Pay Inequalities and Economic Performance

Project report

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Pay inequalities and economic performance

Final Report

I. Executive Summary

In the original submission we proposed to look at the relationship between pay inequalities and business and employment performance, and to focus our analysis on performance at the detailed industry and company level rather than the national level. Rewards play a central part in firms' performance management systems, and they also influence the employment costs of different categories of workers and so affect job openings. Thus firms' behaviour has been at the centre of our work. Our principal questions were:

a) whether large pay inequalities in themselves are sufficient to generate good business performance and employment performance, as competitive economic theory would predict; and

b) how far the exceptions to this view, in which small inequalities coexist with good performance, can be explained by reference to different approaches to performance management within firms and the way firms manage their industrial relations?

Our second goal, on which realisation of the first depended, was to establish a system for secure remote access to the micro-data of the 1995 European Structure of Earnings Survey (ESES) which for many member countries was held at Eurostat in Luxembourg. ESES offers distinct advantages compared with other sources that have been available in the past: it uses a common methodology and set of statistical definitions across countries, and it contains a wide range of information on the individual characteristics of employees and of the establishments in which they work. For some countries also it was possible to identify employees in the same establishment, and thus to study some aspects of human resource management policies and their effects on pay and employment. At the start of our project, the EU had no established regulations for access to micro-data collected from businesses, as opposed to households for which it did. This meant that much of the early part of the project was devoted to establishing the ground rules for secure and confidential access to the satisfaction of all the NSIs involved and Eurostat, and a set of technical procedures and software for sending jobs and receiving back the statistical analyses.

To this end, our project involved both academic partners, and national statistical institutes, which together with Eurostat, helped us devise a system for secure remote access to the micro-data of the 1995 ESES. The academic partners were the Centre for Economic Performance of the London School of Economics (coordinator); the Université Libre de Bruxelles; the Universität Witten; the Universidade de Santiago de Compostela; the Laboratoire d'Economie et de Sociologie du Travail, Aix-en-Provence; the Economic and Social Research Institute, Dublin; Universitá Cattolica di Milano (in order of country). The national statistical institutes of Belgium, Germany, Denmark, Spain, France, Ireland, Italy and the UK, were also partners, affording direct access to the micro data for all countries, except Germany and France, for which alternative arrangements were made. The micro-data were held by Eurostat in Luxembourg.

1.   Main research findings.

In summary our five key analytical findings are as follows:

- Greater pay inequalities within firms appear to be related to better business performance. However, the relationship also appears to decline as levels of inequality increase, and their incentive effect appears to depend on the type of work organisation and human resource management approach adopted by the firm. The effect of greater pay inequalities on performance may be related to the slow diffusion of newer, more team-based, methods of work organisation within the EU.

- The greater overall pay inequalities in some countries, Ireland, Spain and the UK, compared with Belgium, Denmark and Italy, do not systematically give rise to higher employment rates (employment to population ratios) in these countries – in 1995 Denmark and the UK had the highest ratios, and Spain and Italy the lowest ones. The greater inequality in the first three countries appears to be linked to a greater degree of labour market segregation of low paid groups and by gender. This segregation goes beyond the familiar industry concentration, and emerges as a phenomenon associated with employment in certain kinds of firms. Hence, in the future more attention should be given to their human resource policies with regard to low pay and gender. Youth employment appears to be segmented along similar lines.

- National and sectoral pay agreements do not uniformly restrict employers' reward policies across countries more than do single-employer agreements. Whereas single employer pay determination has been associated with greater earnings variation compared with national bargaining in the UK, the opposite appears to hold for Belgium and Italy. There, enterprise bargaining is associated with lesser inequalities than national or sectoral bargaining. The reason for the smaller variation in Belgium and Italy seems to lie in the greater degree to which single employer bargaining is coordinated across firms in these countries.

- Pay inequalities at enterprise level have to be considered in conjunction with other human resource management and work organisation policies. The beneficial effect of greater pay variability on performance depends on there being an appropriate work environment for such incentives. The correlation between earnings and length of service is greater for when the same kind of skill is organised on an enterprise-basis than on a professional basis.

- Many interrelationships observed at the aggregate level, such as between bargaining structures and pay inequality, are not borne out when full account is taken of employment composition differences that can be studied with the ESES micro-data.

Our key methodological findings in summary are:

- Remote access to Eurostat micro-data can be established on a secure basis which protects data respondent confidentiality to the standards expected by National Statistical Institutes and Eurostat;

- The PiEP-LISSY system has proved to be an invaluable tool for researchers, enabling full exploitation of the ESES micro-data, and application of modern econometric techniques to the data for the first time;

- The data protection protocols have been consistent with relatively easy access for researchers, with turn-around times on jobs being as little as two minutes;

- The PiEP-LISSY system can be improved and used as a basis for future data access by the research and policy community to Eurostat micro-data thus encouraging much fuller use of the data, and better value for money for European tax payers and the organisations completing the survey returns.

1. 1   Inequality and business performance outcomes

In most of the countries studied, greater within-firm pay inequalities were associated with greater productivity, although there were indications that this result depended also on the nature of the work environment.Where work is harder to monitor and more dependent on team working, it emerged that smaller inequalities could be beneficial. However, these results are somewhat tentative because of data limitations.

The theory behind our approach to this question is based on the 'principal-agent' analysis of incentives. In many organisations, employees have a degree of discretion about the amount and quality of effort, physical or intellectual, that they apply in their jobs, and management can only observe the effort supplied indirectly, but focusing on outcomes that may not be apparent until some time later. In such cases, the theory suggests that management should link pay to observed performance in some way. This suggests that there are two components to rewards: those dictated by employees' skills, which are the result of investments in education and training, and those which may be related to performance within their job should management operate this kind of payment system.

However, two important caveats should be noted. First, the model just sketched out assumes management can measure individual performance, and this may not always be possible, for example, if it has organised work on the basis of teams. Secondly, if performance is hard to measure reliably and accurately, management may decide not to reward performance financially, but to seek to use other motivators, such as policies to build up employee commitment to the organisation or to their profession.

The British team tested these ideas on British data, as suitable ESES data were lacking, and found that firms do experiment with pay systems, and seek those that have the best 'match' with their own work environment, particularly as concerns how far that allows management to measure performance reliably (Belfield and Marsden 2003). Using panel data from the British Workplace Employment Relations Survey from 1990-1998, they found several instances of firms adopting, and abandoning forms of performance pay, and that the best business outcomes were observed when firms had the right match between pay system and work environment. An important finding for subsequent work on ESES was that use of performance incentives correlated with the overall size of within-firm pay inequalities.

This latter observation is important because ESES has only limited data on the types of incentive systems used within firms. Even these data, for example, use of payment by results, are not uniformly collected across countries. The PiEP team therefore decided to measure the use of incentive payments within plants by taking the overall degree of pay inequality within the plant after standardising for differences in employment composition. In other words, once one has taken account of the element of reward for skills, how much residual variation in earnings is there that could be used to motivate and reward employees who perform well in their jobs? Clearly, in some firms workers are rewarded for skills acquired within the public education and training system, which can be measured roughly by years of full-time education and training. However, in other firms, much use is made of on-the-job training – learning by doing – and that can only be proxied by length of service in the current job, and by prior labour market experience. Both types of training were incorporated into our standardised measure of earnings inequalities.

Only for Belgium could we test directly the link between the strength of performance incentives, as measured by standardised within plant pay inequality, and firm level performance, measured by profits per employee. This was because the team had access also to data on firm-level performance from the Belgian Structure of Business Statistics (SBS). There the team found that profits per capita increased with the use of incentive pay, as measured by within-plant earnings inequality. However, there was also some evidence that the work environment could moderate this relationship. The Belgian team found that the strength of the relationship was greater for blue-collar than for white-collar workers, and that it was stronger the greater the intensity of supervision. 'Taylorist' patterns of work organisation, in which work is subdivided into many small tasks, were never as strongly adopted for white collar as for blue collar workers. Intensity of supervision also tends to go with low trust work environments and individualised work organisation in which one might expect a stronger link between individual pay and individual performance.

The British team extended this analysis to the other countries, Denmark, Spain, Ireland, Italy, and including Belgium, but used an indirect measure of plant performance based on a method developed by Winter-Ebmer and Zweimüller (1999). This took a standardised measure of average earnings in the establishment as a measure of plant performance. This can be justified in a competitive market environment in which employees' pay corresponds to the value of their output, at the level of the firm. Persistent deviations from this position would, over time, lead to lower profits and discontented shareholders, or to difficulties in recruitment and retention.

Their results found a positive relationship between plant performance measured in this way and within-plant inequality. They also tested to see whether the relationship showed signs of moderating at higher levels of wage inequality within plants. This had been found by Winter-Ebmer and Zweimüller for Austria, and was confirmed in the ESES data for Italy and Spain. The relationship was not statistically significant for Belgium, Denmark and Ireland, and so could not be confirmed. However, work by the Belgian team suggested that the lack of statistical significance could be due to interrelationships among the variables studied, so the question remains open.

Finally, using French national data, Koubi and Roux (2004) tested whether firms using broad jobs and problem-solving activities would also use more compressed pay structures, the idea being to foster cooperative rather than individual performance. Their tentative findings supported this view.

Our stronger findings support the positive effect of greater inequalities on performance, even after testing for possible selection effects. Our more tentative findings moderate this, suggesting that when employers need more cooperative systems, they may opt for more compressed pay inequalities. This may be a reflection of the limited diffusion of diffusion of team working and other 'high performance' work systems across the EU. Using data from the Epoc survey, the Italian team found that although there has been some remarkable progress of new forms of work organisation, the majority of firms continue to employ more traditional forms. Thus, the finding that plant performance and within plant inequality are positively related may reflect prior decisions about work organisation, and the continued dominance of work systems based on individual control rather than team working and commitment. Second, this interpretation fits the findings by the British team based on WERS, mentioned earlier, that firms get the best performance when they have the right 'fit' of rewards and work systems, and that the effectiveness of reward systems cannot be judged independently of these other factors.

2.   Employment performance

2. 1   Low-wage employment and gender inequalities

The share of low paid employment in an economy, and gender inequality are closely related because many women are concentrated in lower paid jobs.

Measurement issues are of great concern for low paid employment because many low paid jobs and low paid workers are at the fringes of the labour market, and frequently cross the border between those areas that are well-regulated and those that are not. In addition, many low paid workers, especially women and young workers are close to the margin between devoting their time to market activities and to other types of activity such as household work and full-time study. This is also reflected in the use of part-time and occasional work. As a result, the wages of low paid workers, and the incidence of low pay can be difficult to measure accurately, and results can vary quite considerably from one type of survey to another. Thus, an important part of the work of the team researching these subjects was to benchmark ESES against the findings of other surveys, notably those based on households. For example, ESES does not cover small firms with less than ten employees, and, in some countries, these are major employers of young and low paid workers. Early work by the Irish team established that there is good deal of comparability between the results of the ESES and those of household surveys, especially after allowance is made for differences in coverage.

Using the OECD definition of 'low pay intensity' as the percentage of workers paid less than two thirds of median earnings, the Irish and Spanish teams found two patterns among the six countries for which PiEP LISSY had direct access. On the one hand, the intensity of low pay was moderate in Belgium, Denmark and to a lesser extent Italy, and it was stronger in Ireland, Spain and the UK. Gender pay inequalities followed a similar pattern, being more pronounced overall in the latter three than in the former three countries. Illustrative figures are shown below.

What could explain these patterns? First, these differences follow overall pattern of inequality in these countries as shown by the unadjusted dispersion of earnings (ratio of the top to the bottom decile in Table ES 1). Although the dispersion of hourly pay is reduced when we take account of the effect of the employee and plant characteristics covered by ESES, it drops by about 30-40% in each country, and leaves the two groups of egalitarian and inegalitarian countries unchanged. A similar pattern can be found for gender pay inequalities, as the three countries with the largest pay dispersions also have the largest pay gaps by gender.

Table ES 1. Low wage employment, gender segregation and youth employment.

	Dispersion of f-t log hourly pay CV %	Adjusted dispersions CV %	Low wage intensity females % a)	Low wage intensity males % a)	Gender gaps, hly pay. (gap/male wage) %	Effect of seg into low pay inds	Effect of firm-level factors	CB coverage %	Emp/pop ratios 1995	Youth rel pay
Be	15.6	9.4	19	5	20	-	-	96	56.3	+
DK	12.2	8.7	12	8	18	-	-	69	73.9	+
It	15.2	8.5	16	6	23	+	-	90	50.5	=
Ir	25.2	15.4	28	12	34	+	+	66	53.8	-
Es	24.7	16.3	37	17	28	+	+	83	46.7	-
UK	23.7	15.4	35	11	35	+	+	36	69.3	-

D9/D1 Eurostat The European Structure of Earnings Survey 1995 summary table 4.
a) % earning less that 2/3 medina pay, Fernandez et al 2004 Table 2., and Gannon et al (2004b Table 1).
Emp/population ratios: OECD Employment Outlook 1998, Annex Table B.

The role of industry and workplace factors in gender inequality comes out strongly. Associated with the contrast between the two groups of countries is the tendency for greater inequalities by gender to be associated with stronger segregation of women into certain industries, and beyond that, into low paid establishments. Simon and Russell (2004) find that while controlling for human capital characteristics leaves the ranking of countries for the gender pay gap relatively unchanged, controlling additionally for workplace characteristics brings the six countries into closer alignment. Thus it would seem that workplace characteristics are closely related to the size of the gender pay gap.

Given the cross-sectional nature of the ESES data, it is hard to assess to what extent firms' policies foster greater segregation and inequality, and to what extent the policies of these firms are made possible by the availability of people to work in these conditions. It could also be the result of an interaction between these two processes. There is tentative evidence that patterns of labour market regulation influence the degree of inequality that develops in labour markets. For example, collective bargaining coverage is lower and less coordinated in the more inegalitarian countries. However, as the PiEP studies by the Italian team on collective bargaining effects shows, the bargaining structures are complex and not readily reducible to single dimensions such as the degree of coordination, or coverage. Such factors can vary qualitatively as well as quantitatively.

Whether the greater intensity of low pay in some countries has favoured greater employment is hard to gauge, and could not be tackled directly with ESES. Inspection of the overall employment rates shown in Table ES 1 suggests that there is no clear relationship. Employment rates are highest in Denmark and the UK, countries at opposite

ends of the inequality spectrum, and they are least in Spain, one of the more inegalitarian countries. Ideally, such comparisons should be done holding other things equal, in other words, on the basis of estimates of what the employment rate in a country would be in the absence of greater pay inequality.

An alternative way of tackling the question, using information gathered in our study, is to assess whether greater competition would reduce or increase low pay intensity and gender segregation in labour markets. For example, if it were shown that the price mechanism was more constrained in the egalitarian countries, then one might conclude that increased competition would lead to greater inequalities and less employment distortions. In favour of this view, it appears that the countries with greater wage inequality have weaker and less coordinated collective bargaining systems, and hence, one could imagine that employers are freer to set pay at the low paid end of the labour market. Hence, one might expect to find more frustrated job seekers in more corporatist, egalitarian countries. However, again Denmark and the UK come top for employment/population ratios for both young workers and for women, with Belgium and Spain at the other pole.

On the other hand, greater inequality could be the result of weaker competition, as greater discrimination and barriers to good jobs mean that certain categories of workers are crowded into less desirable jobs. Consistent with this interpretation is that Gannon et al (2004b) found that inter-industry wage differences are related to differences in employers' 'ability to pay', and the greater these differences the greater the intensity of low pay and of gender segregation. In a strongly competitive environment, differences in firms' 'ability to pay' should be eliminated (Teulings and Hartog, 1998). In this case, Gannon et al find that 'ability to pay' contributes less to inter-industry wage differentials in the 'corporatist' than in the non-corporatist countries. The suggestion is that corporatist arrangements attenuate the non-competitive influences on labour markets, and so should reduce any resulting distortions to employment.

Although it is hard to reach a conclusion on this question, the studies of low pay and the gender pay gap using ESES highlight the influence of firm-level practices on gender inequality, once the familiar labour market characteristics are taken into account. They therefore indicate the importance of extending the analysis to employers' human resource management policies.

2. 2   Youth pay and employment

Youth employment, and the role of pay in facilitating young people's access to jobs was taken up the British and French teams, extending previous work by Defreitas, Marsden and Ryan (1991) on youth pay and employment in Europe and the United States. One the recurring problems with youth employment is that it can be affected by the human resource decisions taken by firms for other categories of workers. For example, during much of the post-war period, a great many firms in Europe and the US applied 'rate for the job' rules in their pay systems. These attach rates of pay to job classifications, based on job demands rather than worker performance. They are robust and relatively easy to administer. In effect, one might think of pay as being tied to the average productivity of workers in a particular type of job. These principles have been reinforced by action against gender discrimination in the workplace which has stressed the importance of rewarding employees according to

the demonstrable demands of their jobs rather than the subjective appreciation of managers which has often proved to be gender-biased.

Although administratively simple, such pay rules can have side effects on other groups, notably young workers, because employers will seek to hire the best candidates available for a given job. Because young workers lack experience, and need training, their productivity will be lower and their employment cost higher than that of mature workers competing for the same jobs. Given such pay systems, managers are likely to seek to recruit the best job candidates. If some firms can afford to pay above their competitors, because of higher productivity, or because they earn rents from dominating their product markets, then there will emerge a pay hierarchy among firms, one the demand side of the labour market, and on the supply, there will develop a 'queue' of workers for the best jobs. Young workers, and many women, are likely then to find themselves at the back of line because of lack of experience or career breaks, and such like.

Thus, one can expect youth employment to be concentrated in lower paid firms and industries. One means of offsetting these pressures could be if employers choose, or can agree, special youth rates of pay to compensate partially for the lower productivity and the training costs associated with young workers. In their work, based on ESES 1966, 1972 and 1978, and similar US data, the authors found that youth access to employment was more difficult in industries that paid high adult wages, but the existence of a discount on youth pay could partially offset this.

ESES 1995 offered the opportunity to test this nearly 20 years after the previous ESES survey, a period during which many HRM practices have changed, and, it is often argued, firms have moved away from pay for the job towards pay for performance. Greater competition in EU product markets, as a result in part of the Single Market, should have reduced the rents firms could extract to share with their employees. ESES 1995 also offered the chance to take the study to the level of the firm rather than the industry, and thus, arguably, closer to the decision units on pay and employment.

Results from the ESES 1995 confirm the continued presence of such processes in the labour markets of major European economies. Young workers, as found in the gender studies just mentioned, tend to be segregated in their employment. Indeed, a considerable number of plants employ no workers under the age of 25. In contrast, the 1995 data show a weakening of the effect of youth relative pay in offsetting youth segregation. Two possible explanations emerge. First, youth access to jobs is now more regulated than in the past, and secondly, the 'youth' category has aged, from 'under 21' for the earlier studies, to 'under 25' for 1995, a change imposed by the shrinking of the labour market for under-21s.

3.   Collective bargaining and human resource management changes

3. 1   Collective bargaining

It is commonly assumed, but not proven, that decentralised pay bargaining gives firms more freedom to design pay systems and pay incentives that fit their own business needs, and so should increase pay variation between firms. Firms might set their own pay levels to

attract higher quality labour, or they might adopt incentive systems that seek to reward individual performance, both of which could be thought to increase pay variation.

Several studies, especially by the Italian team, explored the effects of collective bargaining arrangements on pay inequalities. Looking at the effect on individual workers' pay, the team found that for Italy, being covered by local bargaining was associated with higher average pay but also with pay compression, as higher skilled groups benefited less than lower skilled ones (Checchi and Pagani, 2004). This would suggest that local bargaining gives employers freedom to negotiate higher rates of pay to ease recruitment and retention problems, but that their scope to do so is greater for less qualified workers.

Moving beyond Italy, the Italian team found that the relationship between bargaining decentralisation and the variance of earnings varies between countries. In Britain, single-employer bargaining does indeed lead to greater earnings variance. The increase is particularly strong among white collar workers compared with blue collars. For Belgium and Spain, the opposite appeared to be hold: the variance of earnings under single employer bargaining is less than under multi-employer bargaining. The authors find that the whether or not single employer bargaining leads to greater inequality depends on the framework within which it takes place. In Britain, there is no coordinating framework, whereas in Belgium and Spain there is.

The above analyses take no account of possible differences in the composition of the workforce in plants under these different bargaining arrangements. Taking advantage of the ability to do this with ESES, the Italian team found that when we compare these different bargaining arrangements for similar workers and plants, then in Belgium, Italy, and Spain, the variance of earnings is slightly lower under single employer bargaining than under multi-employer bargaining. Only in the UK, is it greater[1]. In Belgium and Italy, this holds for both the top and the bottom ends of the pay distribution, and for white and blue collar workers. Spain shows some similarities with the UK, but on a more muted scale. Thus, the authors conclude that the greater coordination of bargaining in Belgium and Italy, compared with Spain and the UK, leads to greater coordination also of single-employer bargaining outcomes.

