality. "Equal pay for equal work" has a strong resonance in unions across the world. In their overviews, Elster (1989) and Hyman and Brough (1975) present thick descriptions of norms of fairness and equality that guide union wage policies. "A fair day's wages for a fair day's work" was in 1881 cited in the *Manchester Times* by Friedrich Engels as "the old, time-honoured watchword" of British unions. This norm dictated equal hourly pay for like jobs, regardless of the characteristics of the worker. The Biblical "parable of the vineyard" (Matthew, 20: 15), in which workers begrudge Jesus for paying the same amount irrespective of the number of hours worked, is clearly no union norm. In fact, relativities have played a large role in union wage policy and lay at the root of many conflicts. However, large unions and federations, encompassing different sectors, occupations and categories of workers, tend to "expand parochial, myopic bases of comparison that inform workers' perception of injustice" (Svenson, 1989: 24; Olson, 1982).

A large share of wage variation cannot be explained by worker attributes like education, experience or ability. Much of this residual variation occurs *between* rather than *within* firms and is correlated with the firm's ability to pay (Teulings and Hartog, 1998). From the position of an individual worker and assuming imperfect information, it may be a matter of luck where one ends up. Exchange of information about pay and conditions is one of the oldest union activities, but often "they have gone beyond this to agitate for equalisation of pay" (Clegg 1970: 265). According to Sydney and Beatrice Webb, "among trade union regulations there is one which stands out as practically universal, namely, the insistence on payment according to some standard, uniform in application" (Webb and Webb, 1897 [1920]: 279). Wages are usually not exactly related to all observable characteristics of workers, especially not under collective bargaining, which typically provides for wages "determined by some procedure for a reference worker or a reference job" (Pencavel, 1991: 24). By setting standard rates across firms unions provide a form of insurance (Agell, 1999). Tying pay to job descriptions or seniority rather than performance diminishes the possibilities for managerial favouritism and discrimination; extending standard rates across

firms in the industry helps to suspend competition between workers. Together, these principles are at the root of unionism, allowing workers to act in solidarity (Streeck, 2005).

In the following we will first review the literature regarding the union effect on wages and wage inequality. Examining the differential between union and non-union wages is typical a first step in studies of the union effect on wage dispersion (Freeman, 1980; Card et al. 2003) and is often taken as a measure of union power to influence wages. Alison Booth (1995: 157) observes that the union wage gap has generated "an enormous body of empirical research", with most studies relating to the USA, the UK and Canada; she adds, "there has been surprisingly little research into the impact of unions on wage dispersion and wage inequality" (p. 179).

We shall consider the separate contributions of union power, membership composition, bargaining coordination and wage policy. It is the combination that determines the impact on inequality. It matters greatly whether union members start from a position of advantage or disadvantage and whether union contracts extend "beyond the walls of membership (Visser, 1990). Where the union differential comes from is also relevant. We do not assume that markets perform to perfection before trade unions arrive on the scene. To the contrary, an argument can be made that, given labour market uncertainty and the absence of a full set of insurance markets, institutions like trade unions make these markets sustainable by providing stability and insurance (Agell, 1999; Streeck, 2005). When unions successfully challenge employer monopsony power, the economic effect should be beneficial due to the extra purchasing power of workers. With no monopsony power, a redistribution of profits away from shareholders may still be desirable, although much depends on the shareholders' response and the effect on investment and employment. Paying above market wages may be unsustainable, but efficiency wages and perceptions of fair sharing may elicit greater worker effort and productivity.

Other aspects of inequality, like access to jobs, overtime, working hours, pensions or health plans, as well as leave rights, have received much less attention in the empirical literature and will also receive much less attention here. In the final part of this chapter we engage in an estimation of how the presence of trade unions has influenced the extent and dynamics of earnings inequality across advanced economies during the 1980s and 1990s. For this purpose we have developed indicators for trends in equality and union presence from different sources.

2. What Do Unions Do?

In answer to that question Richard Freeman and James Medoff conclude that despite the small size of the union sector, the unions' net effect on the whole US labour market has been an equalizing one. They attribute this to the equalizing effect of union wage policies *within* the union sector, which offsets any disequalizing effect of unions causing wage differentials *between* the union and non-union sector (Freeman and Medoff, 1984: 78-79). With that conclusion, the authors went against the orthodox view that unions increase inequality. In his landmark study of relative union wage effects, Lewis (1963) had found that mean union wage *differentials* correlated with sectoral wage *levels*. This led him to conclude that US unions increased the inequality of average wages across sectors by 2 to 3 percentage points. US union membership in the 1950s was probably concentrated among workers in the upper half of the earnings distribution (Rees, 1962). Noting that unions of skilled workers tend to be most successful in raising the wages of their members, Milton Friedman (1956) concluded that this must have an employment reducing effect and increase competition for less-skilled jobs, hence increase the inequality between skilled and unskilled workers. He generalised this to the view, that in addition to distorting job allocation, "(unions) have also made the incomes of the working class more unequal by reducing the opportunities available to the most disadvantaged workers" (Friedman, 1962: 127).

Against the orthodox view there were studies of industrial relations scholars and institutional economics showing that union-negotiated pay scales tended to compress wages (Reynolds and Taft, 1956). Turner (1952) found that in wartime and post-war Britain the craft unions, representing the elite of skilled workers, had supported wage-levelling policies in an attempt to expand downwards and recruit semi-skilled workers. Skilled workers may support such levelling policies not just for solidaristic reasons, but because it lowers the incentive for employers to replace them with cheaper hands. Maybe reflecting a change in membership composition, studies of US labour markets in the 1960s documented with micro-data that in unionised firms and sectors the unskilled-skilled (Rosen, 1970) and black-white pay gap (Ashenfelter, 1972) was narrower. Metcalf et al. (2000) report that UK unions narrow the pay differentials between women and men, blacks and whites, manual and non-manual workers, and people with and without health problems.

Freeman (1980) was to first to introduce a dual model, distinguishing between the effect of union wage policies *within* the union sector and the effect on the differences *between* the union and non-union sector. This dual approach was crucial for disentangling the effects of unions on earnings inequality in the US and other economies where unions negotiate only or mainly for a minority of union members. However, this approach is less fruitful in countries where union-negotiated contracts cover most or all workers and union-covered firms or workers cannot be neatly distinguished from non-union firms or workers. Ceteris paribus,

under such high coverage conditions the equalizing effect of union policies will be greater, as they do not need to offset the disequalising effect of a distinction between the union and non-union sector.

Below we will estimate the effects of unions on wage inequality for three different bargaining regimes: *limited unionisation and limited coverage* (bargaining coverage rates are below 50 percent: US, UK, Canada, New Zealand, Switzerland, Japan, the Czech Republic, Poland, Hungary and Slovakia); *limited unionisation and extended coverage* (coverage rates are above 50 percent and at least double union density rates: Australia, Austria, Germany France, Netherlands, Portugal, Spain and Slovenia); *extended unionization and extended coverage* (coverage rates are above 50 percent but union density is also near or above 50 (Belgium, Denmark, Finland, Norway, Sweden, and – although a marginal case – Italy.[1] In considering the union effect on earnings dispersion, we shall also take into account the differences in coordination across bargaining units and union centralisation.

3. Whom Do Unions Represent and How Does it Affect Inequality?

Historically, workers with the highest skills and best able to communicate with one another were the first to organise and best positioned to obtain wage gains and benefits (Katznelson and Zollberg, 1986). In the craft unions of 19th century Britain, membership boundaries coincided by and large with the "aristocracy of labour" of skilled workers with regular earnings, prospects of social security and advancement for their children. They owed that to Britain's imperial rule over world markets, the ability to restrict entry and defend the differential in wages, social status and security against less skilled workers (Hobsbawm, 1964). For many groups, exclusion from union representation constituted an inequality in the sense of a reduced capability to realise one's potential (Sen, 1992). In their history, "(u) have ranged from exclusionary to ambivalent in their attitude to women" (Cook, 1984: 12). African-American, Latino and Asian workers have formally and informally been denied representation in US craft unions until the 1960s and the failure to organise the South is partly a self-inflicted wound on US unions until the present day (Goldfield, 1987). Many trade unions in Western European failed to organize and recognize the interests of various "guest worker" groups who came from Southern Europe and North Africa (Penninx and

[1] In the most recent period (2000-2005) bargaining or union coverage averages 35.5 percent and union density 22.5 percent of employees in employment in the first group (*limited unionisation and coverage*). In the second group (*limited unionisation and extended coverage*) the averages are 22.2 for density and 83.8 for coverage; in the third group (*extended unionisation and coverage*) the figures are 61.1 and 85.1 percent (ICTWSS data, see infra; also Visser, 2006, for sources and methods of calculation; Ireland is excluded because coverage statistics are unavailable).

Roosblad, 2000). In many developing countries, unions limit themselves to the state sector and disregard interests of large majorities working in the informal sector (ILO, 1997; Visser, 2003).

Exclusion from the union contributes directly to inequality when insurance, protection and collective worker rights are tied to union membership. For instance, if insurance against unemployment is conditional upon union membership under the so-called Ghent system (Rothstein, 1992), unskilled workers and those with unstable work histories tend to be excluded and denied protection. There are today only few Ghent systems left (in Sweden, Finland, Denmark, Iceland, partly in Belgium) and in each case, as in most advanced market economies, there is also mandatory unemployment insurance and the link between union membership and insurance has been attenuated or severed (Ebbinghaus and Visser, 2000). In the US access to health insurance plans and pension schemes tends to be associated with union membership, though the magnitude of union effects appears to have declines over time together with the decline of unions (Buchmueller et al., 2005). In Europe, health insurance is usually provided under a mandatory scheme and coverage of occupational pensions is often extended beyond an already high coverage rate to include non-organised firms. In the US union members tend to experience less fluctuating working hours (Buchmueller et al., 2005); in Europe workers in highly unionized sectors tend to work shorter hours (EIRO, 2007).

When rights are optional – for instance the right to re-arrange or reduce working hours or take additional leave under the *Fairness at Work* legislation in Britain since 1998 –union presence in the workplace tends to increase the awareness and use of these rights, and improve employer compliance (Dickens and Hall, 2005). Brown et al. (2000: 627) find that unions act as "custodians of individual rights" and report that in the UK union density rates at company level correlate with the provision of written details in contracts. National and sectoral agreements can extend the union rule beyond organised firms, like elected works councils can extend the union rule beyond a unionised minority *within* firms, thus guaranteeing more equal access to rights, as a functional equivalent to the closed shop – though taking away direct incentives to join (Olson, 1965).

[Table 1 about here]

Table 1 provides some recent data on the composition of trade unions for a selection of countries. The first thing to note is that in Northern Europe and in the Anglo-American world the female-male gap in unionisation has disappeared. Second, while more retired workers retain membership and unions are ageing, there are ever less young people in unions. Density rates among the young have fallen to historically low levels. Median voter models would predict union wage and pension policies favouring the generation that is preparing for retirement in the next ten to twenty years to the disadvantage of the young.

Unions are also heavily concentrated in the public sector, with density rates that are often twice or more those in the private sector. Data from the European Social Survey (ESS)[2] show that unionisation in manufacturing, the historical birthplace and stronghold of union and strike action, is often no higher than in the economy at large. The new stronghold is in the collective sector and in the professions. According to the ESS, managerial and professional services rival skilled manual workers in unionisation levels. Union membership tends to rise with higher level of vocational, not general education. Data on tenure, working hours and contract status, available for few countries only, show that unions are relatively underrepresented among those with low tenure, temporary contracts and part-time hours. Finally, union density increases almost everywhere with firm size.

The overrepresentation of union membership among older workers with long tenure in larger firms is the characteristic most clearly associated with the theory that by using their "insider power" trade unions retard job growth and make the burden of unemployment fall disproportionately on the less privileged "outsiders" by prolonging its duration (Lindbeck and Snower, 1988). Unions, in other words, may be a cause of inequality and, hence, a public policy case might exist to reduce union power, for instance by lowering employment protection or placing restrictions on strikes and picketing. Lindbeck and Snower (1988: 261) concede: "the strength of this case depends on the degree to which insiders take outsiders' interests into account."

More recently, Nickell et al. (2005) have studied the determinants of the unemployment rate for 20 countries over the period 1961-92, including a list of shocks (labour demand, total factor productivity, real import, money supply and real interest rates). They find a positive and significant correlation of the unemployment rate with replacement rates and the rate of change in union density. Bertola et al (2002) have challenged this view and show the existence of *institutional* variations in the trade-off between employment and real wage. In their view unions contain earnings dispersion in continental Europe, but not in Anglo-American countries, at the expenses of increased unemployment, especially among the young and among women. However, Bassanini and Duval (2006) did not find any statistically significant *general* association between unemployment and union density in a sample of 21 OECD countries over the period 1982-2003. By contrast, highly centralised and/or coordinated wage bargaining systems are estimated to reduce unemployment. They interpret their finding as supportive of the view that, in centralised/coordinated bargaining systems, unions and employers are able to internalise the adverse employment consequences of their wage claims (Calmfors and Driffill, 1988; Soskice, 1990). In general this type of

[2] Wave of 2002-3, R. Jowell and Central Coordinating Team (2003): *European Social Survey 2002/2003*. Technical Report. London: Centre for Comparative Social Surveys, City University, http://www.europeansocialsurvey.org

research is inconclusive and correlations are highly dependent on the countries included and indicators used in the analysis (Flanagan, 1999).

The data in Table 1 show huge cross-national variations not only in union density, but also in bargaining coverage, coordination across bargaining units, and union centralisation. At this point, the great divide between continental Western Europe and the Anglo-American world emerges. While in Western Europe only a minority of workers – including a large group of higher earning professionals – is *not* covered by collective bargaining, in the USA, Canada and the UK only a minority, and a decreasing one, is covered by union-negotiated agreements. In the first, *inclusive* group, coverage exceeds membership by a large margin. In the second, *exclusive* group, membership and coverage is nearly the same thing and affect only a minority of employees. The exclusive model also applies to large parts of Eastern Europe, Japan, South Korea and other East-Asian countries with enterprise unions and company bargaining (Visser, 2003). This difference between inclusive and exclusive bargaining models has implications for how to estimate and interpret the union wage differential.

4. Union Power, Coverage and the Union Wage Gap

There are a number of ways in which a union wage premium or differential can emerge. We have already discussed, in connection with the practice of craft workers, the possibility of a union-induced wage hike in combination with limits on worker entry in the union sector and job cuts that increase unemployment and lower wages in the non-union sector. Unions tend to limit or retard downward wage flexibility in business downturns relative to the non-union sector (Phelps Brown, 1962). Working in the other direction, non-union employers may raise wages in response to union organising or strike threats in the non-organised sector (Rosen, 1969; Farber, 2003; Mosher, 2006). The union effect on wages may operate via worker voice and job tenure, altering the incentives of workers and employers to invest in training (Addison and Belfield, 2008).

