Moving Apart:

Wage Bargaining and Sectoral Wage Disparities

in Advanced Capitalist Economies

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This paper explores the role of institutional variables, specifically wage-bargaining coordination and unionization, in shaping inter-sectoral wage differentials in OECD countries over the period 1970-2007. Our core claim is that the distributive dynamics of wage bargaining were fundamentally transformed in the early-to-mid 1980s. Prior to this "structural break," strong unions and more centralized wage-bargaining arrangements served to compress inter-sectoral wage differentials. More recently, however, strong unions and centralized wage bargaining have become associated with growing inter-sectoral wage differentials.[i] This change in the effects of institutional variables was part of a broader configuration of inter-related, OECD-wide changes in labor-market conditions and the macro-economic context of wage bargaining: first, the rise of unemployment and the adoption of a "non-accommodating" macro-economic policy stance by most governments; secondly, the expansion of employment in private services and deregulation of low-skill labor markets; and, thirdly, intensified international competition in high-end manufacturing.

Our empirical analysis draws on the KLEMS database, which provides annual information on average wages in 30 sectors for 16 countries.[ii] As a first cut, we have chosen to focus on the evolution of the wage differentials between "high-end manufacturing" and "low-end services."[iii] This measure of inter-sectoral differentials is meant to capture the overlap between two distinctions that feature prominently in the comparative political economy literature: on the one hand, the distinction between export-oriented and sheltered sectors and, on the other hand, the distinction between workers with high skills of a specific nature and workers

with low skills of a general nature. As we document below, the ratio of wages in high-end manufacturing to wages in low-end services has risen in most OECD countries since the early 1980s, but there is a lot of cross-national variation in the timing and extent of this development.

The paper proceeds as follows. First, we situate our paper in relation to existing literature. Second, we develop our current thoughts on how and why the dynamics of wage bargaining have changed and specify how we measure the institutional variables of primary interest. Third, we introduce the control variables that are included in our empirical analysis. Fourth, we discuss the evolution of the ratio of wages in high-end manufacturing to low-end services. Fifth, we briefly address methodological issues. Finally, we present and discuss the results of our empirical analysis.

1. Existing literature

The attention of comparative political economists interested in distributive outcomes has recently shifted to redistributive government policies, but a fairly large literature on the distributive implications of wage-bargaining institutions emerged in the 1990s and early 2000s (e.g., Rowthorn 1992, Wallerstein 1999, Rueda and Pontusson 2000, Pontusson, Rueda and Way 2002) [More references to be added later on]. There is some debate about the relative importance of unionization and bargaining centralization, but, taken as a whole, this literature strongly suggests that both these institutional conditions, separately and in

combination, compress inter-sectoral as well as inter-occupational wage differentials or, alternatively, that they mitigate inegalitarian market forces associated with globalization and skill-biased technological change (see also OECD 2011:ch.3).

Relative to the existing literature, we seek to break new ground on several fronts. With the notable exception of Rowthorn (1992), the existing literature has sought to explain cross-national and cross-temporal trends in overall wage inequality, typically measured in terms of decile wage ratios, based on OECD data on relative wages among full-time employees. As noted earlier, our own analysis focuses on inter-sectoral differentials and ignores other important dimensions of wage inequality (between-gender differentials as well as inter-occupational differentials). This move is motivated partly motivated by the availability of good data, but also by analytical considerations.

The EU KLEMS dataset on which we draw has several notable advantages over the OECD dataset on relative earnings. While the OECD data only pertain to full-time employees, the EU KLEMS permits to calculate average hourly wages for all employees independent of their labor market status, thus including part-time and temporary workers as well. In addition, the EU KLEMS dataset covers more countries for longer periods of time than the OECD dataset. For the 16 countries included in our analysis, it allows us to generate annual observations of inter-sectoral differentials from 1970 to 2007 (N=608, with almost perfectly balanced panels for all countries with the exception of the Canada, Japan, and the US at the beginning and/or the end of the period). Finally, cross-national comparability

appears to be less of a concern with the KLEMS data, since the focus is on average sectoral wages per hour worked.[iv]

Apart from data considerations, we hope to gain analytical precision by focusing on one dimension of wage inequality. The determinants of inter-sectoral and inter-occupational differentials are likely to differ in important respects.[v] There are strong reasons to expect both unionization to be associated with compression of inter-occupational differentials, but the effects on inter-sectoral differentials are less straightforward. If unions primarily organize high-wage sectors, we would not expect unionization to be associated with compression of inter-sectoral wage differentials (cf. Freeman 1980, 1982). Similarly, there are strong reasons to expect a more coordinated bargaining structure to reduce inter-sectoral disparities. In particular, to the extent that wages are set at the national level for all sectors simultaneously, this should lead to inter-sectoral compression. However, the impact of coordinated wage bargaining on inter-occupational differences is much less clear cut. In our view, inter-sectoral wage differentials are particularly relevant to the broader literature on the implications of cross-sectoral coordination of wage bargaining for competiveness and macro-economic performance or, in other, the literature on the political economy of wage restraint (e.g., Calmfors and Driffill 1988, Soskice 1990, Hall and Franzese 1998, Iversen 1999).

We also seek to break new ground by calling into question the assumption of constant effects made by existing studies of the institutional determinants of wage inequality and, indeed, by most of the comparative political economy literature that relies on pooling of cross-sectional and time-series data to estimate causal effects.

To clarify this point, it is well known that union density has declined dramatically in most OECD countries and that wage bargaining has become less centralized in some countries since the early 1980s. Based on these observations, the existing literature would lead us to expect that wage inequality has increased since the 1980s and this is, of course, precisely what has happened. Rising inequality might thus plausibly be explained in terms of variables with constant effects taking on lower values. To the contrary, the empirical results presented in this paper indicate that the causal effects of the variables of interest have changed, such that lower values on these variables are no longer associated with more inequality. Since our dependent variable is the ratio of wages in manufacturing to low-end services rather than overall wage inequality, our results do not directly disprove the conventional wisdom of the existing literature, but they surely raises questions that need to be explored further.[vi]

We conceive this paper as part of a broader effort to reorient the comparative study of advanced capitalist political economies. For the last 10-15 years, this field of inquiry has been dominated by the "Varieties-of-Capitalism" approach (Hall and Soskice 2000). In the VofC tradition, the critical question to be asked is (always) whether or not political-economic actors, such as unions and employers, have the capacity to coordinate. In our view, coordinating capacities do matter, but coordination can serve quite different purposes. Building on and moving beyond the VofC literature, we need to ask, "what are they coordinating about?"

2. Wage-bargaining institutions and their distributive effects

As indicated above, we are primarily interested in the question of whether, how and why the distributive effects of coordinated wage bargaining have changed over time. Based on data from the well-known dataset compiled by Jelle Visser,[vii] we recode Visser's 1-to-5 measure of coordination as a 1-to-3 scale as follows: 3 if bargaining takes place predominantly at the national level; 2 if bargaining takes place predominantly at the industry level; 1 if bargaining takes place predominantly at the enterprise level. In addition, the measure of bargaining coordination is weighted by the fraction of the labor forces covered by collective bargaining agreements. This, then, is a composite measure that combines the level and reach of collective wage bargaining negotiations.[viii]

Our empirical analysis includes two additional variables that pertain to wage bargaining institutions (also from the Visser database): first, the rate of union density and, secondly, a measure of the concentration of union membership at the industry (sectoral) level (Herfindal index of intra-confederational concentration). Before justifying the inclusion of these additional variables, let us try to articulate our current thoughts about time-varying distributive effects of wage-bargaining coordination.

Coordinated wage bargaining

We believe that the existing literature correctly argues that coordinated wage bargaining served to compress inter-sectoral wage differentials in the 1960s

and 1970s. Two basic mechanisms jointly produced this outcome. On the one hand, coordinated bargaining set a floor for competition at the low end of the labor market. In countries where low-wage unions were relatively strong, most notably, the Nordic countries, this floor was progressively raised by means of wage settlements that specified minimum wage increases in absolute amounts (rather than percentages). Floor-setting was a pervasive feature of coordinated bargaining in this period. As Swenson (2002) emphasizes, many employers favored "taking wages out of competition."