Finally, ESES enabled comparisons of the effect of bargaining arrangements on pay dispersions within establishments, and to compare those covered by central agreements with those covered by decentralised ones. Unconditional estimates, which do not control for work force characteristics, again showed greater within-establishment pay inequalities under local bargaining arrangements. Controlling for these factors in Belgium, Ireland, Italy and Spain showed the relationship switch sign, but it was only weakly significant statistically.

In conclusion, it seems that the shift to local bargaining may give individual employers more freedom to agree structures closer to their own individual business needs than when they follow agreements reached by their employers' organisations, but apart from in Britain, greater use of local bargaining would not necessarily lead to dramatic changes in

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[1] For the UK, the category includes a large number of non-union firms where the employer sets pay unilaterally. Nevertheless, early work by Stewart (1987) confirmed this result when comparing the effects of industry and enterprise agreements only.

pay inequalities overall. The studies also highlight the dangers of operating with simplistic contrasts between 'national' and 'local' levels of agreements when making international comparisons. In fact, the relationship between the two levels, and how closely they coordinate, varies considerably between countries. In the UK, local bargaining is uncoordinated by higher levels of bargaining, and so it stands in contrast to local bargaining in Belgium and Italy, and hence the contrasted effects on earnings inequalities.

3. 2   Human resource management

ESES is not rich in measures of the human resource management systems used by firms, and in the context of which one would wish to evaluate the effects of their reward policies. However, some work was possible on this front, some using ESES directly, and some using other sources.

On the issue of pay flexibility, the Italian team used the Epoc survey to explore the determinants of firms' use of these modern forms of payment. Larger firms were more likely to use flexible pay systems than small ones, as were those with more skilled workforces, and those facing more competitive product markets and greater demands for innovation. Pay flexibility was also more likely to be used by firms introducing modern high performance work systems, such as job rotation, job flexibility and low levels of inventory.

ESES does however enable the analysis of firm-specific tenure on pay, often thought to be a proxy for incentives to acquire firm specific skills and to take a long-term view to cooperative working with one's employer. The German team explored this issue and sought to differentiate between explanations of rewards for job tenure based on skill acquisition as compared with providing incentives for cooperative behaviour with management. They found evidence consistent with both explanations, but with the balance of evidence leaning towards incentives for cooperation.

A second theme concerns the manner in which the careers of highly qualified workers are organised in different European countries. The French team at the LEST compared careers of engineers in six countries, and found that two different career models seemed to apply. The first is based on the profession, and the second on the enterprise. Broadly speaking, analysis of the returns to job tenure shows that some countries use the professional model, such as Denmark and the UK, while others use the company model, such as Belgium and Spain, closer to a pole with Japan. French firms appear to use a mix of the two patterns.

A key question for human resource management and for labour market economics is why firms in some industries appear to pay more than others for similar kinds of workers, and why larger firms do likewise, in comparison with small firms. Does this reflect recruitment strategies, motivational and work discipline strategies, sharing of product market rents and bargaining, and so on. In general, ESES confirms that there are substantial pay differences between industries for equivalent kinds of workers, thus highlighting again the importance of company level human resource policies.

The Belgian team explored why large firms pay higher wages, first for Belgium, and the for other countries. They find that a substantial part of this wage premium derives from the sectoral affiliation of the firms. It is also partly due to the higher productivity and stability

of the workforce in large firms. The latter can provide a platform for the development of firm-specific skills learned on the job. This seems especially plausible as the effect was found to be stronger for blue collar workers many of whom acquire their skills on the job rather than in formal education and training institutions. The authors reject an alternative hypothesis that the higher pay is the result of a more efficient matching of workers to jobs.

A final aspect of employer human resource policies is explored comparing the public and private sectors. The Italian team found that public service pay of equivalent workers was better than in the private sector for low paid workers but worse for high paid ones.

4.   Methodological advances

The major methodological achievement of our study has been the establishment of a system for remote user access to micro-data held by Eurostat. Our success can be gauged by two indicators. First, we have the support of Eurostat and a number of NSIs, more than were involved in the current project, to use the system to provide access to future survey data. Many NSIs have already committed to providing access to ESES 2002 data through the PiEP-LISSY System.. The second indicator can be seen in the number of analytical papers and journal articles coming out the project, and the large number of statistical analyses run on the data, compared with the very small number of users for the previous ESES of 1966, 1972 and 1978. In view of the cost of the survey, and the effort put into collecting good comparative data, the low use from 1966-1978 represents very poor value for money. ESES is now recognised by the research and policy community as one of the key sources of earnings data, and the access to the micro-data has enabled application of the modern statistical methods widely used in social science and policy research.

The method of remote access, described fully in the main report, builds on the pioneering work of the Luxembourg Income Study, and additional work by PiEP's software developer, Marc Cigrang. In essence, the PiEP research team agreed certain ground rules with the NSIs that certain kinds of analysis that could possibly lead to deliberate or accidental breaches of respondent confidentiality would be blocked by the software. For example, protections were written into the software to prevent cross-tabulations, scatter diagrams, and copying data. In addition, the project's Data Manager, Tanvi Desai, kept a log of all jobs, and reviewed manually anything that looked doubtful before passing it on. With these protections in place, authorized members of the team could send programs to run on the micro-data as text emails, and receive back their output, also by email. STATA was adopted as the statistical package.

Although great progress compared with work on the paper publications of earlier ESES surveys, the remote access did pose a number of problems for researchers. First, although there were long periods when the system ran well, there were also substantial periods when it proved unstable, and caused considerable delays to our research work. Its operation was especially vulnerable to difficulties of linking to the STATEL system used at Eurostat, and software updates which occur quite frequently given the number of intervening pieces of software that have to be linked:Microsoft Outlook, Windows, and so on. Secondly, although the researchers appreciated the need to disallow cross-tabulations, this made diagnostic work much harder. For example, researchers often use cross-tabulations to check whether a particular regression is influenced by outliers, and they often reveal unexpected inter-relationships among variables that are masked by more synthetic diagnostic

indicators. Thirdly, we had hoped to be able to pool data across countries into a single large data set, but this proved too difficult owing to the size of the computer memory available, and to remaining differences of definition and coverage between the national components of ESES.

We believe that our work broadly endorses the quality of ESES as a statistical instrument for measuring earnings comparatively across countries in the EU. It has also highlighted a number of data quality issues that will no doubt be addressed by future surveys. As can be seen in our research results, the comparative dimension of ESES challenges a number of conclusions about labour markets in the EU that have been based on single country studies, and on use of highly aggregated cross-national comparisons.

Finally, all the researchers wish to express their thanks to the staff of Eurostat and the eight NSIs for their support for our work throughout the project, to the staff of the European Commission, DG Research and DG Empl., for their encouragement, and to the administrative staff at our universities for their help with the unglamorous tasks of budget management.

II. Scientific description of the project, methodology, and results.

1.   Introduction

From the outset, our project has comprised two interrelated elements: an analytical study of pay inequalities, and establishment of an essential tool for our research, a method of secure, remote data access to micro-data from the 1995 European Structure of earnings survey (ESES). This explains the unique, but essential, collaboration in our project team of both academic researchers and statisticians from the national statistical institutes that collected the data according to a common framework agreed with Eurostat. This report covers both aspects of our work. Because most readers will be more interested in the scientific and policy findings, we present these before discussing the important methodological advances achieved within our project.

The relationship between economic growth and employment depends crucially on the behaviour of firms and labour market institutions. The work on 'endogenous growth' highlighted the contribution to sustained long-term growth of the way firms manage their human and knowledge resources (Romer, 1994). At the close of his *Journal of Economic Literature* survey of the causes of European unemployment, Bean (1994) concluded that there were diminishing returns to further analysis of macro-economic data, and recommended more work at the micro level. The PiEP project has focused on the micro level because the decisions of firms with regard to employee management strongly influence both economic growth and employment. The project has explored one area in particular: the relationship between pay inequalities and business and employment performance, and sought to focus analysis on performance at the detailed industry and establishment levels. Rewards play a central part in firms' performance management systems, and they also influence the employment costs of different categories of workers and so affect job openings. Our overriding questions have been:

a) whether large pay inequalities in themselves are sufficient to generate good growth and employment performance, as competitive economic theory would predict; and

b) how far the exceptions to this view, in which small inequalities coexist with good performance, can be explained by reference to different approaches to performance management within firms and the way firms manage their industrial relations?

A very influential view in economic policy circles has been that the superior economic growth and employment performance of the US in recent years, compared with most EU countries, has arisen because wage inequalities have been allowed to rise creating high rewards to motivate initiative and reward skills, and enabling those with few skills to 'price themselves back into jobs' (Blau and Kahn, 2002). The diagnosis has been applied in Europe. Among the higher skilled, the Lindbeck report on Sweden argued that compressed wage differentials had reduced incentives to work hard and invest in training and so damaged Sweden's economic performance (Lindbeck et al. 1993). Among the lower skilled, the OECD Jobs Study argued that western Europe's unemployment difficulties had been made worse by rigid and compressed wage structures (OECD, 1994). If correct, this view has profound implications for reform of the 'European social model' whose philosophy underpins European-level social policy. Although far from uniform across

European countries, this model has, by and large, favoured a long-term reduction of pay inequalities, including those between women and men. It has also favoured the growth of multi-employer bargaining and social dialogue which generally reduce the sensitivity of firms' pay bills and wage structures to short-run shifts in product and labour markets.

Our project set out to test these ideas by comparing the experiences of several EU countries with an eye also to their largest trading partners, the US and Japan. Our project set out also to explore an alternative view: that the relationship between performance and rewards depends on the kinds of performance that management wishes to promote, and the conditions under which it is provided. Greater inequalities in rewards do not of themselves imply greater incentives for performance. If firms need to promote team production, large pay inequalities may be counterproductive. Unless high rewards are attached to the kinds of performance management wants there is every reason to believe they will demotivate staff and encourage them to direct their efforts to the wrong goals. It is our belief that the kind of employee performance that firms want differs according to the personnel management and industrial relations context.

Thus, if we follow the 'New Economics of Personnel' (NEP) (Lazear, 1998), we should expect the type of pay system used to be more critical than the overall size of pay differentials. Where individual employee output is easily measured, or 'monitored', it makes sense to tie pay to results. Where such measurement is difficult, time rates of pay and collective bonuses make more sense. Under a system of occupational or professional labour markets, the critical pay differentials are those between trainees and skilled staff, and between skilled and alternative jobs in semi-skilled occupations. With enterprise internal labour markets, the critical pay differentials focus on age and length of service in the enterprise as these reward on-the-job training and loyalty. With cooperative industrial relations, it is common to promote greater equality both within and between bargaining groups, whereas under more adversarial bargaining, greater diversity can be expected. One important qualification of this literature is that employee motivation depends upon there being a fair chance of gaining the rewards on offer. We therefore expected the presence of gender discrimination in the workplace to reduce the effectiveness of such incentives as women may not have an equal chance of benefiting from them. The same qualification applies to the incentive value of internal labour markets and coordinated bargaining structures.

Until recently, it has only been possible to test these theories on the basis of rather aggregate comparisons of pay inequality and bargaining structures between countries (e.g. Freeman and Katz, 1995, and Teulings and Hartog, 1998). Lack of data comparability between countries, the limited number of countries permitting such comparisons, and the often small sample size have greatly limited progress on this important question. We need comparisons between countries because of the range of institutional diversity they represent, but we need also comparisons between sectors because we know that institutional arrangements and management practices vary greatly within countries.

The 1995 European Structure of Earnings Survey (ESES) has provided a unique opportunity to test the relationship between pay inequalities and economic performance, and hopefully, that of 2002 to be published soon, will extend this. ESES 1995 has provided very rich data on pay structures, pay systems and bargaining arrangements on a comparable basis across Europe, and has enabled the team to link information on individual employee earnings with characteristics of both themselves and their workplaces. This is a clear

advantage over labour force surveys which have only very limited data on the employer's side. It has also been possible to link its results with other European data on economic and employment performance for about 150 3-digit industries and services (in Eurostat's Structural Business Statistics database, SBS), although this proved to be less than we had hoped at the outset. The very richness of this data set has enabled us to formulate and test the theoretical links between pay inequalities and performance in much more detail than previously. It has also been possible to explore more systematically aspects of low pay and gender pay discrimination between countries.

Table I 1. Relationships between pay inequalities and economic performance under different market and personnel management contexts

Context	Condition	Do large pay differences boost:	
		business performance?	**employment performance?**
Competitive market	**Individual negotiation**	Yes: boost incentives	Yes: 'price' people into jobs
Non-competitive markets	**Decentralised bargaining**	No: reflect local monopoly power	Yes: but access to 'non-insider' jobs
	Corporatist bargaining	No: damage coop between bargaining groups, & may undermine incomes policies depressing aggregate economic performance.	No: threat to corporatist system
Personnel management	**Hierarchical control**	Yes: boost management's disciplinary threat	Yes: 'price' lowest skilled into jobs
	Cooperation and horizontal control	No: damages in-group cooperation	No: will tend to push low skill workers into other sectors
Training systems	**Occupational labour market**	Yes: if they reward skill	Yes: low trainee rate favours access to training places.
	Internal labour market	Yes: if they boost promotion ladders	Probably yes: but incumbent workers may oppose because of fears of substitution by cheap labour.
Workplace industrial relations	**Adversarial**	Yes: enable employers to 'buy change', but may also reflect monopoly power	Yes, but employment displacement to non-covered sector
	Cooperative	No: create incentives for individual groups to break away.	No, unless union favours job training for unqualified.

In our initial proposal, we identified an array of hypotheses, set out in Table I 1, showing how the different context of pay inequalities may or may not boost respectively business and employment performance. In practice, it did not prove possible to paint such a fine-grained picture because of data limitations. These were of two main kinds. First, ESES did not enable us to measure many of the items in the 'conditions' column sufficiently clearly, and it proved to be harder than expected to link data from other sources such as Eurostat's Structure of Business Statistics (SBS), which in 1995 provided less good coverage of key

variables than now. Secondly, we had counted on direct access to the micro-data for France and Germany as these countries represent particular types of economic management and business management which are quite well documented. In the end we could work on micro-data on individuals for Belgium, Denmark, Ireland, Italy, Spain and the UK, and on establishment data for all of these excluding the UK where data were collected in a different manner. Also, it proved technically and methodologically too difficult to merge the data sets for all these countries, and we had therefore to analyse each one independently of the others.

Despite these difficulties, our team has produced papers which address each of the types of issues outlined in Table I 1, and in Appendix Table 2 at the end of this report, we list illustrative papers from our team which cover these issues.

In summary our five key analytical findings are as follows:

- Greater pay inequalities within firms appear to be related to better business performance. However, the relationship appears to decline as levels of inequality increase, and their incentive effect appears to depend on the type of work organisation and human resource management approach adopted by the firm. The effect of greater pay inequalities on performance may be related to the slow diffusion of newer, more team-based, methods of work organisation within the EU.

- The greater pay dispersions in some countries, Ireland, Spain and the UK, compared with Belgium, Denmark and Italy, do not systematically give rise to higher employment to population ratios in these countries – in 1995 Denmark and the UK had the highest ratios, and Spain and Italy the lowest ones. The greater inequality in the first three countries appears to be linked to a greater degree of labour market segregation of low paid groups and by gender. This segregation goes beyond the familiar industry concentration, and emerges as a phenomenon associated with employment in certain kinds of firms. Hence, in the future more attention should be given to their human resource policies with regard to low pay and gender. Youth employment appears segmented along similar lines.

- National and sectoral pay agreements do not uniformly restrict employers' reward policies across countries more than do single-employer agreements. Whereas single employer bargaining has been associated with greater earnings variation compared with national bargaining in the UK, the opposite appears to hold for Belgium and Italy. There, enterprise bargaining is associated with lesser inequalities than national or sectoral bargaining. The reason for the smaller variation in Belgium and Italy seems to lie in the greater degree to which single employer bargaining is coordinated across firms in these countries.

- Pay inequalities at enterprise level have to be considered in conjunction with other human resource management and work organisation policies. The beneficial effect of greater pay variability on performance depends on there being an appropriate work environment for such incentives. The correlation between earnings and length of service is greater for when the same kind of skill is organised on an enterprise-basis than on a professional basis.

- Many interrelationships observed at the aggregate level, such as between bargaining structures and pay inequality, are not borne out when full account is taken of employment composition differences that can be studied with the ESES micro-data.

On the methodological front, our project has broken important new ground by establishing a technical system and a set of agreed procedures with NSIs and Eurostat for secure remote access to the 1995 ESES micro-data. The significance of this breakthrough should not be underestimated. At the start of our project, the EU had a regulation for confidential access to micro-data from household surveys, but not for data obtained from enterprises. There was therefore no set of agreed procedures which our project could use, although the eight NSIs and Eurostat had demonstrated their goodwill by working closely with the PiEP project. An illustration of the procedural difficulties is that the countries had administrative arrangement enabling them to send micro-data to Luxembourg, but this did not necessarily extend to using the data for research. Different countries also had differing arrangements for data access nationally. As a result, it was necessary to devise a set of agreements allowing reciprocal access to the micro-data held in Luxembourg that met the requirements of all parties. Even with all the goodwill, this was a slow and difficult task. Not until this stage had been completed was it possible to start work on setting up the data connections. These also posed technical problems because Eurostat's system was designed for its original purpose of receiving large amounts of data on an occasional basis, as compared with the researchers' need to send many small programs for analysis.

The full technical details are described in the section on the methodological aspects of our work.

Our key methodological findings in summary are:

- Remote access to Eurostat micro-data can be established on a secure basis which protects data respondent confidentiality to the standards expected by National Statistical Institutes and Eurostat;

- The PiEP-LISSY system has proved to be an invaluable tool for researchers, enabling full exploitation of the ESES micro-data, and application of modern econometric techniques to the data for the first time;

- The data protection protocols have been consistent with relatively easy access for researchers;

- The PiEP-LISSY system can be improved and used as a basis for future data access by the research and policy community to Eurostat micro-data thus encouraging much fuller use of the data, and better value for money for European tax payers and the organisations completing the survey returns.

2. Wage inequality and firm performance.

This section, and those which follow it, are devoted to summarizing the results of the numerous analytical and descriptive studies carried out during the project. Most of them use the ESES data, but a number extend to use of other data sets, the latter being undertaken in preparation for ESES while the team waited for the data links to be agreed and set up. The papers are analysed thematically, following the structure in our initial research proposal, and flowing from pay and aspects of business performance, through low pay, youth pay and gender inequalities, to the effects of collective bargaining.

2. 1 Wage inequality and firm performance in Belgium

Lallemand, Plasman and Rycx (2004) examine the relationship between intra-firm wage dispersion and firm performance in large Belgian firms using a unique matched employer-employee data set. On the basis of Winter-Ebmer and Zweimüller's (1999) methodology, they find a positive and significant relationship between intra-firm wage dispersion and profits per capita, even when controlling for individual and firm characteristics and addressing potential simultaneity problems. Results also suggest that the intensity of this relationship is stronger for blue-collar workers and within firms with a high degree of monitoring. These findings are more in line with the 'tournament' models than with the 'fairness, morale and cohesiveness' models.

The methodology used is that developed by Winter-Ebmer and Zweimüller (1999) who use a two-step estimation procedure. In the first step, Lallemand et al. (2004) estimate by OLS the following wage equation for each firm:

$$\ln W_{ij} = \alpha_0 + \alpha' Y_{ij} + \varepsilon_{ij} \quad (1)$$

where W_{ij} is the gross hourly wage including bonuses of worker i in firm j, Y_{ij} is a vector of individual characteristics including age, age squared, sex, education (two dummies), and occupation (one dummy), and ε_{ij} is the usual error term. The standard errors of these regressions (σ_j) are used as a measure of conditional intra-firm wage dispersion.

In the second step, they estimate by OLS the following firm-level performance regression:

$$\ln P_j = \beta_0 + \beta'_1 \sigma_j + \beta'_2 X_j + \beta'_3 Z_j + \upsilon_j \quad (2)$$

where P_j is the performance of firm j, σ_j is the conditional indicator of the intra-firm wage dispersion, X_j contains aggregated characteristics of workers, Z_j includes employer characteristics and υ_j is the usual error term. The performance of a firm (P_j) is measured by the gross operating surplus per worker. It is a good proxy of the firm's per capita profits. It is obtained by subtracting total personnel expenses from value added at factor costs.

The main explanatory variable in equation (2) is the conditional intra-firm wage dispersion (σ_j) estimated in step 1. Equation (2) contains numerous control variables for the composition of the workforce (X_j) as well as for firm characteristics (Z_j). These control variables include the share of the workforce that: i) at most has attended lower secondary school, ii) has more than 10 years of tenure, and iii) is younger than 25 and older than 50

years, respectively. The share of women, the share of blue-collar workers, the share of workers supervising co-workers, sectoral affiliation (5 dummies), the size of the firm (the number of workers), and the level of wage bargaining (2 dummies) are also included.

