# INTRODUCTION

Unemployment in the European Union (EU) has more than doubled over the last 30 years, and stands today at approximately 9% of the labour force. Close to fifty per cent are long-term unemployed and youth unemployment is above 17%. The situation is very different in the United States (USA) : less than 5% of the labour force is unemployed, with long-term unemployment at under 7% and youth unemployment at around only 10%. Since the beginning of the 1980s, moreover, unemployment in the USA has been consistently lower than in the EU, and since 1970 total employment has grown by almost 60% compared with less than 20% in Europe.

In view of this situation, it falls to economists to explain why economies which are subject to broadly similar external economic developments (e.g. oil crises, technological progress, competition from low-wage countries) and which have comparable production capacity show such diverse labour market performance. Despite the complexity of this question, many economists and policy makers consider that Europe's poor record on employment and unemployment can be attributed to the institutional characteristics of the labour market. Industrial relations and in particular trade unions in Europe are often regarded as a performance inhibiting rigidity (OECD, 1994; Siebert, 1997; Weede, 1996). In line with the insider-outsider model (Lindbeck and Snower, 1986), it is asserted that trade unions only represent the interests of their employed members. Hence, they are expected to push wages above the market-clearing level and to resist real (downward) wage adjustments even after a substantial negative productivity shock (e.g. oil crisis). In other words, trade unions are often considered as rent-seeking organisations, who prevent the equilibrium on the labour market to be restored. From a social perspective, however, many observers share the conviction that the industrial relations systems in Europe are highly valuable. Collective bargaining and trade union policies, so the argument runs, reduce earnings disparities by compressing the pay structure of workers covered by collective agreements and by driving up earnings of low-paid workers. As a result, the proportion of working poor is lower and social cohesion is reinforced. Overall, the debate – among those in favour of and those against a broad deregulation in Europe – might give the impression that collective bargaining systems create a

trade-off between economic and social performance. The empirical evidence, however, is far more complex. Indeed, results regarding the socio-economic effects of industrial relations systems are often inconclusive or even incomplete.

This is why this thesis empirically investigates the repercussions of collective bargaining systems on labour market performance, wages structures and poverty levels in an international perspective. We consider respectively a theoretical, macro- and microeconomic approach. These complementary approaches, grouped into three chapters, are described below.

A convenient way to address the impact of trade unions on employment consists in testing alternative models of wage and employment determination. Indeed, the results vary considerably according to the model that is chosen. The majority of research has typically tested for two competing models : the *right-to-manage* model (RMM), where the employer unilaterally determines employment, while wages are the result of a confrontation between the objectives of the employer and the trade union; and the *efficient bargaining* model (EBM), where bargaining takes place simultaneously with respect to both employment and wage levels. Yet, findings concerning the appropriate model are rather contradictory. This diversity of results reflects not just differences in the industries or countries under investigation, but a more serious identification problem (Gavosto, 1997). As pointed out by Booth (1995), the alternative to the right-to-manage model is often inaccurately defined. In fact, the outcome of the EBM, which is located on the contract curve, can lie anywhere to the right of the labour demand curve, i.e. the locus of the RMM outcome. As a result, the rejection of the RMM does not necessary imply that the bargaining is efficient.

Starting from these premises, we have chosen – in the first chapter of this thesis – to test for the general bargaining model (GBM), developed by Manning (1987), using annual macro-data from the Swedish private sector covering the period 1960-93. The GBM is composed of two stages. In the first stage, negotiations are concerned with wages and, in the second stage, with employment levels. In contrast to the EBM, the bargaining power of the parties is not necessarily the same at each stage of the game. It is a synthetic model in which there is a continuum of possible results between those proposed by the RMM and the EBM. In other words, with the exception of these two extremes, solutions are situated on neither the labour

demand curve nor the contract curve. Consequently, the GBM is capable not only of identifying the usual bargaining models (i.e. RMM and EBM), but also of pointing out to new solutions. The Swedish private sector provides a natural testing ground for the GBM. Indeed, although wages were definitely the main bargaining topic in the pre-1993 Swedish collective bargaining system, trade unions also had some bargaining power on employment at the local level (Hammarström and Nilsson, 1998). Moreover, following Espinosa and Rhee's (1989) theoretical model, the repeated and co-ordinated nature of the interactions between the Swedish employer's organisations and the trade unions might be at the root of a *nearly* efficient bargaining solution. In this case, a weakening of the trade unions' bargaining power could potentially lead to a reduction in employment. Methodologically, the analysis relies on the Engle-Granger's (1987) two-step estimation procedure and on non-nested tests. Phillips-Hansens's (1990) non-parametric technique is used to obtain optimal and asymptotically normal long-run estimators.

The impact of trade unions, and in particular of collective bargaining systems, on labour market performance can also be addressed in a cross-national perspective on the basis of a macroeconomic approach. Although the debate in this field of research date back to the beginning of the 1980s, the literature still disagrees about what type of bargaining structure performs best. Three competing hypotheses emerge : the corporatist, the hump-shape and the neo-classical hypothesis. This situation stems mainly from the fact that the indicators used to measure the bargaining systems are often inappropriate (time invariant, synthetic or incomplete). Moreover, studies often omit to control for key macroeconomic variables, e.g. the evolution of aggregate demand. Last but not least, given the central role of wage moderation in this type of literature, it is surprising to find that few studies explicitly address the effect of the bargaining regime on labour costs. This is why in the second chapter of this thesis we reconsider the link between industrial relations systems and labour market performance by controlling for these shortcomings. We analyse the relative performance of collective bargaining systems in 19 OECD countries over the last twenty years, both in an aggregated and disaggregated way. The disaggregated approach, based on Spearman's correlation coefficients and on the Kruskal-Wallis test, tackles this question separately for three sub-periods (1978-82, 1988-92 and 1992-96). This allows us to examine the evolution of the relationship between collective bargaining systems and labour market performance since

the end of the 1970s. The aggregated approach investigates this problem for the three sub-periods simultaneously on the basis of pooled data regressions including control variables. This approach provides an insight into long run dynamics. Moreover, we deal individually with the way in which the different characteristics of collective bargaining systems influence the (labour market) performance of the industrialised countries. This choice is crucial in order to identify the key features of the bargaining systems which provide the statistical action. Four characteristics are considered here : the prevailing bargaining level, the degree of co-ordination among the employers' organisations and trade unions, the coverage rate and the trade union density. These variables are *not* time invariant. It is also noteworthy that the effect of collective bargaining systems on unit labour cost growth is explicitly tested.

The second chapter of this thesis also addresses the impact of collective bargaining systems on poverty levels in a cross-national perspective. Findings in this field of research are still fairly insubstantial. Indeed, such results are generally derived from studies dealing solely with the interplay between the characteristics of collective bargaining and wage inequality. The underlying idea is that wage inequality : "(i) often translates into significant disparities in living standards and increasing poverty among individuals, (ii) affects the structure of economic incentives that individuals face and (iii) influences social cohesion and worker solidarity" (Lucifora, 1999: 1). However, few studies explicitly address the impact of collective bargaining systems on poverty rates. This is particularly surprising given that the link between wage dispersion and poverty is far from clear. Indeed, even though the poverty rate among the population at work is higher in countries where wage inequality is pronounced, the proportion of poor people in this category is generally limited (Marx and Verbist, 1998). This is why we try to shed light on the direct relationship between collective bargaining systems and poverty levels in the industrialised countries since the end of the 1970s. We look at relative poverty levels, among different categories of the population, *before* and *after* net social security transfers. This enables us to examine the means by which the collective bargaining features may affect poverty. Two channels are considered here : wage dispersion and social security transfers. The collective bargaining characteristics under investigation are the same as in the previous section devoted to labour market performance. Methodologically, the analysis relies on Spearman's correlation coefficients and pooled data regressions.

The last section of chapter 2, finally, examines whether, in view of the characteristics of collective bargaining, economic efficiency (i.e. labour market performance) is compatible with social performance (i.e. low poverty levels). To this end, we use principal component analysis. The findings produced by this method are compared with those obtained in the first sections of chapter 2.

From a microeconomic point of view, wage formation and in particular wage structures play a key role in the analysis of the socio-economic effects of collective bargaining systems. Indeed, collective bargaining systems are supposed to affect the structure of wages, and therefore also the level of employment, social cohesion and workers' solidarity. This is why in the third chapter of this thesis, we analyse the impact of the bargaining regime on the structure of wages in a corporatist country, i.e. Belgium. Microeconometric results are presented in a cross-national perspective. Our investigation is based upon the 1995 *Structure of Earnings Survey*. This database, which has never been used before, contains a wealth of information both on the characteristics of the establishments and those of the individuals working therein. The motivation of this chapter is twofold :
(i) The current understanding of the structure of wages and more particularly inter-industry wage differentials in Belgium is very limited. Such an analysis requires a major worker-firm matched database which has not been available until now.
(ii) The results concerning the influence of the bargaining regimes on inter-industry wage disparities and on wage levels in the countries of continental Europe are fragmentary.

The first section of chapter 3 focuses on the following questions :
(i) Can we observe inter-industry wage differentials in the Belgian private sector ?
(ii) What is their magnitude, and where do they come from ? Can they be explained exclusively by the sectoral heterogeneity of the workers and their working conditions, or do they also derive from the specific features of the employers in each sector ?
(iii) Do they support the hypothesis that the dispersion of inter-industry wage differentials is significantly lower in corporatist countries and what does it imply ?

In the second section of chapter 3, we assess the effect of the bargaining regime on the structure of wages *within* the Belgian private sector. Unlike in the USA or Canada, the

distinction between unionised and non-unionised sectors has no meaning in Belgium. The point is that virtually all workers are covered by a collective labour agreement. The bargaining regime is therefore reflected more in terms of the level of wage negotiation. We distinguish primarily between two types of establishments : (i) those covered only by national and/or sectoral collective agreements, and (ii) those in which wages are (re)negotiated collectively in house. We then explore the following questions :

(i) Can we observe inter-industry wage differentials for every bargaining regime ?

(ii) Are the sectors offering high/low wages similar in the case of workers covered by different bargaining regimes ?

(iii) Is the dispersion in inter-industry wage differentials lower when wages are covered by a company collective agreement ?

(iv) What is the wage gap between workers covered by different bargaining regimes and what is behind it ?

Finally, the conclusion summarises the main findings and implications of these three chapters. Some suggestions for future research are also discussed.

*CHAPTER 1*

# THE WAR OF MODELS :

# DETERMINATION OF WAGES AND EMPLOYMENT IN THE SWEDISH PRIVATE SECTOR

**Abstract :** The purpose of this chapter is to discriminate between competing models of wage and employment determination (right-to-manage, efficient bargaining and general bargaining models) using annual macro-data from the Swedish private sector covering the period 1960-93. Methodologically, the analysis relies on the Engle-Granger's (1987) two-step estimation procedure and on non-nested tests. Phillips-Hansens's (1990) non-parametric technique is used to obtain optimal and asymptotically normal long-run estimators. Our results show that the right-to-manage and the efficient bargaining models can be rejected in favour of the general bargaining model. Consequently, they stress the absence of a simple linear relation between the trade unions' bargaining power and employment. In particular, a weakening of the trade unions could potentially lead to a reduction in employment.

# 1. INTRODUCTION

What is the impact of trade unions on employment in Sweden ? This crucial question for government policy boils down in defining which wage-employment bargaining model is the most appropriate for describing the Swedish economy. In studying the form of wage contracts, and hence, the relationship between collective bargaining and employment, the central question is that of determining the variables that are subject to negotiation. As there is a consensus with respect to the inclusion of wages as a variable, the controversy is more with respect to employment.

During the period 1956-93, the centralisation of bargaining in Sweden was a direct result of confederate statutes, which state that unions must grant their national committee the right to take all definitive decisions involving collective bargaining. The discussions which took place at the national level produced directives which, in their turn, served as a guide for bargaining at the industry and company levels (Caire, 1992).

Central agreements usually included several pay components like a general pay increase as well as specific increases towards special groups such as low income earners and women. But in addition to the pay agreements other subjects were also negotiated at the central level. They covered for example working hours, working environment and equal opportunities for women (Hammarström and Nilsson, 1998).

Although unions were highly centralised, this does not mean that they were weak or inactive at the local level. For instance, wages were often renegotiated at the plant or workplace level. Furthermore, rules constraint management's decisions over the level of employment. Indeed, on the one hand, from 1974 on, the law made it difficult for employers to dismiss employees and for companies to hire workers on probation without unions approval. On the other hand, the Co-determination Act (MBL) implemented in 1977, ment that the management had to consult the unions before any decision was taken on major changes in the company. For example, in the event of reorganisation or in the case of introduction of a new technology (Hammarström and Nilsson, 1998).

To sum up, although wages were definitely the main bargaining topic in the pre-1993 Swedish collective bargaining system, trade unions also had some bargaining power on employment particularly at the local level.

The aim of this chapter is to discriminate among alternative wage-employment bargaining models using annual macro-data from the Swedish private sector covering the period 1960-93. While the majority of research in this field is restricted to testing the usual bargaining models, i.e. *right-to-manage* (RMM) and *efficient bargaining* (EBM), we will take a broader look at this question. In other words, bearing in mind the main features of the Swedish collective bargaining system, we found it essential not to test only for the usual bargaining models but also for the *general bargaining* model (GBM). In the latter, wages and employment are negotiated separately.

This chapter is divided into two parts. To begin, we briefly present the usual bargaining models, as well as that of Manning (1987). Next, we review the main empirical results regarding the impact of trade unions on employment. In the second part, we describe the general bargaining model in some detail, as well as the selection procedure that has been used. The analysis, per se, follows the Engle-Granger's (1987) estimation procedure. Thus, after verifying the order of integration of our variables, we use Phillips-Hansen's (1990) non-parametric technique to estimate a long-run employment equation for the RMM and EBM, as well as for the GBM. After having tested the stationarity of the residuals, we estimate, in each case, an ECM (error correction model) representation of a dynamic employment equation. Finally, the use of non-nested tests allows us to select the adequate model for the Swedish private sector.

# 2. LITERATURE REVIEW

## 2.1. Bargaining Models

The monopoly union model conceived by Dunlop (1944) is at the origin of wage-employment bargaining theory. In it, companies determine employment after unions have unilaterally set wages. Because it is built upon very restrictive assumptions, this theory is insufficient.

Consequently, it was necessary to introduce factors representative of a true negotiation between the social actors, in order to explain the determination of wages and employment. Until recently, this was a particularly hazardous task, since contemporary theory dealt with the issue of bargaining in only an incidental manner (Cahuc, 1991).

Nonetheless, since the early 1980s, considerable progress has been made, not only through extensions to the Dunlop model (1944), but also through the modelization of strategic interactions and wage contracts. Indeed, developments related to non-cooperative game theory, and the contributions of Nash (1950, 1953), Stahl (1972), and Rubinstein (1982) have given a rigorous theoretical framework to the study of the wage-employment relationship, thus resolving the solution indetermination problem set forth by Edgeworth (1881)[1].

In studying the form of wage contracts, and hence, the relationship between collective bargaining and employment, the central question is that of determining the variables that are subject to negotiation. As there is a consensus with respect to the inclusion of wages as a variable, the controversy is more with respect to employment.

The right-to-manage model (RMM), so-named by Nickell and Andrews (1983), is a generalisation of the monopoly union model. In it, companies unilaterally determine employment, while wages are the result of a confrontation between the objectives of companies and of workers. The result of the negotiation is situated on the company's labour demand curve (productive efficiency). The relationship between employment and wages is negative, and any modification of the balance of power, in favour of the company, results in a decrease in wages. On the other hand, the level of employment declines as the balance of power shifts in favour of the union.

In the efficient bargaining model (EBM), introduced by McDonald and Solow (1981), bargaining takes place with respect to both employment and wage levels. The bargaining power of the union is identical at all stages of negotiation. In contrast to the RMM, the

[1] Edgeworth (1881) set forth the problem of solution indetermination within the contract zone. Although Zeuthen (1930) and Hicks (1932) were able to define a unique solution to this problem, their model was not sufficiently systematic to provide a basis for collective bargaining.

solution is Pareto-efficient : it is situated on the so-called contract curve, in the area of tangency between the curves of union iso-utility and company iso-profit. However, since this result is not on the company's labour demand curve, it will lead to productive inefficiency : the wage is greater than the marginal productivity of labour. Besides, in considering that the union has an aversion to risk (the contract curve has a positive slope), a gain in union bargaining power is accompanied by an increase in both wages and employment. Corroborating the predictions of this model, greater union influence does not have the effect of increasing unemployment by increasing wages.

Finally, the general bargaining model (GBM) presented by Manning (1987) is composed of two stages. Negotiations are concerned in the first stage with wages, and in the second with employment levels. In contrast to the EBM, the bargaining power of parties is not necessarily the same at each stage. This is a synthetic model in which there is a continuum of possible results between those proposed by the RMM and EBM. Furthermore, with the exception of these two extremes, solutions are situated on neither the labour demand curve nor the contract curve. Consequently, the GBM is capable not only of identifying the usual bargaining models, but also of pointing to new solutions. According to the properties of this model, an increase in union influence with respect to wages will reduce employment. On the other hand, a gain in union influence with respect to employment will reduce the number of unemployed[2].

## 2.2. Empirical Results

Estimations concerning the impact of unions on employment are quite rare. This is surprising in light of the number of studies that have been carried out regarding the wage differential between unionised and non-unionised industries. This observation may be explained by the mistaken notion that the only effect of collective bargaining on employment levels results from the product of labour demand elasticity and the wage differential.

The contributions of wage bargaining theory are fundamental to an analysis of the employment-wage tandem. Indeed, the implications for employment of an increase in union power can vary considerably, depending on the model that is chosen to represent reality :

[2] For a more extensive description of the models, see Booth (1995).

RMM, EBM, or GBM. Consequently, it is convenient to estimate the impact of trade unions on employment by testing the relevance of each of these theoretical models.

In most of the recent literature, the analysis is essentially restricted to the usual bargaining models. Hence, these articles fall mainly into one of two categories : those reporting results obtained using the EBM, and those reporting results of the RMM. A small portion of recent literature, however, deals specifically with Manning's model. Below, we review some of these results[3].

### *2.2.1. Tests Relative to the Efficient Bargaining Model*

Ashenfelter and Brown (1986), Card (1986, 1990) and Abowd and Kramarz (1993) based their work on the properties of the relationship between wages and employment in the usual bargaining models, in order to test whether or not the wage contracts were efficient. They start with the observation that at equilibrium, the result of the RMM is situated on the labour demand curve, while that of the EBM is on the contract curve. Consequently, the EBM differs from the RMM in that the latter creates an independence between employment and the reservation wage. The resulting estimations lead to rejection of the assumption that alternative wages have a significant impact on employment. These authors thus conclude that wage contracts are not always Pareto-optimal.

This result must be considered with caution. Indeed, the difficulties inherent to specifying the alternative wage, and in determining the sensitivity of the outcome to this choice, make any conclusion as the role of this variable questionable (Cahuc and Zylberberg, 1996). In order to alleviate this problem, Abowd (1989) worked directly with the earnings functions of companies and unions. He concluded that it is not possible to reject the assumption of efficient wage contracts.

[3] For a summary, see Table 1 at the end of this section.

### *2.2.2. Tests Relative to the Right-to-Manage Model*

Results seem equally contradictory for tests verifying whether or not the final deal in a collective bargaining session is to be found on the labour demand curve (i.e. the marginal productivity is equal to the wage). Indeed, according to Nickell and Andrews (1983), Pencavel and Holmlund (1988), and Hoel and Nymoen (1988), companies unilaterally determine employment once the wage has been negotiated.

By way of contrast, other studies reject the RMM. For example, using the same data as Ashenfelter and Brown (1986), MaCurdy and Pencavel (1986) demonstrated that marginal variations in labour productivity are not explained by wage evolution alone, but also by other variables, such as the reservation wage. Nonetheless, as the authors of this study point out, this does not allow one to conclude that the EBM is correct. Indeed it is possible that the right solution is somewhere between the labour demand curve and the contract curve. Moreover, the validity of their approach rests on the quality of the estimation of marginal productivity (Cahuc and Zylberberg, 1996). Furthermore, the same variables that modify the union's utility[4] may impact workers' behaviour, thus affecting their productivity and displacing the labour demand curve. Hence, the results of MaCurdy and Pencavel (1986) are very fragile.

Svejnar (1986) developed and estimated a theoretical model of wage determination and union-non union wage differentials. His econometric results, based on U.S. data covering twelve major unionised companies between the mid 1950s and late 1970s, identify the threat point, fear of disagreement, and bargaining power as the three determinants of unions wages. They also indicate that, within the expected utility framework, unions tend to be risk neutral or risk loving but that in general one can not accept the traditional proposition that the bargaining solution lies on the marginal product curve of labour. To put it differently, the relevant coefficients suggest that the outcome might be better characterised by the efficient outcome (vertical contract curve).

Using data relative to work performed in the Virginia coal mines between 1897 and 1938, Boal and Pencavel (1994) also reject the RMM. They show that, although the wage

[4] In particular, the reservation wage.

differential between unionised and non-unionised counties is positive, the effect on employment is not significantly different from zero. It is possible to explain their conclusion in the following manner : the presence of unions affects the employment-wage relationship because it modifies the internal organisation of the companies and exerts a positive effect on workers' productivity.

### *2.2.3. Test Relative to the Monopoly Union and Efficient Bargaining Models*

The conclusions reached by Aronsson et al. (1993) relating to the Swedish construction industry between 1960 and 1988 are equally ambiguous. Indeed, if bargaining power is assumed to be constant, their estimations lead them to accept the monopoly union model and reject that of efficient bargaining. On the other hand, if it is assumed that bargaining power can vary as a function of both the degree to which negotiations are centralised and the level of unemployment, then neither of the two models can be rejected.

### *2.2.4. Tests Relative to the General Bargaining Model*

In order to test whether or not the end result of collective bargaining is situated somewhere between the two usual bargaining models, i.e. between the labour demand curve and the contract curve, Nickell and Wadhwani (1991), Alogoskoufis and Manning (1991) and Vannetelbosch (1996) ran tests on Manning's model (1987).

Using data from the U.K. manufacturing sector from the period 1972-82, Nickell and Wadhwani obtained estimations for the labour demand function resulting from employment negotiations (the wage level is exogenous). This expression depends, among other things, on the reservation wage and the employment-related bargaining power of unions, approximated in this study by the trade union density. Concluding on the insignificance of these two variables, they deduce that the RMM seems best adapted. Nonetheless, they add that this result must be accepted with caution for two reasons. First, the estimations are very sensitive to the specification of the reservation wage, and second, the trade union density is far from ideal as a surrogate for the influence of unions on employment.

**Table 1 : Trade Unions and Employment - Some Empirical Results**

| Author(s) | Country | Period | Data | Results | Conclusion |
|---|---|---|---|---|---|
| | | | ***1. Tests relative to the efficient bargaining model (EBM)*** | | |
| Ashenfelter and Brown (1986) | USA | 1948-65 | International Typographical Union | No significant impact of the reservation wage on employment | Reject EBM |
| Card (1986) | USA | 1969-76 | Aeronautical industry | Idem | Reject EBM |
| Card (1990) | Canada | 1966-82 | 1300 contracts from the manufacturing industry | Idem | Reject EBM |
| Abowd and Kramarz (1993) | France | 1978-87 | 1097 private sector enterprises | Idem | Reject EBM |
| Abowd (1989) | USA | 1976-82 | 2228 contracts from the private sector (except construction) | Not possible to reject the assumption of efficient wage contracts | Accept EBM |
| | | | ***2. Tests relative to the right-to-manage model (RMM)*** | | |
| Nickell and Andrews (1983) | UK | 1951-79 | Aggregated | RMM gives satisfactory results | Accept RMM |
| MaCurdy and Pencavel (1986) | USA | 1948-65 | International Typographical Union | Variations in labour productivity partly explained by the reservation wage | Reject RMM |
| Pencavel and Holmlund (1988) | Sweden | 1950-83 | Mining and manufacturing industry | Firms determine unilaterally employment | Accept RMM |
| Hoel and Nymoen (1988) | Norway | 1968-85 | Aggregated | RMM gives satisfactory results | Accept RMM |
| Svejnar (1986) | USA | mid 1950s-late 1970s | Twelve major unionised companies | In general bargaining solution does not lie on the labour demand curve | Reject RMM |
| Boal and Pencavel (1994) | USA | 1897-38 | Virginia coal mines | Union's impact on employment not significantly different from zero | Reject RMM |

*Notes* : RMM = right-to-manage model, EBM = efficient bargaining model, and GBM = general bargaining model.

**Table 1 *(cont.)* : Trade Unions and Employment - Some Empirical Results**

| Author(s) | Country | Period | Data | Results | Conclusion |
|---|---|---|---|---|---|
| | | | ***3. Test relative to the monopoly union and efficient bargaining models*** | | |
| Aronsson et al. (1993) | Sweden | 1960-88 | Construction industry | 1. If bargaining power is assumed constant : accept monopoly union model and reject EBM<br>2. If bargaining power is a function of both the degree to which negotiations are centralised and the level of unemployment : neither of the two models can be rejected | Ambiguous |
| | | | ***4. Tests relative to the general bargaining model (GBM)*** | | |
| Nickell and Wadhwani (1991) | UK | 1972-82 | 219 enterprises from the manufacturing sector. | Trade union density and reservation wage not significant | Accept RMM |
| Alogoskoufis and Manning (1991) | UK | 1956-83 | Aggregated | Reject RMM and EBM in favour of GBM | Accept GBM |
| Vannetelbosch (1996) | Belgium | 1957-88 | Aggregated | Idem | Accept GBM |

*Notes* : RMM = right-to-manage model, EBM = efficient bargaining model, and GBM = general bargaining model.

The tests undertaken by Alogoskoufis and Manning (1991), as well as those performed by Vannetelbosch (1996) are based on aggregate data from the U.K. and Belgium, respectively. They reject the RMM and EBM in favour of the GBM. Consequently, as we have seen, a weakening of union power does not necessarily lead to an increase in employment.

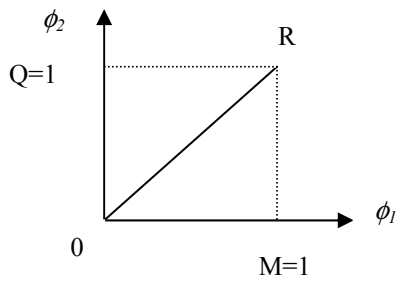
In the end, does any clear pattern emerges as to the most appropriate bargaining model ? Despite some remarkable results, the answer seems to be 'no'. Indeed, the latter are not only contradictory, but they are also subject to much criticism.

# 3. EMPIRICAL ANALYSIS

## 3.1. Description of Manning's Model (1987)

The GBM, developed by Manning (1987), is composed of two stages. Bargaining is concerned with wages in the first stage, and with employment levels in the second. Negotiations are assumed to follow the approach of Rubinstein (1982), i.e. a procedure of offers and counter-offers between fully informed parties. In other words, each party, in turn, makes a proposal that will either be accepted or rejected by the other party. In the event of rejection, the rejecting party formulates a new proposal. In the event of acceptance, the game ends.

**Figure 1 : General Bargaining Model**




*Source* : Adapted from Terraz (1996).

As we mentioned previously, Manning (1987) supposes that union power can evolve as a function of the variable being negotiated. Assuming that $\phi_1$ and $\phi_2$ represent union influence with respect to wages and employment, it is easy to show that Manning's model

(1987) includes, as specific cases, the usual bargaining models. Indeed, by fixing $\phi_1$=1 and $\phi_2$=0 (see Figure 1), we obtain the monopoly union model for which the solution is represented by the point M on Figure 1. On the other hand, if $\phi_1$<1 and $\phi_2$=0, then we find the RMM. In this case, the different results are observed on the x-axis between 0 and M. Finally, by supposing that $\phi_1=\phi_2$, we obtain the EBM, of which the solution is equivalent to the bisector 0R. Since the set of solutions associated with Manning's model comprises the area 0MRQ, we may conclude that it allows an identification of the usual bargaining models as specific cases, as well as extending the analysis to a new family of possibilities.

A more detailed analysis is required. Manning (1987) considers a company that is risk-neutral, profit-maximising, and using a technology characterised by the Cobb-Douglas function : $f(L,K)=L^{\beta}K^{\alpha}$. The company's profit is given by (1) :

$$\Pi\ (W,L,K) = L^{\beta}K^{\alpha} - W\,L \tag{1}$$

with *W, L*, and *K* representing the wage, employment level, and capital stock, respectively. The union members are also assumed to be risk-neutral. The labour supply is a continuum of workers normalised to unity. Consequently, the union's utility function is represented by the following expression :

$$U(W,L,B) = L\ W + (1-L)\ B \tag{2}$$

with *B* representing the reservation wage, i.e. the expected value of real revenue perceived by an individual in the event of redundancy. The negotiation is solved backwards. The last stage consists in determining the level of employment, given the wage determined in the first stage. As is often the case in economic literature, the resulting deal is represented by the maximisation of the generalised Nash bargain. This approach boils down to maximising the weighted product of both parties' net gain. The net gain is considered to be the difference between levels of utility in the event of an agreement and in the event of no agreement.

The status quo positions, i.e. the levels of utility reached when bargaining fails, are replaced by outside options. For the company, without fixed costs, the status quo position equals zero.

Indeed, assuming that all workers are unionised, the company will have to cease production if agreement is not reached. Consequently, the net gain for the company will be equal to its profit function. The status quo position for a union member is equal to *B*.

The generalised Nash bargaining solution associated with this problem can be written in the following manner :

$$\hat{L}\ (W, \phi_2, K, B) = \arg\max_{L}\ \left[L^{\beta} K^{\alpha} - W\ L\right]^{1-\phi_2}\ \left[L\ (W - B)\right]^{\phi_2} \tag{3}$$

$\phi_2 \in [0,1]$ represents the unions' employment-related bargaining power. The first-order condition (FOC) of this solution, which defines the employment level, is represented by (4) :

$$\phi_2\ \frac{\left(L^{\beta} K^{\alpha}\right)}{L} + (1 - \phi_2)\ \beta\ L^{\beta-1} K^{\alpha} = W \tag{4}$$

The above expression clearly demonstrates that at equilibrium, the level of employment will be chosen such that the linear combination of the average and marginal productivities of labour is equal to the wage[5]. If $\phi_2 = 0$, the company will set an employment level that makes the marginal productivity of labour equal to the wage. On the other hand, if $\phi_2 = 1$, in which case the level of employment is unilaterally set by the union, then this level will be such that the company's profits are suppressed.

Let us rewrite expression (4) in the following form :

$$\begin{aligned} &\left[\beta + (1 - \beta)\ \phi_2\right] L^{\beta-1}\ K^{\alpha} = W \\ &\equiv \textit{Employment equation} \end{aligned} \tag{5}$$

We observe that, when $W, \phi_2, K$, and *B* are given, this equation is compatible with only one level of employment. Moreover, the result of the first stage of negotiation (the wage-related stage) corresponds to the solution of the following generalised Nash bargain :

[5] It can be shown that equation (4) fulfils the second-order condition, i.e. that it is concave w.r.t. *L*.

$$\hat{W}(\phi_1, \phi_2, K, B) = \arg\max_{W} \left[L^{\beta} K^{\alpha} - W L\right]^{1-\phi_1} \left[L(W-B)\right]^{\phi_1}$$
$$st. \quad L = \hat{L}(W, \phi_2, K, B) \tag{6}$$

$\phi_1 \in [0,1]$ represents the union's influence in setting wages. The result of the Nash bargain is given by the FOC :

$$\frac{B}{\beta}\left(\beta + (1-\beta)\phi_1\right) = W$$
$$\equiv \textit{Wage equation} \tag{7}$$

This equation does not directly depend on the parameter $\phi_2$. Moreover, for $\phi_1$, $\phi_2$, $K$ and $B$ given, the solution is unique. In sum, Manning's model (1987) results in the level of employment $\hat{L}$ and the wage $\hat{W}$, in line with equations (5) and (7). According to this model, an increase in union influence with respect to wages will reduce employment, whilst an increase of their employment-related bargaining power will reduce the number of unemployed[6].

## 3.2. Selection Procedure

Let us briefly review the procedure developed by Alogoskoufis and Manning (1991) on which we rely to make a choice between the usual bargaining models and the GBM. We begin by noting that equations (5) and (7), log-linear, can be reformulated in the following manner :

$$\begin{cases} (1-\beta)\log L = \log\delta + \alpha\log K - \log W \\ \log(W) = \log\vartheta + \log B - \log\beta \end{cases} \tag{8}$$

[6] Indeed, we can verify that $\frac{\partial \hat{L}}{\partial \phi_1} \leq 0$, $\frac{\partial \hat{L}}{\partial \phi_2} \geq 0$.

with $\delta = \beta + (1-\beta)\ \phi_2$ et $\vartheta = \beta + (1-\beta)\phi_1$. Assuming that $\log \delta = \delta_0 + \delta_1\ \phi_2$, and $\log\ \vartheta = \vartheta_0 + \vartheta_1\ \phi_1$, let us rewrite the system of equations (8) as :

$$\begin{cases} \log L = \dfrac{\delta_0 - \vartheta_0 + \log\beta}{1-\beta} + \dfrac{\alpha}{1-\beta}\log K - \dfrac{1}{1-\beta}\log B + \dfrac{\delta_1}{1-\beta}\phi_2 - \dfrac{\vartheta_1}{1-\beta}\phi_1 \\ \log W = \vartheta_0 - \log\beta + \log B + \vartheta_1\,\phi_1 \end{cases} \tag{9}$$

Since the unions' relative bargaining power is not directly observable, other variables must be used to approximate it. Thus, let us suppose that :

$$\begin{cases} \phi_2 = \tau_0 + \tau_1 \log \varphi_1 + \tau_2 \log \varphi_2 \\ \phi_1 = \upsilon_0 + \upsilon_1 \log \varphi_1 + \upsilon_2 \log \varphi_2 \end{cases} \tag{10}$$

The variables $\varphi_1$ and $\varphi_2$ represent the union's influence during the two stages of the negotiation. These variables do not directly affect the firm's profit function or the level of utility attained by the union. As pointed out by Binmore et al. (1986), it is important to capture the asymmetry of the parties' situations, which is independent of their utility functions and their status quo positions[7]. At present, let us replace the variables $\phi_1$ and $\phi_2$ of expression (9) by system (10), and isolate $\log \varphi_2$ from the wage equation[8]. Next, by substituting this expression in the employment expression, we obtain :

[7] If $\phi_1$ and $\phi_2$ were observable, the relevance of the appropriate bargaining model would be straightforward to verify. Unfortunately this is not the case. As a result, a procedure to discriminate between alternative wage-employment bargaining models based on equation (9) can not be adopted. As mentioned by Manning (1987), one way to solve this problem is to use proxies for $\phi_1$ and $\phi_2$. The latter are identified ex-post by the econometric results.

[8] This gives us : $\log\ \varphi_2 = \dfrac{1}{\vartheta_1\ \upsilon_2}\left(\log\ W - \vartheta_0 + \log\beta - \log B - \vartheta_1\ \upsilon_0 - \vartheta_1\ \upsilon_1\ \log\ \varphi_1\right)$.

$$\log L = \psi_0 + \psi_1 \log K - \psi_2 \log B + \psi_3 \log \varphi_1 + \psi_4 \log W$$
$$\equiv \textit{GBM employment equation} \tag{11}$$

with
$$\begin{cases} \psi_1 = \dfrac{\alpha}{1-\beta} \\ \psi_2 = \dfrac{\delta_1 \tau_2}{1-\beta} \dfrac{1}{\vartheta_1 \upsilon_2} \\ \psi_3 = \dfrac{\delta_1 \tau_1}{1-\beta} - \dfrac{\delta_1 \tau_2}{1-\beta} \dfrac{\upsilon_1}{\upsilon_2} \\ \psi_4 = \dfrac{\delta_1 \tau_2 - \vartheta_1 \upsilon_2}{1-\beta} \dfrac{1}{\vartheta_1 \upsilon_2} \end{cases}$$

With the help of this expression, we can establish a procedure involving wages and employment for selecting an appropriate bargaining model. First, if we accept the RMM, the unions have only an indirect influence on employment, through their wage decisions. The parameter $\phi_2$ equals zero and, in conformity with expression (10) : $\tau_0 = \tau_1 = \tau_2 = 0$. Consequently, the RMM involves a test of the following restrictions :

$$\begin{cases} H_0 : \psi_2 = 0 \quad \psi_3 = 0 \\ H_1 : \psi_2 \neq 0 \quad \psi_3 \neq 0 \end{cases} \tag{12}$$

Under the null hypothesis, we thus obtain :

$$\log L = \psi_0 + \psi_1 \log K + \psi_4 \log W$$
$$\equiv \textit{RMM employment equation} \tag{13}$$

Second, if we choose the EBM, $\phi_1 = \phi_2$. According to expression (10), it follows that $\tau_0 = \upsilon_0$, $\tau_1 = \upsilon_1$ and $\tau_2 = \upsilon_2$. Hence, the EBM implies testing the following restriction :

$$\begin{cases} H_0 : \psi_3 = 0 \\ H_1 : \psi_3 \neq 0 \end{cases} \tag{14}$$

Under the null hypothesis, the equation is :

$$\begin{aligned} &\log L = \psi_0 + \psi_1 \log K - \psi_2 \log B + \psi_4 \log W \\ &\equiv \textit{EBM employment equation} \end{aligned} \tag{15}$$

Before moving on to the empirical analysis, we should point out two things. First, this procedure is only appropriate if we assume that there is no efficiency wage. Indeed, as Nickell and Wadhwani (1987) point out, without this assumption, the presence of a reservation wage in the employment equation would not guarantee that the wage contracts are optimal. Let us imagine, for example, that workers' productivity is a positive function of the difference between their wage and the reservation wage. In this case, even when bargaining is concerned only with wages, the employment equation will depend on the reservation wage. Without rejecting the efficiency wage assumption, there is therefore no way to make an adequate choice between the RMM and the EBM. Second, despite appearances, the employment equations (13) and (15) are not nested. This is due to the fact that the actual null hypotheses, i.e. $\psi_2 = 0$, $\psi_3 = 0$ and $\psi_3 = 0$, are no necessary conditions for the acceptance of the theoretical null hypotheses, i.e. $\phi_2 = 0$ and $\phi_1 = \phi_2$ (see Vannetelbosch, 1996: 48).

## 3.3. Application to the Swedish Labour Market

Our econometric methodology follows first the Engle-Granger's (1987) two-step estimation procedure. We use Phillips and Hansen's (1990) non-parametric technique to correct OLS estimators of the long-run employment equations of each model, i.e. RMM, EBM and GBM. This method gives optimal[9] and asymptotically normal estimators which permit for statistical inference. After having tested the stationarity of the residuals, we estimate, in each case, an ECM (error correction model) representation of a dynamic employment equation. This procedure is justified by the fact that the variables are, as we will see, I(1). Besides, it enables us to distinguish between the short and long run impact of the variables on employment. Finally, the use of non-nested tests allows us to select the adequate model for the Swedish private sector.

[9] Under certain conditions, "fully modified estimators" are asymptotically efficient.

### *3.3.1. Data*

Our sample consists of annual data from 1960 to 1993 relating to the Swedish private sector. In order to apply the above-discussed tests, we have subdivided our variables into three categories : (a) those that have a direct effect on firms' profit function, (b) those influencing the union's utility function without having any direct impact on firms' profit function, and (c) those impacting the parties' bargaining power without directly influencing their utility and profit functions. The variables grouped in each category are listed in Table 2.

The first category includes the real wage cost, a proxy for the cyclical component of external demand for Swedish production, the real exchange rate, and real import prices weighted for the share of imports in the Swedish GDP.

**Table 2 : Variable Classification**

| | |
|---|---|
| A. Dependent variable : | |
| log (Lp) | log of total employment in the private sector |
| B. Independent variables : | |
| (a) Having a direct effect on the profit function | |
| log (WCP / P) | log of the real wage cost in the private sector |
| WT | proxy for the cyclical component of external demand |
| log (e*PW / P) | log of the real exchange rate - competitiveness index |
| v log (PM / P) | log of real import prices, weighted by the share of imports in the GDP |
| (b) Having a direct effect on the utility function but not on the profit function | |
| log (RR) | log of the replacement ratio |
| TAX | the private sector tax wedge |
| (c) Having a direct effect on the bargaining power but not on the profit and utility functions | |
| log (DEN) | log of the trade union density |
| log (NSN) | log of the number of strikes (both legal and illegal) |

*Note* : A detailed description of these variables and their sources can be found in Appendix 1.

The replacement ratio (RR) and the tax wedge (TAX) constitute the second category variables. RR describes the evolution in the ratio of the reservation wage (approximated by the average level of unemployment benefits) to the average wage in the Swedish private sector. This variable represents the external opportunity of workers not finding a job. The theory states that an increase in the RR reduces union incentive for wage moderation, and thus exerts a negative effect on the level of employment. TAX corresponds to the sum of social security contributions and direct and indirect taxes, expressed as a percentage of the

hourly wage in the Swedish private sector. All other things being equal, an increase in this variable decreases the real wage received by workers. Consequently, according to the collective bargaining models, unions will push for higher wages to compensate for their members' loss of purchasing power. The level of employment is negatively affected.

The variables grouped in the third category, i.e. the trade union density and the number of strikes, are more subject to criticism. Indeed, there are arguments supporting the notion that the trade union density will affect the unions' utility function, and hence, this variable should be included in the second category. Nonetheless, it has been conventional to use this variable as a measure of trade union power, and it is difficult to see alternatives (Alogoskoufis and Manning, 1991). The same holds true for the number of strikes.

**Table 3 : Average Annual Growth Rates**

| Period | 1960 - 75 | 1976 - 82 | 1983 - 90 | 1991 - 93 |
|---|---|---|---|---|
| Lp | 0.31 | -1.24 | 1.47 | -4.77 |
| WCP/P | 5.50 | -0.08 | 1.62 | -0.52 |
| e*(PW / P) | -2.59 | 3.66 | -8.56 | 12.79 |
| (PM / P)^ v | -0.02 | 0.80 | -1.19 | 1.27 |
| RR | 0.44 | 4.46 | 0.20 | -0.45 |
| TAX | 2.98 | 2.84 | 0.86 | -1.55 |
| DEN | 0.23 | 1.14 | 0.42 | 5.37 |
| NSN | 16.05 | -15.12 | 4.36 | 11.80 |

*Note* : More details can be found in Appendix 3.

Table 3 presents the average annual growth rates for most of the variables involved in our study. We have chosen a subdivision of time which corresponds to the most characteristic periods of Swedish private sector employment evolutions. During the first period (1960-75), employment remained fairly stable. However, a number of factors contributed to reduced levels of employment in the mid-seventies (Calmfors and Forslund, 1990). These factors included a deterioration in the trade balance, losses of market share for certain exports, a decline in investment and a significant increase in wage costs (provoked by increased prices on imports), all in addition to a weakened growth in productivity. Subsequently, despite real wage cost adjustments, a devaluation of the Swedish Crown and a regain in productivity, it was not until 1983 that employment began to pick up again.

The years 1983-90 correspond to a post-adjustment period (Calmfors and Forslund, 1990). As a result of accommodating economic policy, the level of inflation remained high in

comparison to that of other Western European nations. The growth rate of the real wage cost became positive beginning in 1984, and Sweden's competitiveness progressively deteriorated. However, as a result of adjustments made in the preceding period, of strong demand, and of sustained international economic growth, employment continued to grow until the end of the period.

The number of jobs shrank considerably between 1991 and 1993. This reversal is, to a certain extent, the result of an international recession. However, it is likely that the greatest factor is the anti-inflationary policy implemented in Sweden. Indeed, there was a deliberate attempt to adhere to a non-accommodative policy, in which the fixed exchange rate towards the ECU adopted in 1991 was regarded as the anchor. The consequence was a *collision* between the exchange rate policy and the large wage increases that had already occurred in the preceding boom, which resulted in a serious over-evaluation of the real exchange rate (Calmfors, 1993). Finally, the upward pressures on the exchange rate between 1991 and 1992 also contributed to the sudden growth in unemployment.

### *3.3.2. Unit Root Tests*

Before moving on to the first step of the co-integration test developed by Engle and Granger (1987), we must verify that all our variables have the same order of integration. To accomplish this, we have used three types of tests: Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Durbin-Hausman (DH). In order to determine the number of lags to use in the ADF regression, we relied on the Breusch-Godfrey LM-test. Working with annual data, we chose to test the auto-correlation of residuals to the second order.

A dummy variable, made equal to 0 for the years 1960-75 and to 1 for the years 1976-93, was used in the tests concerning real wage cost. The purpose of this variable is to account for a structural break observed in 1975, in the evolution of wage costs. Indeed, the growth rate of this variable was substantially lower in 1976-93 than in the preceding period.

The column $\Delta$, in Table 4, indicates whether or not the tests were carried out on variables in level or variables in first differences. The figure in the ADF column corresponds to the p-value. The k parameter represents the number of lags used in the regression relative to the

ADF. The LM column indicates the p-values for the Breush-Godfrey test. Finally, the last column shows the order of integration of the variables.

**Table 4 : Order of Integration of the Variables**

| | Δ | PP | DH | ADF | k | LM | Results |
|---|---|---|---|---|---|---|---|
| log (Lp) | 0 | -11.86 | 16.8 | .116 | 2 | .729 /.378 | I (1) |
| | 1 | -12.83 | 50.6 | .078 | 1 | .496 / .700 | |
| log (WCP / P) | 0 | -1.10 | 3.6 | .572 | 0 | .513 / .425 | I (1) |
| with dummy | 1 | -25.48 | 53.5 | .081 | 1 | .446 / .652 | |
| log (WT) | 0 | -5.39 | 19.6 | .287 | 1 | .335 / .559 | I (1) |
| | 1 | -16.66 | 413.0 | .003 | 1 | .852 / .774 | |
| log (e*PW/P) | 0 | -6.16 | 9.9 | .114 | 1 | .319 / .500 | I (1) |
| | 1 | -17.24 | 336.1 | .020 | 0 | .887 / .317 | |
| v log (PM / P) | 0 | -7.58 | 14.3 | .495 | 0 | .352 / .673 | I (1) |
| | 1 | -27.81 | 19298.6 | .001 | 0 | .461 / .775 | |
| log (RR) | 0 | -1.53 | 4.2 | .766 | 0 | .378 / .546 | I (1) |
| | 1 | -33.33 | 741.1 | .000 | 0 | .590 / .249 | |
| TAX | 0 | -1.19 | 0.3 | .589 | 1 | .534 / .346 | I (1) |
| | 1 | -15.63 | 48.4 | .094 | 0 | .662 / .254 | |
| log (DEN) | 0 | 1.24 | 2.0 | .996 | 0 | .785 / .902 | I (1) |
| | 1 | -31.77 | 3816.3 | .003 | 0 | .594 / .704 | |
| log (NSN) | 0 | -5.04 | 25.7 | .525 | 2 | .543 / .674 | I (1) |
| | 1 | -17.07 | 4531.7 | .000 | 1 | .384 / .585 | |

*Note* : The critical values for the ADF test are given by MacKinnon (1991). The critical values at 5% for the PP and the DH tests are respectively 12.8 and 32.6.

In light of the results of Table 4, we can conclude that, at a level of 10%, all of our variables in level are integrated of order one. Moreover, they are stationary in first-order differences. This is also supported graphically.

### *3.3.3. Long-Run Employment Equations*

The first stage in the Engle-Granger (1987) co-integration test is an estimation of the equilibrium relation between the variables in level. If the variables are co-integrated, then the ordinary least squares method (OLS) supplies super-consistent estimators for the co-integration parameters. Stock (1987) demonstrated indeed that these estimators converge more quickly than when the OLS is applied to stationary variables. Unfortunately, these estimators do not allow for statistical inference because their distribution is usually not normal and biased in finite samples. This is due to two things : the I(1) structure of the regressors and their potential correlation with the I(0) residuals. Nevertheless, Phillips and Hansen's (1990) estimation procedure corrects for this bias and yields asymptotic normality where such correlation exist. This non-parametric method provides 'fully modified' t-statistics which permit inference to proceed conventionally. It is based upon two non-

parametric corrections, i.e. for the auto-correlation of the residuals and the possible correlation between the regressors and the disturbances. The existence of a long-run equilibrium relationship is verified through a stationarity test on the 'fully modified' residuals.

Phillips and Hansen's (1990) estimation procedure has been applied to the employment equations of the GBM, the RMM, and the EBM, i.e. to equations (11), (13), and (15). Next, we used the ADF test to determine the order of integration of the residuals from the three regressions. The Breusch-Godfrey LM test allowed us to determine the number of lags to use in the ADF. As recommended by Enders (1995), in order to judge the stationarity of the residuals, we used the critical values supplied by Engle and Yoo (1987). They are available up to N=5, where N corresponds to the number of explanatory I(1) variables in the long-run employment equation. Our estimates are presented in Table 5 and Table 6.

**Table 5 : Co-Integration Tests on the Residuals**

| | ADF(k) | k | LM-test | Critical values at 5 and 10% | Results |
|---|---|---|---|---|---|
| GBM | -5.12 | 0 | .537 / .775 | -4.76 / -4.42 | I(0) |
| EBM | -3.99 | 1 | .297 / .516 | -4.15 / -3.85 | I(0) |
| RMM | -3.90 | 1 | 1.00 / 1.00 | -4.15 / -3.85 | I(0) |

*Notes* : The critical values figuring in this table come from Engle and Yoo (1987).
The parameter 'k' corresponds to the number of lags introduced in the ADF.

The results shown in Table 5 suggest that the residuals of the three regressions are stationary at a level of 10%, which is supported graphically (see Appendix 2). Consequently, it appears reasonable for us to affirm that the variables contained in each of these equations form a co-integration vector.

What lessons can be learned from the long-run relationships illustrated in Table 6 ?

(a) In contrast to the real wage cost, the external demand for Swedish goods has a positive influence on the level of employment at equilibrium.

(b) Real import prices, weighted by the share of imports in the GDP have a negative influence on employment. This result is not surprising given that at the time of the first oil shock and the accompanying rise in commodity prices, this was perhaps the most published cause of the rise in unemployment (Layard and Nickell, 1985).

**Table 6 : Long-Run Employment Equations**

| log(Lp) | GBM | EBM | RMM |
|---|---|---|---|
| Constant | 7.298 (34.41, .00) | 6.63 (73.44, .00) | 6.547 (73.47, .00) |
| log (WCP / P) | -.198 (-5.38, .00) | -.143 (-3.19, .00) | -.054 (-1.60, .11) |
| WT | .188 (1.90, .06) | .524 (5.04, .00) | .462 (3.58, .00) |
| log (e*PW / P) | -.042 (-1.58, .11) | -.011 (-.35, .73) | -.028 (-.62, .54) |
| v log (PM / P) | -.682 (-4.21, .00) | -.474 (-2.46, .02) | -.227 (-.93, .35) |
| log (RR) | -.147 (-4.09, .00) | -.124 (-2.62, .01) | |
| TAX | .381 (6.24, .00) | .250 (3.68, .00) | |
| log (DEN) | -.310 (-3.45, .00) | | |
| log (NSN) | .008 (1.94, .05) | | |
| DUM | -.006 (-.92, .36) | -.005 (-.54, .59) | .009 (-.91, .36) |
| $R^2$ adjusted | .737 | .629 | .417 |
| SSR | .0011 | .0017 | .0029 |
| Obs | 34 | 34 | 34 |

*Note* : t-statistics and p-values are indicated between brackets.

(c) Employment is inversely related to the replacement ratio. In line with the theoretical models an increase in the replacement ratio seems to reduce the unions' incentive to support moderate wages, thereby reducing the level of employment.