On the other hand, coordinated wage bargaining imposed ceilings on wage growth in high-wage sectors or, in other words, wage restraint motivated by the need to maintain competitiveness in sectors exposed to international competition, especially export-oriented industrial sectors. Workers and unions in export-oriented sectors were keenly aware of competitiveness constraints and arguably quite willing to accommodate these constraints so long as workers and unions in other sectors of the economy did so as well. The primary purpose of cross-sectoral coordination was not to restrain the wage demands of workers in export-oriented sectors, but rather to restrain the wage demands of skilled and already well-paid workers in sheltered sectors, such as construction and, increasingly, the public sector (again, see Swenson 1991, 2002).

As we know from existing literature (especially more qualitatively-oriented case studies, such as Martin 1979), coordinated wage bargaining was always a conflictual process and in many cases generated upward pressure on average wages as workers in low-wage sectors sought to keep with "wage drift" in high-wage

sectors. Iversen (1999) argues persuasively that accommodating fiscal policies, inflation and currency depreciation played an important role in securing real-wage restraint while compressing wage differentials.

Our core claim is that logic of sectoral competitiveness, as distinct from the logic of "wage solidarity," became an increasingly prominent feature of coordinated wage bargaining in the course of the 1980s. In general, coordinated wage bargaining systems have not broken down: instead their internal dynamics changed, accommodating increased dispersion of inter-sectoral wage differentials.[ix] The wage floors as well as the wage ceilings imposed by central agreements have been significantly relaxed.   On the one hand, central agreements have increasingly specified minimum and average wage increases in percentage terms rather than absolute amounts. On the other hand, performance pay in export-oriented sectors has expanded massively, and provisions to compensate for the distributive effects of wage drift have effectively been eliminated.

This shift in the dynamics of coordinated wage bargaining can partly be attributed to changes in the macro-economic environment.   As commonly noted (e.g., McNamara 1998), the recession of 1980-82 coincided with a sharp shift in the macro-economy policy stance of many OECD governments.   Motivated by neo-liberal ideology, governments in the UK and the US led the way, but many other governments also adopted more restrictive, less accommodating, fiscal and monetary policies at this time.   At the same time, and partly as a result of macro-economic policy changes, the recession of 1980-82 triggered a sharp increase of the

"equilibrium rate of unemployment," weakening the bargaining power of organized labor in general and, more importantly, the bargaining power of unskilled workers.

The "sea change" of the 1980s can also be attributed to the intensification of competitive pressures. Most obviously, workers and unions in export-oriented sectors have come under increasing pressure to exercise wage restraint in order to preserve employment. As illustrated most clearly by the German case, they have responded to these pressures by joining with export-oriented employers in an effort to restraining wages in sheltered sectors to an even greater extent. Arguably, workers and unions in export-oriented have become prisoners of their own success in this respect. As the wage gap between export-oriented manufacturing and private services has grown, there are fewer attractive employment opportunities outside export-oriented manufacturing and, as a result, the need to make concessions to employers has become even more pressing.

In our view, it is important to recognize that the logic of competitiveness also operates in private services. In addition to rising unemployment, deregulatory reforms have expanded the opportunity for employers to hire workers on fixed-term contracts or outsource labor to employment agencies. Collective bargaining contracts only partially regulate wages in this "atypical" segment of the labor market. Thus unions in low-skill service sectors are also under pressure to engage in concessions in order to preserve employment and unionization within their own domain.

In short, we believe that decentralized and centralized bargaining systems alike have accommodated wage dispersion generated by market forces. The

arguments sketched above lead us to expect that coordinated wage bargaining had significant equalizing effects in the 1970s, but not since the early (or mid-) 1980s.

Unionization

Unionization features prominently in the literature that explores institutional determinants of overall wage inequality. There are straightforward reasons to expect unionization to be associated with compression of inter-occupational or, in other, *intra*-sectoral wage differentials. The standard motivation for this expectation follows the logic of the Meltzer-Richard model (Meltzer and Richard 1981): union wage policy reflects the preferences the preference of the median union member and the median union member will typically benefit from compression of wage differentials. As Freeman (1980, 1982) points out, however, the implications of unionization for inter-sectoral differentials are more ambiguous. On the assumption that unionization generates a wage premium, unionization should be associated with inter-sectoral dispersion (rather than compression) if unions primarily organize high-wage sectors. Focusing on the gap between manufacturing sectors and low-wage service sectors, we would expect the effects of overall unionization to be conditional on relative unionization rates in these labor-market segments.

While Visser's database provides some data on union density by sector and the sectoral composition of union membership, these data are very fragmentary. To incorporate such data into our analysis of inter-sectoral wage differentials over the period 1970-2007 would require us to interpolate or extrapolate observations for more than three-fourths of our country-year observations. For the time being, we

simply include overall union density, but we allow the effects of this variable (like the other variables in our model) to vary over time.

There can be little doubt that manufacturing industry has been the historical core of organized labor. In every country for which we have data on this for the early 1970s, union density for manufacturing exceeded union density for the labor force as a whole by a significant margin. At the same time, it seems clear that most of the OECD-wide increase in union density that we observe from 1965 through the early 1980s involved the unionization of workers outside manufacturing. It was primarily in the public sector that unionization increased in this period, but to the extent that pubic-sector employers compete for labor with employers in private services it seems reasonable to suppose that unionization of public-sector sector workers had important spill-over effects for private services (more on this below). Arguably, workers in low-end private services benefitted from the increase in the bargaining strength of public-sector workers. On these grounds, we expect union density to have been associated with smaller wage differentials between manufacturing and low-end services in the 1970s and early 1980s.

In most the OECD countries, union density peaked some time between 1978 and 1985. For our purposes, post-1985 developments present a more mixed picture than developments over the period 1965-85. In some countries (Canada, France, Ireland, the UK and the US), union density in manufacturing has declined relative to (declining) overall union density, but in other countries (most notably Austria, Belgium and Germany) union density declined less than overall union density. In view of these divergent trajectories, we do not have strong prior expectations

regarding the effects of unionization on inter-sectoral wage differentials in the post-1985 period.

Union concentration

Some of the existing literature argues that concentration of union membership is an important feature of collective bargaining arrangements, providing the basis for informal coordination that is not captured by measures that focus on the level of bargaining or the centralization of authority within union confederations and their national affiliates (see, most notably, Golden 1993). For our purposes, the critical question is whether concentration strengthens the relative bargaining power of workers/unions in low-wage services or high-wage manufacturing and how, if at all, its effects have changed over time.

Over the time period covered by our analysis, union mergers would appear to be the principal source of change in concentration ratios. Union mergers became a widespread to declining membership and other challenges confronting unions from the mid-1980s onwards. The secondary literature that we have consulted suggests that mergers have been most prominent outside the manufacturing sector. Most importantly perhaps, a number of new (merged) unions, such as ver.di in Germany, cross the boundary between public and private services. To extent that this pattern holds more generally, we might expect union concentration at the sectoral level be associated with compression of inter-sectoral wage differentials in the post-1985 period.

3. Control variables

Based on existing literature, it is easy to identify a series of "non-institutional" (or perhaps "economic") variables that might plausibly influence wage differentials between high-end manufacturing and low-end services. Ideally, we would like to have reliable measures of how much labor demand for manufacturing shifted relative to labor demand for services, and of how much labor supply for manufacturing shifted relative to labor supply for services. However, such measures are not available. Therefore, we have to use proxies for relative demand and supply shifts. Our models include three control variables.

First, we control for the national rate of unemployment as a percentage of civilian population from the OECD database. Unemployment signals an excess of labor supply relative to labor demand. If this excess supply is predominantly located in the service sector, unemployment will dampen the relative wage of service sector workers relative to manufacturing workers, thus widening inter-sectoral differentials. If, on the contrary, the workers in excess supply are predominantly manufacturing workers the opposite will happen and inter-sectoral differentials will shrink. If there is no sectoral bias of unemployment the impact on differentials will be zero. Our working hypothesis is that workers in low-end services tend to be less skilled than workers in manufacturing. To the extent that labor market shifts in the past 30 years have been unfavorable to low-skilled workers, we expect unemployment to be associated with greater wage differentials between manufacturing and services, at least from the 1980s on.