The authors use instrumental variable methods to test for, and reject, possible simultaneity whereby highly profitable firms might offer higher bonuses through profit-sharing, and hence have greater internal wage inequalities.

Using both unconditional and conditional measures of within firm pay inequalities, they find that a positive relationship between inequality and profits per employee. However, the relationship is stronger when controlling for employee characteristics. Their strongest estimate, obtained when controlling for differences among employees and when eliminating possible simultaneity between wage inequalities and the level of profits per employee, suggests that on average, when wage dispersion increases by 1%, firm performance rises by between 0.87 and 1.48%.

The authors test two organizational influences that could mediate the relationship between within-firm inequality and business performance. The first relates to the composition of the workforce, and the second to the 'monitoring environment' within the firm. They find that the positive influence of inequality among the firm's employees on performance is greater when there is a high percentage of blue-collar employees, and the reverse when there is a high percentage of white-collar employees. This difference was also observed by Winter-Ebmer and Zweimüller (1999) using Austrian data. One interpretation of this finding is that the work systems of blue-collar workers rely less on team-work and more on individualised effort, for example, as would occur in mass production.

The other finding was that the efficacy of wage inequalities as an incentive depends also on the monitoring environment, consistent with a finding by the PiEP team for the UK (Belfield and Marsden, 2003). Lallemand et al find that a high level of wage inequalities among employees in the same establishment leads to better profits per worker when there is a high degree of monitoring, measured as a high ratio of supervisors to workers. This would also be consistent with the effect of workforce composition as more individualised work systems often also require closer supervision.

A final comment on Lallemand et al's findings is that the positive effect of pay inequalities within the workforce was also positive for white collars, even though it was weaker than for blue collars. Again this should be taken in conjunction with evidence on work organisation, such as that studied by Dell'Aringa et al (2002) (in this report). The Epoc survey they used indicated that although cooperative high performance work systems, which use team-working, have spread within the EU, they remain strong in only a minority of workplaces. The evidence of Lallemand et al, like that of Winter-Ebemer and Zweimüller may reflect the continued and widespread use of older systems of work organisation and reward systems.

2. 2   Wage inequality and firm performance in France

The effects of wage inequalities on firm performance were also addressed by Koubi and Roux (2004), examining the French case. The model they develop rests on the idea that workers can allocate their effort between individual and collective activities. Firms also have differing requirements for individual and team effort depending on the type of

technology used and the patterns of work organisation adopted. Thus firms with production systems that require more team effort will need to adopt appropriate incentive systems that foster cooperative effort, and vice versa. However, whereas individual effort can monitored at the level of the individual workers, collective effort can only be monitored through the collective output.

If firms adopt the appropriate type of reward system for their production technology, then one would expect them to pay by grade and function when seeking collective effort because this rewards what workers contribute in common by virtue of their skills and experience. In contrast, when firms seek to reward individual effort, they will adopt reward systems which differentiate between workers in the same categories according to their performance.

Thus Malik and Roux develop a theoretical model based on the intuition that workers can supply either individual or team effort, and that firms will choose the appropriate mix according to the nature of their production function. From this, they demonstrate that profit maximising firms will offer more dispersed earnings if they need to foster individual effort, and more equal earnings if they wish to foster cooperative effort. They make the important assumption that individual effort can be easily monitored and rewarded by management, and that team effort can only be measured through the aggregate output of the team.

In their empirical work, Malik and Roux use this idea to develop an 'individualism index' reflecting the degree to which firms seek individual rather than collective effort from their employees. Their method is to use earnings data from INSEE's DADS to estimate conditional earnings and residuals for individual employees, and then to compute the index for about 30 industries. Taking advantage of the DADS's long time series, they test the stability of their individualism index over time, and find that differences between sectors have grown during the 1990s, but have otherwise been fairly stable. The next step in their analysis is to see whether measures of workplace organisation from the REPONSE survey can explain the inter-sectoral differences in firms' preferences for more individualistic or more cooperative reward systems.

Table FP 1. Impact of different workplace factors on the adoption of individualistic reward systems.

	coefficient	Standard error	T-value
Intercept	0,256	0,006	41,550
Employment size	0,002	0,001	2,080
Rate of unionisation	0,011	0,003	3,450
Broad jobs and employee problem-solving	-0,025	0,003	-10,010
Autonomous work	-0,008	0,002	-3,380
Cooperative workplace climate	-0,005	0,002	-2,260

Source: Koubi and Roux (2004). Based on REPONSE and DADS.

Although tentative, their results suggest that smaller earnings inequalities will be found where firms offer broad jobs and encourage problem-solving activities among their employees, and where autonomous teams are used and where the firm wishes to promote a cooperative employment relations climate.

2. 3 Intra-firm inequalities and performance: comparisons among selected EU countries.

Assessing the relationship between pay inequalities and business performance was not a straightforward task in the five countries for which the PiEP team had access to micro-data, except in the case of Belgium where data on profits per employee were available at firm level. Belfield and Marsden (2004) attempted to match ESES data on pay structures to the relevant profits and productivity data from the SBS; however, this work proved unrewarding because of the need to work at the two-digit NACE level, and because of the incomplete nature of the SBS data (in the mid-1990s this survey had yet to reach maturity in terms of collection and reliability). The consequent performance of the analysis at a highly aggregated level left too few observations for statistical tractability. The results were further confused by the fact within two-digit industries there is a great deal of heterogeneity among firms in terms of their performance and their HR management and reward practices. Thus, while Belfield and Marsden (2004) did run regressions using the two-digit ESES and SBS data, these problems meant that it was impossible to judge whether there was in fact an underlying relationship that was struggling to attain statistical significance, or whether it was a simply the case that the relationship did not exist.

An alternative approach was attempted using Winter-Ebmer and Zweimüller's methodology, taking conditional average earnings at establishment level as an indicator of business performance. This approach depends on the assumption that competitive conditions obtain across the whole labour market, and that firms can be treated as paying their workers accurately according to their productivity. Although this assumption is open to question, it should be noted that its effectiveness was evinced in the work of Winter-Ebmer and Zweimüller, who applied it in arriving at strongly significant results for Austria. In short, it was shown that in Austria a 'hump-shaped' relation was the rule between pay inequality and firm performance (wage levels as an indicator of firm productivity). This is to say that – all else equal – performance increased with inequality up to an optimum point, beyond which further increases in inequality led to reduced performance. When plotted graphically, this relationship appears a parabolic curve, or 'hump'. Thus, a key contribution of this paper was to suggest that while pay inequality might exert a positive influence, it was possible to have too much of a good thing.

Belfield and Marsden (2004) were able to apply the Winter-Ebmer and Zweimüller method to ESES micro-data alone, thus overcoming the data-reliability and level-of-analysis obstacles posed by the SBS data. Although the ESES did not offer the advantages of the panel data employed in the Austrian study, it was in certain respects a superior source of data, particularly as regards the specificity of the wage data and some human capital variables. Earnings functions were estimated for each individual workplace and used to derive conditional measures of pay inequality for each establishment. The statistical need to work with a minimum number of individual observations within these earnings functions entailed that smaller establishments (with fewer than ten observations) be excluded from the sample. This requirement marginally limited the scope of the conclusions of the study, but ensured that they would be computationally valid.

The results of the ESES analysis substantially replicated those reported in the Austrian study and those attained by Lallemand et al (2004) in their application of elements of the

method to Belgian ESES data, which could be matched at the level of the organization to national SBS data on productivity. A notable difference concerned the form of the relationship between the key variables – while for Italy and Spain the familiar 'hump' was apparent, this could not be discerned at a statistically significant level for the remaining three countries in the study (Belgium, Denmark, and Ireland). However, the possibility could not be rejected that the 'hump-shaped' relationship also applied to these countries, as the absence of a 'clean' outcome appeared to be the result of collinearity problems rather than strong patterns in the data. Regardless, in these cases a significant positive (linear) relationship could be observed between pay inequality and establishment performance, a result partially consonant with the preceding studies.

To summarize, therefore, the multi-country analysis of the ESES data (Belfield and Marsden 2004) indicated that intra-establishment pay inequality was positively associated with establishment performance. In some cases, this relationship was qualified by the existence of an optimum point, beyond which inequality became a drag on performance. In both outcome contexts, however, the relationship was of a relatively small magnitude. On the whole these results are consonant with theories that posit a net incentive effect for pay inequality, but they also suggest that as a management tool pay inequality has its limitations, that for some of the firms in the sample, internal inequalities may have reached the point of diminishing returns on performance.

3. Work systems and incentives

The PiEP studies summarised in this section explore the relationship between incentives and work systems. Because ESES has only limited information on pay systems, two of these use other surveys. They highlight the importance of moving beyond the traditional dimensions of pay covered by ESES, to give more attention to pay systems and how they relate to the work environment and aspects of firm organisation. The first study examines the relationship between firms' adoption of flexible pay systems and new patterns of work organisation. The second examines the returns to job tenure within firms as an indicator of different types of firm-level wage policy. The third examines the match between firms' use of performance related pay and the work organisational environment, and whether the right match between the two leads to better firm financial performance.

3. 1 Work organisation and incentive systems

The ESES provides only limited information on types of pay systems and work organisation, yet in recent years, there has been a marked growth in the use of innovative methods of payment, often coming together with the adoption of innovative patterns of work organisation. The latter are sometimes referred to as 'high performance work practices', and incorporate more flexible patterns of working, often based on team-work, and stand in contrast to the traditional rigid taylorist patterns that prevailed up to the 1980s. Adoption of these innovations owed much to the increased awareness in Europe and the US of Japanese production organisation and the principles of 'lean production' especially from the early 1980s.

The EPOC survey (Employee direct Participation in Organisational Change), carried out by the European Foundation for the Improvement of Living and Working Conditions in 1996, provides information on just these issues, as summarized in Table WSI 15.1. The survey

shows the traditional pay methods remain strong, especially pay for skill in Germany, France and the Netherlands, but that innovative methods are now well-established in most of the EU countries reported. Team based pay is particularly strong in Italy, Ireland and Spain, and profit sharing in France.

Table WSI 15.1 – Index of flexibility in pay methods

	TRADITIONAL METHODS (individualisation of pay)		INNOVATIVE METHODS (output-related pay)			
			Pay for productivity		Pay for performance	
	pay_skill	bonus	pay_ind_out	pay_team_out	prof_share	own_share
Denmark	29	9	12	18	9	6
France	50	16	14	12	43	6
Germany	75	25	27	14	11	3
Ireland	23	16	14	22	7	3
Italy	29	19	22	38	5	2
Nether.	50	13	11	9	13	4
Portugal	33	14	14	5	5	5
Spain	25	13	22	21	11	12

Key: - pay for individual skill (pay_skill); bonuses related to individual attitude (bonuses); pay for individual output (pay_ind_out); pay for team output (pay_team_out); profit-sharing (prof_share); share ownership (own_share).
Source: Dell'Aringa, Ghinetti and Lucifora (2004).

Why do firms adopt these practices? Dell'Aringa et al (2002) ranked the pay practices and combinations thereof used by firms on a six point scale of increasing intensity in the use of flexible pay practices:

> 0 = no flexible pay practices
> 1 = only bonuses and/or pay-skill (trad. forms of pay flexibility)
> 2 = only some pay for productivity (pay for ind prod and/or pay for team prod.)
> 3 = pay for productivity and also some traditional forms of pay flex
> 4 = only some profit related pay schemes (profit sharing and/or share of ownership)
> 5 = some profit related pay and some pay for productivity
> 6 = some profit related pay, some pay for productivity and also some traditional pay flexibility.

Using an ordered probit regression, they show that use of flexible pay practices is indeed associated with competitive pressures on firms, and with the intensity of organisational change and the adoption of high performance work practices. Large firms are also more likely to adopt these flexible pay practices.

Notable too are some of the factors inhibiting the use of flexible pay practices in 1996. High levels of union density and high rates of coverage by collective agreements make it less likely such practices will be found, although this may be the result of the longer time firms need in order to renegotiate pay systems when workers are strongly unionised.

Table WSI 15.2 – Ordered probit estimation of pay flexibility's determinants

Independent variables	Depend variable: Pay flexibility.
Firm characteristics (omitted: size less 50)	
Size 50-100	0.06
Size 100-200	0.14***
Size 200-500	0.16***
Size 500-1000	0.21***
Size more 1000	0.25***
Skill intensity	0.07***
Time flexibility	0.10***
Training	0.18***
Firm's market structure	
Owned	0.16***
Profit	0.38***
Level of competition	0.11***
Increase competition	0.11**
Industrial relations	
Density	-0.12**
Coverage	-0.10***
Innovation activity	
Product innovations	0.07**
ICT	0.11***
High performance work organisation	
Flattening structure.	-0.016
More inv. low level	0.10***
Team work	0.01
Job rotation	0.09**
Multitasking	0.10***
External flexibility	
Downsizing	0.014
Outsourcing	-0.01
Back core busnn	-0.03
Strategic alliance	0.07*
Sectoral dummies (omitted: education)	Yes
Country dummies (omitted: Portugal)	Yes
N° observations	5168
Log likelihood	-8104
Pseudo R^2	0.087

Note: Statistical significance: * 10% level; **5% level; *** 1% level.

For the future, these results suggest that Eurostat should consider enlarging the coverage by ESES of pay systems.

3. 2   Firm-specific Tenure Effects on Wages in Europe

The upward-sloping and concave age-earnings profile is one of the few stylised facts of modern labour and personnel economics. Why do wages increase with tenure? The relevant literature distinguishes between three equally plausible explanations: First, due to shared

investments of workers and firms in firm-specific human capital wages increase after completion of the initial investment period (Becker 1964). Second, good matches tend to last longer than inefficient ones, which, in turn induces wages to increase in enduring employment relationships because informational asymmetries are constantly reduced (Jovanovic 1979a). Third, delayed compensation acts as an incentive for workers to exert effort when monitoring is costly. Thus, at the beginning of their careers workers post a bond that is returned by their employer if they are not caught shirking and dismissed (Lazear 1981).

In contrast to earlier approaches, Frick Prinz and Gesine (2005) take a different approach and interpret the returns to tenure from the point of view of the firm. In particular, they assume that the returns to tenure differ between firms and are related to the firm-specific compensation structure, the composition of the firms' workforces and the economic environment in which a firm is operating. In short, their aim is to analyze the variation in the returns to tenure across firms and the correlates of firm-specific returns to tenure. In this sense they interpret the returns to tenure as one dimension of firm-specific compensation policies.

Use of ESES provides them with data based on comparable design and survey techniques for five European countries. They thus analyse not only the variation of firm-specific returns to tenure within one country but also differences across countries.

The authors estimate a set of firm-specific rates of return on tenure taking account of standard human capital measures, and then regress these on a series of explanatory variables.

The authors hypothesise that:

Test firm-specific human capital:
- The incentives to invest in human capital are higher for workers with longer expected tenure, i.e. the returns to tenure should be higher in firms with a low percentage of female workers. In fact, the opposite emerges from their regression.

Test incentive theory:
- Since highly skilled workers are more often in jobs where monitoring is costly, the returns to tenure should be higher in firms with a high percentage of highly skilled workers. In several countries they find that the mean return to tenure increases with the percentage of workers with a medium and a high degree of schooling. This is in line with the expectation that monitoring may be more costly for these groups of workers.
- Since monitoring is more difficult in services than in manufacturing, the returns to tenure should be higher in firms in service industries, which they find are to be so in banking and insurance.
- Since monitoring is more difficult in large firms, the returns to tenure should increase with firm size, borne out for Belgium and Italy, but in the other countries, the coefficients are postive but not statistically significant.
- Since only those workers accept seniority wages who expect to remain with their current employer for some time into the future, the returns to tenure should be higher in firms with a low percentage of female workers, again borne out in

Belgium and Italy, but in the other countries, the coefficients are postive but not statistically significant.

They also find that starting wages, as indicated by the constant term in their regression, are lower the higher are the firm specific returns to tenure, and this holds across all the countries covered (Belgium, Germany, Ireland, Italy and Spain). However, this observation is consistent with all three of the theories they consider.

Finally, they find that the structure of collective agreements has no significant effect on the returns to tenure, although inter-country comparisons are made difficult by differences in the way agreements were recorded. Thus the balance of their findings is to favour incentive theory, that tenure rewards reflect deferred compensation, over human capital theory, that tenure rewards reflect increasing skills.

Table WSI 15. 3 Regression with Firm-Specific Returns to Tenure as Dependent Variable

	Belgium			Germany			Ireland			Italy			Spain		
	Coef.		P>|t|	Coef.		P>|t|	Coef.		P>|t|	Coef.		P>|t|	Coef.		P>|t|
Parameter Firm-Specific Wage Regressions																
Constant	-0,328	**	0,00	-0,363	**	0,00	-0,346	**	0,00	-0,480	**	0,00	-0,329	**	0,00
Age of 40	-0,034	**	0,00	-0,364	**	0,00	-0,364	**	0,00	-0,487	**	0,00	-0,352	**	0,00
Schooling: Medium Degree	-0,030	**	0,00	-0,343	**	0,00	-0,231	**	0,00	-0,299	**	0,00	-0,146	**	0,00
Schooling: High Degree	-0,268		0,21	-0,006		0,70	-0,067		0,11	0,011		0,61	0,021		0,14
Gender (1 = Male)	-0,178	**	0,00	-0,296	**	0,00	-0,295	**	0,00	-0,259	**	0,00	-0,272	**	0,00
Workforce Characteristics of Firm																
Mean Tenure	-0,006	**	0,00	-0,002		0,18	-0,006		0,31	-0,006	*	0,02	-0,001		0,60
Mean Age	0,002		0,42	-0,002		0,14	-0,003		0,51	0,004		0,21	-0,005	*	0,03
Percent Medium Schooling	0,045		0,10	0,095	**	0,00	0,116		0,11	0,244		0,54	0,077	*	0,02
Percent High Schooling	0,266	**	0,00	0,337	**	0,00	0,261		0,06	0,112		0,18	0,171	**	0,00
Percent Male	0,094	**	0,00	0,033		0,19	0,196	**	0,00	-0,023		0,59	0,032		0,38
Firm Size/1000	0,008	**	0,00	0,004		0,21	0,002		0,71	0,012	*	0,03	0,012		0,07
Sector																
Basic Industries	0,192	**	0,00	0,042	**	0,00	0,021		0,80	0,133	**	0,00	0,018		0,43
Construction	0,004		0,91	0,003		0,83	-		-	0,082		0,21	-0,051	*	0,04
Wholesale and Retail Trade	0,038	*	0,02	-0,024		0,13	0,013		0,69	0,058		0,37	-0,024		0,28
Banking and Insurance	0,080	**	0,00	0,049	**	0,00	0,199	**	0,00	0,092	**	0,00	0,068	**	0,00
Industrial Relations																
National Wage Agreement	-0,005		0,58	-		-	-0,031		0,44	-0,032		0,45	0,093	*	0,01
Industry Level Agreement	-0,059		0,06	0,014		0,26	0,004		0,95	-		-	-		-
Enterprise Level Agreement	0,010		0,31	-0,005		0,76	0,016		0,73	0,008		0,61	0,136	**	0,00
Above Enterprise Level Agreement	-		-	-		-	-		-	-		-	0,104	*	0,01
Establishment Level Agreement	0,001		0,91							-0,015		0,69	0,163	**	0,00
No Collective Agreement	-0,011		0,73	-		-	-		-	-		-	-		-
Constant	1,960	**	0,00	1,243	**	0,00	0,892	**	0,00	1,304	**	0,00	2,480	**	0,00
Number of Firms	542			508			225			306			1277		
Adj R2	0,44			0,41			0,46			0,57			0,44		

Source: Frick and Prinz (2004).

3. 3 The influence of supervisory environments on the effectiveness of performance pay systems

The third are of study of the PiEP team on incentives and patterns of employee supervision used British data, to look at the adoption of performance related pay by firms. Again this was something that could not be done with ESES, but represented an important element in our analysis of the conditions under which pay inequalities influence economic performance.

In line with one of the initial hypotheses of the PiEP project, whether incentives lead to higher performance when they match the organisational environment in which they are set, Belfield and Marsden (2003) set out to see first whether firms which adopted performance pay did so when it was suited to the patterns of supervision in place, or whether they adopted it for some other reason, such as being regarded as 'good practice'. Using the panel element of WERS, they were able to observe firms which retained forms of performance pay between both panel dates, those which dropped it and those which adopted it in between the two surveys. Allowing for measurement difficulties, the authors found that where there was a mismatch between the incentive system and the supervisory or 'monitoring' environment, firms were more likely to abandon performance pay, and where there was a match, they were more, likely to retain it.