(d) The tax wedge has a positive effect on employment. In order to understand this relationship, let us perform a parallel comparison of the evolutions of real wage cost and the tax wedge, bearing in mind that real wage cost is inversely related to employment (see Table 3). The period 1960-76 was characterised by a significant increase in the tax wedge and the real wage cost. Subsequently, in spite of the continued expansion of the tax wedge, between 1976 and 1982, the increase in real wage cost waned considerably. In the next period (1983-90), the growth rate of real wage cost took off again, in spite of a less vigorous growth in the tax wedge. Finally, a decrease in the tax wedge between 1991 and 1993 was accompanied by a reduction in the real wage cost. This description shows quite clearly that increasing the tax wedge is not always synonymous with employment-reducing wage demands. In reality, the course of action chosen was instead to try to reach corporatist agreements with trade unions on wage restraints for tax concessions (Calmfors, 1993). For example, in the so-called Haga-agreements encompassing 1974-76, the wage earner organisations promised to moderate wage claims in response to increases in payroll taxes (Calmfors and Forslund, 1990).

(e) In contrast to the trade union density, the number of strikes has a positive effect on employment. In referring to the underlying theoretical model, these variables can thus be associated with the unions' bargaining power in terms of wages $(\phi_1)$, and of employment $(\phi_2)$, respectively.

### *3.3.4. Dynamic Employment Equations*

The second step in the Engle-Granger test (1987) is the estimation of an ECM representation for the RMM, the EBM and the GBM. To do this, we apply the OLS method to the following expression :

$$\Delta Lp_t = \alpha_1 + \alpha_2 \ \Delta Lp_{t-1} + \alpha_3 \ \Delta x_t + \alpha_4 \ \tilde{z}_{t-1} + \varepsilon_t \qquad (16)$$

The residuals from the co-integration regression $\left(\tilde{z}_{t-1}\right)$ measure the deviation with respect to the long-run equilibrium, at time (t-1). The relative coefficient $\alpha_4$, captures the speed of adjustment toward long-run equilibrium. It thus represents the part of disequilibrium that is corrected from one period to the next.

**Table 7 : Dynamic Employment Equations**

| Δ log (Lp) | GBM | EBM | RMM |
|---|---|---|---|
| Constant | -.002 (-.77, .45) | -.003 (-.97, .34) | -.004 (-1.18, .25) |
| Δ log (Lp (-1)) | .514 (3.25, .00) | .546 (3.44, .00) | .743 (4.27, .00) |
| Δ log (WCP / P) | -.043 (-.36, .72) | .032 (.26, .80) | .202 (1.47, .15) |
| Δ log (WT) | .065 (.86, .40) | .212 (2.67, .01) | .170 (2.05, .05) |
| Δ log (e*PW / P) | -.027 (-.95, .35) | .008 (.24, .81) | .013 (.38, .70) |
| Δ v log (PM / P) | -.357 ( -1.64, .12) | -.303 (-1.26, .22) | -.196 (-.78, .44) |
| Δ log (RR) | -.053 (-2.09, .05) | -.056 (-2.06, .05) | |
| Δ log(TAX) | .227 (2.57, .02) | .217 (2.31, .03) | |
| Δ log (DEN) | -.070 (-.72, .48) | | |
| Δ log (NSN) | .010 (3.02, .01) | | |
| DUM | .001 (.43, .67) | .002 (.66, .52) | .003 (.97, .34) |
| $\tilde{z}_{t-1}$ | -.700 (-3.45, .00) | -.493 (-2.71, .01) | -.475 (-2.87, .01) |
| R² adjusted | .653 | .590 | .517 |
| SSR | .0004 | .0006 | .0007 |
| LM | .147 / .348 | .692 / .862 | .294 / .173 |
| NORM | 4.76 (.092) | 1.79 (.409) | .341 (.843) |
| HET | 21.34 (.448) | 13.80 (.681) | 16.28 (.234) |
| F - test | 6.29 (.000) | 5.96 (.000) | 5.74 (.000) |
| Obs | 32 | 32 | 32 |

*Note* : t-statistics and p-values are indicated between brackets.

Statistical inference based on traditional tests is appropriate, since all the variables involved in equation (16) are stationary. The results of our estimations are presented in Table 7. The values in parentheses in Table 7 are, respectively, the Student variable and the p-value. NORM corresponds to Jarque-Bera's test of normality. HET is the White heteroskedasticity test. The Breusch-Godfrey LM test confirms residual auto-correlation to the second order.

The F statistic assures the global validity of the model. The p-values associated to NORM, HET and F-tests are indicated between brackets.

The results of the GBM meet theoretical expectations. The evolution of employment is characterised by a certain inertia : an increase of $\Delta(Lp_{-1})$ by 1% provokes an increase by approximately 0.5% of $\Delta(Lp)$. More surprising is the non-significance of the real wage cost regression coefficient. This can be explained, however, if we assume that the production function is of the clay-clay type. In this case, the labour demand equation relies on two perfectly complementary production factors. Hence, in the short term, production factors are not interchangeable. However, as mentioned above, the long-run influence of the real wage cost on employment is significantly negative.

None of the variables having a direct role in companies' profit function is significantly different from zero at 10 per cent. The replacement ratio, as in the long-run, has a negative – albeit limited – effect on employment. The positive effect of the tax wedge on employment is explained, as mentioned earlier, by the fact that trade unions accept lower wages under social democratic governments for a *social wage*, i.e. tax and expenditure policies that meet the demands of unions (Calmfors and Forslund, 1990). Thus, wage moderation is often accompanied by an increase in the tax wedge, which explains the positive relationship between the tax wedge and employment. Moreover, as in the long-run employment equation, the number of strikes has a significant positive influence on employment. Consequently, as suggested by Manning's model (1987), we are able to assimilate this variable with the parameter $(\phi_2)$ representing the employment-related bargaining power of the unions.

The results obtained for the EBM and RMM are quite similar to those obtained for the GBM. A noteworthy difference is that in the EBM and RMM, the indicator for external demand for Swedish production becomes significant.

Besides, we remark that the residuals of the long-run employment equations are all significant at a level of 5%. This constitutes additional indication of the existence of co-integration relationships. Moreover, the speed of adjustment towards long-run equilibrium is rather high and this in particular for the GBM.

In the end, what have we found ?

(a) The replacement ratio and the tax wedge have a significant impact on employment both in the short and in the long run. This result can be interpreted as evidence for the rejection of the RMM in favour of the EBM.

(b) The variables affecting only the parties' bargaining power have significant long run estimated coefficients. Moreover, we found that the number of strikes exerts a significant positive influence on employment in the short run. Hence, the GBM seems to be a relevant candidate for describing employment determination in the Swedish private sector.

### *3.3.5. Non-Nested Tests*

The Engle-Granger two-step procedure (1987) involves the use of non-nested tests to choose the appropriate wage-employment bargaining model. Indeed, by including the residuals from the co-integration regression, it becomes impossible to write any dynamic employment equation as a specific case of any other. A characteristic of the non-nested tests is that they involve two null hypotheses.

Let us consider the following models :

$$\begin{cases} M_1 \equiv \quad y = X\beta + \varepsilon_1 \\ M_2 \equiv \quad y = Z\gamma + \varepsilon_2 \end{cases} \tag{17}$$

with $M_1, M_2 \in \{GBM, EBM, RMM\}$ and $\varepsilon_{1t}, \varepsilon_{2t}$ i.i.d. and normally distributed. Making a choice between these models thus boils down to testing $H_0 = M_1$ and $H_0 = M_2$, respectively. As indicated in Table 8, four types of results – potentially incoherent – may be obtained. There may be no result if the models are simultaneously rejected or accepted. According to Gourieroux and Monfort (1991), the first case implies a specification problem, and the second implies that the data do not contain a sufficient amount of information to choose between $M_1$ and $M_2$.

**Table 8 : Four Types of Results**

| Test result : $H_0 = M_1$ / Test result : $H_0 = M_2$ | Accept $M_1$ | Reject $M_1$ |
|---|---|---|
| Accept $M_2$ | Incoherent | Coherent |
| Reject $M_2$ | Coherent | Incoherent |

*Source* : Gourieroux and Monfort (1991).

We have used six tests to make a choice between the GBM, EBM and RMM. Before analysing the results, let us briefly describe each of these tests.

### (i) Encompassing Test

Let us suppose $H_0 = M_1$ and $H_1 = M_2$, and call $c$ and $c_0$ the estimated parameters for the regression of y on Z and of $X\hat{\beta}$ on Z (where $\hat{\beta}$ is the OLS estimator of $\beta$ in $M_1$), respectively. In this case, as Greene (1997) points out, testing the assumption that $H_0 = M_1$ is equivalent to verifying that $E[c - c_0] = 0$. Davidson and MacKinnon (1993) demonstrated that this approach is equivalent to testing the assumption $\gamma_1 = 0$, using the F statistic, based on the following regression :

$$y = X\beta + Z_1\gamma_1 + \varepsilon_1 \tag{18}$$

where $Z_1$ contains the variables of Z that are not included in *X*, and the residuals are i.i.d. The encompassing test therefore corresponds to a classic F-test in which the assumption that $H_0 = M_1$ is rejected, when the F statistic is significant.

### (ii) J-Test

The J-test, developed by Davidson and MacKinnon (1981) is based on the following regression :

$$y = X\beta + \lambda\ Z\hat{\gamma} + \varepsilon \tag{19}$$

where $\hat{\gamma}$ is the OLS estimator for the parameter $\gamma$ in $M_2$ and the residuals are i.i.d. The distribution of the t-statistic related to the OLS estimator of the parameter $\lambda$ is asymptotically normal under the assumption that $H_0 = M_1$. Hence, the procedure dictates that we reject $M_1$ when the parameter $\hat{\lambda}$ is significant.

**(iii) JA-Test**

Fisher and McAleer's JA-test (1981) is based on the t-statistic associated with the OLS estimator of the parameter $\lambda$ of the following regression :

$$y = X\beta + \lambda\left(Z\left(Z'Z\right)^{-1}Z'X\hat{\beta}\right) + \varepsilon \tag{20}$$

where $\hat{\beta}$ is the OLS estimator of $\beta$ and the residuals are i.i.d.. This test rejects $M_1$ when $\hat{\lambda}$ is significant.

**(iv) N-Test, NT-Test, and W-Test**

The N-test, introduced by Cox (1962), generalises the maximum likelihood test used for nested models. The NT-test and the W-test, developed by Godfrey and Pesaran (1983), are modified versions of Cox's test (1962). Their properties are better adapted than Cox's test for small samples. Finally, under the null hypothesis, all these tests have a normal asymptotic distribution.

Godfrey and Pesaran (1983) compared the performances of these six tests, using Monte Carlo simulations run on small samples. Let us review their main results.

(a) *When the number of regressors is not identical* :
-the N-test is too often significantly different from zero.
-the modified versions of Cox's test (1962), and the F-test are more reliable. We note, however that the W-test does not generally reject the null hypothesis often enough.
-the J-test and JA-test are not sufficient.

(b) *When the distribution of the residuals is not normal* :

- Monte Carlo results are in many ways similar to those obtained for the case of normally distributed errors.

(c) *In the case of lagged variables* :

-the value of the NT-statistic is sometimes too great, but this effect is much less significant than in the case of the non-adjusted Cox test (1962).

-the F-test does not reject the null assumption often enough.

-the J-test and JA-test are not satisfactory.

Hence, as Godfrey and Pesaran (1983) write, these results push us to concentrate on the F, NT, and W tests.

**Table 9 : Non-Nested Tests**

| $H_0 : M_1$ , $H_1 : M_2$ | Encompassing | N - test | NT - test | W - test | J - test | JA - test |
|---|---|---|---|---|---|---|
| GBM - RMM | .554 | -1.108 | -.463 | -.665 | .741 | .760 |
| | (.466) | (.268) | (.643) | (.506) | (.468) | (.457) |
| RMM - GBM | 2.726 | -8.395 | -2.001 | -2.528 | 4.025 | 2.963 |
| | (.051) | (.000) | (.045) | (.012) | (.001) | (.007) |
| GBM - EBM | .142 | -.512 | -.266 | -.292 | .375 | .373 |
| | (.711) | (.609) | (.790) | (.770) | (.715) | (.713) |
| EBM - GBM | 1.952 | -4.224 | -1.141 | -1.451 | 2.498 | 1.027 |
| | (.156) | (.000) | (.254) | (.147) | (.021) | (.316) |
| EBM - RMM | .145 | -.503 | -.179 | -.284 | .375 | .370 |
| | (.707) | (.615) | (.858) | (.776) | (.711) | (.759) |
| RMM - EBM | 2.057 | -4.372 | -1.323 | -1.803 | 2.601 | 2.085 |
| | (.137) | (.000) | (.186) | (.071) | (.016) | (.048) |

*Notes* : If the test is not significant, model 1 encompasses model 2. When the test is significant, model 1 does not encompass model 2. p-values are indicated between brackets.

Results from Table 9 are consistent with preceding findings. Indeed, they show that :

(a) The EBM encompasses the RMM at the level of 10 per cent.

(b) The RMM and the EBM can be rejected in favour of the GBM respectively at the level of 5 and 15 per cent.

## 4. CONCLUSION

The purpose of this chapter was to discriminate among alternative wage-employment bargaining models using annual macro-data from the Swedish private sector covering the

period 1960-93. While the majority of research in this field is restricted to testing the usual bargaining models, i.e. *right-to-manage* (RMM) and *efficient bargaining* (EBM), we took a broader look at this question. In other words, bearing in mind the main features of the Swedish collective bargaining system, we found it essential not to test only for the usual bargaining models but also for the *general bargaining* model (GBM). Indeed, although wages were unquestionably the main bargaining topic in the pre-1993 Swedish industrial relations system, trade unions also had some bargaining power on employment particularly at the local level (Hammarström and Nilsson, 1998).

Our results, obtained using the Engle-Granger procedure (1987) and non-nested tests, show that the EBM encompasses the RMM. In addition, we found that the RMM and EBM can be rejected in favour of the GBM. This result may be particularly important for government policy. Indeed, in the latter (i.e. the GBM), an increase in the unions' bargaining power with respect to wages $(\phi_1)$ reduces employment. On the other hand, an increase in their influence in the setting of employment levels $(\phi_2)$ has the inverse effect. Consequently, a weakening of the unions could potentially lead to a reduction in employment. Among other things, this suggests that the relationship between collective bargaining and employment is considerably more complex than implied by the usual models. Besides, this implies that Pareto inefficiency is not a consequence of the unions' bargaining power, per se, but rather of the difference between $\phi_1$ and $\phi_2$.

Let us also notice that our findings support Espinosa and Rhee's (1989) predictions. Their theoretical model shows that the equilibria on the labour market are neither as inefficient as the monopoly union model forecasts nor as fully optimal as the efficient bargaining model forecasts. Following Espinosa and Rhee this stems from the fact that the firm-union bargaining relationship is not a one-shot game in nature. Firms and unions are involved in a repeated interaction, so that considerable opportunity exists for the parties to build a long-term relationship that may end up in a nearly efficient outcome. Bargaining over wages and employment thus corresponds to a cooperative strategy that may be sustained in equilibrium if the future consequences of any unilateral deviation are bad enough and if the future matters sufficiently. In other words, they point out that the reason why the monopoly union model fails to result in an efficient outcome in a one-period model is that the problem has a Prisoner's Dilemma structure. This argument seems particularly relevant for a highly

corporatist country like Sweden. The concept of corporatism resembles the level of centralisation of collective bargaining as well as the degree of co-ordination among the social partners. In particular, it reflects an intense and repeated firm-union relationship which we believe to be at the root of our findings, i.e. a nearly efficient outcome.

Nevertheless, further research should try to improve the variables representing union bargaining power. This could be done by using industry or establishment data. It would also be interesting to test a modified version of Manning's (1987) model, assuming that the parties' bargaining power is dependent on the degree of centralisation of the negotiations. We could thus account for the fact that the Swedish wage negotiations are relatively less centralised since the 1980s and in particular since SAF's (Swedish Employer's Confederation) 1991 decision to withdraw from the central bargaining process. Finally, additional work is needed on the nature and evolution of trade unions objectives and on how their influence on wages is affected by government policy.

# APPENDICES

## Appendix 1 : Sources and Description of the Data

*Lp* : Total employment in the Swedish private sector. *Source* : Anders Forslund (AF), Department of Economics, Uppsala University, Sweden.

*WCP/P* : Real wage cost in the Swedish private sector, i.e. (hourly wage per worker + social security contributions) / GDP deflator. *Source* : AF.

*WT* : Indicator of the cyclical component of external demand for Swedish production (weighted by the GDP, Hodrick-Prescott filter). *Source* : AF.

*e*PW/P* : Real exchange rate - competitiveness index.

*e* : SEK / USD exchange rate. *Source* : OECD (1998), *Economic outlook*, Paris : OECD.

*PW* : USD export price indices for all OECD countries. *Source* : OECD (1998), *National accounts - Volume 1*, Paris : OECD.

*v* : Ratio of imports to the GDP at production cost. *Source* : OECD (1998), *National accounts - Volume 1*, Paris : OECD.

*PM* : Import deflator. *Source* : OECD (1998), *National accounts - Volume 1*, Paris : OECD.

*TAX* : Tax wedge, corresponding to the sum of social contributions, plus direct and indirect taxes in the private sector, as a percentage of the average hourly wage. TAX = log(WCP/P) - log(WN/PC).

*WN* : Average post-tax hourly wage in the private sector, i.e., after deduction of the salary withholding tax and employee social contributions. *Source* : AF.

*PC* : Private consumption deflator. OECD (1998), *National accounts - Volume 1*, Paris : OECD.

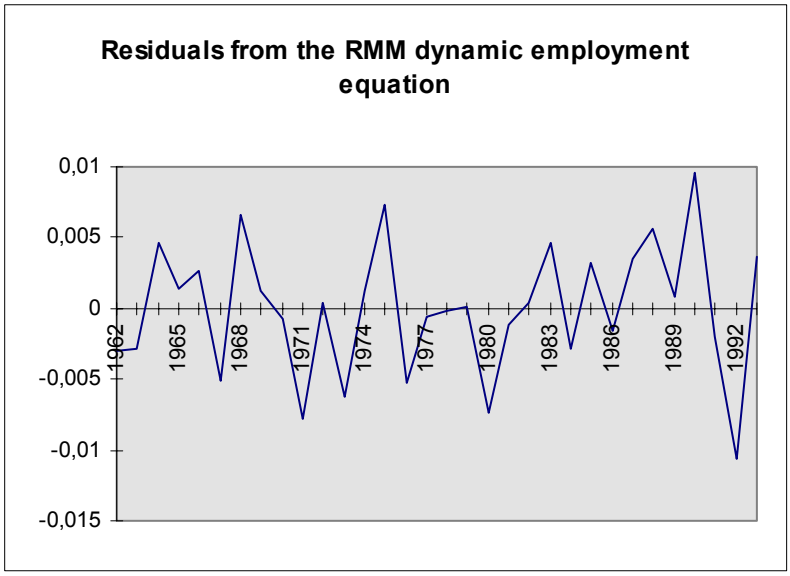
*RR* : Replacement ratio, i.e. *W°*/*WN*.

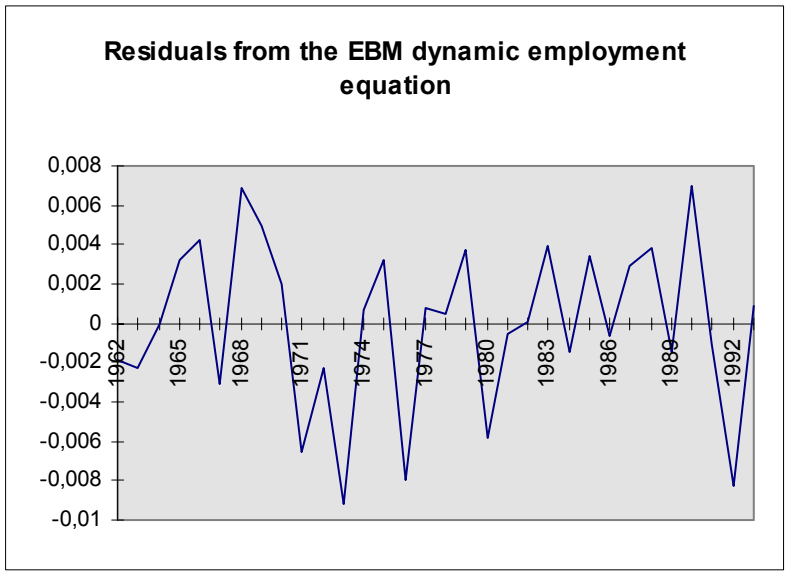
*W°*: Average unemployment benefits, after withholding tax. *Source* : Arbetslöshetsförsäkringens utveckling 1946-1995, Arbetsmarknadsstyrelsen, Försäkringenheten, AMS, Sweden.

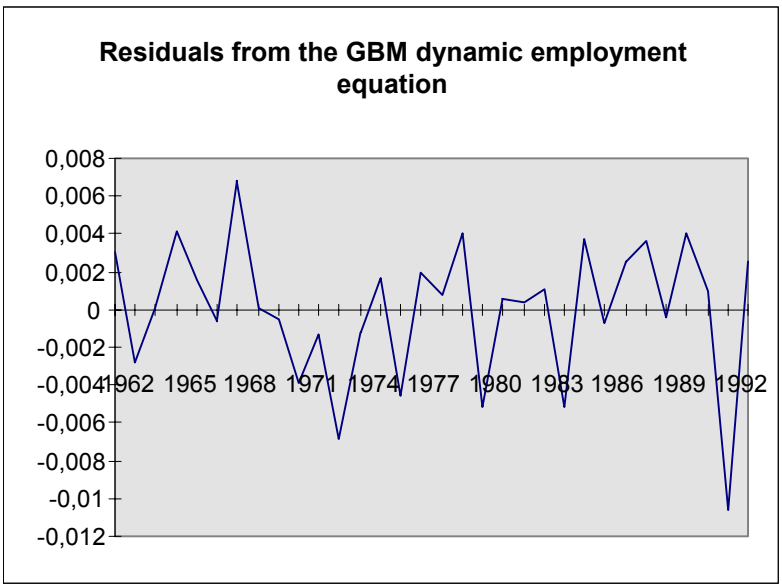
*DEN* : Trade union density, i.e. total number of union members (including the unemployed, but excluding students, retirees, and the self-employed) / active population. *Source* : Jelle Visser, University of Amsterdam, Department of Sociology.

*NSN* : Number of legal and illegal strikes. *Source* : "Stoppages of work in Sweden, private and public sector," 1947-1964 and 1965-1996, Swedish National Conciliation Office, Sweden.

## Appendix 2 : Residuals from the Dynamic Employment Equations



## Appendix 3 : Average Annual Growth Rates

| Period | 1960 - 1975 | 1976 - 1982 | 1983 - 1990 | 1991 - 1993 |
|---|---|---|---|---|
| P | 5.82 | 9.60 | 7.02 | 1.89 |
| WCP | 11.62 | 9.50 | 8.75 | 1.32 |
| W | 9.39 | 7.80 | 8.53 | 5.35 |
| SCR | 15.28 | 2.86 | 0.28 | -4.97 |
| AVTAX | 3.43 | 0.00 | 1.42 | 0.74 |
| WN/PC | 2.45 | -2.84 | 0.76 | 1.04 |
| PC | 5.51 | 10.95 | 6.92 | 3.98 |
| W° | 7.49 | 12.03 | 8.20 | 8.02 |
| WN | 7.02 | 7.25 | 7.99 | 8.51 |

*Notes* : W corresponds to the hourly wage in the private sector, SCR to the rate used in calculating social contributions, and AVTAX to the average personal income tax, see also Appendix 1.

*CHAPTER 2*

# COLLECTIVE BARGAINING AND THE SOCIO-ECONOMIC PERFORMANCE OF INDUSTRIALISED COUNTRIES

**Abstract – Collective Bargaining and Economic Performance :** The literature disagrees about what type of collective bargaining system performs best in economic terms. This situation stems mainly from the fact that the indicators used to measure the bargaining systems are often inappropriate (time invariant, synthetic or incomplete). Moreover, studies often omit to control for key macroeconomic variables. Last but not least, few studies explicitly address the effect of the bargaining regime on labour costs. Controlling for these shortcomings, we find a *non-linear* relationship between collective bargaining systems and economic performance in the OECD countries. In the long run, trade unions – hampered by the prevailing bargaining level and the coverage rate – have a negative impact on economic performance, but this effect is neutralised or even reversed in cases where there is a high degree of co-ordination among the social partners.

**Abstract – Collective Bargaining and Poverty Levels :** A large and increasing number of studies examine the influence of collective bargaining systems on wage dispersion; but very few analyse their influence on poverty levels. Yet it would be a mistake to assume that the relationship between wage dispersion and poverty rates is straightforward : the evidence shows that in most industrialised countries, poverty is not primarily a problem of the *working poor*. This is why we address explicitly the relationship between collective bargaining systems and relative poverty rates in the OECD countries. Our empirical findings suggest that industrial relations systems have a significant and intense impact upon poverty, not through any direct effect on wage dispersion, but from their relative impact on government spending on social security. The variables that provide the statistical action are the bargaining level, the coverage rate and the trade union density.

**Abstract – A Trade-Off between Economic and Social Performance ? :** The final section of this chapter investigates whether, in view of the characteristics of collective bargaining, economic efficiency (i.e. labour market performance) is compatible with social performance (i.e. low poverty levels). In a cross-national perspective, our findings suggest that industrial relations systems provide a much better explanation for the diversity of poverty levels than for the differences in economic efficiency. Moreover, we find no inevitable trade-off between social and economic performance. Indeed, in the long run, economic efficiency depends essentially on the degree of co-ordination of the social partners, whereas poverty is influenced by the formal bargaining level, the coverage rate and the trade union density.

# 1. INTRODUCTION

The introduction of the single currency has reopened the debate about the links between industrial relations systems and macroeconomic performance in Europe. By re-establishing the non-monetary adjustment conditions which exist in a system based on a gold standard, this major step in the process of European construction means that pay regulation mechanisms once again have an essential role to play. Moreover, it has been observed that since the beginning of the 1990s, many European countries have adjusted the content of collective bargaining with a view to Economic and Monetary Union. The attempt to adopt centralised social pacts in countries which were outside the deutschmark zone (such as Portugal, Italy, Spain, Finland and Ireland) shows that these countries wish to internalise macroeconomic variables within the collective bargaining system itself and to realign negotiating levels in order to achieve better control of the results (Goetschy and Lallement, 1998). Furthermore, in many countries including Belgium there is increasing government intervention in collective bargaining. The Belgian government adopted in 1996 a mechanism called the wage norm, a preventive measure for aligning pay increases with those of its main trading partners. This norm is designed to enhance *de facto* the degree of co-ordination among the social partners, forcing them to internalise the macroeconomic impact of their agreements. Also noteworthy is that observers often argue that the existence of this mechanism is justified by the inability of the two sides of industry to reach agreements - particularly on pay - which would safeguard the country's competitive position (Federal Ministry of Labour and Employment, 1998). These are just some examples that testify to a reawakening of interest in the macroeconomic consequences of different industrial relations systems. At the same time such examples also raise the question of the future of the European social model.

This is why the aim of this chapter is to assess how the characteristics of collective bargaining systems have influenced macroeconomic (i.e. labour market) performance on the one hand, and social cohesion (i.e. poverty levels) on the other, in the industrialised countries since the end of the 1970s. On this basis, bearing in mind the main characteristics of collective bargaining systems (the prevailing bargaining level, the degree of co-ordination among trade unions and employers' organisations, the coverage rate and the trade union density), we will also ascertain whether economic efficiency is compatible with social performance.

This chapter is structured as follows. The first section emphasises the heterogeneity of the industrial relations systems in the OECD countries. Then, the analysis focuses on the link between the characteristics of collective bargaining systems and macroeconomic efficiency. The third section deals with the effect of industrial relations on poverty levels, and addresses the following : (i) the impact of collective bargaining systems on wage inequality; (ii) the relationship between wage inequality and poverty; and (iii) the interplay between the characteristics of collective bargaining systems and poverty before and after net social security transfers. Next, we consider whether, in view of the characteristics of collective bargaining systems, economic efficiency is compatible with social performance. This is followed by a conclusion.

## 2. HETEROGENEOUS COLLECTIVE BARGAINING SYSTEMS

The characteristics of collective bargaining systems vary widely among the OECD countries. For instance, if we consider the prevailing bargaining level, three groups of countries emerge. Austria, Finland and Norway present a fairly centralised structure : in these countries, bargaining primarily tends to take place at the national level. By way of contrast, in Japan, New-Zealand, North-America and the UK, negotiations are decentralised and thus take place essentially at the level of individual companies. In other countries, such as Germany, France, Italy, Belgium and the Netherlands, this function is mainly taken up at the industry level.

The diversity of collective bargaining systems is also reflected in the degree of co-ordination among the social partners, i.e. the ability of trade unions and employers' organisations to co-ordinate their decisions both horizontally (within a given bargaining level) and vertically (between different bargaining levels). Co-ordination might be 'overt' or 'covert'. Overt or direct co-ordination refers to the explicit pursuit of economy-wide co-ordination goals by the principal bargaining agents (i.e. peak associations of business and labour, possibly joined by the government agencies in tripartite arrangements). In contrast, covert or indirect co-ordination is achieved through the internal governance of the associations and/or through the pace-setting role of bargaining in key sectors (OECD, 1994).

Although in most countries a high degree of co-ordination is associated with a highly centralised formal bargaining level, this is not always the case. For instance, while

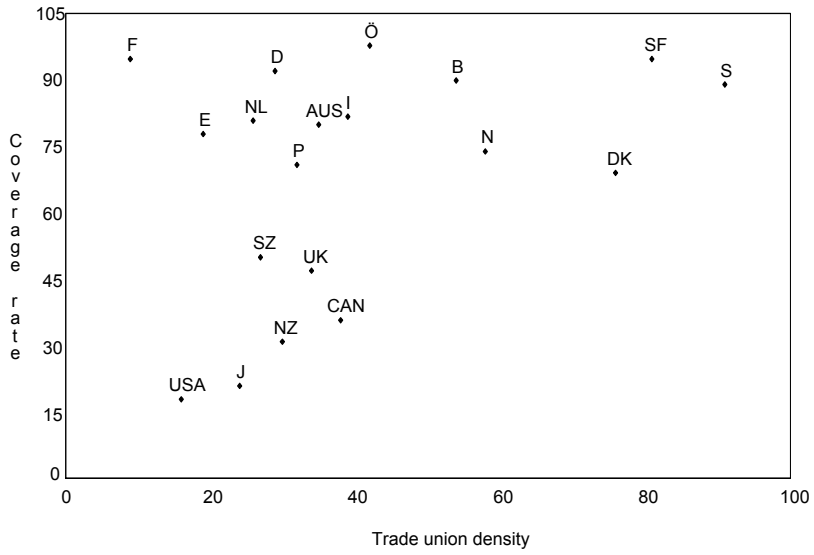
negotiations in Japan and Germany occur respectively at the firm and industry level, the degree of co-ordination is very high. The co-ordination of wage bargaining in Japan results from the so-called Spring Offensive or Shunto, i.e. the annual announcement – traditionally in April – of the future labour cost growth in a small number of large companies. In Germany the reason of a high degree of co-ordination lies in the existence of so-called pattern bargaining. Wage determination is characterised by a key leading settlement – often a regional engineering agreement – which is broadly followed by the other industries (Soskice, 1990).

Moreover, highly centralised systems (at least on a formal level) might in fact be poorly co-ordinated. Indeed, since centralised systems are characterised by multiple tiers of bargaining, a co-ordination failure may well appear. This observation refers to a highly prevalent phenomenon in Scandinavian countries : *the wage drift*. It measures the difference between the actual wage increases and the increases required by the central collective bargaining agreements. Following Flanagan's (1990) estimations, this phenomenon would account for 30 to 60 % of the earnings increases registered in Scandinavian countries.

The consequences of the wage drift on the actual ability of the social partners to co-ordinate their decision-making and on the effective degree of centralisation of collective bargaining is not straightforward. In fact, it depends on whether the central negotiators accurately anticipate the future wage drift. Although evidence is still incomplete, it seems that "lower tiers of bargaining may weaken but do not offset the ability of central federations to influence overall wage growth" (Flanagan, 1999: 1167). Hence, it appears reasonable to assume that centralised bargaining systems are generally quite well co-ordinated.

Also noteworthy, in a cross-national perspective, is the diversity among trade union densities and coverage rates (see Figure 1). These indicators measure respectively the proportion of unionised employees and the percentage employees covered by a collective labour agreement. In most countries, the coverage rate significantly exceeds the trade union density. Following the OECD (1997), in 1994, the trade union density was below 20% in France, the USA and Spain. By way of contrast, the Scandinavian countries (except Norway) registered figures above 75%, reaching even 91% in Sweden.

**Figure 1 : Trade Union Density and Coverage Rate, 1994**




*Source* : OECD (1997).

As the coverage rate is concerned, three groups of countries appear. In the first group – composed of the USA, Japan, New-Zealand and Canada – the coverage rate was under 40%. The UK and Switzerland were in the middle of the ranking with a rate of around 50%. Finally, in the other OECD countries, the coverage rate was above 65% and attained even 95% or more in France, Finland and Austria.

## 3. COLLECTIVE BARGAINING AND ECONOMIC PERFORMANCE

Although the debate concerning the macroeconomic consequences of collective bargaining systems date back to the beginning of the 1980s, the literature still disagrees about what type of bargaining structure performs best. Three competing hypotheses emerge : the corporatist, the hump-shape and the neo-classical hypothesis. This situation stems mainly from the fact that the indicators used to measure the bargaining systems are often inappropriate (time invariant, synthetic or incomplete). Moreover, studies often omit to control for key macroeconomic variables, e.g. the evolution of aggregate demand. Last but not least, given the central role of wage moderation in this type of literature, it is surprising to find that few studies explicitly address the effect of the bargaining regime on labour costs.

The aim of this section is to reconsider the link between industrial relations systems and macroeconomic performance (i.e. labour market performance) by controlling for these shortcomings. We analyse the relative performance of collective bargaining systems in 19 OECD countries over the last twenty years, both in aggregated and disaggregated way. The disaggregated approach, based on Spearman's correlations and on the Kruskal-Wallis test, tackles this question separately for three sub-periods (1978-82, 1988-92 and 1992-96). It allows us to examine the evolution of the relationship between collective bargaining systems and economic performance since the end of the 1970s. The aggregated approach investigates this problem for the three sub-periods simultaneously on the basis of pooled data regressions including control variables. This approach provides an insight into long run dynamics. Moreover, we deal individually with the way in which the different characteristics of collective bargaining systems influence the performance of the industrialised countries. This choice is crucial in order to identify the key features of the bargaining systems which provide the statistical action. Four characteristics are considered here : the prevailing bargaining level, the degree of co-ordination among the employers' organisations and trade unions, the coverage rate and the trade union density. These variables are *not* time invariant. Also noteworthy is that a large set of macroeconomic variables is considered, including inflation, unit labour cost growth, employment and unemployment. Other studies have been dealing *inter alia* with the interplay between industrial relations and investments (Anderson and Devreux, 1988; Cahuc, 1994; Grout, 1984; Van der Ploug, 1987), productivity (Freeman and Medoff, 1984; Hirschman, 1970; Robinson, 1989) and profits (Abowd, 1989; Ruback and Zimmerman, 1984). We do not deal with this issues.

This section is subdivided into two parts. First, we describe the overall context, providing a critical review of the economic literature. Next, we describe the empirical analysis and in particular the main findings.

## 3.1. Literature Review

After the first oil crisis, large and sustained differences in economic performance were observed among the industrialised countries. Since the various classic and Keynesian economic theories were unable to explain this phenomenon, a large number of economists turned their attention to the potential role of the institutional environment.

One of the major difficulties when studying the macroeconomic consequences of industrial relations systems consists in finding an adequate index reflecting the multiple dimensions of the latter.

### *3.1.1. Corporatist Hypothesis*

The first empirical studies, taking account of the structure of industrial relations in their analysis, refer to a corporatism index. Corporatism resembles the level of centralisation of collective bargaining as well the degree of co-ordination among the social partners. However, this concept, borrowed from political science, has not been defined in one single way. Hence, various scales of corporatism co-exist. We discuss some of them briefly below.

**Table 1 : Scales of Corporatism**

| Lehmbruch, 1984 | Cameron, 1984 | Schmitter, 1981 | Blyth, 1979 | Crouch, 1985 |
|---|---|---|---|---|
| 1. Austria | 1. Sweden | 1. Austria | 1. Austria | 1. Austria |
| Sweden | 2. Norway | 2. Norway | 2. Norway | 2. Germany |
| Norway | 3. Austria | Sweden | 3. Sweden | 3. Netherlands |
| Netherlands | 4. Belgium | 4. Denmark | 4. Denmark | 4. Norway |
| 2. Ireland | 5. Finland | Finland | 5. Finland | Sweden |
| Belgium | 6. Denmark | 6. Netherlands | 6. New-Zealand | 6. Switzerland |
| Germany | 7. Netherlands | 7. Belgium | 7. Australia | 7. Denmark |
| Denmark | 8. Germany | 8. Germany | 8. Germany | 8. Finland |
| Finland | 9. UK | 9. Switzerland | 9. Belgium | 9. Belgium |
| Switzerland | 10. Australia | 10. USA | 10. Netherlands | 10. Japan |
| 3. Italy | 11. Switzerland | 11. Canada | 11. Japan | 11. New-Zealand |
| UK | 12. Italy | 12. France | 12. France | 12. UK |
| 4. Australia | 13. Canada | 13. UK | 13. UK | 13. France |
| Canada | 14. USA | 14. Italy | 14. Italy | 14. Italy |
| New-Zealand | 15. France | | 15. USA | 15. Australia |
| USA | 16. Japan | | 16. Canada | 16. Canada |
| | | | | 17. USA |

*Sources* : Calmfors and Driffill (1988) and Lehmbruch (1984).
*Note* : Low indices are associated with highly corporatist systems.

Lehmbruch (1984) considers three criteria to measure corporatism, i.e. the presence of (i) powerful centralised employers' and workers' organisations enjoying an exclusive right of representation, (ii) privileged established linkages between the central organisations, the government and the administration, and (iii) organisational structures to permit an effective implementation of 'concerted' policies. In other words, he associates corporatism with the existence of tripartite concertation.

The scales of corporatism constructed by Cameron (1984) and Schmitter (1981) concentrate exclusively on the union structure. Schmitter focuses on the degree of centralisation of trade unions (engagement in collective bargaining, strike support, capacity to collect dues, staff size) and on the monopoly power of the latter (which depends for instance on the presence of separate trade unions for blue and white collar workers). Cameron's ranking is based on the organisational unity of the workers, i.e. the degree of fragmentation of the union movement, the centralisation of collective bargaining and the trade union density.

Blyth (1979) and Crouch (1985) bring in the capacity of the social partners to make their decisions respected at lower levels of negotiation. Blyth's scale of corporatism thus resembles the prevailing bargaining level as well as the degree of co-ordination of the social partners. Crouch's ranking, widely used in the literature, combines the following variables : the union influence on wage setting at the central level, the shop floor union power, the degree of co-ordination among employers and the existence of works councils within companies.

As shown in Table 1, there are differences in opinion as to the relative position of some industrialised countries on the scale of corporatism. For instance, Cameron considers Japan as the least corporatist country, while Blyth and Crouch place Japan in the middle of their ranking. This difference stems from the fact that, in contrast to the latter, Cameron does not focus on the degree of co-ordination of the social partners. Having said this, we should also stress some similarities between the rankings. In particular, noteworthy is the fact that the Scandinavian countries and Austria are always in the category of strongly corporatist countries, whereas the USA and Canada are invariably at the bottom of the ranking.

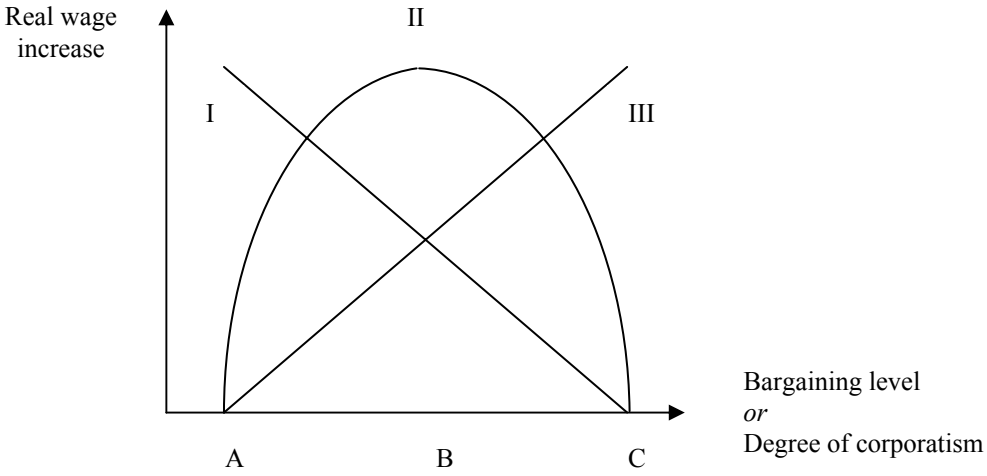
Be this as it may, there appears to be a large consensus among the first empirical studies on the fact that corporatist countries achieved better macroeconomic performance at the end of the first oil crisis[1]. Cameron (1984), in fact, finds a negative correlation between the degree of corporatism and the rate of unemployment, inflation and the growth in pay for the period 1965-82. Bruno and Sachs (1985), for their part, found there was a negative monotonic correlation between the degree of corporatism[2] and a composite 'misery' index obtained by adding together the increase in inflation and the reduction in the growth of GDP. Their study

[1] For an extensive summary of the empirical results, see Table 2 at the end of this sub-section.

[2] Bruno and Sachs (1985) used the scale of corporatism developed by Crouch (1985).

on 17 OECD countries compares the changes in average performance for the periods 1965-73 and 1973-79, i.e. before and after the first oil crisis. Furthermore, by estimating Phillips equations, Bruno and Sachs (1985) and McCallum (1983, 1986) demonstrate that in the wake of the oil crises, the growth of inflation was lower in the corporatist economies. They thus deduce that there was greater wage restraint. Tarantelli (1986) finds a negative correlation between his measure of neo-corporatism[3] and the Okun's index (rate of inflation plus rate of unemployment). Tarantelli's study, which relates to the periods 1968-73, 1974-79 and 1980-83, covers 16 OECD countries. Estimates of earnings equations carried out by Bean et al. (1986) and Newell and Symons (1987) serve to corroborate previous findings, showing that in corporatist countries real pay is more sensitive to fluctuations in unemployment, and that there is less correlation between real labour costs and the development of the tax wedge.

**Figure 2 : Three Competing Hypotheses**




*Note* : A, B and C stand respectively for 'firm / low', 'industry / intermediate' and 'national / high'.

In theoretical terms, this first series of results is founded on the idea that a high degree of corporatism, and particularly of co-ordination among employers' organisations and trade unions, prompts the economic players to *internalise* the negative *externalities* of their

[3] Tarantelli's scale of neo-corporatism combines the following variables : the degree of neocooptation of trade unions and employers' representatives (i.e. the degree of ideological and political consensus and the integration of interest groups in government policy making), the degree of centralisation of collective bargaining, the coverage rate, the average duration of labour contracts, the degree to which contract renewals are synchronous, the existence of pattern bargaining and the degree of neoregulation of industrial conflicts.

agreements, mainly on pay. It follows that a high degree of corporatism encourages greater wage restraint, which in turn improves economic performance (see Figure 2, relationship I).

For instance, if one takes price levels as an externality[4], the argument would be that in the corporatist countries, trade unions take a broader view of the economy. In other words, they are aware that strong pressure on nominal pay will have a knock-on effect on general price levels, thus reducing their real gains. As a result their pay claims are more modest, which leads to relatively lower unemployment. Conversely, in non-corporatist economies (decentralised and not co-ordinated), each trade union negotiates at company level and attempts to increase the purchasing power of the workers it represents, without considering similar negotiations going on elsewhere. Such a system of individual negotiation, pushing up nominal pay, creates inflationary pressure and reduces overall employment. This approach, based on wage externalities, therefore suggests that there is a negative monotonic correlation between the degree of corporatism and real wages. In addition, it is often argued that the corporatist institutions establish implicit or explicit *social contracts* which encourage greater wage restraint on the part of the trade unions in exchange for (para-)fiscal concessions from the government (Flanagan, 1999).

### *3.1.2. Hump-Shape Hypothesis*

Rather than taking as a basis the notion of corporatism - which they consider too broad and imprecise - Calmfors and Driffill (1988) preferred to analyse one specific characteristic of the structure of the labour market, namely the degree of centralisation of pay negotiations. This is measured by applying a system of weightings to the following criteria : (i) the principal level at which co-ordination takes place within workers' and employers' organisations[5], and (ii) the number of workers' or employers' confederations co-ordinating their decisions at national level[6]. According to Calmfors and Driffill, this indicator reflects the amount of cooperation among employers' organisations and trade unions during pay negotiations. In fact, as we will

[4] For an overall view of the main externalities engendered by pay increases studied in economic literature, see Calmfors (1993: 163).

[5] Weighting : 3 for national level, 2 for sectoral level, 1 for company level and 0 where there is no coordination.

[6] Weighting : 3 for countries with one single employers' organisation and one single workers' organisation at national level, 2 for countries where there are two to five workers' and/or employers' confederations, 1 for countries where there is no employers' or workers' organisation at national level.

see below, the degree of centralisation calculated in this way corresponds rather more to the formal bargaining level.

Be this as it may, their results for 17 OECD countries suggest the existence of a hump-shaped relationship between the centralisation of pay negotiations and macroeconomic performance during the period 1963-85[7]. Macroeconomic performance is calculated on the basis of the rates of unemployment and employment, Okun's index (rate of inflation plus rate of unemployment) and an 'alternative' performance index (rate of unemployment plus the current account deficit, expressed as a percentage of GDP).

The theory claiming that sectoral pay bargaining is inefficient is based on the following arguments : (i) unlike at national level, there is insufficient co-ordination of decision-making at sectoral level to encourage the trade unions to internalise *all* the externalities arising from pay increases; and (ii) the wage-employment elasticity at sectoral level is smaller than at individual company level. As a consequence, wage restraint is present to a lesser extent at sectoral level, and this has a bearing on economic performance (see Figure 2, relationship II).

A study by Freeman (1988) of 19 OECD countries confirms that a hump-shaped relationship exists for the period 1979-1984/85 between the centralisation of pay bargaining and macroeconomic performance (employment rate, unemployment rate and growth in hourly pay). Inter-sectoral wage dispersion is used in the study as an indicator of the degree of centralisation. Although Freeman emphasises that this indicator is reliable because of its objectivity, numerous observers stress quite rightly that it is a dependent rather than an independent variable. Rowthorn's findings (1992) also confirm that there is a correlation in the form of a normal distribution curve between the degree of centralisation and economic performance in 1985 and during the period 1973-85[8]. These results are obtained using a regression which links the employment rate to the centralisation index established by Calmfors and Driffill and to the square of this index.

[7] In fact, their results are based on the average performance during the period 1973-85 and on the change in average performance between 1965-73 and 1973-85.

[8] No correlation of this type was obtained for 1973. In fact, despite the fact that the regression coefficients are along the right lines, they are not significant.

However, the view that centralised and decentralised systems necessarily lead to better macroeconomic performance than intermediate systems has been challenged. In fact, the OECD update (1997) of Calmfors and Driffill's results, covering 1986-96, fails to come up with any systematic evidence to suggest that the hump-shaped relationship between the authors' classification and economic results continued over this ten-year period.

Furthermore, the results obtained by Calmfors and Driffill are criticised mainly on two counts. First of all, in theoretical terms, issue is taken with the mistaken hypothesis that demand for labour is inevitably less elastic at sectoral than at national or decentralised level. Indeed, there is no guarantee of this if we take account of the horizontal dimension of pay bargaining : decentralisation by occupation, region, bargaining coverage and trade union density (Cahuc and Zylberberg, 1996) or of the economic integration of markets (Calmfors, 1993; Danthine and Hunt, 1994).

Secondly, in empirical terms, there are reservations about the criteria used by Calmfors and Driffill to measure the degree of centralisation. Soskice (1990: 41) notes that “the Calmfors and Driffill theory relates to co-ordination, but the empirical measure they use - the degree of centralisation of bargaining institutions - relates to the actual location of bargaining”. He thus takes issue with the incorrect hypothesis that the formal bargaining level corresponds to the degree of co-ordination of pay bargaining. Soskice believes, in fact, that while it is reasonable to claim that there is strong co-ordination of pay bargaining in countries where formal bargaining is centralised, the reverse is not necessarily proven. In other words, he emphasises that the principal bargaining level alone cannot adequately reflect the degree of co-ordination between the social partners in countries where the formal bargaining structure is decentralised. As a consequence, when measuring the degree of centralisation, he takes as a basis the concept of co-ordination (degree of consensus between the social partners) rather than the formal bargaining structure. This prompts him to alter the classification established by Calmfors and Driffill in several ways, one of which entails moving Japan and Switzerland from the decentralised systems to the centralised systems category. On the basis of this new classification, Soskice obtains a negative monotonic correlation between the unemployment rate and the degree of centralisation for the period 1985-89.

Layard et al. (1991) confirm that the degree of co-ordination within trade unions and particularly employers' organisations had a negative impact on unemployment between 1983

and 1988. They also point to a positive correlation between bargaining coverage and the unemployment rate. These findings are reiterated by Nickell (1997). Golden (1993) also backs up Soskice's findings. She shows that the degree of co-ordination of trade union organisations provides a much more reliable explanation for the variations in economic performance between 1963 and 1985 than the degree of centralisation of these organisations or any other composite indicator of corporatism. On the other hand, results obtained by Bean (1994) and Traxler et al. (1997) are less categorical. Although Bean stresses the positive role of co-ordination of employers' organisations, he finds a positive correlation between unemployment and the degree of trade union co-ordination. In addition, he highlights the non significant impact of the coverage rate on economic performance. Findings by Traxler et al. (1997), based on 1963-85, do not indicate a clear choice between the hypothesis of a hump-shaped relationship and that of a positive monotonic correlation between macroeconomic performance and co-ordination of the social partners. Besides, they show that the coverage rate did not have any significant impact on unemployment, employment or labour costs between 1980 and 1991. Notice in addition that the OECD (1997) also ends up with mixed results. However, this ambiguity stems probably from by the fact that their analysis is based on a composite indicator, combining both the formal bargaining level and the degree of co-ordination of the social partners, which makes the interpretation of the results much more difficult.

### *3.1.3. Neo-Classical Hypothesis*

Finally, some authors (e.g. OECD, 1994; Siebert; 1997; Weede, 1996) consider any collective regulation of the labour market as a performance inhibiting rigidity. They suggest the existence of a monotonic decreasing relationship between macroeconomic performance and the bargaining level, the coverage rate and the trade union density. The theoretical argument relies in this case principally on the virtues of competition to stimulate wage moderation and flexibility (see Figure 2, relationship III). In line with the insider-outsider model (Lindbeck and Snower, 1986), they assume that trade unions only represent the interests of their employed members. Hence, they expect unions to push wages above the market-clearing level and to reduce economic efficiency. Implicitly they thus refute the standard corporatist argument which states that “with increasing encompassingness of organisation the incentives for voluntary wage restraint become dominant” (Kittel, 2000: 182).