In empirical work, it is difficult to disentangle these mechanisms. To complicate matters, union status is not randomly assigned and may be endogenous with regard to wages. Union wage policies, in particular standardisation of wages through pay scales, may be most attractive for workers with a low underlying earnings capacity. On the other hand, where such jobs are scarce, employers may be able to select more able workers (Abowd and Farber, 1982). Union wage differentials may also compensate for working conditions, for instance a lower degree of control over one's work in the large hierarchical firms where union membership is concentrated (Duncan and Stafford, 1980; Lockwood, 1958). Finally, in order to establish the effect of union status on an individual's wage, we must disentangle the effect

of the level of unionisation of the sector, occupation, or firm, and the effect of one's own union status (Booth, 1995: 162).

Aggregate data cannot offer these controls, but most analysis based on micro data also fail to control for establishment effects and other unobserved variables (worker quality, for instance). Estimations techniques, which allow union membership to be simultaneously determined with wages, address the endogeneity issue, but tend to produce unstable estimates. After considering many of these studies, Lewis (1986) concluded that ordinary least square (OLS) yielded the least-biased estimators of union wage effects, probably with an upward bias. All but a handful of the empirical studies of the union wage differential deal with data from the USA, the UK or Canada. The simple reason is that identification of the union wage differential in household data is only meaningful when union membership is roughly coterminous with bargaining coverage. If union agreements also cover non-union members, the differential of interest is not whether somebody is unionised, but whether she is covered by a collective contract. Survey data on bargaining coverage is rare and probably only reliable in case of company contracts.

In spite of the many reservations regarding the *meaning* of a union wage differential in bargaining contexts other that the USA, Canada and the UK, Blanchflower and Bryson (2003) have nonetheless estimated the differential in a large number of countries with ISSP data. Their estimates confirm that outside the Anglo-American context, the union wage gap cannot be related to union power, as conventionally measured by union density or union centralisation. In fact, the correlation between union density and the union wage differential for the 21 countries in Figure 1 is negative, albeit not significantly different from zero. There is, however, a significant and inverse relationship with union coverage. The larger the coverage rate, or the fraction of workers covered by one or more collective agreements, the lower the union wage differential.[3]

As indicated by the two circles drawn in figure 1, it is possible to identify at least two groups of countries: one group of countries where coverage is high and exceeds half of the workers and another group with much lower coverage. That union wage differentials are not significantly different from zero in France, Germany, Italy, the Netherlands, Norway and Sweden is, according to Blanchflower and Bryson (2003: 211), "primarily due to the fact that unions are also able to control wage outcomes in the non-union sector", for instance via administrative extension of agreements and (in Eastern Europe) the application of the minimum wage. These differences also reflect union wage policy. With one of the highest coverage rates, Austrian unions are notoriously unconcerned about wage distribution as they have consistently prioritized the full employment goal as the best distributive union strategy

[3] Note that ISSP data allow controls for education, age, age squared, sex, public or private employment, but not for sector or establishment

(Guger, 1998). This shows in a relatively high differential as Austrial union members are concentrated in high wage industries. As a consequence of the broad coalitions needed for centralised wage policies, in Sweden and a number of other Northern countries, trade unions have consistently tried to compress wages (Iversen, 1999).

[Figure 1 about here]

Probably as a sign of union weakening and contraction of the union sector, union wage premiums in the US and UK have decreased in recent times. Adjusting for different skill groups, Card et al. (2003) report a declining union wage differential for male workers in the US, Canada and the UK between 1983 and 2001. For women the tendency is less clear as the union wage differential is less marked to begin with. In the US, the "union premium" plays a role in the decision of workers to join (a vote for the union in representation elections) as well as in the employers' resolve to resist or de-recognize unions (Farber and Saks, 1980). There is little reason to believe that this is the case in continental Europe and for this reason, probably, in their research or recruitment strtaegies unions do not pay any attention to it. (They do pay attention to the general wage level or rate of increase.) When union contracts extend automatically to non-members, the union wage gap cannot motivate people to join.

5. Union Power and Wage Dispersion When Union Coverage Is Exclusive

Where there is a sharp distinction between the union and non-union sector of employment, there is evidence that the earnings structure is flatter in the union sector (Bell and Pit, 1998; Card, 2001; Card et al, 2003; DiNardo et al, 1996; Freeman, 1980; Gosling and Machin, 1995; Metcalf, 1982; Metcalf et al, 2000). This compression of wages in the unions is explicitly attributed to union policies that seek to standardize wages within and across firms. Combined with the tendency to reduce the wage gap between blue- and white-collar workers, this offsets the disequalizing 'between' effect of the differential between union and non-union workers. In Britain, age-earnings profiles tend to be less steep among union members than among non-union members, but only for men. The same pattern does not hold for women, possibly because many of the higher-paid female jobs like teachers and nurses are in the highly unionised public sector (Metcalf et al. 2000: 70). Most interesting is the evidence that in firms where unions are recognised and even in firms where they are present but not recognised, the incidence of low pay is lower. This conclusion relates to Britain in 1998, before the introduction of the statutory minimum wage.

The power of unions to contain wage dispersion has waned. Using the 1987-88 Current Population Survey, Freeman (1993) concluded that the decline in unionization accounted for about 20 percent of the increase in the standard deviation of male wages in the US between

1978 and 1988. Gosling and Machin (1995) reach a similar conclusion for Britain estimating that the fall in unionisation during the 1980s accounted for some 15 percent of the increase in wage inequality among semi-skilled male workers. Metcalf et al. (2000: 69) claim that the equalizing effect of union presence was only one-third compared to what it ha been in an earlier and comparable study with data for 1978, when British unions registered their maximum post-war power (Metcalf, 1982).

Newer studies have introduced variation in union coverage or membership across subgroups (gender, skill level) and differences in union wage gaps for these different subgroups in Freeman's model. If union coverage is higher for less-skilled workers, or if the union wage impact is higher for these workers, the equalizing effect on wage dispersion will be larger. The conclusions remain broadly the same, though they show a different effect for men and women (Bell and Pitt, 1998; Gosling and Lemieux, 2001; DiNardo et al., 1997; Machin, 1999). Membership decline among men was concentrated among average and above average earning workers in manufacturing, whereas membership retention rates were strongest among higher earning professionals and public sector employees. Consequently, both in the US and in the UK, unions had, and have, a smaller equalizing effect on female earnings than on male earnings. In his study of male wages in the 1980s, Card (1996), considers the possibility that the union effect on wage flattening is overestimated, if unions attract disproportionately males with lower unobserved skills, but finds a small bias only.

Controlling for about 25 age-education groups in the UK and Canada and 150 age-occupation-skill groups in the US, Card et al. (2003) report that the mean union wage tends to be much higher for males in skill groups with low average wages, while the union mark-up for groups with high average wages (middle-aged college and university graduates) is small. Within each group, unions also have an equalizing effect on wages, as was reported by Freeman (1980), even after adjusting for the fact that union members tend to be more homogenous in skill levels than their non-union counterparts. Together these effects imply that unions in all three countries flatten wage differentials across skill groups. However, this effect has decreased over time. Had the variation of male wages in the union sector remained at its 1970s level, overall inequality in male earnings in the US would have been nearly one-third less in 2001 than it actually was. Effects of somewhat similar magnitude are found in the UK, whereas in Canada overall inequality would have declined had the union impact stayed the same as in 1983-84. Union effects on *female* wage inequality are slight in all three countries and within the overall pattern of rising wage inequality there is no clear trend of a larger or smaller union contribution.

6. Union Power and Wage Dispersion When Union Coverage Is Inclusive

If nearly everybody is covered by union contracts or if the same mechanism for adjusting wage rates applies to all workers, we cannot infer the effect of unions or union-based institutions from a comparison of union and non-union wages. There are two alternative methods, of which the second is probably more effective (Freeman, 2005).

Firstly, we can compare earnings distributions across countries with different levels of collective bargaining and union coverage. Such comparisons invariably show that countries with the highest coverage have the lowest wage dispersion – as argued before, union policies compressing wages do not have to compensate for the inequality increasing effect of the union wage differential. Other measures, reinforcing this association, relate to union structure (unions encompassing low and high earning groups) and bargaining centralisation (Blau and Kahn, 1996; 1999; Iversen, 1999; Wallerstein, 1999). Our data – comparing earnings inequality data, as measured by the P90/P10 distance from the OECD, and various indicators of union density and union centralisation – shows that the association between union centralisation, measured by the Iversen index (Iversen, 1999) and earnings equality has slightly weakened. The correlation between union centralisation and inequality for the cross-section of 22 countries shown in Figure 2 is -.608 in 2000 compared to -.672 in 1980.

[Figure 2 about here]

The second method tries to test whether changes in unionisation and wage-setting institutions are associated with changes in wage dispersion. Breaking away from sector agreements or derecognizing the union gives firms more scope for merit- and performance based pay. According to Brown et al. (2000), for many UK firms the advantage of breaking away from the existing structure of collective bargaining was to increase the dispersion of pay and there was a greater tendency towards linking pay rises to individual performance in derecognising firms. Changing from national to sectoral or from sectoral to company bargaining tends to raise the inter-industry or inter-firm earnings dispersion. Åberg (1994: 80) reports data on wages among manual workers in Swedish manufacturing, showing that the dispersion continued to fall in the 1970s but began to increase again after 1983, when a long period of national bargaining ended (see also Iversen, 1999; Hibbs and Locking, 2001).

Using data from the European Structure of Earnings Survey of 1995, Plasman et al. (2005) concentrate on the increased role of supplementary company-level bargaining in Belgium, Spain and Denmark. They find that in Belgium and Denmark company-level bargaining raises average wages and increase wage dispersion compared to sectoral agreements; in Spain company agreements decrease dispersion, but this must be seen in the context that sectoral agreements in Spain were much less standardising to begin with. In Denmark, collective agreements for unskilled workers had before 1991 been fixed at standard rates for

the full length of the contract, usually two or three years. In the 1990s these agreements fixed only minimum levels (as had been the case for skilled workers) and the major part of the wage became linked to performance criteria negotiated at firm level. Comparing Belgium, Spain and Italy, and using the same database, Dell'Aringa and Pagani (2006) examine also the effects of different bargaining regimes, which change over time. They do not find that wages are more compressed when workers are covered by sectoral agreements rather than by two-level, sectoral *and* company agreements. They suggest that increases in wage dispersion arising from an additional layer of enterprise bargaining are mirrored in wage drift under centralised bargaining at the sectoral or national level, a point made by Holden (1987) in his study of centralised bargaining and wage drift in Norway. These results suggest that both the level of bargaining and coordination across levels matters for the capacity of unions to stem the rise of inequality.

In Germany, as in the Netherlands, company bargaining is not a supplement to industry bargaining but an *alternative*, used by a minority of firms, affecting 6 (Germany) to 14 (Netherlands) percent of workers. Stephen and Gerlach (2005) cannot find a significant differential between the two types of agreements. Gürtzgen (2006) studies firms that switched bargaining regimes in order to identify wage effects, using fixed effects for unobservables that determine selection into different bargaining regimes. She found a small premium of about 2 percent for industry-level as compared to company-level agreements in West Germany and a similar premium for company agreements in East Germany. The explanation may be historical – sectoral bargaining is the rule in West Germany and with some exceptions (Volkswagen, Lufthansa) company bargaining is mainly a phenomenon of smaller firms unable to pay the high sectoral standard; in East Germany sectoral bargaining is less established. Hartog et al. (2002) distinguished between four bargaining arrangements: company agreements; sectoral agreements; sectoral agreements made binding on non-organised firms; and no agreement. The maximum effect on wages they found was 4 percent in favour of company bargaining, which in the Netherlands applies in particular to multinational firms and privatised firms in the utilities. These small effects cannot explain the increase in wage inequality that we observe. Probably, the fact that unions negotiate minimum rather than standard rates and concede greater variation in actual wages tied to performance is of greater importance.

7. How Do They Do It?

Our empirical evidence, based on the ISSP surveys, shows that the likelihood of union membership decreases when the earnings distance to the mean increases (Checchi et al. 2007). Highly skilled workers may believe that they do better by staying outside the union,

especially when unions favour wage flattening. In addition, they may have sufficient bargaining power as individuals. Agell (1999) develops an insurance rationale for union membership and egalitarian pay structures based on uncertainty about the future place in the wage distribution and ability to keep up with others. Assuming that risk aversion is inversely correlated with income (or wealth) and assuming that risk aversion motivates people to buy insurance, unions should be more attractive for lower than for higher earning workers. However, lower-paid workers tend be concentrated in sectors, establishments and occupations that are often most difficult to unionize and they may have more frequent spells of unemployment or inactivity, making it more difficult to retain membership ties. Those that need the union most, from an insurance point of view, may be least able to get it (Crouch, 1982).

There are different reasons why trade unions should compress the wage distribution relative to the productivity distribution. "Leaving aside the problem how employers' wage policies are determined by economic conditions, it is certain that trade unions are influenced decisively by other considerations, by their internal and external politics and by the conventions current among their members" (Flanders, 1954: 318). In the opening of this chapter we mentioned the widely cited "equal pay for equal work" norm. The rationale for equalitarian policies may be less idealistic or principled and be the consequence rather than the cause of centralised policies. Wage compression was the price paid for the support that lower-paid workers gave to centralised incomes policies (Iversen, 1999). Streeck (1994) has described how in the system of interconnected industry-wide wage setting in Germany electoral competition for union office ensures that union leaders have an incentive to follow the trend set by the strongest union, i.e. the metalworkers. More generally, Elster (1989: 218) claims that envy or "preventing others from getting ahead" has played in the competition between unions representing lower and higher paid workers that preceded the break-up of centralised bargaining in Sweden.

Secondly, trade unions have defended wage compressing strategies as part of a growth- and productivity-enhancing strategy, seeking to raise standards by squeezing low-paid work and inefficient firms or sectors out of the market (Agell and Lommerud, 1993; Horn and Wolinsky, 1988; Streeck, 1992). Unions may also try to redistribute income as an alternative to progressive taxation (Agell, 1999), though adverse effects on employment temper such attempts. In Sweden, the development of an active labour market policy was intended to address these adverse effects, helping workers to upgrade skills and jobs, and shortening the time spent in unemployment.

Thirdly, internal union politics may favour wage policies tending to the vote of the median union member. Since most modern unions organise heterogeneous workers with different skill and pay levels, there must be a political mechanism for aggregating the potential

diverse preferences of union members. For instance, when deciding on annual wage increases lower paid members are better off with absolute rather than percentage increases. Generally, under the median voter model and given a mean wage higher than the medium, union policies will tend towards wage compression (Freeman and Medoff, 1984). Whether the median voter applies to union is debatable – in most ratification decisions with regard to strikes union statutes or the law require supermajorities.

The puzzle of explaining wage patterns as a result of egalitarian union policies is why workers with higher earnings join such unions and how they can be made to stay rather than move to the non-union sector or set up rival unions with less egalitarian preferences. In fact, rival unions did spring up among professionals and academics in the 1970s, for instance in Norway, Denmark and the Netherlands, and this has been related to the levelling-down policies of the major union confederations at the time (Ebbinghaus and Visser, 2000). One possibility is that industrial unions, covering all grades and skills, have more bargaining power and extra rents which they then can redistribute among members (Horn and Wolinsky, 1988). Unions may have developed efficient means to discourage union members from leaving or convince employers and public authorities to deny recognition to rivals.