The results also confirmed that establishments that used performance pay incentives tended to have greater within plant pay inequalities, although it was not possible to control for differences between workers' human capital endowments in different plants. Nevertheless, this confirmed the PiEP team's interest in examining within establishment pay differences using ESES as a means to explore use of incentive payments.

The next question was whether the firm performed better financially when there was a match compared with a mismatch. Again, allowing for measurement difficulties, the results supported the hypothesis that where firms had the right match of pay system and monitoring environment, on average, they outperformed those that did not (Table WSI 15.4). Nevertheless, the authors also noted that firms using PRP generally outperformed those that did not, even when there was a mismatch.

Table WSI 15.4: Financial performance outcomes

Mean establishment financial performance (standard error)	Establishment's monitoring environment is suited to PRP	
Establishment uses PRP system	*Yes*	*No*
Yes	4.11* (0.11)	3.84* (0.08)
No	3.38* (0.12)	3.65* (0.06)

* These values are all significantly different from one another at the 10% level or better
Source: WERS 98 cross-section data
Source: Belfield and Marsden (2003)

Finally, an important result of the study was that firms appear to experiment with pay incentive systems, to try them out, and if they find they are wrong, to try to adapt them or abandon them. The period of observation for the WERS panel, 1990-1998 is relatively short in view inertia likely to arise from the management costs of changing pay systems, which limits the number of observed changes in any period, but the results are suggestive.

4. Engineers' pay and careers: between occupational and internal labour markets

Engineers are an important occupational category within Europe's economies, being associated especially with the high quality niche of production and the knowledge economy stressed by the EU's Lisbon conference of March 2000.

ESES provides an opportunity to compare the pay and careers of engineers in different EU countries, and also offers a point of comparison with the same category in Japan. A first point to note therefore is that, even controlling for individual human capital and firm characteristics, engineers occupy a varying position in the occupational pay hierarchy across the EU (Table EP 14.1). Nohara used a standard Mincer earnings function regressing the log of wages on age and tenure (natural and squared) and the key variables covered in ESES for individuals and firms.

Table EP 14.1 – Occupational pay hierarchy (adjusted hourly pay including bonus) Engineer=100.

	Denmark	France	United-Kingdom	Belgium	Spain	Japan
Corporate-manager	121	110	119	125	125	135
Engineer	100	100	100	100	100	100
Technician	90	71	83	87	84	89
Manual worker(Craft-type)	90	42	70	70	67	-
Manual worker (Industrial-type)	86	41	58	72	67	86

Note: PIEP project; calculated from a Mincer-type earnings function.
Source: Nohara (2004 Table 1)

Career patterns for engineers differ markedly across these countries, as is illustrated by data on their length of service patterns with their current employers. In Britain and Denmark their job tenures are markedly shorter than in the other countries, and especially in comparison with France and Japan where between a quarter and a third of engineers have been with their current employers for more than 20 years (Table EP 14.2).

Table EP 14.2. Distribution of E/S by length of tenure: Distribution (%) of E/S by length of tenure

Tenure	Denmark	UK	France	Spain	Belgium	Japan
Less than 2 years	49.1	33.5	22.2	23.1	25.5	14.4
Between 2 and 9 years	19.2	43.6	10.3	18.3	16.9	10.5
Between 10 and 19 years	23.4	20.6	42.8	38.0	37.6	43.3
20 years or more	9.3	2.3	24.7	20.6	20.0	31.8
Total	100	100	100	100	100	100

Source PIEP ; Nohara 2004

Nohara (2004) explains this by arguing that there are two types of career models which underpin these differences: an occupational model with higher degrees of inter-employer mobility in Britain and Denmark, and an internal labour market model, associated with less inter-firm mobility in the other four countries. In Japan, the internal model is particularly strong, although the quite large percentages of shorter service engineers in the other internal labour market countries suggests that in these cases the internal labour markets are less closed than in Japan. The effect of the internal and occupational models can be detected in the wage premia associated with additional years of tenure and labour market experience (Figure EP 14.1). These are consistently lower in Britain and Denmark than in the other countries, signalling, according to Nohara, that engineers' skills in the former two countries are more closely tied to their occupation than to the firm, whereas the reverse is true of the other countries, the most extreme case being Japan.

These different patterns of labour market and firm organisation have been observed in earlier research using ESES for 1966, 1972 and 1978. Saunders and Marsden (1981) and Marsden (1990) found that in those years, for mainly blue collar workers, Britain, Germany and, to some extent, the Netherlands were characterised by the occupational market model, whereas in France, Italy and Belgium, firm internal labour markets were more predominant, a fact reflected in different patterns of earnings growth with tenure, and different tenure distibutions by occupation. Subsequent research by Nohara's colleagues at the LEST suggests that in France, internal labour markets have lost some of their strength compared with the 1960s and 1970s, and in Britain, the occupational model has gone into a long decline for blue collar skills (Aline Valette, doctoral thesis in progress).

Figure EP 41.1. Returns to tenure: engineers
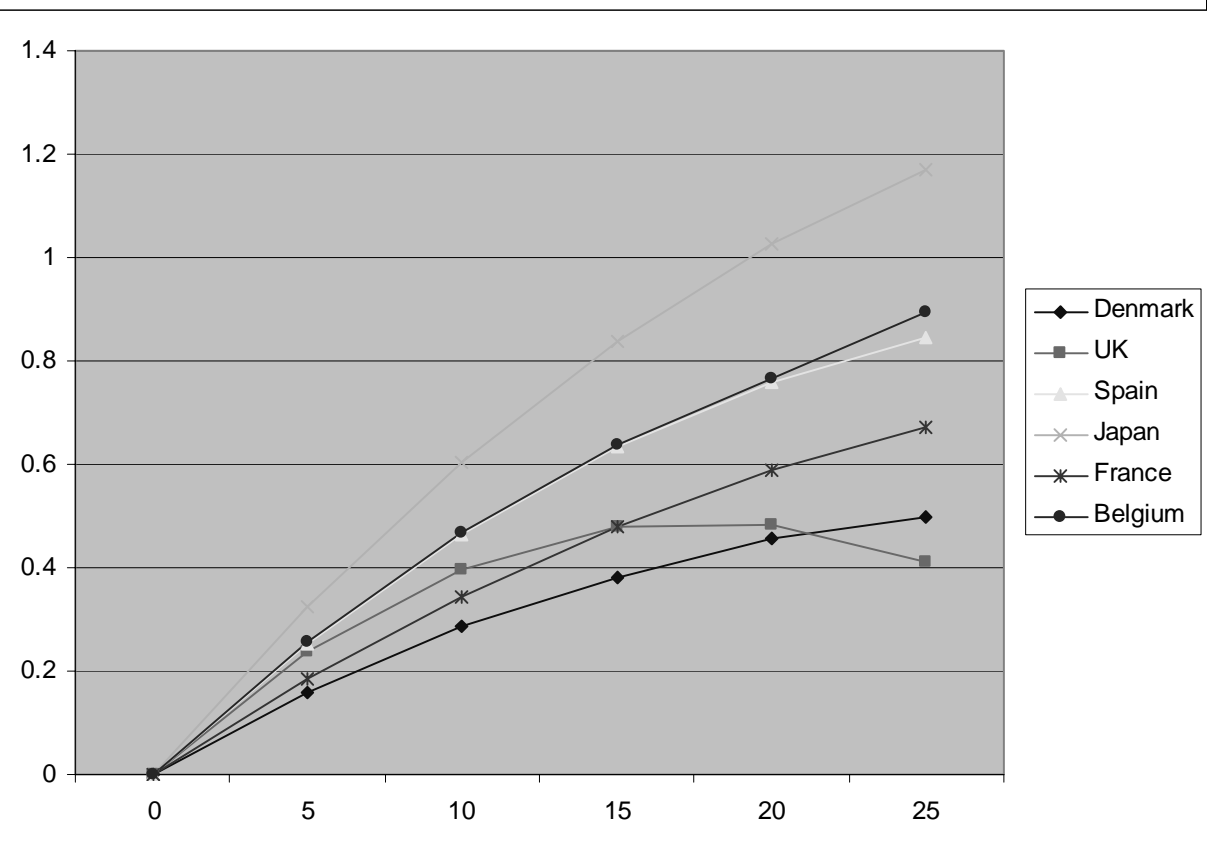
Source: Nohara (2004)

5. Inter-Industry Wage Differentials: analysis and competitive and non-competitive interpretations

The persistence of wage differentials between industries for comparable employees is an empirical anomaly for the competitive view of labour markets, as it suggests that the law of one price for workers of the same productive capabilities may not obtain across the entire labour market. Evidently, if this were the case, it would have serious implications for our understanding of the allocative efficiency of labour markets. While this seeming empirical anomaly has long been noted, interest in its analysis has increased markedly since its return to academic prominence in the US in the late-1980s (Krueger and Summers 1988), although similar observations were found in a number of field studies in the late 1960s in the US and in Europe (eg. Rees and Shultz, Mackay et al, and Daubigney et al). A large number of studies have since been performed for a range of countries. On the balance it has been found that such wage differentials appear to occur in many labour markets, with similar industries emerging as high- and low-payers across countries.

However, the observation of patterns inconsistent with the predictions of competitive theory does not necessarily entail the reassessment of said theory. There are two principal reasons that this is so. First, the standard theoretical framework accommodates differentials where they derive from differences in working conditions, with less attractive such conditions commanding a wage premium – so-called 'compensating differentials'. Consequently, what appear to be industry wage differentials may simply be the manifestation of these compensating payments, whose presence could be 'filtered out' if data could be collected on all of the aspects of jobs that drive them. A second question that can be asked of industry wage differentials relates to employee characteristics. Here, it can be posited that apparent differences in pay levels across individuals with identical productive characteristics are in fact the outcome of unobserved differences in worker quality. This is to say that the data may be insufficiently sophisticated to be able to capture the differences among individuals. In this case, apparent industry differentials could thus derive from the concentration of individuals with higher unobserved productive capabilities in particular industries. It should be noted that both these theoretical responses to the challenge posed by industry differentials call for more detailed data to be brought to bear on the issue.

Two other hypotheses examined during the project concern the presence of monopsony, which would facilitate discrimination (see section on gender inequalities), and the 'efficiency wage' hypotheses, which relate to reward systems offered within the firm (see section of work systems and incentives).

In light of this debate, the matched employee-employer nature of the ESES data set is particularly suited to the role of inter-industry analysis, as it permits the precise identification of the industry-specific component of wages while controlling for a rich set of earnings-related individual and job characteristics. Moreover, its harmonized nature enables reliable comparison of results across countries, and as such it represents a significant advance over previous comparative work in this area.

5. 1   Inter-Industry Wage Differentials in Ireland

Previous work performed in on inter-industry wage differentials for Ireland has utilized household data, and has inevitably been constrained by its limitations as regards job and employer characteristics. In this respect, the study by Gannon and Nolan (2004) represents a considerable advance on preceding analyses. The method of analysis employed is based on that used by Rycx (2002) and others in recent studies in this area. At its core is a standard Mincerian wage equation comprising individual, employer, and industry characteristics. For ease of interpretation, adjustments are made to transform differentials initially calculated in log points into percentage points (Table IW 1).

Table IW1 shows that substantial raw inter-industry differences in wages exist in Ireland, but that these are strongly reduced by the inclusion of observable employee and job characteristics in the calculation process. The possibility that these differences might be due to employer characteristics is largely ruled out by the fact that the addition of these factors to the model fails to meaningfully reduce the degree of variation across industries. As a result, such modifications to the standard theoretical framework as rent-sharing and efficiency wage effects do not appear to explain the remaining differentials.

Table IW1: Measures of Dispersion of Inter-industry Wage Differentials, Ireland 1996: Standard Deviation %

	Weighted (by employment)	Weighted and Adjusted
Sector only	31.6	31.2
Sector and Employee Characteristics	12.7	12.3
Sector, Employee and Employer Characteristics	11.7	11.3

Source: Gannon and Nolan (2004)

In a comparison with results for a number of Western European countries, the US, and Canada, it is shown that Ireland ranks towards the top end of the scale in terms of the magnitude of dispersion of its inter-industry wage differentials (see Table 5). Work by Teulings and Hartog (1998) offers evidence for a strong inverse link between this magnitude of dispersion and the degree of 'corporatism' – that is, the degree of centralization and coordination of wage setting – in a country. Often, Ireland has not been included as a case in attempts to construct metrics of corporatism, and thus it is difficult to categorize it in this dimension. Certainly, prior to 1987 and the advent of social partnership, Ireland would have ranked with countries like the US and UK at the bottom of any ranking of corporatist practices and institution. However, there is reason to believe that developments since this date would at least nudge the country towards the 'more corporatist' pole. Nevertheless, despite the difficulty of assigning a corporatism rating to Ireland for 1995, it is clear that the size of its inter-industry differentials are not those that would be expected in a strongly corporatist country.

5. 2   Inter-Industry Wage Differentials: Evidence from Belgium in a Cross-National Perspective

Plasman and Rycx (2004) assess the case of inter-industry differentials in Belgium within an analytical framework very similar to that applied in the Gannon and Nolan paper above. It is found that wages differ significantly by industry in Belgium, and that while accounting for job and employer characteristics reduces the magnitude of these differentials

considerably, they remain non-trivial. The weighted adjusted standard deviation of inter-industry differentials drops from 0.18 to 0.07 as one moves from adjusting for individual employee characteristics to including, in addition, employer characteristics and sector (Plasman and Rycx 2004, Table 2). Comparison with results derived elsewhere for other industrialized countries places Belgium in a middling position in the ranking of the dispersion of inter-industry wage differentials (see Plasman and Rycx 2004, Table 3). This position is consistent with its ranking in the hierarchies of corporatism.

5.3 Why Do Large Firms Pay Higher Wages? Evidence from Matched Worker-Firm Data

Lallemand, Plasman, and Rycx (2005 a) investigate why large firms pay higher wages? They note that the existence of a positive effect of firm size on workers' wages is well documented in the economic literature (Oi and Idson, 1999a). Yet, there is little consensus about the particular reason why large firms pay higher wages (Winter-Ebmer and Zweimüller, 1999). Traditional explanations suggest that large firms: i) employ more qualified workers, ii) compensate workers for bad working conditions, iii) have more market power and share their excess profits with their workers, iv) avoid or mimic unionisation, and v) substitute high monitoring costs with wage premiums, and vi) develop internal labour markets. Empirical papers offer only partial evidence for these traditional arguments. As a result, alternative hypotheses have been recently developed. Oi and Idson (1999b) suggest, for instance, that workers are more productive in large firms and therefore ask for higher wages. Another explanation might be that large firms prefer to match high-skilled workers together (Kremer and Maskin, 1996; Troske, 1999) and create internal labour markets in order to increase the stability of their workforce (Idson, 1996).

Lallemand et al (2005) use the ESES data for Belgium and combine them with data for establishment level productivity from the SBS. Their results show the existence of a significant and positive firm-size wage premium, even when controlling for many individual characteristics and working conditions.

A substantial part of this wage premium derives from the sectoral affiliation of the firms. It is also partly due to the higher productivity and stability of the workforce in large firms. The latter can provide a platform for the development of firm-specific skills learned on the job. Yet, findings do not support the hypothesis that large firms match high skilled workers together. Finally, results indicate that the elasticity between wages and firm size is significantly larger for white-collar workers and comparable in the manufacturing and the service sectors.

Lallemand, Plasman and Rycx (2005 b) extend this analysis to four other EU countries covered by ESES (Denmark, Ireland, Italy and Spain), looking at the magnitude and determinants of the establishment-size wage premium in these countries. Their findings show the existence of a significant positive wage premium in all countries, even when controlling for labour quality, working conditions, monitoring, sectoral and regional effects, bargaining institutions, job stability, and concentration of skilled workers. In cross-national perspective, the results support the existence of an inverse relationship between the size wage gap and the degree of corporatism. Final results indicate that the size wage premium is generally larger in the manufacturing sector and for blue-collar workers.

5. 4 Public private sector pay differences

Pay differences between the public and private sectors have attracted much attention in recent years because of the effect of public sector pay on national budgets, and its influence on recruitment and retention for private sector employers. Roughly 40 million employees work in the public services across the EU. Comparisons between countries of this issue have been problematic in the past because of differences in the data sources available, in addition to differences in the coverage of public employment. ESES represents a big step forward by applying common methodology and definitions, although it does not cover important areas of employee benefits such as pensions which differ between the public and private sectors.

The study by Lucifora and Meurs (2004) investigates public-private pay determination using French, British and Italian microdata. It starts by noting that there are major differences between the three countries in methods of public sector pay determination, and hence in the degree to which the regulation of public sector pay differs from that in the private sector in each country. For example, in France and Italy, the human resource management of public employees, in terms of pay and careers, remains more centralised than it is in the UK despite recent changes. The authors point out too that whereas in the UK, public pay setting usually takes the private sector as comparator, in France and Italy, it is more common to focus on the cost of living and budgetary considerations.

Previous research from various countries, but with disparate data sources, shows that public sector pay is often higher than that in the private sector, but that behind this average effect, there are major differences between occupations. Often, less-skilled, lower paid, occupations do better in the public compared with the private sector whereas the reverse can be true for higher paid occupations. It is also quite common that the private sector includes a larger number of low paid and unskilled employees than the public sector, and this composition effect often means that overall average public-private differences are misleading.

Use of ESES enables one to control for a number of these factors, and this is the approach of Lucifora and Meurs (2004) in their study. Whereas the unadjusted pay gap in favour of the public sector is 12%, 29% and 16% respectively in France, Italy and the UK, it drops to around 5-6% in all countries when account is taken of differences in employees' personal characteristics, for all employees combined. These results are found to be consistent with those of other studies using various national sources.

The best illustration of their findings is shown in Figure IW 1, which compares the ratio of public to private sector pay at different quantile points in the pay distribution, separately for women and for men. For example, the downward slope of the line shows that at the bottom end of the pay distribution in each sector, public sector workers enjoy a considerable pay advantage over their peers in the private sector. However, higher paid public sector workers enjoy a much smaller advantage over their peers, and for males in all three countries, private sector workers earn more than their public sector counterparts. The fact that these ratios are mostly above zero shows that public sector pay is above that in the private sector for most groups. It also shows the greater advantage for women of jobs in the public sector.

Because the same statistical methods and definitions are used by ESES, one may compare the point at which private sector pay overtakes that in the public sector for males. For men, this occurs between the sixth and the seventh decile in France and Italy, but in the UK, it

occurs around the fourth decile. Thus in France and Italy, it is only the top 30-40% of male earners who are better paid in the private sector, compared with the top 60% in the UK.