**Table 2 : Collective Bargaining and Economic Performance – Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| McCallum (1983) | 1973-79 | 18 | Degree of social consensus (a) | Rate of inflation | Negative relationship between the degree of social consensus and inflation |
| Cameron (1984) | 1965-82 | 18 | Degree of corporatism *(Cameron, 1984)* | Rate of inflation<br>Rate of unemployment<br>Growth rate of earnings | Positive relationship between the degree of corporatism and economic performance |
| Bruno and Sachs (1985) | 1965-73<br>1973-79 | 17 | Degree of corporatism *(Crouch, 1985)* | Composite 'misery' index (b)<br>Rate of inflation | Negative relationship between the degree of corporatism, the 'misery' index and the rate of inflation |
| Tarantelli (1986) | 1968-73<br>1974-79<br>1980-83 | 16 | Degree of corporatism *(Tarantelli, 1986)* | Okun's index (c) | Negative relationship between the degree of corporatism and the Okun's index |
| McCallum (1986) | 1974-83<br>1983-84 | 18 | Degree of social consensus (a)<br>Degree of corporatism *(Bruno and Sachs, 1985)* | Okun's index (c)<br>Rate of inflation | Positive relationship between the degree of social consensus / corporatism and economic performance |
| Bean et al. (1986) | 1953-83 | 17 | Degree of corporatism *(Bruno and Sachs, 1985)* | Real pay sensibility to unemployment fluctuations<br>Real labour cost sensibility to tax wedge developments | Corporatism increases real pay sensibility to unemployment fluctuations and decreases real labour cost sensibility to tax wedge developments, independently of the trade union density |

(a) Measured by the number of working days lost because of strikes (per 1000 non agricultural workers) .
(b) Obtained by adding up the increase in inflation and the reduction in GDP growth.
(c) Obtained by adding up the rate of inflation and the rate of unemployment.

**Table 2 *(cont.)* : Collective Bargaining and Economic Performance – Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| Newell and Symons (1987) | 1955-83 | 5 | Degree of corporatism *(Lash, 1985)* | Wage restraint<br>Real pay sensibility to unemployment fluctuations<br>Speed of real wage adjustment | Positive relationship between the degree of corporatism and economic performance |
| Calmfors and Driffill (1988) | 1963-73<br>1973-85 | 17 | Degree of centralisation (a) *(Calmfors and Driffill, 1988)* | Rate of unemployment<br>Rate of employment<br>Okun's index (b)<br>Alternative performance index (c) | Hump-shaped relationship between the degree of centralisation and economic performance<br>Only exception : Okun's index (in level) |
| Freeman (1988) | 1984<br>1979-84/85 | 19 | Degree of centralisation (d) | Rate of unemployment<br>Rate of employment<br>Hourly earnings | Hump-shaped relationship between the level of wage differentials and economic performance, independently of the trade union density |
| Rowthorn (1992) | 1973, 1985 | 17 | Degree of centralisation *(Calmfors and Driffill, 1988)* | Rate of employment | Hump-shaped relationship between the degree of centralisation and the employment rate in 1985 and during the period 1973-85 but not in 1973 |
| OECD (1997) | 1986-96 | 17 | Degree of centralisation *(Calmfors and Driffill, 1988)* | Rate of unemployment<br>Rate of employment<br>Okun's index (b)<br>Alternative performance index (c) | No systematic evidence supporting the hump-shaped relationship |

(a) Corresponds to the formal bargaining level.
(b) Obtained by adding up the rate of inflation and the rate of unemployment.
(c) Obtained by adding up the rate of unemployment and the current account deficit, expressed as a percentage of GDP.
(d) Measured by the inter-industry wage dispersion.

**Table 2 *(cont.)* : Collective Bargaining and Economic Performance – Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| Soskice (1990) | 1985-89 | 11 | Degree of centralisation (a)<br>*(Soskice, 1990)* | Rate of unemployment<br>Alternative performance index (b) | Positive relationship between the degree of coordination and economic performance |
| Layard et al. (1991) | 1983-88 | 20 | Degree of coordination within employers' organisations and trade unions<br>Coverage rate<br>*(Layard et al., 1991)* | Rate of unemployment | Positive (negative) relationship between the coverage rate (degree of coordination) and the unemployment rate |
| Nickell (1997) | 1983-88<br>1989-94 | 20 | Trade union density<br>Coverage rate<br>Degree of coordination<br>*(Layard et al., 1991 ; OECD, 1994)* | Rate of unemployment<br>Rate of employment<br><br>Control variable :<br>Change in inflation | Negative (positive) relationship between the coverage rate / trade union density (degree of coordination) and economic performance |
| Golden (1993) | 1963-73<br>1973-85 | 14 | Degree of centralisation and coordination of trade unions<br>*(Cameron, 1984; Schmitter, 1981)* | Rate of unemployment<br>Rate of inflation<br>Okun's index (c)<br>Alternative performance index (b) | Positive relationship between coordination and economic performance |
| Bean (1994) | 1956-92 | 20 | Degree of coordination within employers' organisations and trade unions<br>Coverage rate<br>*(Layard et al., 1991)* | Rate of unemployment | Negative (positive) relationship between the degree of coordination within employers' organisation (trade unions) and the unemployment rate<br>No significant relationship with the coverage rate |

(a) Measured by the degree of coordination.
(b) Obtained by adding up the rate of unemployment and the current account deficit, expressed as a percentage of GDP.
(c) Obtained by adding up the rate of inflation and the rate of unemployment.

**Table 2 *(cont.)* : Collective Bargaining and Economic Performance – Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| Bleany (1996) | 1973-82<br>1983-89 | 17 | Degree of corporatism<br>*(Bruno and Sachs, 1985)*<br>Degree of centralisation<br>*(Calmfors and Driffill, 1988)*<br>Composite index (a) | Rate of inflation<br>Rate of unemployment | Collective bargaining has a significant impact on economic performance but results do not allow to draw any clear conclusion |
| Traxler et al. (1997) | 1980-91 | 18 | Coverage rate (b)<br>*(Traxler, 1994)* | Rate of unemployment<br>Rate of employment<br>Real labour cost<br>Unit labour cost | No significant relationship between the coverage rate and economic performance |
| | 1963-73<br>1973-85 | 16 | Degree of centralisation (c)<br>*(Traxler, 1994)* | Rate of unemployment<br>Rate of employment<br>Okun's index (d)<br>Alternative performance index (e) | Monotonic decreasing relationship with the unemployment rate; hump-shaped relationship with the change in the rate of employment and unemployment; ambiguous relationship with the Okun's and alternative performance index |
| OECD (1997) | 1980, 90, 94 | 19 | Degree of centralisation (f)<br>Coverage rate<br>Trade union density<br>*(OECD, 1997)* | Rate of unemployment<br>Rate of employment<br>Rate of inflation<br>Growth rate of real earnings | Results do not allow to draw any clear conclusion |

(a) Based on the indexes of Crouch (1985) and Calmfors and Driffill (1988).
(b) Stands for the degree of deregulation of the labour market.
(c) Measured by the degree of coordination of the social partners.
(d) Obtained by adding up the rate of inflation and the rate of unemployment.
(e) Obtained by adding up the rate of unemployment and the current account deficit, expressed as a percentage of GDP.
(f) Composite index resembling the formal bargaining level and the degree of coordination of the social partners.

### *3.1.4 Where Does This Leave Us ?*

The characteristics of collective bargaining systems have a significant impact on the economic activity of the industrialised countries. They also appear to account partly for cross-national differences in economic performance. Nevertheless, there are still many areas of uncertainties :

(a) Opinions differ as to the relative importance of the different characteristics of collective bargaining systems, in particular of the formal bargaining level and the degree of coordination among the social partners. This situation stems mainly from the fact that the indicators used to measure the bargaining systems are often inappropriate. Indeed, on the one hand, the use of composite indexes, such as corporatism, does not make it possible to identify the variable(s) that truly determine macroeconomic performance. On the other hand, when the analysis is confined to a single characteristic, like the degree of bargaining centralisation, there is every danger that it represents a limited view of the situation. In addition, many studies rely on time invariant indicators. Hence, they implicitly assume that collective bargaining systems are 'frozen'. This also might lead to erroneous findings.

(b) Results as to the economic effects of collective bargaining systems are not constant over time. This seems to indicate that the performance of different industrial relations systems varies depending on the nature of the economic shocks. However, on the one hand, this observation could simply stems from the fact that most studies omit to control for key macroeconomic variables, e.g. the evolution of aggregate demand. On the other hand, it underlines the fragility of the relationship between industrial relations systems and economic performance in the short run.

(c) Last but not least, given the pivotal role played by wage restraint in this literature, it is surprising to find that few studies explicitly address the effect of the bargaining regime on labour costs.

## 3.2. Empirical Analysis

Starting from these premises, we considered that a number of points were essential to this study :

(a) It should analyse the relative performance of the industrial relations systems over the past 20 years, in an aggregated and disaggregated way. In other words, on the one hand, we will tackle this question separately for three sub-periods (1978-82, 1988-92 and 1992-96)

on the basis of the Kruskal-Wallis test and Spearman's correlations. This approach, will allow us to examine the evolution of the relationship between collective bargaining systems and economic performance since the end of the 1970s. On the other hand, we will analyse this problem for the three sub-periods simultaneously on the basis of pooled data regressions (including control variables). In this way, we will get an insight into long run dynamics. Notice that the sub-periods under investigation have been chosen such as to fit the periodicity of the data on collective bargaining, i.e. 1980, 1990 and 1994.

(b) It should deal individually with the way in which the different dimensions of collective bargaining systems influence the performance of the industrialised countries. Indeed, this will allow us to determine which features of the bargaining systems provide the statistical action. Four characteristics are considered here : the prevailing bargaining level, the degree of co-ordination among employers' organisations and trade unions, collective bargaining coverage rates and trade union density. Data on these variables, which are *not* time invariant, are taken from the OECD (1997)[9].

(c) It should examine a broad range of macroeconomic variables and in particular labour costs. The variables considered here are the following : the increase in the unit labour cost, the inflation rate, the unemployment rate, the employment rate, the employment growth and the growth in real GDP[10]. To reduce the effect of cyclical fluctuations we have taken the average values of these variables expressed as a level or rate of growth over a five-year period (1978-82, 1988-92 and 1992-96).

In short, this sub-section investigates the interactions between various collective bargaining features and the economic performance of 19 OECD countries[11] in 1978-82, 1988-92 and 1992-96. We consider this problem first for each period separately (i.e. disaggregated approach) and then for the three periods simultaneously (i.e. aggregated approach).

[9] For more details, see Appendix 1.

[10] For more details, see Appendix 2.

[11] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany (only West-Germany in 1978-82 and 1988-92), Italy, Japan, the Netherlands, New-Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the UK and the USA.

### *3.2.1. Disaggregated Approach*

This analysis uses Spearman's correlation coefficients to verify whether there is a possible linear or hump-shaped relationship between the characteristics of collective bargaining and economic performance. Rank correlation coefficients are adequate because central collective bargaining characteristics, i.e. the prevailing bargaining level and the degree of coordination among the social partners, are measured by ordinal data[12]. In order to check for a hump-shaped relationship it is necessary to make changes to the ranks assigned to each country by virtue of their bargaining system : ranks 1 to 10 remain unchanged, while ranks 11 to 19 take values from 9 to 1. This method has one major disadvantage in that it means that the parabolic relation must be symmetrical, i.e. the minimum or maximum value must be in the centre of the scale. For this reason the non-parametric Kruskal-Wallis test is additionally used.

The non-parametric Kruskal-Wallis test is the non-parametric equivalent of a one-way analysis of variance (one-way ANOVA). The use of this test does not imply any hypothesis about the shape of the distribution of the observed variables. The Kruskal-Wallis test is based solely on the ranks and signs of the observations, and is applied as follows. Let us assume that k independent samples each contain $n_j$ observations (with $1 \leq j \leq k$). The null hypothesis is that the distributions of these different samples, and their median values in particular, are equivalent. Let us call $R_{i,j}$ the rank of observation $X_{i,j}$ with $\{X_{i,j} \mid 1 \leq j \leq k\ ,\ 1 \leq i \leq n_j\}$. Thus $1 \leq R_{i,j} \leq n_1 + n_2 + \ldots + n_k = N$. Let us designate the mean rank of the *j*th sample $R^j = (1/n_j) \sum_{i=1}^{nj} R_{i,j}$. The mean rank of all observations = (N+1)/2. Under the null hypothesis we therefore expect $R^j \approx (N+1)/2$ for each $1 \leq j \leq k$. The formula below :

$$\sum_{j=1}^{k} n_j \left( R^j - \frac{N+1}{2} \right)^2$$

supplies the amount of deviation from the null hypothesis. In addition it is also possible to demonstrate the existence of a constant *C(N)* such as :

$$KW = C(N) \sum_{j=1}^{k} n_j \left( R^j - \frac{N+1}{2} \right)^2 \xrightarrow{d} \chi^2_{k-1},$$

[12] Let us note that the results relative to the continuous variables, i.e. the trade union density and the coverage rate, are similar when applying Pearson correlation coefficients.

if $n_1, n_2, \ldots, n_k \rightarrow \infty$. As a result the null hypothesis is rejected if :

$$KW \succ \chi^2_{k-1,\,1-\alpha}\,.$$

By grouping countries according to the characteristics of their bargaining system, this method allows us to verify whether the median values of the various groups of systems are significantly different. One should approach an analysis of this kind with caution, however, since the grouping of data into a number of categories (e.g. centralised, intermediate and decentralised systems) entails a loss of information.

For the sake of clarity, the text only includes Spearman's correlation coefficients relevant to a linear relation between the characteristics of collective bargaining and economic performance. The complete results will be found in Appendix 4 and these are described below :

**Table 3 : Spearman's Correlations, 19 OECD Countries**

| | Bargaining level | | | Degree of co-ordination | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| Unemployment rate | 0.05 | -0.33 | 0.04 | **-0.49*** | **-0.65*** | -0.36 |
| Employment rate | 0.22 | 0.04 | -0.25 | **0.47*** | 0.35 | 0.11 |
| Employment growth | -0.32 | -0.14 | **-0.55*** | -0.01 | 0.20 | -0.43 |
| Inflation rate | 0.06 | 0.20 | 0.20 | **-0.49*** | -0.36 | -0.02 |
| Unit labour cost growth | -0.07 | 0.13 | 0.09 | **-0.57*** | -0.23 | -0.01 |
| Real GDP growth | -0.20 | 0.03 | -0.28 | 0.11 | 0.35 | -0.33 |

*Notes* : Linear relation, simple classification. * $p < 0.05$, ** $p < 0.01$.

(a) Spearman's correlation coefficients indicate that the countries with a high degree of co-ordination among employers' organisations and trade unions achieved better economic performance – in rates of employment and unemployment, inflation and growth of the unit labour cost – during the period 1978-82.

The Kruskal-Wallis (K-W) test, however, underlines the fragile nature of these results : in fact, the test is not significant for most economic performance indicators. It does nevertheless confirm that systems with a large degree of co-ordination achieved significantly higher employment rates than intermediate systems or those with little co-ordination. Besides, it shows that the most efficient systems in term of employment

growth and inflation were characterised by a narrow bargaining coverage. Also noteworthy is that the trade union density and the prevailing bargaining level had no significant economic effect.

**Table 4 : Spearman's Correlations, 19 OECD Countries**

| | Bargaining coverage | | | Trade union density | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| Unemployment rate | -0.05 | -0.01 | 0.33 | -0.07 | -0.21 | 0.13 |
| Employment rate | -0.13 | -0.36 | **-0.51*** | 0.44 | 0.30 | 0.12 |
| Employment growth | -0.45 | -0.18 | **-0.54*** | 0.03 | **-0.64**** | -0.30 |
| Inflation rate | 0.06 | 0.07 | 0.19 | 0.22 | 0.18 | -0.05 |
| Unit labour cost growth | -0.09 | 0.08 | 0.16 | 0.13 | 0.06 | -0.40 |
| Real GDP growth | 0.07 | 0.15 | -0.38 | 0.28 | **-0.60**** | 0.06 |

*Notes* : Linear relation, simple classification. * $p < 0.05$, ** $p < 0.01$.

(b) For the period 1988-92, Spearman's correlation coefficients confirm once again that the degree of co-ordination among the social partners had a favourable impact on the unemployment rate. This result is also backed up by the K-W test, which indicates that highly co-ordinated countries had significantly lower unemployment figures than those with no co-ordination. Furthermore, our findings show that the growth in employment and in real GDP was significantly lower during this period in highly unionised countries. However, this is mainly explained by the poor performance of the Scandinavian countries.

(c) A significant correlation emerge for the period 1992-96 between the prevailing bargaining level and the economic activity of the OECD countries. Spearman's correlation coefficients indicate that there is a monotonic decreasing and parabolic relation between the prevailing bargaining level and the growth in employment on the one hand, and a parabolic relation between the prevailing bargaining level and the real GDP growth on the other. However, by analysing these correlations more closely using the K-W test for two categories of countries[13], we arrive at the conclusion that countries with highly decentralised bargaining systems (New Zealand, the USA, Canada, Japan, Australia and

[13] Unlike in the previous periods, we were unable to divide the 19 countries into three categories because there has been a substantial process of decentralisation of the formal bargaining level during the 1990s (see Appendix 1). As a consequence the K-W test has been applied to two groups of countries (decentralised systems : index between 1 and 1.5; centralised systems : index between 2 and 2+).

the UK) scored significantly better than the others in terms of employment growth and real GDP.

Moreover, employment growth and employment rates were significantly higher in countries with narrow bargaining coverage, regardless of the degree of co-ordination among the social partners (i.e. in the USA, Japan, New Zealand, Canada, the UK and Switzerland). Nevertheless, the K-W test illustrates the fragile nature of these results : in fact, the only significant results are those relating to employment rates.

**Table 5 : Summary Disaggregated Approach**

| | 1980 | 1990 | 1994 |
|---|---|---|---|
| Bargaining level | / | / | (-): employment growth, real GDP growth |
| Degree of co-ordination | (+): employment rate, (-): unemployment rate, unit labour cost growth, inflation rate | (-): unemployment rate | / |
| Bargaining coverage | (+): inflation rate (-): employment growth | / | (-): employment rate, employment growth |
| Trade union density | / | (-): real GDP growth, employment growth | / |

*Notes* : (+) positive correlation, (-) negative correlation, significant at the level of 5 per cent.
"/" : correlation not significant at the level of 5 per cent.

What conclusions can we draw from this disaggregated approach ?

As shown in Table 5, the relation between the characteristics of collective bargaining and economic performance is a fragile and dynamic one. Nevertheless, this analysis gives rise to a number of conclusions :

(a) The degree of co-ordination among employers' organisations and trade unions is a factor which to a significant extent explains the diversity of labour market performance in the OECD countries between 1978 and 1982. Findings suggest also that most efficient systems in terms of inflation during this period were those either with narrow bargaining coverage or with broad coverage coupled with substantial co-ordination between the social partners. In conformity with the corporatist hypothesis, these results can be

explained by the fact that highly co-ordinated collective bargaining encourages the social partners to internalise the macroeconomic impact of their agreements, which in turn promotes economic efficiency.

(b) The evidence in favour of the corporatist hypothesis is more limited in the next period, i.e. 1988-92. Indeed, the only variable being significantly correlated with the degree of co-ordination of the social partners is the rate of unemployment. In addition, results suggest that labour cost increases were no longer affected by the diversity of bargaining systems. Moreover, the relationship between collective bargaining systems and economic performance appears to reach a turning point in the mid-1990s. Indeed, the degree of co-ordination among the social partners ceases to be a decisive factor in explaining the diversity of labour market performance between 1992 and 1996. It follows that the adverse impact of the bargaining coverage on the employment growth and the employment rate seems independent of the degree of co-ordination among the social partners. The significant correlation between the formal bargaining level and growth in employment and real GDP also represents a departure from the results for 1980 and 1990.

In short, our findings suggest the existence of a corporatist relationship – emphasising the importance of a high degree of co-ordination among the social partners – during the two first periods (1978-82 and 1988-92) and a neo-classical relationship – based on the virtues of competition – during the third period (1992-96). However, results show quite clearly that the intensity of the relationship between macroeconomic performance and collective bargaining systems has substantially decreased during the two last periods. Also noteworthy is that no evidence was found in favour of a hump-shaped relationship.

### *3.2.2. Aggregated Approach*

The methodology applied until now is quite useful to examine the evolution of the relationship between collective bargaining and economic performance since the end of the 1970s. Yet, it contains a certain number of limitations. First, it ignores the interactions that may exist between economic performance indicators and several collective bargaining characteristics. Second, it only reveals complementarity relations and thus neglects the causality issue. Third, despite the use of five-year averages, there still may be significant

variations across countries in the business cycle for which it does not control. Finally, it does not provide any insight into long run dynamics.

Hence, additional pooled data regressions were run. This technique stresses the cross-sectional dimension and the coefficients represent essentially cross-country effects averaged over all periods. It has been chosen because the hypothesis under consideration refers to cross-sectional effects, not to the effect of institutional dynamics over time within countries. Moreover, in many countries there is only little variation over time in the institutional variables. All models are set up as a panel of three period average measurement for 1978-82, 1988-92 and 1992-96, controlling for common developments in the dependent variable by including a dummy for 1990 and 1994.

Three different specifications were applied. First, to get rid of the multicollinearity problem induced by the strong correlation between the coverage rate and the bargaining level, two models were estimated each using one of these variables. Finally, a third specification was used in order to compare the relative economic performance of centralised/co-ordinated countries and intermediate countries w.r.t. decentralised/non co-ordinated countries. Notice that this specification also allows to test for the existence of a hump-shaped relationship.

The results of these regressions, estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance, can be found in the Tables 6 to 8 as well as in the Appendices 5 and 6[14]. In contrast to the results reported in the text, those in the Appendices include two control variables : the average change in inflation and the world market exposure of the national economies (see Appendix 2 for a detailed description of these variables). The introduction of the first variable constitute an attempt to deal with cross-country differences in the stance of macroeconomic policy. The selection of the second variable is justified by the fact that growing exposure probably increases the acceptance of a policy of wage restraint. For the sake of clarity, since the results of the regressions with and without control variables do not significantly differ, we have chosen to report in the text only the models without control variables.

[14] Similar results have been obtained using a random effects model.

**Table 6 : Pooled Data Regressions – 1978-82, 1988-92 and 1992-96**

| | ULC growth (%) | | Inflation rate (%) | | Unemployment rate (%) | |
|---|---|---|---|---|---|---|
| Bargaining level (1–3) | **2.585**** (0.000) | | **2.351**** (0.000) | | **2.596**** (0.000) | |
| Degree of co-ordination (1–3) | **-1.859**** (0.000) | **-1.518**** (0.002) | **-1.853**** (0.000) | **-1.447**** (0.001) | **-2.627**** (0.000) | **-2.815**** (0.000) |
| Bargaining coverage (%) | | **0.027*** (0.032) | | **0.029*** (0.011) | | **0.057**** (0.000) |
| Trade union density (%) | -0.013 (0.145) | 0.003 (0.784) | -0.007 (0.451) | 0.006 (0.589) | -0.032 (0.077) | -0.026 (0.069) |
| Dummy for 1990 | -4.864** (0.000) | -4.646** (0.000) | -5.605** (0.000) | -5.719** (0.000) | 1.113* (0.029) | 1.169* (0.015) |
| Dummy for 1994 | -7.718** (0.005) | -7.747** (0.003) | -7.343** (0.000) | -7.537** (0.000) | 2.823** (0.000) | 2.887* (0.001) |
| Constant | 8.735** (0.000) | 10.086** (0.000) | 9.086** (0.000) | 10.252** (0.000) | 7.688** (0.000) | 8.338** (0.000) |
| N (countries, time) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) |
| $R^2$ adjusted | 0.543 | 0.522 | 0.585 | 0.575 | 0.294 | 0.305 |
| F-test | 204.306** (0.000) | 64.848** (0.000) | 136.713** (0.000) | 140.305** (0.000) | 95.975** (0.000) | 92.008** (0.000) |

*Notes :* The p-values are indicated between brackets. * $p < 0.05$, ** $p < 0.01$.
Regressions are estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance.
ULC stands for unit labour costs.

The results related to the first specifications are particularly interesting (see Tables 6 and 7 and Appendices 5 and 6) :

(a) They confirm the theoretical argument that a high degree of co-ordination among employer's organisations and trade unions, prompts the economic players to internalise the negative external repercussions of their agreements, particularly on pay. In other words, they indicate that the degree of co-ordination among the social partners is positively related to wage moderation and low inflation. Besides they show that a high degree of co-ordination improves economic performance, i.e. unemployment and employment rates.

(b) Furthermore, in compliance with the neo-classical hypothesis, they show that the bargaining level and the coverage rate have the reverse effect. In other words, they indicate that these variables : (i) increase significantly unit labour cost growth and inflation and (ii) reduce labour market performance, i.e. the rate and growth of employment and the rate of unemployment.

(c) Taken at face value, results also indicate that real GDP growth is unaffected by the collective bargaining characteristics. Hence, they support the idea that cross-country differences in labour market performance can not solely be attributed to GDP growth differentials.

**Table 7 : Pooled Data Regressions – 1978-82, 1988-92 and 1992-96**

| | Employment rate (%) | | Employment growth (%) | | Real GDP growth (%) | |
|---|---|---|---|---|---|---|
| Bargaining level (1–3) | **-6.499**** (0.000) | | **-0.852**** (0.001) | | -0.547 (0.104) | |
| Degree of co-ordination (1–3) | **2.093**** (0.005) | **3.465**** (0.001) | -0.007 (0.960) | 0.005 (0.976) | 0.456 (0.067) | 0.357 (0.151) |
| Bargaining coverage (%) | | **-0.200**** (0.000) | | **-0.017**** (0.000) | | -0.006 (0.331) |
| Trade union density (%) | **0.198**** (0.000) | **0.184**** (0.000) | -0.007 (0.288) | -0.009 (0.053) | -0.006 (0.296) | -0.009 (0.115) |
| Dummy for 1990 | 2.118 (0.059) | 1.801* (0.049) | 0.032 (0.900) | -0.020 (0.931) | 0.214 (0.453) | 0.192 (0.500) |
| Dummy for 1994 | 0.250 (0.821) | 0.265 (0.767) | -0.624* (0.014) | -0.662** (0.005) | -0.235 (0.412) | -0.127 (0.655) |
| Constant | 65.130** (0.000) | 64.916** (0.000) | 2.440** (0.000) | 2.116** (0.000) | 2.305** (0.000) | 2.004** (0.000) |
| N (countries, time) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) |
| $R^2$ adjusted | 0.142 | 0.408 | 0.153 | 0.185 | 0.000 | 0.000 |
| F-test | 1397.16** (0.000) | 2657.08** (0.000) | 10.072** (0.000) | 11.230** (0.000) | 4.648** (0.001) | 4.689** (0.001) |

*Notes :* The p-values are indicated between brackets. * $p < 0.05$, ** $p < 0.01$.
Regressions are estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance.

Having found evidence in favour of both the corporatist and the neo-classical hypothesis, the next step of our analysis consists naturally in determining whether a high degree of co-ordination among employer's organisations and trade unions offsets the adverse impact on the labour market of a highly centralised bargaining level. This turns out to compare the economic performance of highly centralised/co-ordinated countries and intermediate countries w.r.t. decentralised/non co-ordinated countries. The results from the regressions based on the third specification are very informative on this point (see Table 8 and Appendices 5 and 6). They show indeed that highly centralised/co-ordinated countries and intermediate countries achieved significantly lower unit labour cost growth and a lower inflation rate than decentralised/non co-ordinated countries. In addition, the best results w.r.t. the unemployment and employment rates are attributed to the centralised/co-ordinated countries.

## Table 8 : Pooled Data Regressions – 1978-82, 1988-92 and 1992-96

| | ULC growth (%) | Inflation rate (%) | Unemployment rate (%) | Employment rate (%) | Employment growth (%) | Real GDP growth (%) |
|---|---|---|---|---|---|---|
| Highly centralised and co-ordinated countries (dummy) [a] | **-3.894**** (0.000) | **-3.428**** (0.000) | **-3.486**** (0.000) | **9.081**** (0.000) | 0.638 (0.080) | -0.266 (0.541) |
| Intermediate countries (dummy) [b] | **-3.176**** (0.000) | **-3.238**** (0.000) | -1.050 (0.221) | 3.738 (0.076) | 0.232 (0.450) | -0.470 (0.207) |
| Bargaining coverage (%) | **0.042**** (0.005) | **0.039*** (0.012) | **0.035*** (0.044) | **-0.243**** (0.000) | **-0.023**** (0.000) | 0.008 (0.241) |
| Trade union density (%) | 0.013 (0.332) | 0.015 (0.205) | -0.017 (0.238) | **0.184**** (0.000) | **-0.014**** (0.004) | -0.009 (0.163) |
| Dummy for 1990 | -4.363** (0.000) | -5.192** (0.000) | 1.337* (0.037) | 1.508 (0.165) | -0.177 (0.501) | 0.226 (0.447) |
| Dummy for 1994 | -7.439** (0.000) | -7.414** (0.000) | 2.794** (0.000) | 0.054 (0.960) | -0.728** (0.009) | 0.160 (0.595) |
| Constant | 7.661** (0.000) | 8.248** (0.000) | 5.445** (0.000) | 70.696** (0.000) | 2.615** (0.000) | 1.797** (0.000) |
| N (countries, time) | 54 (18, 3) | 54 (18, 3) | 54 (18, 3) | 54 (18, 3) | 54 (18, 3) | 54 (18, 3) |
| $R^2$ adjusted | 0.539 | 0.533 | 0.118 | 0.384 | 0.170 | 0.000 |
| F-test | 51.704** (0.000) | 142.759** (0.000) | 47.834** (0.000) | 1224.63** (0.000) | 7.365** (0.000) | 2.927* (0.017) |

*Notes :* The p-values are indicated between brackets. * $p < 0.05$, ** $p < 0.01$.
Regressions are estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance.
ULC stands for unit labour costs.
[a] Highly centralised and co-ordinated countries : sum of the index of centralisation and co-ordination $\geq 4.5$.
[b] Intermediate countries : sum of the index of centralisation and co-ordination $\in [4 ; 4.5)$.
Japan, being highly decentralised and highly co-ordinated, was not been taken into account for the third type of regression.

Moreover, the results point out that no significant difference appears in employment growth between the three groups of countries. Thus, the results show that in the long run the beneficial effect of a high degree of co-ordination among social partners cancels or even exceeds the negative impact on the labour market of a highly centralised bargaining level. Besides, they show that intermediate countries obtained similar or even better results than decentralised/non co-ordinated countries. As a result, we found no evidence in favour of a hump-shaped relationship.

In conclusion, the aggregated approach suggests the existence of a *non-linear* relationship between the characteristics of collective bargaining systems and economic performance in the OECD countries. Indeed, the data show that the trade unions – hampered by the prevailing bargaining level and the coverage rate – have a negative impact on labour market performance, but that this effect is neutralised or even reversed in cases where there is a high degree of co-ordination among the social partners.

## 4. COLLECTIVE BARGAINING AND POVERTY LEVELS

To what extent is the diversity of poverty levels in the OECD countries explained by differences in collective bargaining systems ? Findings in this area are still fairly insubstantial. Indeed, such results are generally derived from studies dealing solely with the interplay between the characteristics of collective bargaining and wage inequality. The underlying idea is that wage inequality : "(i) often translates into significant disparities in living standards and increasing poverty among individuals, (ii) affects the structure of economic incentives that individuals face and (iii) influences social cohesion and worker solidarity" (Lucifora, 1999: 1).

However, few studies explicitly address the impact of collective bargaining systems on poverty rates. This is particularly surprising given that the link between wage dispersion and poverty is far from clear. Indeed, even though the poverty rate among the population at work is higher in countries where wage inequality is pronounced, the proportion of poor people in this category is generally limited (Marx and Verbist, 1998).

This is why, in this section we try to shed light on the direct relationship between collective bargaining systems and poverty levels in the industrialised countries since the end of the 1970s. We look at relative poverty levels, among different categories of the population, *before* and *after* net social security transfers[15] so as to identify the means by which the collective bargaining features may affect poverty. Two channels are considered here : wage dispersion and social security transfers. As in the previous section, our analysis relies on Spearman's correlations and multivariate regressions.

This section is subdivided into two parts. First, we present a critical review of the economic literature dealing respectively with : (i) the effect of collective bargaining systems on the extent of and trend in wage inequality, and (ii) the relationship between wage inequality and poverty levels. Next, we describe the empirical analysis concerning the interplay between collective bargaining systems and relative poverty rates.

## 4.1. Literature Review

Analysis of the impact of collective bargaining systems on macroeconomic performance concentrates on the determination of *aggregate* pay[16]. Conversely, studies dealing – explicitly or implicitly – with the social impact of industrial relations systems tend to focus on pay *structure*[17].

### *4.1.1. Collective Bargaining and the Extent of Wage Inequality*

There are many ways in which industrial relations systems can influence earnings disparities. First of all, there is the impact of legislation governing minimum wages and overtime pay. The existence of a statutory minimum wage tends to reduce earnings inequality by establishing a lower limit for earnings distribution. How much the disparity is reduced depends in turn on the relative level of the minimum wage compared with the initial earnings distribution. The impact of legislation specifying overtime premia is less certain. If the basic pay of those working overtime is above average, then legislation providing sizeable overtime

[15] Transfer payments net of direct taxation.

[16] For a review of this literature, see section 3 of chapter 2.

[17] For a summary of the empirical results, see Tables 9 and 10 at the end of sub-section 4.1.2. of the present chapter.

bonuses will, other things being equal, increase earnings disparities; if overtime workers are otherwise low paid, inequality will be reduced.

Second, collective bargaining and trade union policies influence pay disparities. The net impact on earnings inequality seems ambiguous : they increase earnings disparities between unionised and non-unionised workers with identical production characteristics (Lewis, 1986), but also reduce earnings disparities by compressing the pay structure of workers covered by collective agreements and by driving up earnings of low-paid workers (Gottschalk and Smeeding, 1997).

The empirical debate about the causes of earnings inequality was reopened in the late 1980s by an article by Krueger and Summers (1988). They highlighted the fact that the pay structure in the USA was not compatible with the standard Walrasian (competitive) model of the labour market according to which wage disparities are explained either by different qualifications, or by 'compensating differences'[18]. Krueger and Summers demonstrated that pay differentials existed between workers, with identical (observed) production characteristics and working conditions, employed in different sectors. Since then, equivalent results have been obtained for many industrialised countries (Abowd et al., 1999; Araï et al., 1996; Bart and Zweimüller, 1994; Hartog et al., 1997). Thus the existence of sectoral effects has become an accepted fact in economic literature. Furthermore, it is often agreed that these effects are persistent, closely correlated from one country to another (Helwege, 1992), and of varying dimensions in the industrialised countries (Hartog et al., 1997).

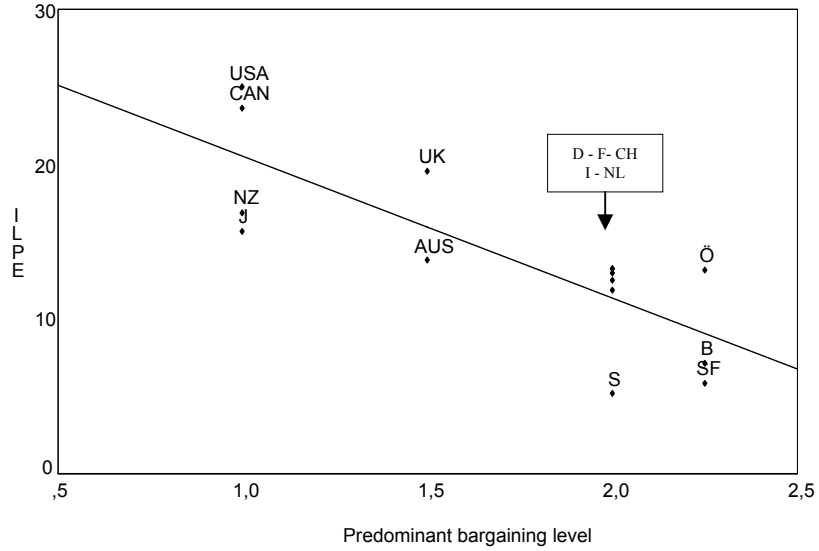
In seeking to explain the diversity of sectoral effects observed in the OECD countries, economists have turned their attention to the characteristics of industrial relations systems, and much can be learned from their findings. Some studies show that sectoral effects are considerably greater in countries with little centralisation and/or corporatism, regardless of the period studied (Bart and Zweimüller, 1994; Freeman, 1988; Rowthorn, 1992; Teulings and Hartog, 1998). Teulings and Hartog (1998: 54), for example, report that "from the most to the

[18] According to the standard neo-classical model, wages are determined by the marginal productivity of labour and thus workers with identical production characteristics necessarily receive the same pay. However, there may be 'compensating differences' between similar individuals working in different conditions. For more details, see chapter 3.

least corporatist countries overall wage dispersion increases roughly at a ratio of 1:2. For industry dispersion it is about 1:4, for tenure about 1:5 and for firm size about 1:5".

Other studies emphasise the existence of a negative correlation between the degree of centralisation and/or corporatism and inter-decile ratios of earnings inequality (D9/D1, D5/D1 and D9/D5) on the one hand, and the number of low-paid jobs on the other (Blau and Kahn, 1996; Iversen, 1999; Lucifora, 1999; OECD, 1997; Plasman and Rycx, 2000). Unfortunately, the measures of low-paid employment generally refer only to full-time, full-year workers. This is shown in Figure 3.

**Figure 3 : Predominant Bargaining Level and Incidence of Low-Paid Employment, 1994**




*Source* : Plasman and Rycx (2000).
Predominant bargaining level : interval [1, 3]. '1' stands for company and/or establishment bargaining, '2' for sectoral bargaining and '3' for economy wide bargaining.
ILPE : incidence of low-paid employment. Low-pay is defined as being less than two thirds of the median wage for all full-time, full-year employees.

### *4.1.2. Collective Bargaining and the Trend in Wage Inequality*

There have been many studies of trends in earnings inequality over the last twenty years (Freeman and Katz, 1995; Gottschalk and Smeeding, 1997; OECD, 1996). In substance, these indicate that earnings inequality has increased since the early 1980s, at a fairly moderate rate in most industrialised countries, more rapidly in the USA and the UK. These studies also point out that the progression of earnings inequality has not always had the same impact on

the real earnings of low-paid workers. In the USA, for example, earnings inequality increased at the same time as the real earnings of low-paid workers fell (OECD, 1996), while in the UK and Japan, "real earnings rose for all workers noticeably between 1979 and 1990, with the result that despite greater inequality, the real earnings for those at the bottom of the earnings distribution grew" (Freeman and Katz, 1995: 12).

Generally speaking, the studies agree on the extent of and trends in earnings inequality, but its causes continue to give rise to a great deal of debate. Some observers point to changes in the structure of supply and demand of labour since the end of the 1970s (Johnson, 1997; Topel, 1997). Industrialised countries have indeed seen less growth in the supply of skilled labour (Freeman and Katz, 1995) at the same time as a shift in demand to the detriment of unskilled workers. This shift appears to reflect fiercer competition from cheap-labour countries and also the introduction of new technologies, particularly information technology and robotisation.

This explanation tallies with the experience of earnings inequality in various countries, including the USA. Even so, given the similar upheavals in the structure of labour supply and demand in most of the industrialised countries (Card et al., 1996), it seems to be an insufficient explanation of the different ways in which earnings inequalities have developed internationally. An alternative explanation, therefore, is that trends in earnings inequality reflect specific institutional features of different countries, and particularly the characteristics of industrial relations systems. Indeed, several studies show that during the 1980s and 1990s earnings inequality did not grow as fast in countries where pay rates were established on a fairly centralised basis (Gottschalk and Smeeding, 1997). They also indicate that between 1980 and 1990 earnings inequality increased more in countries where collective bargaining was decentralised (OECD, 1997).

Nevertheless, it remains extremely difficult to distinguish the relative impact of labour market institutions from the underlying economic trends. In fact, besides the statistical problems involved in this kind of analysis, it is also possible that the explanations mentioned above are interconnected (Gottschalk and Smeeding, 1997). On top of this, economists generally take a sceptical view of the real influence of industrial relations on the development of earnings inequality. Their main criticism is of the assumption that labour market institutions are exogenous. For instance, they point out that the fall in trade union density and the

accompanying increase in earnings inequality might both be outcomes of intensified international trade (Fortin and Lemieux, 1997).

Although it is impossible to rule out entirely the effect of simultaneity, the growth of earnings inequalities in countries where industrial relations have undergone a major transformation provides a clear indication – albeit statistically imprecise – of the influence of labour market institutions on earnings inequality (Flanagan, 1999). Studies on the USA and the UK attribute 20 to 30 percent of the increase in earnings inequality in the 1980s to the reduction in the minimum wage and declining trade union density (DiNardo et al., 1996; Fortin and Lemieux, 1997; Machin, 1997; Machin and Manning, 1994). Furthermore, around 40 percent of the difference in pay dispersion between the USA and Canada during the 1980s is attributable to the difference in trade union density (Lemieux, 1993). In countries with a more highly regulated labour market, trends in earnings inequality is determined to a greater extent by the rate of bargaining coverage and the centralisation of collective bargaining (DiNardo et al., 1996). Edin and Holmlund (1995) demonstrate that the increase in earnings inequality in Sweden from the mid-1980s was encouraged by the decentralisation of collective bargaining which started in 1984. Moreover, Maloney and Savage (1996) state that the increase in earnings inequality in New Zealand from the early 1990s is linked to labour market deregulation, which began in 1991. In similar vein, Kahn (1998) claims that the reduction of earnings inequality in Norway between 1987 and 1991 was favoured by increasingly centralised collective bargaining. For their part, Erickson and Ichino (1995) stress that labour market institutions and the 'pay solidarity' policy made it possible to curb the growth in earnings inequality in Italy during the 1980s. A study of West Germany by Abraham and Houseman (1995) backs up these findings. And finally we should note that Katz et al. (1995) state that the moderate increase in earnings disparities in France between 1970 and 1990 is attributable to the high minimum wage and high bargaining coverage.

An alternative approach to the question whether labour market institutions are endogenous involves examining the impact of economic shocks on industrial relations systems. Once again, the hypothesis that labour market institutions are entirely endogenous appears unrealistic. Indeed, bargaining coverage decreased during the 1980s in the USA and the UK, but remained relatively stable in Canada and continental Europe. As a consequence, if the characteristics of industrial relations were entirely endogenous, one would have expected far greater economic upheavals in the USA and the UK.

**Table 9 : Collective Bargaining and the Extent of Wage Inequality - Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| Freeman (1988) | 1970-85 | 18 | Trade union density<br>Degree of corporatism<br>*(Bruno and Sachs, 1985)*<br>Degree of centralisation<br>*(Calmfors and Driffill, 1988)* | Inter-industry wage dispersion | Negative correlation between wage dispersion and :<br>(i) the trade union density ($r^2$ between –0.3 and -0.56)<br>(ii) the degree of corporatism ($r^2$ equals –0.47),<br>(iii) the degree of centralisation. ($r^2$ equals –0.37) |
| Rowthorn (1992) | 1973, 85 | 17 | Degree of centralisation<br>*(Calmfors and Driffill, 1988)* | Inter-industry wage dispersion | Inter-industry wage dispersion is significantly higher in decentralised systems ($r^2$ equals -0.61) |
| Barth and Zweimüller (1994) | Beginning of the 1980s | 6 | Degree of corporatism<br>*(Blyth, 1979; Schmitter, 1981 Cameron, 1984; Bruno and Sachs, 1985)*<br>Degree of centralisation<br>*(Calmfors and Driffill, 1988)* | Inter-industry wage dispersion | Decreasing relationship between the extent of inter-industry wage dispersion and the degree of centralisation / corporatism |
| Blau and Kahn (1996) | 1984-89 | 10 | Weighted average of the following indices :<br>Blyth (1979), Schmitter (1981), Cameron (1984), Bruno and Sachs, (1985), Calmfors and Driffill (1988) | Wage inequality among men, i.e. inter-decile ratios of the earnings distribution (D9/D1, D5/D1 and D9/D5) | Decreasing relationship between wage inequality (in particular D5/D1) and the composite index of centralisation / corporatism |
| OECD (1997) | 1980, 90, 94 | 19 | Degree of centralisation (a)<br>Coverage rate<br>Trade union density<br>*(OECD, 1997)* | Wage inequality, i.e. inter-decile ratio of the earnings distribution (D9/D1) | Wage inequality is significantly lower in centralised systems<br>Decreasing relationship between wage inequality and the trade union density |

(a) Composite index resembling the formal bargaining level and the degree of co-ordination of the social partners.

**Table 9 *(cont.)* : Collective Bargaining and the Extent of Wage Inequality - Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| Teulings and Hartog (1998) | 1980s | 11/7 | Degree of corporatism *(Lehmbruch, 1984)* | Standard deviation of hourly wages<br>Inter-industry wage differential<br>Wage differential between 0 and 8 years of tenure, between 0 and 8 years of experience, etc. | Decreasing relationship between wage dispersion indicators and the degree of corporatism |
| Lucifora (1999) | Beginning of the 1990s | 20 | Trade union density<br>Coverage rate<br>Bargaining level<br>Wage regulations :<br>(i) extension of collective agreements<br>(ii) Kaitz index (a)<br>Benefit replacement ratio<br>*(OECD, 1996 ; Nickell, 1997)* | Incidence of low-paid employment<br>Wage inequality : inter-decile ratios of the earnings distribution (D9/D1, D9/D5, D5/D1) | Decreasing relationship between the incidence of low-paid employment and (i) the coverage rate, (ii) the trade union density and (iii) the prevailing bargaining level<br>The trade union density and the prevailing bargaining level are negatively related to the extent of D5/D1 and D9/D5 |
| Iversen (1999) | 1977-93 | 15 | Degree of centralisation *(Iversen, 1999)* | Wage inequality : inter-decile ratio of the earnings distribution (D5/D1) | Decreasing relationship between wage inequality and the degree of centralisation |
| Plasman and Rycx (2000) | 1980, 90, 94 | 15 | Bargaining level<br>Degree of coordination<br>Coverage rate<br>Trade union density<br>*(OECD, 1997)* | Incidence of low-paid employment<br>Wage inequality : inter-decile ratios of the earnings distribution (D9/D1, D5/D1) | The prevailing bargaining level and to a lesser extent the coverage rate and the trade union density reduce wage inequality and the incidence of low-paid employment<br>The degree of (indirect) coordination among the social partners is not a statistical driving variable |

(a) Ratio of minimum wages to the average wages.

**Table 10 : Collective Bargaining and the Trend in Wage Inequality - Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| Machin and Manning (1994) | 1979-90 | UK | Ratio of the minimum wage to the average wage in firms with a Wage Council | Wage inequality among workers in firms with a Wage Council | The dramatic decline in the toughness of the regulation imposed by the Wage Councils through the 1980s, i.e. the decrease in the ratio of the minimum wage to the average wage, contributed significantly to the increase in wage inequality |
| Katz et al. (1995) | 1970-90 | USA<br>UK<br>Japan<br>France | Supply and demand of labour<br>Institutional variables | Wage inequality (overall, by gender, level of education and occupation) | The existence of high minimum wages and the presence of strong trade unions (extension mechanisms) reduced significantly the increase in wage inequality |
| Erickson and Ichino (1995) | 1978-87 | Italy | Institutional, economical, technical and political variables | Wage inequality (overall, by age, gender, level of education and occupation) | The inflation rate and the institutions influenced significantly the evolution of wage inequality |
| Edin and Holmlund (1995) | 1968-91 | Sweden | Supply and demand of labour<br>Institutional variables | Wage inequality (overall, by age, gender, level of education and occupation) | The increase in wage inequality observed in the 1980s derives at least as much from the decentralisation of collective bargaining as from changes in the supply and demand of labour |
| Abraham and Houseman (1995) | 1976-89 | West Germany | Supply and demand of labour<br>Institutional variables | Wage inequality (overall, by age, gender, level of education and occupation) | The collective bargaining regime and the effectiveness of the education system contributed to the moderate increase in wage inequality |
| DiNardo et al. (1996) | 1973-88 | USA | Supply and demand of labour<br>Institutional variables (change in the minimum wage and in the trade union density) | Wage inequality (overall, by age, gender, level of education and occupation) | The increase in wage inequality derives at least as much from institutional variables as from economic upheavals |

**Table 10 *(cont.)* : Collective Bargaining and the Trend in Wage Inequality - Some Empirical Results**

| Author(s) | Period | # countries | Index | Type of performance | Results |
|---|---|---|---|---|---|
| Machin (1997) | 1983, 91<br><br>1979-92 | UK | Proportion of unionised firms<br>Minimum wage | Wage inequality among men<br>Overall wage inequality | The decreasing proportion of unionised firms and the falling minimum wage contributed significantly to the increase in wage inequality |
| Fortin and Lemieux (1997) | 1979, 88 | USA | Institutional variables (real minimum wage and trade union density) | Wage inequality (overall and by gender) | Approximately one third of the increase in wage inequality observed in the USA in the 1980s can be attributed to the change in the institutional variables |
| Kahn (1998) | 1987-91 | Norway | Degree of centralisation (index which resembles the bargaining level and the wage drift) | Overall wage inequality | The increase in the prevailing bargaining level contributed to the decrease in wage inequality |

However, as we have already indicated, empirical studies have identified similar economic shocks occurring in most industrialised countries. This suggests, therefore, that it is differences in labour market legislation, rather than labour supply and demand, which are responsible for bargaining coverage developing in very different ways (Fortin and Lemieux, 1997).

### *4.1.3. Wage Inequality and Poverty Levels*

Given the large, and increasing, number of studies examining the influence of collective bargaining systems on earnings inequality, it is somewhat surprising to find that very few analyses consider their influence on poverty levels. This observation, however, may be explained by the mistaken notion that the relationship between wage dispersion and poverty rates is straightforward.

Poverty in the industrialised countries can be defined as the incapacity of individuals to participate normally in society because of a lack of material resources. In other words, it is generally accepted that in rich societies "income – or the ability to consume – is the key measure of economic resources and the ability to avoid poverty" (Smeeding 1997: 4). Hence, it is common practice in cross-national poverty research to adopt a relative poverty threshold : typically, a person is said to be in poverty if the total disposable income of the household, adjusted for family size (also called equivalent income), is less than 50 percent of the mean or median equivalent income.

Measurement of the incidence of low-paid employment in international comparisons also generally relies on a relative rather than an absolute concept. Using an absolute definition indeed poses a number of difficulties. On the one hand, it implies to find appropriate conversion factors for determining an equivalent benchmark for low pay in terms of each country's national currency and on the other hand, what is considered as a low pay may change over time and may differ substantially across countries (Keese et al., 1998). Therefore, in most cross-country comparisons an individual is said to have a low-paid employment if his earning is below a certain threshold, usually two-thirds of the national median. Notice that in contrast to poverty, low pay is not considered as an household phenomenon. Indeed, the measurement of low pay is based on the earnings of the *individual*, while poverty is assessed by the disposable *household* income.

What is the link between low pay and poverty ? To shed light on this issue, we begin by addressing the question of wage mobility among low-paid workers. Indeed, the literature on the interaction between collective bargaining systems and low pay uses 'snapshot' measures of wage inequality (i.e. evaluated at a given point in time) and thus neglects the fact that a large fraction of low wage earners in one year might earn significantly higher wages next year. It is generally assumed that inegalitarian countries are characterised by a high earnings mobility. If true, this would imply that the probability of exit from low pay is higher in decentralised and deregulated bargaining systems like the USA and the UK. Conversely, countries with a lower incidence of low-paid employment – the Scandinavian and Benelux countries or Germany – would have a lower earnings mobility and thus possibly a more unequal distribution of *lifetime* earnings.