8. Is Union Decline a Cause of Increased Inequality.

If unions aim to wage compression for ideological or principled reasons as well as for retaining and expanding their membership, we should observe a negative correlation between earnings inequality and union presence. However, causality can run in both directions, since a union decline yields an increase in inequality, but at the same time an exogenous increase in earnings inequality reduces membership support to unions, since workers feel less protected against uncertainty. In the absence of purely exogenous variations (like natural experiments), we can just speak of correlations among these two dimensions. Nonetheless, the strength of this association heavily depends on the institutional framework. Countries characterized by low coverage tend to experience higher level of inequality, with unions being less important in affecting the wage distribution. On the contrary, other things held constant, countries with high coverage experience more wage compression; in such a case, a decline of union presence may translate in reduction of coverage and an increase in inequality.

In this section we provide additional new evidence. For this analysis we have collected data on earnings inequality from three different sources (the Luxemburg Income Study or LIS, the International Social Survey Programme or ISSP and the OECD database on earnings). The institutional data is from the ICTWSS (Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts) Database, covering 26 countries

between1960 and 2006 (Visser, 2008). On one of the variables, union density, we have also used the International Social Survey Programme (ISSP), which contains information on earnings, employment status, gender, age, years of education, public or private sector, and *individual* union membership.[4] The data on earnings inequality come from three sources. The Luxemburg Income Study (LIS) reports individual earnings, employment status, gender, age, educational attainment, occupation and employment sector.[5] In most ISSP waves earnings are collected in categories; we have recoded the data using midpoint values.[6] The OECD database includes earnings deciles by gender, though collected according to different definitions (gross/net, yearly/monthly/daily/hourly, type of workers).[7] Finally, we consider the role of the minimum wage and use the Kaitz index, or ratio of the statutory minimum to the median wage, spanning the period 1960-2005.[8] The value has been set equal to zero for countries or years without a statutory minimum.

We have resorted to principal component analysis in order to get a summary picture (Table 2). Most countries have experienced an increase in earnings inequality in recent years, while they exhibit diverging trend in the previous decade.[9] The trend in union presence is downward, affecting 19 countries out of 25 countries in the 1990s compared to 12 out of 20 in the 1980s. The combination of rising earnings inequality and declining union presence characterises the situation in 12 countries compared to 5 in the previous period. The opposite situation of decreasing or rather unchanged inequality and rising or equal union presence is limited to the unique case of Denmark, compared to five such cases in the 1980s.

[Table 2 about here]

We now move to the analysis of correlation between alternative measures of wage inequality and measures of union presence. [10] When we consider unconditional correlation measures,

[4] We include 24 countries for overall 282 surveys covering the period 1985-2004 (all of the aforementioned except Belgium and Luxembourg).

[5] We include 11 countries for overall 66 surveys covering the period 1967-200: Australia (6), Austria (2), Canada (7), Germany (7), Italy (8), Netherlands (4), Norway (5), Spain (4), Sweden (7), UK (8) and US (8). Sector codings are however inconsistent between years and countries.

[6] Consequently, the ISSP systematically underestimates earnings inequality when compared to the LIS dataset, due to the original categorical nature of the data.

[7] The OECD dataset was updated in 2007 (*Employment Outlook 2007*, Table H) and covers 23 countries (all except Slovakia and Slovenia, but with Belgium) over the period 1960-2005, for overall 420 observations

[8] This data was obtained from the OECD. A statutory minimum wages applies in Australia, Belgium, Canada, Czech Republic, France, Hungary, Ireland, Japan, Netherlands, New Zealand, Poland, Portugal, Slovakia, Spain, UK and US.

[9] A note of caution should be raised here. Data availability does not allow controlling for hours worked, and therefore depicts trends in overall inequality that may be attributable to either differences in hourly wages or hours worked or both. Increased flexibilisation of the labour market may have increased earnings inequality by raising the turnover in and out of unemployment (especially in young age cohorts), while potentially leaving the hourly wage unaffected (Bertola et al. 2002). We partially control for these confounding factors in our estimates by including country and year fixed effects, which also captures other unmeasured institutional differences.

[10] While Chapter 9 of this volume analyses earnings inequality using a supply-demand framework, we consider the alteration of competitive wages due to labour market institutions.

we find an expected negative association between union presence and inequality, using various measurements of both union presence (density, coverage, coordination) and inequality (Table 3).

[Table 3 about here]

However we could be facing spurious correlations, since other labour market institutions (like minimum wage provision) could be responsible for this outcome.[11] In order to partially dispense with these effects, we have in table 4 included country and year fixed effects. We observe that higher union density or more wage coordination do not seem to decrease inequality, but that minimum wage legislation and higher bargaining coverage do.[12] This is rather intuitive, since both variables capture the impact or diffusion of external norms in wage setting. However, when we restrict our analysis to public employment (as we do in the two final columns), we observe that the relative power locally expressed by the unions (thanks to their high membership) is positively associated with wage compression.

[Table 4 about here]

If the bulk of the wage distribution does not strongly correlate with union presence, the two tails of the same distribution exhibit more statistically significant correlations. In table 4 we repeat the exercise using decile ratios as dependent variables. We find that union density exhibits a negative correlation with the top tail, and to a lesser extent with the bottom tail of the earnings distribution. This effect is reinforced in liberal economies, when bargaining coverage is limited. Bargaining coverage is also negatively correlated with earnings dispersion, but this effect is for obvious reasons more pronounced in the group of countries where coverage is high and union density low. Finally, wage coordination does not obtain a consistent pattern of correlation with both decile ratios, while minimum wage continues to exhibit a consistent negative association. These results suggest that unions contribute to wage compression by restricting wage decline among low-wage earners and restraining wage hikes among high-wage workers.[13] However, the channels through this happens vary with the bargaining framework. When coverage is low, local presence or power of unions matters. In contrast, when coverage is high, union membership becomes less relevant, but inequality reduction is obtained on a larger scale. For obvious reasons, the combination of high coverage and high density, observed in Northern Europe, is associated with the lowest level of earnings dispersion.

[11] Koeninger et al (2007) show that wage inequality is also negatively associated to the employment protection legislation index and argue that unions offer different degrees of protection to high- and low-skilled workers.
[12] Analogous results are obtained when the dependent variable is replaced with analogous measure from LIS, or even when the inequality measure is the Gini concentration index.
[13] This is also consistent with the findings that union membership declines with the distance of individual wage from the median one (Checchi, Visser and van de Werfhorst 2007).

A key element in union wage policies is the negotiation of pay criteria based on job descriptions and seniority rather than performance, thus limiting the discretion of managers. We examine this along three directions. Firstly, if wages are associated with jobs, then individual worker characteristics, including education, should be less relevant. We expect the return to education to be lower under higher bargaining activity of unions. Secondly, if pay and promotion criteria are relation to seniority, we should find that the variance explained by age (and age squared) increases with union bargaining activity. Finally, under high union bargaining activity, wage differentials between male and female workers should be lower.

We have used the various ISSP surveys for estimating the average return to education with a Mincerian function, where gender, age and age squared and working less than full time are included as regressors.[14] We neglect information about sector of employment and status, because we are interested in the gross rate of return, which takes into account better employment opportunities associated with formal schooling.[15] Individual membership is also added as regressor in order to capture the possibility that a wage premium is associated with union membership. We find, as expected, that this is indeed the case in the US, the UK, Ireland, Australia, and, unexpectedly, in Austria (capturing the concentration of union members in high paying sectors and the absence of union levelling policies across sectors).

In the final three columns of table 5 we report the result of OLS regressions of estimated returns to education (ranging from –0.02 to 0.17) onto the aforementioned indicators of union presence, weighting the observations by the (absolute value of the) inverse of their standard errors. We also introduce clustered cross-national variations, in order to account for institutional diversities in bargaining regimes. Rates of return to education exhibit negative correlation with union presence only in Nordic countries, where both membership and coverage are high.[16] On the contrary, in the other regions, all indicators of union presence exhibit no correlation with return to education. We draw attention to the fact that minimum wage legislation, by raising the lowest wages irrespective of educational attainment, negatively correlates with the return on education.

[Table 5 about here]

[14] This exercise could not be replicated using LIS samples because for most countries only the maximal educational attainment is reported.

[15] We are perfectly aware that the estimated coefficients (including the return to education) are quite likely to be biased, due to omitted variables (for example ability) and/or measurement errors. In the absence of good instruments available for the entire sample period (for example parental education is available in few surveys only), we cannot correct for this bias. However, if the distortion is consistent across countries and years, cross-country comparisons still make sense.

[16] Carbonaro 2006 performs a similar analysis, estimating the return to literacy from IALS and correlating it with labour market institutions. He finds that labour market institutions tend to compress earnings distribution in coordinated market economies.

In order to assess the impact of seniority rules in shaping the earnings distribution, we have regressed individual earnings on age (as proxy for potential work experience) and age squared (to take into account the possibility of entry wages and gradual retirement) using the LIS surveys. By retrieving the variance explained exclusively by these regressors, which ranges from 0.03 to 0.35, we have a proxy for the extent of seniority rules in accounting for (log)wage dispersion. When we regress this variable on measures of union presence, we find evidence of positive correlation of union presence with the variance explained by age: countries where unions are stronger and/or coverage is higher, also witness a larger fraction of wage variability explained by "objective" criteria like seniority.[17]

Finally, we consider gender differentials. Irrespective of the selected proxy for gender discrimination (median percent differences from OECD or ISSP datasets; the estimated female coefficient in Mincerian wage equation from LIS or from ISSP surveys), we also find some evidence of an association between union presence and a gender gap in earnings – estimated from regressing (log)earnings onto gender, age, age squared, years of education, working less than fulltime and union status over various ISSP surveys).[18] In columns 1 to 6 of table 6 we leave out country fixed effects (while retaining a year fixed effect), finding that all measures of union presence (membership, coverage and bargaining coordination) are associated with a relative improvement in female earnings, with an additional contribution brought in by minimum wage.[19] When we allow for country-group variations, we find a negative association to union membership and coverage in liberal economies, the same correlation reverting to positive in the other groups. However almost all correlations become insignificant when we introduce country fixed effects, suggesting that gender discrimination in the labour market is associated to local factors that go beyond union presence (cultural attitudes, labour market segmentation, access to technical education, to name some).[20]

[Table 6 about here]

[17] When we allow for group variation in the estimated coefficients, the effect of union density looses significance, because it takes opposite signs in the first and the third group, while wage bargaining retains sign and significance.

[18] This dependent variable – the estimated gender differential - varies from -0.78 to 0.11. An alternative measure for female disadvantage is the median percent gender difference computed in the same dataset. The two measures are highly correlated (r = -0.90).

[19] Recall that the dependent variable (wage differential) is a negative one. A positive correlation with union presence thus implies that its increase is associated to an increase in the relative wage of working women.

[20] With more detailed information about individual hourly earnings one could probably obtain a clearer picture of the effect of union presence on gender pay differences. With respect to the US, Blau and Kahn (1999) are able to show that unionised establishments are associated with reduced wage gaps at different points of earnings distribution. Once again, given the more aggregate data at our hand, we cannot replicate their analysis.

9. Concluding remarks

In this chapter we have shown how and why unions compress wages, if they. Emerged historically as craft unions and evolved in mass organisation, unions bargain for tying pay to jobs and not to workers. This can be achieved in different ways, depending whether the degree of workers coverage is limited (as in liberal economies) or high (as in many European countries). The reduced coverage can be partially offset by other institutional arrangements (like minimum wage) and locally powerful unions (at workplace or at sector level) can compress wages within the union sector, albeit often at the price of increasing the differential between the union and non-union part of the economy.

We have also provided new evidence that union presence is negatively associated to earnings inequality in a sample of developed countries observed in the last two decades. Most of this correlation is accounted for by tow variables: bargaining coverage and minimum wage legislation. These two institutional measures are potential substitutes (Checchi and Lucifora 2002), because both aim to generalise a uniform wage treatment in the population. However, while bargaining coverage potentially extends to the entire earnings distribution, the impact of minimum wage focuses on the bottom tail. Whenever unions are stronger (in terms of membership) they are also able to compress the upper tail of income distribution, typically by reducing individual heterogeneity (like that introduced by high returns to education) and expanding objective norms (like seniority rules). This only partially applies to gender inequality, which may be related to other country specific factors going beyond union presence.

References

Åberg, R. (1994). Wage Control and Cost-push Inflation in Sweden since 1960" In The Return to Incomes Policty, edited by R. Dore, R. Boyer, and Z. Mars. London, Pinter: 71-93.

Abowd, J. M., and H.S. Farber (1982). "Job Queues and the Union Status of Workers". Industrial and Labor Relations Review 35(3): 354-367.

Addison, J., and C. Belfield (2008). "Unions, Training, and Firm Performance", IZA Discussion paper n.3294

Agell, J. (1999). "On the Benefits from Rigid Labour Markets: Norms, market failures, and social insurance". Economic Journal 109.

Ashenfelter, O. (1972). "Racial Discrimination and Trade Unionism". Journal of Political Economy 80(3): 434-464.

Bell, B. D., and Michael K. Pitt (1998). "Trade Union Decline and the Distribution of Wages in the UK: Evidence from kerner density estimation". Oxford Bulletin of Economics and Statistics 60(4): 509-528.

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

Blanchflower, D. G., and Alex Bryson (2003). "Changes over Time in Union Relative Wage Effects in the Uk and the USA Revisited". In International Handbook of Trade Unions, edited by J. T. Addison, and A. Bryson. Cheltenham, Edwar Elgar: 197-245.

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

Blau, F., and L. Kahn (1996). "International Differences in Male Wage Inequality: institutions versus market forces". Journal of Political Economy 104(4): 791-837.

Blau, F., and L. Kahn (1999. "Institutions and Laws in the Labor Market". In *Handbook of labor economics*, vol3a, edited by O. Ashenfelter and D. Card. Amsterdam: North Holland.

Booth, A. L. (1995). The Economics of the Trade Union. Cambridge, Cambridge University Press.

Brown W., D. S., D. Nash, and S. Oxenbridge (2000). "The Employment Contract: From Collective Procedures to Individual Rights". British Journal of Industrial Relations 38(4): 611-629.

Buchmueller, T. C., J.E. DiNardo, and R.G. Valetta (2005). "A Submerging Labor Market Institution? Unions and the nonwage aspects of work". In Emerging Labor Market Institutions for the Twenty-First Century, edited by R. B. Freeman, J. Hersch, and L. Mishel. Chicago, Ill., The University of Chicago Press, pp. 231-264.

Calmfors, L., and Driffill, J. (1988). "Bargaining Structure, Corporatism, and Macroeconomic Performance". Economic Policy 6: 12-61.

Carbonaro, W. (2006). "Cross-National Differences in the Skills-Earnings Relationship: The Role of Labor Market Institutions". Social Forces 84 (3): 1819-42.

Card, D. (2001). "The Effect of Unions on Wage Inequality in the U.S. Labor Market". Industrial and Labor Relations Review 54(2): 296-315.

Card, D., Th. Lemieux, and W. Craig Riddell (2003). "Unionization and the Wage Structure". In International Handbook of Trade Unions, edited by J.T. Addison, and C. Schnabel. Cheltenham, UK, Edward Elgar, pp. 246-292.

Checchi, D. and C. Lucifora (2002). "Unions and Labour Market Institutions in Europe". Economic Policy 17(2): 362-401.