Our second control variable is hours of work in the public administration, education, health and social work sectors expressed as a percentage of total hours of work.[x] We conceive of this variable as a proxy for the size of the public sector, which we treat as an exogenous variable here. This is, of course, an imperfect proxy for there are some countries (most obviously the US) in which some education and most health services are provided by the private sector. In most countries, however, the public sector accounts for the lion's share of employment in these sectors. Even in countries with significant presence of private enterprises, public-sector pay and employment practices are likely to affect all employees in these sectors. In the US, private schools (hospitals) compete with public schools (hospitals) for teachers (nurses) and would lose their competitive edge if they did not match public-sector salaries.

Relative to private employers in service sectors, public-sector employers have clearly been more favorable to unions. The available evidence also suggests that inter-occupational wages differentials in the public sector tend to be more compressed than inter-occupational differentials in the private sector (for cross-national evidence, see Gornick and Jacobs 1997).

The relevance of the public sector for wage differentials between manufacturing and low-end services hinges on competition in particular segments of the labor market. If the share of public sector workers increases, this will create relative scarcity in manufacturing or private services. The sectoral labor supply curve will shift to the left, i.e. workers will ask a higher wage for a given quantity of work. If the relative scarcity occurs in private services, wage differentials between

manufacturing and services will tend to decline. The opposite will occur if relative

scarcity occurs in manufacturing. To the extent that skills in manufacturing are

more specific than skills in services, relative scarcity seems more likely to involve

private services than manufacturing. In other words, we hypothesize that

substitutability between private service and public service workers is greater than

substitutability between public service and manufacturing workers.

On account of more commensurate skill profiles, as well as the compression

of inter-occupational differentials characteristic of the public sector, our working

hypothesis is that the expansion of public-sector employment tends to boost wages

in private services, including low-end services. To the extent that international

competition imposes a ceiling on wage growth in manufacturing sectors and

prevents manufacturing workers to make up for lost ground relative to private

service workers, the overall effect should lead to compression of wage differentials

between manufacturing and private services.

Finally, we include exports to OECD countries in percent of GDP as a control

variable.   All other things being equal, we expect the export share of GDP to be

associated with greater wage differentials between manufacturing and services. If

external demand for domestic products increases (i.e. exports grow as a share of

GDP), this will shift labor demand in the manufacturing sector to the right relative to

labor demand in the service sector, i.e. manufacturing employers will be willing to

pay more for given quantities of work.

We do not conceive of the export share as a strictly exogenous variable but as

a predetermined variable. The export share is probably endogenously determined

by inter-sectoral differentials if high (low) wage differentials between manufacturing and services increase (decrease) the export share of GDP by increasing (decreasing) the competitiveness of manufacturing. To rule out concerns about endogeneity, specifying the timing of these mutual effects is crucial. On the one hand it seems plausible to assume that a shock that increases foreign demand for domestic product simultaneously increases labor demand in the manufacturing sector. This leads to a simultaneous increase in the relative manufacturing wage in the same period. On the other hand, it also seems plausible to assume that the impact of wage differentials on exports operates with a lag of one year and possibly more if wages are set through multi-year contracts: higher (lower) sectoral wage differentials this year influence the higher (lower) export share of next year or of several years in advance. Hence it seems both correct to consider the export share variable as predetermined and to model the effect of export share on sectoral differentials as simultaneous. However, we will also estimate a model where the export share is lagged one year to rule out concerns that part of the effect of sectoral differentials on export share is simultaneous.[xi]

Arguably, we should also control for immigration and FDI flows, and for the dramatic expansion of fixed-term employment over the last two decades. We have not been able to identify good data on these variables for the entire period 1970-200t. To mitigate the potential problem of missing variables we estimate our models with country and time dummies. Let us also reiterate that our analysis focuses on over-time changes in the effects of institutional variables. Our analysis surely omits some variables that shape inter-sectoral differentials, but we doubt

that the inclusion of these variables would alter our findings pertaining to over-time changes in the effects of institutional variables.

4. **The evolution of inter-sectoral wage differentials**

The graphs in the appendix show the evolution of the ratio of wages in high-end manufacturing to wages in low-end services in each of the sixteen countries included in our analysis. (Note the scale of the vertical axis differs across these graphs). Focusing on trajectories over the period 1970-2006, our cases can be grouped as follows.

To begin with, we observe a remarkably steady rise of inter-sectoral wage differentials in Austria, Belgium, Denmark, Germany and France. We also observe some increase in the manufacturing-to-low-end-services ratio in Finland and Spain, but stability since the mid-1970s seems to be the distinguishing characteristic of these two countries. (The sharp decline in Finland in the early 1970s is presumably due to some sort of measurement error).

A third group of countries is characterized by rising differentials in the 1970s and 1980s followed by stability in the more recent period. This group includes Canada, Italy and Japan. In a fourth group, the evolution of the manufacturing-to-low-services is U-shaped (decline in the 1970s and 1980s, followed by sharp rise in the more recent period). This group includes the Netherlands, the UK and the US. Australia and Sweden conform to the same pattern from the late 1970s onwards, but in both these countries we observe an initial rise wage differentials in the first

half of the 1970s. Finally, Ireland stands out as a very case in that it is the only country in which the manufacturing-to-low-end-services ratio has decline since 1990.

5. Model Specification

The basic specification of our models of inter-sectoral wage differentials is the following:

$$diff_{i,t} = a_i + t_t + X^{'}\beta_t + \varepsilon_{i,t}$$

where *diff* is the wage differentials between manufacturing and private service sectors, *i* indexes countries, *t* years, *X* is a matrix of economic (unemployment rate, public sector employment, and exports as a percentage of GDP) and institutional variables (bargaining coordination, union density, and union concentration), and ε is the error term.   As is standard practice in comparative political economy, we assume that the effects of variables do not vary across countries – the CPE literature argues that different countries have different institutional characteristics (or endowments) but not that the effects of institutions vary across countries. However, and this is the main peculiarity of the model specification, we let coefficients vary over time (β_t). The model controls for country fixed effects, capturing time-unvarying characteristics of countries that affect inter-sectoral differentials. Through the time dummies, the models also control for time-varying shocks (e.g. increases in the price of raw materials, or global shifts in international

trade) that affect all countries simultaneously and that may have an impact on sectoral differentials.

The models are estimated by OLS. However, we do not assume that the error term is i.i.d. To correct simultaneously for cross-sectional correlation of the errors, country-specific heteroskedasticity, and serial correlation (up to the fourth lag), we use Driscoll and Kraay (1998)'s standard errors. The results are essentially the same when we use Newey-West standard errors (which correct for panel-specific heteroskedasticity and serial correlation but not for cross-sectional correlation of the errors).

[The next iteration of the paper will provide formal tests of the various violations of i.i.d. errors as well as a discussion of stationarity/cointegration issues, and of why we don't estimate a dynamic model. For now it suffices to say that we have explored the non-stationarity issue and although we haven't gone to the bottom of it, the null of all series being non-stationary was rejected. In addition, when we estimated our regressions the null that the error term of the regression was non-stationary for all panels was rejected as well. In brief, non-stationarity and/or lack of cointegration do not seem crucial concerns. As to why we don't estimate a dynamic model to mop up serial correlation, the answer is twofold: 1) we are interested in the long-term effects of the variables and 2) we have no hypothesis about the dynamics of the adjustment to shocks. Therefore we prefer to use OLS – which is supposed to provide consistent coefficients even when errors are not i.i.d. – and to correct the standard errors through a form of robust estimator of the variance-covariance matrix.]

6. Empirical results and discussion

We begin by estimating a model that constrains coefficients to be the same over time. The results are reported in Table 1, column 1. For reasons discussed above, this is not our preferred model and we only pay cursory attention to it. It shows that, over the whole period, wage coordination is significantly positively associated with manufacturing sector differentials over private services wages; that the unemployment rate and the export share both have a positive impact on the differential; that increases (decreases) in public sector employment, on the contrary, boost (dampen) the relative wage of service sector workers thus impacting negatively on the differential; and that the effect of union density is insignificantly different from zero. Column 2 shows that these results remain essentially the same when the export share is lagged.