Although much research has been devoted to the question of earnings mobility[19], comparative analysis has not progressed very far in this field. Nevertheless, current evidence does not support the hypothesis that earnings mobility among low-paid workers is higher in inegalitarian countries. According to the threshold chosen to define low pay, there is either no clear relationship between the incidence of low-paid workers and the pattern of wage mobility across the OECD countries, or even a negative correlation between wage dispersion and the probability of exit from low pay (Keese et al., 1998; OECD, 1996). The latter result should however be viewed with caution. When the incidence of low-paid workers is small, their greater mobility occurs across a more compressed earnings distribution (Siebert, 1997); and of workers who exit from low pay, some may obtain a better paid job but others may move into non-employment (Lucifora, 1999).

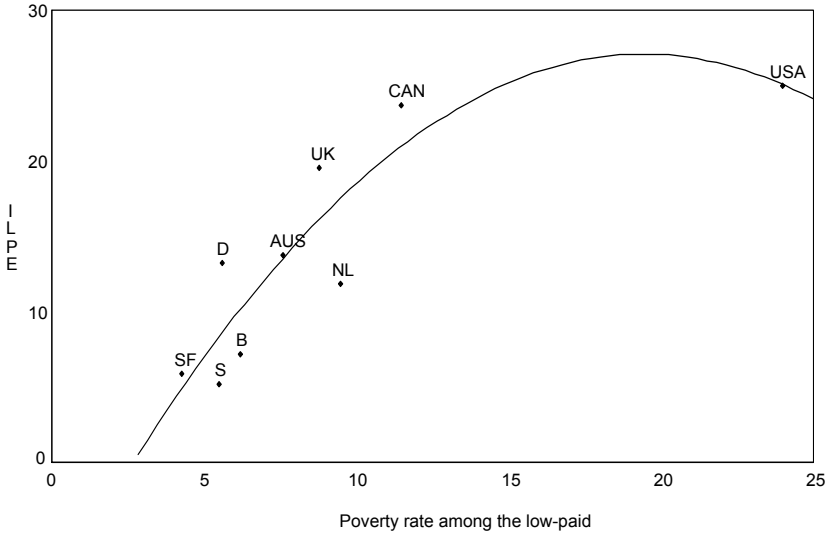
Be that as it may, results suggest that it is likely that the ranking of industrialised countries based on the 'snapshot' wage dispersion provides a good approximation of the 'effective' wage dispersion, i.e. measured over a longer period; hence findings concerning the impact of collective bargaining on wage inequality would not be appreciably different if wage mobility was taken into account.

Let us now examine the association between pronounced wage inequalities, and in particular a high proportion of low wages, and poverty. As shown in Figure 4, there is a strong positive

[19] For a comparison of these studies, see for instance OECD (1996).

correlation between wage dispersion, represented by the incidence of low-paid employment, and relative poverty among low-paid workers. In other words, the poverty rate among low-paid workers is higher in countries where the frequency of low-paid employment is pronounced (Marx and Verbist, 1998; OECD, 1996; Smeeding, 1997). This suggests that the proportion of working poor is higher in inegalitarian countries.

**Figure 4 : Incidence of Low-Paid Employment and Poverty Rate among Low-Paid Workers, 1994**




*Source* : own calculations from Marx and Verbist (1998) and OECD (1996).
ILPE : incidence of low-paid employment. Low-paid workers are workers who work full-year, full-time and who earn less than two-thirds of the median gross wage for full-year, full-time workers. Poverty rate is defined as 50 percent of the average equivalent income.

This result must however be read with caution; although the number of poor people as a proportion of the low-paid workers is significantly higher in countries with large earnings inequalities, it rarely exceeds 10 percent – the USA being the main exception. This is because a large number of low-paid workers belong to dual-income households and escape poverty (Marx and Verbist, 1998). In other words, although households with a single income-earner face a substantial poverty risk, especially in countries where the social security system is less developed, poverty among the working-age population is still essentially concentrated among households with *no* income-earner.

Hence, even though evidence shows that decentralised collective bargaining systems result in a higher proportion of low-paid workers, this interaction is insufficient to explain why the latter might lead to significantly higher poverty rates.

## 4.3. Empirical Analysis

In this section we try to shed light on the relationship between collective bargaining systems and poverty levels across the industrialised countries in 1980, 1990 and 1994. As in the previous section, we investigate this problem first for each year separately (disaggregated approach) and then for the three years simultaneously (aggregated approach). The disaggregated approach, based on Spearman's correlations, allows us to verify whether the impact on poverty levels of different collective bargaining systems has been stable since the end of the 1970s; the aggregated approach, based on pooled data regressions, provides insight into long run dynamics.

### *4.3.1. Short Description of the Data*

We examine the following characteristics of collective bargaining systems : the predominant bargaining level; the degree of coordination among the social partners; the coverage rate; and trade union density. Data on these variables are taken from the OECD (1997)[20].

In conformity with the literature on cross-national comparisons of poverty, we rely on a *relative* definition of poverty based on total disposable household income, adjusted for family size. Two different thresholds are considered here, 50 percent of *mean* and *median* equivalent income, because relying on a single definition could lead to quite different results. We also look at relative poverty levels, for different categories of the population, before and after net social security transfers. This enables us to examine the means by which the collective bargaining features may affect poverty (i.e. wage inequality and/or social expenditures). Data on poverty levels are taken from Marx and Verbist (1998), Smeeding (1997), and Van den Bosch and Marx (1996)[21]. Those on social expenditure come from the OECD (1999).

### *4.3.2. Disaggregated Approach*

The analysis below is divided into three parts. First we examine the correlation between collective bargaining and poverty rates across the OECD countries, before and after net social security transfers, in 1980, 1990 and 1994. We then turn to the relation between these same

[20] For an extended description of the data, see Appendix 1.

[21] For an extended description of the data, see Appendix 3.

characteristics and the diversity of social expenditure, as well as to the impact of social expenditure on poverty rates.

Table 11 reports the Spearman's correlation coefficients between collective bargaining characteristics and the poverty rate among total population and population of working age, before and after net social security transfers[22]. In fact, as shown by Table 11, the correlation between collective bargaining and poverty is significant only when net social security transfers are taken into account. This means that social security expenditure seems to be an important channel through which the collective bargaining systems influence poverty rates, even more than earnings inequality.

Hence we obtain the following *extended* frame of reference :

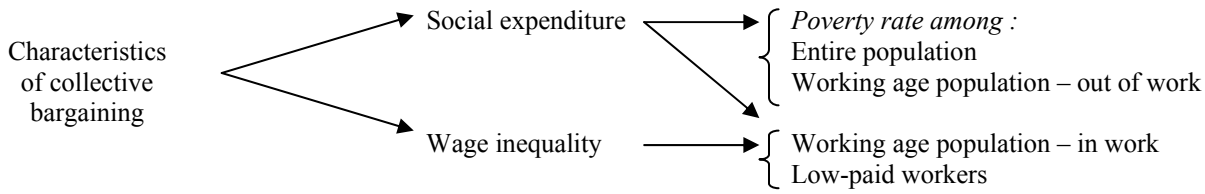



Table 11 also shows that the predominant bargaining level is the main characteristic to be negatively correlated with the poverty rate among the entire population and the population of working age (after net social security transfers).

It is also noteworthy that the impact of the coverage rate and the trade union density is more modest but not negligible. The negative correlation between coordination among social partners and poverty rates results mainly from the fact that most highly coordinated countries are also highly centralised. Indeed, when this is not the case, as in Japan (company bargaining and high indirect coordination), the poverty rate is as high as in decentralised countries. We therefore put the emphasis on the bargaining level rather than on the degree of coordination.

[22] Let us note that the results relative to the continuous variables, i.e. the trade union density and the coverage rate, are similar when applying Pearson correlation coefficients.

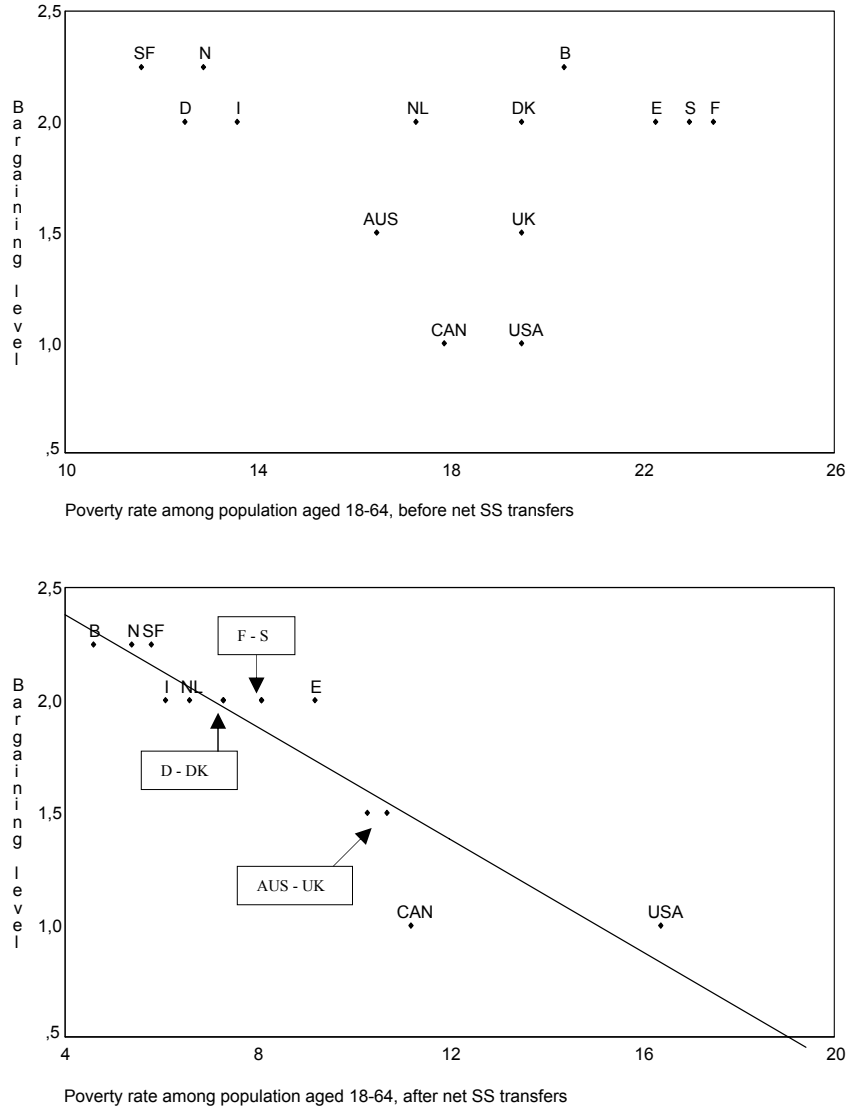
## Table 11 : Collective Bargaining and Poverty Levels, before and after Net Social Security Transfers

| *Poverty rate **before** net transfers among :* | Bargaining level (1–3) | | | Degree of co-ordination (1–3) | | | Bargaining coverage (%) | | | Trade union density (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| Total population : (1) | / | -0.04 | -0.30 | / | -0.22 | -0.53 | / | -0.40 | -0.42 | / | -0.13 | -0.08 |
| (2) | -0.11 | -0.40 | -0.17 | -0.29 | -0.28 | -0.17 | -0.13 | -0.09 | 0.00 | -0.39 | -0.42 | -0.46 |
| Working age population : (1) | / | -0.10 | -0.19 | / | -0.36 | -0.48 | / | -0.08 | -0.08 | / | -0.26 | -0.26 |
| (2) | 0.05 | -0.44 | -0.25 | -0.09 | -0.50 | -0.37 | 0.13 | -0.18 | -0.09 | -0.25 | -0.31 | -0.30 |

| *Poverty rate **after** net transfers among :* | Bargaining level (1–3) | | | Degree of co-ordination (1–3) | | | Bargaining coverage (%) | | | Trade union density (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| Total population : (1) | -0.52 | **-0.60*** | **-0.88**** | -0.51 | -0.22 | -0.48 | -0.51 | **-0.67*** | **-0.68**** | -0.35 | -0.50 | **-0.59*** |
| (2) | **-0.68*** | -0.38 | **-0.69**** | **-0.74**** | **-0.56*** | **-0.64*** | -0.55 | -0.26 | -0.37 | **-0.75**** | **-0.64*** | **-0.65*** |
| Working age population : (1) | -0.49 | **-0.60*** | **-0.93**** | **-0.56*** | -0.52 | **-0.77**** | -0.54 | **-0.58*** | **-0.59*** | -0.45 | -0.44 | -0.47 |
| (2) | **-0.65*** | -0.49 | **-0.72**** | **-0.63*** | **-0.64*** | **-0.65*** | -0.47 | -0.34 | -0.45 | **-0.84**** | **-0.64*** | **-0.65*** |

*Notes* : Spearman's correlation coefficients, * $p < 0.05$, ** $p < 0.01$, "/" : no data available.
(1) Poverty rate corresponds to 50 per cent of *median* equivalent income, 14 countries.
(2) Poverty rate corresponds to 50 per cent of *average* equivalent income, 14 countries.

**Figure 5 : Bargaining Level and Poverty Rate among the Working Age Population in 1994, before and after Net Social Security Transfers**



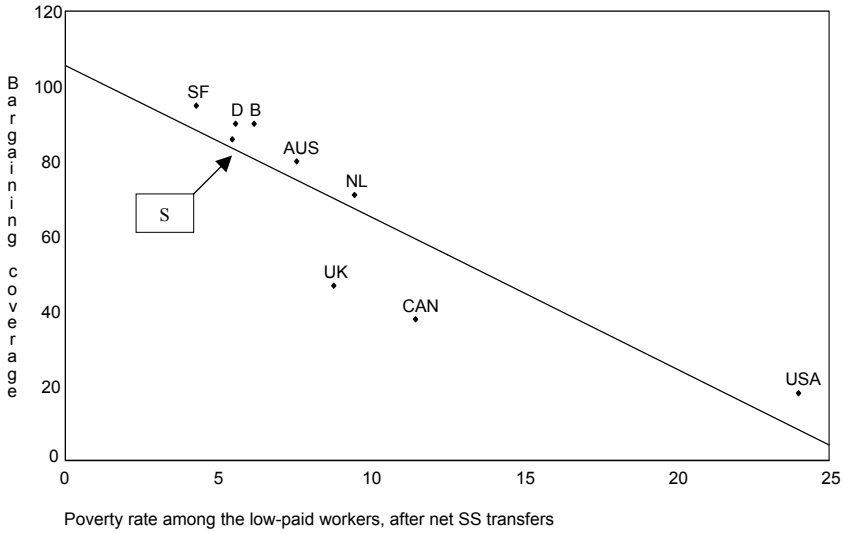

*Notes* : Poverty rate is defined as 50 percent of median equivalent income.
Bargaining level : interval [1, 3]. '1' stands for company and/or establishment bargaining, '2' for sectoral bargaining and '3' for economy wide bargaining.

Figure 5 shows the relationship between bargaining level and poverty among the working population, before (upper figure) and after (lower figure) net social security transfers. Notice that the post-transfer correlation is particularly strong.

What about the poverty rate (after net social security transfers) among the other categories of the population (see Appendix 7B) ? First, when we analyse the poverty rate among the population aged 16 to 64, *in* or *out* of work, the impact of the predominant bargaining level is quite similar. Nevertheless, the correlation is more intense with the poverty rate among the non-employed. The

other characteristics of collective bargaining prove insignificant overall. Second, all the characteristics of collective bargaining covered here are negatively correlated with the poverty rate among low-paid full-time employees in both 1990 and 1994. Yet the best results are obtained with the coverage rate (see Figure 6). Third, there appears to be no significant correlation between the characteristics of collective bargaining and the poverty rate among people aged over 65 in 1980, 1990 and 1994. Consequently, this population group has not been included in the remainder of our analysis.

**Figure 6 : Coverage Rate and Poverty among Low-Paid Workers in 1990, after Net Social Security Transfers**




*Note :* Poverty rate is defined as 50 percent of mean equivalent income.

These conclusions can be better understood by examining the impact of collective bargaining on social expenditure and the relationship between social expenditure and rates of poverty. The findings are set out in Tables 12 and 13.

Table 12 shows that collective bargaining coverage rates, trade union density and more particularly the predominant bargaining level account to a significant extent for the diversity in social expenditure (expressed as a percentage of GDP) allocated to the entire population and to the population of working age, within the industrialised countries, in 1980, 1990 and 1994. We can surmise that this finding is attributable to the fact that :

(a) When bargaining occurs at a more centralised level, unions have a broader overview of the economy. Hence they are more likely to internalise the social repercussions of the agreements they negotiate and, more generally, the weaknesses of the market economy.

(b) When negotiations are centralised, unions have more bargaining power to enforce greater solidarity through a relatively generous social security system. Furthermore, other things being equal, the higher the collective bargaining coverage and trade union density, the stronger their bargaining power.

**Table 12 : Collective Bargaining and Social Expenditure**

| | *Social expenditure as a % of GDP for :* | | | | | |
|---|---|---|---|---|---|---|
| | Total population (1) | | | Working age population (1) | | |
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| Bargaining level (1–3) | **0.64**** | **0.46*** | **0.70**** | **0.60**** | 0.43 | **0.57*** |
| Degree of co-ordination (1–3) | 0.35 | 0.22 | 0.34 | 0.27 | 0.16 | 0.15 |
| Bargaining coverage (%) | **0.56*** | **0.52*** | **0.65**** | 0.44 | 0.36 | **0.50*** |
| Trade union density (%) | 0.34 | **0.50*** | **0.51*** | 0.35 | **0.56*** | **0.52*** |

*Notes* : Spearman's correlations, they refer to 19 OECD countries, * $p < 0.05$, ** $p < 0.01$.
(1) For definitions, see Appendix 3.

Table 13 reports that the poverty rate among the entire population and among the population of working age correlates negatively with the social expenditure (expressed as a percentage of GDP) allocated to these two population groups. This relatively unsurprising finding is borne out by several empirical studies, including that by Smeeding (1997). Indeed, the latter points out that in general "low poverty reduction nations have lower social expenditures on the non-elderly, while high expenditure nations achieve higher rates of poverty reduction". It follows that "high spending societies produce lower poverty rates in large part due to their safety nets".

**Table 13 : Social Expenditure and Poverty Rates, after Net Social Security Transfers**

| | | *Social expenditure as a % of GDP for :* | | | | | |
|---|---|---|---|---|---|---|---|
| | | Total population (3) | | | Working age population (3) | | |
| | | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| *Poverty rate (%) among :* | | | | | | | |
| Total population : | (1) | **-0.70**** | **-0.69*** | **-0.70*** | | | |
| | (2) | **-0.63*** | **-0.80**** | **-0.78**** | | | |
| Working age population : | (1) | | | | **-0.60*** | **-0.59*** | **-0.57*** |
| | (2) | | | | **-0.38** | **-0.79**** | **-0.77**** |

*Notes* : Pearson's correlations, * $p < 0.05$, ** $p < 0.01$.
(1) Poverty rate corresponds to 50 per cent of *median* equivalent income, 14 countries.
(2) Poverty rate corresponds to 50 per cent of *average* equivalent income, 14 countries.
(3) For definitions, see Appendix 3.

What conclusions can we draw from this disaggregated approach ? The relation between collective bargaining and poverty is intense and stable since the end of the 1970s. We also conclude that the dominant bargaining level and - to a lesser extent - collective bargaining coverage rates and trade union density correlate negatively with the poverty rate among the entire population and the population of working age, the reason being principally their impact on social expenditure and marginally on wage inequality. The degree of coordination among the social partners, on the other hand, proves less significant overall.

### *4.3.3. Aggregated Approach*

As mentioned previously, the methodology applied until now is quite useful to investigate whether the impact on poverty levels of different collective bargaining systems has been stable since the end of the 1970s. However, it has certain limitations. First, it ignores the interactions that may exist between poverty rates and several collective bargaining characteristics. Second, it only reveals complementarity relations. Finally, it does not provide any insight into long-run dynamics. Hence additional regressions were run on pooled data. Pooled data estimation stress the cross-sectional dimension and, given that in many countries there is only little variation over time in the institutional variables, the coefficients represent essentially cross-country effects averaged over all periods. This technique has been chosen because the hypothesis under consideration refers to cross-sectional effects, not to the effect of institutional dynamics over time within countries[23].

As in the previous sub-section, all models are constructed as a panel of three years 1980, 1990 and 1994, controlling for common developments in the dependent variable by including a dummy for 1990 and 1994. Moreover, to avoid the multicollinearity problem induced by the strong correlation between the coverage rate and the prevailing bargaining level, two models were estimated each using one of these variables.

Table 14 and Appendix 10B present pooled data regressions (ordinary least squares with White heteroskedasticity-consistent standard errors and covariance) relating to the poverty rate among the entire population and the population of working age *after* net social security transfers for two different thresholds, i.e. 50 per cent of median and mean equivalent income. Evidence suggests that central characteristics of industrial relations (mainly the prevailing bargaining level, the

[23] Similar results have been obtained using a random effects model.

coverage rate and the trade union density) have a highly significant impact on relative poverty rates after net social security transfers[24] and, this impact is in the 'right' direction, i.e. in the direction of minimising relative poverty.

**Table 14 : Pooled Data Regressions – 1980, 1990 and 1994**

| | *Poverty rate (%) after net SS transfers among :* | | | |
|---|---|---|---|---|
| | Total population | | Working age population | |
| Bargaining level (1–3) | **-4.107**** (0.001) | | **-2.762*** (0.011) | |
| Degree of coordination (1–3) | **-1.335**** (0.001) | **-1.875*** (0.000) | **-1.125**** (0.002) | -0.507 (0.153) |
| Bargaining coverage (%) | | **-0.090**** (0.000) | | **-0.067**** (0.000) |
| Trade union density (%) | **-0.023*** (0.021) | **-0.021**** (0.001) | **-0.016**** (0.001) | **-0.031**** (0.000) |
| Dummy for 1990 | 0.107 (0.783) | 0.597 (0.117) | 0.283 (0.240) | 0.449 (0.102) |
| Dummy for 1994 | 0.134 (0.734) | 0.689 (0.071) | 0.265 (0.271) | 0.647* (0.020) |
| Constant | 20.228** (0.000) | 19.760** (0.000) | 15.814** (0.000) | 15.089** (0.000) |
| N (countries, time) | 43 (14/15, 3) | 43 (14/15, 3) | 41 (13/14, 3) | 41 (13/14, 3) |
| $R^2$ adjusted | 0.535 | 0.649 | 0.538 | 0.616 |
| F-test | 357.15** (0.000) | 131.17** (0.000) | 853.79** (0.000) | 276.42** (0.000) |

*Notes* : Poverty rate corresponds to 50 per cent of *median* equivalent income.
The p-values are indicated in parentheses. * $p < 0.05$, ** $p < 0.01$.
Regressions are estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance.
Regressions relative to the poverty rate among the entire population refer respectively to 13 countries in 1980 (Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, UK, USA), and also Japan and Spain in 1990 and 1994.
Regressions relative to the poverty rate among the adult population refer to the same 13 countries in 1980 plus Spain in 1990 and 1994

Moreover, this impact seems not (or only marginally) to follow from any direct effect on wage formation (whether central or decentralised bargaining and wage formation processes), but from obliging the state/government to spend more on social security. Indeed, (i) the determination coefficients (adjusted $R^2$) from the regressions linking the relative poverty rates *before* net social security transfers to the collective bargaining characteristics reaches only 5 per cent on average

[24] The degree of coordination among the social partners seems also to exert a negative impact on poverty. However, as mentioned previously, given that our data set does not allow to distinguish between direct and indirect coordination among the social partners, we emphasise the role of the predominant bargaining level.

(see Appendix 10A) and (ii) differences in collective bargaining characteristics seem to explain a significant fraction of the cross-country diversity in social security expenditures, expressed as a percentage of GDP (see Table 15).

**Table 15 : Pooled Data Regressions – 1980, 1990 and 1994**

| | *Social expenditure as % of GDP for :* | | | |
|---|---|---|---|---|
| | Total population | | Working age population | |
| Bargaining level (1–3) | **6.051**** (0.000) | | **3.203**** (0.000) | |
| Degree of coordination (1–3) | -0.207 (0.707) | 0.140 (0.801) | **-1.078**** (0.008) | -0.662 (0.077) |
| Bargaining coverage (%) | | **0.130**** (0.000) | | **0.062**** (0.000) |
| Trade union density (%) | **0.129**** (0.000) | **0.102**** (0.000) | **0.100**** (0.000) | **0.089**** (0.000) |
| Dummy for 1990 | 4.402** (0.000) | 3.996** (0.000) | 2.155** (0.001) | 1.756** (0.000) |
| Dummy for 1994 | 6.903** (0.000) | 6.358** (0.000) | 3.716** (0.000) | 3.258** (0.000) |
| Constant | 1.973 (0.098) | 4.798** (0.000) | -2.126* (0.028) | -0.335 (0.625) |
| N (countries, time) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) | 57 (19, 3) |
| $R^2$ adjusted | 0.498 | 0.532 | 0.482 | 0.456 |
| F-test | 451.76** (0.000) | 347.97** (0.000) | 94.92** (0.000) | 93.22** (0.000) |

*Notes* : The p-values are indicated in parentheses. * $p < 0.05$, ** $p < 0.01$.
Regressions are estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance.
Regressions refer to 19 OECD countries in each period (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New-Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA).

To sum up, empirical evidence suggests that centralised industrial relations systems have a significant impact in reducing relative poverty. Moreover, this impact seems to follow only marginally, if at all, from any direct effect on wage formation, but from obliging the state or government to spend more on social security.

## 5. A TRADE - OFF BETWEEN ECONOMIC AND SOCIAL PERFORMANCE ?

The aim of this section is to analyse whether, in view of the characteristics of collective bargaining, economic efficiency (i.e. labour market performance) is compatible with social

performance (mainly low poverty levels). To this end we use principal component analysis (PCA). The findings produced by this method are compared with those of sections 3 and 4.

PCA is a form of factor analysis which aims to extract information from a set of N individuals about which one knows K characteristics. The principle consists in adjusting to best advantage a scatter of points situated in a space of dimension NxK, by projecting it in a very small-scale sub-vector in order to improve data readability. In our case the N individuals are countries and the K variables are : (i) the prevailing bargaining level; (ii) the degree of co-ordination among the social partners; (iii) collective bargaining coverage rates; (iv) trade union density; (v) real GDP growth; (vi) employment growth; (vii) the employment rate; (viii) the unemployment rate; (ix) the rate of growth in unit labour costs; (x) the ratio of the fifth to the first decile of the earnings distribution; (xi) total social expenditure as a percentage of GDP; and (xii) the poverty rate after net social security transfers among the entire population (threshold : 50 per cent of the median equivalent income). As in section 3, variables (v) to (ix) are expressed as an average level or rate of growth over a five-year period (1978-82, 1988-92 and 1992-96). In this way we try to reduce the cyclical fluctuations of these variables. The other variables refer respectively to 1980, 1990 and 1994. For a detailed description of the data, see Appendices 1 to 3.

In order to preserve the initial configuration of the scatter of points as far as possible, the projection is carried out in such a way as to maximise the average squared distances between the individuals on the projection map. The axes forming the projection map, known as principal components, must be orthogonal. They provide the co-ordinates of the individuals situated on the map. There are at most as many as there are characteristics, i.e. K. Each one of these, deriving from a linear combination of the initial characteristics, accounts in part for the total variance in the scatter of points.

In graphical terms, individuals situated a short distance from each other on the projection map are interpreted as being relatively similar. Since this is a projection, however, the proximity of two individuals on the map does not necessarily correspond to the distance separating them in space. It is therefore necessary to measure the quality of the representation of individuals on the map. The quality criterion most frequently used to do this is the squared cosine of the angle between the vector of an individual's initial characteristics and its projection. When the cosine of the angle = 1, the vector of the initial characteristics and its projection meet. Conversely, if it is

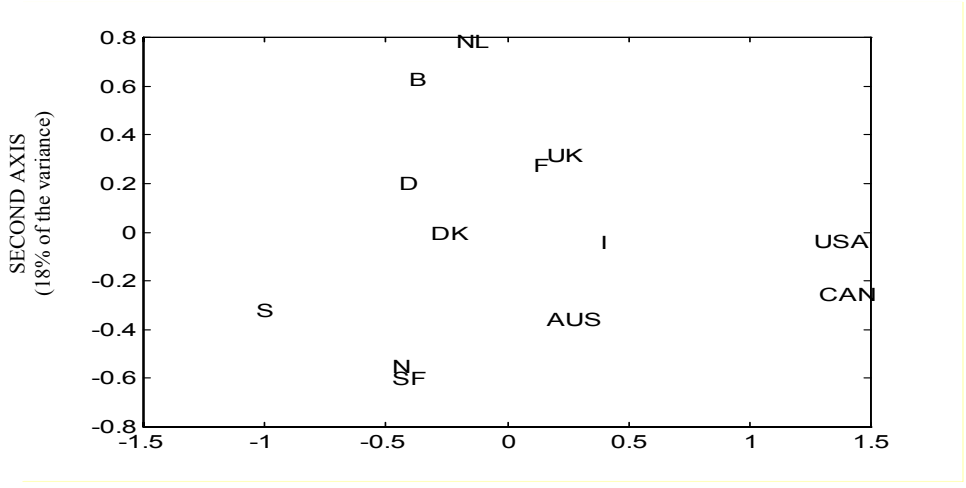
close to 0, extra caution is required. Thus, if the distance between two points on the map is to be interpreted strictly, each of them must be correctly represented.

Finally we would stress that, because PCA is based on a correlation matrix, it cannot identify causal relations. Nevertheless, as pointed out by Cadiou and Guichard (1999), PCA can be used not only to reveal the complementary features of characteristics, but also to detect the existence of potentially strong correlations and to establish a hierarchy of variables by selecting those which account for the greatest part of the variance. The results obtained by applying PCA to the data for 1980, 1990 and 1994 (separately and simultaneously) are shown in the figures below. For further details please refer to Appendix 11.

## 5.1. Disaggregated Approach

An analysis of the 1980 data reveals that the main source of divergence concerns social performance. The first axis, accounting for 46% of the variance in the sample, illustrates in fact that the prevailing bargaining level, degree of co-ordination, collective bargaining coverage rates, wage inequality, volume of social expenditure (as a % of GDP) and poverty are all highly complementary. This reinforces our belief that central features of collective bargaining systems are negatively (positively) correlated with the poverty rate and earnings inequality (social expenditure).

**Figure 7 : Summary for 1980 based on PCA**



The second source of differentiation is linked to a combination of economic performance criteria, namely the employment rate, employment growth and real GDP growth (18% of the variance). In Figure 7 we see a hump-shaped relationship between this composite performance indicator and the prevailing bargaining level. Indeed, Figure 7 shows that countries characterised by an intermediate bargaining level (i.e. the Netherlands, Belgium, West-Germany, France and the UK) had a lower composite performance index than highly centralised (i.e. the Scandinavian countries and Australia) or decentralised countries (i.e. Italy, Canada and the USA)[25]. This finding corroborates to some extent the conclusion reached by Calmfors and Driffill (1988) as to the ineffectiveness of sectoral bargaining during the period 1973-85.

However, caution is required since the quality of representation of countries on the projection map is not always flawless (see Appendix 11). Nor should we forget (see section 3) that, contrary to the degree of co-ordination, the prevailing bargaining level was not significantly correlated to the economic performance indicators when they were analysed separately for 1980. We therefore abide by our point of view that, in the early 1980s, the degree of co-ordination among the social partners was the characteristic of collective bargaining which contributed most to good economic performance.

Furthermore we note that, in view of the characteristics of collective bargaining, economic efficiency and social cohesion were not incompatible in 1980. Indeed, the Scandinavian countries scored best in both economic and social terms (see Figure 7).

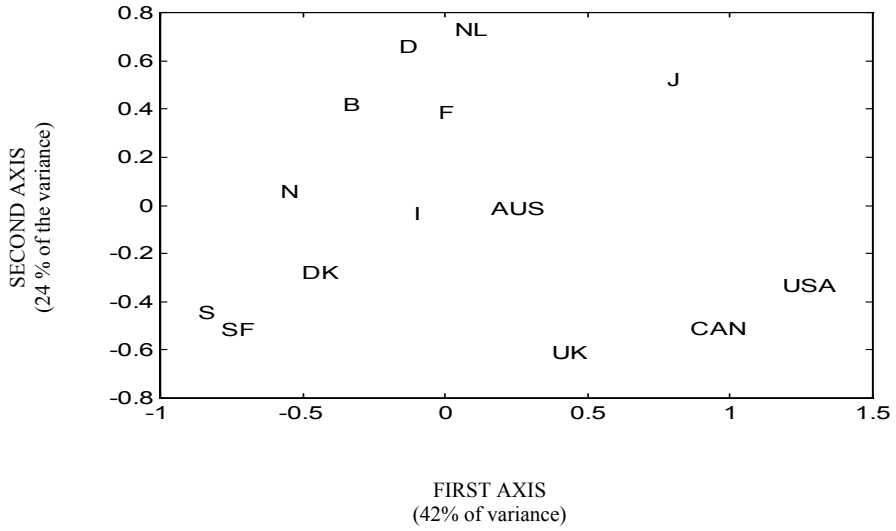
As shown in Figure 8, the first axis, relating to 1990, is a linear combination of the prevailing bargaining level, the coverage rate, earnings inequality, social expenditure, the poverty rate and the trade union density (42% of the variance). It confirms the intensity and stability of the above-mentioned relation between the characteristics of collective bargaining and social performance.

The second criterion of differentiation is a composite index of economic performance constructed by weighting negatively the employment rate and the rate of growth in unit labour costs, and by weighting positively the rate of real GDP growth, the rate of employment growth and the degree of co-ordination among the social partners. In graphical terms (see Figure 8), we observe a roughly hump-shaped correlation between this performance indicator and the

[25] For a description of the bargaining level in the OECD countries in 1980, see Appendix 1.

prevailing bargaining level. Thus between 1988 and 1992 the best performance as concerns economic growth, employment growth and pay restraint was achieved in Japan, as well as in countries characterised by sectoral bargaining (i.e. in the Netherlands, West-Germany, Belgium and France). Consequently, although the employment rate also contributes to the construction of the second axis, this finding underscores the fragility of the conclusions reached by Calmfors and Driffill (1988). Also noteworthy is that no trade-off emerges, in view of the characteristics of collective bargaining, between economic and social efficiency in 1990.

**Figure 8 : Summary for 1990 based on PCA**

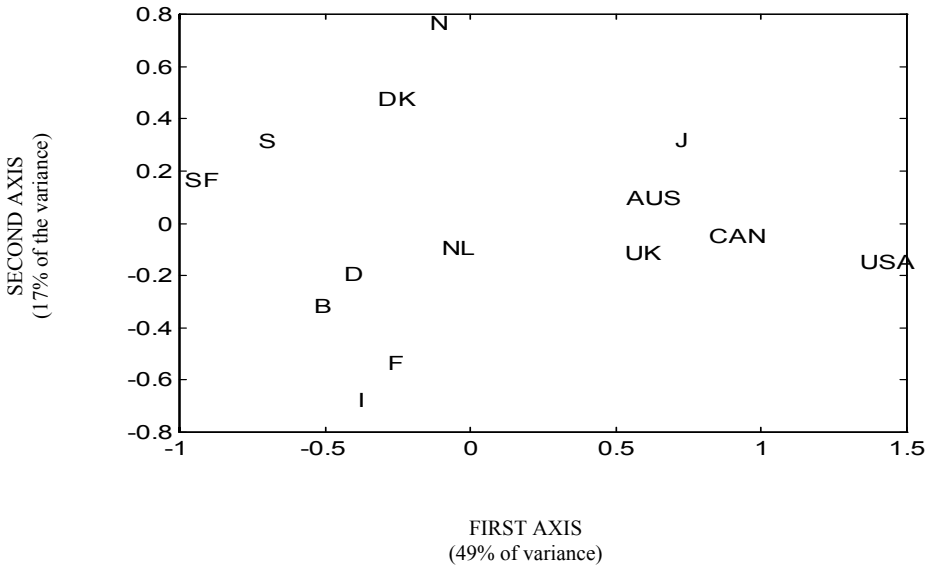



The main source of divergence in 1994 concerns social performance and employment growth. The first principal component, accounting for almost 50% of the variance, results in fact from a linear combination of the prevailing bargaining level, the poverty rate, the coverage rate, social expenditure, earnings inequality and the rate of employment growth. Figure 9 tells us that in the mid-1990s employment growth and poverty were higher in the USA, Canada, Japan, Australia and the UK : countries characterised by decentralised bargaining and narrow bargaining coverage.

This result, in line with our previous findings (see section 3), therefore suggests the existence of a slight trade-off between economic efficiency and poverty. It goes without saying, however, that this result must be interpreted with caution. Indeed, in order to be convinced by it one would need to understand why countries with decentralised industrial relations suddenly generate more employment. Although certain authors attribute this effect to the fact that pay differentials are

more marked in such countries, there is no consensus on this subject[26]. Moreover, this result might simply derive from the fact that we do not control for the position of the countries in the business cycle.

**Figure 9 : Summary for 1994 based on PCA**




Finally, the second axis (17% of the variance) indicates the absence of a clear relationship between the other economic performance indicators and the characteristics of collective bargaining in the mid-1990s.

## 5.2. Aggregated Approach

The results from the PCA applied simultaneously to the three points in time (1980, 1990 and 1994) provide a very good summary of the overall interactions at work (see Appendix 11D). They show that the principal source of divergence within the OECD countries concerns social performance. Indeed, the first axes, accounting for almost 42 per cent of the variance, is a linear combination of the prevailing bargaining level, the coverage rate, wage inequality, social expenditures and the poverty rate. The second source of differentiation (circa 17 per cent of the variance) is related to economic performance. It is a composite index constructed by weighting positively the employment rate, real GDP growth and the degree of co-ordination among the social partners, and by weighting negatively the unemployment rate.

[26] See for example Freeman and Schettkat (2000), Nickell and Bell (1996) and Siebert (1997).

**Table 16 : Summary of the Aggregated Approach**

| | | *Degree of co-ordination of social partners :* | |
|---|---|---|---|
| | | Low | High |
| *Bargaining level :* | Low | EP : +0.5<br>SP : -1 | EP : +1<br>SP : -1 |
| | High | EP : -1<br>SP : +1 | EP : +1<br>SP : +1 |

*Notes* :
Low bargaining level : company bargaining.
EP : economic performance, i.e. labour market efficiency.
PS : social performance, i.e. 1/poverty level.
Interval : [–1, +1].

These findings, in line with the results described in sections 3 and 4, suggest that the industrial relations systems provide a much better explanation for the diversity of poverty levels than for the differences in macroeconomic efficiency. Moreover, considering long-run principal component and regression results together (see Table 16), there are few reasons to believe that, in view of the characteristics of collective bargaining systems, the industrialised countries are faced with a trade-off between macroeconomic efficiency and low poverty levels. Indeed, macroeconomic performance depends in the long run essentially on the degree of co-ordination among the social partners, whereas poverty is influenced by the formal bargaining level, the coverage rate and the trade union density.

Despite the virtues of highly co-ordinated centralised bargaining systems, however, it has been observed, that during the last decade many OECD countries have chosen more deregulated arrangements, e.g. Italy, New-Zealand, Australia and Sweden. These developments leads us to question the sustainability of a high degree of co-ordination in relatively centralised systems. Indeed, the change in social structures (de-industrialisation, fall in the number of manual workers, tertiarisation of the economy, growing female participation in the labour market, increasing number of small enterprises) and the trend in social values (collectivism is giving way to individualism) confront the trade unions with a new challenge : representing the interests of the various components (the elite, the hard core, the periphery, the unemployed, those left out), while still being able to maintain a coherent overall vision as a basis for influencing the (inter) national social and economic system (Goetschy and Lallement, 1998). Notice, moreover, that the context in which social pacts have been negotiated in recent years makes this task even more

difficult. Indeed, in contrast to the Fordist period, where wage restraint was bargained in exchange for full employment and social protection, today wage moderation is just part of a whole set of measures considered as crucial for competitiveness (Pochet, 1998). Besides, the disarray of centralised arrangements in many industrialised countries underlines the importance of the education system. Indeed, international differences in recent labour market experiences suggest that policies that buffer the earnings of the less educated by institutional wage setting work best when accompanied by institutions that augment those workers' skills as well (Freeman and Katz, 1995). Therefore, although empirical findings reveal no inevitable trade-off between social and macroeconomic performance, practice stresses the difficulty of maintaining a high degree of co-ordination in a relatively centralised structure.

## 6. CONCLUSION

The purpose of this chapter was to investigate how the characteristics of collective bargaining systems have influenced macroeconomic (i.e. labour market) performance on the one hand, and social cohesion (i.e. poverty levels) on the other, in the industrialised countries since the end of the 1970s. We also tried to ascertain whether, in view of the characteristics of collective bargaining, macroeconomic efficiency is compatible with social performance. The main lessons to be drawn from this chapter are outlined below.

*What of economic performance ?* Results show that the relationship between the collective bargaining systems and macroeconomic performance is relatively fragile and unstable over time. Indeed, the findings from the disaggregated analyses, i.e. considering three sub-periods (1978-82, 1988-92 and 1992-96) separately, suggest the existence of a corporatist relationship – emphasising the importance of a high degree of co-ordination among the social partners – during the two first periods (1978-82 and 1988-92) and a neo-classical relationship – based on the virtues of competition – during the third period (1992-96). In addition, results show quite clearly that the intensity of the relationship between macroeconomic performance and collective bargaining systems has substantially decreased during the two last periods. Nevertheless, our analysis, realised simultaneously for the periods 1978-82, 1988-92 and 1992-96, suggests the existence of a *non-linear* relationship between collective bargaining systems and economic performance in the OECD countries. In the long run, trade unions – hampered by the prevailing bargaining level and the coverage rate – have a negative impact on economic performance, but

this effect is neutralised or even reversed in cases where there is a high degree of co-ordination among the social partners. Also noteworthy is that no evidence was found in favour of a hump-shaped relationship.

*What of social performance ?* Our findings show that the relationship between collective bargaining and relative poverty rates, among the entire population and the population of working age, has been intense and stable in OECD countries since the end of the 1970s. They also suggest that this is due to their impact on social security expenditures and marginally to their interaction with earnings inequality. In addition, they point out that in terms of poverty rates, the predominant bargaining level, coverage rate and trade union density are variables of much greater importance than the degree of (indirect) coordination between the social partners. To sum up, empirical evidence suggests that centralised industrial relations systems have a significant impact in reducing relative poverty. Moreover, this impact seems to follow only marginally, if at all, from any direct effect on wage formation, but from obliging the state or government to spend more on social security.

*Finally*, we found that industrial relations systems provide a much better explanation for the diversity of poverty levels than for differences in macroeconomic efficiency. Moreover, empirical findings reveal no inevitable trade-off between social and macroeconomic performance. Indeed, in the long run macroeconomic performance depends essentially on the degree of co-ordination among the social partners, whereas poverty is influenced by the formal bargaining level, the coverage rate and the trade union density.

Future research should focus on the evolution of labour market performance and poverty levels in countries where industrial relations have undergone a major transformation. Indeed, assessing the effect of institutional dynamics over time within countries would provide a highly valuable and complementary source of information. The impact of government intervention in collective bargaining also deserves more attention. Besides, it would be very interesting to consider a *new* definition of poverty which would reflect the actual distribution of income within the household. This approach would probably increase the number of poor people (in particular women) among the low-paid workers and hence affect the relationship between collective bargaining systems and poverty levels. In addition, more research should be devoted to the question of the sustainability of a high degree of co-ordination in a centralised or intermediate collective bargaining structure. Finally, in order to avoid coordination of wage setting to result in a

competitive deflationary scenario, research should focus on the best way to promote cross-boarder collective bargaining in Europe.

# APPENDICES

## Appendix 1 : Description of the Collective Bargaining Characteristics

### *A. Data*

| | Prevailing bargaining level | | | Degree of co-ordination among the social partners | | |
|---|---|---|---|---|---|---|
| Country | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| Australia | 2+ | 2+ | 1.5 | 2+ | 2+ | 1.5 |
| Austria | 2+ | 2+ | 2+ | 3 | 3 | 3 |
| Belgium | 2+ | 2+ | 2+ | 2 | 2 | 2 |
| Canada | 1 | 1 | 1 | 1 | 1 | 1 |
| Denmark | 2+ | 2 | 2 | 2.5 | 2+ | 2+ |
| Finland | 2.5 | 2+ | 2+ | 2+ | 2+ | 2+ |
| France | 2 | 2 | 2 | 2- | 2 | 2 |
| Germany | 2 | 2 | 2 | 3 | 3 | 3 |
| Italy | 2- | 2- | 2 | 1.5 | 1.5 | 2.5 |
| Japan | 1 | 1 | 1 | 3 | 3 | 3 |
| Netherlands | 2 | 2 | 2 | 2 | 2 | 2 |
| New-Zealand | 2 | 1.5 | 1 | 1.5 | 1 | 1 |
| Norway | 2 | 2+ | 2+ | 2.5 | 2.5 | 2.5 |
| Portugal | 2- | 2+ | 2 | 2- | 2 | 2 |
| Spain | 2+ | 2 | 2 | 2 | 2 | 2 |
| Sweden | 3 | 2+ | 2 | 2.5 | 2+ | 2 |
| Switzerland | 2 | 2 | 2 | 2+ | 2+ | 2+ |
| UK | 2 | 2- | 1.5 | 1.5 | 1+ | 1 |
| USA | 1 | 1 | 1 | 1 | 1 | 1 |

| | Collective bargaining coverage rates | | | Trade union density | | |
|---|---|---|---|---|---|---|
| Country | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| Australia | 88 | 80 | 80 | 48 | 41 | 35 |
| Austria | (98) | 98 | 98 | 56 | 46 | 42 |
| Belgium | (90) | 90 | 90 | 56 | 51 | 54 |
| Canada | 37 | 38 | 36 | 36 | 36 | 38 |
| Denmark | (69) | 69 | 69 | 76 | 71 | 76 |
| Finland | 95 | 95 | 95 | 70 | 72 | 81 |
| France | 85 | 92 | 95 | 18 | 10 | 9 |
| Germany | 91 | 90 | 92 | 36 | 33 | 29 |
| Italy | 85 | 83 | 82 | 49 | 39 | 39 |
| Japan | 28 | 23 | 21 | 31 | 25 | 24 |
| Netherlands | 76 | 71 | 81 | 35 | 26 | 26 |
| New-Zealand | (67) | 67 | 31 | 56 | 45 | 30 |
| Norway | (75) | 75 | 74 | 57 | 56 | 58 |
| Portugal | 70 | 79 | 71 | 61 | 32 | 32 |
| Spain | (76) | 76 | 78 | 9 | 13 | 19 |
| Sweden | (86) | 86 | 89 | 80 | 83 | 91 |
| Switzerland | (53) | 53 | 50 | 31 | 27 | 27 |
| UK | 70 | 47 | 47 | 50 | 39 | 34 |
| USA | 26 | 18 | 18 | 22 | 16 | 16 |

*Notes :* The brackets indicate that the information was not available for 1980.
The number between brackets corresponds to the value of 1990.
High indices are associated with "centralised/co-ordinated" countries.
*Source* : OECD (1997).

### *B. Definitions*

*Prevailing bargaining level.* "Within certain limits set by each country's labour legislation, bargaining parties are, as a rule, free to choose the appropriate level, or specific mixture of levels, for their negotiations. To simplify, three levels, not necessarily mutually exclusive, may be distinguished :

- Economy-wide bargaining is a bipartite or tripartite form of negotiation or 'concertation' between union confederations, central employer associations and government agencies. It aims at providing a floor for lower-level bargaining on the terms of employment, often taking into account macroeconomic goals.
- Sectoral bargaining, which aims at the standardisation of the terms of employment in one industry, includes a range of bargaining patterns. Bargaining may be either broadly or narrowly defined in terms of the industrial activities covered and may be either split up according to territorial sub-units or conducted nationally.
- The third bargaining level involves the company and/or establishment" (OECD, 1994).

"In no country is bargaining conducted at only one level - in some, it even takes place at all three levels. Nevertheless, in most countries one of these levels is distinctly preferred." (OECD, 1997) The data on the prevailing bargaining level which appear in OECD (1997) are taken from the OECD (1994). Certain amendments have however been made in order to take account of recent changes in some countries.

*Degree of co-ordination among the social partners.* This is a composite indicator which takes account of co-ordination between trade unions and between employers. It measures the degree of direct or indirect co-ordination between the different bargaining levels. *Direct* or *overt* co-ordination refers to the explicit pursuit of economy-wide co-ordination goals by the principal bargaining agents (i.e. the peak associations of business and labour, possibly joined by government agencies in tripartite arrangements). When co-ordination is achieved through the internal governance of the associations and/or through the pace-setting role of bargaining in key sectors, it may be termed *indirect* or *covert* co-ordination (OECD, 1994). The values used in OECD (1997) are based on Visser's (1990) classification of trade union co-ordination, on the index developed by Calmfors and Driffill (1988) and on information gathered by the OECD on employers' associations.

*Collective bargaining coverage rates.* This indicates the extent to which terms of employment are affected by collective negotiations. "It is important to differentiate between :

- the unadjusted coverage rate, defined as employees covered by a collective agreement as a proportion of all employees, and
- the adjusted coverage rate, defined as the ratio of employees actually covered to the potential number who could in principle be covered as determined by the formal provision of bargaining rights" (OECD, 1994).

The statistics included in the OECD (1997), relating to the years 1980 and 1990, are taken from the OECD (1994). They correspond to the adjusted rate because, according to the OECD (1994), "it better measures the diffusion of collective bargaining within its potential domain and because it shows the relative importance of collective bargaining compared with individual contracts as an alternative mode of employment and governance." The rates for 1994 are based on household and labour force surveys, where such surveys exist. Otherwise they were obtained by calculating the ratio of employees covered to the total number of employees. This information is drawn from the OECD publication *Labour force statistics*.

*Trade union density.* "Save a few exceptions (Portugal and Canada), the figures are established on a *net* basis, i.e. excluding self-employed, retired and unemployed workers who belong to a trade union." In most cases, therefore, they correspond to the proportion of unionised employees. The data for European countries are taken from the study by Visser (1996); the others come from OECD (1994) and from household and company surveys.

## Appendix 2 : Description of the Macroeconomic Variables

### *A. Dependent variables*

*Unit labour cost growth* (ULC) : compensation of employees total economy over volume GDP, local currency (cost of labour per produced unit). Average annual growth rates referring respectively to the period 1978-82, 1988-92 and 1992-96. This indicator has the advantage to put into balance labour cost and productivity growth. Source : OECD (1998), *Economic outlook*, OECD : Paris.

*Unemployment rate* : number of unemployed (standardised definition) as a percentage of active population. Average rates referring respectively to the period 1978-82, 1988-92 and 1992-96. Source : OECD (1998), *Labour force statistics,* OECD : Paris.

*Employment rate* : total employment as a percentage of population aged 16-64. Average rates referring respectively to the period 1978-82, 1988-92 and 1992-96. Source : OECD (1998), *Economic outlook*, OECD : Paris.

*Employment growth* : total employed population. Average annual growth rates referring respectively to the period 1978-82, 1988-92 and 1992-96. Source : OECD (1998), *Economic outlook*, OECD : Paris.

*Real GDP growth* : gross domestic product (expenditure), 1990 prices. Average annual growth rates referring respectively to the period 1978-82, 1988-92 and 1992-96. Source : OECD (1998), *National accounts – Volume 2*, OECD : Paris.