Checchi, D., J.Visser, and H. G. van de Werfhorst (2007). “Inequality and Union membership: the impact of relative earnings position and inequality attitudes”. IZA Discussion Paper No. 2691

Clegg, H. A. (1970). The System of Industrial Relations in Great Britain. Oxford, Blackwell.

Cook, A. H. V.R. Lorwin, and A. Kaplan Daniels, editors (1984). Women and Trade Unions in Eleven Industrialized Countries. Philadelphia, Temple University Press: 3-36.

Crouch, C.J. (1982). Trade Unions. Glasgow: Fontana.

Dell'Aringa, C., and L. Pagani (2006). "Collective Bargaining and Wage Dispersion”. British Journal of Industrial Relations

Dickens, L., and M. Hall (2005). “The Impact of Employment Legislation: Reviewing the research”. London, Department of trade and Industry: Employment Relations Research Series, No. 45.

DiNardo, J., and Th. Lemieux (1997). "Diverging Male Wage Inequality in the United States and Canada, 1981-1998: Do institutions explain the difference”. Industrial and Labor Relations Review 50(4): 629-51.

DiNardo, J., N. Fortin, and Th. Lemieux (1996). "Labor Market Institutions and the Distribution of Wages, 1973-1992. A semi-parametric approach”. Econometrica 64(5): 1001-1044.

Duncan, G. J., and F.P. Stafford (1980). "Do Union Members Receive Compensating Wage Differentials?". American Economic Review 70(June): 355-371.

Ebbinghaus, B., and J. Visser (2000). Handbook on European Societies: Trade Unions in Western Europe Since 1945. London, Palgrave-Macmillan.

Elster, J. (1989). The Cement of Society. A study of social order. Cambridge, Cambridge University Press.

Farber, H. S. (2003). "Nonunion Wage Rates and the Threat of Unionization " NBER Working Paper #9705.

Farber, H. S., and D.H. Saks (1980). "Why Workers Want Unions: The Role of Relative Wages and Job Characteristics” Journal of Policital Economy 88(2): 349-369.

Flanders, A. (1954). “Collective Bargaining”. In Industrial Relations in Great Britain edited by A. Flanders and H.A. Clegg. Oxford, Blackwell, pp. 252-321.

Flanders, A. (1970). Management and Unions. The Theory and Reform of Industrial Relations. London, Faber and Faber.

Freeman, R. B. (1980). "Unionism and the Dispersion of Wages”. Industrial and Labor Relations Review 34(1): 3-23.

Freeman, R. B. (1984). "Longitudinal Analysis of the Effects of Trade Unions". Journal of Labor Economics 2(1): 1-26.

Freeman, R. B. (1993). "How Much has Deunionization Contributed to the Rise of Male Earnings Inequality". In Uneven Tides: Rising income inequality in America, edited by S. Danizger, and Peter Gottschalk. New York, Russell Sage Foundation, pp.133-163.

Freeman, R. B., and J.L. Medoff (1984). What do Unions Do? New York, NY, Basic Books.

Friedman, M. (1956). "Some Comments on the Significance of Labor Unions for Economic Policy". In The Impact of the Union, edited by D. McCord Whright. New York, Kelley and Millman, pp. 204-234.

Friedman, M. (1962). Capitalism and Freedom. Chicago, University of Chicago Press.

Gosling, A., and S. Machin (1995). "Trade Unions and the Dispersion of Wages in UK establishments 1980-90". Oxford Bulletin of Economic and Statistics 57(2): 167-84.

Hartog, J., E. Leuven, and C. Teulings (2002). "Wages and the Bargaining Regime in a Corporatist Setting: the Netherlands". European Journal of Political Economy 18: 317-331.

Hibbs, D. A., and H. Locking (2000). "Wage Dispersion and Productive Efficiency: evidence for Sweden". Journal of Labour Economics 18 (October): 755-82.

Hobsbawm, E. J. (1964). Labouring Men. Studies in the history of Labour. London, Weidenfeld and Nicolson.

Holden, S. (1987). "Local and Central Wage Bargaining", Scandinavian Journal of Economics 90: 93-99.

Hyman, R., and I. Brough (1975). Social Values and Industrial Relations. A study of fairness and inequality. Oxford, Blackwell.

ILO (1997). World Labour Report 1997-98: industrial relations, democracy and social stability, Geneva: International Labour Office.

Iversen, T. (1999). Contested Economic Institutions. The politics of macroeconomics and wage bargaining in advanced democracies. Cambridge, Mass., Cambridge University Press.

Katznelson, I., and A.R. Zollberg (1986). Working-Class Formation: Nineteenth century patterns in Western Europe and the United States. Princeton, NJ, Princeton University Press.

Koeninger, W., M. Leonardi, and L. Nunziata (2007). "Labour Market Institutions and Wage Inequality". Industrial & Labor Relations Review, 60(3): 340-356.

Lewis, H. G. (1963). Unionism and Relative Wages in the United States. Chicago, Ill., University of Chicago Press.

Lewis, H. G. (1986). Union Relative Wage Effects. A survey. Chicago, Ill., University of Chicago Press.

Lindbeck, A., and D. J. Snower (1988). The Insider-Outsider Theory of Employment and Unemployment. Cambridge, MA.: The MIT Press.

Machin, S. (1999). “Pay Inequality in the 1970s, 1980s and 1990s”. In The State of Working Britain, edited by P. Cregg, and J. Wadsworth. Manchester, Mancherster University Press.

Metcalf, D. (1982). "Unions and the Dispersion of Earnings”. British Journal of Industrial Relations 20(2): 163-169.

Metcalf, D., K. Hansen, and A. Charlwood (2000). “Unions and the Sword of Justice: unions and pay systems, pay inequality, pay discrimination and low pay., London School of Economics, CEPR Discussion Paper, no. 452.

Mosher, J. (2006). "U.S. Wage Inequality, Technological Change, and Decline in Union Power”. Politic & Society 35(2): 225-264.

Nickell, S., L.Nunziata, and W.Ochel (2005). “Unemployment in the OECD since the 1960s. What do we know?” Economic Journal 115: 1-27.

Olson, M. J. (1965). The Logic of Collectiove Action. Cambridge MA: Harvard University Press.

Olson, M. J. (1982). The Rise and Decline of Nations. New Haven, Yale University Press.

Pencavel, J. (1991). Labour Markets under Trade Unionism. Oxford, Blackwell.

Penninx, R., and J. Roosblad, editors (2000). Trade Unions, Immigration and Immigrants in Europe, 1960-1993. New York, Berghahn.

Phelps Brown, E. H. (1962). The Economics of Labor. New Haven, CT, Yale University Press.

Plasman, R., M. Rusinek, and F. Rycx (2005). "Wages and Bargaining Regime under Multi-level Bargaining: Belgium, Denmark and Spain”. European Journal of Industrial Relations.

Rees, A. (1962). The Economics of Trade Unions. Chicago, Ill., University of Chicago Press.

Reynolds, L. G., and C.H. Taft (1956). The Evolution of Wage Structure. New Haven, CT, Yale Univetsity Press.

Rosen, S. (1969). "Trade Union Power, Threat Effects and the Extent of Organization”. Review of Economic Studies 36(2): 185-196.

Rosen, S. (1970). "Unionism and the Occupational Wage Structure in the United States”. International Economic Review 11(2): 269-286.

Rothstein, B. (1992). “Labor-Market Institutions and Working-Class Strength” In Structuring Politics. Historical institutionalism in comparative analysis, edited by S.

Steinmo, K. Thelen, and F. Longstreth. Cambridge, MA, Cambridge University Press, pp. 33-56.

Sen, A. (1992). Inequality Reexamined. New York and Oxford, Russell Sage Foundation and Clarendon Press.

Soskice, D. W. (1990). "Wage Determination: The Changing Role of Institutions in Advanced Industrialised Countries". Oxford Review of Economic Policy 6(4): 36-61.

Streeck, W. (1992). Social Institutions and Economic Performance: Studies of industrial relations in advanced capitalist economies. London, Sage.

Streeck, W. (1994). Pay Restraint Without Incomes Policy: Institutionalised monetarism and industrial unionism in GermanyR. Dore, R. Boyer, and Z. Mars, (eds.) The Return to incomes Policy. The Return to incomes Policy. R. Dore, Boyer R., and Z. Mars. London, Pinter: 118-140.

Streeck, W. (2005). The Sociology of Labor Markets and Trade Unions. The Handbook of Economic Sociology. N. J. Smelser, and R. Swedberg. Princeton, N.J., and Ney York, Princeton University Press, with Russell Sage Foundations: 254-283.

Svensen, P. (1989). Fair Shares. Unions, Pay, and Politics in Sweden and West Germany. Ithaca N.Y, Cornell University Press.

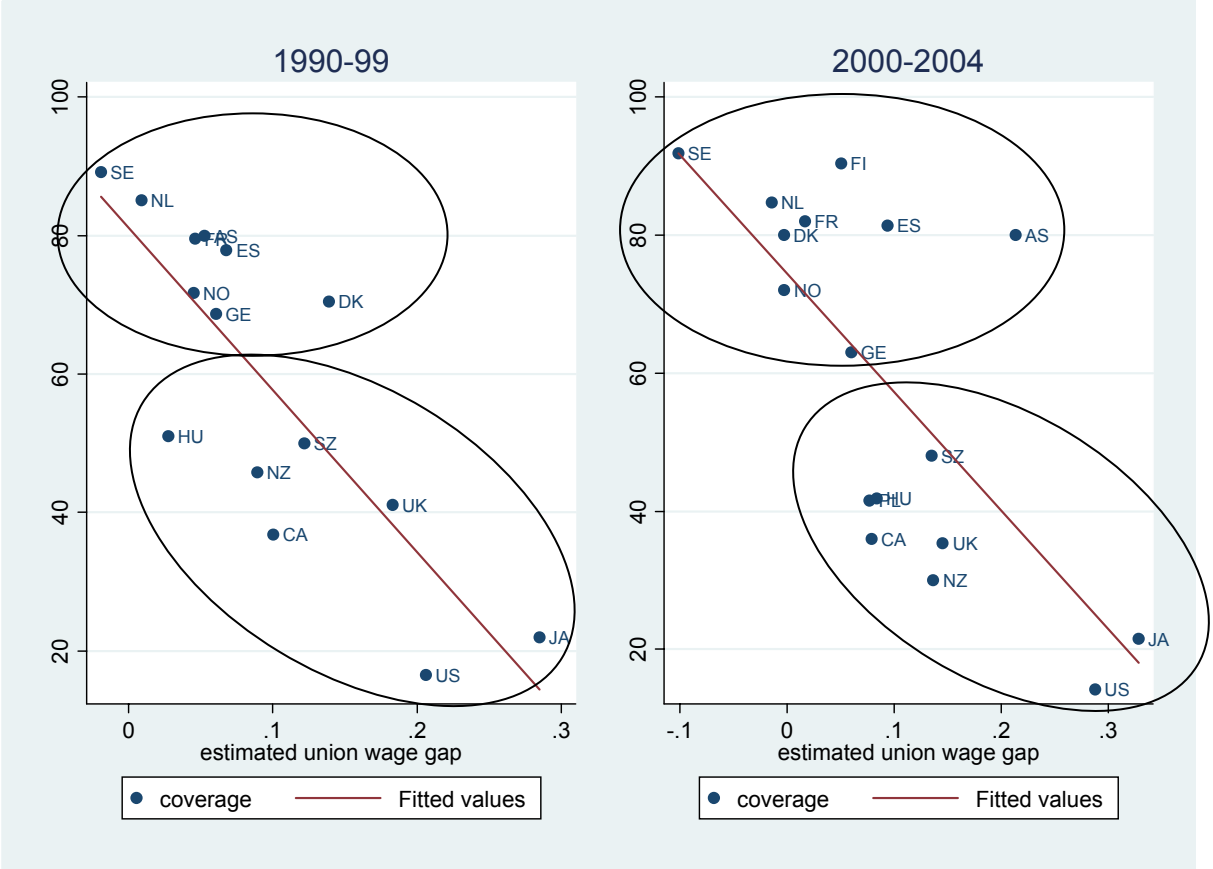
Teulings, C., and J. Hartog (1998). Corporatism or Competition. Labour contracts, institutions and wage structures in international comparison. Cambridge, UK, Cambridge University Press.

Turner, H. A. (1952). "Trade Unions, Differentials and the Levelling of Wages". The Manchester School 20 (September): 227-282.

Visser, J. (1990). "In Search of Inclusive Unionism". Bulletin of Comparative Labour Relations 18: 5-278.

Visser, J. (2003). "Unions and Unionism Around the World". In The International Handbook of Trade Unions, edited by J.T. Addison and C. Schnabel. Cheltenham, Edward Elgar, pp. 366-40

Figure 1 – Union gap and coverage



Note: the wage gape is the estimated return on union member status, controlling for gender, age, education on ISSP dataset, averaged over the decades. Coverage rates from ICTWSS