Table 1 about here

However, the assumption of constant coefficients is untenable. This emerges clearly when comparing columns 2 and 3, where the same model is estimated for two different time frames: 1970-1982 and 1983-2007. The threshold of 1983 was selected based on theoretical considerations. It is the year in which employers and unions decided to break the pattern of centralized wage bargaining in Sweden. According to the literature (cites needed), they did so for reasons related to the undesirable distributional properties of centralized bargaining, which had a tendency to bring about excessive wage compression between high- and low-wage

sectors and, through this channel, made it difficult for employers and unions to recruit, retain, and motivate skilled workers. This episode is generally considered a watershed in the literature on wage bargaining institutions. Although coordinated bargaining did not disappear afterwards, and actually experienced a surprising renaissance in the 1990s, it seems plausible to think that it may have started to function differently from the past.

These expectations are indeed borne out by the estimates reported in columns 2 and 3 of Table 1. The export share variable is the only one to have a univocal effect – positive and significant – across time periods as expected.   The greater the importance of exports for a country, the greater the tendency for manufacturing wages to be higher than private service wages, which confirms our initial expectations. This relationship does not change over time, although the magnitude of the effect becomes smaller in the latter period as indicated by the point estimates.

Most variables, however, do change sign: the effect of wage coordination is to reduce differentials in the period up to 1982 and to expand them afterwards. A similar change in sign is visible for union density, which is associated with lower sectoral wage dispersion in the earlier period and greater dispersion in the latter. The union concentration variable is positive and insignificant in both periods. Yet it has a significant negative coefficient in the regression covering the whole period. This discrepancy suggests that if there is any marginal effect of union concentration, it probably fluctuates over time.

Interestingly enough, two of the economic variables also change sign: the effect of the unemployment rate is to significantly decrease the sectoral differential in the

earlier period and to increase it afterwards. In other words, it looks as though unemployment hit primarily manufacturing workers up to the early 1980s (thus dampening their wage levels relative to private service workers) while it predominantly affected service sector workers afterwards (thus leading to manufacturing wages pulling away from service sector ones). The finding that unemployment had a manufacturing bias up to the early 1980s was unexpected, but is consistent with stylized facts about the labor market of advanced countries: this was favorable to less skilled workers in the 1970s (Katz and Murphy 1992 and other references to be provided) but the situation shifted in the 1980s when returns to skills began to increase.

The variable capturing the share of public sector employment also changes sign. A unit increase in public sector employment is associated with an increase in sectoral differentials in the period between 1970 and 1982 (although the coefficient is only weakly significant), while it seems to have a negative (albeit insignificant) impact on differentials in the 1983 to 2007 period. These results point to a possible shift in the profile of public sector expansion over time. We will return to these results later in the paper.

The finding of a structural break in the model explaining the evolution of sectoral differentials is confirmed by the estimates presented in column 5 of Table 1. Here the predictors are interacted with a dummy taking the value of 0 up to a threshold year and 1 afterwards. In this interacted model the marginal effect of a variable before the threshold year is given by the coefficient of the non-interacted variable (main effect); the marginal effect of the variable for the whole period is the

algebraic sum of the main effect and the interaction; and the coefficient of the interaction term captures the difference between the post- and pre-period. The threshold year is 1981. It is determined by trail and error by selecting the model with the highest adjusted r-squared of the regression. Results indicate a shift in sign from differential-decreasing to differential-increasing for wage coordination, union density, and unemployment. There is a shift in the opposite direction (from differential-increasing to differential-decreasing) for the share of public sector employment (insignificant) and union concentration. The latter shift suggest that in the early period union concentration was probably a way to limit the wage militancy of non-exposed workers, while in the following period union concentration – which was brought about by union mergers – helped low wage workers to keep up with their manufacturing colleagues. There is no shift in sign for the impact of the export share, which remains associated with a tendency to increase sectoral differentials even though the magnitude of the impact appears to decline over time (insignificantly).

Thus the analysis clearly suggests a shift in the behavior of most predictors from the early 1980s on. However, the structural break model presented in Table 1 column 5 may not be the most appropriate as it assumes that economic and institutional variation have a constant marginal effect up to the threshold and that the marginal effect shifts by a fixed amount (while remaining constant) afterward. Also, it constrains all variables to shift their marginal effects at the same time.

We relax these assumptions by estimating a series of "moving-window" regressions, in which the model in table 1 column 1 (with wage coordination, union

density, union concentration, unemployment rate, public sector quota, export share, country dummies, and the appropriate time dummies) is estimated on shifting panels of 12 years each. The first panel covers 1970 to 1981; the second panel 1971 to 1982; ... the last panel 1996 to 2007. In this way, the shift in marginal effects is not constrained to be constant or to happen in the same year for all variables. Figures 1 to 6 plot marginal effects and 95 percent confidence intervals of the variables over time.

Figures 1 to 6 about here

The evidence from this moving-windows analysis can be summarized as follows: clearly there has been a shift in the effect of wage coordination, from compression enhancing to dispersion-enhancing (Figure 1). As we hypothesized, it seems to have happened in the early 1980s. For most of the 1980s, 1990s, and 2000s, coordinated bargaining contributed to increasing intersectoral wage dispersion as opposed to reducing them. A similar, and unexpected, shift also seems to have occurred for union density, although it seems to have happened later, towards the mid-1980s as opposed to the early 1980s (Figure 2). Particularly in the second half of the 1990s strong unions seem to have helped firms in manufacturing sectors to widen pay relativities with service sectors., controlling for other predictors in the model This dispersion-enhancing effect has abated somewhat in more recent years. We do not know what exactly what mechanisms cause the changing effects of union density. We hypothesize it may be related to changes in the sectoral compositions of unions, i.e. that in the context of a generalized union decline, manufacturing unions were able to protect their bargaining power better than service sector unions. However,

it may also be due to changes in union ideology away from redistribution and to the internalization of competitiveness constraints by trade unions. These alternative mechanisms seem difficult to untangle. However, for the next version of the paper we plan to collect data on the internal composition of trade unions to see how far a purely compositional story can go.

The changing effects of wage coordination and union mergers have been partially counterbalanced, at least for a portion of the period, by increasing sectoral concentration of unions (Figure 3). There has been increasing union concentration in all countries in our sample except Japan, although the timing and the extent of the increase have varied. Our results suggest that the first wave of mergers, from the mid-1980s until the late 1990s, allowed low-wage sectors to keep in touch with more high-wage export sectors. As time went by, however, the effect of additional union concentration tapered off. In the years 2000 – the year of the ver.di merger was 2001 – increasing union concentration no longer improved wage relativities between service sectors and manufacturing sectors.

The analysis confirms that the impact of unemployment is distributed unequally across sectors and that depending on which sectors are primarily affected by it the effect on sectoral differentials changes over time (Figure 4). Until the early- to mid-1980s unemployment weakened manufacturing workers more than service sector workers, thus contributing to reducing wage differentials. This labor market effect was in addition to the wage-compression effects of trade unions and coordinated bargaining, which were also at work in the period. Then the effect reversed: service sector workers became more vulnerable to unemployment than manufacturing ones

and thus differentials were pushed up. The dispersion-increasing effect of unemployment peaked during the recession of the early 1990s and then again (albeit to a lesser extent) in the early 2000s.

Between the mid-1980s to mid-1990s another force contributed to keep intersectoral wage differentials in check: the growth of public sector employment (Figure 5). According to our data, public sector employment expands virtually everywhere but at a declining rate over time. In the earlier period public sector employment and private service sector employment were presumably substitutes: to the extent that employment in the public sector expanded, workers in the private service sectors required a higher wage to work (i.e. labor supply shifted to the left). This explains the declining wage differential in the mid-1980s to mid-1990s period. However the unexpected result is that this dispersion-reducing effect first abated and then changed sign with the recession of the early 2000s, when any further expansion of the public sector seems to have produced relative scarcity in manufacturing sector, and to have contributed through this channel to boost the relative wage of this sector. This shift in sign may be linked with skill upgrading in both manufacturing and public services, which may have increased the substitutability of these types of workers.

Differently from other predictors, by in line with theoretical expectations, the functional pressure exerted by export reliance does not seem to have changed fundamentally over time: greater export share of GDP have a tendency to widen intersectoral differentials, although this effect seems to have declined after peaking in the early- to mid-1990s (Figure 6).