Figure IW 1. Comparison of the distribution of hourly wages in the public and private sectors by gender. (Based on unconditional estimates).
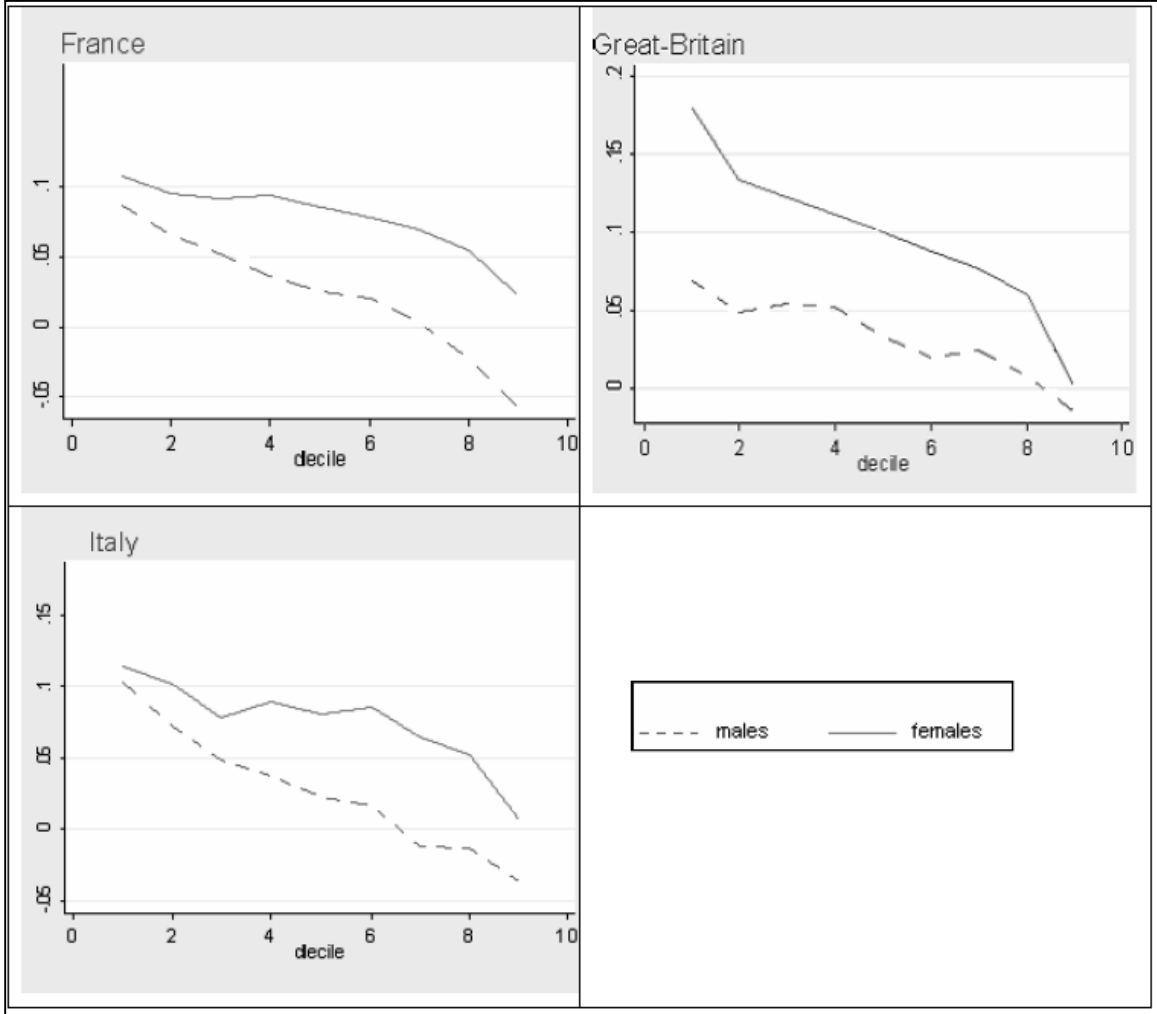
Source: Lucifora and Meurs (2004, Fig 2)

A similar analysis, carried out adjusting for differences in personal characteristics, confirmed the broad picture shown in Figure IW 1, although with some slight reduction. This picture was also confirmed by means of quantile regression methods which estimate the determinants of earnings at each quantile in the distribution instead of the mean which is estimated in standard regressions (Table IW 2). Quantile regressions estimate the determinants of earnings, for example, of the lowest paid decile, or the top decile, and so enable us to compare the determinants of earnings of low and high paid workers, and to assess whether these differ between the public and private sectors. As can be seen in Table IW 2, traditional OLS methods based on the mean difference between the sectors,

controlling for individual and job and region characteristics, tell only part of the story, and omit the greater benefit conferred by public sector employment on lower paid workers.

Table IW 2. Estimates of the public sector pay advantage

	Controlling for:	Mean	Decile 1	Median	Decile 9
France					
	Personal characteristics only	0.070	0.094	0.082	0.003
	Personal, job & regional characteristics	0.055	0.084	0.064	-0.006
Italy					
	Personal characteristics only	0.113	0.172	0.117	0.059
	Personal, job & regional characteristics	0.049	0.114	0.061	-0.017
UK					
	Personal characteristics only	0.079	0.154	0.099	-0.025
	Personal, job & regional characteristics	0.064	0.137	0.073	-0.005

The t-values for the top decile indicated the coefficients were not statistically significant. All the others were significant at the 1% level.
Source: Lucifora and Meurs (2004, Table 2)

A final feature of the Lucifora-Meurs study is to compare public and private by gender, and to decompose these differences into employment composition and different 'rates of return' on characteristics such as skills at different points in the pay distribution (Lucifora and Meurs 2004, Table 3). Consistent with the earlier results, the returns to employee skills are greater for low-skill than high-skill employees in the public, as compared with the private, sector. This relationship is more pronounced for women than for men.

Thus, the public sector emerges in all three countries as a better payer on average than the private sector, after controlling for employee skills and other characteristics, but this benefit is greater for low-skilled employees and for women, but is unfavourable to high-skilled employees. This is consistent with the greater strength of collective bargaining and government regulation in the public sector which gives greater scope for fairness considerations in pay determination as compared with business performance.

6. Low pay and low wage employment

6. 1 Low pay incidence

The European Structure of Earnings Survey is a unique source for the comparative study of low-wage employment, combining, as it does, payroll data with information about the employer. In this respect, it is an invaluable complement to the European Community Household Panel (ECHP) and the Labour Force Survey.

Table LP1 Incidence of low wage employment, wage dispersion and wage-setting characteristics.

Country	Incidence of low wage employ-ment a)		D5/D1 b)			Collective bargaining system			Mechan-ism of low wage regulation f)
	ESES	ECHP	ESES	ECHP	Coordin-ation c)	Dominant Level d)	Extension of collective agreements e)	Coverage rate %	
Spain	21.3	22.8	1.72	1.97	1.5	Sectoral	High	83	Minimum wage
United Kingdom	20.6	20.8	1.80	1.81	1	Enterprise	Inexistent	36	Minimum wage
Ireland	18.1	25.1	1.76	2.13	1	National	Inexistent	66	Minimum wage
Belgium	9.1	11.8	1.41	1.56	2	National	High	96	Minimum wage
Italy	8.8	9.2	1.39	1.50	2	Sectoral	High	90	Collective agree-ments
Denmark	8.1	11.6	1.45	1.66	3	National/ sectoral	Inexistent	69	Collective agree-ments
United States	25.2	25.2	2.09	2.09	1	Enterprise	Inexistent	16	Minimum wage
Mean (excluding US)	14.3	16.9	1.6	1.8					

a Employee share with a hourly wage lower than two thirds of the median wage. In all cases the information relates to 1995. Values according to the European Structure of Earnings Survey (ESES) correspond to own elaboration. Results for the European Community Household Panel (ECHP) come from Salverda et al.(2001). The United States figure is from the Current Population Survey.

b D1 is the value of the upper limit of the first decile and D5 that of the fifth (D5 is therefore equal to the distribution median). The United States values are based in annual wages and they proceed from the Current Population Survey (OCDE, 1996) and the rest of countries are based in hourly wages.

c Nickell and Layard (1999). Average of coordination of union and employer organizations. 1 indicates low coordination, 2 medium coordination and 3 a high degree of coordination.

d EIRO (2002) and Traxler et al. (2001).

e European Commission (2000).

f Eurostat (2003). The implantation of the minimum wage in Ireland and The United Kingdom was in 2000 and 1999, respectively.

Based on Fernandez et al (2004, Table 1).

Because these surveys have different coverage, the PiEP team spent some time benchmarking ESES against other sources. ESES does not include some activities, such as central government and notably excludes establishments with under 10 employees, whereas the European Community Household Panel (ECHP) covers these categories, but with a smaller sample and the greater inaccuracy of earnings reports associated with household data. A first check therefore in our research was to compare the incidence of low-wage employment between the first two sources (ESES and ECHP), shown in Table LP1. Taking the incidence of low wage employment as occurring below two thirds of the median wage, the ESES and ECHP estimates are fairly close. The unweighted mean across countries is 14% for ESES and 17% for the ECHP. However, in some countries, the difference is greater than in others, being within one percentage point in Italy, and the UK, and within two points in Belgium and Spain.

The nature of the ESES enables us to relate the risk of being low paid to certain individual and employment characteristics, shown in Table LP2. That confirms much of what is already known: that women are more likely to be low paid, as are employees with a low level of final education, those with short tenure and labour market experience, those in small firms, in service occupations, with fixed term contracts and in part-time employment. Additionally, certain sectors stand out as employers of low paid workers.

ESES makes a particularly useful contribution because of the range of employee and workplace variables covered simultaneously, and because of the inter-country comparisons made possible by adoption of similar statistical methodologies and common variable definitions. Thus gender, occupation, having a degree, and working full-time emerge as the stronger among the factors. However, their importance varies considerably between countries, with the countries for which data was available falling into two groups: Belgium, Denmark and Italy on the one hand, and Ireland, Spain and the UK on the other.

Table LP2. Likelihood that a worker's hourly pay is < 2/3 average pay: How big is difference between countries?

	Belgium	Denmark	Italy	Un-weighted mean	Ireland	Spain	UK	Un-weighted mean
Gender (male)	-0.030**	-0.026**	-0.012**	-0.023	-0.134**	-0.128**	-0.076**	-0.113
Occupation (skilled service/manager)	0.116**	0.088**	0.202**	0.135	0.212**	0.228**	0.357**	0.266
Education (degree/primary)	-0.018**	-0.017**	-0.011**	-0.015	-0.118**	-0.099**	-0.045**	-0.087
Tenure	-0.003**	-0.001*	-0.002**	-0.002	-0.015**	-0.017**	-0.011**	-0.014
Experience	-0.002**	-0.003**	-0.002**	-0.002	-0.018**	-0.011**	-0.007**	-0.012
Firm Size (>=200/<20)	-0.021**	-0.009**	-0.017**	-0.016	-0.197**	-0.109**	-0.068**	-0.125
Sector		Several sig.			Several sig.	Several sig.	Several sig.	
Contract type (permanent)	-0.014**	ns	-0.011**	-0.008	ns	-0.056**	-0.030**	-0.029
Full-time (ref p-t)	-0.016**	0.032**	-0.198**	-0.061	-0.148**	ns	-0.109**	-0.086

Source: Fernandez et al 2004, Table 11

In the first group of countries, the factors exerted mostly a rather weak influence determining whether an employee would be among the low paid or not, whereas in the second group, their influence on the structure of the low paid population was much greater. Simplifying, the unweighted mean of the second group of countries, compared with the first, reveals how much more strongly gender, occupation, and firm size condition low paid employment in Ireland, Spain and the UK.

Another feature of the ESES has been the scope to study the impact of individual establishments in which people are employed on their earnings. In this, Fernandez et al explore the determinants of an establishment having more than 20% of its employees as low paid. Controlling for workforce composition, this analysis sought to discover in which industries, and firm size categories low paying plants were more likely to be found, and also to explore whether being covered by a collective agreement made a plant less likely to employee a high percentage of low paid employees.

As with the preceding analysis, in Belgium and Denmark, there were many fewer individual industries characterised by low paid employment than in Spain, Ireland or Italy (Table LP3). Small firms were more likely to employ large numbers of low paid workers than were large ones, the effect being strongest in Ireland and Spain, and as with the individual employee data, so with the individual establishment data, establishment concentrations of low paid workers were more likely when the establishment also employed large numbers of women, young workers and part-timers.

In all countries shown (Table LP3), levels of coverage by national collective agreements are high, and so are unlikely to explain the observed concentrations of low paid workers by establishment. In contrast, if coverage by a firm-level agreement is taken to indicate greater strength of local union organisation, and because unions have generally be shown in several countries to compress wage inequalities (Freeman and Katz (1995), Dell'Aringa et al (2004) in this study), one might expect plants with high concentrations of low paid workers to be those without local agreements. This is indeed the case in Belgium, Italy and Spain, but not so in Denmark. On the other hand, as noted in Section 5 above, the Danish wage structure displays a smaller between-plant dispersion of earnings but a greater within-plant dispersion than in other countries. Danish collective agreements also give greater emphasis to occupations as a focus of pay than do agreements in the other EU countries shown, and this may give Danish employers greater freedom to adapt their pay structures to their local needs.

Table LP3. Determinants of establishments having more than 20% low paid employees (controlling for labour force composition), ESES 1995

	Belgium	Denmark	Italy	Ireland	Spain
Firm pay agreement	-0.1037**	0.0899**	-0.1012**	Na	-0.1289**
Other pay agreement			ns	0.0982**	ns
Firm size	-0.0017**	ns	ns	-0.0048**	-0.0208**
State owned	-0/1145**	na	na	Ns	-0.1183**
Percent women	0.1265**	0.1387**	0.0329**	0.4389**	0.2839**
Percent under 25	0.6164**	0.534**	0.4365**	1.2897**	1.0467**
Percent part-time	0.3524**	-0.2972**	0.4189**	0.7241**	0.1587**
Industry dummies	Yes, none significant	Yes, 4/38 significant	Yes, 9/37 significant	Yes, 9/23 significant	Yes, 24/44 significant
Number of estabs	4197	13390	7485	2507	17905

Source: Fernandez et al 2004 Table 14. Note: establishment data not available for the UK.

Table LP 3. Dispersion of Log Wages and their Residuals

Population	Variable	Be	Dk	Es	Ir	It	UK
Both sexes							
	Mean log hourly wages	2.67	2.77	2.09	2.27	2.84	2.14
	S.D. of log hourly wages	0.42	0.34	0.52	0.53	0.43	0.51
	C.V. of log hourly wages (%)	15.56	12.17	24.69	23.49	15.22	23.74
	S.D. of residual of log hourly wages	0.25	0.24	0.34	0.35	0.24	0.33
Women only							
	Mean log hourly wages	2.52	2.68	1.86	2.07	2.70	1.89
	S.D. of log hourly wages	0.36	0.29	0.46	0.46	0.38	0.42
	C.V. of log hourly wages (%)	14.44	10.67	24.81	22.03	14.16	22.39
	S.D. of residual of log hourly wages	0.22	0.21	0.30	0.31	0.21	0.29

Notes:
Source is European Structure of Earnings Survey 1995 microdata
Population is employees aged 21 or more working in establishments employing at least 10 individuals in manufacturing industry, commerce, construction, and financial services
Basis of table statistics is log of hourly wages including irregular bonuses, expressed in 1995 ECU
Wage measure in Denmark omits irregular bonuses
Residuals are derived from regression of log wages on employee and employer characteristics as per model in Annex 1 of ES article
No regional breakdown is available for Denmark or Ireland
Omitted industries include: extractive industries in Belgium; and construction and auxiliary financial services in Ireland
Source: Belfield and Marsden (2005).

6. 2   Youth pay and employment

With high rates of unemployment among young people in many EU countries, and problems of transition from education into employment, youth employment remains a serious issue for labour market policy (Ryan 2001). There has been an extensive debate about the impact of young workers' wage and employment costs on firms' willingness to hire them (Wells 1987, Junankar 1987, OECD 1996). The 1995 ESES provided the opportunity to follow up one aspect of this debate, extending work on the 1966, 1972 and 1978 ESES (Marsden and Ryan 1986, 1989), and extending similar work on the US (DeFreitas Marsden and Ryan 1991), and on Japan (Nohara and Ryan). The burden of this series of studies was to show that youth access to employment was greatest in low adult-wage industries, which the authors explain in terms of a queue model of the labour market in which young workers are at the back. Their work also showed that where firms could apply lower rates of pay to workers, they were more likely to hire them in greater number.

The intuition behind the relationship is that if firms use 'pay-for-the-job' systems, as has been common through much of the post-war period for blue collar and intermediate white collar jobs, then they reward the average productivity of employees in a particular job-grade. This is very common in bureaucratic organisations which operate according to standardised job descriptions and job evaluation principles. Although the spread of flexible working in teams may have eroded this to some extent (see Dell'Aringa et al 2002), this movement has been partial, and has to some extent been offset by anti-discrimination legislation which requires employers to have transparent principles for recruitment, selection, promotion and reward decisions. Faced with reward systems that reward average productivity in a given job, firms have an incentive to hire those with the highest expected productivity, and to avoid those with the lowest expected productivity and higher than average expected training costs. Young workers and those lacking previous experience will inevitably find themselves disadvantaged by such rules, and will fall to the back of the hiring queue. If all firms had an equal ability to pay, then they would all fill their vacancies with a similar mix of above and below average productivity recruits. However, if some firms have a greater ability to pay, perhaps because of rent-sharing arising from product market dominance, on the lines suggested by Plasman et al (2004), then the best paying firms and industries will be able to recruit from the front of the labour queue, leaving other firms and industries to recruit from those further back. An alternative, competitive, explanation would be that some firms have a lesser tolerance of below-average productivity workers, perhaps because they produce for high quality product niches, and therefore offer higher wages in order to enable them to cream off the best workers available. Firms producing less quality-sensitive goods and services could then afford to offer pay levels that are sufficient to recruit further back along the hiring queue. Whichever the more accurate description, one would expect to find inexperienced young workers, and similarly disadvantaged groups, concentrated in firms and industries in which adult pay is lowest.

Youth relative pay enters the picture because sometimes firms are able to hire inexperienced workers into special job categories, for example as apprentices or trainees, which command a lower rate of pay, thus compensating the employer for their higher training costs and lesser immediate productivity. However, such special employment categories have a troublesome history. Often, experienced workers fear that their employers may be tempted to hire more trainees than necessary and to use trainees as a source of cheap substitute labour. Ryan (1989) argued this occurred widely with the British Youth Opportunities Programme, a variant of a common form of youth employment subsidy found in many EU countries. Thus, unless such discounted hiring routes are clearly

identified, it can be difficult for employers to overcome opposition to these from their incumbent workforce, especially if it is strongly unionised. Thus, Marsden and Ryan (1989) argue that well-regulated apprenticeships systems, such as in Germany, are able to offer low training allowances to young workers because their adult colleagues can see that it helps compensate employers for providing expensive workplace training. In other countries where trainee positions are less clearly defined, adult workers and their union representatives have been much more insistent that the full adult rate of pay should be applied.

The postulated relationship between youth relative employment and the two dimensions of pay structure, adult pay and youth relative pay, assuming linear and independent effects, is then:

$$LY_i / LA_i = \alpha + \beta . WA_i / WA_{\sum} + \gamma . Wy_i / WA_i + controls + \varepsilon_i \qquad (1)$$

where LY, LA are youth and adult employment; WY, WA are youth and adult average pay, respectively; subscript i refers to the specific firm or sector, and subscript $\sum$ to the entire economy. The relationship is estimated in the first instance for individual economies, but it may also be applied to data pooled across countries (Marsden and Ryan, 1989).

There is the additional expectation that this relationship will be more pronounced in sectors where such pay and recruitment practices are widespread, and also where there is a greater dispersion in firms' ability to pay, either because of rent-sharing or differential labour quality needs.

As an illustration, results for 1995 are shown compared with those of the earlier years of ESES for manual males (Table YP1). On the whole the results are stronger for the earlier years, and weaker for 1995. However, the latter result could be due to use of an older category of young workers (under 25 instead of under 21) because of changes in youth employment patterns, and because ESES 1995 used a more aggregated industry classification, with a resulting reduction in the number of possible observations.

To increase the number of observations, and to get closer to the relevant decision units, the authors used the ESES 1995 microdata to work on observations at the establishment level. This was possible for only five countries: Belgium, Denmark, Ireland, Italy and Spain (such data were not available for the UK). The establishment level analyses confirmed the unconditional values for adult relative pay and youth-to-adult pay with statistically significant and negative signs for manual men and mostly for manual women.

A notable feature of youth employment to emerge from the establishment-level data is that a large number of establishments employ no young workers, aged under 25, either male or female. The authors therefore switched to logit regressions to estimate the probability of establishments employing young workers. This analysis was identical to the earlier OLS analysis, except that it was no longer possible to include a measure of youth relative pay. In place of the adult pay variable, a composite variable was estimated, taking first the predicted level of pay in an establishment if employees were rewarded only for their skills (based on education, experience and tenure). They then computed the gap between the actual and the 'human capital' predicted earnings. Whereas the former would capture the

element of pay for skill in an establishment's average pay level, the latter would capture that of other factors, notably, non-competitive, segmentation factors (Teulings and Hartog 1998).

Table YP1: Elasticity of youth (teenage) relative employment with respect to adult pay and youth relative pay by country, manual males, 1995 compared to previous years. Analysis by two-digit industry.

	Adult pay				Youth relative pay			
	1966	1972	1978	1995	1966	1972	1978	1995
Austria	n.a.	n.a.	n.a.	-1.35	n.a.	n.a.	n.a.	-0.53
Belgium	-2.33**	-1.84**	-2.10**	-1.00	-1.88**	-0.78	-1.73*	-0.21
Denmark	n.a.	n.a.	n.a.	-4.90*	n.a.	n.a.	n.a.	-0.80
France	-2.40**	-2.04**	-3.04**	-3.84	-2.99**	-1.07	-1.82	-2.58
Germany	-0.48	-2.03**	-4.52**	n.a.	-2.62**	-1.73**	-3.12**	n.a.
Italy	-1.91**	-2.22**	-6.31**	-3.80	-2.58**	-1.63	-3.25**	0.77
Netherlands	-2.18**	-2.71**	-1.36*	n.a.	-0.62*	-1.82**	-1.37*	n.a.
Spain	n.a.	n.a.	n.a.	-4.02**	n.a.	n.a.	n.a.	-0.39
UK	-2.17**	-2.32**	-2.65**	-3.95*	-1.89**	-1.41**	-1.68**	0.53
All				-3.20**				-0.41

** p<.01; * p<.05; n.a. signifies data not available
Sources (1966-78): Marsden and Ryan (1989), Table 3.
Notes: youth defined as <21 in data for 1966, 1972 and 1978, and <20 for 1995; part-time employees excluded for 1995 only; pay variables based on hourly earnings, excluding bonuses; 'All' refers to regressions on data pooled across countries.
Sample sizes for 1966-78 varied between 32 and 46.
Source: Marsden, Nohara and Ryan (2004).