Figure 2 – Bargaining centralisation and inequality

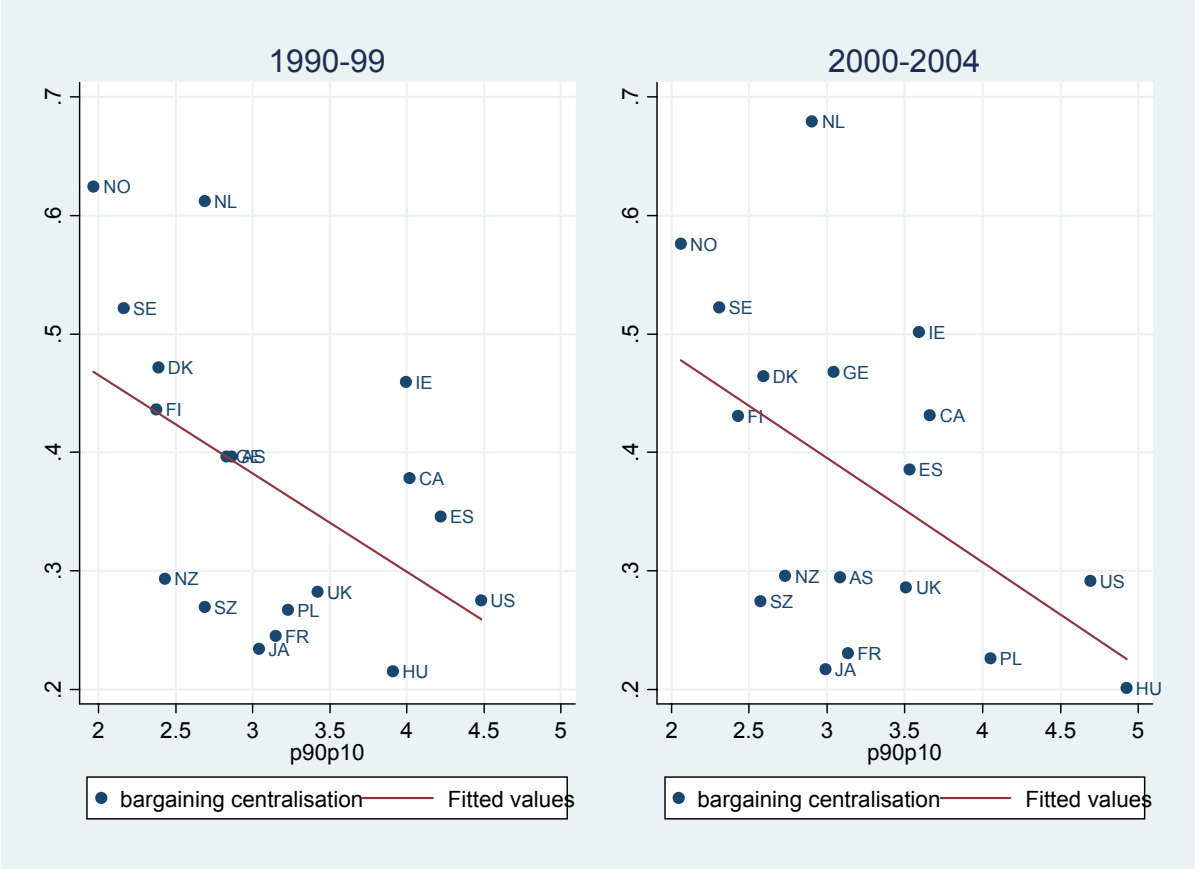


Table 1: Density and union presence

country	United States		Canada		Australia		United Kingdom		Ireland		Netherlands		Sweden		Denmark		France		Spain		Italy		Germany		Poland	
year	1985	2004	1992	2004	1985	2004	1985	2004	1988	2004	1987	2004	1994	2004	1997	2004	1996	2004	1996	2004	1985	1998	1985	2004	1991	2004
ISSP DATA																										
density rate	19.6	7.8	32.1	35.6	50.8	30.1	47.6	27.4	43.2	38.2	30.8	31	87.4	79.1	87.9	85.9	20.1	17.7	16	20.2	48.4	36.2	35.2	19.3	32.8	18.2
men	23.2	8.4	30.3	32.3	53.2	28.4	52.8	28.9	44.2	39	34.6	33.3	83.6	80.5	87.3	82.2	21.1	19.4	16.6	21.9	51.7	36.1	42.4	22.4	34.7	13.9
women	13.1	7.2	33.9	39.7	46.9	31.8	41.4	26	42	37.4	23.8	27.5	90.7	77.8	88.4	89.5	18.6	15.7	14.8	17.9	41.3	36.4	23.3	15.2	30.4	23.3
age < 30	15.7	5.1	18.6	25	47.9	20.4	42.6	20.5	35.8	31.5	22.4	19.6	76.7	57.6	77.6	72.6	9.6	6.9	9.6	14.7	40.4	23.3	28.5	10.2	24.5	6.9
age 31-50	20.2	8.7	38.6	37.9	54.9	32.6	47.7	28.9	47.7	40.7	33.6	30.5	91.3	81.4	91.8	87.1	21.7	18	20.6	23.4	52.7	39.7	34.7	20	34.4	21.2
age 51-65	23.1	8.7	46.8	33.9	44	31.4	55.4	29.3	56.8	42.4	41.2	40.4	87.6	89.2	89.9	90.3	37.8	26.6	15	21.5	55.3	47.6	46.6	26.1	41.7	25
full time	20.1	8.7	34.7	35.1	51.7	31.6	51.4	28.8	46.6	43.2	34.1	32.9	85.4	80.7	89.8	87.4	20.7	18.3	16	21	na	38.6	38.3	20.4	34.1	19.3
part time	16.7	3.1	22.3	38.6	47.9	26.2	38.3	22.6	17.1	23.3	20.3	26.3	93	72.7	79.6	75.3	16.5	14.3	0	15.9	na	22.2	17.2	12.8	12	9.1
private sector	17.8	5.3	11.8	19.1	34.2	20.4	30.2	18	30.5	23.7	26.1	23.4	78.3	69.6	83.9	80.4	10.5	12.8	11.9	17	na	28.3	30.3	16.3	13.2	9.6
public sector	26.3	17.9	54.6	52.4	74.5	55	78.7	49.2	65.1	66	40	43.4	95.4	89.6	91.9	92.7	34.9	24.8	26	34.2	na	48	46.5	27.3	36.5	26.8
secondary education	24	9.4	34.1	41.3	52	26.6	48.1	29.9	38.3	38.9	25.9	na	82.4	69.2	82.7	85.2	18.8	12.7	12.4	22.3	44.3	35.1	33.3	5.4	38.5	15.7
college degree	8.1	9.7	32.9	31.9	60	35.6	47.1	32.1	59.6	41.5	38.3	22.5	83	78.4	90.4	78.8	13.8	17	12.7	16.5	57.4	26.8	21	18.5	30.2	20.6
ICTWSS DATA																										
DENSITY RATES	18.0	12.5	35.6	29.9	46.3	22.7	46.2	28.8	56.1	38.1	24.7	22.4	87.4	78.0	75.6	71.7	8.3	8.4	16.1	16.0	42.5	34.0	34.7	22.1	na	14.1
COVERAGE	21	14	37	36	85	80	65	35	na	na	78.85	84	89	92	73	80	81	82	79	82	85	82	75	63	na	na
BARG. COORDINATION	1	1	1	1	4	2	1	1	4	5	4	4	3	3	3	3	2	2	3	4	2	4	4	4	2	2
UNION CENTRALISATION	0.26	0.29	0.35	0.44	0.52	0.29	0.29	0.29	0.39	0.50	0.60	0.67	0.50	0.52	0.47	0.46	0.24	0.22	0.35	0.40	0.33	0.37	0.38	0.44	na	0.23

Source: density rates computed from ISSP (various surveys) – union presence measures from ICTWSS database.

Table 2 – Summary dynamics of inequality and union presence

country	inequality trends 80/90	inequality trends 90/00	union presence trends 80/90	union presence trends 90/00
Australia	↘	↗	↘	↘
Austria	↘	↗	↘	↘
Belgium	↘	na	→	↘
Canada	↘	↗	→	↘
Czech Rep	na	↗	na	↘
Denmark	↗	→	↘	↗
Finland	→	→	↗	↘
France	→	↘	↘	↘
Germany	→	↗	↘	↘
Hungary	↗	↗	na	↘
Ireland	↘	↗	↘	↘
Italy	↗	↗	→	→
Japan	→	→	↘	↘
Netherlands	↗	↗	→	→
New Zealand	↗	↗	↘	↘
Norway	→	→	→	→
Poland	↗	↗	na	↘
Portugal	↗	↘	↘	↘
Slovakia	na	↗	na	↘
Slovenia	na	→	na	↘
Spain	↗	↗	↗	→
Sweden	→	→	↗	↘
Switzerland	↗	↗	↘	→
United Kingdom	↗	↗	↘	↘
United States	↘	↗	↘	↘

inequality	union presence	1980s	1990s
↗	↘	5	12
↗	↗ or →	5	4
↘ or →	↘	7	7
↘ or →	↗ or →	5	1

Table.1 – Pair-wise correlations between inequality and union presence

	union density	Bargaining coverage	wage coordination	kaitz index (minimum/median)
st.dev.log wage ISSP	-0.5005*	-0.6268*	-0.3923*	-0.1248
st.dev.log wage LIS	0.3318*	-0.3845*	-0.0475	-0.4622*
p90p50 OECD	-0.6710*	-0.4983*	-0.4907*	-0.2940*
p50p10 OECD	-0.5758*	-0.6512*	-0.5529*	-0.4420*
Gini on wages LIS	-0.0699	-0.6842*	-0.3686*	-0.6383*

* significant at 5%

Table 4 – Correlations with standard deviation of log-earnings

	1	2	3	4	5	6	7	8	9	10	11
	total economy	**total economy**	**total economy**	**total economy**	**total economy**	**total economy**	**total economy**	**total economy**	**total economy**	**public admin**	**public admin**
union density ISSP data	-0.0342			-0.0589			-0.0821		-0.1529	-0.1264	-0.1748
	[0.56]			[0.90]			[1.04]		[1.61]	[1.60]	[2.11]**
bargaining (or union) coverage, adjusted		-0.0023			-0.0029			-0.0029	-0.0024		
		[2.34]**			[2.80]***			[2.81]***	[2.29]**		
coordination of wage bargaining			-0.0016			-0.0003	-0.0029	-0.0008	-0.0019		-0.0132
			[0.25]			[0.05]	[0.46]	[0.09]	[0.21]		[1.60]
minimum wage to the median OECD				-0.0784	-0.107	-0.0838	-0.0927	-0.1067	-0.1213	-0.1494	-0.1557
				[1.77]*	[2.19]**	[1.86]*	[2.00]**	[2.17]**	[2.29]**	[2.88]***	[2.95]***
Observations	283	240	283	283	240	283	280	240	239	267	264
R^2	0.87	0.88	0.87	0.87	0.88	0.87	0.87	0.88	0.88	0.79	0.8
Log likelihood	423.35	355.95	422.63	424.8	357.41	424.11	421.02	357.42	357.27	375.29	374.95

Robust t statistics in brackets - * significant at 10%; ** significant at 5%; *** significant at 1% - country and year controls included – minimum wage = 0 when absent

Table 5: Correlations between union presence (ICTWSS) and other measures of inequality

	p90/p50 decile ratio			p50/p10 decile ratio			return to education		
	1	2	3	4	5	6	7	8	9
union density x group1	-0.0028		0.0052	0.002		0.0062	-0.0241		-0.0227
	[1.93]*		[2.78]***	[1.02]		[2.14]**	[0.47]		[0.40]
union density x group2	0.0025		-0.0006	0.0069		0.0037	-0.0246		0.0587
	[1.68]*		[0.39]	[3.15]***		[2.03]**	[0.47]		[1.11]
union density	-0.0037		-0.0039	-0.0064		-0.0079	-0.0048		-0.0316
	[3.14]***		[3.49]***	[3.75]***		[5.39]***	[0.09]		[0.64]
bargaining (or union) coverage x group1		-0.0054	-0.0087		-0.0068	-0.0081		0.0018	0.0021
		[5.03]***	[5.86]***		[5.07]***	[3.76]***		[1.64]	[1.87]*
bargaining (or union) coverage x group2		-0.0057	-0.006		-0.0055	-0.0062		0.0001	-0.0003
		[4.07]***	[4.49]***		[2.88]***	[3.11]***		[0.10]	[0.20]
bargaining (or union) coverage, adjusted		0.0006	0.0021		0.0045	0.0059		-0.0018	-0.0019
		[0.65]	[2.37]**		[4.65]***	[6.31]***		[1.98]**	[2.00]**
coordination of wage bargaining x group1	-0.0014	-0.0034	-0.0051	0.0326	0.0116	0.0147	-0.0127	-0.0056	-0.0046
	[0.15]	[0.39]	[0.59]	[2.73]***	[0.93]	[1.18]	[3.49]***	[1.57]	[1.23]
coordination of wage bargaining x group2	-0.0136	-0.0246	-0.0118	0.012	-0.0088	0.0078	-0.0019	-0.0033	-0.0013
	[1.65]	[2.63]***	[1.40]	[0.98]	[0.97]	[0.88]	[0.51]	[0.94]	[0.36]
coordination of wage bargaining	0.0014	0.0075	0.007	-0.0197	0	-0.0027	0.0048	0.0034	0.003
	[0.23]	[1.08]	[1.01]	[3.18]***	[0.00]	[0.46]	[2.16]**	[1.70]*	[1.24]
minimum wage to the median OECD	-0.0819	-0.0759	-0.1156	-0.1426	-0.0653	-0.1118	-0.0985	-0.0933	-0.1074
	[3.61]***	[3.22]***	[5.12]***	[3.56]***	[2.12]**	[3.70]***	[4.71]***	[3.73]***	[4.02]***
Observations	377	365	353	380	369	356	265	236	234
R^2	0.94	0.95	0.96	0.9	0.93	0.94	0.7	0.74	0.75
Log likelihood	640.46	654.52	671.76	465.91	526.81	521.63	754.84	686.18	682.79

Robust t statistics in brackets - * significant at 10%; ** significant at 5%; *** significant at 1% - country and year controls included – minimum wage = 0 when absent - Group 1 of countries includes countries with coverage below 50% (United States, Japan, Canada, Czech Republic, Poland, Hungary, Slovakia, New Zealand, United Kingdom, Switzerland). Group 2 includes countries with coverage above 50% and excess coverage (=coverage-density) above 50% (Slovenia, Australia, Netherlands, Austria, Spain, France, Germany, Portugal). The residual group is composed by Belgium, Denmark, Sweden, Finland, Norway and Italy

Table 6 – Gender differential (estimated including age, age squared, part-time, education and union membership)

	1	2	3	4	5	6	7	8	9	10	11	12
union density ISSP	0.1173			0.1304			-0.0987			-0.0421		0.118
	[4.22]***			[4.25]***			[1.30]			[0.43]		[0.89]
bargaining (or union) coverage, adjusted		0.0024			0.0025			-0.0026			-0.0027	-0.003
		[7.02]***			[7.07]***			[1.52]			[1.54]	[1.70]*
coordination of wage bargaining			0.0136			0.0131			-0.0076	-0.0096	-0.0054	-0.0061
			[2.51]**			[1.93]*			[1.01]	[1.23]	[0.50]	[0.55]
minimum wage to the median OECD				0.0205	0.0513	-0.0067	0.1193	0.0249	0.1218	0.1206	0.0273	0.0412
				[0.65]	[1.69]*	[0.19]	[1.98]**	[0.30]	[1.82]*	[1.77]*	[0.33]	[0.48]
Country fixed effects	no	no	no	no	no	no	yes	yes	yes	yes	yes	yes
Observations	278	236	279	278	236	279	278	236	279	275	236	234
R^2	0.12	0.31	0.11	0.13	0.31	0.11	0.69	0.71	0.69	0.69	0.71	0.72
Log likelihood	195.82	183.25	195.36	195.96	184.42	195.37	340.08	287.78	341.67	336.39	287.89	285.07

Robust t statistics in brackets - * significant at 10%; ** significant at 5%; *** significant at 1% – Year fixed effect included – weighed by 1/s.e. of estimate

Appendix

Data on earnings inequality are from three different sources:
1) The *Luxemburg Income Study* (LIS) reports individual information on earnings, employment status, gender, age, educational attainment, occupation and sector of employment (unfortunately not in a consistent way across countries or years). We have included 11 countries for overall 66 surveys covering the period 1967-2003. The countries are Australia (6), Austria (2), Canada (7), Germany (7), Italy (8), Netherlands (4), Norway (5), Spain (4), Sweden (7), United Kingdom (8) and United States (8).
2) The *International Social Survey Programme* (ISSP) contains information on earnings, employment status, gender, age, years of education, public or private sector, and individual union membership. In most waves earnings are collected in categories; we have recoded the data replacing with midpoint values, but this obviously reduces measured inequality. It can be noticed that ISSP data source constantly underestimate earnings inequality when compared to the LIS dataset, due to the original categorical nature of the data. We have included 24 countries for overall 282 surveys covering the period 1985-2004. The countries are Australia (16), Austria (14), Canada (9), Czech Republic (11), Denmark (7), Finland (5), France (8), Germany (joining East and West Germany, which are separately sampled since 1990 -17), Hungary (18), Ireland (11), Italy (9), Japan (12), Netherlands (7), New Zealand (14), Norway (16), Poland (13), Portugal (7), Slovakia (6), Slovenia (14), Spain (10), Sweden (10), Switzerland (8), United Kingdom (20), United States (20). One tenth of the surveys (32 out of 282) overlap with LIS data.
3) The OECD database on earnings (updated July 2007 – see table H in OECD *Employment Outlook* 2007) includes earnings deciles by gender, though collected according to different definitions (gross/net, yearly/monthly/daily/hourly, types of workers included). This database covers 23 countries over the period 1960-2005, for overall 420 observations. The countries Australia (30), Austria (1), Belgium (8), Canada (19), Czech Republic (6), Denmark (21), Finland (22), France (43), Germany (19), Hungary (10), Ireland (5), Italy (11), Japan (31), Netherlands (29), New Zealand (17), Norway (10), Poland (23), Portugal (5), Spain (3), Sweden (27), Switzerland (11), United Kingdom (36) and United States (33).