7. Preliminary conclusion

One story that could be told about the contribution of wage bargaining institutions to growing inter-sectoral wage dispersion would be that bargaining institutions that once contained market forces have been weakened and therefore now they are no longer strong or encompassing enough to play the same role. This simple story is not supported by our data. What our data tell is something different and possibly more worrisome: that the effects of wage bargaining institutions have changed fundamentally over time: inter-sectoral differentials have increased more sharply in more sharply under coordinated bargaining arrangements since the beginning of the 1980s. In other words, it would appear to be the case that coordinated bargaining has not only accommodated inegalitarian market pressures, but has actually reinforced these pressures. In addition our analysis confirms the main finding of an earlier literature, i.e. that coordination was associated with smaller differentials between wages in manufacturing and low-end services in the 1970s.

Other interesting and in some cases surprising results have emerged from the analysis: the impact of union density has turned from dispersion-decreasing to dispersion-increasing from the mid-1980s on; union mergers have helped low wage service workers to keep up with more highly paid manufacturing workers, but only until the late 1990s and not beyond; the labor market situation of relatively unskilled service workers has worsened dramatically from the early 1980s on; the

pattern of public sector expansion has first played to the advantage of low-wage private service workers and then turned against them in relative wage terms. In regard to this latter finding, it is possible that the increase in university-educated labor in both manufacturing and public services strengthened the substitutability of manufacturing and public sector employees and therefore contributed to boosting relative manufacturing wages.

These findings invite further theoretical reflection and empirical analysis. For the next iteration of this paper, we hope to identify some of the mechanisms driving the observed effects. In particular, we hope to be able to develop some reasonable proxy for the relative bargaining power of workers in different sectors to see to what extent our results are driven by shifts over time in the sectoral composition of trade unions. One of our expectations would be that in the post-1980s period the association between coordination and inter-sectoral dispersion is positive when the bargaining power of workers in low-end services is low relative to the bargaining power of workers in export-oriented manufacturing, but not when the opposite situation occurs.

Table 1: Determinants of Sectoral Wage Differentials: OLS with Driscoll-Kraay standard errors