Marsden, Nohara and Ryan (2005) found that youth employment shares were lower in plants with high 'human capital' adjusted earnings, implying that they had difficulty gaining access to high skilled employment, and in plants where the gap between actual, and human capital adjusted earnings, was higher. These results proved to be robust to the inclusion of a full set of industry, plant size, establishment workforce, and collective agreement characteristics for both young males and young females.

In conclusion, there is much evidence to support the argument of Marsden, Nohara and Ryan (2004) concerning the influence of relative adult and youth pay on employment shares of young workers, although some the results are still pending. The implication of this is that labour markets for young people are strongly affected by the policies adopted by managers and sometimes also by unions in relation to adult workers' pay. Pay systems that are more performance related and which take more account of productivity differences between workers, instead being job related, could well facilitate the access of young people to jobs.

7.   Gender inequalities in pay and employment

7. 1   Gender pay inequalities: introduction

The ESES brings two special strengths to the analysis of gender pay inequalities in the European Union. First it provides data collected according to roughly the same methods and definitions across the EU, something already done by the Labour Force Survey and the ECHP, but unlike the LFS, its coverage of earnings applies across all countries, and unlike both the LFS and the ECHP, it collects earnings data from employers' records which are generally regarded as being more precise that those of households.

Secondly, it is a matched employer-employee data set (with information on both workers and firms and with several observations per firm) for most countries in the sample (Britain is an exception). Recently available matched employer-employee data has allowed researchers to discover very relevant empirical findings in wage determination, notably, the recognition of the empirical relevance of demand-side factors in wage determination.: inter-firm wage differentials for similarly skilled workers exist in a variety of countries[2]. Although matched employer-employee data sets are now available for a number of individual countries, the ESES provides the only comparative, multi-country, data set with matched employer-employee data.

Differences in employment earnings between women and men vary considerably across the EU. Of the countries for which the PiEP project had micro-data access, Denmark and Belgium stand out as the countries with the smallest overall wage gap, at 18.2% and 19.9% respectively, whereas Ireland and the UK had the largest, at 34.3% and 35.2% respectively (Table GP1) (Gannon et al 2004). However, behind these overall earnings differences, lie a number of other important differences between women's and men's employment which potentially contribute to these inter-country differences. In Ireland, women spend more years in schooling than men, whereas in the UK women lag behind by about 18 months, according to ESES. Women's job tenures are in every country less than those for men, but the gap also differs between countries, as it does for potential experience. Notable also, as the ESES includes data on the firms where employees work, women and men often work in different types and sizes of establishments.

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[2] See for example Abowd and Kramartz (1999), and Haltinwanger (1999), who provide very comprehensive overviews on the impact of the availability of matched employer-employee data on empirical analysis on wage determination.

Table GP1: Summary Statistics of some Variables in the 1995 ESES.

Country	Gross hourly wage		Seniority in the firm		Prior potential experi-ence		Size of establish-ment		Overall wage gap
	M	F	M	F	M	F	M	F	%
Belgium	16.0	12.8	11.0	8.9	9.8	9.1	777.7	406.3	19.9
Denmark	21.1	17.2	6.5	5.5	13.3	13.4	1,108.1	1,824.6	18.2
Italy	9.4	8.8	10.6	8.9	12.4	10.4	1,507.2	1,281.1	23.4
Spain	9.9	7.1	11.2	8.4	13.5	10.7	743.4	672.5	28.1
UK	7.4	4.7	5.6	4.1	16.5	17.9	15,945	15,275.1	35.2
Ireland	8.4	5.5	10.7	7.1	9.0	7.9	1,502.7	1,821.5	34.3
France	12.7	9.3	10.3	8.9	11.1	11.0	297.7	399.2	27.0
Average	11.8	9.3	9.4	7.4	12.2	11.5	n.a.	n.a.	*26.6*

Gross hourly wage in 1995 ECU (1 ECU= 0.934 EURO). It includes overtime paid and bonuses for shift work, night work and or weekend work and bonuses (i.e. irregular payments which do not occur during each pay period. such as pay for holiday. 13th month. arrears. advances. travel expenses. etc.

Source: Gannon et al (2004a, Table 1)

7. 2   The effect of inter-industry differences on gender inequalities

Gannon et al (2004b) set out to examine the effect of inter-industry differences on the pay gap between women and men from a comparative European perspective:
   a) inter-industry wage differentials by gender,
   b) gender wage gaps by industry, and
   c) the contribution of industry effects to the overall gender wage gap.

Their study is also one of the few, besides Kahn (1998), to analyse for both sexes the relationship between collective bargaining characteristics and the dispersion of industry wage differentials. Finally, they examine, separately for male and female workers, the extent to which industry wage differentials are correlated to industry profitability.

The first stage of their analysis applies a variant on the Krueger and Summers (1988) method separately to the male and female sub-samples of each country. They find that inter-industry differentials can be observed to varying extents for both men and women in all countries, and that they are statistically significant. In terms of the within-country pattern of dispersion of these differentials, Belgium, Denmark, France, and Spain appear to constitute a lower-variation group for both sexes as compared to the UK, Ireland, and Italy. These patterns of dispersion are strongly correlated at the level of the country with features of the wage-setting institutional framework, notably, the larger dispersion with greater bargaining decentralisation. The rankings of inter-industry differentials by gender and country show on the whole that industries occupy similar positions in the wage hierarchy for both men and women within individual countries, although tests of group significance suggest that this apparent similarity is reversed when the differentials are considered collectively. It can also be shown that there is a significant positive correlation between industry differentials and industry profitability for both genders in all countries except Denmark.

In a second stage, the overall wage gaps by country are decomposed using the Oaxaca and Blinder method. The key findings are presented in Table GP2. The greatest overall gaps

are observed in the UK, Ireland, and Spain, and the lowest in Denmark, and Belgium, reflecting the pattern found for low pay in the previous section. Italy occupies an intermediate position. Virtually none of this wage gap is accounted for by women's segregation into low paid industries in Denmark and Belgium; only in Italy is segregation responsible for more 10% of the overall gender wage gap. The impact of industry specific gender premia is less widespread, being significant only in the cases of Denmark, and Ireland (in the 10-20% range in both cases). Notably, for Spain this effect is negative in sign – that is, the impact of gender-specific industry premia is to narrow the overall wage gap, rather than to increase it.

In summary, women are over-represented in low-paid industries, and therefore, their situation is worse when the distribution of earnings in the economy is more unequal, but there are substantial differences between countries. National pay distributions account for a considerable part of the cross-country differences in the gender pay gap in some countries, but as with segregation, they do not do so universally. As a result, it is unlikely that any single policy response can be found to address these issues within the EU as a whole; to be successful, interventions must be tailored to the circumstances of individual countries.

Table GP2: Decomposition of the Overall Gender Wage Gap

		Percentage of overall wage gap due to difference in:		
Country	Overall gender wage gap:	Employment distribution:	Industry coefficients:	All other factors
Belgium	.20	3.1***	-.3.8	100.8
Denmark	.18	-1.5***	14.1***	87.4
Ireland	.35	8.5***	20.1***	71.4
Italy	.24	15.8***	-13.6	97.8
Spain	.30	8.1***	-7.8*	99.7
U.K.	.39	7.2***	-0.4	93.2

The level of significance of the different components of the gender wage gaps has been computed according to Oaxaca and Ransom (1998). Estimations are based on the 1995 European Structure of Earnings Survey.
* Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.
Source: Gannon et al (2004b, Table 9)

Plasman and Sissoko (2004) extend this analysis estimating the effect of occupational and industrial segregation on gender pay gap. Using an index of dissimilarity calculated on basis of the actual occupational and industrial distributions for four countries (Belgium, Denmark, Italy and Spain), they find that segregation is greatest in Belgium and least in Italy. Industrial segregation is smaller than that by occupation one in all four countries under study. The authors use a simulated distribution, the indexes reduce a great deal and are close to zero (case of perfect similarity between men and women). Evidence based on the Brown, Moon and Zoloth (1980) decomposition into segregation by occupation and that by industry. This analysis shows that the part of the gender pay differential due to *occupational* segregation ranges from 5.3% in Italy to 29.6% in Spain. For Italy, this component can be fully explained by differences in observed productivity characteristics between men and women. However, these differences account only for 58-63% in Belgium and in Denmark and for 24% in Spain. Plasman and Sissoko's findings for *industrial* segregation show that this element accounts for 3.6% of the Spanish gender wage gap and for 17.2% of that of Italy. In the latter country, 11.9% of the segregation is explained by

gender differences in human capital. The corresponding figure in the former country is 73%. At the time of writing, the final results concerning industrial segregation for Belgium and Denmark are under revision. Thus, the detailed effects of occupational and industrial segregation of women's employment on the gender pay gap varies considerably between countries.

7. 3   Gender inequalities within firms: cross-national comparisons

An important contribution of ESES is to enable researchers to investigate the extent to which the gender pay gap is influenced by the human resource policies of different firms. In its present form, ESES enables one to identify the presence of such firm effects, but not to go into them in any great detail. This work is the first international comparison of the magnitude of employer wage differentials on a comparable basis in the literature.

Concerning employer wage differentials, the results indicate that the extent of inter-firm wage differentials for similarly skilled workers varies considerably across countries. Inter-firm wage differentials are quite dispersed in Ireland and Spain and relatively compressed in Belgium, Italy and Denmark.

Analysis of the gender pay gap within firms (Simon and Russell 2004) indicates that many of the results previously associated with women's concentration in certain industries also apply at the level of the firm (Table GP3).

1. Males and females are unevenly distributed by firms and women are segregated into low-paying firms in all the countries. The extent of the influence of firm segregation in explaining the adjusted gender wage gap (net of differences in labour qualifications) nonetheless varies considerably across countries).
2. The largest portion of the adjusted gender wage gap in every country arises from wage differentials within establishments for similarly skilled workers. A substantial part of the wage gap hence remains attributable to a worker's sex, which brings into question whether women and men are equally rewarded by employers.
3. The extent of femaleness of the labour force within firms affects wages in a negative manner in every country.
4. Oaxaca-Blinder wage decomposition results strongly suggest that job and workplace characteristics are very relevant in explaining wage differences between males and females in all the countries.

Thus, just as one has in the past spoken of the 'femaleness' of certain industries, so these results indicate that one can also do the same with regard to the 'femaleness' of groups of firms which employ predominantly female labour.

Table GP3. The gender wage gap: 1995

	Belgium	Denmark	Italy	Ireland	Spain	UK
Gender wage gap	0.207	0.152	0.173	0.301	0.299	0.367
Mean female percentile in male wage distribution	33	37	38	28	31	24
Mean female percentile in male wage residual distribution [a]						
Human capital	27	37	34	30	29	26
Human capital + job and workplace characteristics	32	31	35	33	32	31
Male wage inequality (standard deviation of log wages)	0.384	0.408	0.385	0.521	0.515	0.536
Male residual wage inequality [a] (standard deviation of log wages)						
Human capital	0.274	0.320	0.288	0.373	0.394	0.461
Human capital + job and workplace characteristics	0.222	0.255	0.217	0.305	0.348	0.367

a) Estimated using male (non-discriminatory) wage regressions with indicated explanatory variables.
Source: Simon and Russell (2004)

In order to analyse the sources of international differences in the gender gap in earnings, Simon and Russell applied the Juhn-Murphy-Pierce decomposition technique. Their evidence provides interesting insights into the origin of the gender pay gap in the countries in the sample:

1. To the extent that women tend to be confined in the lower part of the wage structure in all labour markets, in those countries with a dispersed wage structure (the UK, Ireland and Spain) the penalty attached to holding a relatively low paid job is greater, and hence the gender pay gap is wider, than in countries with a compressed wage structure (Denmark, Belgium and Italy).
2. In general, the overall pattern of wage inequality in a country, and the position of women within this, are major sources of international differences in the gender pay gap: wage structure characteristics explain a major part of the difference in the gender wage gap between high-gap countries (the UK, Ireland and Spain) and low-gap countries (Denmark, Belgium and Italy).
3. Gender-specific factors (inter-country differences in female deficiencies or deficits…) play a minor role in explaining inter-country differences in the sex wage gap.
4. Inter-firm wage differentials are quite dispersed in Ireland and Spain and relatively compressed in Belgium, Italy and Denmark.

The extent of the influence of firm segregation in explaining the adjusted gender wage gap (net of differences in labour qualifications) nonetheless varies considerably across countries.

7. 4   Women's pay and firms' 'ability to pay'.
If the firms in which women and men work play a part in generating the gender wage gap, to what extent is this influenced by their product market performance and their 'ability to

pay'? Plasman, Rycx and Tojerow (2004) investigate this using the Belgian ESES and SBS data which can be linked at the level of the firm.

Of an overall gender wage gap of 24% in Belgium, the authors find that about 14% of this can be explained by women's concentration in less profitable firms (measured as profits per employee). They also find that the pay-profit elasticity (the rate by which earnings increase with profitability) is roughly similar for women and for men, at about six per cent.

There are several different interpretations of what lies behind firms' willingness to share rents – to share their 'ability to pay'. One theory is that employers may offer more than the minimum required to recruit and retain in order to instill a sense of loyalty among their employees and a willingness to work flexibly – they pay 'efficiency wages'. This may occur even without pressures from collective bargaining. On the other hand, they may also pay above the minimum because of pressure from their employees or their unions. The fact that, in Belgium, the authors found that the wage-profit elasticity was similar for men and for women suggests that if unions are a key channel through which such bargaining pressures are transmitted, then they do so equally for women and for men.

Further light on the influence of labour institutions on gender inequalities is shed by the paper by Plasman and Sissoko (2004) who find that the gender wage gap follows the ranking of countries in terms of coordination of collective bargaining. There are two paths through which this might take effect. First, better coordination may make it easier to pursue gender equality as firms which take a positive step have less to fear that they will do so as a lone 'first mover' and risk being under-cut by those that do not. Secondly, coordinated bargaining may lead to smaller inter-industry wage inequalities.

Very roughly, the raw gender wage gap appears to follow the degree of bargaining coordination, with the two most coordinated countries having smaller wage gaps than the two least coordinated ones. One might also expect anti-discrimination policies to be more widely implemented once adopted in more coordinated countries, as Visser (1998) argued in the case of implementing labour market flexibility measures in the Netherlands – once agreement had been reached at the peak level among the social partners, individual firms and local employee representatives had a framework for swift local implementation. Thus one observes that women tend to be less disadvantaged because of human capital differences in Denmark, compared with Spain and Ireland.

Table GP4. Degree of coordination and the wage gap in Belgium

Country	Degree of coordination a)	Ave gender wage gap	% due to human capital characteristics b)	Increase in gender gap due to the position of women's jobs in the male wage structure c)
Denmark	3	.186	6	.076
Italy	2.5	.241	23	.057
Belgium	2	.199	42	Reference
Spain	2	.284	21	.062
Ireland	1	.341	39	.026

a) 1 is low, 3 high, Table 3, b) Table 5 based on Oaxaca-Blinder decomposition c) Table 6
Source: Plasman and Sissoko (2004)

7. 5   Comparisons between the EU and Japan

Using French ESES data and matching it with the Japanese structure of earnings survey, Hori and Nohara (2002) compared the gender pay gap between Japan and France using similar methods to those for the other EU countries above. They apply a two-stage decomposition of differences: first between women and men in each country, and then a comparison of the decompositions between the two countries.

The main results of the comparison between the two countries show that differences in the gender employment distributions, by age, tenure, education, establishment size, industry and region account for about two thirds of the difference in the wage gap between France and Japan. Of these, the strong difference between male and female job tenures in Japan compared with France emerge as the strongest single factor. This arises from the different organisation of enterprise internal labour markets in the two countries, and notably, the very small numbers of women in Japan who are able to stay with their employers after the arrival of children.

Two variables in particular cause major differences in gender inequality between France and Japan: age and establishment size. Applying the Oaxaca decompositions within different age groups, Hori and Nohara find that the human capital related factors explain more of the gap among younger workers in Japan than among older ones. Among younger workers, human capital differences between women and men account for much of the difference between the two countries in gender pay inequality, whereas for older groups, the unexplained gap between France and Japan, the 'gender' effect is greatest. Likewise, differences in human capital explain most of the gender pay differences in large firms, whereas the 'gender' effect is strongest in smaller firms. Both of these differences are likely to result from the continued strength of internal labour market practices in Japan compared with France and other EU countries. Male workers benefit from much greater integration into these than do women in Japan, as many women have to quit jobs in such companies when they have children.

Table GP5 illustrates Hori and Nohara's results for all workers, the composition effects that can be observed with the variables recorded in the data set, the effects resulting from

differences in the 'prices' attached to each of these variables, and then the unexplained 'gap' effect. The statistically observed effects account for two thirds of the difference in gender pay inequality between France and Japan, and the unexplained gap effect accounts for almost half (48%). Different jobs and job training opportunities probably account for some of this 'gap', but some may be due to general discrimination effects. The 'price effects' arise from the different pay premia associated with different employment compositional patterns, but as the authors note, these are not very influential between France and Japan.

Table GP5   Factor Analysis of Japan-France Gap in Male-Female Wage Differentials

	Differences	Percentage(%)
Japan-France Gap in Male-Female Wage Differentials	**0.2175**	**100.0**
Observed X's Effect	**0.1441**	**66.3**
Age	0.0330	15.2
Tenure	0.0723	33.2
Education	0.0250	11.5
Establishment Size	-0.0007	-0.3
Industry	-0.0041	-1.9
Region	0.0185	8.5
Observed-Prices Effect	**0.0063**	**2.9**
Age	-0.0055	-2.5
Tenure	0.0122	5.6
Education	0.0116	5.3
Establishment Size	0.0082	3.8
Industry	-0.0221	-10.2
Region	0.0018	0.8
Gap Effect	**0.1046**	**48.1**
Unobserved-Prices Effect	**-0.0375**	**-17.2**
Gender-Specific Effect	**0.2487**	**114.3**
Wage-Structure Effect	**-0.0312**	**-14.3**

Source: Hori and Nohara (2002).

From a policy point of view, the authors suggest that the position of Japanese women could be improved by enabling them to increase their job tenures which account for a third of the difference between the two countries. For example, they suggest policies designed to enable women to stay longer with their employer after childbirth would help to narrow the gap between Japan and France, as would policies to improve labour market re-entry among women with children.

8.   Collective Bargaining and pay inequalities

One of the strengths of the ESES is to enable an analysis of the impact of collective bargaining arrangements on pay inequalities within the EU, and in particular, comparisons of the effect of different national bargaining systems on pay. In recent years, there has been much discussion of the different effects of national and sectoral bargaining as compared with company or single-employer bargaining. In the first case, it has often been argued that highly coordinated sectoral level bargaining may facilitate wage restraint in times of inflation, but that it also tends to promote greater pay uniformity across sectors and sometimes also between occupations. In contrast, single employer bargaining enables firms to reach agreements which reflect their own business needs and those of their employees, so that the outcome will be more varied between firms.

One factor which complicates investigation of these ideas in many EU countries is that almost all plants are covered by collective agreements as many countries' national and sectoral agreements establish minimum rates of pay for different job classifications (Table CB1). In some cases, these minima are set quite low, leaving individual firms considerable scope to agree better terms with unions at enterprise or establishment level, or to offer better terms unilaterally. For this reason, the work undertaken by the PiEP team focuses more on the effects of bargaining structure, and in particular those of local, single employer bargaining versus national, or sectoral, multi-employer bargaining. ESES collected data on bargaining structure according to the norms prevailing within each country's industrial relations system, leaving Eurostat to devise an indicator for its NewCronos publication, and the researchers to agree their own classification in consultation with NSIs and national experts.

Table CB1. Collective bargaining coverage according to ESES: per cent of employees in plants covered by different kinds of agreement (approximate)

	be	dk	es	ie	it	uk	dew	fr
All industry and services (Nace c to k)								
In plant covered by collective agreement of any kind	90	84	100	100	99	15*	76	94
Of which single employer	19	8	27	43	26	na	na	na
Other (incl no agt)	29	11	3	na	3	na	na	na

* Major national agreements only. Na: France and Germany not available at time of writing. UK: data not reported.

8. 1   National and local pay agreements

The policy interest behind pay-setting by different levels of collective bargaining is well-illustrated by the work of PiEP's Italian team which constructed a data series for pay set by national agreements compared with effective earnings which includes also locally negotiated pay and that determined unilaterally by employers. Italy is of special interest because of the emergence of two-tier, national and local, bargaining from 1993 as a result of the Italian industrial relations reforms. Chart CB1 plots national rates and actual earnings

from 1970 to the present time. Starting a little before 1993, but especially since then, actual earnings have increased markedly faster than nationally negotiated rates of pay.