While for earnings inequality we have to rely on scattered evidence from multiple sources, with respect to union presence we have made use of data from a consistent source for institutional measures:
4) the database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS), covering 26 countries between1960 and 2006, compiled by on author (Jelle Visser) in the framework of the NEWGOV project, financed under the EU FP7 research framework, on "Distributive Politics, Learning and Reform: National Social Pacts". All countries correspond to the ISSP sample but Greece.

Among other institutional variables we have considered, we have included
5) the Kaitz index (namely the ratio of the minimum wage established by the law and the median wage) is available for a subset of 16 countries (Australia, Belgium, Canada, Czech Republic, France, Hungary, Ireland, Japan, Netherlands, New Zealand, Poland, Portugal, Slovakia, Spain, United Kingdom and United States) spanning the period 1960-2005. For the remaining countries the minimum wage has been set equal to zero.

In order to provide some descriptive evidence, we have computed the (unweighed) averages of some inequality measures in table A.2, including **standard deviation of (log) earnings, decile ratios** (9th to median and median to 1st decile). The same variables are plotted in figures A.1 and A.2 (which also report **the Gini concentration index** from LIS database).

With respect to wage bargaining, we have considered three measures of union presence:
i) **union density**, the fraction of workers joining the unions, which reflects both the popularity of unions' arguments and the strength they possess when confronting their counterparts.[21] The plots of alternative estimates of union density are in figure A.3.
ii) **union coverage**, that is employees covered by wage bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining; it proxies the range of action allowed by the institutional features.[22]
iii) **coordination of wage bargaining**, which proxies the degree of similarity of wage policies followed by unions among different sectors.[23]

Unconditional sample correlations between inequality measures and union presence are reported in table **Table.1**.

Full tables used to construct table **Errore. L'origine riferimento non è stata trovata.** are reported in tables A.5-A.6-A.7. The dependent variable of this last table (the return to education estimated in ISSP data) is plotted in figure A.6, jointly with the return to age/experience. Also searching for the relative contribution of seniority in accounting for wage dynamics produced table A.8, which is commented in the main text.

Two alternative measures for the gender gap (gender differential – the percentage difference in median incomes; gender penalty, estimated from individual data) are plotted in figures A.4 and A.5. The latter is the dependent variable in the estimates of table **Errore. L'origine riferimento non è stata trovata.** in the main text.

Finally, the wage gap between union and non-union members is estimated, results are reported in figure A.7 (and also usedto depict figure **Errore. L'origine riferimento non è stata trovata.** in the main text).

[21] In the empirical analysis we consider two alternative measures of density, one obtained by aggregate data on membership and another obtained from individual responses in ISSP surveys. The two measures are strongly associated (correlation index is 0.91), and the results do not differ significantly when using either one or the other measure.
[22] This measure is available at 5-year intervals, but has been interpolated in order not to loose observations.
[23] It is based on a 5-point scale, ranging from "economy-wide bargaining, based on enforceable agreements between the central organisations of unions and employers affecting the entire economy or entire private sector, or by government imposition of a wage schedule, freeze, or ceiling." to "fragmented bargaining, mostly at company level".

Table A.2 – Earnings inequality trends (unweighed averages by decades)

	st.deviation log earnings ISSP			st.deviation log earnings LIS					p90p50 earnings OECD					p50p10 earnings OECD				
country	1980	1990	2000	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000
Australia	0.736	0.662	0.724			1.03	0.789	0.842		1.65	1.7	1.75	1.86		1.59	1.68	1.64	1.66
Austria	0.546	0.518	0.573				0.869					1.77					1.57	
Belgium											1.68	1.58				1.45	1.44	
Canada		0.634	0.601			1.128	1.247	1.339	1.78	1.79	1.83	1.82	1.83	2.4	2.09	2.36	2.2	2
Czech Rep		0.436	0.435									1.71	1.75				1.65	1.68
Denmark		0.471	0.43								1.55	1.65	1.71			1.4	1.44	1.51
Finland			0.516							1.68	1.69	1.68	1.71		1.57	1.47	1.42	1.42
France		0.567	0.543						2.04	2	1.95	1.95	1.99	1.92	1.76	1.63	1.61	1.58
Germany	0.566	0.537	0.562		0.823	0.875	1.027				1.73	1.77	1.82			1.67	1.6	1.67
Hungary	0.496	0.487	0.446								1.64	2.09	2.29			1.59	1.87	2.15
Ireland	0.585	0.615	0.55									1.99	2.01				2.01	1.79
Italy	0.552	0.446				0.596	0.623	0.667			1.57	1.69				1.46	1.4	
Japan		0.807	0.812							1.76	1.81	1.85	1.83		1.7	1.72	1.64	1.63
Netherlands	0.497	0.437	0.658			0.677	1.199			1.62	1.62	1.69	1.76		1.59	1.55	1.6	1.65
New Zealand		0.63	0.681								1.45	1.56	1.75			1.49	1.56	1.56
Norway		0.491	0.463			1.364	1.467	1.333			1.48	1.45	1.45			1.41	1.36	1.42
Poland		0.494	0.521								1.65	1.89	2.08			1.6	1.71	1.94
Portugal		0.586	0.564								2.14	2.4				1.62	1.6	
Slovakia		0.419	0.444															
Slovenia		0.491	0.485															
Spain		0.518	0.567			0.642	0.923	0.972				2.1	2.14				2.01	1.65
Sweden		0.438	0.418	1.319	1.218	1.324	1.486	1.528		1.57	1.55	1.59	1.67		1.36	1.32	1.36	1.38
Switzerland	0.676	0.735	0.771									1.69	1.74				1.59	1.48
United Kingdom	0.68	0.707	0.723	0.791	0.851	0.799	0.994			1.7	1.78	1.88	1.95		1.88	1.78	1.82	1.8
United States	0.973	0.853	1	1.386	1.343	1.358	1.269	1.201		1.94	2.03	2.16	2.27		1.92	1.99	2.07	2.07

Table A.3 –Trends in union presence

	union density (ICTWSS)					adjusted coverage (ICTWSS)					wage coordination (ICTWSS)				
country	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000
Australia	47.44	48	46.23	35	22.98	85	85	84.33	80	80	3	3	3.44	2.89	2
Austria	65.78	59.87	52.58	42.2	34.36	95	95	95.53	99	99	5	5	4.33	4	4
Belgium	40.53	49.21	52.27	54.37	51.91	81	89.27	96.33	96	96	4	3.89	4.56	4.56	4.25
Canada	28.21	33.23	34.68	34.13	30.03			37.13	36.78	36	1	2.33	1	1	1
Czech Rep				62.23	24.6				32.25	39.39				2	2
Denmark	58.13	67.24	78.12	76.35	73.54	67.7	69.6	72.67	70.47	80	5	5	3.89	3.22	3.13
Finland	38.03	62.11	69.55	78.41	73.67	95	95	95	94.72	90.36	4.2	4.11	3.67	3.67	3.88
France	19.89	21.59	14.8	9.14	8.3			74.13	79.56	82	2.2	2.33	2.33	2	2
Germany	33.13	33.69	34.44	30.35	22.78	79.6	78	75.6	68.67	63	4	4	4	4	4
Hungary				48.12	19.17				51	41.83				2	2
Ireland	53.73	60.91	60.56	52.91	38.97						1	3.33	2	4.56	5
Italy	26.78	45.19	44.21	37.96	34.18	89.9	86	84.73	82.28	82	2	2.89	2.67	3.56	4
Japan	34.59	33.95	29.25	24.33	20.03	31.4	31.2	26.27	22	21.5	5	5	5	3.89	3
Netherlands	38.25	36.52	29.34	24.72	22.43	81.17	76.67	79.6	85.11	84.71	4.2	4.11	4.33	4	4
New Zealand		58.68	60.1	32.84	22.8		70	68.8	45.83	30	3	3	3	1.22	1
Norway	58.93	54.13	57.46	57.23	54.58	65	65.67	70	71.67	72	4.8	4.89	4.33	4.67	4.5
Poland				28.53	13.8					41.5				2	2
Portugal		60.76	56.23	27.1	17.77			73.33	75			4	2.89	2.89	2.75
Slovakia				59.24	32.04				49.5	48.04				3	3
Slovenia				42.76	41.13				95	95				3.75	3.75
Spain		46.32	11	15.99	16.05			70.91	77.86	81.34		5	3.67	3	3.75
Sweden	68.64	72.95	81	84.43	77.53	70	70	72.43	89.19	91.84	5	5	4.11	3.44	3
Switzerland	33.99	30.7	28.29	22.99	20.41	60	61.33	67.73	49.94	48	4	4	4	4	4
United Kingdom	40.37	47.63	46.98	34.52	29.1	67.2	70.4	64.67	41.12	35.33	2.6	3.33	1	1	1
United States	28.59	24.36	19.25	15.19	12.82	32.2	33.2	21.73	16.54	14.17	1	1.89	1	1	1

Table A.4 – Pair-wise correlations between inequality and union presence

	union density ICTWSS	adjusted coverage ICTWSS	wage coordination ICTWSS	kaitz index (minimum/median)
st.dev.log wage ISSP	-0.5005*	-0.6268*	-0.3923*	-0.1248
st.dev.log wage LIS	0.3318*	-0.3845*	-0.0475	-0.4622*
p90p50 OECD	-0.6710*	-0.4983*	-0.4907*	-0.2940*
p50p10 OECD	-0.5758*	-0.6512*	-0.5529*	-0.4420*
Gini on wages LIS	-0.0699	-0.6842*	-0.3686*	-0.6383*

* significant at 5%

Table A.5 – Correlations with p90/p50 decile ratio – OECD

	1	2	3	4	5	6	7	8	9
union density ICTWSS x group1	-0.0024			-0.0029			-0.0028		0.0052
	[1.66]*			[2.03]**			[1.93]*		[2.78]***
union density ICTWSS x group2	0.0032			0.0019			0.0025		-0.0006
	[2.18]**			[1.29]			[1.68]*		[0.39]
union density ICTWSS	-0.0038			-0.0038			-0.0037		-0.0039
	[3.20]***			[3.17]***			[3.14]***		[3.49]***
bargaining (or union) coverage, adjusted x group1		-0.0047			-0.0046			-0.0054	-0.0087
		[4.88]***			[4.63]***			[5.03]***	[5.86]***
bargaining (or union) coverage, adjusted x group2		-0.0041			-0.0054			-0.0057	-0.006
		[3.28]***			[4.18]***			[4.07]***	[4.49]***
bargaining (or union) coverage, adjusted		0.0002			0			0.0006	0.0021
		[0.32]			[0.02]			[0.65]	[2.37]**
coordination of wage bargaining x group1			-0.0315			-0.0321	-0.0014	-0.0034	-0.0051
			[3.98]***			[4.05]***	[0.15]	[0.39]	[0.59]
coordination of wage bargaining x group2			-0.0152			-0.0154	-0.0136	-0.0246	-0.0118
			[1.99]**			[2.04]**	[1.65]	[2.63]***	[1.40]
coordination of wage bargaining			0.0054			0.0059	0.0014	0.0075	0.007
			[0.91]			[0.97]	[0.23]	[1.08]	[1.01]
minimum wage to the median OECD				-0.0906	-0.0783	-0.0377	-0.0819	-0.0759	-0.1156
				[3.95]***	[3.31]***	[1.30]	[3.61]***	[3.22]***	[5.12]***
Observations	377	365	405	377	365	405	377	365	353
R^2	0.93	0.95	0.92	0.94	0.95	0.92	0.94	0.95	0.96
Log likelihood	632.7	644.32	603.61	638.66	649.73	604.52	640.46	654.52	671.76

Robust t statistics in brackets - * significant at 10%; ** significant at 5%; *** significant at 1% - country and year controls included – minimum wage = 0 when absent
Group 1 includes countries with coverage below 50% (United States, Japan, Canada, Czech Republic, Poland, Hungary, Slovakia, New Zealand, United Kingdom, Switzerland).
Group 2 includes countries with coverage above 50% and excess coverage (=coverage-density) above 50% (Slovenia, Australia, Netherlands, Austria, Spain, France, Germany and Portugal).
The residual group is composed by Belgium, Denmark, Sweden, Finland, Norway and Italy.