VARIABLES	Whole sample	Whole sample with lagged export share	1970-1982	1983-2007	Structural break in 1981
	differential	Differential	differential	Differential	differential
Wage coordination	0.0770***	0.0856***	-0.0230**	0.0609***	-0.0252***
	(0.0157)	(0.0144)	(0.00912)	(0.0138)	(0.00775)
Union density	-0.00291	-0.00245	-0.00796***	0.00468***	-0.00810***
	(0.00189)	(0.00199)	(0.00125)	(0.00129)	(0.00160)
Union concentration	-1.770**	-1.694**	0.860	0.210	1.953**
	(0.670)	(0.740)	(1.162)	(0.396)	(0.880)
Unemployment rate	0.0258***	0.0274***	-0.0152***	0.0228***	-0.0121***
	(0.00483)	(0.00447)	(0.00217)	(0.00470)	(0.00264)
Share of public sector employment	-2.501***	-2.664***	1.020*	-0.0893	0.687
	(0.617)	(0.701)	(0.499)	(0.816)	(0.444)
Exports to OECD countries as % of GDP	7.685***		10.57***	5.835***	9.808***
	(1.334)		(2.649)	(1.694)	(3.202)
Lagged export share		5.675***			
		(1.197)			
Wage coordination post 1981					0.0933***
					(0.0154)
Union density post 1981					0.0115***
					(0.00254)
Union concentration post 1981					-1.802*
					(0.873)
Unemployment rate post 1981					0.0367***
					(0.00511)
Share of public sector employment post 1981					-1.245
					(1.041)
Exports to OECD countries as % of GDP post 1981					-3.614
					(3.872)
Country effects	YES	YES	YES	YES	YES
Time effects	YES	YES	YES	YES	YES
Country effects post 1981	NO	NO	NO	NO	YES
F-test joint significance of post-1981 economic and institutional variables (p-value)					0.0000
F-test joint significance of post-1981 country effects (p-value)					0.0000
F-test joint significance of all post-1981 predictors (p-value)					0.0000
Constant	1.884***	1.862***	1.639***	1.217***	1.655***
	(0.100)	(0.120)	(0.0580)	(0.181)	(0.0645)
Observations	587	574	191	396	587
Adjusted R-squared	0.7840	0.7607	0.9107	0.8768	0.9002
Number of groups	16	16	16	16	16
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Figure 1: Marginal Effects of Wage Coordination over Time
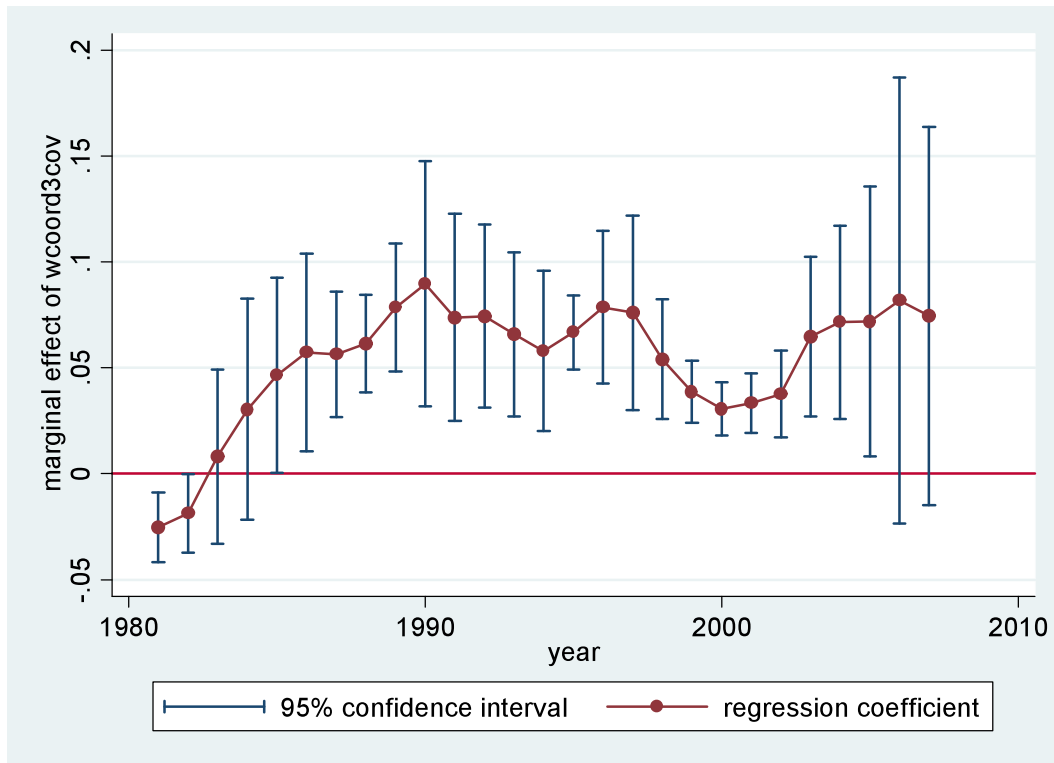
Figure 2: Marginal Effects of Union Density over Time
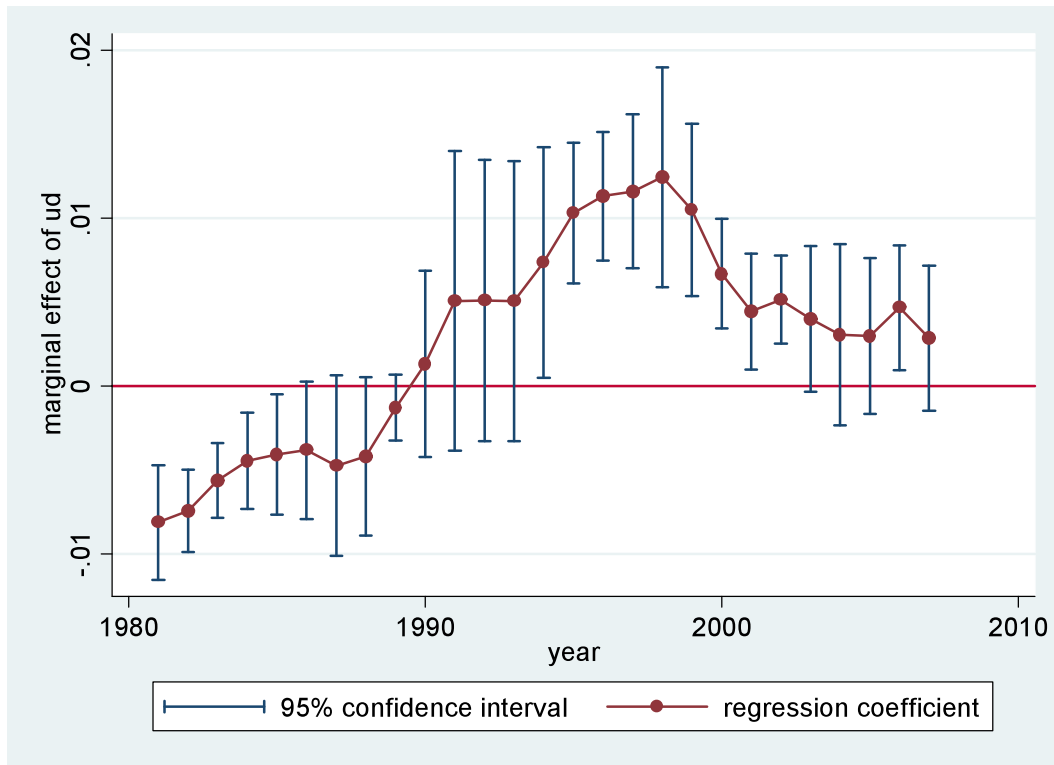
Figure 3: Marginal Effects of Union Concentration over Time
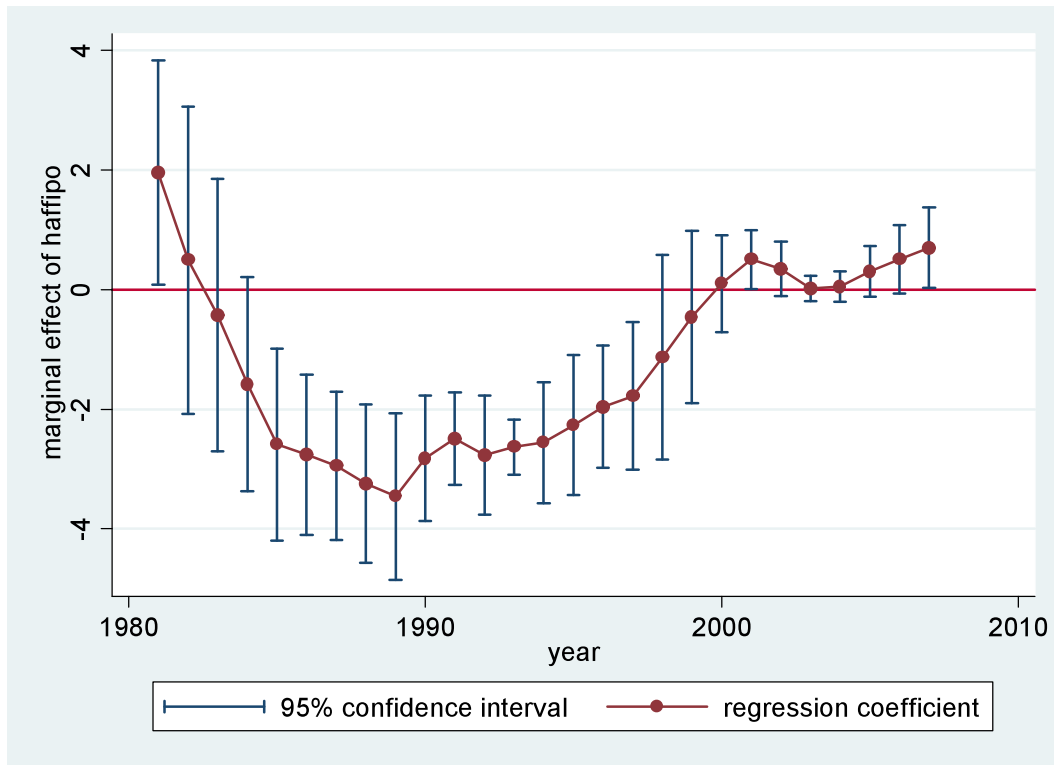
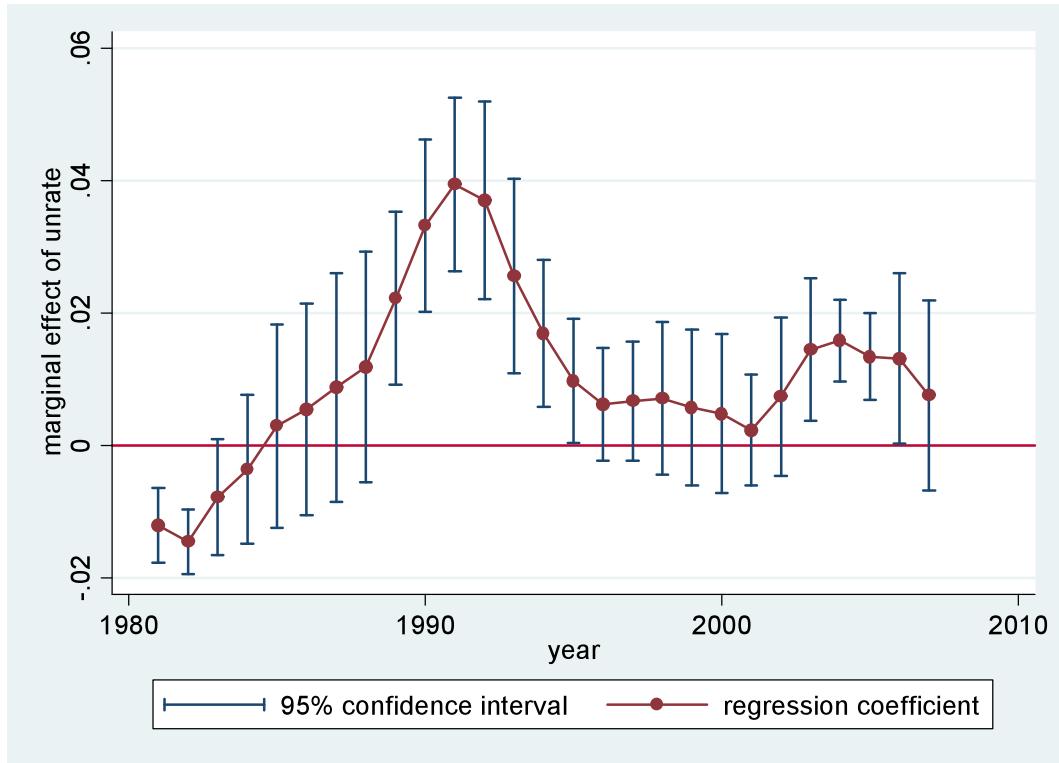Figure 4: Marginal Effects of Unemployment Rate over Time