*Inflation rate :* GDP deflator, i.e. ratio gross domestic product (expenditure) at current prices to gross domestic product (expenditure) at 1990 prices. Average annual growth rates referring respectively to the period 1978-82, 1988-92 and 1992-96. Source : OECD (1998), *National accounts – Volume 1*, OECD : Paris.

### *B. Control variables*

*Change in inflation (% pts. p.a.)* : average annual change in GDP deflator respectively during the years 1978-82, 1988-92 and 1992-96. Source : OECD (1998), *National accounts – Volume 1*, OECD : Paris.

*Trade dependence (world market exposure)* : 100*[(sum of exports and imports of goods and services in current prices, national currencies)/2] / GDP in current prices, national currencies. Average level referring to the periods 1978-82, 1988-92 and 1992-96. Source : OECD (1998), *National accounts – Volume 1*, OECD : Paris.

*Note* : Data refer to West Germany for the period 1978-82 and 1988-92, and to Germany (East and West) for the period 1992-96.

## Appendix 3 : Description of the Social Variables

*D5/D1* : ratio of gross earnings (including all employer contributions for pensions, social security, etc.) of a worker at the median of the earnings distribution relative to the worker at the bottom decile of the earnings distribution. Relate only to full-time employees. Data refer to 1980, 1990 and 1994. Source : OECD (1996), *Employment outlook*, OECD : Paris.

*Incidence of low-paid employment* : low pay is defined as being less than two thirds of the median wage for all full-time employees. Data refer to 1994. Source : OECD (1996), *Employment outlook*, OECD : Paris.

*Social expenditure (public and private mandatory) as a % of GDP allocated to total population.* The numerator includes the following spending categories (based on the classification of Adema, 1999) : old-age cash benefits, disability cash benefits, occupational injury and diseases, sickness benefits, services to the elderly and disabled, family cash benefits, family services, unemployment compensation, active labour market programmes, public expenditure on health, housing benefits and other contingencies (including non-categorical social assistance benefits). Data refer to 1980, 1990 and 1994. Source : OECD (1999), *Social expenditure database 1980-1996*, OECD : Paris.

*Social expenditure (public and private mandatory) as a % of GDP allocated to population of working age.* As above, but excluding old-age benefits, services to elderly and disabled and public expenditure on health. Source : OECD (1999), *Social expenditure database 1980-1996*, OECD : Paris.

*Social expenditure (public and private mandatory) as a % of GDP allocated to the elderly.* The numerator includes : old-age cash benefits, survivors and services on the elderly and disabled. Source : OECD (1999), *Social expenditure database 1980-1996*, OECD : Paris.

*Poverty rate among total population, working-age population and population over 65, threshold: 50% of the median equivalent income* (i.e. disposable household income divided by the square root of the household size). Source : Smeeding T. (1997), "Financial poverty in developed countries : the evidence from LIS", Maxwell School of Citizenship and Public Affairs, Syracuse University, Working Paper 155.

*Poverty rate among total population, working-age population and population over 65, threshold: 50% of the mean equivalent income*. The equivalence factors used to calculate equivalent income are as follows : 1.0 for the first adult, 0.5 for each additional adult and 0.3 for every child. Source: Van den Bosch K. and Marx I. (1996), "Trends in financial poverty in the OECD countries", Centre for Social Policy, University of Antwerp, Working Paper.

*Poverty rate among employed and non-employed working age population, threshold: 50% of the mean equivalent income*. The equivalence factors used to calculate equivalent income are as follows : 1.0 for the first adult, 0.5 for each additional adult and 0.3 for every child. Source : Marx I. and Verbist G. (1998), "Low-paid work and poverty : a cross-country perspective", in Bazen S., Gregory M. and Salverda W. (eds) *Low-wage employment in Europe*, Edward Elgar, Cheltenham.

*Poverty rate among the low-paid workers, threshold: 50% of the mean equivalent income*. The equivalence factors used to calculate equivalent income are as follows : 1.0 for the first adult, 0.5 for each additional adult and 0.3 for every child. Source : Marx I. and Verbist G. (1998), "Low-paid work and poverty : a cross-country perspective", in Bazen S., Gregory M. and Salverda W. (eds) *Low-wage employment in Europe*, Edward Elgar, Cheltenham.

# Appendix 4 : Collective Bargaining and Economic Performance

## *A. Results for 1978-82 (19 OECD countries)*

Parabolic relationship (first increasing and than decreasing classification)

| | Unemployment rate | Employment rate | Employment growth | Inflation rate | ULC growth | Real GDP growth |
|---|---|---|---|---|---|---|
| Bargaining level | -0.19 | -0.018 | -0.42 | 0.11 | 0.04 | -0.30 |
| Co-ordination | 0.35 | -0.41 | -0.34 | 0.27 | 0.10 | -0.14 |
| Coverage rate | 0.24 | -0.29 | **-0.46*** | **0.57*** | 0.42 | 0.22 |
| Union density | -0.08 | -0.21 | 0.07 | -0.04 | 0.00 | 0.10 |

*Notes* : Spearman's correlations (two-tailed), * $p < 0.05$, ** $p < 0.01$.
ULC stands for unit labour costs.

Main results of the Kruskall-Wallis test

| | KW-test | Employment rate | Employment growth | Inflation rate |
|---|---|---|---|---|
| Co-ordination [a] | C1-C2 | ns | ns | ns |
| | C2-C3 | **3.9%** | ns | ns |
| | C1-C3 | **4.5%** | ns | ns |
| Coverage rate [b] | C1-C2 | ns | **0.8%** | **2.3%** |
| | C2-C3 | ns | ns | ns |
| | C1-C3 | ns | **1.7%** | **8.9%** |

*Notes* : The percentages corresponds to the p-values.
"ns" means that the median values are not significantly different at the level of 5 per cent.
C1 : "decentralised" countries; C2 : "intermediate" countries; and C3 : "centralised" countries.
[a] C1 ∈ [1; 1.5], C2 ∈ [1.75; 2.25] and C3 ∈ [2.5; 3].
[b] C1 ∈ [0%; 59%], C2 ∈ [60%; 79%] and C3 ∈ [80%; 100%].

## *B. Results for 1988-92 (19 OECD countries)*

Parabolic relationship (first increasing and than decreasing classification)

| | Unemployment rate | Employment rate | Employment growth | Inflation rate | ULC growth | Real GDP growth |
|---|---|---|---|---|---|---|
| Bargaining level | 0.10 | -0.18 | 0.20 | -0.14 | 0.06 | 0.24 |
| Co-ordination | 0.18 | -0.24 | 0.08 | 0.19 | 0.23 | 0.13 |
| Coverage rate | 0.19 | -0.20 | -0.05 | 0.38 | 0.24 | 0.01 |
| Union density | 0.18 | -0.27 | 0.14 | 0.17 | 0.19 | 0.11 |

*Notes* : Spearman's correlations (two-tailed), * $p < 0.05$, ** $p < 0.01$.
ULC stands for unit labour costs.

Main results of the Kruskall-Wallis test

| | KW-test | Unemployment rate | Employment growth | Real GDP growth | ULC growth |
|---|---|---|---|---|---|
| Co-ordination [a] | C1-C2 | ns | ns | ns | ns |
| | C2-C3 | ns | ns | ns | ns |
| | C1-C3 | **4.7%** | ns | **5%** | ns |
| Union density [b] | C1-C2 | ns | **3.8%** | **2.3%** | ns |
| | C2-C3 | ns | **6.7%** | ns | ns |
| | C1-C3 | ns | **1%** | **8.9%** | ns |

*Notes* : The percentages corresponds to the p-values.
"ns" means that the median values are not significantly different at the level of 5 per cent.
C1 : "decentralised" countries; C2 : "intermediate" countries; and C3 : "centralised" countries.
[a] C1 ∈ [1; 1.5], C2 ∈ [1.75; 2.25] and C3 ∈ [2.5; 3].
[b] C1 ∈ [0%; 29%], C2 ∈ [30%; 49%] and C3 ∈ [50%; 100%].

## *C. Results for 1992-96 (19 OECD countries)*

Parabolic relationship (first increasing and than decreasing classification)

| | Unemployment rate | Employment rate | Employment growth | Inflation rate | ULC growth | Real GDP growth |
|---|---|---|---|---|---|---|
| Bargaining level | 0.13 | -0.29 | **-0.66**** | 0.39 | 0.36 | **-0.57*** |
| Co-ordination | 0.30 | -0.37 | **-0.47*** | 0.14 | 0.17 | -0.42 |
| Coverage rate | 0.16 | -0.12 | -0.07 | 0.22 | 0.10 | 0.06 |
| Union density | -0.10 | -0.05 | 0.25 | 0.22 | 0.16 | 0.22 |

*Notes* : Spearman's correlations (two-tailed), * $p < 0.05$, ** $p < 0.01$.
ULC stands for unit labour costs.

Main results of the Kruskall-Wallis test

| | KW-test | Employment rate | Employment growth | Real GDP growth |
|---|---|---|---|---|
| Bargaining level [a] | C1-C2 | ns | **3.4%** | **4.7%** |
| Co-ordination [b] | C1-C2 | ns | **0.6%** | **1.3%** |
| | C2-C3 | ns | ns | ns |
| | C1-C3 | ns | **3.6%** | ns |
| Coverage rate [c] | C1-C2 | ns | ns | ns |
| | C2-C3 | ns | ns | ns |
| | C1-C3 | **3.9%** | ns | ns |

*Notes* : The percentages corresponds to the p-values.
"ns" means that the median values are not significantly different at the level of 5 per cent.
C1 : "decentralised" countries; C2 : "intermediate" countries; and C3 : "centralised" countries.
[a] Unlike in the previous periods, here we were unable to divide the 19 countries into three categories because there has been a substantial process of decentralisation of the formal bargaining level. As a consequence the K-W test has been applied to two groups of countries, i.e. decentralised systems (C1 $\in$ [1; 1.5]) and centralised systems (C2 $\in$ [2; 2+]).
[b] C1 $\in$ [1; 1.5], C2 $\in$ [1.75; 2.25] and C3 $\in$ [2.5; 3].
[c] C1 $\in$ [0%; 59%], C2 $\in$ [60%; 79%] and C3 $\in$ [80%; 100%].

## Appendix 5 : Pooled Data Regressions

## 1978-82, 1988-92 and 1992-96 – 19 OECD Countries

| | ULC growth (%) | | | Unemployment rate (%) | | | Employment rate (%) | | | Employment growth (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bargaining level (1–3) | **3.328**** | | | **2.970**** | | | **-4.556**** | | | **-1.027**** | | |
| | (0.000) | | | (0.000) | | | (0.000) | | | (0.000) | | |
| Degree of co-ordination (1–3) | **-2.138**** | **-1.473**** | | **-2.599**** | **-2.884**** | | 1.203 | **2.980**** | | 0.028 | -0.098 | |
| | (0.000) | (0.004) | | (0.000) | (0.000) | | (0.074) | (0.007) | | (0.795) | (0.351) | |
| Highly centralised and co-ordinated countries (dummy) [a] | | | **-2.909**** | | | **-2.995**** | | | **8.230**** | | | -0.180 |
| | | | (0.003) | | | (0.000) | | | (0.001) | | | (0.513) |
| Intermediate countries (dummy) [b] | | | -1.326 | | | 0.224 | | | **4.209*** | | | **-0.616*** |
| | | | (0.106) | | | (0.822) | | | (0.050) | | | (0.012) |
| Bargaining coverage (%) | | **0.044**** | **0.049**** | | **0.064**** | **0.037**** | | **-0.162**** | **-0.210**** | | **-0.021**** | **-0.016**** |
| | | (0.004) | (0.005) | | (0.000) | (0.022) | | (0.000) | (0.000) | | (0.000) | (0.002) |
| Trade union density (%) | -0.006 | 0.001 | 0.003 | -0.028 | -0.019 | 0.003 | **0.238**** | **0.216**** | **0.209**** | -0.007 | -0.006 | -0.010* |
| | (0.572) | (0.932) | (0.844) | (0.116) | (0.252) | (0.882) | (0.000) | (0.000) | (0.000) | (0.231) | (0.277) | (0.042) |
| Change in inflation (% pts. p.a.) [c] | -0.225 | -0.608 | -0.770 | -0.074 | -0.238 | -0.415 | 0.517 | -0.369 | -0.359 | **0.993**** | **1.030**** | **1.099**** |
| | (0.553) | (0.150) | (0.073) | (0.792) | (0.511) | (0.263) | (0.473) | (0.659) | (0.695) | (0.000) | (0.000) | (0.000) |
| Trade dependence (%) [d] | **-0.096**** | **-0.073**** | **-0.087**** | **-0.048*** | -0.045 | **-0.089*** | **-0.253**** | **-0.183**** | **-0.190**** | 0.010 | 0.009 | 0.0135 |
| | (0.000) | (0.007) | (0.006) | (0.016) | (0.065) | (0.007) | (0.000) | (0.001) | (0.003) | (0.254) | (0.244) | (0.097) |
| Dummy for 1990 | -4.640** | -4.352** | -4.511** | 1.410** | 1.319* | 1.587** | 2.129* | 1.705 | 2.085 | -0.159 | -0.155 | 0.047 |
| | (0.000) | (0.000) | (0.000) | (0.005) | (0.011) | (0.010) | (0.039) | (0.053) | (0.074) | (0.353) | (0.355) | (0.791) |
| Dummy for 1994 | -7.450** | -7.446** | -7.819** | 3.303** | 2.686** | 2.847** | 0.923 | 0.411 | 0.388 | -0.347 | -0.361* | -0.109 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.372) | (0.644) | (0.741) | (0.055) | (0.041) | (0.551) |
| Constant | 10.218** | 10.677** | 9.340** | 7.705** | 8.808** | 6.231** | 68.589** | 67.310** | 72.683** | 2.666** | 2.475** | 2.103** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| N (countries, time) | 57 (19, 3) | 57 (19, 3) | 54 (18, 3) | 57 (19,3) | 57 (19, 3) | 54 (18, 3) | 57 (19, 3) | 57 (19, 3) | 54 (18, 3) | 57 (19, 3) | 57 (19, 3) | 54 (18, 3) |
| $R^2$ adjusted | 0.598 | 0.570 | 0.607 | 0.225 | 0.300 | 0.168 | 0.147 | 0.375 | 0.356 | 0.461 | 0.517 | 0.511 |
| F-test | 74.711** | 30.671** | 32.830** | 172.418** | 49.747** | 32.062** | 1193.441** | 2003.913** | 708.41** | 29.525** | 36.936** | 30.811** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |

*Notes :* The p-values are indicated between brackets. Regressions are estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance.

* $p < 0.05$, ** $p < 0.01$.

[a] Highly centralised and co-ordinated countries : sum of the index of centralisation and co-ordination ≥ 4.5.

[b] Intermediate countries : sum of the index of centralisation and co-ordination ∈ [4 ; 4.5).

Japan, being highly decentralised and highly co-ordinated, was not been taken into account for the third type of regression.

[c] Change in inflation (% pts. p.a.) : average annual change in GDP deflator respectively during 1978-82, 1988-92 and 1992-96.

[d] Trade dependence (world market exposure) : 100*[(sum of exports and imports of goods and services)/2] / GDP, current prices, national currencies, averages referring to the periods 1978-82, 1988-92 and 1992-96.

## Appendix 6 : Pooled Data Regressions

(1978-82, 1988-92 and 1992-96 – 19 OECD Countries)

| | Inflation rate(%) | | | Real GDP growth (%) | | |
|---|---|---|---|---|---|---|
| Bargaining level (1–3) | **3.632**** | | | -0.356 | | |
| | (0.000) | | | (0.318) | | |
| Degree of co-ordination (1–3) | **-2.201**** | **-1.595**** | | 0.254 | 0.206 | |
| | (0.000) | (0.002) | | (0.297) | (0.392) | |
| Highly centralised and co-ordinated countries (dummy) [a] | | | **-2.869**** | | | -0.548 |
| | | | (0.002) | | | (0.154) |
| Intermediate countries (dummy) [b] | | | **-2.095**** | | | -0.611 |
| | | | (0.008) | | | (0.079) |
| Bargaining coverage (%) | | **0.048**** | **0.046**** | | -0.004 | 0.012 |
| | | (0.002) | (0.006) | | (0.564) | (0.085) |
| Trade union density (%) | -0.008 | 0.005 | 0.004 | -0.005 | -0.006 | -0.006 |
| | (0.462) | (0.690) | (0.779) | (0.405) | (0.293) | (0.290) |
| Change in inflation (% pts. p.a.) [c] | -0.470 | -0.776 | **-0.987*** | **0.718**** | **0.784**** | **0.855**** |
| | (0.186) | (0.062) | (0.020) | (0.000) | (0.000) | (0.000) |
| Trade dependence [d] | **-0.082**** | -0.060 | -0.049 | 0.001 | 0.000 | 0.000 |
| | (0.001) | (0.029) | (0.099) | (0.886) | (0.976) | (0.991) |
| Dummy for 1990 | -5.587** | -5.282** | -5.251** | 0.306 | 0.334 | 0.376 |
| | (0.000) | (0.000) | (0.000) | (0.236) | (0.182) | (0.140) |
| Dummy for 1994 | -7.120** | -7.275** | -7.452** | 0.008 | 0.132 | 0.469 |
| | (0.000) | (0.000) | (0.000) | (0.976) | (0.602) | (0.078) |
| Constant | 9.775** | 10.639** | 8.950** | 2.369** | 2.142** | 1.673** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| N (countries, time) | 57 (19, 3) | 57 (19, 3) | 54 (18, 3) | 57 (19, 3) | 57 (19, 3) | 54 (18, 3) |
| $R^2$ adjusted | 0.607 | 0.594 | 0.609 | 0.107 | 0.083 | 0.126 |
| F-test | 85.133** | 38.723** | 52.170** | 7.242** | 8.630** | 6.058** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |

*Notes :* The p-values are indicated between brackets. Regressions are estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance. * $p < 0.05$, ** $p < 0.01$.

[a] Highly centralised and co-ordinated countries : sum of the index of centralisation and co-ordination ≥ 4.5.

[b] Intermediate countries : sum of the index of centralisation and co-ordination ∈ [4 ; 4.5).

Japan, being highly decentralised and highly co-ordinated, was not been taken into account for the third type of regression.

[c] Change in inflation (% pts. p.a.) : average annual change in GDP deflator respectively during 1978-82, 1988-92 and 1992-96.

[d] Trade dependence (world market exposure) : 100*[(sum of exports and imports of goods and services)/2] / GDP, current prices, national currencies, averages referring to the periods 1978-82, 1988-92 and 1992-96.

## Appendix 7 : Collective Bargaining and Poverty Levels

(12 to 14 OECD countries)

### *A. Before net social security transfers*

| | Bargaining level (1-3) | | | Degree of co-ordination (1-3) | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| *Poverty rate among :* | | | | | | |
| Entire population (1) | / | -0.04 | -0.30 | / | -0.22 | -0.53 |
| Entire population(2) | -0.11 | -0.40 | -0.17 | -0.29 | -0.28 | -0.17 |
| Working age population (3) | / | -0.10 | -0.19 | / | -0.36 | -0.48 |
| Working age population(4) | 0.05 | -0.44 | -0.25 | -0.09 | -0.50 | -0.37 |
| Population over 65 (5) | 0.22 | 0.67 | 0.33 | 0.20 | 0.56 | 0.13 |

| | Coverage rate (%) | | | Trade union density (%) | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| *Poverty rate among :* | | | | | | |
| Entire population (1) | / | -0.40 | -0.42 | / | 0.13 | 0.08 |
| Entire population(2) | -0.13 | -0.09 | 0.00 | -0.39 | -0.42 | -0.46 |
| Working age population (3) | / | -0.08 | -0.08 | / | -0.26 | -0.26 |
| Working age population(4) | 0.13 | -0.18 | -0.09 | -0.25 | -0.31 | -0.30 |
| Population over 65 (5) | 0.00 | 0.16 | 0.21 | 0.19 | -0.06 | -0.12 |

*Notes* : Spearman's correlations (two-tailed), * $p < 0.05$, ** $p < 0.01$. "/" : data not available.
(1) Poverty rate corresponds to 50 per cent of median equivalent income, 14 countries.
(2) Poverty rate corresponds to 50 per cent of average equivalent income, 12 countries.
(3) Poverty rate among population aged 18-64, 50 per cent of median equivalent income, 14 countries.
(4) Poverty rate among population aged 16-64, 50 per cent of average equivalent income, 12 countries.
(5) Poverty rate corresponds to 50 per cent of average equivalent income, 12 countries.

## *B. After net social security transfers*

| | Bargaining level (1-3) | | | Degree of co-ordination (1-3) | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| *Poverty rate among :* | | | | | | |
| Entire population (1) | -0.52 | **-0.60*** | **-0.88**** | -0.51 | -0.22 | -0.48 |
| Entire population(2) | **-0.68*** | -0.38 | **-0.69**** | **-0.74**** | **-0.56*** | **-0.64*** |
| Working age population (3) | -0.49 | **-0.60*** | **-0.93**** | **-0.56*** | -0.52 | **-0.77**** |
| Working age population (4) | **-0.65*** | -0.49 | **-0.72**** | **-0.63*** | **-0.64*** | **-0.65*** |
| Working age population - employed (5) | / | -0.53 | **-0.68**** | / | -0.44 | -0.39 |
| Working age population - not employed (6) | / | **-0.66*** | **-0.89**** | / | -0.58 | **-0.79**** |
| Low-wage workers (7) | / | **-0.82**** | **-0.80**** | / | **-0.84**** | **-0.79*** |
| Population over 65 (8) | -0.34 | 0.13 | -0.23 | -0.34 | 0.09 | -0.17 |

| | Coverage rate (%) | | | Trade union density (%) | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| *Poverty rate among :* | | | | | | |
| Entire population (1) | -0.51 | **-0.67*** | **-0.68**** | -0.35 | -0.50 | **-0.59*** |
| Entire population(2) | -0.55 | -0.26 | -0.37 | **-0.75**** | **-0.64*** | **-0.65*** |
| Working age population (3) | -0.54 | **-0.58*** | **-0.59*** | -0.45 | -0.44 | -0.49 |
| Working age population (4) | -0.47 | -0.34 | -0.45 | **-0.84**** | **-0.64*** | **-0.61*** |
| Working age population - employed (5) | / | -0.40 | -0.44 | / | -0.32 | -0.28 |
| Working age population - not employed (6) | / | -0.57 | -0.54 | / | -0.48 | -0.53 |
| Low-wage workers (7) | / | **-0.93**** | **-0.90**** | / | **-0.78*** | **-0.70*** |
| Population over 65 (8) | -0.37 | 0.09 | -0.03 | -0.31 | 0.01 | -0.10 |

*Notes* : Spearman's correlations (two-tailed), * $p < 0.05$, ** $p < 0.01$. "/" : data not available.
(1) Poverty rate corresponds to 50 per cent of median equivalent income, 14 countries.
(2) Poverty rate corresponds to 50 per cent of average equivalent income, 12 countries.
(3) Poverty rate among population aged 18-64, 50 per cent of median equivalent income, 14 countries.
(4) Poverty rate among population aged 16-64, 50 per cent of average equivalent income, 12 countries.
(5) Poverty rate among working age population in employment, i.e. population aged 16-64 with non zero annual wage income (free lance workers excluded), 50 per cent of average equivalent income, 14 countries.
(6) Poverty rate among working age population not employment, i.e. population aged 16-64 with zero annual wage income (free lance workers excluded), 50 per cent of average equivalent income, 14 countries.
(7) Poverty rate among low-paid (full-time, full-year) workers, 50 per cent of average equivalent income, 9 countries.
(8) Poverty rate corresponds to 50 per cent of average equivalent income, 12 countries.

## Appendix 8 : Collective Bargaining and Social Expenditure

(19 OECD countries)

| | Bargaining level (1-3) | | | Degree of co-ordination (1-3) | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| *Social expenditures as a % of GDP* [a] *:* | | | | | | |
| Total population | **0.64**** | **0.46*** | **0.70**** | 0.35 | 0.22 | 0.34 |
| Working age population | **0.60**** | 0.43 | **0.57*** | 0.27 | 0.16 | 0.15 |
| Population over 65 | 0.43 | 0.34 | **0.75**** | 0.31 | 0.19 | **0.57*** |

| | Coverage rate (%) | | | Trade union density (%) | | |
|---|---|---|---|---|---|---|
| | 1980 | 1990 | 1994 | 1980 | 1990 | 1994 |
| *Social expenditures as a % of GDP* [a] *:* | | | | | | |
| Total population | **0.56*** | **0.52*** | **0.65**** | 0.34 | **0.50*** | **0.51*** |
| Working age population | 0.44 | 0.36 | **0.50*** | 0.35 | **0.56*** | **0.52*** |
| Population over 65 | **0.59*** | **0.66**** | **0.77**** | 0.08 | 0.20 | 0.32 |

*Notes* : Spearman's correlations (two-tailed), * $p < 0.05$, ** $p < 0.01$.
[a] For a description of the data see Appendix 3.

## Appendix 9 : Social Expenditure and Poverty Level

(12 to 14 OECD countries)

| 1980 | *Social expenditures as a % of GDP* [a] *:* | | |
|---|---|---|---|
| | Total population | Working age population | Population over 65 |
| *Poverty rate among :* | | | |
| Entire population (1) | **-0.70**** | | |
| Entire population(2) | **-0.63*** | | |
| Working age population (3) | | **-0.60*** | |
| Working age population (4) | | -0.38 | |
| Population over 65(5) | | | -0.38 |

| 1990 | *Social expenditures as a % of GDP* [a] *:* | | |
|---|---|---|---|
| | Total population | Working age population | Population over 65 |
| *Poverty rate among :* | | | |
| Entire population (1) | **-0.69*** | | |
| Entire population(2) | **-0.80**** | | |
| Working age population (3) | | **-0.59*** | |
| Working age population (4) | | **-0.79**** | |
| Population over 65(5) | | | -0.58 |

| 1994 | *Social expenditures as a % of GDP* [a] *:* | | |
|---|---|---|---|
| | Total population | Working age population | Population over 65 |
| *Poverty rate among :* | | | |
| Entire population (1) | **-0.70*** | | |
| Entire population(2) | **-0.78**** | | |
| Working age population (3) | | **-0.57*** | |
| Working age population (4) | | **-0.77**** | |
| Population over 65(5) | | | -0.56 |

*Notes* : Spearman's correlations (two-tailed), * $p < 0.05$, ** $p < 0.01$.
(1) Poverty rate corresponds to 50 per cent of median equivalent income, 14 countries.
(2) Poverty rate corresponds to 50 per cent of average equivalent income, 12 countries.
(3) Poverty rate among population aged 18-64, 50 per cent of median equivalent income, 14 countries.
(4) Poverty rate among population aged 16-64, after transfers and taxes, 50 per cent of average equivalent income, 12 countries.
(5) Poverty rate corresponds to 50 per cent of average equivalent income, 12 countries.
[a] For a description of the data see Appendix 3.

# Appendix 10 : Collective Bargaining and Poverty Levels

## *A. Before net social security transfers*

**Pooled Data Regressions – 1980, 1990 and 1994**

| | *Poverty rate among :* | | | |
|---|---|---|---|---|
| | Total population (%) | | Working age population (%) | |
| Bargaining level (1–3) | 7.73** | | 7.21** | |
| | (0.00) | | (0.00) | |
| Degree of co-ordination (1–3) | -3.11 | -2.46 | -4.69** | -5.44** |
| | (0.06) | (0.17) | (0.00) | (0.00) |
| Bargaining coverage (%) | | 0.11* | | 0.14** |
| | | (0.02) | | (0.00) |
| Trade union density (%) | -0.15** | -0.13** | -0.10* | -0.08 |
| | (0.00) | (0.00) | (0.01) | (0.05) |
| Dummy for 1990 | 4.40** | 4.47* | 3.31* | 3.02 |
| | (0.00) | (0.01) | (0.03) | (0.05) |
| Dummy for 1994 | 4.60** | 4.23* | 3.43* | 2.63 |
| | (0.00) | (0.01) | (0.02) | (0.08) |
| Intercept | 25.41** | 29.37** | 19.61** | 23.22** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| N (countries, time) | 33 (11, 3) | 33 (11, 3) | 33 (11, 3) | 33 (11, 3) |
| $R^2$ adjusted | **0.10** | **0.00** | **0.05** | **0.00** |
| F-test | 195.39** | 73.71** | 43.56** | 32.70** |
| | (0.00) | (0.00) | (0.00) | (0.00) |

*Notes* : Poverty rate corresponds to 50 per cent of ***mean*** equivalent income. * $p < 0.05$, ** $p < 0.01$. Regressions, estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance, refer to 11 countries (Australia, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, UK, USA)

**Pooled Data Regressions – 1980, 1990 and 1994**

| | *Poverty rate among :* | | | |
|---|---|---|---|---|
| | Entire population (%) | | Working age population (%) | |
| Bargaining level (1–3) | 0.45 | | 6.48** | |
| | (0.81) | | (0.00) | |
| Degree of co-ordination (1–3) | -3.06* | -0.80 | -6.07** | -3.88 |
| | (0.03) | (0.07) | (0.00) | (0.00) |
| Bargaining coverage (%) | | -0.05** | | 0.04** |
| | | (0.00) | | (0.11) |
| Trade union density (%) | 0.06* | 0.05** | -0.05* | -0.02 |
| | (0.02) | (0.00) | (0.01) | (0.46) |
| Dummy for 1994 | -0.25 | 0.00 | 0.07 | -0.550 |
| | (0.76) | (0.93) | (0.82) | (0.35) |
| Intercept | 27.00** | 27.65** | 19.40** | 22.96** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| N (countries, time) | 28 (14, 2) | 28 (14, 2) | 28 (14, 2) | 28 (14, 2) |
| $R^2$ adjusted | **0.00** | **0.00** | **0.10** | **0.02** |
| F-test | 168.86** | 372168.2** | 1913.83** | 686.77** |
| | (0.00) | (0.00) | (0.00) | (0.00) |

*Notes* : Poverty rate corresponds to 50 per cent of ***median*** equivalent income.* $p < 0.05$, ** $p < 0.01$. Regressions, estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance, refer to 14 countries (Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, UK, USA).

## *B. After net social security transfers*

**Pooled Data Regressions – 1980, 1990 and 1994**

| | *Poverty rate among :* | | | |
|---|---|---|---|---|
| | Entire population (%) | | Working age population (%) | |
| Bargaining level (1–3) | -0.42 | | 0.60 | |
| | (0.62) | | (0.38) | |
| Degree of co-ordination (1–3) | **-3.47**** | **-1.99**** | **-3.33**** | **-2.50**** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Bargaining coverage (%) | | **-0.08**** | | **-0.03*** |
| | | (0.00) | | (0.03) |
| Trade union density (%) | **-0.13**** | **-0.12**** | **-0.10**** | **-0.09**** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Dummy for 1990 | 1.07 | 1.71** | 0.82 | 0.78 |
| | (0.07) | (0.00) | (0.07) | (0.09) |
| Dummy for 1994 | 0.15* | 1.85** | 1.13* | 1.05* |
| | (0.01) | (0.00) | (0.02) | (0.02) |
| Intercept | 24.27** | 25.71** | 19.18** | 20.51** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| N (countries, time) | 40 (12/14, 3) | 40 (12/14, 3) | 40 (12/14, 3) | 40 (12/14, 3) |
| $R^2$ adjusted | **0.53** | **0.54** | **0.52** | **0.53** |
| F-test | 278.20** | 867.8** | 199.16** | 161.91** |
| | (0.00) | (0.00) | (0.00) | (0.00) |

*Notes* : Poverty rate corresponds to 50 per cent of ***mean*** equivalent income.
The p-values are indicated between brackets. * $p < 0.05$, ** $p < 0.01$.
Regressions, estimated by ordinary least squares with White heteroskedasticity-consistent standard errors and covariance, refer respectively to 12 countries in 1980 (Australia, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, UK, USA) and 14 countries in 1990 and 1994 (12 previous countries + Portugal and Spain).

# Appendix 11 : Principal Component Analysis

## *A. Results for 1980 (13 OECD countries)*

| N° | Eigenvalues | Percentage of total variance |
|---|---|---|
| 1 | 5.49 | 45.7 |
| 2 | 2.19 | 18.2 |
| 3 | 1.37 | 11.4 |
| 4 | 1.07 | 8.9 |
| 5 | 0.77 | 6.4 |
| 6 | 0.38 | 3.2 |
| 7 | 0.28 | 2.3 |
| 8 | 0.19 | 1.6 |
| 9 | 0.14 | 1.2 |
| 10 | 0.12 | 1.0 |
| 11 | 0.02 | 0.2 |
| 12 | 0.00 | 0.0 |

| Eigenvectors | | Variables associated to the weighting coefficients |
|---|---|---|
| V1 | V2 | |
| -0.39 | -0.06 | Bargaining level |
| -0.37 | -0.09 | Degree of co-ordination among social partners |
| -0.34 | 0.03 | Coverage rate |
| -0.28 | -0.27 | Trade union density |
| -0.05 | -0.47 | Real GDP growth (1978-82) |
| 0.19 | -0.48 | Employment growth (1978-82) |
| -0.13 | -0.48 | Employment rate (1978-82) |
| 0.22 | 0.28 | Unemployment rate (1978-82) |
| 0.15 | -0.18 | Growth of unit labour costs (1978-82) |
| 0.39 | 0 | Ratio of the fifth to the first decile of the earnings distribution |
| -0.31 | 0.32 | Social expenditures as a % of GDP |
| 0.36 | -0.13 | Poverty rate among the entire population |

| Country | Principal components | | Quality criterion : |
|---|---|---|---|
| | C1 | C2 | $\cos^2(\theta)$ |
| Australia | 0.16 | -0.36 | 0.37 |
| Belgium | -0.41 | 0.63 | 0.68 |
| Canada | 1.28 | -0.26 | 0.90 |
| Denmark | -0.31 | -0.01 | 0.16 |
| Finland | -0.47 | -0.60 | 0.69 |
| France | 0.11 | 0.27 | 0.24 |
| W-Germany | -0.45 | 0.20 | 0.37 |
| Italy | 0.39 | -0.04 | 0.18 |
| Netherlands | -0.21 | 0.78 | 0.82 |
| Norway | -0.48 | -0.55 | 0.68 |
| Sweden | -1.04 | -0.32 | 0.79 |
| UK | 0.16 | 0.31 | 0.22 |
| USA | 1.26 | -0.04 | 0.86 |

## *B. Results for 1990 (14 OECD countries)*

| N° | Eigenvalues | Percentage of total variance |
|---|---|---|
| 1 | 5.04 | 42.0 |
| 2 | 2.86 | 23.9 |
| 3 | 2.12 | 17.7 |
| 4 | 0.66 | 5.5 |
| 5 | 0.43 | 3.6 |
| 6 | 0.32 | 2.7 |
| 7 | 0.22 | 1.8 |
| 8 | 0.16 | 1.3 |
| 9 | 0.11 | 1.0 |
| 10 | 0.04 | 0.3 |
| 11 | 0.02 | 0.2 |
| 12 | 0.01 | 0.0 |

| Eigenvectors | | Variables associated to the weighting coefficients |
|---|---|---|
| V1 | V2 | |
| -0.40 | 0.07 | Bargaining level |
| -0.21 | 0.34 | Degree of co-ordination among social partners |
| -0.38 | 0.13 | Coverage rate |
| -0.34 | -0.28 | Trade union density |
| 0.15 | 0.53 | Real GDP growth (1988-92) |
| 0.29 | 0.35 | Employment growth (1988-92) |
| -0.02 | -0.34 | Employment rate (1988-92) |
| 0.06 | -0.12 | Unemployment rate (1988-92) |
| -0.09 | -0.42 | Growth of unit labour costs (1988-92) |
| 0.38 | -0.16 | Ratio of the fifth to the first decile of the earnings distribution |
| -0.37 | 0.07 | Social expenditures as a % of GDP |
| 0.37 | -0.21 | Poverty rate among the entire population |

| Country | Principal components | | Quality criterion : |
|---|---|---|---|
| | C1 | C2 | $\cos^2(\theta)$ |
| Australia | 0.16 | -0.02 | 0.07 |
| Belgium | -0.36 | 0.42 | 0.66 |
| Canada | 0.86 | -0.52 | 0.80 |
| Denmark | -0.50 | -0.28 | 0.67 |
| Finland | -0.79 | -0.52 | 0.90 |
| France | -0.02 | 0.38 | 0.27 |
| W-Germany | -0.16 | 0.66 | 0.80 |
| Italy | -0.11 | -0.04 | 0.02 |
| Japan | 0.78 | 0.52 | 0.51 |
| Netherlands | 0.03 | 0.73 | 0.70 |
| Norway | -0.58 | 0.06 | 0.54 |
| Sweden | -0.87 | -0.45 | 0.72 |
| UK | 0.38 | -0.61 | 0.80 |
| USA | 1.18 | -0.33 | 0.93 |

## *C. Results for 1994 (14 OECD countries)*

| N° | Eigenvalues | Percentage of total variance |
|---|---|---|
| 1 | 5.87 | 48.9 |
| 2 | 1.98 | 16.5 |
| 3 | 1.55 | 12.9 |
| 4 | 1.17 | 9.7 |
| 5 | 0.66 | 5.5 |
| 6 | 0.32 | 2.7 |
| 7 | 0.20 | 1.7 |
| 8 | 0.11 | 0.9 |
| 9 | 0.09 | 0.7 |
| 10 | 0.04 | 0.3 |
| 11 | 0.02 | 0.2 |
| 12 | 0.00 | 0.0 |

| Eigenvectors | | Variables associated to the weighting coefficients |
|---|---|---|
| V1 | V2 | |
| -0.38 | 0.01 | Bargaining level |
| -0.23 | 0.12 | Degree of co-ordination among social partners |
| -0.37 | -0.12 | Coverage rate |
| -0.26 | 0.39 | Trade union density |
| 0.19 | 0.38 | Real GDP growth (1992-96) |
| 0.32 | 0.10 | Employment growth (1992-96) |
| 0.19 | 0.55 | Employment rate (1992-96) |
| -0.19 | -0.27 | Unemployment rate (1992-96) |
| 0.09 | -0.4 | Growth of unit labour costs (1992-96) |
| 0.32 | -0.29 | Ratio of the fifth to the first decile of the earnings distribution |
| -0.37 | 0.08 | Social expenditures as a % of GDP |
| 0.38 | -0.02 | Poverty rate among the entire population |

| Country | Principal components | | Quality criterion : |
|---|---|---|---|
| | C1 | C2 | $\cos^2(\theta)$ |
| Australia | 0.53 | 0.10 | 0.43 |
| Belgium | -0.54 | -0.32 | 0.77 |
| Canada | 0.82 | -0.05 | 0.56 |
| Denmark | -0.32 | 0.48 | 0.83 |
| Finland | -0.99 | 0.17 | 0.64 |
| France | -0.29 | -0.54 | 0.77 |
| Germany | -0.43 | -0.19 | 0.46 |
| Italy | -0.39 | -0.68 | 0.86 |
| Japan | 0.70 | 0.32 | 0.43 |
| Netherlands | -0.10 | -0.10 | 0.06 |
| Norway | -0.14 | 0.77 | 0.68 |
| Sweden | -0.73 | 0.31 | 0.65 |
| UK | 0.53 | -0.12 | 0.64 |
| USA | 1.34 | -0.15 | 0.94 |

## *D. Results for the three sub-periods taken together (1980, 1990, 1994)*

(14 OECD countries)

| N° | Eigenvalues | Percentage of total variance |
|---|---|---|
| 1 | 5.02 | 41.8 |
| 2 | 2.03 | 16.9 |
| 3 | 1.58 | 13.2 |
| 4 | 1.26 | 10.5 |
| 5 | 0.74 | 6.2 |
| 6 | 0.38 | 3.2 |
| 7 | 0.29 | 2.4 |
| 8 | 0.06 | 0.5 |
| 9 | 0.09 | 0.8 |
| 10 | 0.12 | 1.0 |
| 11 | 0.20 | 1.7 |
| 12 | 0.22 | 1.8 |

| Eigenvectors | | Variables associated to the weighting coefficients |
|---|---|---|
| V1 | V2 | |
| -0.40 | 0.10 | Bargaining level |
| -0.28 | 0.34 | Degree of co-ordination among social partners |
| -0.38 | -0.06 | Coverage rate |
| -0.29 | 0.12 | Trade union density |
| 0.11 | 0.34 | Real GDP growth |
| 0.29 | 0.30 | Employment growth |
| 0.05 | 0.41 | Employment rate |
| -0.02 | -0.62 | Unemployment rate |
| 0.04 | 0.17 | Growth of unit labour costs |
| 0.39 | -0.20 | Ratio of the fifth to the first decile of the earnings distribution |
| -0.37 | -0.19 | Social expenditures as a % of GDP |
| 0.39 | -0.02 | Poverty rate among the entire population |

*CHAPTER 3*

# INTER-INDUSTRY WAGE DIFFERENTIALS AND THE BARGAINING REGIME(S) IN A CORPORATIST COUNTRY : BELGIUM

**Abstract –** The current understanding of the structure of wages and more particularly inter-industry wage differentials in Belgium is very limited. Moreover, the results as to the influence of the bargaining regimes on inter-industry wage disparities and on wage levels in the countries of continental Europe are fragmentary. Using for the first time the 1995 *Structure of Earnings Survey* – a very rich worker-firm matched database relative to the Belgian private sector, we show that the wages of workers differ significantly by industry, even when controlling for worker's individual characteristics and working conditions. These differences derive partly from the features of the employers in each sector (firm size and wage bargaining regime). In an international perspective, our results support the hypothesis that a high degree of corporatism reduces the dispersion of inter-industry wage differentials. In a national perspective, we note that when wages are the subject of collective (re)negotiation within the individual establishment : (i) the dispersion of inter-interindustry wage differentials diminishes, (ii) workers earn 5.1% more than their opposite numbers whose wages are solely covered by national/sectoral collective agreements.

# 1. INTRODUCTION

The empirical debate about the causes of earnings inequalities was reopened at the end of the 1980s by an article by Krueger and Summers (1988). The authors highlighted the fact that the structure of wages in the USA was not compatible with the neo-classical model, according to which wage differentials in equilibrium are explained either through differences in the quality of the labour force – measured in terms of productive capacity – or by so-called compensating differences[1]. In other words, they showed that wage disparities persisted between agents with identical *observed* individual characteristics and working conditions, employed in different sectors. Since then, similar results have been obtained for numerous industrialised countries (Araï et al., 1996; Ferro-Luzzi, 1994; Hartog et al., 1997 Lucifora, 1993; Vainiomäki and Laaksonen, 1995). Accordingly, the existence of sectoral effects has become a stylised fact in the economic literature. There is, moreover, general agreement on the fact that these effects are persistent, strongly correlated between countries (Helwege, 1992) and on a variable scale among the industrialised countries.

Certain studies (Edin and Zetterberg, 1992; Hartog et al., 1997; Teulings and Hartog, 1998; Zweimüller and Barth, 1994) suggest in addition that the sectoral effects are significantly weaker in strongly corporatist countries. The concept of corporatism, borrowed from political science, resembles the level of centralisation of collective bargaining as well as the degree of co-ordination between the social partners. However, as this concept has not been defined in one single way, there are differences in opinion as to the relative position of the industrialised countries on the scale of corporatism[2]. The Scandinavian countries and Austria are nevertheless always in the category of strongly corporatist countries, whereas the USA and Canada are invariably at the bottom of the ranking.

Various reasons may explain these inter-industry wage differentials. They may, of course, reflect the fact that the non-observed individual characteristics of the employees are not

[1] According to the standard neo-classical model, where the equilibrium wage is determined through marginal labour productivity, two agents with identical productive characteristics necessarily receive the same wages. However, so-called compensating differences may occur between similar individuals placed in different working conditions. The disutility undergone by one individual following the performance of a task in an unfavourable situation may lead to wage compensation.

[2] For a comparison of these classifications, see sections 2 and 3 of chapter 2.

distributed randomly among industries. In this case, the most well paid sectors would simply be those in which the non-observed quality of the labour force is the highest. However, they may equally stem from the specific characteristics of the employers in each sector. Gibbons and Katz (1992) support the existence of significant sectoral effects on workers' wages. Their study, relating to the USA, in fact indicates that workers changing industry claw back a significant part of the inter-industry wage differential after their move. Conversely, Goux and Maurin (1999) and Abowd et al. (1999) show that in the case of France, the non-observed productive capacities of workers account for a substantial part of the inter-industry wage differentials. In sum, there is no consensus regarding the exact scale of the inter-industry wage differentials. However, their existence highlights the influence of the characteristics of the employers in each sector on workers' wages.

Economic theories supporting the existence of an effect of the employers' characteristics on wages have proliferated over recent years (e.g. efficiency wage theory, insider-outsider theory). They provide a very interesting framework for analysis for anyone trying to gain an understanding of why, in equilibrium, two agents with identical productive characteristics, placed in the same working conditions, may be paid differently. Among these, the rent-sharing theory suggests that because of their bargaining power, unions can obtain a wage differential for their members which is greater than the competitive level. According to this theory, inter-industry wage disparities would therefore result in part from the heterogeneity of the bargaining power of the unions in the various industries.

Empirical studies confirm the hypothesis that unions have a significant and positive influence on the level of wages. Indeed, the wage gap between establishments which are unionised, in other words which have a collective labour agreement, and non-unionised establishments amounts to some 15% in the USA (Booth, 1995; Pencavel, 1991) and over 20% in Canada (Robinson, 1989; Robinson and Tomes, 1984). The results for the European countries, although fragmentary and not having exactly the same meaning, also tend in the same direction. Andrews et al. (1998) report a union wage gap of between 8 and 12% in the UK, while Dell'Aringa and Lucifora (1994), for their part, suggest a wage gap of 4.4% in the case of unskilled workers and 7.5% for skilled workers in the metal-mechanical industry in Italy. Finally, in the case of Germany, Austria, Norway and the Netherlands, the wage gap lies at between 4 and 8% (Barth et al., 1994; Blanchflower and Freeman, 1992; Hartog et al., 1997). Results regarding the influence of the unions on the dispersion of wages are less numerous.

However, an increasing literature in the case of the Anglo-Saxon countries shows that the unions are significantly reducing inter-industry and inter-/intra-establishment wage disparities (Fortin and Lemieux, 1997; Freeman, 1980, 1982; Gosling and Machin, 1995; Hirsch, 1982; Metcalf, 1982; Stewart, 1991).

Our contribution seeks to extend this literature in the case of the Belgian private sector on the basis of the 1995 *Structure of Earnings Survey*. This database, which has never been used before, contains a wealth of information on both the characteristics of the establishments and those of the individuals working therein.

The major reasons why we have chosen to study the Belgian private sector are the following :

- The current understanding of the structure of wages and more particularly inter-industry wage differentials in Belgium is very limited. Such an analysis in fact requires a major worker-firm matched database which has not been available until now.
- The results as to the influence of the bargaining regimes on inter-industry wage disparities and on wage levels in the countries of continental Europe are fragmentary. In addition, they are non-existent in the case of Belgium.

This chapter is subdivided into two parts. First, we attempt to answer the following questions:

- Can we observe inter-industry wage differentials in Belgium ?
- What is their magnitude, and where do they come from ? Can they be explained exclusively by the sectoral heterogeneity of the workers and their working conditions, or do they also derive from the specific features of the employers in each sector ?
- Do they support the hypothesis that the dispersion of inter-industry wage differentials is significantly lower in corporatist countries and what does it imply ?

In the second part of our study, we assess the effect of the bargaining regime on the structure of wages *within* the Belgian private sector. Unlike in the USA or Canada, the distinction between unionised and non-unionised sectors has no meaning in Belgium. The point is that virtually all workers are covered by a collective labour agreement. The bargaining regime is therefore reflected more in terms of the level of wage negotiation. We distinguish primarily between two types of establishments : (i) those covered only by national and/or sectoral collective agreements, and (ii) those in which wages are (re)negotiated collectively in house. We then explore the following questions :

- Can we observe inter-industry wage differentials for every bargaining regime ?
- Are the sectors offering high/low wages similar in the case of workers covered by different bargaining regimes ?
- Is the dispersion in inter-industry wage differentials lower when wages are covered by a company collective agreement ?
- What is the wage gap between workers covered by different bargaining regimes and what is behind it ?

## 2. DESCRIPTION OF THE DATABASE

The present study is based upon the 1995 *Structure of Earnings Survey*, carried out by the Belgian National Statistical Institute. This survey was conducted using a representative sample of 145,107 individuals working for 6,015 establishments. It covers the Belgian establishments employing at least ten workers and whose economic activities fall within sections C to K of the Nace nomenclature[3]. This corresponds to approximately 1.5 million workers. The survey contains a wealth of information, provided by the management of the establishments, both on the characteristics of the latter (sector of activity, region, size of the establishment, level of wage bargaining, etc.) and on the individuals working there (gender, age, experience, seniority, education, wages, number of working hours paid, occupation, etc.). The simultaneous use of data relating to wages and levels of education nevertheless reduces the size of the sample to 81,562 units. After the exclusion of individuals for whom one of the variables used entailed a missing or incorrect observation, the number of individuals in the sample falls by approximately 2.1% to 79,835 units. Finally, the exclusive selection of establishments which are at least 50% owned by the private sector brings the definitive sample to 67,023 individuals. This selection is justified by the fact that the wages are determined in very different ways in the public and private sectors. Taking into account establishments where economic and financial control is primarily in public hands would in fact be liable to skew our results.

[3] The following sectors are therefore not part of the sample : (i) agriculture, hunting and forestry; (ii) fisheries, (iii) public administration, (iv) education, (v) health and social action, (vi) collective, social and personal services, (vii) domestic services, and (viii) extra-territorial bodies.

## 3. WAGE EQUATIONS

In the perfect competition model, where the equilibrium wage is determined by marginal labour productivity, two agents with identical productive characteristics, placed in similar working conditions, necessarily receive the same wages. This model assumes that in equilibrium : (i) the individual characteristics of the agents as well as their working conditions explain a substantial part of the variability in individual wages, and (ii) workers' wages are independent of the specific features of their employers.

Therefore, in order to test the validity of this model, we have chosen initially to estimate various versions of a Mincer wage equation (1974). Our objective lies primarily in studying the evolution of the adjusted determination coefficient as the number of explanatory variables increases. We also discuss the major lessons of these wage equations.

The general specification of the equation which we have estimated, in a semi-logarithmic form, is as follows :

$$\ln w_i = \alpha + \sum_{j=1}^{J} \beta_j X_{j,i} + \sum_{k=1}^{K} \psi_k Y_{k,i} + \sum_{l=1}^{L} \delta_l Z_{l,i} + \varepsilon_i \qquad (1)$$

where $w_i$ represents the gross hourly wage of the individual *i (i=1, ..., N)*; *X* is the vector of the individual characteristics of the workers and their working conditions (level of education, prior experience, seniority within the company, sex, number of hours paid, a dummy for extra paid hours, occupation, region where the establishment is located, type of contract, an indicator showing whether the individual is paid a bonus for shift work, night-time and/or weekend work and a dichotomic variable indicating whether the individual supervises other workers); *Y* comprises dummy variables relating to the sectoral affiliation of the individuals (nomenclature with 9, 43 and 174 branches); *Z* contains the characteristics of the employer (the size of the establishment and the level of wage bargaining); $\alpha$ is the constant; $\beta$, $\psi$ and $\delta$ are the parameters to be estimated and $\varepsilon_i$ is an error term. For more details regarding these variables, see Appendix 1. The various versions of this wage equation have been estimated by applying ordinary least squares to the weighted sample.