Table A.6 – Correlations with p50/p10 decile ratio – OECD

	1	2	3	4	5	6	7	8	9
union density ICTWSS x group1	0.0034			0.0024			0.002		0.0062
	[1.74]*			[1.24]			[1.02]		[2.14]**
union density ICTWSS x group2	0.0081			0.006			0.0069		0.0037
	[3.77]***			[2.78]***			[3.15]***		[2.03]**
union density ICTWSS	-0.0058			-0.0057			-0.0064		-0.0079
	[3.25]***			[3.19]***			[3.75]***		[5.39]***
bargaining (or union) coverage, adjusted x group1		-0.0064			-0.0062			-0.0068	-0.0081
		[5.36]***			[5.23]***			[5.07]***	[3.76]***
bargaining (or union) coverage, adjusted x group2		-0.0046			-0.0056			-0.0055	-0.0062
		[2.48]**			[3.02]***			[2.88]***	[3.11]***
bargaining (or union) coverage, adjusted		0.0048			0.0045			0.0045	0.0059
		[5.67]***			[5.33]***			[4.65]***	[6.31]***
coordination of wage bargaining x group1			0.0083			0.006	0.0326	0.0116	0.0147
			[0.77]			[0.56]	[2.73]***	[0.93]	[1.18]
coordination of wage bargaining x group2			0.0122			0.0117	0.012	-0.0088	0.0078
			[1.08]			[1.07]	[0.98]	[0.97]	[0.88]
coordination of wage bargaining			-0.0172			-0.0158	-0.0197	0	-0.0027
			[2.73]***			[2.60]***	[3.18]***	[0.00]	[0.46]
minimum wage to the median OECD				-0.1476	-0.065	-0.1234	-0.1426	-0.0653	-0.1118
				[3.68]***	[2.17]**	[2.92]***	[3.56]***	[2.12]**	[3.70]***
Observations	380	369	409	380	369	409	380	369	356
R^2	0.9	0.93	0.88	0.9	0.93	0.88	0.9	0.93	0.94
Log likelihood	456.21	522.6	467.53	462.3	524.44	472.43	465.91	526.81	521.63

See footnote to table **Errore. L'origine riferimento non è stata trovata.**

Table A.7 – Correlations with return to education (estimated including gender, age, age squared, working part-time and union membership) – ISSP

	1	2	3	4	5	6	7	8	9
union density ISSP x group1	0.0172			-0.0083			-0.0241		-0.0227
	[0.37]			[0.17]			[0.47]		[0.40]
union density ISSP x group2	0.0128			0.0155			-0.0246		0.0587
	[0.26]			[0.31]			[0.47]		[1.11]
union density ISSP	-0.0717			-0.0731			-0.0048		-0.0316
	[1.54]			[1.56]			[0.09]		[0.64]
bargaining (or union) coverage, adjusted x group1		0.0022			0.0023			0.0018	0.0021
		[1.94]*			[1.90]*			[1.64]	[1.87]*
bargaining (or union) coverage, adjusted x group2		0.0002			0.0006			0.0001	-0.0003
		[0.16]			[0.49]			[0.10]	[0.20]
bargaining (or union) coverage, adjusted		-0.0018			-0.0024			-0.0018	-0.0019
		[1.69]*			[2.17]**			[1.98]**	[2.00]**
coordination of wage bargaining x group1			-0.0112			-0.0119	-0.0127	-0.0056	-0.0046
			[3.08]***			[3.42]***	[3.49]***	[1.57]	[1.23]
coordination of wage bargaining x group2			-0.0036			-0.0024	-0.0019	-0.0033	-0.0013
			[0.96]			[0.66]	[0.51]	[0.94]	[0.36]
coordination of wage bargaining			0.0047			0.0047	0.0048	0.0034	0.003
			[2.29]**			[2.34]**	[2.16]**	[1.70]*	[1.24]
minimum wage to the median OECD				-0.0581	-0.0933	-0.0963	-0.0985	-0.0933	-0.1074
				[2.60]**	[3.77]***	[4.71]***	[4.71]***	[3.73]***	[4.02]***
Observations	268	236	268	268	236	268	265	236	234
R^2	0.65	0.71	0.66	0.67	0.74	0.69	0.7	0.74	0.75
Log likelihood	744.63	672.93	747.12	750.59	685.54	761.37	754.84	686.18	682.79

See footnote to table **Errore. L'origine riferimento non è stata trovata.** – weighed by 1/s.e. of estimate

Table A.8 – Correlations with explained variance of log wages (R^2) when only age and age squared are included as regressors – LIS

	1	2	3	4	5	6	7	8	9
union density ICTWSS	0.0043			0.0046			0.0046		-0.0039
	[2.15]**			[2.22]**			[1.96]*		[0.94]
bargaining (or union) coverage, adjusted		0.0046			0.0047			0.0046	0.0064
		[3.40]***			[3.37]***			[3.49]***	[2.57]**
coordination of wage bargaining			0.0164			0.0161	0.016	0.0141	0.0134
			[0.79]			[0.73]	[0.68]	[0.72]	[0.76]
minimum wage to the median OECD				0.078	0.0834	0.0219	0.0571	0.0644	0.0509
				[1.01]	[1.52]	[0.25]	[0.67]	[0.97]	[0.61]
Observations	61	61	61	61	61	61	61	61	61
R^2	0.66	0.74	0.64	0.66	0.75	0.64	0.68	0.76	0.77
Log likelihood	99.49	107.62	98.18	100.02	108.43	98.22	101.82	110.25	111.7

Robust t statistics in brackets - * significant at 10%; ** significant at 5%; *** significant at 1% - country and year controls included

Figure A.1 – Standard deviations in (log) earnings

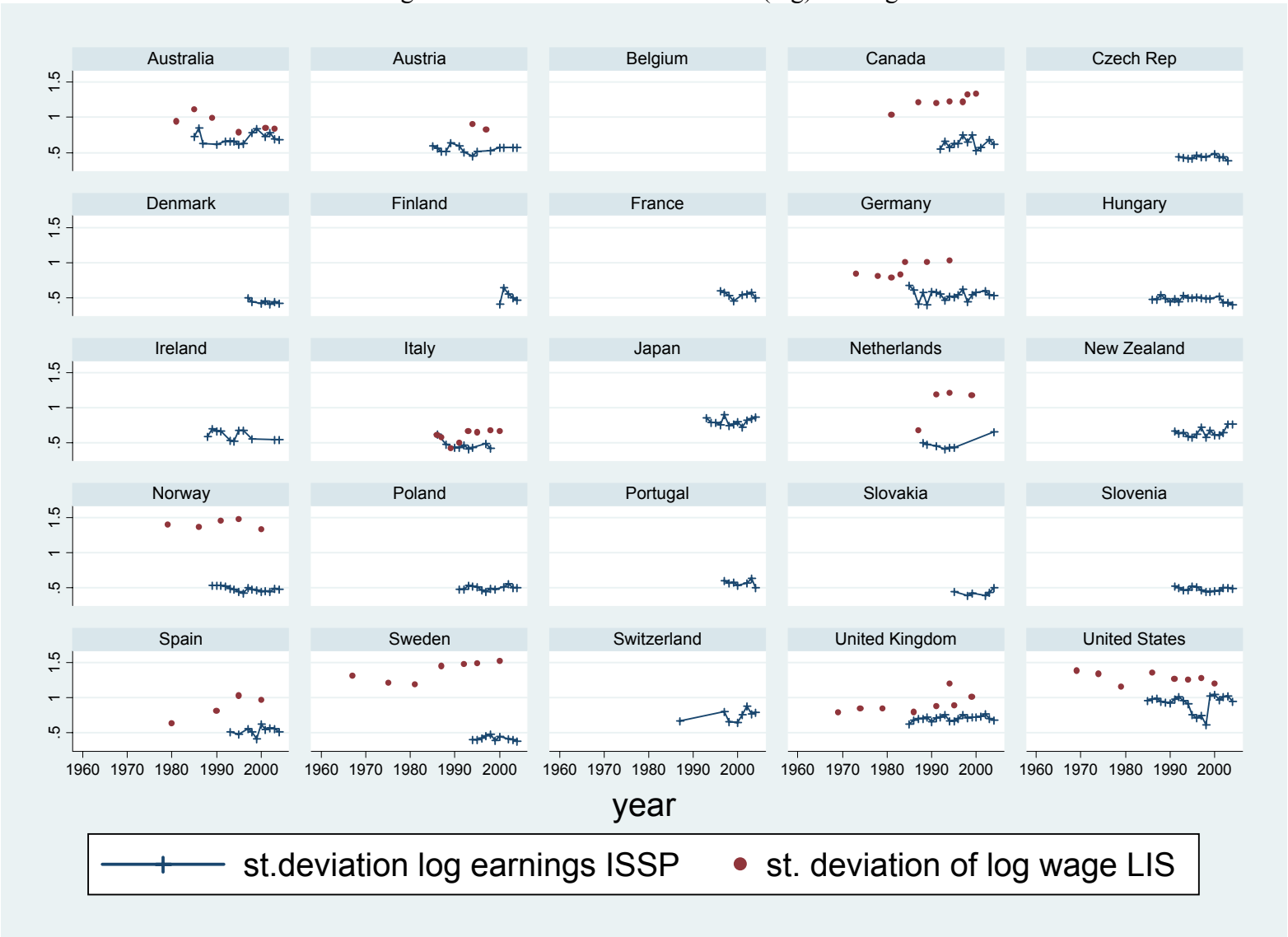


Figure A.2 – Decile ratios (OECD) and Gini concentration index (LIS) - earnings

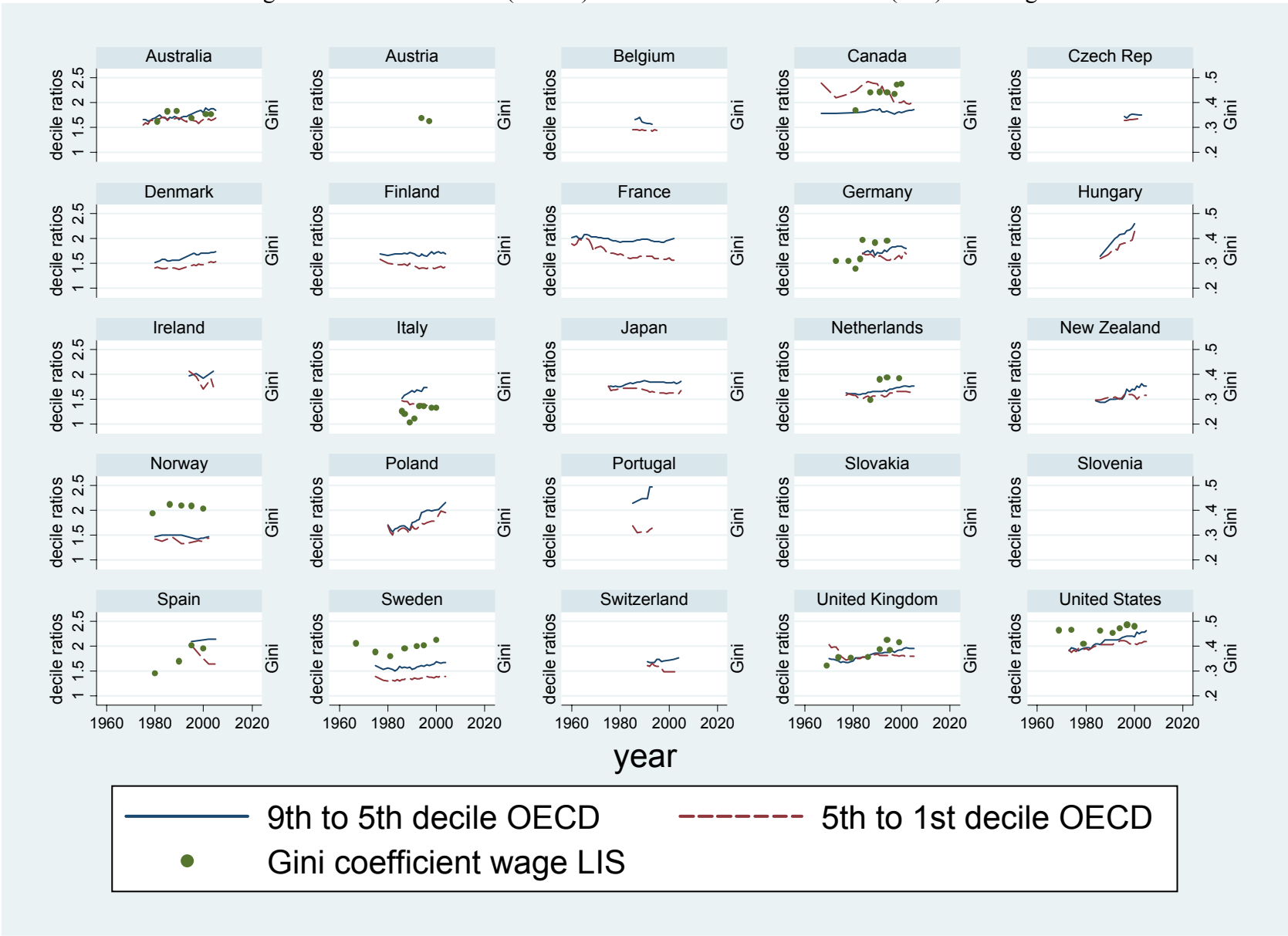


Figure A.3 – Union density (membership/dependent employment)

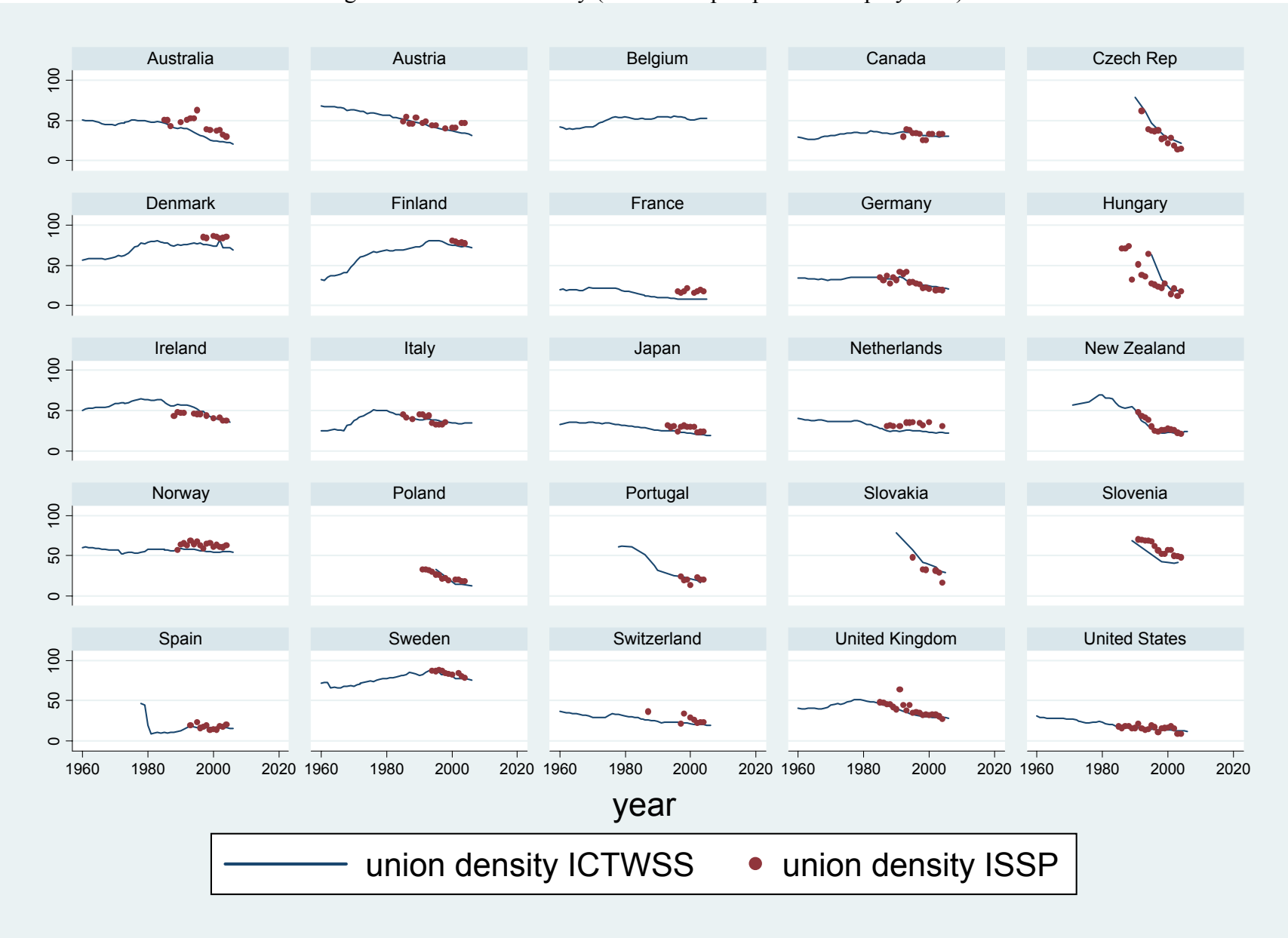


Figure A.4 – Gender differential (percent points)