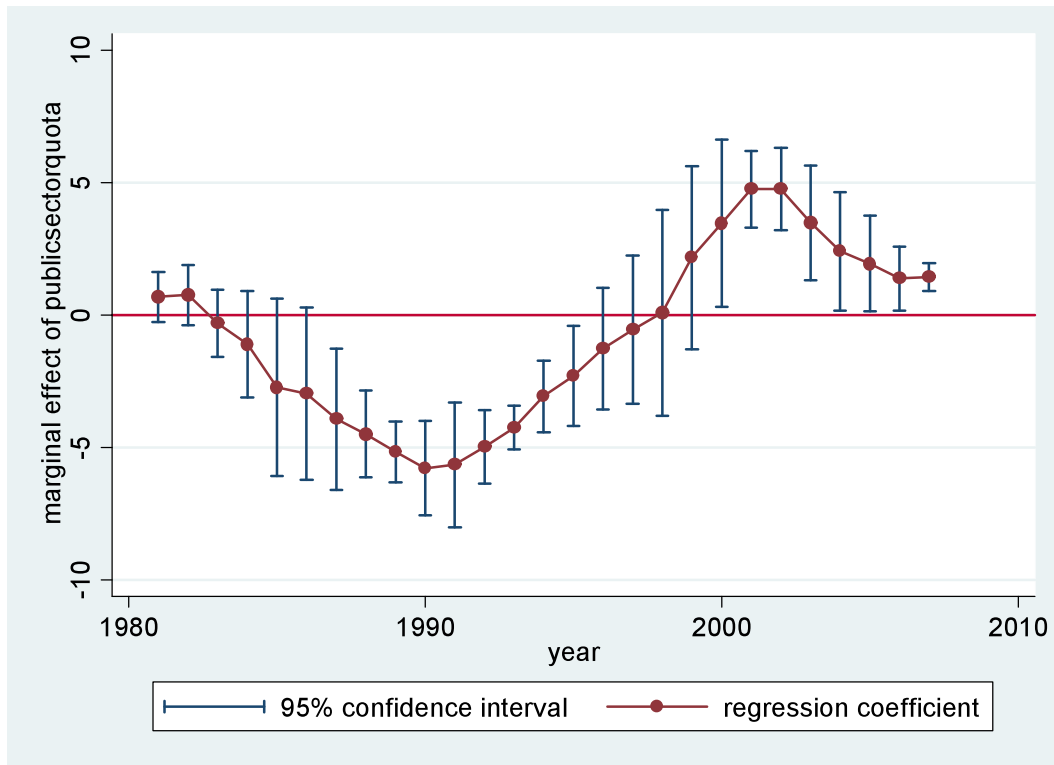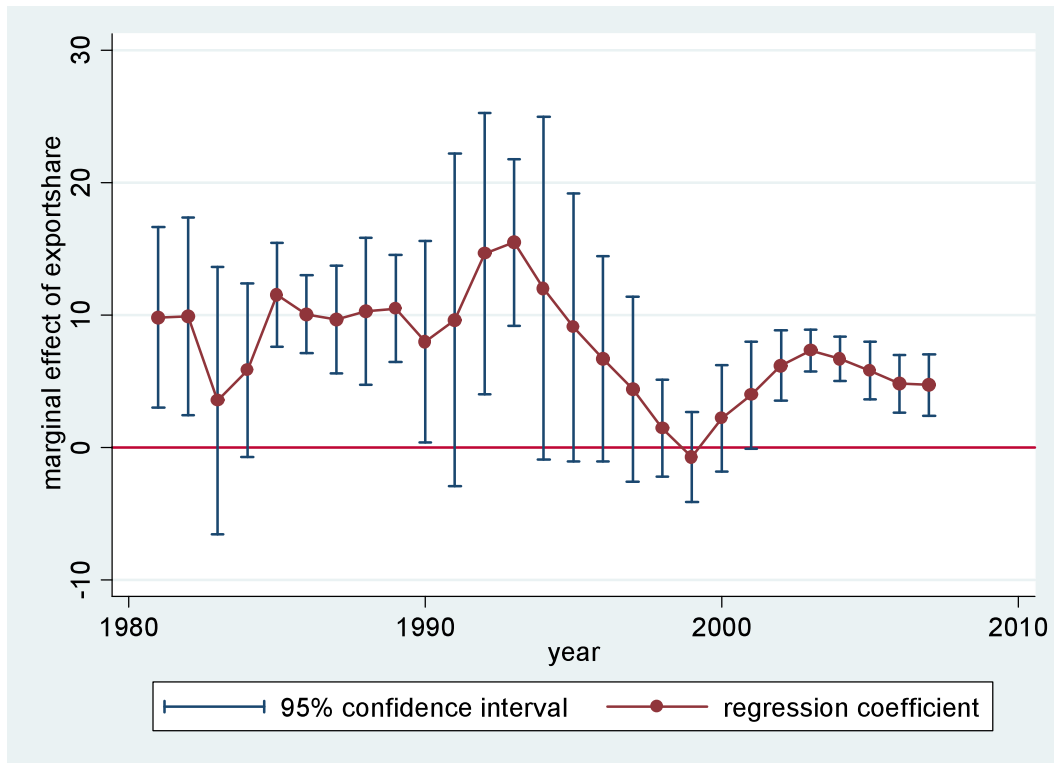Figure 5: Marginal Effects of Public Sector Employment Share over Time
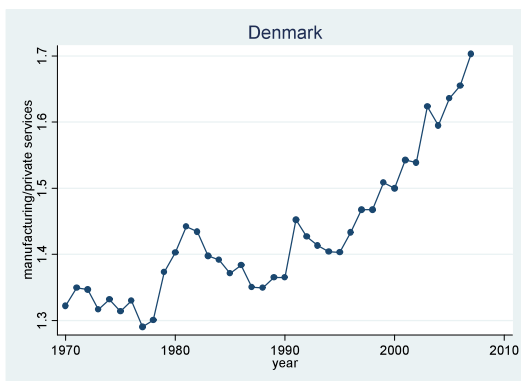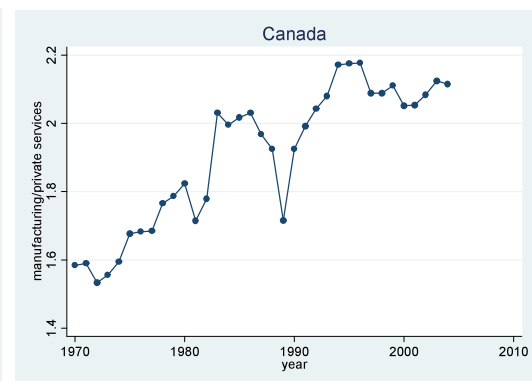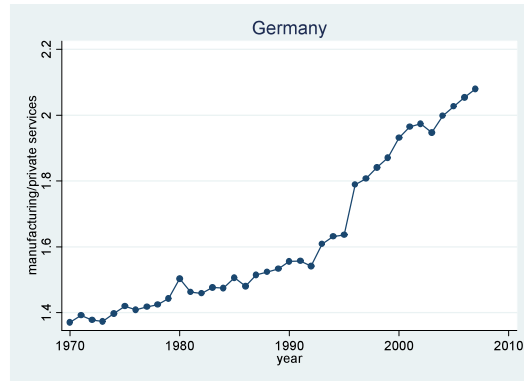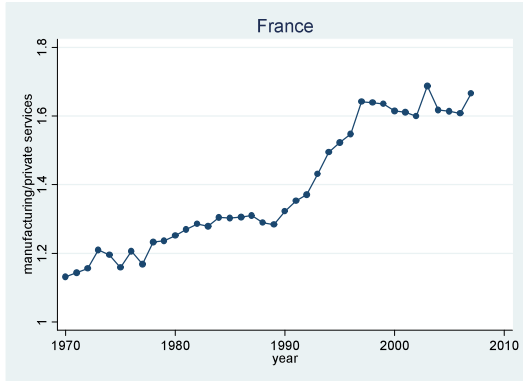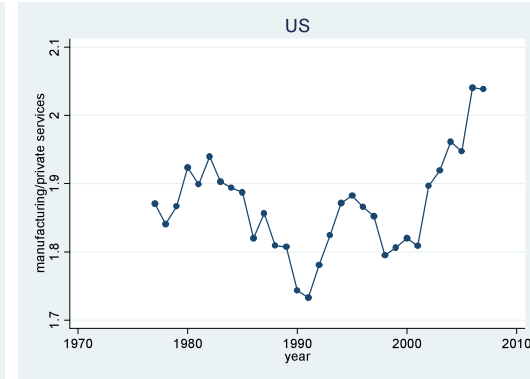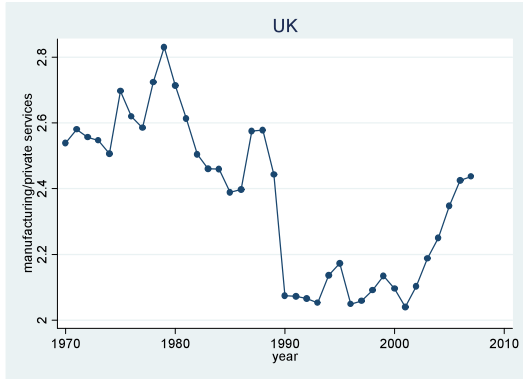
Figure 6: Marginal Effects of Export Share of GDP over Time