**Table 1 : Evolution of the Adjusted Determination Coefficient**

| Variables included in the wage equation : | | $R^2$ adjusted |
|---|---|---|
| *X* | Level of education; prior experience, its square and its cube; seniority and its square[1] | 0.464 |
| | Type of occupation; sex; region and supervision[2] | 0.634 |
| | Number of hours paid, type of contract, indicators for bonuses and overtime paid | 0.649 |
| *Y* | Indicators of the worker's sectoral affiliation (174 categories) | 0.703 |
| *Z* | Size of the establishment and level of wage bargaining | 0.713 |

[1] A dummy variable equal to 1 if the individual has no seniority is also included in the regression.
[2] Variable indicating whether the individual supervises the work of his co-workers.

As Table 1 shows, the human capital variables – in other words, 6 indicators showing degree level, prior experience and its square, seniority in the firm, its square and its cube, and a dummy variable equal to 1 if the individual has no seniority in the company – account for almost 47% of the total variance in individual wages. The inclusion of other individual characteristics – 22 indicators of the occupation of workers, 2 indicators of the region in which the establishment is located, a dummy variable relating to gender and a variable to indicate whether the individual supervises the work of his co-workers – pushes the adjusted determination coefficient beyond 63%. Finally, the introduction of the number of hours paid, of 3 indicators relating to the type of contract, a dichotomic variable indicating whether the individual has received a bonus for shift work, night work or weekend work and an indicator showing overtime paid, brings the explained variance in individual wages to almost 65%. This result seems to be at odds with the neo-classical model. The point is that a substantial part of the variability of individual wages remains unexplained in spite of the taking into account of vector *X*.

Naturally, this observation might result from the fact that :

- certain individual characteristics likely to influence the productivity of the workers do not appear in our database;
- the working conditions are not taken into account perfectly.

Nevertheless, serious doubts may be expressed as to the hypothesis that the wages result simply from productive characteristics and working conditions. Indeed, contrary to the predictions of the standard neo-classical model, we note (see Table 1) that the sectoral dummies (*Y*) and the characteristics of the firms (*Z*) substantially increase the explained variance in individual wages. To sum up, our results suggest, in line with the recent theories

of the labour market, that firm characteristics exercise a significant influence on workers' wages.

**Table 2 : Wage Equation**

| Explanatory variables[1] | Coefficients | t-stat | Wage[2] | Variation[3] |
|---|---|---|---|---|
| Constant (reference) | 5.524** | 1434.89 | 251 | 0.0 |
| *Education* | | | | |
| Primary or no degree (0-6 years) | Reference | | | |
| Lower secondary (9 years) | 0.053** | 70.09 | 265 | 5.4 |
| General upper secondary (12 years) | 0.140** | 159.21 | 289 | 15.0 |
| Technical/Artistic/Prof. upper secondary (12 years) | 0.128** | 156.76 | 285 | 13.7 |
| Higher non-university short type, higher artistic training (14 years) | 0.221** | 219.79 | 313 | 24.7 |
| University and non-university higher education, long type (16 years) | 0.383** | 324.12 | 368 | 46.7 |
| Post-graduate (17 years or more) | 0.510** | 176.45 | 418 | 66.5 |
| *Prior experience* | | | | |
| Simple | 0.016** | 118.87 | | |
| Squared/$10^2$ | -0.036** | -40.48 | | |
| Cubed/$10^4$ | 0.022** | 13.31 | | |
| *Seniority in the company* | | | | |
| Simple | 0.016** | 220.70 | | |
| Squared/$10^2$ | -0.017** | -71.06 | | |
| *Sex* | | | | |
| Male | Reference | | | |
| Female | -0.116** | -227.73 | 224 | -11.0 |
| *Supervises the work of his or her co-workers* | | | | |
| No | Reference | | | |
| Yes | 0.110** | 177.14 | 280 | 11.6 |
| *Hours* | | | | |
| Ln of the number of hours paid, including overtime paid | 0.000 | -0.65 | 251 | 0.0 |
| *Bonus for shift work, night work and/or weekend work* | | | | |
| No | Reference | | | |
| Yes | 0.057** | 87.39 | 266 | 5.9 |
| *Overtime paid* | | | | |
| No | Reference | | | |
| Yes | 0.024** | 30.61 | 257 | 2.4 |
| *Contract* | | | | |
| Unlimited-term employment contract | Reference | | | |
| Limited-term employment contract | -0.025** | -19.10 | 245 | -2.5 |
| Apprentice/Trainee contract | -0.636** | -124.12 | 133 | -47.1 |
| Other employment contract | -0.024** | -8.48 | 245 | -2.4 |
| $R^2$ adjusted | 0.713 | | | |
| F-test | 11792.23** | | | |
| Number of observations | 67,023 | | | |

*Notes* : * $p < 0.05$, ** $p < 0.01$. 173 indicators of sectoral affiliation, 22 indicators relating to the type of occupation, 2 indicators of the region in which the establishment is located, a dummy showing whether the individual has no seniority in the firm, the Napierian logarithm of the size of the company and 2 indicators of the level of wage bargaining have also been included in the regression. For more details, see Appendix 2.

[1] The variable explained is the Napierian logarithm of the gross hourly wage in BEF.

[2] Gross hourly wage in BEF.

[3] Variation in % with regard to the reference. Technically, it is obtained by the antilog (to base e) of the estimated dummy coefficient from which 1 is substracted (x 100). For more details see Gujarati (1995: 525).

Before embarking upon the analysis relating to the effects of workers' sectoral affiliation and firm characteristics on wages, various lessons can be drawn from the wage equation (see Table 2) :

- Firstly, in line with the human capital theory, we note that the level of education exercises a significant and positive influence upon wages. The point is that compared to someone with a primary education qualification (or no degree), the wage differential is 15% for someone with a general upper secondary education, 24.7% for someone qualified on a short non-university higher education course, 46.7% for someone with a long non-university or university higher education and 66.5% for an individual who has obtained a postgraduate degree.

- Moreover, in agreement with the literature, we see a concave relation between the wages and the general experience of a worker on the labour market[4]. Initially, the return on an additional year of experience is approximately 1.6%; however, it decreases progressively and becomes negative after 32 years of experience. All other things being equal, an individual with 31 years of experience obtains a wage differential of 21.6% compared to the reference worker whose gross hourly wage is 251 BEF. The hypothesis of a bell-shaped relationship between wages and experience rests upon the idea that the investment in human capital (specific training and accumulation by work) diminishes over time and that the stock of human capital suffers from some degree of obsolescence. The growing share of the relationship between wages and general experience is explained essentially by the evolution in individual productivity and partly by scale increases.

- The relationship between wages and seniority in the company is also in the form of a bell. However, the return on seniority decreases markedly less quickly than that on experience. This difference can be explained through the almost automatic increase in wages as a function of years of seniority (essentially for white collar-workers) and through the progression in the earnings classification (i.e. promotion by seniority). It also illustrates the fact that companies offer more rewards for the human capital specific to their working environment. Finally, these results support the 'turnover' version of the efficiency wage

[4] The introduction of the experience in the form of an order three polynomial rests upon the results of Murphy and Welch (1990).

theory (Stiglitz, 1974) according to which companies grant a bonus to workers who are faithful to them.

- The dummy variable relating to gender suggests that all other things being equal, women are paid wages which are 11% lower than those of men. However, this result is not correct, for it implies that the individual characteristics of men and women are being remunerated in an equivalent way. Oaxaca (1973) and Blinder (1973) have developed a method which allows the returns of the characteristics of men and women to vary. It is a decomposition procedure which consists basically in estimating separate wage equations for men and women and to compute the wage differential that derives from differences in endowments (explained share of the gap) and the wage differential resulting from differences in the returns of the various characteristics (unexplained share of the gap, i.e. discrimination)[5]. Table 3 sets out the results of the Oaxaca-Blinder decomposition. They show that the gender wage gap stands at 28.3%. Approximately 50% of this wage gap results from different endowments (i.e. individual characteristics, working conditions, sectoral affiliation, size of the establishments and level of wage bargaining). In other words, there is a 14.1% gender wage gap which remains unexplained and which might be attributed to discrimination.

**Table 3 : Decomposition of the Gender Wage Gap**

| Overall [1] | Explained | Unexplained |
|---|---|---|
| 28.3% | 14.2% | 14.1% |
| (100) | (50.1) | (49.9) |

*Notes* : [1] Gender wage gap as a percentage of the average wage for women, i.e. $(W_m - W_w)/W_w$ where $W_m$ and $W_w$ stand respectively for the average wage of men and women in BEF.
These results are based on separate regressions for men and women which include the same explanatory variables as in Table 2 (except the gender dummy).
We have chosen as a non discriminatory wage structure that of men. This choice is based on the fact that : (i) men are the largest group in the work force and (ii) the law on "equal pay for equal work" implicitly considers men's wages as a norm.

- We likewise observe a wage differential of 11.6 % in favour of individuals supervising the work of their co-workers. This result stems from the fact that all other things being equal, these individuals have a higher degree of responsibility within the company. It likewise backs up the 'effort' version of the efficiency wage theory (Shapiro and Stiglitz, 1984). According to the latter, it is optimal for a company to offer a bonus to employees whose

[5] For more details on the Oaxaca-Blinder decomposition method, see section 5.4. at the end of this chapter.

effort it is not able to monitor constantly, and to carry out intermittent checks with respect to them, including dismissal in the event of insufficient effort. To sum up, these results suggest the existence of a positive relationship between the wage of an individual and his degree of autonomy at work. Notice that such a relationship has also been observed in other countries (Araï, 1994; Groshen and Krueger, 1990).

- Table 2 reveals, finally, that the number of hours worked does not significantly influence the gross hourly wage. Having said that, the fact of putting in extra paid hours or being paid a bonus for non-typical working hours (shift work, night work and/or weekend work) leads to an increase in hourly wages of 2.4% and 5.9% respectively compared to the reference category[6]. Let us also note that the wages of those employed on a limited-term employment contract are 2.5% lower than those of their opposite numbers with an unlimited-term contract.

Globally speaking, our results are in agreement with the economic theory : most of the regression coefficients are significant and they have the expected sign (see Appendix 2 for a complete description of the results). However, our estimates might be slightly biased because of the fact that our sample is censored. In fact it does not contain any information on the number of unemployed people or on their characteristics. Docquier et al. (1999), Laurent (2000) and Jepsen (2001) have studied this problem in the case of Belgium. Their results obtained using the PSBH (Panel Survey on Belgian Households) suggest that the expected level of earning is not significantly tied to the fact of having a job. The assessment of a censored sample therefore would not lead to a significant selection bias in Belgium. Although

[6] The regression coefficients relative to the number of hours paid and over-time hours should be interpreted with caution. This is due to a potential endogeneity bias. Indeed, even if employees can not always freely choose their working hours, the assumption of exogenous hours is too restrictive. To put it differently, the labour supply decision might depend on the potential market wage rate. An easy way to account for this potential bias is to use instrumental variables representing the expected working hours of each employee. Following Wolf (2000), it is extremely difficult to find appropriate instruments. Nonetheless, it has been conventional to use variables describing the household context, such as the number of small children, the marital status and the other household income. Unfortunately, these instruments are not reported in the *Structure of Earnings Survey*. This is why controlling for the endogeneity of working hours appears to be a very difficult task. However, this should not be a major limitation for our analysis. Findings show indeed that the inclusion of the number of working hours and a dummy for over-time paid in the wage equation does not affect the significance nor the magnitude of the other regression coefficients reported in Table 2 and Appendix 2.

this result might derive from the low percentage of unemployed people included in their samples, it does tend to back up our estimates.

# 4. INTER-INDUSTRY WAGE DIFFERENTIALS

The analysis of the estimated wage equations suggests that in addition to the productive characteristics of the workers and their working conditions, other factors might contribute to the variance in individual wages. In this section, we test this proposal in a more rigorous way. To do this, we look into the existence and scale of inter-industry wage differentials in the Belgian private sector. In other words, we analyse whether wage disparities may be observed between people employed in different sectors of activity, similar from the point of view of their productive characteristics and their working conditions. Our methodology, which is consistent with that of Krueger and Summers (1988), is described below. Notice, however, that the interpretation of the results is slightly different.

## 4.1. Methodology

The evaluation of the inter-industry wage differentials rests upon the estimation of a wage equation identical to the one described in the previous section (see equation (1)). Initially, we include only the constant and the sectoral dummies ($Y$) according to the nomenclature with 9, 43 or 174 branches. The coefficients estimated, $\hat{\alpha}$ and $\hat{\psi}_k$ ($k = 1, \ldots, K$), are used to identify the following respectively :

- the wage of the average worker in the reference sector,
- the wage differential between the average worker in sector $k$ and the average worker in the reference sector.

The wage of the average worker in sector $k$ (i.e. $\hat{w}_k$) is therefore obtained by adding $\hat{\alpha}$ and $\hat{\psi}_k$. In addition, the wage of the average worker in the economy (i.e. $\omega$) corresponds to the average of the wages of the average workers in all sectors (i.e. $\hat{w}_k$, for $k=1,..,K+1$), weighted by the sectoral employment shares (i.e. $\bar{p}_k$). In other words :

$$\omega = \sum_{k=1}^{K+1} \bar{p}_k \, \hat{w}_k \tag{2}$$

$$\begin{cases} \hat{w}_{K+1} = \hat{\alpha} \\ \bar{p}_k = \dfrac{1}{N} \sum_{i=1}^{N} p_{k,i} \qquad (k = 1,\ldots, K+1). \end{cases}$$

Accordingly, the wage differential between the average worker in sector *k* and the average worker in the economy may be expressed as follows :

$$d_k = \hat{w}_k - \omega \qquad (k = 1,\ldots, K+1) \tag{3}$$

This is the *gross* inter-industry wage differential : $d_k$ does not take account of the sectoral heterogeneity of productive capacities, working conditions or characteristics of the companies. That is why we have also estimated some 'enlarged' wage equations. These contain other explanatory variables in addition to the constant and the sectoral dummies (*Y*). We therefore obtain inter-industry wage differentials between individuals who have been made identical, for example from the point of view of their individual characteristics. However, given that the constant no longer corresponds to the wage of the average worker in the reference sector, the procedure used to estimate the $d_k$ values is slightly different. The point is that it first of all involves calculating the average wage differential of all the sectors compared to the reference :

$$\pi = \sum_{k=1}^{K} \bar{p}_k \, \hat{\psi}_k \tag{4}$$

and then applying the formulae below :

$$\begin{cases} d_k = \hat{\psi}_k - \pi \qquad (k = 1,\ldots, K) \\ d_{K+1} = -\pi \end{cases} \tag{5}$$

Moreover, we have also calculated a synthetic indicator of the dispersion of the inter-industry wage differentials. This is the standard deviation of the $d_k$ values, adjusted for sampling error and weighted by the sectoral employment shares. In algebraic terms, the weighted adjusted standard deviation (WASD) of the $d_k$ corresponds to the following expression :

$$WASD(d_k) = \sqrt{\sum_{k=1}^{K+1} \overline{p}_k \left( d_k - \frac{\sum_{k=1}^{K+1} d_k}{K+1} \right)^2 - \frac{\sum_{k=1}^{K+1} \text{var}(\hat{d}_k)}{K+1} + \frac{\sum_{k=1}^{K+1} \sum_{l=1}^{K+1} \text{cov}(\hat{d}_k, \hat{d}_l)}{(K+1)^2}} \qquad (6)$$

## 4.2. Empirical Results

Table 4 shows the inter-industry wage differentials as well as their dispersion for a 43-branch nomenclature[7]. Column (i) contains the *gross* wage differentials, i.e. estimated without control variables. These are significant at the level of 5%, both in individual terms (with the exception of one sector) and globally.

The best-paid sector is post and telecommunications[8] : the average worker here earns 58.4% more than the average worker in the economy[9]. This sector is followed by the electricity, gas, steam and hot water supply sector (+48.9%); manufacture of coke, refined petroleum and

[7] An identical analysis was carried out for a 174-branch nomenclature (Nace 3-digit). The results arising from this, set out in Appendix 3, support and refine our conclusions.

[8] This sector represents 0.4% of our entire sample (after weighting). Approximately 87% of the individuals included in this category work in the telecommunications sector, as against only 13% in postal activities. This asymmetry derives from the fact that the national mail service is not included in our analysis. Accordingly, the wage differential associated with the post and telecommunications sector basically reflects the wage disparity recorded in the telecommunications sector (see Appendix 3, codes 641 and 642).

[9] The $d_k$'s reported in Table 4 measure the differential between the log wage of the average worker in sector k and the log wage of the average worker in the economy. Hence, in order to get the difference in percentage between the wage (in BEF) of the average worker in sector k ($\lambda_k$) and the wage (in BEF) of the average worker in the economy ($\rho$) , the following expression has been computed :

$V_k = (\lambda_k - \rho) / \rho$ for $k = 1,..., K+1$; where $\lambda_k = \exp(\hat{\alpha}) [1 + (\exp(\hat{\psi}_k) - 1)]$ for $k = 1,..., K$; $\lambda_{K+1} = \exp(\hat{\alpha})$ ; and $\rho = \sum_{k=1}^{K+1} \overline{p}_k \lambda_k$ . This transformation, which is surprisingly often neglected in the literature, is required because the estimated wage equation has a semi-logarithmic form.

nuclear fuel industries (+43.6%) and financial intermediaries, except insurance and pension funding (+36.6%). The hotel and restaurant sector is at the very bottom of the scale of wages : the average worker's wage is 30.1% lower than that of the average worker in the economy. At the bottom of the scale, we likewise find the recycling industry (-27.3%); the manufacture of wearing apparel; dressing an dyeing of fur industries (-25.2%), and the retail trade, except of motor vehicles and motor cycles; and repair of personal and household goods (-24%).

**Table 4 : Inter-Industry Wage Differentials and their Dispersion in 1995**

| | *Variables included in the wage equation :* | | |
|---|---|---|---|
| | *(i)* | *(ii)* | *(iii)* |
| *Industry (NACE 2-digit)* | *Y* | *X, Y* | *X, Y, Z* |
| Other mining and quarrying (14) | 0.027 | 0.000 | 0.018 |
| Manufacture of food products and beverages (15) | -0.080 | -0.016 | -0.012 |
| Manufacture of tobacco products (16) | 0.039 | 0.026 | 0.019 |
| Manufacture of textiles (17) | -0.180 | -0.066 | -0.069 |
| Manufacture of wearing apparel; dressing and dyeing of fur (18) | -0.273 | **-0.123** | **-0.109** |
| Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear (19) | -0.236 | -0.019 | -0.026 |
| Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (20) | -0.144 | -0.053 | -0.031 |
| Manufacture of pulp, paper and paper products (21) | 0.074 | 0.095 | 0.067 |
| Publishing, printing and reproduction of recorded media (22) | 0.093 | 0.085 | 0.095 |
| Manufacture of coke, refined petroleum products and nuclear fuel (23) | 0.379 | 0.207 | 0.193 |
| Manufacture of chemicals and chemical products (24) | 0.240 | 0.137 | 0.104 |
| Manufacture of rubber and plastic products (25) | -0.001 | -0.001 | 0.001 |
| Manufacture of other non-metallic mineral products (26) | 0.030 | 0.039 | 0.028 |
| Manufacture of basic metals (27) | 0.196 | 0.083 | 0.024 |
| Manufacture of fabricated metal products, except machinery and equipment (28) | -0.088 | -0.019 | -0.004 |
| Manufacture of machinery and equipment n.e.c. (29) | -0.006 | -0.021 | -0.042 |
| Manufacture of office machinery and computers (30) | **-0.223** | -0.037 | 0.021 |
| Manufacture of electrical machinery and apparatus n.e.c. (31) | 0.011 | 0.032 | -0.002 |
| Manufacture of radio, television and communications equipment and apparatus (32) | 0.186 | 0.060 | 0.018 |
| Manufacture of medical, precision and optical instruments, watches and clocks (33) | 0.093 | 0.027 | 0.020 |
| Manufacture of motor vehicles, trailers and semi-trailers (34) | 0.054 | 0.041 | -0.036 |
| Manufacture of other transport equipment (35) | 0.162 | 0.065 | 0.016 |
| Manufacture of furniture; manufacturing n.e.c. (36) | -0.169 | -0.089 | -0.076 |
| Recycling (37) | -0.302 | -0.089 | -0.059 |
| Electricity, gas, steam and hot water supply (40) | 0.415 | 0.256 | 0.229 |
| Construction (45) | -0.079 | -0.022 | 0.000 |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel (50) | -0.074 | -0.067 | -0.031 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles (51) | 0.042 | -0.030 | -0.003 |
| Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods (52) | -0.257 | -0.119 | -0.110 |
| Hotels and restaurants (55) | -0.342 | -0.142 | -0.097 |
| Land transport; transport via pipelines (60) | -0.200 | -0.082 | -0.059 |
| Water transport (61) | 0.260 | 0.170 | 0.180 |
| Air transport (62) | 0.142 | 0.134 | 0.159 |

| | | | |
|---|---|---|---|
| Supporting and auxiliary transport activities; activities of travel agencies (63) | 0.023 | 0.011 | 0.031 |
| Post and telecommunications (64) | 0.477 | 0.296 | 0.254 |
| Financial intermediation, except insurance and pension funding (65) | 0.328 | 0.145 | 0.113 |
| Insurance and pension funding, except compulsory social security (66) | 0.222 | 0.079 | 0.054 |
| Activities auxiliary to financial intermediation (67) | 0.092 | -0.020 | 0.009 |
| Real estate activities (70) | -0.121 | -0.081 | 0.004 |
| Renting of machinery and equipment without operator and of personal and household goods (71) | -0.005 | -0.056 | -0.035 |
| Computer and related activities (72) | 0.206 | -0.005 | 0.006 |
| Research and development (73) | 0.314 | 0.073 | 0.057 |
| Other businesses activities (74) | -0.035 | -0.014 | 0.009 |
| $R^2$ adjusted | 0.250 | 0.689 | 0.701 |
| F-test relative to the estimated relation | 8331 | 26966 | 27593 |
| F-test relative to the sectoral dummies | 8331 | 2921 | 2170 |
| Weighted adjusted standard deviation (WASD) of the inter-industry differentials ($d_k$) | 0.184 | 0.089 | 0.074 |
| Number of industries | 43 | 43 | 43 |
| Number of observations in the sample | 67023 | 67023 | 67023 |

*Notes* : All the estimates are significant at the level of 5%, except those in bold.
*Y* : sectoral dummies, *X* : individual characteristics and working conditions, *Z* : specific features of the companies.

Where do these gross wage differentials come from ? Can they be accounted for solely by the sectoral heterogeneity of the workers and their working conditions, or do they also derive from the specific features of the employers in each sector ?

Column (ii) records the inter-industry wage differentials stripped of the productive characteristics of the individuals and their working conditions. In contrast with the predictions of the perfect competition model, we note that significant wage differentials subsist between agents with identical *observed* individual characteristics and working conditions, employed in different sectors. The latter are naturally smaller than the gross wage differentials; but having said that, they are still not negligible. Indeed, compared to the average worker in the economy, the wage differentials (in BEF) still fluctuate between +38.3% in the post and telecommunications sector and –15.3% in the hotel and restaurant sector[10]. Therefore, the gross wage differentials do not seem to result exclusively from the sectoral heterogeneity of the characteristics of the workers and their working conditions.

[10] In order to get the difference in percentage between the wage (in BEF) of the average worker in sector k and the employment-share weighted mean wage (in BEF) in the economy, the following expressions have been computed : $V_k = [(\exp(\hat{\psi}_k) - 1) - G]$ for $k = 1,..., K$ and $V_{K+1} = -G$ ; where $G = \sum_{k=1}^{K} \overline{p}_k [\exp(\hat{\psi}_k) - 1]$ . This transformation, often omitted in the literature, is necessary because the estimated wage equation has a semi-logarithmic form.

Column (iii) reveals, indeed, that the inclusion of the size of the establishments and the level of wage bargaining, in addition to the individual characteristics and the working conditions, also gives rise to a reduction in sectoral wage differentials. This result suggests that the inter-industry wage differentials result to some extent from the specific features of the firms in each sector. In other words, wage determination within each sector would be influenced by the organisational and technological characteristics of the establishments making them up.

**Table 5 : Correlation between the Inter-Industry Wage Differentials**

| | *Sectoral nomenclature :* | | |
|---|---|---|---|
| *Specification :* | Nace 1 : 9 categories | Nace 2 : 43 categories | Nace 3 : 174 categories |
| 1) $Y - X,Y$ | 0.972** / 0.883** | 0.913** / 0.904** | 0.866** / 0.859** |
| 2) $Y - X,Y,Z$ | 0.952** / 0.867** | 0.853** / 0.840** | 0.842** / 0.824** |

*Notes :* Pearson/Spearman correlation coefficients.* $p < 0.05$, ** $p < 0.01$. $Y$ : sectoral dummies, $X$ : individual characteristics and working conditions, $Z$ : specific features of the establishments.
1) Pearson/Spearman correlation coefficients between the inter-industry wage differentials ($d_k$) obtained respectively from a wage equation containing ($Y$) and ($X$,$Y$).
2) Pearson/Spearman correlation coefficients between the inter-industry wage differentials ($d_k$) obtained respectively from a wage equation containing ($Y$) and ($X$,$Y$,$Z$).

Table 5 shows that the hierarchy of the sectoral wage differentials is not greatly influenced by the introduction of the control variables ($X$ and/or $Z$) in the wage equation. Indeed, the Pearson/Spearman correlation coefficients between the *gross* and *stripped* wage differentials – estimated in Nace 1, 2 or 3-digit – are significant at the probability level of 1% and they reach an average of 90%. Moreover, it is interesting to note that the sectoral wage structure which we have just described is similar to that observed in the other industrialised countries (see, for example, Zweimüller and Barth (1994) for a comparison with Austria, Germany, Canada, Norway, Sweden and the USA).

What about the dispersion of the inter-industry wage differentials ? Table 6 shows that the weighted adjusted standard deviation (WASD) of the wage differentials grows significantly when the number of sectors being considered increases. In addition, we note that the introduction of the individual characteristics and the working conditions ($X$) into the wage equation reduces the dispersion in the wage differentials by about 50%, irrespective of the sectoral nomenclature used. The inclusion of the specific features of the employers (the size of the establishment and the level of wage bargaining), in addition to the vector $X$, leads to a

drop in the WASD in the differentials of between 16.5 and 20% (from 0.060 to 0.048 in Nace 1-digit; from 0.089 to 0.074 in Nace 2-digit and from 0.103 to 0.086 in Nace 3-digit).

**Table 6 : WASD of the Inter-Industry Wage differentials – Summary**

| *Variables included in the wage equation :* | *Sectoral nomenclature :* | | |
|---|---|---|---|
| | Nace 1 : 9 categories | Nace 2 : 43 categories | Nace 3 : 174 categories |
| *Y* | 0.130 | 0.184 | 0.199 |
| *X, Y* | 0.060 | 0.089 | 0.103 |
| *X, Y, Z* | 0.048 | 0.074 | 0.086 |

*Notes :* WASD stands for weighted adjusted standard deviation of the inter-industry wage differentials. *Y* : sectoral dummies, *X* : individual characteristics and working conditions, *Z* : specific features of the companies.

To sum up, our results emphasise the existence of inter-industry wage differentials, independently of the configuration adopted. They likewise suggest that their structure is comparable to that observed in the other industrialised countries and that they result in part from the characteristics of the employers in each sector.

## 4.4. An International Perspective

As we indicated in the introduction, certain studies support the existence of a decreasing relationship between the dispersion of inter-industry wage differentials and the degree of corporatism of the country concerned. To put it another way, they suggest that the non-competitive wage disparities – in other words, those which do not derive from the heterogeneity of the individual characteristics or the working conditions – are significantly lower in strongly corporatist countries.

Do the results which we have obtained for Belgium support this hypothesis ? It is not easy to answer this question, because international comparisons with regard to inter-industry wage differentials need to be carried out with the greatest of care. The point is that the scale of the estimated wage disparities between different industries depends heavily upon the specification of the wage equation, the sectoral nomenclature used, the field covered by the data and the position of the country in the business cycle.

It is for this reason that in Table 7 we compare our results almost exclusively against those of Teulings and Hartog (1998). The latter provide, for 11 industrialised countries, comparable indicators of the dispersion of inter-industry wage differentials. Moreover, the field covered by their data, the number of sectoral categories used and the variables included in their wage equations are similar to our own[11]. They thus provide an interesting reference framework for the evaluation of our results from an international perspective. However, we also compare our results against those of Ferro-Luzzi (1994). The latter provides comparable estimates for Switzerland.

**Table 7 : Collective Bargaining and the Dispersion of Inter-Industry Wage Differentials**

| | | | | *Degree of corporatism :* | |
|---|---|---|---|---|---|
| Country | Year | # Sectors | WASD[+] | Calmfors & Driffill [a] | Bruno & Sachs [b] |
| Sweden | 1981 | 31 | 0.044 [c] | 14 | 12 |
| Austria | 1983 | 24 | 0.050 [c] | 16 | 16 |
| Denmark | 1990 | 18 | 0.054 [c] | 13 | 10 |
| France | 1992 | 36 | 0.058 [c] | 7 | 5 |
| Finland | 1987 | 27 | 0.065 [c] | 12 | 9 |
| Netherlands | 1985 | 42 | 0.066 [c] | 10 | 14 |
| **Belgium** | **1995** | **43** | **0.074 [d]** | **9** | **8** |
| Norway | 1989 | 29 | 0.085 [c] | 15 | 13 |
| Germany | 1988 | 34 | 0.110 [c] | 11 | 15 |
| Switzerland | 1991 | 40 | 0.113 [e] | 3 | 11 |
| UK | 1991 | 59 | 0.143 [c] | 6 | 6 |
| USA | 1988 | 44 | 0.141 [c] | 2 | 1 |
| Canada | 1982 | 16 | 0.171 [c] | 1 | 2 |
| Correlations between the WASD and the degree of corporatism: | | | | | |
| Spearman | | | | -0.776** | -0.476 |
| Pearson | | | | -0.800** | -0.597* |

*Notes* : * $p < 0.05$, ** $p < 0.01$.
[+] : Dispersion of the inter-industry wage differentials.
[a] : Reversed Calmfors and Driffill corporatism index (1988). 16 = highly corporatist country.
[b] : Reversed Bruno and Sachs corporatism index (1985). 16 = highly corporatist country.
[c] : Teulings and Hartog (1998).
[d] : Own calculations. This result rests upon the estimation of a wage equation containing, as explanatory variables, 43 sectoral indicators and the vectors *X* and *Z* (see Table 6).
[e] : Ferro-Luzzi (1994).

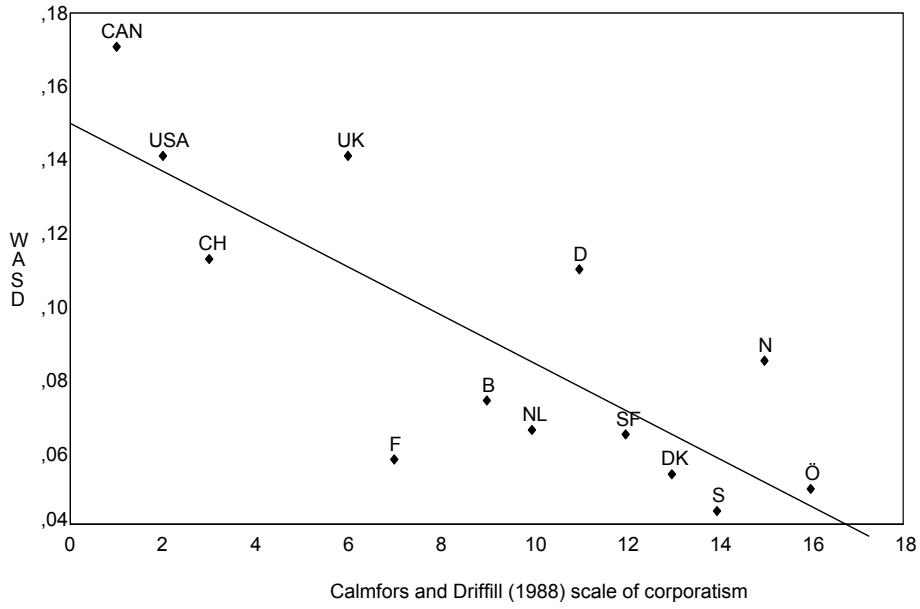
In order to test the relation between the dispersion of inter-industry wage differentials and the characteristics of the collective bargaining arrangements, two indicators measuring the degree of corporatism of the industrialised countries have also been included in Table 7. These are

[11] The general specification of their wage equation is as follows : they regress the log of the gross hourly wage on the experience and its square, tenure, its square and its cube, a dummy for zero tenure, education, the log of the number of hours worked, indicators combining family situation and gender, sectoral dummies, regional indicators and the log of the size of the company/establishment.

the Bruno and Sachs (1985) and Calmfors and Driffill (1988) indices. The former reflects the privileged level of bargaining (national, sectoral or company) as well as the ability of the social partners to ensure compliance with their agreements at the lower bargaining levels (degree of vertical co-ordination), while the second measures exclusively the formal level of the bargaining. It thus does not take account of the level of co-ordination between the social partners[12].

If we explore Table 7 we note that Belgium occupies a middle position among the industrialised countries with regard to the dispersion of inter-industry wage differentials. The scale of the latter is indeed lower than the figures recorded in the Anglo-Saxon countries (UK, USA and Canada), Switzerland and Germany and slightly higher than those in the Scandinavian countries (with the exception of Norway), Austria, France and the Netherlands.

**Figure 1 : Degree of Corporatism and the Dispersion of Inter-Industry Wage Differentials**




*Note :* WASD indicates the dispersion of the inter-industry wage differentials.

Moreover, our results clearly support the existence of a decreasing relationship between the dispersion of inter-industry wage differentials and the degree of corporatism of the industrialised countries. Table 7 in fact reveals a strong negative correlation, which is significant at the level of probability 1%, between the dispersion of the inter-industry wage

[12] For more details, see sections 2 and 3 of chapter 2.

differentials and the Calmfors and Driffill indicator (see Figure 1). The correlation with the Bruno and Sachs indicator, on the other hand, is less intense. This result suggests that when it comes to wage dispersion, the influence of the formal level of bargaining is greater than that of the degree of co-ordination of the social partners.

How are we to interpret these results ? The wage disparities observed between sectors militate in favour of the efficiency wage theory. Indeed, the latter demonstrate that if the effort incentive conditions vary from one sector to another, two individuals with identical individual characteristics, placed in the same working conditions, are likely to earn different wages. For example, according to the 'effort' version of the efficiency wage theory, big companies would find it to be in their interests to offer relatively higher wages to their employees because they face higher costs in order to monitor the effort of the latter. However, this theory does not explain why the non-competitive wage inequalities are higher in the non-corporatist countries. The constraints encouraging companies to pay *efficient* wages, i.e. wages above the competitive level, actually seem to be similar among the industrialised countries.

The justification put forward by Holmlund and Zetterberg (1991), based upon the rent-sharing theory, is more compelling. They showed that the influence of the sectoral conditions (variations in prices and productivity) on wages is strong in the USA, moderate in Germany and low in the Scandinavian countries. The elasticity between the sectoral environment and wages would thus be more pronounced in the non-corporatist countries. To put it another way, the determination of wages would depend more on the general macroeconomic conditions in the corporatist countries. This result can be explained by the fact that the explicit or implicit co-ordination of the wage bargaining in the corporatist countries restricts the insider power of workers, in other words their ability to capture part of the sectoral rents. In addition, the policy of 'wage solidarity' pursued by the unions in most of the corporatist countries reinforces this phenomenon. Vainiomäki and Laaksonen (1995: 172) emphasise in fact that "the difference (in the dispersion of inter-industry wage differentials) between Sweden and Finland (may derive from) less successful implementation of solidarity wage policy and more flexibility in industry level agreements in Finland". To sum up, the theory of 'rent-sharing' provides a plausible explanation for the lower dispersion of inter-industry wage differentials in the corporatist countries.

This interpretation of the heterogeneity of inter-industry wage differentials runs counter to the results of Calmfors and Driffill (1988), who support the existence of a bell-shaped relationship between the degree of centralisation of the wage bargaining and the macroeconomic performances of the industrialised countries. From a theoretical point of view, the ineffectiveness of the sectoral wage bargaining rests upon the following arguments : (i) contrary to the national level, the co-ordination of decisions is too weak at the sectoral level to encourage the unions to take on board all the externalities stemming from wage increases and (ii) the wage-employment elasticity at the sectoral level is lower than at the level of the individual companies. Accordingly, wage moderation here is less strong, which affects economic performances. To put it another way, Calmfors and Driffill suggest that sectoral bargaining accentuates the insider power of the workers (represented by the union organisations) and their ability to capture part of the rents. Yet our results invalidate this hypothesis (see Figure 1). They serve more to back up the empirical results described in the third section of chapter 2. Nevertheless, the relationship between the scale of the inter-industry wage differentials and labour market performance should be regarded with caution.

## 5. BARGAINING REGIMES AND THE STRUCTURE OF WAGES IN A CORPORATIST COUNTRY

There is a growing body of literature which suggests that the bargaining regimes which coexist within a country (for example, the existence of unionised and non-unionised sectors) have a significant impact on inter-industry wage disparities as well as wage levels. (e.g. Booth, 1995 and Pencavel, 1991). However, it relates almost exclusively to the Anglo-Saxon countries. In this section, we provide some results for the Belgian private sector. Unlike in the USA or Canada, the distinction between unionised and non-unionised sectors has no meaning in Belgium. The point is that virtually all workers are covered by a collective labour agreement. The bargaining regime is therefore reflected more through the level of wage bargaining. We distinguish primarily between two types of establishments : (i) those covered only by national and/or sectoral collective agreements and (ii) those where wages are collectively (re)negotiated in house. The followings questions are explored in this section : (i) Can we observe inter-industry wage differentials for every bargaining regime ? (ii) Are the sectors offering high/low wages similar for workers covered by different bargaining regimes ? (iii) Is the dispersion in inter-industry wage differentials weaker when wages are

(re)negotiated within companies ? (iv) What is the wage gap between workers covered by different bargaining regimes and what is behind it ? Before addressing these questions, we first focus on the specific features of wage bargaining in the Belgian private sector.

## 5.1. Wage Bargaining in the Private Sector

In the countries of North America (USA and Canada) the legal provisions offer workers the possibility of voting for or against their companies' joining a union in elections supervised by the public authorities. This means that the union can earn the exclusive right to represent all the workers, whether union members or not, in bargaining with the employers. Yet as the majority of the collective agreements are negotiated at the level of the individual companies, the institutional system leads to a clear distinction between the unionised establishments, in other words those which are subject to a collective agreement, and the non-unionised establishments. Besides, the rate of unionisation provides a good approximation of the coverage rate/the bargaining regime.

In Belgium, as in the majority of European countries, the situation is very different. The point is that wage bargaining in the Belgian private sector occurs at three levels : the company level, the sectoral level and the national (interprofessional) level. They generally occur every two years on a pyramidal basis. In principle, they are inaugurated by a national collective agreement defining a minimum level in wage terms. This national agreement can be improved within every sector of activity. Then we have the company negotiations where the sectoral collective agreements may be renegotiated, except where there is a so-called imperative clause. However, these cannot give rise to a collective agreement which would run counter to the sectoral or national agreements.

Belgium is characterised, in addition, by a coverage rate of about 90% (OECD, 1997). This stems from the fact that non-unionised workers, like employers not members of an employers' organisation, are generally covered by a collective agreement. The point is that Article 19 of the law dated 5 December 1968 specifies that a collective agreement is automatically binding upon the signatory organisations, employers who are members of those organisations or who have personally concluded the agreement, employers joining those organisations after the date of the conclusion of the agreement, and finally, all workers, *whether unionised or not*, who are employed by an employer so bound. Moreover, most of the sectoral collective agreements

have been rendered obligatory by Royal Decree. This means that they apply compulsorily to all companies in the sector and to their workers, *whether or not they are members* of the signatory organisations (employers' organisations or unions).

To sum up, unlike in the USA or Canada, the bargaining regime in companies in the Belgian private sector does not derive directly from the latter's union membership. It is reflected more through the level of wage bargaining. The heart of the wage bargaining lies at the sectoral level in Belgium. However, in certain cases, sectoral agreements are renegotiated (improved) within individual companies.

## 5.2. Breakdown of the Sample

In order to gain the best picture of the influence of the bargaining regime on the structure of wages in Belgium, we have split our sample into two categories. These contain the following establishments : (i) those covered only by national and/or sectoral collective agreements and (ii) those where wages are (re)negotiated collectively within the individual companies.

**Table 8 : Selected Descriptive Statistics by Bargaining Regime (means, standard deviations)**

| | *Bargaining regime*[1] *:* | |
|---|---|---|
| | (i) Only national and/or sectoral CA | (ii) Company CA |
| Gross hourly wage (in BEF) | 456 | 523 |
| Seniority (years) | 8.44<br>(8.60) | 12.12<br>(9.32) |
| Prior experience (years) | 10.53<br>(9.03) | 7.83<br>(7.35) |
| Size of the establishment (number of workers) | 222.60<br>(547.84) | 949.72<br>(1610.57) |
| Working hours paid (in the reference period) | 158.01<br>(31.74) | 159.65<br>(27.13) |
| Female (yes) | 33.6 | 27.4 |
| Overtime paid (yes) | 5.7 | 10.1 |
| Bonuses for shift work, night work and/or weekend work (yes) | 9.2 | 24.8 |
| Number of observations in the sample<br>(proportions in weighted sample) | 34774<br>(0.57) | 26806<br>(0.43) |

*Note* : The descriptive statistics refer to the weighted sample.
[1] CA means collective (wage) agreement.

We made this division by referring to the *Level of Collective Agreement on Pay* variable in the 1995 *Structure of Earnings Survey*. Notice that the exclusion of the individuals for which this variable was badly recorded reduced our sample from 67,023 to 61,580 units.

Table 8 sets out the means (standard deviations) of selected variables for the two bargaining regimes[13]. We note a clear-cut difference between the characteristics of the firms covered by a company collective agreement and those not so covered. The point is that companies within which wages are collectively (re)negotiated are significantly larger, gross hourly wages are higher, workers have more seniority, the number of hours paid is greater and the proportion of workers being paid a bonus for overtime or shift work, night work and/or weekend work is greater. Conversely, the prior experience of the workers and the proportion of women is lower here. Table 8 shows, in addition, that 57% of the workers in the (weighted) sample are only covered by national and/or sectoral collective agreements.

## 5.3. Bargaining Regimes and Inter-Industry Wage Differentials

The methodology which we have adopted to measure the scale and dispersion of the inter-industry wage differentials for each bargaining regime is similar to the one described in section 4.1. This time it rests upon the estimation of a wage equation containing the following explanatory variables : the individual characteristics of the workers and their working conditions (*X*), sectoral dummies (*Y*) and the size of the establishments.

**Table 9 : Bargaining Regimes and Inter-Industry Wage Differentials**

| | *Bargaining regime[1] :* | |
|---|---|---|
| | *(i)* | *(ii)* |
| *Industry (NACE 2-digit) :* | *Only national and/or sectoral CA* | *Company CA* |
| Other mining and quarrying (14) | 0.038 | -0.013 |
| Manufacture of food products and beverages (15) | -0.013 | 0.001 |
| Manufacture of tobacco products (16) | 0.022 | 0.038 |
| Manufacture of textiles (17) | -0.069 | -0.086 |
| Manufacture of wearing apparel; dressing and dyeing of fur (18) | -0.107 | -0.047 |
| Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear (19) | -0.010 | -0.243 |
| Manufacture of wood and products of wood and cork, except furniture; | -0.025 | -0.046 |

[13] For a description of all the variables, see Appendix 1. The distribution of employment across bargaining regimes for Nace two-digit industries can be found in Appendix 4.

| | | |
|---|---|---|
| manufacture of articles of straw and plaiting materials (20) | | |
| Manufacture of pulp, paper and paper products (21) | 0.000 | 0.067 |
| Publishing, printing and reproduction of recorded media (22) | 0.097 | 0.079 |
| Manufacture of coke, refined petroleum products and nuclear fuel (23) | 0.251 | 0.077 |
| Manufacture of chemicals and chemical products (24) | 0.048 | 0.098 |
| Manufacture of rubber and plastic products (25) | 0.027 | -0.021 |
| Manufacture of other non-metallic mineral products (26) | 0.033 | 0.017 |
| Manufacture of basic metals (27) | 0.000 | 0.003 |
| Manufacture of fabricated metal products, except machinery and equipment (28) | 0.019 | -0.033 |
| Manufacture of machinery and equipment n.e.c. (29) | -0.020 | -0.063 |
| Manufacture of office machinery and computers (30) | 0.016 | / |
| Manufacture of electrical machinery and apparatus n.e.c. (31) | 0.009 | -0.041 |
| Manufacture of radio, television and communications equipment and apparatus (32) | 0.085 | -0.047 |
| Manufacture of medical, precision and optical instruments, watches and clocks (33) | 0.065 | -0.004 |
| Manufacture of motor vehicles, trailers and semi-trailers (34) | 0.010 | -0.069 |
| Manufacture of other transport equipment (35) | 0.025 | 0.033 |
| Manufacture of furniture; manufacturing n.e.c. (36) | -0.047 | **-0.076** |
| Recycling (37) | -0.054 | 0.145 |
| Electricity, gas, steam and hot water supply (40) | 0.243 | 0.425 |
| Construction (45) | 0.019 | -0.047 |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel (50) | -0.033 | -0.044 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles (51) | 0.003 | -0.071 |
| Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods (52) | -0.136 | -0.080 |
| Hotels and restaurants (55) | -0.085 | -0.134 |
| Land transport; transport via pipelines (60) | -0.032 | -0.119 |
| Water transport (61) | 0.171 | 0.271 |
| Air transport (62) | 0.067 | 0.105 |
| Supporting and auxiliary transport activities; activities of travel agencies (63) | 0.049 | -0.003 |
| Post and telecommunications (64) | 0.284 | 0.096 |
| Financial intermediation, except insurance and pension funding (65) | 0.125 | 0.113 |
| Insurance and pension funding, except compulsory social security (66) | 0.114 | 0.044 |
| Activities auxiliary to financial intermediation (67) | 0.032 | 0.021 |
| Real estate activities (70) | 0.006 | / |
| Renting of machinery and equipment without operator and of personal and household goods (71) | 0.001 | -0.039 |
| Computer and related activities (72) | 0.020 | 0.016 |
| Research and development (73) | 0.035 | 0.048 |
| Other businesses activities (74) | 0.013 | 0.009 |
| $R^2$ adjusted | 0.710 | 0.677 |
| F-test relative to the estimated relation | 15277 | 10191 |
| F-test relative to the sectoral dummies | 1245 | 1022 |
| Weighted adjusted standard deviation of the inter-industry differentials ($d_k$) | 0.083 | 0.074 |
| Number of sectors | 43 | 41 |
| Number of observations in the sample | 34774 | 26806 |

*Notes* : [1]CA means collective (wage) agreement. All the estimates are significant at the level of 5%, except those in bold. They were estimated from a wage equation including the vectors *X* (individual characteristics and working conditions), *Y* (43 sectoral dummies) and *Z* (size of the establishments). For more details regarding the explanatory variables, see section 3.

Table 9 shows that for every bargaining regime, wage differentials exist between individuals apparently homogeneous from the point of view of their individual characteristics and their working environment. These differentials are significant both in individual terms and globally at the 5% threshold[14]. We further note that the hierarchy of the sectors in terms of wages is similar to the one we obtained for the aggregate sample (see section 4.2). In Nace 2-digit, we find among the best paid sectors : electricity, gas, steam and hot water supply; financial intermediaries (except insurance and pension funding); post and telecommunications; and the manufacture of coke, refined petroleum and nuclear fuel. Furthermore, it is in the traditional sectors (hotels and restaurants, the textile industry and retailing) that wages are the lowest.

**Table 10 : Correlation between the Inter-Industry Wage Differentials**

| *Bargaining regimes* | Company CA |
|---|---|
| Only national and/or sectoral CA | 0.675** / 0.699** |

*Notes :* CA means collective (wage) agreement.
Pearson/Spearman correlation coefficients. * $p < 0.05$, ** $p < 0.01$.

The hypothesis according to which the hierarchy of the wage differentials is similar for both bargaining regimes is confirmed by Table 10. In fact we see that the Pearson and Spearman correlation coefficients between the wage differentials estimated for each bargaining regime reach almost 0.700, with a probability of being zero of less than 1%. This result underlines the existence of a *sectoral effect* on the workers' wages, irrespective of the bargaining regime considered. In other words, the sectors offering high/low wages are similar for workers covered by different bargaining regimes. This is explained by the relative homogeneity of the organisational and technological characteristics of the establishments within each sector of activity. In addition, this result might be due to a phenomenon of mimetism (Dickens, 1986) : companies in which wages are not (re)negotiated collectively might be patterning their wage policy on those which do operate such an arrangement, in order to attract the best workers, to show their staff that they are being treated fairly and to curb the rate of manpower rotation.

[14] An identical analysis has been carried out for a Nace 3-digit nomenclature. The results arising from this, set out in Appendix 5, support our conclusions.

### 5.3.1. Dispersion of Inter-Industry Wage Differentials

Should we infer from these results that the bargaining regime has no influence on the structure of wages in a corporatist country ? The analysis of the dispersion of the inter-industry wage differentials refutes this hypothesis. Table 9 reveals, in fact, that the WASD of the wage differentials is lower when wages are collectively (re)negotiated at the firm level[15]. Indeed, the latter reaches 0.083 when there is only a national and/or sectoral collective agreement and 0.074 when wages are collectively (re)negotiated within the individual companies.

**Table 11 : Top/Bottom 10 Industry Wage Differentials and the Bargaining Regime**

| Rank | Industry | Inter-industry wage differentials | % workers solely covered by a national and/or sectoral CA | |
|---|---|---|---|---|
| (1) | Post and telecommunications | + 0.254 | 0.92 | |
| (2) | Electricity, gas, steam and hot water supply | + 0.229 | 1.00 | |
| (3) | Manufacture of coke, refined petroleum products and nuclear fuel | + 0.193 | 0.57 | |
| (4) | Water transport | + 0.180 | 0.87 | |
| (5) | Air transport | + 0.159 | | 0.39 |
| (6) | Financial intermediation, except insurance and pension funding | + 0.113 | | 0.20 |
| (7) | Manufacture of chemicals and chemical products | + 0.104 | | 0.14 |
| (8) | Publishing, printing and reproduction of recorded media | + 0.095 | 0.81 | |
| (9) | Manufacture of pulp, paper and paper products | + 0.067 | | 0.12 |
| (10) | Research and development | + 0.057 | 0.53 | |
| (34) | Renting of machinery and equipment without operator and of personal and household goods | - 0.035 | | 0.23 |
| (35) | Manufacture of motor vehicles, trailers and semi-trailers | - 0.036 | | 0.09 |
| (36) | Manufacture of machinery and equipment n.e.c. | - 0.042 | | 0.41 |
| (37) | Land transport; transport via pipelines | - 0.059 | 0.81 | |
| (38) | Recycling | -0.059 | 0.91 | |
| (39) | Manufacture of textiles | - 0.069 | 0.74 | |
| (40) | Manufacture of furniture; manufacturing n.e.c. | -0.076 | 0.67 | |
| (41) | Hotels and restaurants | - 0.097 | 0.73 | |
| (42) | Manufacture of wearing apparel; dressing and dyeing of fur | - 0.109 | 0.88 | |
| (43) | Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods | - 0.110 | 0.54 | |

*Notes :* The inter-industry wage differentials have been estimated from the aggregate sample controlling for individual characteristics, working conditions and firm size (see Table 4).