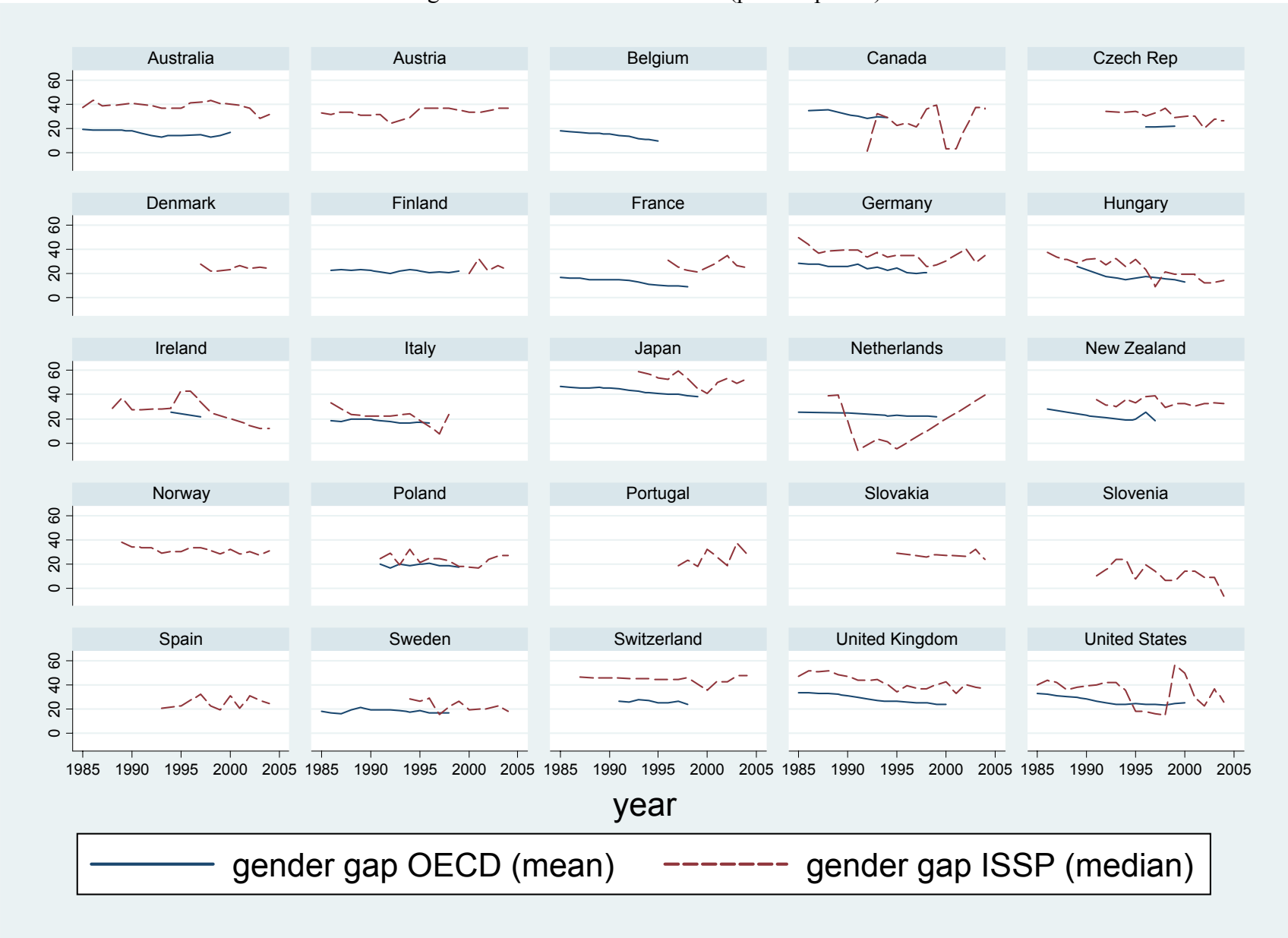


Figure A.5 – Gender penalty

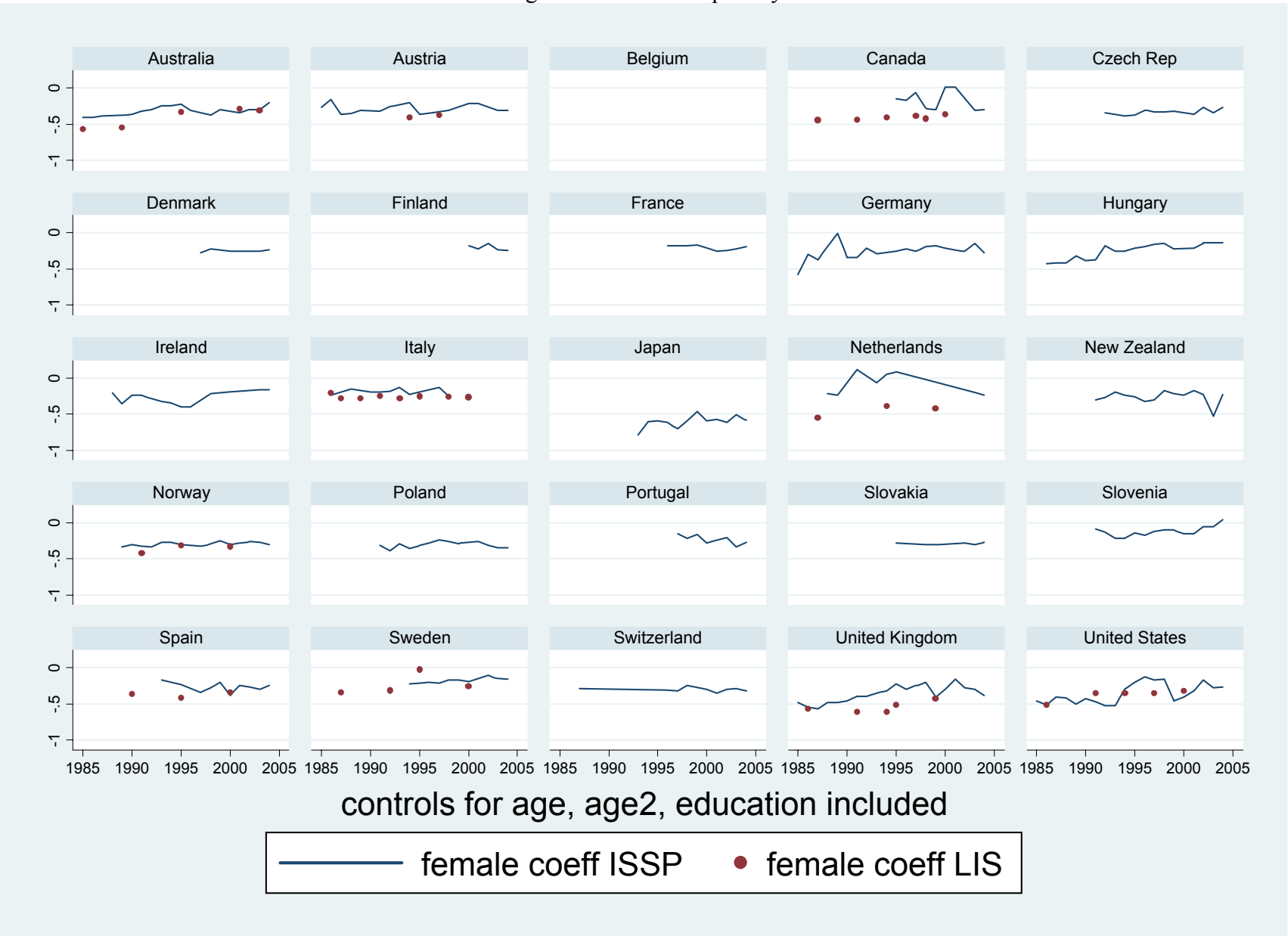


Figure A.6 – Return to age and education

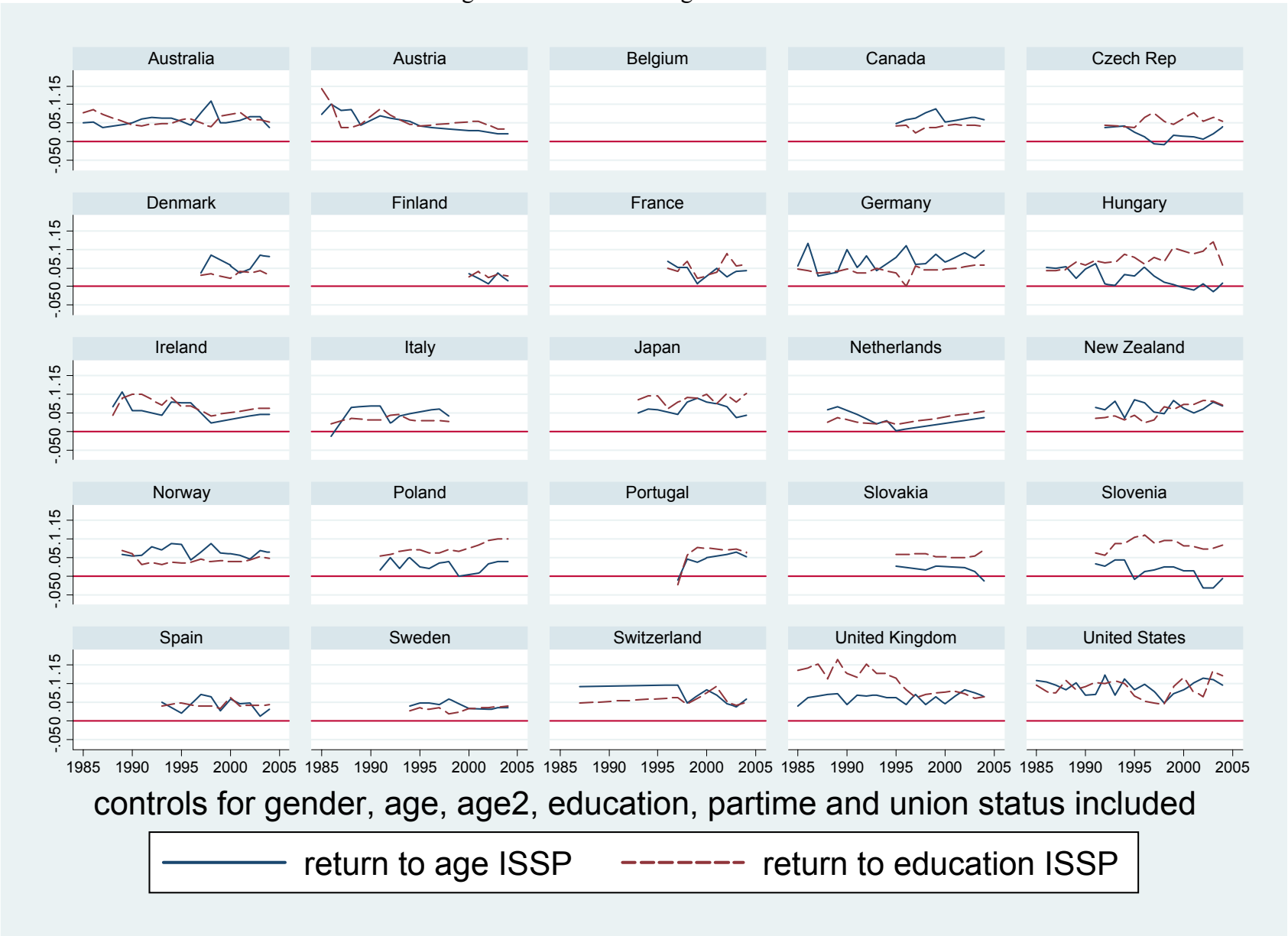
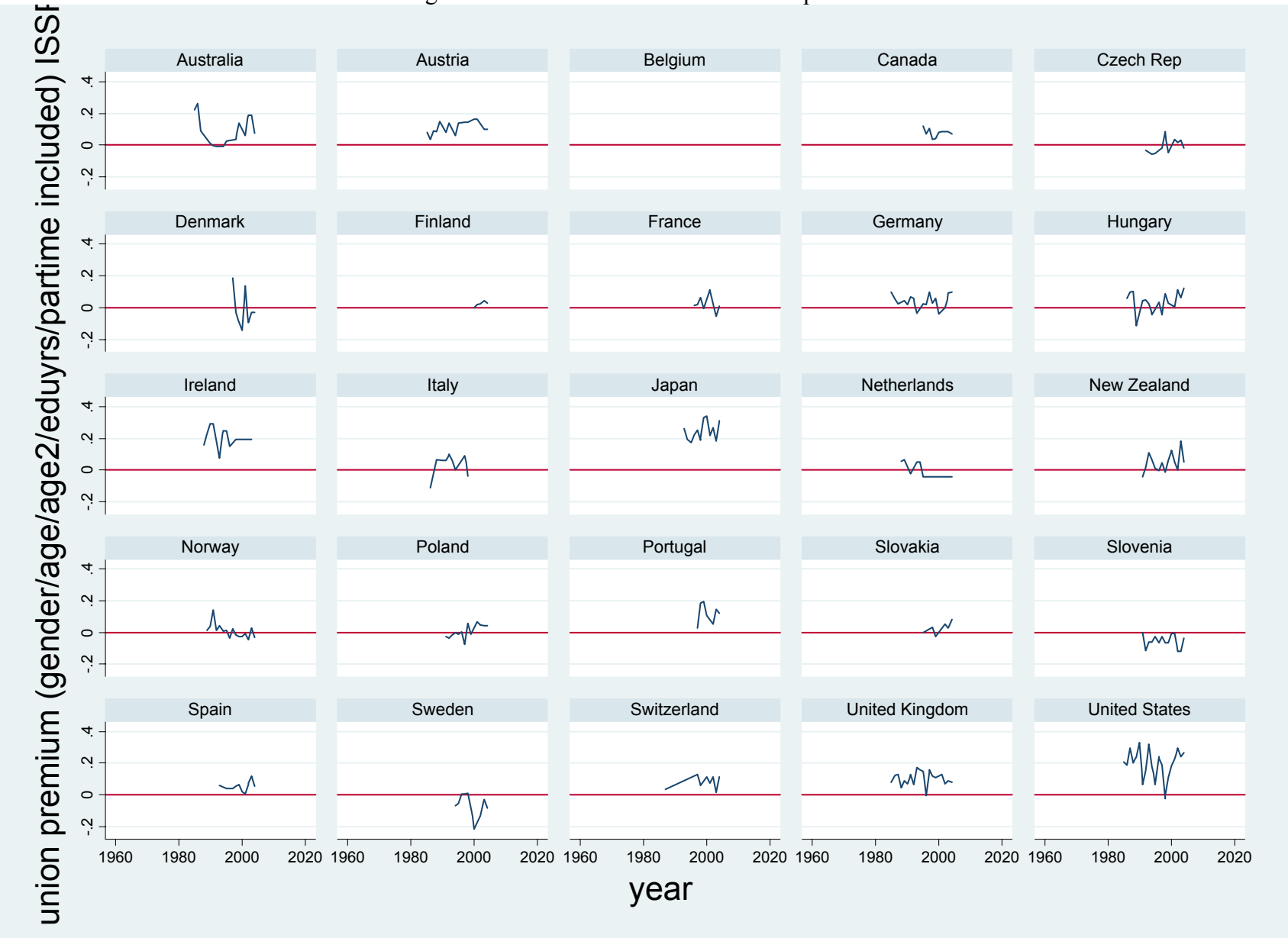



Figure A.7 – Return to union membership - ISSP