APPENDIX: RATIOS OF AVERAGE WAGES IN HIGH-END MANUFACTURING TO LOW-

END SERVICES

France

Germany

Ireland

Italy

Japan

Netherlands

Spain

Sweden
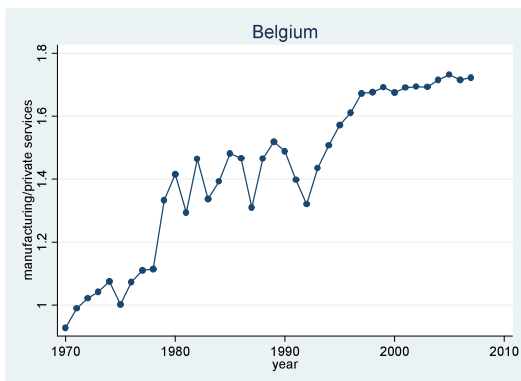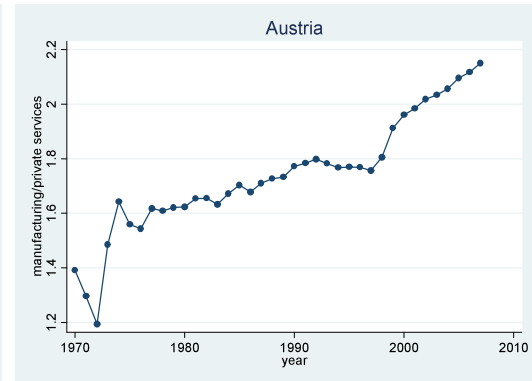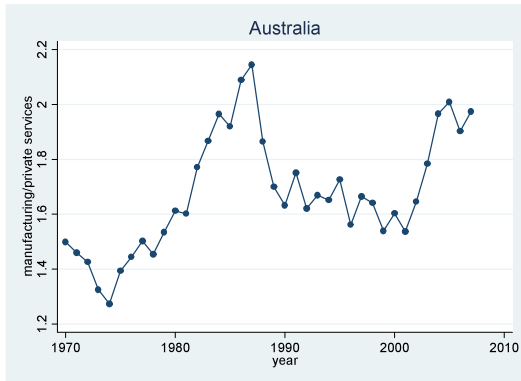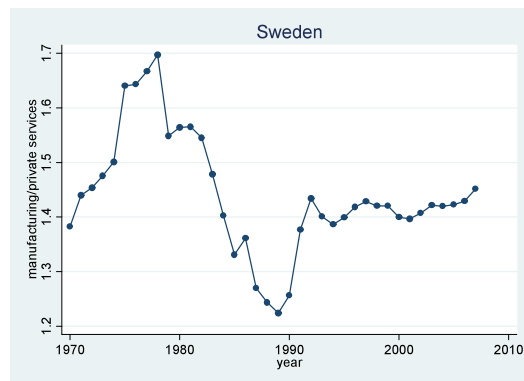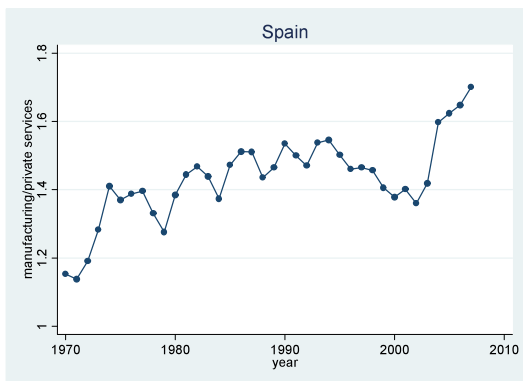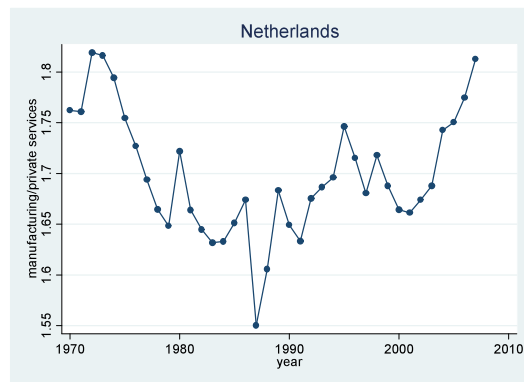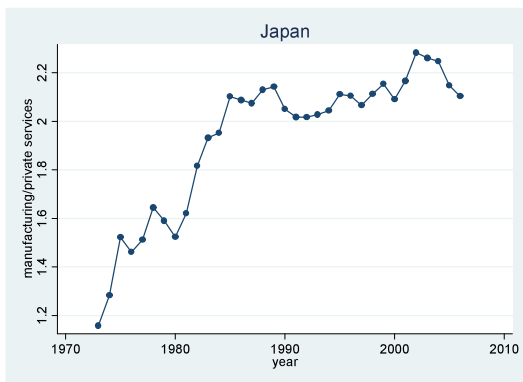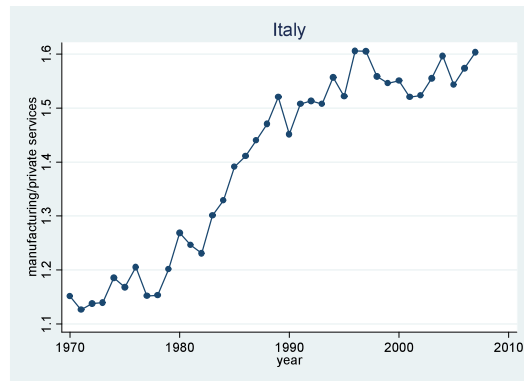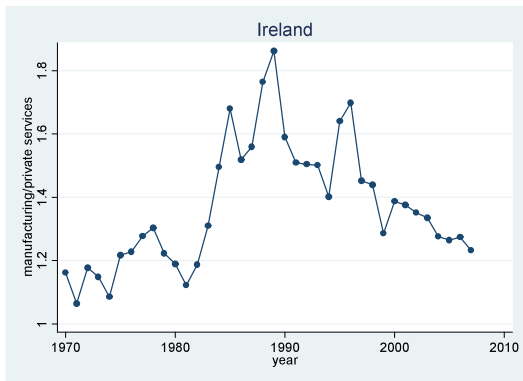
Notes

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[i] Note that we use "centralization" and "coordination" of wage bargaining interchangeably. Separate from centralization, informal coordination might be inferred from bargaining outcomes, but the claim that coordination causes wage restraint or wage compression then becomes tautological.

[ii] The countries included in our analysis are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Spain, Sweden, the UK and the US.

[iii] "High-end manufacturing" includes sectors with NACE codes D21 through D37: Paper and pulp, petroleum products, chemicals, rubber and plastics, non-metallic mineral products, metal products, machinery, electrical and optical equipment, transportation equipment, and manufacturing NEC. "Low-end services" includes NACE codes G52 (retail trade) and H (hotels and restaurants). Note that the effects of coordinated wage bargaining and unionization also change in models with (weighted or unweighted) coefficients of variation in sectoral wages as the dependent variable.

[iv] The OECD itself stresses that its data on relative earnings are plagued by cross-national differences in how earnings are measured and how full-time employees are defined.

[v] In contrast to Rowthorn (1992), we do *not* conceive our measure of inter-sectoral wage differentials as a proxy for overall wage inequality.

[vi] In future work, we plan to revisit the determinants of overall wage inequality (90-10 wage ratios) from the theoretical and methodological perspective adopted in this paper.

[vii] http://www.uva-aias.net/207.

[viii] Preliminary analyses suggest that alternative measures of wage-bargaining coordination yield results that are quite similar to the results reported in this paper, but this is something that we need to explore further.

[ix] Sweden is the obvious case of decentralization in the 1980s, but coordination was restored in the 1990s. See Pontusson and Swenson 2000.

[x] EU KLEMS is our source for these data. The NACE codes of the sectors included are L, M and N.

[xi] Technically, we assume that there are the following two equations linking export share and inter-sectoral differentials:

$$\exp_{i,t} = X_{e}{'}_{i,t}\beta_e + \gamma_e dif\!f_{,t-k} + \varepsilon_{i,t}$$

$$dif\!f_{,t} = X_{d}{'}_{i,t}\beta_d + \gamma_d \exp_{i,t} + \upsilon_{i,t}$$

The export share at time t (exp) is determined by sectoral differentials (diff) at time t-k, controlling for other determinants of exports (X_e). Sectoral differentials are determined by exports at time t, controlling for other determinants of differentials (X_d). The crucial assumption for identification of the impact of export share on sectoral differentials is:

$$COV(\varepsilon_{i,t}, \upsilon_{i,t}) = 0$$

i.e. that the shocks that affect exports at time t are uncorrelated with the shocks that affect sectoral differentials at time t. Since we are controlling for time and country dummies, as well as for a measure of the economic cycle, the unemployment rate, we are willing to make this assumption.