The influence of local bargaining on pay is also apparent when comparing the spread of earnings between industries (Chart CB2): that the coefficient of variation of nationally negotiated pay rates is considerably smaller than that of actual earnings. As Checchi and Pagani point out, national agreements mostly set minimum rates of pay for sectors and regions, and although these may constrain some employers, it is clear that they leave many employers with a considerable margin of freedom to determine their own reward policies either by negotiation with unions locally, or at their own decision.

Such findings concerning the influence of local bargaining are not unique to Italy, and have been observed in a number of other studies of other countries, such as the Sweden where it was long associated with 'wage drift'. On the basis of these observations, one might expect that pay differences between firms and sectors covered by local agreements would be greater than for those covered by national agreements only, on account of the additional wage concessions negotiated locally. In fact, Checchi and Pagani (2004) find that the presence of local bargaining raises the average pay of workers, compared with those covered exclusively by national agreements, as well as those covered by other pay arrangements, but it reduces the pay inequality among such workers.

Before one can draw any conclusions about whether local bargaining causes these differences in wage structure, one needs to ensure that it is not the result of differences in the kinds of workers covered by different bargaining arrangements – those in local bargaining might be more qualified that those elsewhere, for example. It is also important to check whether higher paying firms are more likely to attract local bargaining, either because the employers want to use their greater capacity to pay to adapt pay incentives to their own needs, or perhaps, because unions identify them as potential wage leaders.

ESES enables the two authors to take account of possible workforce composition effects under these three types of bargaining arrangements. They test for the effects of different workforce composition under bargaining arrangements by regressing workers' pay under each type of arrangement on a range of individual and plant characteristics. Thus they find that on average, equivalent workers are better paid under local than under national agreements, and the latter have a small advantage over those with no agreement (the constant term is largest for local agreements). However, they also find that the differences vary considerably between different categories of workers (as the coefficients vary between bargaining types). An ordinary full time permanent worker gains a premium of about 15% when covered by local bargaining as compared with a similar worker not covered by any agreement, and the gender pay gap is smaller under local bargaining. However, more highly educated and white collar workers are less advantaged under local bargaining than do other categories (Checchi and Pagani 2004, Table 8).

Chart CB1. Nationally bargained pay rates and actual earnings 1970-2003, Italy.

actual and contractual wage - industry
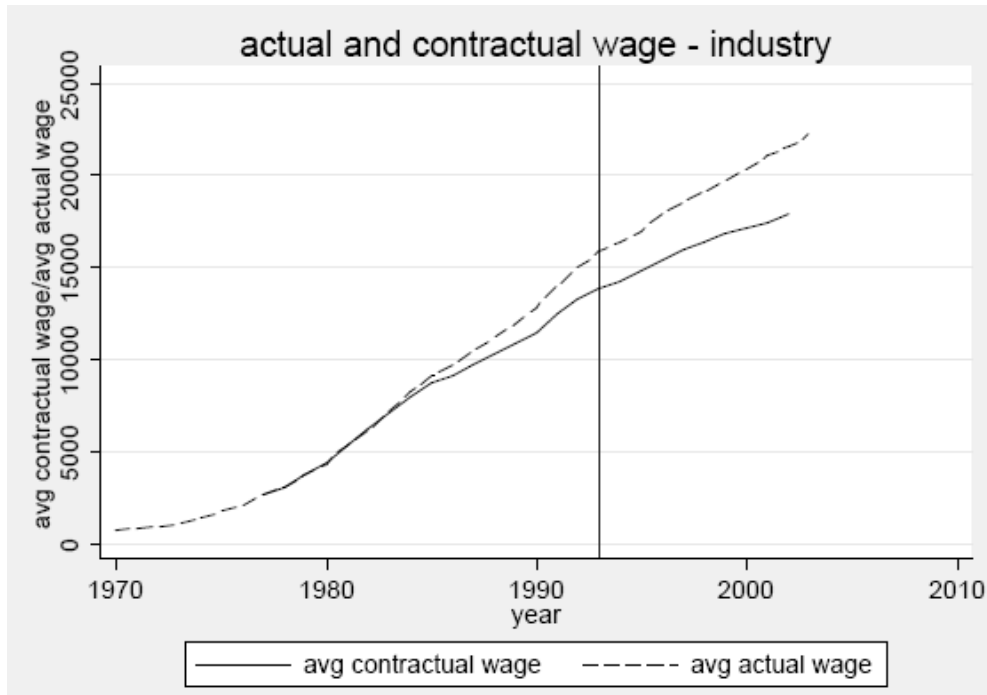
Source: Checchi and Pagani, 2004.

Chart CB2. Difference between the spread of inter-industry nationally negotiated pay rates and actual earnings 1970-2003, Italy.

between sector inequality - coefficients of variation
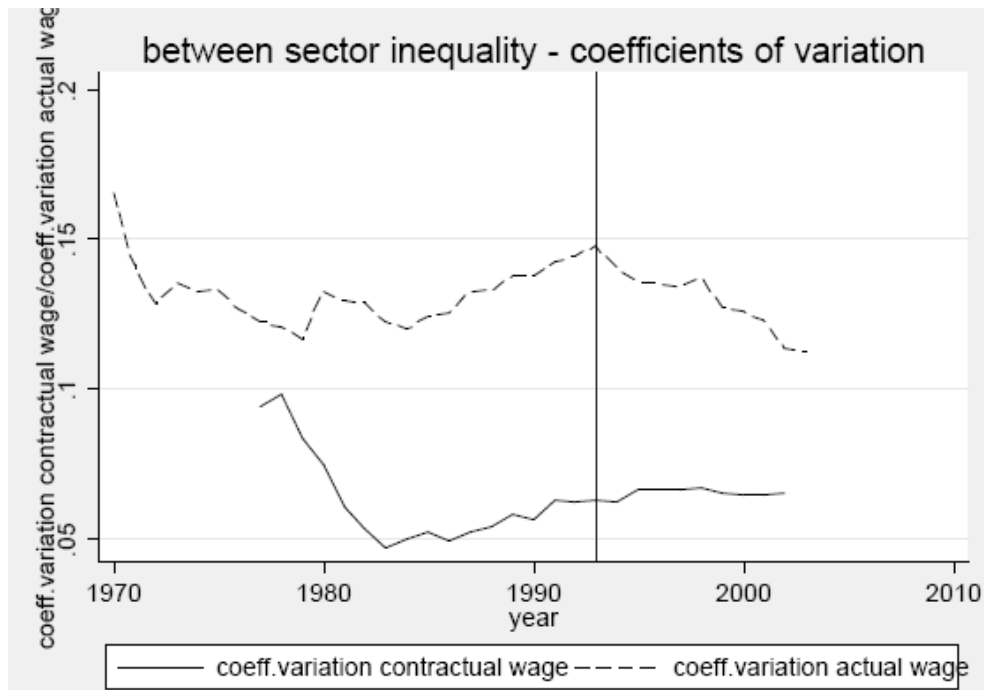
Source: Checchi and Pagani, 2004.

The second test that Checchi and Pagani apply relates to possible selection effects: whether the same factors that cause plants to opt for local bargaining also explain their pay structures. Using an instrumental variable approach, they estimate the probability that certain types of enterprises and establishments will opt for local bargaining. This is derived from the shares of young, part-time, and minority workers, and mean tenure. Thus they find that local bargaining adds around 36% to workers' pay if they assume there is a single mark-up that benefits all workers equally. However, this mark-up effect is not uniform across different groups of workers, and it is greater for women than men, for less qualified workers, and for workers in small establishments, in other words, it confirms Checchi and Pagani's initial observation that local bargaining raises average pay, and compresses wage inequalities among those covered. This is illustrated in Table CB2 which shows the means and coefficients of variation of pay for each type of bargaining arrangement.

Table CB2. Earnings differences between workers (CV) Italy.

	Firms with other/no agreement	Firms with only national agreement	Firms with national and local agreement
CV (unconditional)	.323	.320	.279
CV (conditional)	.233	.238	.199
Mean (unconditional)	6847	7213	8018
Mean (conditional|)	7095	7254	7419

Source: Checchi et al (2004) Tables 3 and 9.

8. 2   Collective bargaining and wage dispersion.

Turning to a wider range of countries, Dell'Aringa and Pagani (2004) analyse pay differences among workers covered by these different arrangements in four EU countries shown in Table CB3. The countries are ranked in descending order of bargaining coverage and coordination. The table shows three measures of inequality: the ratio of the top to the bottom decile earnings[3], and similar measures of the spread of earnings at the upper and the lower half of the earnings distribution. In comparison with the later analyses, these measures are not adjusted to take account of other earnings determinants.

In line with previous research, higher levels of bargaining coverage and coordination are broadly associated with lower overall levels of wage inequality. Belgium and Italy represent the higher degrees of coverage and coordination being associated with lower levels of wage inequality, and the reverse for Spain and the UK. Since 1995, coverage has fallen even further in the UK, whereas it has remained fairly steady in the other three countries.

Moving beyond coverage, it is clear that different types of bargaining arrangements, whether by multi-employer bargaining or single employer bargaining make a difference, however, it is not uniform across countries. The prior expectation, based on early work by Stewart (1987) was that single employer agreements, because they are likely to reflect better the business concerns of individual firms would lead to greater variation in pay

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[3] The gap between the earnings thresholds for the top and the bottom ten per cent of earners.

compared with multi-employer agreements. This was borne out strongly in the UK, a ratio of the top to the bottom decile of 3.99 for single employer bargaining to one of 2.52 for multi-employer bargaining, but it was not true of the other countries, where single-employer bargaining was associated with a lesser variance of earnings. Dell'Aringa and Pagani explain this by the greater degree of coordination of single employer bargaining particularly in Belgium and Italy. One reason why multi-employer bargaining could have a smaller compression effect is that it often sets minimum rates of pay, and these are often supplemented by other premia at company level.

Table CB3. Inequality measures, with multi-employer bargaining (MEB) and single employer bargaining (SEB) (unconditional: not adjusted for other influences on pay).

	Bargain-ing cover-age, c 1995 %	Coord-ination	Q90/Q10			Q90/Q50			Q50/Q10		
			All	MEB	SEB	**All**	MEB	SEB	**All**	MEB	SEB
BELGIUM											
All	90	4	**2.840**	3.045	2.530	**1.904**	2.133	1.748	**1.490**	1.429	1.447
Non manual			**2.923**	3.240	2.589	**1.777**	1.875	1.692	**1.645**	1.727	1.529
Manual			**1.847**	1.718	1.789	**1.433**	1.384	1.359	**1.289**	1.241	1.318
ITALY											
All	82	3	**2.769**	2.699	2.787	**1.863**	1.846	1.930	**1.486**	1.462	1.443
Non manual			**3.207**	3.129	3.228	**1.868**	1.814	2.023	**1.718**	1.724	1.595
Manual			**2.029**	2.071	1.803	**1.478**	1.521	1.367	**1.374**	1.361	1.319
SPAIN											
All	60+	3	**3.679**	3.407	3.339	**2.108**	2.171	1.822	**1.745**	1.570	1.832
Non manual			**4.520**	4.502	3.672	**2.125**	2.227	1.931	**2.128**	2.020	1.901
Manual			**2.883**	2.467	2.798	**1.837**	1.706	1.579	**1.570**	1.445	1.773
UK*											
All	47**	1	**3.723**	2.517	3.994	**2.079**	1.671	2.169	**1.792**	1.506	1.842
Non manual			**4.424**	2.740	4.747	**2.110**	1.803	2.137	**2.096**	1.520	2.222
Manual			**2.459**	2.242	2.504	**1.544**	1.462	1.563	**1.592**	1.534	1.603

Source: Dell'Aringa and Pagani (2004), based on ESES. Note: * UK single employer variable relates to pay determination either by collective agreement or employer decision. For ESES the UK collected data only on whether employees were covered by a major national collective agreement.
** UK coverage figure liable to revision downwards.

Of particular interest in the light of the PiEP work on low pay, is the effect of bargaining on the lower end of the wage dispersion. Does collective bargaining boost the relative earnings of the lower paid, and does multi-employer bargaining have a greater effect than single employer bargaining. Again in the UK, single-employer pay determination is associated with a lower floor for the low paid than multi-employer bargaining, and this applies to both manual and non-manual workers. In the other countries, the difference between the two types of bargaining arrangements is somewhat smaller, and varies between these occupational groups.

Turning to performance incentives, again one might expect single employer bargaining to give individual firms more freedom to design their own incentive systems for non-manual

and middle-management employees, and thus for there to be more inequality with this type of bargaining. In Spain and again strikingly also the UK, single employer bargaining is associated with greater inequalities among workers at the top end of the wage distribution, for both manual and non-manual.

To get a more accurate estimate of the effects of different types of bargaining regime, and of inter-country differences, one needs to re-calculate them taking account of other information in the ESES on workers' skill characteristics, and to control for differences in employment composition. Dell'Aringa and Pagani therefore go on to:

a) decompose the variance associated with different factors behind the distribution of earnings;
b) compute wage differentials by bargaining regime associated with different variables; and
c) carry out a quantile regression analysis to examine the effects of union bargaining at different points on the wage distribution.

Variance decomposition: To sum up, in the cases of Belgium and UK the variance decomposition exercise confirms that SEB contributes to reducing/increasing wage dispersion depending on the fact that it is "co-ordinated" (Belgian case) or "uncoordinated" (UK case). The results are weaker for Italy and Spain where the contribution of SEB to wage dispersion is generally very small.

Analysing the contribution of the three effects separately, the between effect is positive in Italy and Belgium while it is negative in Spain and UK; the within effect is negative in all four countries. Finally, the wage gap effect is positive in Italy, Belgium and Spain while it is negative in the U.K. On the whole, the Dinardo and Lemieux (1997) decomposition exercise also confirms the fact that "co-ordinated" decentralisation produces egalitarian effects on wage distribution.

Adjusted wage differentials: On the whole, the analysis of adjusted wage differentials computed through the (corrected) standard deviation of coefficients allows us to draw the same conclusions as those obtained from the variance decomposition exercise: the impact of decentralised wage-setting is to reduce wage dispersion considerably among different kinds of workers and among workers hired in different types of firms when it is strongly "co-ordinated" as in Belgium, while it contributes to spreading wage differentials when it is totally "uncoordinated" as in the UK.

Quantile regressions: Inequality is much higher in Spain and in the UK and, in particular, the highest inequality indexes are registered in Spain, independently of the type of bargaining and of the groups of workers considered. Thus, the comparison indicates that inequality is higher in countries characterised by more decentralised system of bargaining, whatever the applied type of agreement. Hence, wage-setting institutions play an important role in explaining not only the within-country differences in wage distribution generated by the type of bargaining, but also across-country diversity in the level of inequality.

The results given in Table CB4 show that in the countries where a "co-ordinated" decentralisation exists (Italy and Belgium), all the percentile ratios considered are smaller in the presence of single-employer rather than multi-employer bargaining, and this is true for both groups of workers considered; in Spain the evidence is mixed: wage dispersion is always higher in the presence of an establishment/ enterprise agreement rather than with

above-establishment bargaining for manual workers. For non-manual workers the overall differential and the differential in the upper part of the wage distribution are higher when a multi-employer agreement is signed. As regards the UK, the overall dispersion, and the dispersion in both the lower and upper ranges are lower in the presence of collective multi-employer agreements. Finally, it is interesting to notice that in all four countries the three percentile ratios are higher for non-manual than for manual workers whatever the type of bargaining. This result may be due to the fact that the key egalitarian aim of unions and their scope for action is stronger as regards manual rather than non-manual workers.

Table CB4: Conditional log wage differentials

	Q90/Q10		Q90/Q50		Q50/Q10	
	MEB	SEB	MEB	SEB	MEB	SEB
ITALY						
All	1.788	1.721	1.377	1.350	1.298	1.275
Non manual	1.940	1.829	1.442	1.398	1.345	1.308
Manual	1.665	1.616	1.315	1.304	1.267	1.239
BELGIUM						
All	1.788	1.766	1.376	1.368	1.300	1.290
Non manual	1.960	1.822	1.444	1.386	1.357	1.315
Manual	1.634	1.546	1.320	1.250	1.238	1.237
SPAIN						
All	2.273	2.388	1.586	1.584	1.434	1.507
Non manual	2.630	2.512	1.702	1.618	1.545	1.553
Manual	2.049	2.274	1.502	1.544	1.365	1.473
UK						
All	2.120	2.343	1.483	1.595	1.430	1.469
Non manual	2.195	2.588	1.518	1.686	1.446	1.534
Manual	2.035	2.052	1.454	1.464	1.400	1.402

Source: Dell'Aringa and Pagani (2004).

8. 3   Industry Wage Differentials and the Bargaining Regime in a Corporatist Country

Extending the field of analysis, Robert Plasman and François Rycx (2004) examine inter-industry wage differentials from the perspective of rent sharing as it is enabled by the bargaining power of unions. Within this framework, therefore, industry differentials are conceived as being (partially) the product of heterogeneity of union bargaining power across industries. Previous work of this type has been performed almost exclusively for Anglophone countries, which tend to have distinct union and non-union bargaining regimes that co-vary with industry background. Belgium's structure of wage-setting institutions is not of this variety. Instead, like many other EU countries, it effectively has no non-union sector. However, this is not to say that a uniform bargaining structure obtains in all parts of the economy. Rather, two primary collective bargaining regimes can be discerned: one in which establishments set pay in compliance with national or sectoral agreements, and another in which renegotiation of these agreements occurs at the level of the establishment. A major contribution of this paper, therefore, is to extend the bargaining power-rent sharing framework to a corporatist country. Furthermore, while the existence of inter-industry differentials in Belgium has been established elsewhere (e.g., Rycx 2002), this analysis parses them in more detail by its examination of their covariance with the dimension of collective agreement structures. Essentially, therefore, the paper is concerned with the

questions of whether inter-industry differentials obtain under different bargaining regimes, and the magnitude of any such observed differences between regimes.

The analysis of inter-industry differentials for both types of bargaining regime shows that similar industries cluster among the highest- and lowest-paid in both sub-samples (Plasman and Rycx 2004, Table 2), and the correlation between the two sets of industry wage differentials is high (approximately 0.7) and strongly significant (Plasman and Rycx 2004, Table 3). These results indicate the importance of underlying industry effects on wage outcomes, irrespective of bargaining regime, perhaps due to the common technological and organizational features of establishments in any given sector.

However, this is not to suggest that the bargaining regime has no impact on wage structures. Indeed, although the variation of inter-industry differentials appears lower under the regime of local renegotiation (Plasman and Rycx 2004, Table 2), it emerges that this result is largely driven by differences in the distribution of employment across bargaining regimes. When adjustments are made for this fact, it can be observed that inter-industry differentials are considerably higher among establishments that renegotiate locally (Plasman and Rycx 2004, Table 5). This outcome is consistent with the finding for many Anglophone countries that such differentials are higher the more collective bargaining is decentralized. In terms of wage levels, an Oaxaca-Blinder decomposition of the differential between the two bargaining regimes – controlling for individual and establishment characteristics and industry effects – indicates that local bargaining raises wages by approximately 5% in relation to the base outcome obtained under national or industry bargaining. In an international comparison, this differential between bargaining regimes is relatively low, and is also consistent with the hypothesis that wages will be less sensitive to the bargaining regime in a corporatist country.

8. 4 Collective bargaining and wage inequalities within the firm.

ESES provides a unique opportunity to analyse the effects of local bargaining on wage inequalities within the firm in a comparative way. Until now, this has been possible only on a national basis. Dell'Aringa, Lucifora, Orlando, and Cottini, (2004) anlayse the effects of bargaining structure and intra-establishment pay inequality in four European countries. Their paper investigates the patterns in Belgium, Ireland, Italy and Spain. Using the establishment data from ESES, their study analyses the effect of local agreements compared with national and sectoral agreement on wage differentials within the firm. It builds on a similar study confined to the Italian case by the authors (Dell'Aringa, Lucifora, and Orlando, 2003). The main findings suggest that employee characteristics, firm size and work organisation practices are important determinants of wage dispersion within establishments.

Decentralised bargaining is shown to be associated to higher unconditional intra-firm wage dispersion (Table CB5). At first sight, this is hard to reconcile with the earlier findings of Checchi and Pagani that local bargaining led to compressed pay inequalities, albeit on the basis of observations across the labour market rather than looking at the effects of workers employed within the same firms.

Table CB5 Within-establishment pay inequality (coefficient of variation) by type of collective agreement in each country (unconditional estimates).

	Plants with centralised Agreements only (1)	Plants with both Centralised and Decentralised Agreements (2)	Difference (1) - (2)
Belgium	0.279	0.296	-0.017*
Ireland	0.398	0.442	-0.044*
Italy	0.274	0.353	-0.078*
Spain	0.297	0.333	-0.036*

Note:
* Statistically significant at 1% level.
Source: Dell'Aringa et al. (2004, Table 7).