The interpretation of this result is not straightforward. Indeed, it seems reasonably to assume that collective (re)negotiation of wages at the firm level intensifies the correlation between the

[15] This result is supported by an analysis carried out for three-digit industries (see Appendix 5).

economic situation of the establishments (e.g. productivity, market share, prices) and the level of wages therein. Hence, we would expect the dispersion of inter-industry wage differentials to be *wider* among firms covered a company collective agreement.

Where does this puzzle come from ? Table 11 presents the top/bottom 10 sectors according to their wage differentials. It shows also the proportion of workers solely covered by national and/or sectoral collective agreements within these sectors.

If we explore Table 11 we note that the diversity of sectors in terms of wage differentials (after controlling for individual characteristics, working conditions and firm size) is higher when wages are solely covered by national and/or sectoral collective agreements. Results show, indeed, that in the majority of the best and worst paying sectors wages are not (re)negotiated at the firm level. To put it differently, a very high proportion of workers solely covered by national and/or sectoral collective agreements is found in the high-wage sectors (e.g. post and telecommunications; electricity, gas steam and hot water supply; manufacture of coke, refined petroleum products and nuclear fuel) and even more in the low-wage sectors (e.g. retail trade, clothing and fur industry, hotels and restaurants, manufacture of textiles).

The sectoral diversity of workers' bargaining power with respect to wages thus seems particularly pronounced when wages are not covered by a company collective agreement. What is more, the distribution of sectoral employment appears to be more compressed in the second sub-sample of firms, i.e. when wages are collectively (re)negotiated in house[16]. Overall, these findings suggest that the reason why the WASD of inter-industry wage differentials is lower when workers are covered by a company collective agreement is that these workers are concentrated in a smaller number of sectors offering more homogeneous wage premiums.

[16] The standard deviation of sectoral employment shares for two-digit industries equals respectively 0.033 and 0.031 in the first and second sub-sample of firms. For three digit industries the compression of sectoral employment shares in the second sub-sample is even more obvious (see Appendix 5). Indeed, there are only 139 sectors in which at least part of the firms (re)negotiate wages in house, while there are 163 sectors in which at least part of the firms are (solely) covered by national and/or sectoral collective agreements.

**Table 12 : Dispersion of Inter-Industry Wage Differentials**

| *Specification (Nace 2-digit industries)* | *Bargaining regime :* Only national and/or sectoral CA | | Company CA |
|---|---|---|---|
| WASD of inter-industry wage differentials *(Reference)* | 0.083 | > | 0.074 |
| ♦ Standard deviation of inter-industry wage differentials (no weighting/adjustment) | 0.086 | < | 0.109 |
| ♦ WASD of inter-industry wage differentials computed with sectoral employment shares of : | | | |
| - the first sub-sample of firms, | 0.083 | < | 0.100 |
| - the second sub-sample of firms. | 0.075 | ≅ | 0.074 |

*Notes* : CA stands for collective (wage) agreement.
The first sub-sample of firms includes those solely covered by national and/or sectoral CA.
The second sub-sample of firms includes those where wages are collectively (re)negotiated in house.

This explanation is backed up and took further by Table 12. Indeed, results show that :

(i) The standard deviation of the inter-industry wage differentials prior to weighting and adjustment is significantly higher when wages are (re)negotiated at the firm level[17].

(ii) The WASD of the inter-industry wage differentials among the firms covered by a company collective agreement would have been larger than in those not so covered, if the distribution of sectoral employment had been the same as in the latter.

(iii) The WASD of the inter-industry wage differentials would have been similar for both bargaining regimes, if the distribution of sectoral employment among the firms solely covered by national and/or sectoral collective agreements had been the same as for the firms covered by a company collective agreement.

In sum, although we found that the WASD of inter-industry wage differentials is smaller when wages are covered by a company collective agreement, it is likely that the reverse result would have appeared if the distribution of sectoral employment had been the same across bargaining regimes.

It is not easy to compare our results against those of other studies, because the latter relate essentially to the Anglo-Saxon countries and therefore refer to very different industrial

[17] Similar results were found for three-digit industries.

relations systems. Be that as it may, the litterature do show that the unions significantly reduce the inter-industry and inter/intra-establishment wage differentials (Fortin and Lemieux, 1997; Freeman, 1980, 1982; Gosling and Machin, 1995; Hirsch, 1982; Metcalf, 1982; Stewart, 1991). Our results corroborate these findings to some extent, for they illustrate that, *all other things being equal*[18], the dispersion of inter-industry wage differentials increases when collective bargaining becomes more decentralised.

### 5.3.2. Wage Levels

What about the influence of the bargaining regime on the *level* of wages ? To answer this question, we have applied the decomposition procedure developed by Oaxaca (1973) and Blinder (1973), who showed that the difference between the average hourly wage (in logarithms) of workers covered by a different bargaining regime can be broken down as follows :

$$\overline{W}_d - \overline{W}_{nd} = \left(\overline{V}_d - \overline{V}_{nd}\right)' \hat{\beta}_{nd} + \overline{V}_d' \left(\hat{\beta}_d - \hat{\beta}_{nd}\right) \tag{7}$$

where the indices *d* and *nd* refer respectively to a discriminatory and a non-discriminatory wage structure, $\overline{W}$ represents the average (Napierian logarithm) of the hourly wage, $\overline{V}$ is a vector containing an intercept and the average values or frequencies of occurrence of the individual characteristics of the workers, their working conditions, their sectoral affiliation (174-categories nomenclature) and the size of their establishment[19]. The coefficients $\hat{\beta}$ are obtained by estimating the following wage equation : $W_I = \beta_I \, V_I + \varepsilon_I$ , with $I = \{d, nd\}$ and $\varepsilon$ an error term. They measure the estimated returns of the various variables contained in the vector *V*.

The procedure developed by Oaxaca and Blinder involves defining a non-discriminatory wage structure serving as a reference for the decomposition[20]. A non-discriminatory wage structure corresponds to a situation where the bargaining regime would have no effect upon

[18] In particular, if the distribution of sectoral employment shares is the same across bargaining regimes.

[19] For a complete list of the explanatory variables, see Appendix 1.

[20] For a discussion of the non-discriminatory wage structures that may used for a decomposition, see Oaxaca and Ransom (1994).

the wages of individuals. In this case, wage disparities between workers covered by different bargaining regimes would be entirely explained by the diversity of their individual characteristics, their working environment and the features of the firm by which they are employed.

We have chosen as a non-discriminatory wage structure that of the workers (solely) covered by a national and/or sectoral collective agreement. This choice is justified by the following facts : (i) the heart of the collective bargaining is at the sectoral level in Belgium; (ii) this bargaining regime covers the greatest number of individuals. We thus arrive at the following equation :

$$\overline{W}_c - \overline{W}_s = \left(\overline{V}_c - \overline{V}_s\right)' \hat{\beta}_s + \overline{V}_c' \left(\hat{\beta}_c - \hat{\beta}_s\right) \tag{8}$$

where the indices *c* and *s* respectively identify the workers covered by a company collective agreement and those covered solely by a national and/or sectoral collective agreement. The left-hand term in equation (8) measures the overall wage gap (in logarithms) between individuals covered by different bargaining regimes. The first right-hand term indicates the proportion of that wage gap which is explained by differences in terms of individual characteristics, working conditions, sectoral affiliation and the size of the company. The second right-hand term reflects the unexplained part of the wage gap. It measures the influence of the bargaining regime on the level of wages.

**Table 13 : Decomposition of the Bargaining Regime Wage Gap**

| *Bargaining regime*[1] : | *Wage gap :* | | |
|---|---|---|---|
| | Overall [2] | Explained | Unexplained |
| Company CA | | | |
| *versus* | 14.7% | 9.6% | 5.1% |
| | (100) | (65.4) | (34.6) |
| Only national and/or sectoral CA | | | |

*Notes* : [1] CA means collective (wage) agreement. The reference wage structure (non-discriminatory) corresponds to that of workers (solely) covered by a national and/or sectoral collective agreement.
[2] Measured by the following expression : $\left[\left(\widetilde{W}_c - \widetilde{W}_s\right)/\widetilde{W}_s\right] * 100$ , where $\widetilde{W}$ corresponds to the mean wage in BEF.

Table 13 sets out the results of the Oaxaca-Blinder decomposition. This shows that the wage gap stands at 14.7% between workers (solely) covered by a national and/or sectoral collective

agreement and workers whose wages are (re)negotiated within their establishment. Approximately 65% of this wage gap results from the individual characteristics of the workers, their working conditions, their sectoral affiliation and the size of their establishment. In other words, results indicate that all other things being equal workers covered by a company collective agreement earn 5.1% more than their opposite numbers who are (solely) covered by a national and/or sectoral collective agreement.

**Table 14 : Bargaining Regimes and Wage Levels – A Comparison**

| Country | Influence of the regime on wage level in % | Degree of corporatism | |
|---|---|---|---|
| | | Calmfors & Driffill [a] | Bruno & Sachs [b] |
| Netherlands | 4 [c] | 10 | 14 |
| Austria | 5 [d] | 16 | 16 |
| **Belgium** | **5.1** [e] | **9** | **8** |
| Germany | 6 [d] | 11 | 15 |
| Italy | 4.4 –7.5 [f] | 5 | 4 |
| Norway | 7.5 [g] | 15 | 13 |
| UK | 8 – 12 [h] | 6 | 6 |
| USA | 15 [I] | 2 | 1 |
| Australia | 15 – 17 [j] | 8 | 3 |
| Canada | 20 and more [k] | 1 | 2 |

*Notes* :
[a] : Reversed Calmfors and Driffill corporatism index (1988). 16 = highly corporatist country.
[b] : Reversed Bruno and Sachs corporatism index (1985). 16 = highly corporatist country.
[c] : Hartog et al. (1997). [d] : Blanchflower and Freeman (1992). [e] : Own calculations (see Table 13). [f] : Dell'Aringa and Lucifora (1994). [g] : Barth et al. (1994). [h] : Andrews et al. (1998), Stewart (1987). [i] : Booth (1995) and Pencavel (1991). [j] : Christie (1992). [k] : Robinson (1989) and Robinson and Tomes (1984).

In an international perspective, our results support the hypothesis that the sensitivity of wages to the bargaining regime is significantly lower in corporatist countries. Indeed, as shown in Table 14, the estimated union - non union wage gap is over 20% in Canada (Robinson, 1989 and Robinson and Tomes, 1984), between 15 and 17% in Australia (Christie, 1992) and approximately 15% in the USA (Booth, 1995; Pencavel, 1991). The studies on the UK, for their part, reveal the existence of a union wage gap which stands at between 8 and 12% (Andrews et al., 1998) with sizeable differences depending on the bargaining regime considered (Stewart, 1987). The results in the case of continental Europe are rarer. Dell'Aringa and Lucifora (1994), however, report a union wage gap of 4.4% for unskilled workers and 7.5% for skilled workers in the metal-mechanical industry in Italy. In Germany,

Austria and the Netherlands, this effect would be respectively 6.5%[21] (Blanchflower and Freeman, 1992) and 4% (Hartog et al., 1997). Finally, according to Barth et al. (1994), Norwegian workers covered by a company collective agreement would, all other things being equal, earn 7.5% more than their opposite numbers (solely) covered by a national collective agreement.

## 6. CONCLUSION

The current understanding of the structure of wages and more particularly inter-industry wage disparities in Belgium is very limited. Such an analysis in fact requires a major database matching the characteristics of the establishments and those working therein which has not been available until now. Moreover, the results as to the influence of the bargaining regimes on inter-industry wage disparities and on wage levels in the countries of continental Europe are fragmentary. Therefore in this chapter, we have addressed both issues for the Belgian private sector on the basis of the 1995 *Structure of Earnings Survey*. It is a very rich worker-firm matched database which has never been used before.

In the first section of this chapter, we highlighted the fact that the structure of wages in the Belgian private sector is incompatible with the neo-classical model, according to which wage disparities in equilibrium are explained either by differences in the quality of the labour force, or by so-called compensating differences. In fact we note that wage differentials subsist between agents who are apparently similar from the point of view of their individual characteristics and their working conditions. Our results also suggest that these differences derive partly from the characteristics of the employers in each sector (size of the establishment, wage bargaining regime). Hence, they indicate that the determination of wages within each industry is influenced by the organisational and technological characteristics of the establishments making it up. Moreover, in an international perspective, our findings support the existence of a negative relation between the dispersion of the inter-industry wage differentials and the degree of corporatism of the industrialised countries.

[21] Results for Austria and Germany should be regarded with care because they have been measured rather inadequately. Indeed, they reflect the impact of individual membership on wages and not that of the bargaining regime.

How are we to interpret these results ? The wage disparities observed between the various sectors militate in favour of the efficiency wage theory. Indeed, the latter shows that if the incentive conditions for effort vary between sectors, then two individuals with identical individual characteristics, placed in the same working conditions, are likely to earn different wages. However, this theory does not make it clear why the non-competitive wage disparities are greater in the non-corporatist countries. In point of fact, the constraints forcing employers to pay *efficient* wages, in other words wages higher than the competitive level, seem similar among the industrialised countries. We argue that the rent-sharing theory provides a more reliable explanation. In other words, we believe that inter-industry wage differentials are lower in the corporatist countries because of the explicit or implicit co-ordination of the wage bargaining, which restricts the insider power of the workers, i.e their ability to capture part of the sectoral rents. Notice, that this phenomenon is also reinforced by the policy of 'wage solidarity' pursued by the unions in most of the corporatist countries. This interpretation of the heterogeneity of the inter-industry wage differentials runs counter to the theoretical foundations of the Calmfors and Driffill results (1988). The point is that it rejects the hypothesis that the non-competitive wage differentials would be greater in those countries where wage bargaining is conducted primarily at the sectoral level. It serves more to back up our empirical results described in the third section of chapter 2. Nevertheless, the relationship between the scale of inter-industry wage differentials and labour market performance should be regarded with caution.

In the second chapter of this contribution, we emphasised the existence of a *sectoral effect* on the workers' wages, irrespective of the bargaining regime considered. In other words, our results show that the sectors offering high/low wages are similar for workers covered by different bargaining regimes. This result is explained by the relative homogeneity of the organisational and technological characteristics of the establishments within each sector of activity. In addition, it might be due to a phenomenon of mimetism (Dickens, 1986) : companies in which wages are not (re)negotiated collectively might be patterning their wage policy on those which do operate such an arrangement, in order to attract the best workers, to show their staff that they are being treated fairly and to curb the rate of manpower rotation. Nevertheless, our findings do show that the bargaining regime has a significant impact upon the structure of the wages in Belgium. In fact we note that the weighted adjusted standard deviation (WASD) of the inter-industry wage differentials is lower where wages are covered by a company collective agreement. This puzzling result can be explained by the fact that the

workers whose wages are solely covered by national and/or sectoral collective agreements are diluted across sectors offering more heterogeneous wage differentials. To put it differently, this result derives from the fact that the diversity of workers' bargaining power with respect to wages is more pronounced when wages are not covered by a company collective agreement. What is more, results suggest that it is likely that the WASD of inter-industry wage differentials would have been larger among firms covered by a company collective agreement if the distribution of sectoral employment had been the same across bargaining regimes. Hence, they do corroborate the idea that, *all other things being equal*, the dispersion of inter-industry wage differentials increases when collective bargaining becomes more decentralised. Finally, results indicate that the bargaining regime has a significant influence on the level of wages and that, all other things being equal, workers covered by a company collective agreement earn 5.1% more than their opposite numbers who are (solely) covered by national and/or sectoral collective agreements. In an international perspective, this finding supports the hypothesis that the sensitivity of wages to the bargaining regime is significantly lower in corporatist countries.

Future research concerning the magnitude of inter-industry wage differentials and the impact of the bargaining regime on the structure of wages in the Belgian private sector should rely on a longitudinal database in order to control for the non observed individual characteristics of the workers. Indeed, these characteristics might modify our results if it emerged that they were not distributed randomly between sectors and/or bargaining regimes. Unfortunately, at the moment such database does not exist. In addition, future analysis should try to control for a potential firm selectivity effect, i.e. for the fact that firms in a particular bargaining regime might not be representative of the overall sample of firms. However, as pointed out by Hartog et al. (1997: 7), "every judgement will be provisional as long as no independent variables to control for the endogeneity of the bargaining regime are available". Further research should also investigate whose wages unions raise/compress most or least (e.g. men vs. women, high skilled vs. low skilled workers,…). Let us finally note that the link between the magnitude of wage differentials and labour market performance should also deserve more attention.

# APPENDICES

## Appendix 1 : Description of the Variables

| | Overall sample | *Bargaining regime :* Company CA[1] | Only national and/or sectoral CA[2] |
|---|---|---|---|
| **Continuous variables** | *Average and standard deviation* | | |
| Gross hourly wage | | | |
| Gross hourly wage (in BEF), includes overtime paid and bonuses for shift work, night work and/or weekend work. Pay for holiday, 13th month, arrears, advances, travelling expenses etc. are excluded. | 481.03 (224.02) | 522.50 (213.38) | 455.56 (226.27) |
| Seniority in the company | 9.85 | 12.12 | 8.44 |
| Seniority in the company (years) | (9.03) | (9.32) | (8.60) |
| Prior experience | 9.49 | 7.83 | 10.53 |
| Experience accumulated on the labour market before the lost job (years) | (8.52) | (7.35) | (9.03) |
| Size of the establishment | 500.89 | 949.72 | 222.60 |
| Size of the establishment (number of workers) | (1145.09) | (1610.57) | (547.84) |
| Hours | 159.65 | 159.65 | 158.01 |
| Number of hours paid, including overtime paid | (27.13) | (27.13) | (31.74) |
| **Dummy variables** | *Frequency of occurrence within each bargaining regime (%)* | | |
| Sex | | | |
| Female | 31.4 | 27.4 | 33.6 |
| Male (reference) | 68.6 | 72.6 | 66.4 |
| Education | | | |
| Primary or no degree : 0-6 years (reference) | 9.7 | 10.0 | 9.4 |
| Lower secondary : 9 years | 24.3 | 22.6 | 25.2 |
| General upper secondary : 12 years | 18.4 | 18.1 | 18.4 |
| Technical/Artistic/Prof. upper secondary : 12 years | 24.9 | 25.9 | 25.2 |
| Higher non-university short type, higher artistic training : 14 years | 13.9 | 14.2 | 13.4 |
| University and non-university higher education, long type : 16 years | 8.4 | 8.7 | 7.9 |
| Post-graduate : 17 years or more | 0.5 | 0.4 | 0.6 |
| Occupation | | | |
| Corporate managers | 6.3 | 6.8 | 5.9 |

| | | | |
|---|---|---|---|
| Managers of small enterprises | 0.1 | 0.1 | 0.1 |
| Physical, mathematic and engineer science professionals | 3.7 | 4.3 | 3.4 |
| Life science and health professionals | 0.3 | 0.5 | 0.1 |
| Teaching professionals | 0.0 | 0.0 | 0.0 |
| Other professionals | 1.8 | 1.2 | 2.2 |
| Physical and engineer science associate professionals | 10.0 | 11.6 | 9.2 |
| Life science and health associate professionals | 0.2 | 0.5 | 0.1 |
| Teaching associate professionals | 0.0 | 0.0 | 0.0 |
| Other associate professionals | 4.8 | 4.5 | 5.0 |
| Office clerks (reference) | 18.8 | 20.9 | 16.8 |
| Customer services clerks | 1.3 | 1.3 | 1.0 |
| Personal and protective services workers | 3.2 | 1.8 | 4.0 |
| Models, salespersons and demonstrators | 7.4 | 6.6 | 8.3 |
| Extraction and building trading workers | 4.3 | 3.1 | 5.4 |
| Metal, machinery and related trades workers | 8.6 | 12.5 | 6.1 |
| Precision, handicraft, printing workers | 1.5 | 1.9 | 1.2 |
| Other craft and related trades workers | 4.5 | 2.5 | 5.9 |
| Stationary plant and related operators | 2.4 | 4.3 | 1.1 |
| Machine operators and assemblers | 5.0 | 5.7 | 4.7 |
| Drivers and mobile plant operators | 4.6 | 2.8 | 6.1 |
| Sales and services elementary occupations | 3.8 | 1.8 | 5.1 |
| Labourers in mining, construction, manufacturing and transport | 7.3 | 5.4 | 8.4 |
| Region (geographic location of the establishment) | | | |
| Brussels (reference) | 17.6 | 17.3 | 16.8 |
| Wallonia | 19.4 | 22.2 | 16.8 |
| Flanders | 63.0 | 60.5 | 66.4 |
| Supervises the work of his or her co-workers | | | |
| No (reference) | 83.7 | 82.1 | 84.8 |
| Yes | 16.3 | 17.9 | 15.2 |
| Level of wage bargaining | | | |
| Collective wage agreement at the company level | 39.3 | 100.0 | / |
| Collective wage agreement only at the national and/or sectoral level (reference) | 51.7 | / | 100.0 |
| Other | 9.0 | / | / |
| Contract | | | |
| Unlimited-term employment contract (reference) | 97.0 | 96.5 | 97.3 |
| Limited-term employment contract | 2.4 | 3.0 | 2.1 |
| Apprentice/Trainee contract | 0.1 | 0.1 | 0.2 |
| Other | 0.5 | 0.5 | 0.5 |
| Bonus for shift work, night work and/or weekend work | | | |

| | | | |
|---|---|---|---|
| No (reference) | 84.9 | 75.2 | 90.8 |
| Yes | 15.1 | 24.8 | 9.2 |
| Overtime paid | | | |
| No (reference) | 92.7 | 89.9 | 94.3 |
| Yes | 7.3 | 10.1 | 5.7 |
| Industry | | | |
| Other mining and quarrying (14) | 0.3 | 0.1 | 0.4 |
| Manufacture of food products and beverages (15) | 5.2 | 5.3 | 5.7 |
| Manufacture of tobacco products (16) | 0.3 | 0.1 | 0.5 |
| Manufacture of textiles (17) | 3.4 | 1.9 | 4.1 |
| Manufacture of wearing apparel; dressing and dyeing of fur (18) | 1.2 | 0.4 | 1.9 |
| Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear (19) | 0.2 | 0.0 | 0.3 |
| Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (20) | 1.0 | 0.3 | 1.4 |
| Manufacture of pulp, paper and paper products (21) | 1.2 | 2.5 | 0.3 |
| Publishing, printing and reproduction of recorded media (22) | 1.8 | 0.9 | 2.8 |
| Manufacture of coke, refined petroleum products and nuclear fuel (23) | 0.4 | 0.3 | 0.3 |
| Manufacture of chemicals and chemical products (24) | 5.2 | 10.7 | 1.4 |
| Manufacture of rubber and plastic products (25) | 1.8 | 2.6 | 1.2 |
| Manufacture of other non-metallic mineral products (26) | 2.8 | 3.8 | 2.1 |
| Manufacture of basic metals (27) | 2.6 | 5.9 | 0.5 |
| Manufacture of fabricated metal products, except machinery and equipment (28) | 3.3 | 2.8 | 3.6 |
| Manufacture of machinery and equipment n.e.c. (29) | 3.0 | 4.5 | 2.3 |
| Manufacture of office machinery and computers (30) | 0.0 | / | 0.0 |
| Manufacture of electrical machinery and apparatus n.e.c. (31) | 1.4 | 2.3 | 0.5 |
| Manufacture of radio, television and communications equipment and apparatus (32) | 1.4 | 1.8 | 1.3 |
| Manufacture of medical, precision and optical instruments, watches and clocks (33) | 0.3 | 0.5 | 0.2 |
| Manufacture of motor vehicles, trailers and semi-trailers (34) | 3.6 | 8.0 | 0.6 |
| Manufacture of other transport equipment (35) | 0.8 | 1.1 | 0.8 |
| Manufacture of furniture; manufacturing n.e.c. (36) | 1.9 | 1.2 | 1.9 |
| Recycling (37) | 0.2 | 0.0 | 0.2 |
| Electricity, gas, steam and hot water supply (40) | 1.4 | 0.0 | 2.7 |
| Collecting, purification and distribution of water (41) | / | / | / |
| Construction (45) | 4.7 | 1.4 | 7.5 |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel (50) | 2.4 | 1.6 | 3.2 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles (51) | 11.0 | 4.9 | 14.7 |
| Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods (52) | 9.5 | 10.2 | 9.0 |
| Hotels and restaurants (55) | 3.0 | 1.8 | 3.7 |

| | | | |
|---|---|---|---|
| Land transport; transport via pipelines (60) | 2.8 | 1.2 | 4.1 |
| Water transport (61) | 0.1 | 0.0 | 0.1 |
| Air transport (62) | 0.1 | 0.1 | 0.0 |
| Supporting and auxiliary transport activities; activities of travel agencies (63) | 1.6 | 1.2 | 1.8 |
| Post and telecommunications (64) | 0.4 | 0.1 | 0.7 |
| Financial intermediation, except insurance and pension funding (65) | 6.6 | 13.2 | 2.4 |
| Insurance and pension funding, except compulsory social security (66) | 2.1 | 3.3 | 0.9 |
| Activities auxiliary to financial intermediation (67) | 0.3 | 0.2 | 0.3 |
| Real estate activities (70) | 0.2 | / | 0.1 |
| Renting of machinery and equipment without operator and of personal and household goods (71) | 0.3 | 0.5 | 0.1 |
| Computer and related activities (72) | 1.1 | 1.8 | 0.7 |
| Research and development (73) | 0.2 | 0.2 | 0.2 |
| Other businesses activities (74) | 8.9 | 1.2 | 13.3 |
| Number of observations in the sample | 67023 | 26806 | 34774 |

*Note* : The descriptive statistics refer to the weighted sample.
[1] Collective wage agreement at the company level; [2] Collective wage agreement only at the national and/or sectoral level.

## Appendix 2 : Complete Wage Equation

| Explanatory variables[1] | Coefficients | t-stat | Wage[2] | Variation[3] |
|---|---|---|---|---|
| Constant (reference) | 5.524** | 1434.89 | 251 | 0.0 |
| *Education* | | | | |
| Primary or no degree : 0-6 years (reference) | Reference | | | |
| Lower secondary : 9 years | 0.053** | 70.09 | 265 | 5.4 |
| General upper secondary : 12 years | 0.140** | 159.21 | 289 | 15.0 |
| Technical/Artistic/Prof. upper secondary : 12 years | 0.128** | 156.76 | 285 | 13.7 |
| Higher non-university short type, higher artistic training : 14 years | 0.221** | 219.79 | 313 | 24.7 |
| University and non-university higher education, long type : 16 years | 0.383** | 324.12 | 368 | 46.7 |
| Post-graduate : 17 years or more | 0.510** | 176.45 | 418 | 66.5 |
| *General experience* | | | | |
| Simple | 0.016** | 118.87 | | |
| Squared/$10^2$ | -0.036** | -40.48 | | |
| Cubed/$10^4$ | 0.022** | 13.31 | | |
| *Seniority in the company* | | | | |
| Simple | 0.016** | 220.70 | | |
| Squared/$10^2$ | -0.017** | -71.06 | | |
| Dummy=1 if the individual has no seniority | -0.010** | -4.48 | | |
| *Sex* | | | | |
| Male | Reference | | | |
| Female | -0.116** | -227.73 | 224 | -11.0 |
| *Occupation* | | | | |
| Office clerks | Reference | | | |
| Corporate managers | 0.360** | 349.79 | 360 | 43.3 |
| Managers of small enterprises | 0.068** | 9.79 | 269 | 7.0 |
| Physical, mathematic and engineer science professionals | 0.162** | 132.95 | 295 | 17.6 |
| Life science and health professionals | 0.146** | 34.65 | 290 | 15.7 |
| Teaching professionals | 0.127** | 13.42 | 285 | 13.5 |
| Other professionals | 0.120** | 77.78 | 283 | 12.7 |
| Physical and engineer science associate professionals | 0.019** | 22.93 | 256 | 1.9 |
| Life science and health associate professionals | -0.069** | -16.01 | 234 | -6.7 |
| Teaching associate professionals | 0.057** | 2.59 | 266 | 5.9 |
| Other associate professionals | 0.091** | 90.66 | 275 | 9.5 |
| Customer services clerks | -0.054** | -29.63 | 238 | -5.3 |
| Personal and protective services workers | -0.064** | -33.21 | 235 | -6.2 |
| Models, salespersons and demonstrators | -0.070** | -68.25 | 234 | -6.7 |
| Extraction and building trading workers | -0.059** | -46.91 | 237 | -5.7 |
| Metal, machinery and related trades workers | -0.063** | -65.07 | 236 | -6.1 |
| Precision, handicraft, printing workers | -0.068** | -32.68 | 234 | -6.6 |
| Other craft and related trades workers | -0.089** | -72.44 | 230 | -8.5 |
| Stationary plant and related operators | -0.060** | -39.70 | 236 | -5.8 |
| Machine operators and assemblers | -0.077** | -68.18 | 232 | 7.4 |
| Drivers and mobile plant operators | -0.108** | -87.33 | 225 | -10.2 |
| Sales and services elementary occupations | -0.134** | -91.89 | 220 | -12.5 |
| Labourers in mining, construction, manufacturing and transport | -0.108** | -111.06 | 225 | -10.2 |
| *Region* | | | | |
| Brussels | Reference | | | |
| Wallonia | -0.036** | -49.91 | 242 | -3.5 |
| Flanders | -0.037** | -61.39 | 242 | -3.6 |
| *Supervises the work of his or her co-workers* | | | | |
| No | Reference | | | |
| Yes | 0.110** | 177.14 | 280 | 11.6 |
| *Hours* | | | | |
| Ln of the number of hours paid, including overtime paid | -0.000 | -0.65 | 251 | -0.0 |

| | | | | |
|---|---|---|---|---|
| *Bonus for shift work, night work and/or weekend work* | | | | |
| No | Reference | | | |
| Yes | 0.057** | 87.39 | 266 | 5.9 |
| *Overtime paid* | | | | |
| No | Reference | | | |
| Yes | 0.024** | 30.61 | 257 | 2.4 |
| *Contract* | | | | |
| Unlimited-term employment contract | Reference | | | |
| Limited-term employment contract | -0.025** | -19.10 | 245 | -2.5 |
| Apprentice/Trainee contract | -0.636** | -124.12 | 133 | -47.1 |
| Other employment contract | -0.024** | -8.48 | 245 | -2.4 |
| *Size of the establishment* | | | | |
| Ln size of the establishment (number of workers) | 0.029** | 165.05 | | |
| *Level of wage bargaining* | | | | |
| CA at the company level | Reference | | | |
| CA only at the national and/or sectoral level (reference) | 0.023** | 42.39 | 257 | 2.3 |
| Other | -0.016** | -22.60 | 247 | -1.6 |
| $R^2$ adjusted | 0.713 | | | |
| F-test | 11792.23** | | | |
| Number of observations | 67023 | | | |

*Notes* : * $p < 0.05$, ** $p < 0.01$. [1] 173 indicators of sectoral affiliation have also been included in the regression.
[2] Gross hourly wage in BEF
[3] Variation in % with regard to the reference.

## Appendix 3 : Inter-Industry Wage Differentials and their Dispersion

| *Industry (Nace 3-digit)* | *Variables included in the wage equation: (i) Y* | *(ii) X, Y* | *(iii) X, Y, Z* |
|---|---|---|---|
| Quarrying of stone (141) | 0,020 | 0,014 | 0,022 |
| Quarrying of sand and clay (142) | 0,119 | 0,062 | 0,067 |
| Mining of chemical and fertiliser minerals (143) | 0,200 | **-0,094** | **-0,028** |
| Other mining and quarrying n.e.c. (145) | **-0,216** | -0,194 | -0,163 |
| Production, processing and preserving of meat and meat products (151) | -0,185 | -0,035 | -0,025 |
| Processing and preserving of fish and fish products (152) | **-0,269** | **-0,092** | -0,066 |
| Processing and preserving of fruit and vegetables (153) | -0,125 | -0,073 | -0,088 |
| Manufacture of vegetable and animal oils and fats (154) | 0,178 | 0,092 | 0,059 |
| Manufacture of dairy products (155) | 0,032 | 0,026 | 0,001 |
| Manufacture of grain mill products, starches and starch products (156) | 0,085 | 0,056 | 0,033 |
| Manufacture of prepared animal feeds (157) | 0,047 | 0,011 | 0,016 |
| Manufacture of other food products (158) | -0,109 | -0,010 | -0,007 |
| Manufacture of beverages (159) | -0,047 | -0,030 | -0,036 |
| Manufacture of tobacco product (160) | 0,039 | 0,033 | 0,021 |
| Preparation and spinning of textile fibres (171) | -0,153 | -0,054 | -0,080 |
| Textile weaving (172) | -0,130 | -0,040 | -0,050 |
| Finishing of textiles (173) | -0,221 | -0,123 | -0,127 |
| Manufacture of made-up textile articles, except apparel (174) | -0,274 | **-0,104** | **-0,109** |
| Manufacture of other textiles (175) | -0,133 | -0,022 | -0,028 |
| Manufacture of knitted and crocheted fabrics (176) | -0,132 | **-0,119** | **-0,102** |
| Manufacture of knitted and crocheted articles (177) | -0,487 | -0,283 | -0,250 |
| Manufacture of other wearing apparel and accessories (182) | -0,273 | -0,125 | -0,115 |
| Dressing and dyeing of fur; manufacture of articles of fur (183) | -0,387 | -0,206 | **-0,165** |
| Tanning and dressing of leather (191) | **-0,280** | **-0,115** | **-0,115** |
| Manufacture of luggage, handbags and the like, saddlery and harness (192) | -0,229 | 0,061 | 0,021 |
| Manufacture of footwear (193) | -0,195 | -0,075 | -0,036 |
| Sawmilling and planing of wood, impregnation of wood (201) | -0,152 | -0,065 | -0,037 |
| Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards (202) | -0,090 | 0,004 | 0,007 |
| Manufacture of builders' carpentry and joinery (203) | -0,162 | -0,059 | -0,043 |
| Manufacture of wooden containers (204) | -0,192 | -0,040 | -0,009 |
| Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials (205) | -0,139 | -0,082 | -0,066 |
| Manufacture of pulp, paper and paperboard (211) | 0,230 | 0,244 | 0,199 |
| Manufacture of articles of paper and paperboard (212) | 0,019 | 0,049 | 0,018 |
| Publishing (221) | 0,164 | 0,048 | 0,027 |
| Printing and service activities related to printing (222) | 0,081 | 0,089 | 0,097 |
| Manufacture of coke oven products (231) | 0,102 | 0,118 | 0,084 |
| Manufacture of refined petroleum products (232) | 0,460 | 0,290 | 0,267 |
| Processing of nuclear fuel (233) | 0,277 | 0,058 | 0,049 |
| Manufacture of basic chemicals (241) | 0,321 | 0,211 | 0,161 |
| Manufacture of pesticides and other agro-chemical products (242) | 0,237 | 0,106 | 0,100 |
| Manufacture of paints, varnishes and similar coatings, printing ink and mastics (243) | 0,123 | 0,101 | 0,075 |
| Manufacture of pharmaceuticals, medicinal chemicals and botanical product (244) | 0,154 | 0,060 | 0,026 |
| Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations (245) | -0,037 | 0,009 | -0,026 |
| Manufacture of other chemical products (246) | 0,254 | 0,122 | 0,107 |
| Manufacture of man-made fibres (247) | -0,069 | 0,055 | 0,033 |
| Manufacture of rubber products (251) | 0,020 | 0,010 | -0,017 |

| | | | |
|---|---|---|---|
| Manufacture of plastic products (252) | -0,005 | 0,007 | 0,005 |
| Manufacture of glass and glass products (261) | 0,067 | 0,060 | 0,012 |
| Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products (262) | 0,060 | 0,046 | 0,013 |
| Manufacture of ceramic tiles and flags (263) | -0,089 | -0,050 | -0,035 |
| Manufacture of bricks, tiles and construction products, in baked clay (264) | -0,039 | -0,013 | -0,021 |
| Manufacture of cement, lime and plaster (265) | 0,268 | 0,195 | 0,172 |
| Manufacture of articles of concrete, plaster and cement (266) | -0,038 | 0,015 | 0,020 |
| Cutting, shaping and finishing of stone (267) | -0,089 | -0,028 | 0,029 |
| Manufacture of other non-metallic mineral products (268) | 0,159 | 0,092 | 0,088 |
| Manufacture of basic iron and steel and of ferro-alloys (ECSC) (271) | 0,278 | 0,106 | 0,011 |
| Other first processing of iron and steel and production of non-ECSC ferro-alloys (273) | 0,185 | 0,111 | 0,046 |
| Manufacture of basic precious and non-ferrous metals (274) | 0,214 | 0,145 | 0,086 |
| Casting of metals (275) | -0,038 | -0,026 | -0,031 |
| Manufacture of structural metal products (281) | -0,097 | -0,017 | -0,005 |
| Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers (282) | -0,077 | -0,004 | -0,007 |
| Manufacture of steam generators, except central heating hot water boilers (283) | -0,047 | -0,025 | -0,031 |
| Forging, pressing, stamping and roll forming of metal; powder metallurgy (284) | 0,056 | 0,064 | 0,064 |
| Treatment and coating of metals; general mechanical engineering (285) | -0,101 | -0,021 | -0,006 |
| Manufacture of cutlery, tools and general hardware (286) | -0,125 | -0,030 | -0,008 |
| Manufacture of other fabricated metal products (287) | -0,065 | 0,000 | 0,002 |
| Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines (291) | 0,078 | 0,043 | 0,026 |
| Manufacture of other general purpose machinery (292) | -0,045 | -0,054 | -0,054 |
| Manufacture of agricultural and forestry machinery (293) | -0,070 | 0,031 | -0,036 |
| Manufacture of machine-tools (294) | 0,042 | -0,015 | -0,034 |
| Manufacture of other special purpose machinery (295) | -0,002 | -0,017 | -0,058 |
| Manufacture of weapons and ammunition (296) | 0,170 | 0,170 | 0,100 |
| Manufacture of domestic appliances n.e.c. (297) | -0,132 | -0,117 | -0,133 |
| Manufacture of office machinery and computers (300) | **-0,223** | -0,039 | 0,013 |
| Manufacture of electric motors, generators and transformers (311) | -0,022 | 0,009 | -0,023 |
| Manufacture of electricity distribution and control apparatus (312) | -0,015 | 0,048 | 0,011 |
| Manufacture of insulated wire and cable (313) | 0,057 | 0,105 | 0,055 |
| Manufacture of accumulators, primary cells and primary batteries (314) | 0,139 | 0,103 | 0,049 |
| Manufacture of lighting equipment and electric lamps (315) | 0,026 | 0,011 | -0,013 |
| Manufacture of electrical equipment n.e.c. (316) | -0,072 | -0,055 | -0,094 |
| Manufacture of electronic valves and tubes and other electronic components (321) | 0,094 | 0,051 | 0,021 |
| Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy (322) | 0,258 | 0,109 | 0,054 |
| Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods (323) | -0,037 | -0,068 | **-0,101** |
| Manufacture of medical and surgical equipment and orthopaedic appliances (331) | 0,252 | 0,106 | 0,064 |
| Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment (332) | 0,145 | 0,108 | 0,086 |
| Manufacture of industrial process control equipment (333) | 0,017 | -0,007 | 0,008 |
| Manufacture of optical instruments and photographic equipment (334) | -0,129 | -0,167 | -0,167 |
| Manufacture of watches and clocks (335) | -0,150 | -0,137 | **-0,107** |
| Manufacture of motor vehicles (341) | 0,131 | 0,090 | -0,014 |
| Manufacture of bodies (coachwork) for motor vehicles; manufacture of | -0,076 | 0,000 | -0,066 |

| | | | |
|---|---|---|---|
| trailers and semi-trailers (342) | | | |
| Manufacture of parts and accessories for motor vehicles and their engines (343) | -0,051 | 0,002 | -0,034 |
| Building and repairing of ships and boats (351) | 0,013 | -0,004 | 0,010 |
| Manufacture of railway and tramway locomotives and rolling stock (352) | 0,173 | 0,034 | 0,007 |
| Manufacture of aircraft and spacecraft (353) | 0,197 | 0,108 | 0,035 |
| Manufacture of motorcycles and bicycles (354) | 0,042 | -0,009 | -0,015 |
| Manufacture of other transport equipment n.e.c. (355) | **-0,293** | **-0,113** | -0,072 |
| Manufacture of furniture (361) | -0,138 | -0,062 | -0,057 |
| Manufacture of jewellery and related articles (362) | -0,392 | -0,289 | -0,252 |
| Manufacture of musical instruments (363) | **-0,219** | **-0,058** | 0,005 |
| Manufacture of sports goods (364) | -0,184 | **-0,141** | **-0,105** |
| Manufacture of games and toys (365) | -0,070 | 0,051 | 0,002 |
| Miscellaneous manufacturing n.e.c (366) | -0,222 | **-0,100** | **-0,111** |
| Recycling of metal waste and scrap (371) | 0,122 | 0,141 | 0,149 |
| Recycling of non-metal waste and scrap (372) | -0,367 | -0,124 | -0,098 |
| Production and distribution of electricity (401) | 0,411 | 0,273 | 0,237 |
| Manufacture of gas; distribution of gaseous fuels through mains (402) | 0,496 | 0,324 | 0,320 |
| Collection, purification and distribution of water (410) | / | / | / |
| Site preparation (451) | -0,173 | -0,020 | 0,006 |
| Building of complete constructions or parts thereof; civil engineering (452) | -0,068 | 0,001 | 0,016 |
| Building installation (453) | -0,090 | -0,064 | -0,052 |
| Building completion (454) | -0,091 | -0,029 | 0,011 |
| Renting of construction or demolition equipment with operator (455) | **-0,105** | 0,062 | 0,122 |
| Sale of motor vehicles (501) | 0,075 | 0,029 | 0,029 |
| Maintenance and repair of motor vehicles (502) | -0,133 | -0,084 | -0,040 |
| Sale of motor vehicle parts and accessories (503) | -0,101 | **-0,107** | -0,077 |
| Sale, maintenance and repair of motorcycles and related parts and accessories (504) | **-0,176** | **-0,117** | **-0,057** |
| Retail sale of automotive fuel (505) | -0,205 | -0,075 | -0,042 |
| Wholesale on a fee or contract basis (511) | 0,209 | 0,087 | 0,154 |
| Wholesale of agricultural raw materials and live animals (512) | -0,063 | -0,050 | -0,049 |
| Wholesale of food, beverages and tobacco (513) | -0,111 | -0,064 | -0,056 |
| Wholesale of household goods (514) | 0,054 | -0,031 | -0,003 |
| Wholesale of non-agricultural intermediate products, waste and scrap (515) | 0,049 | 0,001 | 0,030 |
| Wholesale of machinery, equipment and supplies (516) | 0,130 | -0,001 | 0,018 |
| Other wholesale (517) | 0,080 | **-0,083** | -0,065 |
| Retail sale in non-specialised stores (521) | -0,256 | -0,102 | -0,108 |
| Retail sale of food, beverages and tobacco in specialised stores (522) | -0,449 | -0,210 | -0,172 |
| Retail sale of pharmaceutical and medical goods, cosmetic and toilet articles (523) | 0,035 | -0,059 | -0,077 |
| Other retail sale of new goods in specialised store (524) | -0,280 | -0,150 | -0,127 |
| Retail sale of second-hand goods in stores (525) | -0,456 | -0,253 | -0,204 |
| Retail sale not in stores (526) | -0,107 | -0,059 | -0,067 |
| Repair of personal and household goods (527) | **-0,224** | **-0,119** | -0,151 |
| Hotels (551) | -0,276 | -0,154 | -0,134 |
| Camping sites and other provision of short-stay accommodation (552) | **-0,242** | -0,124 | -0,096 |
| Restaurants (553) | -0,391 | -0,193 | -0,156 |
| Bars (554) | -0,373 | -0,170 | -0,125 |
| Canteens and catering (555) | -0,314 | -0,137 | -0,124 |
| Transport via railways (601) | / | / | / |
| Other land transport (602) | -0,200 | -0,079 | -0,062 |
| Sea and coastal water transport (611) | 0,336 | 0,168 | 0,150 |
| Inland water transport (612) | 0,116 | 0,197 | 0,245 |

| | | | |
|---|---|---|---|
| Scheduled air transport (621) | 0,184 | 0,165 | 0,185 |
| Non-scheduled air transport (622) | -0,023 | 0,044 | 0,078 |
| Space transport (623) | 0,014 | 0,041 | 0,036 |
| Cargo handling and storage (631) | 0,106 | 0,073 | 0,099 |
| Other supporting transport activities (632) | -0,183 | -0,117 | -0,086 |
| Activities of travel agencies and tour operators; tourist assistance activities n.e.c. (633) | -0,072 | -0,053 | -0,065 |
| Activities of other transport agencies (634) | 0,055 | 0,040 | 0,061 |
| Post and courier activities (641) | -0,189 | **-0,091** | -0,125 |
| Telecommunications (642) | 0,614 | 0,395 | 0,346 |
| Monetary intermediation (651) | 0,336 | 0,163 | 0,122 |
| Other financial intermediation (652) | 0,221 | 0,083 | 0,105 |
| Insurance and pension funding, except compulsory social security (660) | 0,222 | 0,091 | 0,062 |
| Activities auxiliary to financial intermediation, except insurance and pension funding (671) | 0,209 | 0,085 | 0,138 |
| Activities auxiliary to insurance and pension funding (672) | 0,081 | -0,018 | 0,005 |
| Real estate activities with own property (701) | 0,040 | -0,011 | 0,060 |
| Letting of own property (702) | -0,154 | **-0,092** | -0,023 |
| Real estate activities on a fee or contract basis (703) | -0,102 | -0,069 | 0,006 |
| Renting of automobiles (711) | 0,063 | -0,033 | -0,013 |
| Renting of other transport equipment (712) | -0,104 | -0,031 | -0,033 |
| Renting of other machinery and equipment (713) | -0,047 | -0,051 | -0,040 |
| Renting of personal and household goods n.e.c. (714) | **-0,226** | -0,252 | -0,208 |
| Hardware consultancy (721) | 0,221 | 0,017 | 0,030 |
| Software consultancy and supply (722) | 0,204 | 0,003 | -0,003 |
| Data processing (723) | 0,269 | 0,108 | 0,127 |
| Data base activities (724) | -0,020 | **-0,108** | **-0,086** |
| Maintenance and repair of office, accounting and computing machinery (725) | -0,032 | **-0,096** | **-0,092** |
| Other computer related activities (726) | -0,087 | -0,274 | **-0,196** |
| Research and experimental development on natural sciences and engineering (731) | 0,302 | 0,090 | 0,064 |
| Research and experimental development on social sciences and humanities (732) | 0,588 | 0,156 | 0,207 |
| Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; holdings (741) | 0,249 | 0,060 | 0,094 |
| Architectural and engineering activities and related technical consultancy (742) | 0,167 | -0,008 | 0,014 |
| Technical testing and analysis (743) | 0,210 | 0,073 | 0,099 |
| Advertising (744) | 0,050 | -0,020 | 0,019 |
| Labour recruitment and provision of personnel (745) | **-0,247** | -0,110 | -0,073 |
| Investigation and security activities (746) | -0,183 | **-0,101** | -0,122 |
| Industrial cleaning (747) | -0,300 | -0,015 | -0,020 |
| Miscellaneous business activities n.e.c (748) | -0,082 | **-0,102** | -0,080 |
| $R^2$ adjusted | 0,327 | 0,703 | 0,713 |
| F-test relative to the estimated relation | 2928 | 11404 | 11792 |
| F-test relative to the sectoral dummies | 2928 | 1075 | 798 |
| Weighted adjusted standard deviation (WASD) of the inter-industry differentials ($d_k$) | 0,199 | 0,103 | 0,086 |
| Number of industries | 174 | 174 | 174 |
| Number of observation in the sample | 67023 | 67023 | 67023 |

*Notes* : All the estimates are significant at the level of 5%, except those in bold.
$Y$ : sectoral dummies , $X$ : individual characteristics and working conditions, $Z$ : specific features of the companies.

## Appendix 4 : Type of Bargaining Regime by Sector, Proportions

| *Industry (NACE 2-digit)* | *Bargaining regime[1] : (i) Only national and/or sectoral CA* | *(ii) Company CA* |
|---|---|---|
| | *Proportions across bargaining regimes (%)* | |
| Other mining and quarrying (14) | 0.83 | 0.17 |
| Manufacture of food products and beverages (15) | 0.59 | 0.41 |
| Manufacture of tobacco products (16) | 0.81 | 0.19 |
| Manufacture of textiles (17) | 0.74 | 0.26 |
| Manufacture of wearing apparel; dressing and dyeing of fur (18) | 0.88 | 0.12 |
| Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear (19) | 0.97 | 0.03 |
| Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (20) | 0.85 | 0.15 |
| Manufacture of pulp, paper and paper products (21) | 0.12 | 0.88 |
| Publishing, printing and reproduction of recorded media (22) | 0.81 | 0.19 |
| Manufacture of coke, refined petroleum products and nuclear fuel (23) | 0.57 | 0.43 |
| Manufacture of chemicals and chemical products (24) | 0.14 | 0.86 |
| Manufacture of rubber and plastic products (25) | 0.38 | 0.62 |
| Manufacture of other non-metallic mineral products (26) | 0.42 | 0.56 |
| Manufacture of basic metals (27) | 0.10 | 0.90 |
| Manufacture of fabricated metal products, except machinery and equipment (28) | 0.63 | 0.37 |
| Manufacture of machinery and equipment n.e.c. (29) | 0.41 | 0.59 |
| Manufacture of office machinery and computers (30) | 1.00 | 0.00 |
| Manufacture of electrical machinery and apparatus n.e.c. (31) | 0.22 | 0.78 |
| Manufacture of radio, television and communications equipment and apparatus (32) | 0.50 | 0.50 |
| Manufacture of medical, precision and optical instruments, watches and clocks (33) | 0.33 | 0.67 |
| Manufacture of motor vehicles, trailers and semi-trailers (34) | 0.09 | 0.91 |
| Manufacture of other transport equipment (35) | 0.49 | 0.51 |
| Manufacture of furniture; manufacturing n.e.c. (36) | 0.67 | 0.33 |
| Recycling (37) | 0.91 | 0.09 |
| Electricity, gas, steam and hot water supply (40) | 1.00 | 0.00 |
| Construction (45) | 0.87 | 0.13 |
| Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel (50) | 0.72 | 0.28 |
| Wholesale trade and commission trade, except of motor vehicles and motorcycles (51) | 0.80 | 0.20 |
| Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods (52) | 0.54 | 0.46 |
| Hotels and restaurants (55) | 0.73 | 0.27 |
| Land transport; transport via pipelines (60) | 0.81 | 0.19 |
| Water transport (61) | 0.87 | 0.13 |
| Air transport (62) | 0.39 | 0.61 |
| Supporting and auxiliary transport activities; activities of travel agencies (63) | 0.67 | 0.33 |
| Post and telecommunications (64) | 0.92 | 0.08 |
| Financial intermediation, except insurance and pension funding (65) | 0.20 | 0.80 |
| Insurance and pension funding, except compulsory social security (66) | 0.27 | 0.73 |
| Activities auxiliary to financial intermediation (67) | 0.67 | 0.33 |
| Real estate activities (70) | 1.00 | 0.00 |
| Renting of machinery and equipment without operator and of personal and household goods (71) | 0.23 | 0.77 |

| | | |
|---|---|---|
| Computer and related activities (72) | 0.33 | 0.67 |
| Research and development (73) | 0.53 | 0.47 |
| Other businesses activities (74) | 0.93 | 0.07 |
| Total | 0.57 | 0.43 |

*Note* : The proportions refer to the weighted sample.
[1] CA means collective (wage) agreement.

## Appendix 5 : Bargaining Regimes and Inter-Industry Wage Differentials

| *Industry (Nace 3-digit)* | *Bargaining regime[1] : (i) Only national and/or sectoral CA* | *(ii) Company CA* |
|---|---|---|
| Quarrying of stone (141) | 0,053 | -0,115 |
| Quarrying of sand and clay (142) | 0,023 | 0,071 |
| Mining of chemical and fertiliser minerals (143) | **-0,048** | / |
| Other mining and quarrying n.e.c. (145) | **-0,149** | **-0,099** |
| Production, processing and preserving of meat and meat products (151) | -0,002 | -0,098 |
| Processing and preserving of fish and fish products (152) | -0,036 | / |
| Processing and preserving of fruit and vegetables (153) | -0,056 | -0,131 |
| Manufacture of vegetable and animal oils and fats (154) | 0,130 | -0,001 |
| Manufacture of dairy products (155) | 0,024 | -0,015 |
| Manufacture of grain mill products, starches and starch products (156) | 0,043 | 0,012 |
| Manufacture of prepared animal feeds (157) | 0,097 | -0,054 |
| Manufacture of other food products (158) | -0,047 | 0,047 |
| Manufacture of beverages (159) | -0,021 | -0,047 |
| Manufacture of tobacco product (160) | 0,026 | 0,026 |
| Preparation and spinning of textile fibres (171) | -0,043 | -0,147 |
| Textile weaving (172) | -0,039 | **-0,074** |
| Finishing of textiles (173) | -0,105 | / |
| Manufacture of made-up textile articles, except apparel (174) | -0,105 | -0,112 |
| Manufacture of other textiles (175) | -0,036 | 0,003 |
| Manufacture of knitted and crocheted fabrics (176) | -0,073 | / |
| Manufacture of knitted and crocheted articles (177) | -0,245 | -0,264 |
| Manufacture of other wearing apparel and accessories (182) | -0,110 | -0,060 |
| Dressing and dyeing of fur; manufacture of articles of fur (183) | **-0,140** | / |
| Tanning and dressing of leather (191) | -0,077 | -0,271 |
| Manufacture of luggage, handbags and the like, saddlery and harness (192) | 0,040 | / |
| Manufacture of footwear (193) | -0,052 | / |
| Sawmilling and planing of wood, impregnation of wood (201) | -0,019 | / |
| Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards (202) | 0,026 | **-0,064** |
| Manufacture of builders' carpentry and joinery (203) | -0,044 | -0,031 |
| Manufacture of wooden containers (204) | 0,052 | -0,144 |
| Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials (205) | -0,049 | / |
| Manufacture of pulp, paper and paperboard (211) | 0,086 | 0,212 |
| Manufacture of articles of paper and paperboard (212) | -0,009 | 0,009 |
| Publishing (221) | 0,045 | 0,016 |
| Printing and service activities related to printing (222) | 0,106 | 0,085 |
| Manufacture of coke oven products (231) | / | 0,071 |
| Manufacture of refined petroleum products (232) | 0,308 | 0,148 |
| Processing of nuclear fuel (233) | 0,067 | 0,037 |
| Manufacture of basic chemicals (241) | 0,094 | 0,145 |
| Manufacture of pesticides and other agro-chemical products (242) | 0,198 | 0,130 |
| Manufacture of paints, varnishes and similar coatings, printing ink and mastics (243) | 0,117 | 0,035 |
| Manufacture of pharmaceuticals, medicinal chemicals and botanical product (244) | -0,003 | 0,023 |
| Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations (245) | -0,048 | -0,048 |
| Manufacture of other chemical products (246) | 0,073 | 0,110 |
| Manufacture of man-made fibres (247) | 0,050 | -0,009 |

| | | |
|---|---|---|
| Manufacture of rubber products (251) | -0,018 | -0,034 |
| Manufacture of plastic products (252) | 0,032 | -0,020 |
| Manufacture of glass and glass products (261) | -0,093 | 0,031 |
| Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products (262) | 0,142 | 0,010 |
| Manufacture of ceramic tiles and flags (263) | -0,033 | -0,015 |
| Manufacture of bricks, tiles and construction products, in baked clay (264) | -0,080 | 0,018 |
| Manufacture of cement, lime and plaster (265) | 0,217 | **0,146** |
| Manufacture of articles of concrete, plaster and cement (266) | 0,048 | -0,066 |
| Cutting, shaping and finishing of stone (267) | 0,019 | / |
| Manufacture of other non-metallic mineral products (268) | / | 0,133 |
| Manufacture of basic iron and steel and of ferro-alloys (ECSC) (271) | / | -0,023 |
| Other first processing of iron and steel and production of non-ECSC ferro-alloys (273) | -0,027 | 0,024 |
| Manufacture of basic precious and non-ferrous metals (274) | 0,159 | 0,053 |
| Casting of metals (275) | -0,062 | -0,016 |
| Manufacture of structural metal products (281) | 0,010 | -0,047 |
| Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers (282) | 0,015 | -0,037 |
| Manufacture of steam generators, except central heating hot water boilers (283) | 0,011 | **-0,061** |
| Forging, pressing, stamping and roll forming of metal; powder metallurgy (284) | 0,103 | 0,028 |
| Treatment and coating of metals; general mechanical engineering (285) | 0,015 | -0,029 |
| Manufacture of cutlery, tools and general hardware (286) | 0,048 | -0,095 |
| Manufacture of other fabricated metal products (287) | 0,017 | -0,014 |
| Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines (291) | 0,082 | -0,016 |
| Manufacture of other general purpose machinery (292) | -0,029 | -0,083 |
| Manufacture of agricultural and forestry machinery (293) | -0,055 | **-0,065** |
| Manufacture of machine-tools (294) | 0,005 | -0,052 |
| Manufacture of other special purpose machinery (295) | -0,022 | -0,089 |
| Manufacture of weapons and ammunition (296) | -0,011 | 0,119 |
| Manufacture of domestic appliances n.e.c. (297) | **-0,159** | -0,118 |
| Manufacture of office machinery and computers (300) | 0,016 | / |
| Manufacture of electric motors, generators and transformers (311) | / | -0,054 |
| Manufacture of electricity distribution and control apparatus (312) | 0,034 | -0,091 |
| Manufacture of insulated wire and cable (313) | 0,046 | 0,055 |
| Manufacture of accumulators, primary cells and primary batteries (314) | -0,084 | 0,038 |
| Manufacture of lighting equipment and electric lamps (315) | 0,022 | -0,054 |
| Manufacture of electrical equipment n.e.c. (316) | -0,045 | -0,112 |
| Manufacture of electronic valves and tubes and other electronic components (321) | 0,009 | 0,008 |
| Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy (322) | 0,114 | -0,035 |
| Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods (323) | -0,033 | -0,135 |
| Manufacture of medical and surgical equipment and orthopaedic appliances (331) | -0,069 | 0,066 |
| Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment (332) | 0,124 | 0,051 |
| Manufacture of industrial process control equipment (333) | 0,111 | -0,100 |
| Manufacture of optical instruments and photographic equipment (334) | **-0,075** | -0,198 |
| Manufacture of watches and clocks (335) | -0,086 | / |
| Manufacture of motor vehicles (341) | -0,066 | -0,041 |

| | | |
|---|---|---|
| Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers (342) | -0,047 | -0,108 |
| Manufacture of parts and accessories for motor vehicles and their engines (343) | 0,069 | -0,088 |
| Building and repairing of ships and boats (351) | 0,017 | 0,033 |
| Manufacture of railway and tramway locomotives and rolling stock (352) | 0,023 | / |
| Manufacture of aircraft and spacecraft (353) | 0,045 | 0,052 |
| Manufacture of motorcycles and bicycles (354) | 0,072 | **-0,093** |
| Manufacture of other transport equipment n.e.c. (355) | / | **-0,080** |
| Manufacture of furniture (361) | -0,041 | -0,083 |
| Manufacture of jewellery and related articles (362) | **-0,176** | -0,169 |
| Manufacture of musical instruments (363) | -0,010 | / |
| Manufacture of sports goods (364) | -0,095 | / |
| Manufacture of games and toys (365) | -0,264 | -0,017 |
| Miscellaneous manufacturing n.e.c (366) | / | -0,126 |
| Recycling of metal waste and scrap (371) | 0,145 | 0,151 |
| Recycling of non-metal waste and scrap (372) | -0,076 | / |
| Production and distribution of electricity (401) | 0,257 | / |
| Manufacture of gas; distribution of gaseous fuels through mains (402) | 0,326 | 0,419 |
| Collection, purification and distribution of water (410) | / | / |
| Site preparation (451) | 0,020 | **-0,068** |
| Building of complete constructions or parts thereof; civil engineering (452) | 0,033 | -0,023 |
| Building installation (453) | -0,021 | -0,099 |
| Building completion (454) | 0,014 | 0,037 |
| Renting of construction or demolition equipment with operator (455) | 0,108 | / |
| Sale of motor vehicles (501) | 0,067 | -0,007 |
| Maintenance and repair of motor vehicles (502) | -0,039 | -0,056 |
| Sale of motor vehicle parts and accessories (503) | -0,080 | -0,129 |
| Sale, maintenance and repair of motorcycles and related parts and accessories (504) | / | / |
| Retail sale of automotive fuel (505) | -0,017 | -0,140 |
| Wholesale on a fee or contract basis (511) | 0,093 | / |
| Wholesale of agricultural raw materials and live animals (512) | 0,071 | -0,117 |
| Wholesale of food, beverages and tobacco (513) | -0,051 | -0,102 |
| Wholesale of household goods (514) | 0,005 | -0,049 |
| Wholesale of non-agricultural intermediate products, waste and scrap (515) | 0,016 | 0,073 |
| Wholesale of machinery, equipment and supplies (516) | 0,042 | **-0,069** |
| Other wholesale (517) | -0,063 | / |
| Retail sale in non-specialised stores (521) | -0,156 | -0,073 |
| Retail sale of food, beverages and tobacco in specialised stores (522) | **-0,157** | -0,275 |
| Retail sale of pharmaceutical and medical goods, cosmetic and toilet articles (523) | -0,011 | **-0,082** |
| Other retail sale of new goods in specialised store (524) | -0,132 | -0,128 |
| Retail sale of second-hand goods in stores (525) | -0,206 | / |
| Retail sale not in stores (526) | -0,070 | 0,162 |
| Repair of personal and household goods (527) | / | -0,142 |
| Hotels (551) | -0,116 | -0,239 |
| Camping sites and other provision of short-stay accommodation (552) | -0,201 | 0,071 |
| Restaurants (553) | -0,135 | -0,255 |
| Bars (554) | -0,090 | -0,220 |
| Canteens and catering (555) | -0,130 | -0,110 |
| Transport via railways (601) | / | / |
| Other land transport (602) | -0,037 | -0,117 |
| Sea and coastal water transport (611) | 0,129 | 0,267 |

| | | |
|---|---|---|
| Inland water transport (612) | 0,246 | / |
| Scheduled air transport (621) | / | 0,107 |
| Non-scheduled air transport (622) | 0,090 | / |
| Space transport (623) | 0,053 | / |
| Cargo handling and storage (631) | 0,126 | 0,074 |
| Other supporting transport activities (632) | **-0,088** | / |
| Activities of travel agencies and tour operators; tourist assistance activities n.e.c. (633) | -0,162 | -0,047 |
| Activities of other transport agencies (634) | 0,076 | 0,016 |
| Post and courier activities (641) | -0,103 | / |
| Telecommunications (642) | 0,403 | 0,096 |
| Monetary intermediation (651) | 0,145 | 0,115 |
| Other financial intermediation (652) | 0,127 | -0,045 |
| Insurance and pension funding, except compulsory social security (660) | 0,127 | 0,046 |
| Activities auxiliary to financial intermediation, except insurance and pension funding (671) | 0,624 | / |
| Activities auxiliary to insurance and pension funding (672) | 0,010 | 0,022 |
| Real estate activities with own property (701) | 0,063 | / |
| Letting of own property (702) | / | / |
| Real estate activities on a fee or contract basis (703) | -0,005 | / |
| Renting of automobiles (711) | 0,048 | -0,040 |
| Renting of other transport equipment (712) | 0,021 | -0,025 |
| Renting of other machinery and equipment (713) | / | -0,039 |
| Renting of personal and household goods n.e.c. (714) | -0,290 | -0,262 |
| Hardware consultancy (721) | 0,113 | 0,019 |
| Software consultancy and supply (722) | -0,027 | 0,001 |
| Data processing (723) | 0,126 | / |
| Data base activities (724) | -0,115 | 0,302 |
| Maintenance and repair of office, accounting and computing machinery (725) | -0,086 | / |
| Other computer related activities (726) | / | / |
| Research and experimental development on natural sciences and engineering (731) | 0,063 | 0,052 |
| Research and experimental development on social sciences and humanities (732) | **-0,201** | / |
| Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy; holdings (741) | 0,092 | 0,088 |
| Architectural and engineering activities and related technical consultancy (742) | 0,025 | -0,031 |
| Technical testing and analysis (743) | 0,103 | 0,074 |
| Advertising (744) | 0,026 | -0,258 |
| Labour recruitment and provision of personnel (745) | -0,086 | 0,216 |
| Investigation and security activities (746) | -0,111 | / |
| Industrial cleaning (747) | -0,022 | -0,033 |
| Miscellaneous business activities n.e.c (748) | -0,033 | -0,144 |
| $R^2$ adjusted | 0,725 | 0,695 |
| F-test relative to the estimated relation | 6888 | 5132 |
| F-test relative to the sectoral dummies | 523 | 490 |
| Weighted adjusted standard deviation of the inter-industry differentials ($d_k$) | 0,095 | 0,090 |
| Number of sectors | 163 | 139 |
| Number of observations in the sample | 34774 | 26806 |

*Notes* : [1] CA means collective (wage) agreement. All estimates are significant at the level of 5%, except those in bold. They were estimated from a wage equation including the vector *X* (individual characteristics and working conditions), *Y* (sectoral dummies, Nace 3-digit) and *Z* (size of the establishments). For more details regarding the explanatory variables, see section 3.

# CONCLUSION

This thesis has empirically investigated the impact of collective bargaining systems on labour market performance, wage structures and poverty levels in an international perspective. A theoretical, macro- and microeconomic approach were respectively considered. The main findings of these complementary approaches are described below.

The purpose of the first chapter of this thesis was to discriminate among alternative wage-employment bargaining models using annual macro-data from the Swedish private sector covering the period 1960-93. While the majority of research in this field is restricted to testing the usual bargaining models, i.e. *right-to-manage* (RMM) and *efficient bargaining* (EBM), we took a broader look at this question. In other words, bearing in mind the main features of the Swedish collective bargaining system, we found it essential not to test only for the usual bargaining models but also for the *general bargaining* model (GBM). Indeed, although wages were unquestionably the main bargaining topic in the pre-1993 Swedish industrial relations system, trade unions also had some bargaining power on employment particularly at the local level (Hammarström and Nilsson, 1998).

Our results, obtained using the Engle-Granger procedure (1987) and non-nested tests, show that the EBM encompasses the RMM. In addition, we found that the RMM and the EBM can be rejected in favour of the GBM. This result may be particularly important for government policy. Indeed, in the latter (i.e. the GBM), an increase in the unions' bargaining power with respect to wages $(\phi_1)$ reduces employment. On the other hand, an increase in their influence in the setting of employment levels $(\phi_2)$ has the inverse effect. Consequently, a weakening of the unions could potentially lead to a reduction in employment. Among other things, this means that the relationship between collective bargaining and employment is considerably more complex than suggested by the usual bargaining models. Besides, this implies that Pareto inefficiency is not a consequence of the unions' bargaining power, per se, but rather of the difference between $\phi_1$ and $\phi_2$.

This finding also supports Espinosa and Rhee's (1989) predictions. Their theoretical model shows that the equilibria on the labour market are neither as inefficient as the monopoly union

model forecasts nor as fully optimal as the efficient bargaining model forecasts. Following Espinosa and Rhee this stems from the fact that the firm-union bargaining relationship is not a one-shot game in nature. Firms and unions are involved in a repeated interaction, so that considerable opportunity exists for the parties to build a long-term relationship that may end up in a nearly efficient outcome. Bargaining over wages and employment thus corresponds to a cooperative strategy that may be sustained in equilibrium if the future consequences of any unilateral deviation are bad enough and if the future matters sufficiently. In other words, they point out that the reason why the monopoly union model fails to result in an efficient outcome in a one-period model is that the problem has a Prisoner's Dilemma structure. This argument seems particularly relevant for a highly corporatist country like Sweden. The concept of corporatism resembles the level of centralisation of collective bargaining as well as the degree of co-ordination among the social partners. In particular, it reflects an intense and repeated firm-union relationship which we believe to be at the root of our finding, i.e. a nearly efficient outcome.

Nevertheless, further research should try to improve the variables representing union bargaining power. This could be done by using sectoral or establishment data. It would also be interesting to test a modified version of Manning's (1987) model, assuming that the parties' bargaining power is dependent on the degree of centralisation of the negotiations. We could thus account for the fact that the Swedish wage negotiations are relatively less centralised since the 1980s and in particular since SAF's (Swedish Employer's Confederation) 1991 decision to withdraw from the central bargaining process. Finally, additional work is needed on the nature and evolution of trade unions objectives and on how their influence on wages is affected by government policy.

In the second chapter of this thesis we have investigated how the characteristics of collective bargaining systems have influenced economic efficiency (i.e. labour market performance) on the one hand, and social performance (i.e. poverty levels) on the other, in the industrialised countries since the end of the 1970s. We have also tried to ascertain whether, in view of the characteristics of collective bargaining, economic efficiency is compatible with social performance. The main lessons to be drawn from this chapter are outlined below.

What of economic performance ? Results show that the relationship between collective bargaining systems and macroeconomic performance is relatively fragile and unstable over

time. Indeed, the findings from the disaggregated analysis, i.e. considering three sub-periods (1978-82, 1988-92 and 1992-96) separately, suggest the existence of a corporatist relationship – emphasising the importance of a high degree of co-ordination among the social partners – during the two first periods (1978-82 and 1988-92) and a neo-classical relationship – based on the virtues of competition – during the third period (1992-96). In addition, results show quite clearly that the intensity of the relationship between macroeconomic performance and collective bargaining systems has decreased substantially during the two last periods. Nevertheless, our analysis, realised simultaneously for the periods 1978-82, 1988-92 and 1992-96, suggests the existence of a *non-linear* relationship between collective bargaining systems and economic performance in the OECD countries. In the long run, trade unions – hampered by the prevailing bargaining level and the coverage rate – have a negative impact on economic performance, but this effect is neutralised or even reversed in cases where there is a high degree of co-ordination among the social partners. It is also noteworthy that no evidence was found in favour of a hump-shaped relationship.

What of social performance ? Our findings show that the relationship between collective bargaining and relative poverty rates, among the entire population and the population of working age, has been intense and stable in the OECD countries since the end of the 1970s. They also suggest that this is due to their impact on social security expenditures and marginally to their interaction with earnings inequality. In addition, they point out that in terms of poverty rates, the predominant bargaining level, the coverage rate and the trade union density are variables of much greater importance than the degree of (indirect) coordination between the social partners. To sum up, empirical evidence suggests that centralised industrial relations systems have a significant impact in reducing relative poverty. Moreover, this impact seems to follow only marginally, if at all, from any direct effect on wage formation, but from obliging the state or government to spend more on social security.

Finally, we found that industrial relations systems provide a much better explanation for the diversity of poverty levels than for differences in macroeconomic efficiency. Moreover, empirical findings reveal no inevitable trade-off between social and economic efficiency. Indeed, in the long run macroeconomic performance depends essentially on the degree of co-ordination among the social partners, whereas poverty is influenced by the formal bargaining level, the coverage rate and the trade union density.

Despite the virtues of highly co-ordinated centralised bargaining systems, however, it has been observed, that during the last decade many OECD countries have chosen more deregulated arrangements, e.g. Italy, New-Zealand, Australia and Sweden. These developments lead us to question the sustainability of a high degree of co-ordination in relatively centralised systems. Indeed, the change in social structures (de-industrialisation, fall in the number of manual workers, tertiarisation of the economy, growing female participation in the labour market, increasing number of small enterprises) and the trend in social values (collectivism is giving way to individualism) confront the trade unions with a new challenge : representing the interests of the various components (the elite, the hard core, the periphery, the unemployed, those left out), while still being able to maintain a coherent overall vision as a basis for influencing the (inter)national social and economic system (Goetschy and Lallement, 1998). Notice, moreover, that the context in which social pacts have been negotiated in recent years makes this task even more difficult. Indeed, in contrast to the Fordist period, where wage restraint was bargained in exchange for full employment and social protection, today wage moderation is just part of a whole set of measures considered as crucial for competitiveness (Pochet, 1998). Besides, the disarray of centralised arrangements in many industrialised countries underlines the importance of the education system. Indeed, international differences in recent labour market experiences suggest that policies that buffer the earnings of the less educated by institutional wage setting work best when accompanied by institutions that augment those workers' skills as well (Freeman and Katz, 1995). Therefore, although empirical findings reveal no inevitable trade-off between social and macroeconomic performance, practice stresses the difficulty of maintaining a high degree of co-ordination in a relatively centralised structure.

Future research should focus on the evolution of labour market performance and poverty levels in countries where industrial relations have undergone a major transformation. Indeed, assessing the effect of institutional dynamics over time within countries would provide a highly valuable and complementary source of information. The impact of government intervention in collective bargaining also deserves more attention. Besides, it would be very interesting to consider a *new* definition of poverty which would reflect the actual distribution of income within the household. This approach would probably increase the number of poor people (in particular women) among the low-paid workers and hence affect the relationship between collective bargaining systems and poverty levels. In addition, more research should be devoted to the question of the sustainability of a high degree of co-ordination in a

centralised or intermediate collective bargaining structure. Finally, in order to avoid coordination of wage setting to result in a competitive deflationary scenario, research should focus on the best way to promote cross-boarder collective bargaining in Europe.

In the third chapter of this thesis, we have examined the impact of the bargaining regime on the structure of wages in a corporatist country, i.e. Belgium. To this end, we have used the 1995 *Structure of Earnings Survey*. It is a very rich worker-firm matched database which has never been used before. The motivation of this chapter was twofold :

(i) The current understanding of the structure of wages and more particularly inter-industry wage differentials in Belgium is very limited.

(ii) The results concerning the influence of the bargaining regimes on inter-industry wage disparities and on wage levels in the countries of continental Europe are fragmentary.

In the first section of this chapter, we highlighted the fact that the structure of wages in the Belgian private sector is not compatible with the neo-classical model, according to which wage disparities in equilibrium are explained either by differences in the quality of the labour force, or by compensating differences. In fact we note that wage differentials subsist between agents who are apparently similar from the point of view of their individual characteristics and their working conditions. Our results also suggest that these differences derive partly from the characteristics of the employers in each sector (the size of the establishment, the wage bargaining regime). Hence, they indicate that the determination of wages within each industry is influenced by the organisational and technological characteristics of the establishments making it up. Moreover, in an international perspective, our findings support the existence of a negative relationship between the dispersion of the inter-industry wage differentials and the degree of corporatism of the industrialised countries.

How are we to interpret these results ? The wage disparities observed between the various sectors militate in favour of the efficiency wage theory. Indeed, the latter shows that if the incentive conditions for effort vary between sectors, then two individuals with identical individual characteristics, placed in the same working conditions, are likely to earn different wages. However, this theory does not make it clear why the dispersion of inter-industry wage differentials are greater in the non-corporatist countries. In point of fact, the constraints forcing employers to pay *efficient* wages, i.e. higher than the competitive level, seem similar among the industrialised countries. Therefore, we argue that the rent-sharing theory provides

a more reliable explanation. We believe that inter-industry wage differentials are lower in the corporatist countries because of the explicit or implicit co-ordination of the wage bargaining process, which restricts the insider power of the workers, i.e. their ability to capture part of the sectoral rents. Notice that this phenomenon is also reinforced by the policy of 'wage solidarity' pursued by the unions in most of the corporatist countries. This interpretation of the heterogeneity of the inter-industry wage differentials runs counter to the theoretical foundations of the Calmfors and Driffill (1988) results. The point is that it rejects the hypothesis that the non-competitive wage differentials would be greater in those countries where wage bargaining is conducted primarily at the sectoral level. It serves more to back up our empirical results described in chapter 2. Nevertheless, the relationship between the scale of inter-industry wage differentials and labour market performance should be regarded with caution.

In the second chapter of this contribution, we emphasised the existence of a *sectoral effect* on the workers' wages, irrespective of the bargaining regime considered. In other words, our results show that the sectors offering high/low wages are similar for workers covered by different bargaining regimes. This result is explained by the relative homogeneity of the organisational and technological characteristics of the establishments within each sector of activity. In addition, it might be due to a phenomenon of mimetism (Dickens, 1986) : companies in which wages are not (re)negotiated collectively might be patterning their wage policy on those which do operate such an arrangement, in order to attract the best workers, to show their staff that they are being treated fairly and to curb the rate of manpower rotation. Nevertheless, our findings do show that the bargaining regime has a significant impact upon the structure of the wages in Belgium. In fact we note that the weighted adjusted standard deviation (WASD) of the inter-industry wage differentials is lower where wages are covered by a company collective agreement. This puzzling result can be explained by the fact that the workers whose wages are solely covered by national and/or sectoral collective agreements are diluted across sectors offering more heterogeneous wage differentials. To put it differently, this result derives from the fact that the diversity of workers' bargaining power with respect to wages is more pronounced when wages are not covered by a company collective agreement. What is more, results suggest that it is likely that the WASD of inter-industry wage differentials would have been larger among firms covered by a company collective agreement if the distribution of sectoral employment had been the same across bargaining regimes. Hence, they do corroborate the idea that, *all other things being equal*, the dispersion of inter-

industry wage differentials increases when collective bargaining becomes more decentralised. Finally, results indicate that the bargaining regime has a significant influence on the level of wages and that, all other things being equal, workers covered by a company collective agreement earn 5.1% more than their opposite numbers who are (solely) covered by national and/or sectoral collective agreements. In an international perspective, this finding supports the hypothesis that the sensitivity of wages to the bargaining regime is significantly lower in corporatist countries.

Future research concerning the magnitude of inter-industry wage differentials and the impact of the bargaining regime on the structure of wages in the Belgian private sector should rely on a longitudinal database in order to control for the non observed individual characteristics of the workers. Indeed, these characteristics might modify our results if it emerged that they were not distributed randomly between sectors and/or bargaining regimes. Unfortunately, at the moment such database does not exist. In addition, future analysis should try to control for a potential firm selectivity effect, i.e. for the fact that firms in a particular bargaining regime might not be representative of the overall sample of firms. However, as pointed out by Hartog et al. (1997: 7), “every judgement will be provisional as long as no independent variables to control for the endogeneity of the bargaining regime are available”. Further research should also investigate whose wages unions raise/compress most or least (e.g. men vs. women, high skilled vs. low skilled workers,…). Let us finally note that the link between the magnitude of wage differentials and labour market performance should also deserve more attention.

# REFERENCES


Abowd J. (1989), "The effect of wage bargains on the stock market value of the firm", *American Economic Review*, 79(4) : 774-809.

Abowd J. and Kramarz F. (1993), "A test of negotiation and incentive compensation models using longitudinal French enterprise data", in van Ours J., Pfann G. and Ridder G. (eds) *Labour demand and equilibrium wage formation*, Elsevier Science Publisher, North-Holland.

Abowd J., Kramarz F. and Margolis D. (1999), "High wage workers and high wage firms", *Econometrica*, 67(2) : 251-333.

Abraham K. and Houseman S. (1995), "Earnings inequality in Germany", in Freeman R. and Katz L. (eds) *Differences and changes in the wage structures*, Chicago University Press, Chicago.

Adema W. (1999), "Background information to presentation on social expenditure trends and employment-oriented social policies", Workshop Maxwell Stamp plc/DG5, London.

Alogoskoufis G. and Manning A. (1991), "Tests of alternative wage employment bargaining models with an application to the UK aggregate labour market", *European Economic Review*, 35(1) : 23-37.

Anderson S. and Devreux M. (1988), "Trade unions and the choice of capital stock", *Scandinavian Journal of Economics*, 90(1) : 27-44.

Andrews M., Stewart M., Swaffield J. and Upward R. (1998), "The estimation of union wage differentials and the impact of methodological choices", *Labour Economics*, 5(4) : 449-74.

Araï M. (1994), "Compensating wage differentials versus efficiency wages : an empirical study of job autonomy and wages", *Industrial Relations*, 33(2) : 249-62.

Araï M., Ballot G. and Skalli A. (1996), "Différentiels intersectoriels de salaire et caractéristiques des employeurs en France", *Economie et Statistique*, 299 : 37-58.

Arbache J. and Carneiro F. (1999), "Unions and interindustry wage differentials", *World Development*, 27(10) : 1875-83.

Aronsson T., Löfgren K. and Wikström M. (1993), "Monopoly union versus efficient bargaining : wage and employment determination in the Swedish construction sector", *European Journal of Political Economy*, 9(3) : 357-70.

Ashenfelter O. and Brown J. (1986), "Testing the efficiency of employment contracts", *Journal of Political Economy*, 94(3) : 40-87.

Barth E. and Zweimüller J. (1994), "Bargaining structure, wage determination and wage dispersion in 6 OECD countries", *Kyklos*, 47(1) : 81-93.

Barth E., Naylor R. and Raaum O. (1994), "Does union density matter ?", Institute for Social Research, Oslo, Working Paper.

Bean C. (1994), "European unemployment, two decades later. European unemployment : a retrospective", *European Economic Review*, 38(3-4) : 523-34.

Bean C., Layard R. and Nickell J. (1986), "Unemployment : a multi-country study", *Economica*, 53 : S1-S22.

Binmore K., Rubinstein A. and Wolinsky A. (1986), "The Nash solution in economic modelling", *RAND Journal of Economics*, 17(2) : 176-188.

Blanchflower D. and Freeman R. (1992), "Unionism in the USA and other advanced OECD countries", *Industrial Relations*, 31(1) : 56-81.

Blau F. and Kahn L. (1996), "International differences in male wage inequality : institutions versus market forces", *Journal of Political Economy*, 104(4) : 791-837.

Bleany M. (1996), "Central bank independence, wage bargaining structure, and macroeconomic performance in OECD countries", *Oxford Economic Papers*, 48(1) : 20-38.

Blinder A. (1973), "Wage discrimination : reduced form and structural variables", *Journal of Human Resources*, 8 : 436-65.

Blyth C. (1979), "L'interaction entre les négociations collectives et les politiques gouvernementales dans un certain nombre de pays Membres", in OECD (eds) *Négociations collectives et politiques gouvernementales*, Paris.

Boal W. and Pencavel J. (1994), "The effects of labor unions on employment, wages and day of operation : coal mine in West Virginia", *Quarterly Journal of Economics*, 109(1) : 267-98.

Booth A. (1995), *The economics of the trade union*, Cambridge University Press, Cambridge.

Bruno M. and Sachs J. (1985), *The economics of worldwide stagflation*, Basil Blackwell, Oxford.

Cadiou L. and Guichard S. (1999), "La diversité des marchés du travail en Europe", CEPII Working Paper 99.

Cahuc P. (1991), *Les négociations salariales : des fondements micro-économiques aux enjeux macro-économiques*, Economica, Paris.

Cahuc P. (1994) : “Réglementation des négociations collectives, chômage et croissance”, *Recherches Economiques de Louvain*, 60(2) : 163-95.

Cahuc P. and Zylberberg A. (1996), *Economie du travail : la formation des salaires et les déterminants du chômage*, Balises, De Boeck Université, Bruxelles.

Caire G. (1992), *La négociation collective,* Que sais-je, Presses Universitaires de France, Paris.

Calmfors L. (1993), “Lessons from the macroeconomic experience of Sweden”, *European Journal of Political Economy*, 9(1) : 25-72.

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

Calmfors L. and Forslund A. (1990), “Wage formation in Sweden”, in Calmfors L. (eds) *Wage formation and Macroeconomic Policy in the Nordic Countries,* Oxford University Press, Oxford.

Cameron D. (1984), “Social democracy, corporatism, labour quiescence, and the representation of economic interest in advanced capitalist society”, in Goldthorpe J. (eds) *Order and conflict in contemporary capitalism*, Clarendon Press, Oxford.

Card D. (1986), “Efficient contracts with costly adjustment : a short run employment determination for airline mechanics”, *American Economic Review*, 76(5) : 1045-71.

Card D. (1990), “Unexpected inflation, real wages, and employment determination in union contracts”, *American Economic Review*, 80(4) : 669-88.

Card D., Kramarz F. and Lemieux T. (1996), “Changes in the structure of wages and employment : a comparison of the United States, Canada and France”, NBER Working Paper 5487.

Christie V. (1992), “Union wage effects and the probability of union membership”, *Economic Record*, 68(200) : 43-56.

Cox D. (1962), “Further results on tests of separate families of hypotheses”, *Journal of the Royal Statistical Society*, B24 : 406-24.

Crouch C. (1985), “Conditions for trade union wage restraint”, in Lindberg L. and Maier C. (eds) *The politics of inflation and economic stagnation*, The Brookings Institution, Washington DC.

Danthine J-P. and Hunt J. (1994), “Wage bargaining structure, employment and economic integration”, *Economic Journal*, 104(424) : 528-41.

Davidson J. and MacKinnon J. (1981), "Several tests for model specifications in the presence of alternative hypothesis", *Econometrica*, 49(3) : 781-93.

Davidson J. and MacKinnon J. (1993), *Estimation and inference in econometrics*, Oxford University Press, Oxford.

Dell'Aringa and Lucifora C. (1994), "Collective bargaining and relative earnings in Italy", *European Journal of Political Economy*, 10(4) : 727-47.

Dickens W. (1986), "Wages, employment and the threat of collective action by workers", NBER Working Paper 2271.

DiNardo J., Fortin N. and Lemieux T. (1996), "Labor market institutions and the distribution of wages, 1973-1992 : a semiparametric approach", *Econometrica*, 64(5) : 1001-44.

Docquier F., Laurent S. and Perelman S. (1999), "Capital humain, emploi et revenus du travail : Belgique, 1992", *Cahiers Economiques de Bruxelles*, 161 : 77-103.

Dunlop J. (1944), *Wage determination under trade unions*, Macmillan, London.

Edgeworth F. (1881), *Mathematical psychics*, Kegan Paul, London.

Edin P-A. and Holmlund B. (1995), "The Swedish wage structure : the rise and fall of solidarity wage policy ?", in Freeman R. and Katz L. (eds) *Differences and changes in the wage structures*, Chicago University Press, Chicago.

Edin P-A. and Zetterberg J. (1992), "Interindustry wage differentials : evidence from Sweden and a comparison with the USA", *American Economic Review*, 82(5) : 1341-49.

Enders W. (1995), *Applied econometric time series*, John Wisley and Sons, New-York.

Engle R. and Granger C. (1987), "Co-integration and error correction : representation, estimation and testing", *Econometrica*, 55(2) : 251-76.

Engle R. and Yoo B. (1987), "Forecasting and testing in cointegrated systems", *Journal of Econometrics*, 35(1) : 143-59.

Erickson C. and Ichino A. (1995), "Wage differentials in Italy : market forces, institutions, and inflation", in Freeman R. and Katz L. (eds) *Differences and changes in the wage structures*, Chicago University Press, Chicago.

Espinosa M. and Rhee C. (1989), "Efficient bargaining as a repeated game*", Quarterly Journal of Economics*, 104(3) : 566-88.

Federal Ministry of Labour and Employment (1998), *La politique fédérale de l'emploi – Rapport d'évaluation*, Bruxelles.

Ferro-Luzzi G. (1994), "Inter-industry wage differentials in Switzerland", *Swiss Journal of Economics and Statistics*, 130(3) : 421-43.

Fisher G. and MacAleer M. (1981), "Alternative procedures and associated tests of significance for non-nested hypotheses", *Journal of Econometrics*, 16(1) : 103-19.

Flanagan R. (1990), "Centralized and decentralized pay determination in Nordic countries", in Calmfors L. (eds) *Wage formation and macroeconomic policy in the Nordic countries*, Oxford University Press, Oxford.

Flanagan R. (1999), "Macroeconomic performance and collective bargaining : an international perspective", *Journal of Economic Literature*, 37(3) : 1150-75.

Fortin N. and Lemieux T. (1997), "Institutional changes and rising wage inequality : is there a linkage", *Journal of Economic Perspectives*, 11(2) : 75-96.

Freeman R. (1980), "Unionism and the dispersion of wages", *Industrial and Labor Relations Review*, 34(1) : 3-23.

Freeman R. (1982), "Union wage practices and wage dispersion within establishments", *Industrial and Labor Relations Review*, 36(1) : 3-21.

Freeman R. (1988), "Labour market institutions and economic performance*", Economic Policy*, 6 : 63-78.

Freeman R. and Katz L. (1995), "Introduction and summary", in Freeman R. and Katz L. (eds) *Differences and changes in the wage structures*, Chicago University Press, Chicago.

Freeman R. and Medoff J. (1984), *What do unions do ?*, Basic Books, New York.

Freeman R. and Schettkat R. (2000), "Skill compression, wage differentials and employment, Germany vs. US", paper presented at the 1st EALE/SOLE World Conference, Milan, Italy.

Gavosto A. (1997), "The British Docks: a test of alternative models of wage and employment determination", *Labour*, 11(2) : 225-48.

Gibbons R. and Katz L. (1992), "Does unmeasured ability explain interindustry wage differentials ?", *Review of Economic Studies*, 59(3) : 515-35.

Godfrey L. and Pesaran M. (1983), "Tests of non-nested regression models : small sample adjustments and Monte Carlo evidence", *Journal of Econometrics*, 21(1) : 133-54.

Goetschy J. and Lallement M. (1998), "Reconfiguration des relations professionnelles – Avant-propos", *Sociologie du Travail*, 2 : 123-28.

Golden M. (1993), "The dynamics of trade unionism and national economic performance", *American Political Science Review*, 87(2) : 439-54.

Gosling A. and Machin S. (1995), "Trade unions and the dispersion of earnings in British establishments, 1980-90", *Oxford Bulletin of Economics and Statistics*, 57(2) : 167-84.

Gottschalk P. and Smeeding T. (1997), "Cross-national comparisons of earnings and income inequality", *Journal of Economic Literature*, 35(2) : 633-87.

Gourieroux C. and Monfort A. (1991), "Testing non-nested hypotheses", INSEE Working Paper 9207, Paris.

Goux D. and Maurin E. (1999), "Persistence of interindustry wage differentials : a reexamination using matched worker-firm panel data", *Journal of Labor Economics*, 17(3): 492-533.

Greene W. (1997), *Econometric analysis*, Prentice-Hall International, New Jersey.

Groschen E. and Krueger A. (1990), "The structure of supervision and pay in hospitals", *Industrial and Labor Relations Review*, 43(3) : 1345-465.

Grout P. (1984), "Investment and wages in the absence of binding contracts", *Econometrica*, 52(2) : 449-60.

Gujarati D. (1995), *Basic econometrics*, McGraw-Hill International, Singapore.

Hammarström O. and Nilsson T. (1998) : "Employment relations in Sweden", in Bamber G. and Lansbury R. (eds) *International and comparative employment relations*, Sage Publications, London.

Harris M. and Holmström B. (1982), "A theory of wage dynamics", *Review of Economic Studies*, 49(3) : 315-33.

Hartog J., Van Opstal R. and Teulings C. (1997), "Inter-industry wage differentials and tenure effects in the Netherlands and the US", *De Economist*, 145(1) : 91-9.

Helwege J. (1992), "Sectoral shifts and interindustry wage differentials", *Journal of Labor Economics*, 10(1) : 55-84.

Hicks J. (1932), *The theory of wages*, Macmillan, New York.

Hirsch B. (1982), "The interindustry structure of unionism, earnings and earnings dispersion", *Industrial and Labor Relations Review*, 36(1) : 22-39.

Hirschman A. (1970), *Exit, voice and loyalty*, Harvard University Press, Cambridge (Mass.).

Hoel M. and Nymoen R. (1988), "Wage formation in Norwegian manufacturing : an empirical application of a theoretical bargaining model", *European Economic Review*, 32(4) : 977-97.

Holmlund B. and Zetterberg J. (1991), "Insider effects in wage determination : evidence from five countries", *European Economic Review*, 35(5) : 1009-35.

Iversen T. (1999), *Contested economic institutions. The politics of macroeconomics and wage bargaining in advanced democracies*, Cambridge Studies in Comparative Politics, Cambridge University Press, Cambridge (Mass.).

Jepsen M. (2001), "Evaluation des différentiels salariaux en Belgique : hommes - femmes et temps partiel – temps plein", *Reflets et Perspectives de la vie économique*, 40(1-2) : 51-64.

Johnson G. (1997), “Changes in earning inequality : the role of demand shifts”, *Journal of Economic Perspectives*, 11(2) : 41-54.

Kahn L. (1998), “Against the wind : bargaining recentralisation and wage inequality in Norway, 1987-91”, *Economic Journal*, 108(448) : 603-45.

Katz L., Loveman G. and Blanchflower D. (1995), “A comparison of changes in the structure of wages in four OECD countries”, in Freeman R. and Katz L. (eds) *Differences and changes in the wage structures*, Chicago University Press, Chicago.

Keese M., Puymoyen A. and Swaim P. (1998), “The incidence and dynamics of low-paid employment in OECD countries”, in Asplund R., Sloane P. and Theodossiou I. (eds) *Low pay and earnings mobility in Europe*, LoWER, Edward Elgar.

Kittel B. (2000), “Trade union bargaining horizons in comparative perspective : the effects of encompassing organization, unemployment and the monetary regime on wage-pushfulness”, *European Journal of Industrial Relations*, 6(2) : 181-202.

Krueger A. and Summers L. (1988), “Efficiency wages and inter-industry wage structure”, *Econometrica*, 56(2) : 259-93.

Laurent S. (2000), “Capital humain, emploi et salaire en Belgique et dans ses régions”, Rapport préparatoire du 14ième Congrès des Economistes Belges de Langue Française, Commission 4 : Capital humain et croissance régionale, CIFoP.

Layard P. and Nickell J. (1985), “The causes of British unemployment”, *National Institute Economic Review*, 111 : 62-85.

Layard P. and Nickell J. (1986), “Unemployment in Britain”, *Economica*, 53 : 121-70.

Layard R., Nickell S. and Jackman R. (1991), *Unemployment, macroeconomic performance and the labour market*, Oxford University Press, Oxford.

Lehmbruch G. (1984), “Concertation and the structure of corporatist networks”, in Goldthorpe J. (eds) *Order and conflict in contemporary capitalism*, Clarendon Press, Oxford.

Lemieux T. (1993), “Unions and wage inequality in Canada and the United States”, in Card D. and Freeman R. (eds) *Small differences that matter*, University of Chicago Press, Chicago.

Lewis G. (1986), *Union relative wage effects : a survey*, University of Chicago Press, Chicago.

Lindbeck A. and Snower D. (1986), “Wage setting, unemployment, and insider-outsider relations”, *American Economic Review* (Papers and Proceedings), 76(2) : 235-9.

Lucifora C. (1993), "Inter-industry and occupational wage differentials in Italy", *Applied Economics*, 25(8) : 1113-24.

Lucifora C. (1999), "Wage inequalities and low pay : the role of labour market institutions", paper presented at the European Association of Labour Economists (EALE) Conference, Regensburg, Germany.

Machin S. (1997), "The decline of labour market institutions and the rise in wage inequality in Britain", *European Economic Review*, 41(3-5) : 647-57.

Machin S. and Manning A. (1994), "The effects of minimum wages on wage dispersion and employment : evidence from the UK wage councils", *Industrial and Labor Relations Review*, 47(2) : 319-29.

MacKinnon J. (1991), "Critical values for cointegration tests", in Engle R. and Granger C. (eds*) Long-run economic relationships : readings in cointegration*, Oxford University Press, Oxford.

MaCurdy T. and Pencavel J. (1986), "Testing between competing models of wage and employment determination in unionised markets", *Journal of Political Economy*, 94(3) : 530-39.

Maloney T. and Savage J. (1996), "Labour markets and policy", in Silverstone B., Bollard A. and Lattimore R. (eds) *A study of economic reform : the case of New Zealand*, Elsevier, Amsterdam.

Manning A. (1987), "An integration of trade union models in a sequential bargaining framework", *Economic Journal*, 97 : 121-39.

Marx I. and Verbist G. (1998), "Low-paid work and poverty : a cross-country perspective", in Bazen S., Gregory M. and Salverda W. (eds) *Low-wage employment in Europe*, LoWER, Edward Elgar.

McCallum J. (1983), "Inflation and social consensus in the seventies", *Economic Journal*, 93(372) : 784-805.

McCallum J. (1986), "Unemployment in OECD countries in the 1980s", *Economic Journal*, 96(384) : 942-60.

McDonald I. and Solow R. (1981), "Wage bargaining and employment", *American Economic Review*, 71(5) : 896-908.

Metcalf D. (1982), "Unions and the distribution of earnings", *British Journal of Industrial Relations*, 20(2) : 163-69.

Mincer J. (1974), *Schooling, experience and earnings*, Columbia University Press, New-York.

Murphy K. and Welch F. (1990), "Empirical age-earnings profiles", *Journal of Labor Economics*, 8(2) : 202-29.

Nash J. (1950), "The bargaining problem", *Econometrica*, 18(2) : 155-62.

Nash J. (1953), "Two-person cooperative games", *Econometrica*, 21(1) : 128-40.

Newell A. and Symons J. (1987), "Corporatism, laissez faire, and the rise in unemployment", *European Economic Review*, 31(3) : 567-601.

Nickell S. (1997), "Unemployment and labor market rigidities : Europe versus North America", *Journal of Economic Perspectives*, 11(3) : 55-74.

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

Nickell S. and Bell B. (1996), "The distribution of wages and unemployment. Changes in the distribution of wages and unemployment in OECD countries", *American Economic Review*, 86(2) : 302-8.

Nickell S. and Wadhwani S. (1991), "Insider forces and wage determination", *Economic Journal*, 100 : 496-509.

Oaxaca R. (1973), "Male-female wage differentials in urban labour markets", *International Economic Review*, 14(3) : 693-709.

Oaxaca R. and Ransom M. (1994), "On discrimination and the decomposition of wage differentials", *Journal of Econometrics*, 61(1) : 5-21.

OECD (1994), *Employment outlook*, OECD : Paris.

OECD (1996), *Employment outlook*, OECD : Paris.

OECD (1997), *Employment outlook*, OECD : Paris.

OECD (1998), *Economic outlook*, OECD : Paris.

OECD (1998), *Labour force statistics*, OECD : Paris.

OECD (1998), *National accounts – Volume 1 and 2*, OECD : Paris.

OECD (1999), *Social expenditure database 1980-1996*, OECD : Paris.

Pencavel J. (1991), *Labor markets under trade unionism*, Basil Blackwell, Cambridge (Mass.).

Pencavel J. and Holmlund B. (1988), "The determination of wages, employment, and work hours in an economy with centralized wage setting : Sweden 1950-1983", *Economic Journal*, 98(393) : 1105-26.

Phillips P. and Hansen B. (1990), "Statistical inference in instrumental variables regression with I(1) processes", *Review of Economic Studies*, 57(1) : 99-125.

Plasman R. and Rycx F. (2000), "Négociations collectives et performances socio-économiques : une comparaison internationale", *La Revue de l'IRES*, 32(1) : 5-43.

Pochet P. (1998), "Les pactes sociaux en Europe dans les années 1990", *Sociologie du Travail*, 2 : 173-90.

Robinson C and Tomes N. (1984), "Union wage differentials in the public and private sectors : a simultaneous equations specification", *Labour Economics*, 2(1) : 106-27.

Robinson C. (1989), "The joint determinations of union status and union wage effects : some test of alternative models", *Journal of Political Economy*, 97(3) : 639-67.

Rowthorn R. (1992), "Centralisation, employment and wage dispersion, *Economic Journal*, 102(412) : 506-23.

Ruback S. and Zimmerman M. (1984), "Unionization and profitability : evidence from the capital market", *Journal of Political Economy*, 92(6) : 1134-57.

Rubinstein A. (1982), "Perfect equilibrium in a bargaining model", *Econometrica*, 50(1) : 97-109.

Schmitter P. (1981), "Interest intermediation and regime governability in contemporary Western Europe and North America", in Berger S. (eds) *Organizing interests in Western Europe*, Cambridge University Press, Cambridge (Mass.).

Shapiro C. and Stiglitz J. (1984), "Equilibrium unemployment as a worker discipline device", *American Economic Review*, 74(3) : 433-44.

Siebert H. (1997), "Labour market rigidities : at the root of unemployment in Europe", *Journal of Economic Perspectives*, 11(3) : 37-54.

Smeeding T. (1997), "Financial poverty in developed countries : the evidence from LIS", Final report to the UNDP, Working Paper 155.

Soskice D. (1990), "Wage determination : the changing role of institutions in advanced industrialized countries", *Oxford Review of Economic Policy*, 6(4) : 36-61.

Stahl I. (1972), *Bargaining theory*, Economic Research Institute, Stockholm School of Economics.

Stewart M. (1987), "Collective bargaining arrangements, closed shops and relative pay", *Economic Journal*, 97(385) : 140-156.

Stewart M. (1991), "Union wage differentials in the face of changes in the economic and legal environment", *Economica*, 58(230) : 155-72.

Stiglitz J. (1974), "Alternative theories of wage determination in LDC'S :the labor turnover model*", Quarterly Journal of Economics*, 88(2) : 194-227.

Stock J. (1987), “Asymptotic properties of least-squares estimators of cointegrating vectors”, *Econometrica*, 55(5) : 1035-56.

Tarantelli E. (1986), “The regulation of inflation and unemployment”, *Industrial Relations*, 25(1) : 1-15.

Terraz I. (1996), “*Structures de négociation, investissement et croissance”,* Doctoral Thesis in Economics, Université Louis Pasteur, Strasbourg, France.

Teuling C. and Hartog J. (1998), *Corporatism or competition ? Labour contracts, institutions and wage structures in international comparison*, Cambridge University Press, Cambridge.

Topel R. (1997), “Factor proportions and relative wages : the supply-side determinants of wage inequality”, *Journal of Economic Perspectives*, 11(2) : 55-74.

Traxler F., Kittel B. and Lengauer S. (1997), “Globalisation, collective bargaining and performance”, *Transfer*, 4 : 787-806.

Vainiomäki J. and Laaksonen S. (1995), “Inter-industry wage differentials in Finland : evidence from longitudinal census data for 1975-85”, *Labour Economics*, 2(2) : 161-73.

Van den Bosch K. and Marx I. (1996), “Trends in financial poverty in OECD countries”, Centre for Social Policy, University of Antwerp, Working Paper.

Van der Ploeg (1987), “Trade unions, investment, and employment, a non cooperative approach”, *European Economic Review*, 31(7) : 1465-92.

Vannetelbosch V. (1996), “Testing between alternative wage-employment bargaining models using Belgian aggregate data”, *Labour Economics*, 3(1) : 43-64.

Visser J. (1990), “In search of inclusive unionism”, *Bulletin of Comparative Labour Relations* 18, Deventer, Kluwer.

Visser J. (1996), “Unionisation trends revisited”, University of Amsterdam, Working Paper.

Weede E. (1996), *Economic development, social order and world politics*, Lynne Rienner, Boulder, CO.

Wolf E. (2000), “Lower wages for less hours ? A simultaneous wage-hours model for Germany”, ZEW Discussion Paper 00-03.

Zeuthen F. (1930), *Problems of monopoly and economics*, Routledge, London.

Zweimüller J. and Barth E. (1994), “Bargaining structure, wage determination and wage dispersion in 6 OECD countries”, *Kyklos*, 47(1) : 81-93.