Decomposing the difference between plants covered by the two types of bargaining arrangements, using an Oaxaca decomposition, shows that, depending on the country, around 80% of the difference in individual countries can be explained by the personal characteristics of the employees and the type of plants in which they work, leaving about 20% explained by differences in bargaining régime.

The measures of intra-establishment earnings variation shown in Table CB5 take no account of differences in the type of workers within different establishments, and one might expect that coefficient of variation to be higher in plants employing workers with a more diverse skill mix. Dell'Aringa et al (2004) control for this is by estimating the residual variation in earnings within the establishment after adjusting for their workforce differences. This uses the residual variation within the establishment after regressing the earnings of individual employees in the plant on a standard set of human capital variables, such as age, age squared, gender and education. These adjusted, or 'conditional' measures of earnings variation can then be regressed on average establishment characteristics relating to employment structure, size, bargaining régime, sector and region in order to see how much these factors can explain. The main results of this analysis show that, for all four countries, the greater the share of highly educated employees in the plant the greater will be the degree of adjusted within-establishment pay inequality. Tenure had a negative influence on residual inequality, as did firm size, but these effects were less strong than those of education.

A final question to be resolved is whether decentralized bargaining causes a difference in within-establishment inequality, or whether similar factors which shape inequality also determine the decision of firms whether or not to bargain at that level. To test this, the authors estimate the latent 'propensity to negotiate at establishment level', based on employee and plant characteristics, and then feed this into a regression of plant level coefficients of variation on this estimated propensity and plant and individual characteristics. The results show that the apparent relationship between decentralized bargaining and the unconditional estimates of earnings inequality within plants shown in Table CB3 is not robust. The authors then conclude that local bargaining does raise within establishment pay inequality as compared with national bargaining.

The conclusion therefore is that decentralized bargaining in these four countries neither increases or decreases the amount of within-establishment inequality, and that the main effects observed in the raw, unconditional, data are due to differences in the work force

employed in these plants, and the type of industry and plant size. This finding reduces the initial inconsistency noted between the unconditional estimates in Table CB3 and the findings of Checchi and Pagani which indicated a degree of wage compression associated with local bargaining, but still leaves some unanswered questions.

The chief policy conclusion to flow from this is that decentralized local neither constrains nor enables the management of individual firms in the design and application of reward policies for different categories of employees.

8. 5   The influence of sectoral wage agreements on inter-industry differentials in earnings (Spain).

Another way in which the influence of collective agreements on earnings can be traced is by comparing actual earnings with negotiated rates of pay. Simon (2004) compares the results from ESES with those from the Spanish database on wage agreements for the same year. In the absence of information about the agreements covering individual employees, he matches the two data sets by industry. As with the analyses for the other countries for which ESES micro-data are available, he computes conditional earnings, that is industry average earnings adjusted for individual employee characteristics.

A first conclusion is that the coefficient of variation of earnings between industries is quite similar, being 0.1196 for earnings and 0.1252 for agreed rates (Tables 2 and 5). These figures place Spain in an intermediate position among industrial countries, less inequality between industries than in Ireland and the UK, but more than in Italy and Denmark. Simon also compares adjusted earnings and wage rates across industries, and obtain a Pearson correlation of 0.78, indicating that the same industries tend to be high or low paid whether one takes earnings or wage rates. Moreover, when he regresses industry average earnings on wage rates, he obtains a coefficient of determination of 0.61, again indicating a close matching between the two.

From these findings, Simon concludes that sectoral wages agreements exert a strong influence on the structure of earnings between industries in Spain.

III. Methodological advances: The PiEP-LISSY Remote Data Access System

By Tanvi Desai, PiEP and CEP Data Manager.

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1.   A History of the System

Choosing the System

From the beginning, the PiEP project planned to make use of the European Structure of Earnings Survey microdata (ESES), as this valuable resource had never been exploited for cross country comparisons. We originally approached Eurostat, the holders of the ESES, for access to the data. However, they did not have the authority to grant access, and referred us to the eight member state National Statistical Offices (NSIs) which had expressed an interest in the project at the outset.

It soon became clear that those countries that were willing to let us access the data, would not let the data be stored anywhere but Eurostat[4]. It was already likely that we would need to access the data remotely, due to the number of different countries involved in the project and the improbability of the National Statistical Institutes (NSIs) allowing us to hold multiple copies of microdata in all participating countries. However, the need to hold the data at Eurostat while managing an access system from London was an added complication.

The main priorities when choosing the remote access system were:

- Security capable of safeguarding confidential microdata to the satisfaction of the NSIs
- A system that provided an environment that allowed the user to feel as much as possible as if they were working on their own PC.
- A system compatible with the Eurostat network, that could be managed from London

After having looked at a number of options[5], we met with Marc Cigrang of HAL Consulting, developers of the LISSY system.

The advantages of this system were significant. They included the fact that LISSY has been used successfully by the Luxembourg Income Study[6] for 20 years, to provide access to household income study microdata for 25 countries. This meant that all but

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[4] In fact many countries have laws that prevent micro data leaving the country for anywhere except Eurostat.

[5] Including PVWAVE and NESSTAR

[6] http://www.lisproject.org

two[7] of the original European member states to whom we applied for data access already had microdata deposited on this System. The LISSY system also allows users to analyse data using standard statistical packages (STATA, SPSS and SAS, though for economic reasons PiEP chose to implement only the STATA option), giving researchers access to a full range of statistical techniques and making it unnecessary for them to learn system specific software.

From the data management point of view, LISSY requires the minimum of data set up. Data files are mounted on LISSY as STATA, SPSS, or SAS files. Other systems we investigated required a lot of additional data preparation to configure data files for access.

Another major advantage of LISSY was the involvement of the Systems Consultant, who was willing to become a part of the project, and tailor the software to our needs for a very reasonable price. This meant that the software was not only more affordable than the other options explored, but was also able to meet our needs more specifically. This was particularly important as the participating NSIs, while happy with using LISSY software as a base, requested additional security measures over and above those provided by LISSY, thus the PiEP-LISSY system was developed.

2.   Developing and Installing the System

Following negotiations with the member states, 7 agreed to allow us to access their ESES microdata: Belgium, Denmark, Ireland, Italy, Norway, Spain and the United Kingdom. In the end we were able to provide access to 6 of these countries' data, as the Norwegian data was never delivered to Eurostat.

For confidentiality reasons, all of the participating countries were unwilling to allow cross tabulations on their microdata, unless there was a guarantee that cells with a small number of observations could be blocked. At the time LISSY was not able to provide this facility, so we had to find a way to prevent researchers from running any cross tabulations. Some countries also requested an additional security measure: the ability to block analysis of pairs of disaggregate variables where those variables combined might disclose sensitive information.

Thanks to the close collaboration with the Systems Consultant we were able to find a solution to the above problems by including a facility to search the programs submitted for illegal or inappropriate commands before they gain access to the data. This will be described in greater detail below.

Setting the system up at Eurostat took a significant amount of time, in spite of a very high level of support from members of the IT team and Steve Clarke of the Earnings and Labour Costs Statistics Unit. This was mainly because the pioneering nature of our work meant that a number of different units in Eurostat, (including IT systems, IT security, the staff who manage the file transfer systems, and those in charge of collecting and disseminating information from the ESES), had to assure themselves of the security of the project.

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[7] Greece and Portugal are the two European member states not involved in the LIS project.

An additional substantial delay was caused by the problems we faced in adapting the Eurostat File Transfer Protocol STATEL to the needs of the System. STATEL was originally developed to transfer data files securely between Eurostat and member states. Therefore, it was designed to transfer large amounts of data at occasional intervals, whereas a remote access system needs to transfer small amounts at very frequent intervals. We eventually managed to adapt the System to transfer data every minute, though ideally we would have liked an even smaller time interval.

3.   An outline of the PiEP-LISSY system

The System provides an e-mail interface with microdata that are held securely at Eurostat. At no time do project members have direct access to the data, which is protected by the System.

The System consists of two major components: The 'PostOffice', based at the LSE; and the 'Batch Machine', based at Eurostat.

The Postoffice's main function is to provide security for the system, and to prevent any unauthorised programs from gaining access to the data. Researchers email statistical analysis programs (jobs) in STATA format to an address at the LSE. These emails are then picked up by the Postoffice, which scans and logs all incoming jobs. In particular the Postoffice checks for

> ⌂ A heading containing a valid username and password.
> ⌂ Illegal commands

The PostOffice checks the heading against the user database, if the heading is incorrect the job is immediately returned to the e-mail address that it came from. If the header is correct, the job is scanned for illegal commands. If any string is identified that contains an illegal command (i.e. one that might reveal potentially sensitive information), the job is blocked and an error message is returned to the user. These jobs never gain access to the Batch Machine, thus preventing the output and transmission of sensitive information.
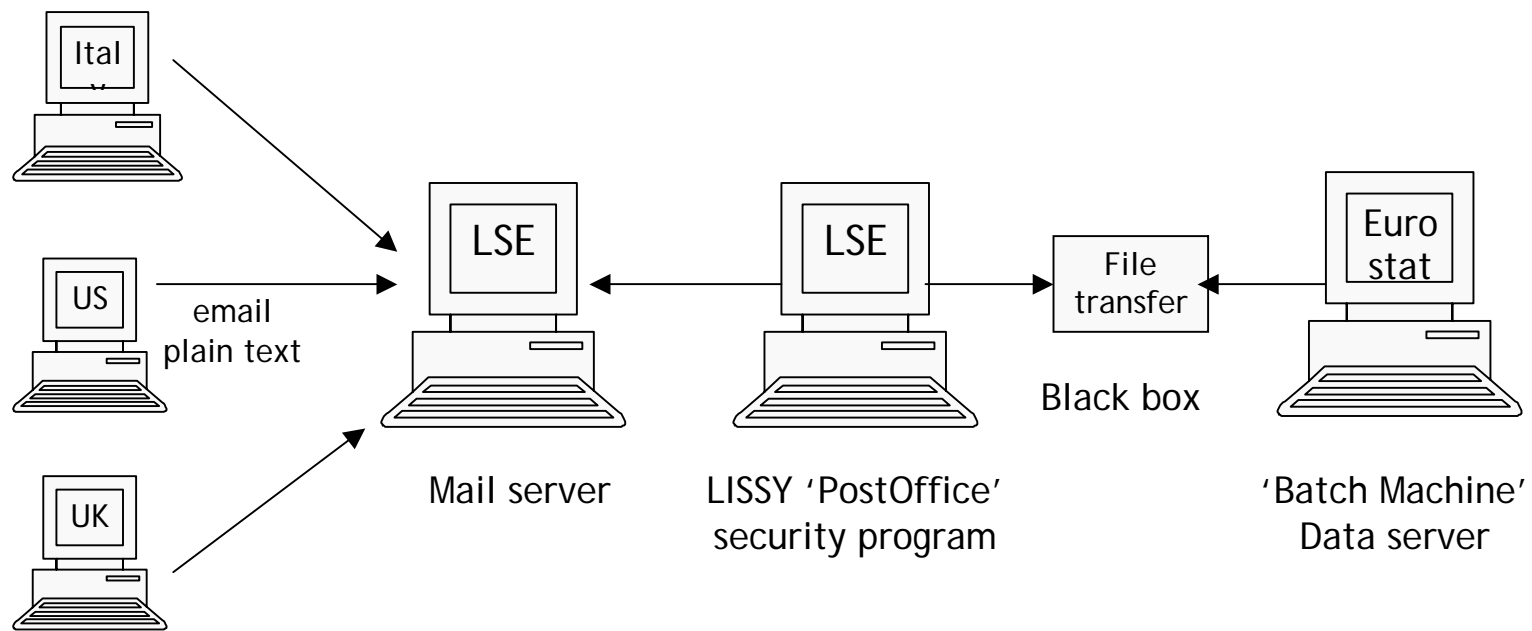
All emails must be sent in plain text with no attachments, this makes it far more difficult for viruses and trojans to enter the system.

The Batch Machine is based in a secure server room at Eurostat, and holds the microdata and the statistical software. If the job passes the Postoffice's security checks it is then placed in a queue to be collected by Eurostat's File Transfer Protocol: STATEL. STATEL transfers the jobs to a queue on the Eurostat network, from where they are picked up by the Batch Machine.

> Note: the Postoffice does not know the identity of the Batch Machine and therefore will not provide a hacker with a gateway to access the data.

Once the job has been run the results are returned to the Postoffice, via STATEL, where they are again checked and returned to the user. As an additional security measure ALL output is returned only to the email address registered on the system irrelevant of where the job is sent from. Therefore even if an unauthorised person were to gain access to a username and password, they would not be able to receive output unless they also hacked the user's email account.

PiEP-LISSY Diagram

Ital

US   email
      plain text

UK

LSE   LSE   File
              transfer

              Black box

Mail server   LISSY 'PostOffice'   'Batch Machine'
               security program   Data server

Euro
stat

4.   Use of the system

Towards the end of June 2002, after representatives of participating NSIs had been given the opportunity to test the security of the System, researchers were given access to the ESES microdata through the PiEP-LISSY system. The System worked effectively during these early stages of data access, however it soon became clear that a lot of time and processing power was being wasted deriving variables.

As well as the standard dummy variables needed for regression analysis, a lot of harmonisation was necessary to enable cross country comparison of variables. This meant that each job sent to PiEP-LISSY had to include commands to set the data up, before any analysis could be carried out. This was not only time consuming for researchers, but the programs also took longer to run on the System, thereby lowering the number of jobs processed. Therefore, it was decided that files containing the merged firm and employee data and any commonly used derived variables should be generated and added to the System. The international research team was invaluable when developing these files, as we would not have been able to construct reliable comparative variables without the national expertise available for each country.

The derived 'd' files were added to the System as working files in September 2002. At the same time the secondary data sources (COMPET, Industrial conflict, SBS_sizeclass, SBS_enter) were also added.

Following the PiEP Project meeting in July 2003 it was decided that additional derived variables were needed in the 'd' files. These new variables were generated and added to the System as 'd2' files (thus preserving the original 'd' files to allow researchers to replicate earlier findings) in October 2003.

Problems

Stability

The main problem we have faced with the PiEP-LISSY system is stability. The stability problems are very difficult to avoid, as we are dependant on software and networks at Eurostat and LSE that are out of our control. The specific factors that have an effect on the PiEP-LISSY system stability are listed below

LSE Network downtime
As the PiEP-LISSY system is part of the LSE network, any problems on the Network affect the LISSY Post Office, preventing it from sending and receiving jobs. There is very little we can do about this apart from wait for the situation to be rectified. Luckily this is rarely a problem, as the LSE network is very stable.

LSE Exchange Server maintenance and downtime.
The PiEP-LISSY system uses an LSE email address to receive and send mail. Therefore any problems with the LSE Exchange Server has an immediate effect on the Post Office, usually causing it to crash. The Post Office can be easily restarted,

once the problem with the Exchange server is solved. However, we have no control over the LSE Exchange server.

Eurostat Network downtime
Downtime on the Eurostat Network usually means that the LISSY Batch Machine at Eurostat has to be rebooted. This means emailing our contacts in the Eurostat IT support team and asking them to do it.

STATEL Robot Service (SRS)
The SRS software is very unstable. It is very easy to restart the Service, however it does mean that the System needs constant monitoring, as without the SRS no jobs can be sent or received.

System downtime caused by lack of stability has meant that researchers cannot be as confident as we would like that their jobs will be returned promptly. It also means that the Data Manager's absence from the office can have a disproportionate effect on system downtime, as a system crash is often not picked up by other staff. The Data Manager is also responsible for alerting staff at Eurostat if there are any problems with the System at that end. Again this means delays if the Data Manager is away from the office. However, the Eurostat IT staff have been incredibly helpful, and have been willing to take time out from their own work to assist in keeping the System running. The Project is particularly grateful to Dominique Bonaert, Sandra Bertrand and Fatmi Guettouche for all their assistance.

STATEL Controller

The STATEL controller, though it has not had a significant effect on System stability, has had a very large impact on disaster recovery. In the event that either the Eurostat or the LSE machine has been reinstalled or upgraded, reconfiguring the STATEL controller has been very time consuming and has required the cooperation of a large number of people to get it working again.

There is also a minor concern about the security of STATEL as a file transfer protocol. All the software necessary to install and run STATEL (and therefore access Eurostat) can be downloaded from the Eurostat website. From this point the only thing that required to connect to the Eurostat is an SNN (Statel Nick Name). As these are assigned in a way that directly refers to projects, they could potentially be identified by someone with a knowledge of the work done at Eurostat. Though this is not a major issue and has not caused the project any problems, we would ideally have used a more secure transfer protocol had we not been constrained by Eurostat to use STATEL.

Microsoft Exchange Server Formatting

A serious problem which has been affecting all LISSY systems is caused by Microsoft Exchange Server 2000. This software uses an XML MIME Transformation Protocol to reformat all incoming emails to a standard template, in doing so a number of additional characters can appear in the text of the email. As the email text sent to PiEP-LISSY is a statistical program the extra characters prevent the program from running where the statistical package does not recognise the character.

Solutions

Stability

The ideal solution to the problem of stability would be to transfer the entire System to the LSE. We would still be affected by the LSE network, but as this causes the fewest problems, there would be a significant improvement in stability. However, one of the primary conditions the National Statistical Institutes placed on the Project when granting access to their data was that it be stored at Eurostat, so this solution is not an option.

The next best solution to the stability problem would be to have internet access to the Eurostat network. This would not only allow us to use a more stable (and more secure) file transfer protocol, but would also allow us to install the newest version of the LISSY system. The new version has a user friendly web interface which includes a secure web tabulation tool, which would allow us to run cross tabulations on the microdata (an analysis technique not currently available for security reasons). Unfortunately Eurostat have a policy of not allowing web access to their network, so we are also unable to use this solution.

Should the project continue (and we are hoping to add the 2002 data as discussed below), we will attempt to develop the PiEP-LISSY system itself to combat some of the stability problems. Utilities we will be looking at include,

- remote restart, to allow the Data Manager to monitor the System from outside the office and to restart the Post Office and SRS when needed.
- reboot script, a script that can be sent using the LISSY system that will reboot the batch machine at Eurostat without the need to involve the Eurostat IT staff.

Microsoft Exchange Server Reformatting

The first additional characters to appear in programs sent to PiEP-LISSY were limited to =3D. As this is not a character set likely to be used in a program we added a basic search and replace to the PostOffice to enable the programs to be cleaned, before being sent on to the Batch Machine. However, other character sets began to appear, including =20 which ideally we do not want to replace as it is likely to be used in statistical programs.

We have considered running our own non-Microsoft mail server separate from the LSE's mail server, however since the majority of Universities at which our users are based run Microsoft Exchange, the problem will often have originated outside the LSE.

Investigation is ongoing to try to discover a solution to this problem, including negotiations with Microsoft to try to ascertain exactly how the transformations are implemented.

5.   Further Developments

Research for the future

Though the LISSY system was first released 20 years ago, development of remote access has largely been ignored over the last decade or so as the improvements in desktop computing made them largely irrelevant. Therefore, there are areas that need to be addressed if we are to develop high-quality, secure remote access systems.

The first of these is particularly important for systems like LISSY that block commands as a security measure. Though we can implement blocks on variables that we know to be sensitive, there is still no real understanding of the dangers to confidentiality posed by different methods of analysis. It is vital that research projects are funded to define how and when different statistical analyses techniques will cause sensitive information to be disclosed.

Another area that needs investigation is the delivery of graphics by remote access. This is less fundamental than the problem above as it is not related to security. However, the production of graphics is a common problem faced by users of remote access systems, as very few have the provision to return graphics. There are some remote access packages available commercially that produce beautiful graphics, but these tend to be aimed towards the private sector, and users whose priority is producing high quality graphics from relatively simple analyses to form part of commercial presentations. Therefore the range of analysis techniques can be too limited for academic use (this software also tends to be very, very expensive).

The Future of the PiEP-LISSY System

The PiEP-LISSY System is currently scheduled to close at the end of the project. However we feel very strongly that to not take advantage of the work that has been invested in the System would be wasting an opportunity that may never arise again. A significant investment has been made in the development of the PiEP-LISSY System, and it has a number of undeniable advantages.

- ⌃ In the past, NSI and Eurostat concerns about data security and confidentiality prevented the dissemination of sensitive classes of microdata to researchers and policymakers. However, given advances in analytical resources and techniques, it is precisely this type of data that offers the greatest depth of insight into socio-economic questions. The comprehensive security and confidentiality features of PIEP-LISSY offered a route out of this impasse—by meeting NSI and Eurostat requirements, the System has enabled high-value added analysis of comparative microdata. PIEP-LISSY remains the only such system approved by NSIs and Eurostat.

- ⌃ Member states and EU institutions invest significant amounts of money in the collection and preparation of comparative socio-economic data for the ultimate purpose of informing policy decisions at all levels of governance. At present, however, the bulk of these data are only ever disseminated as summary tables, which are substantially less informative than results derived from the dedicated

analysis of microdata. Much greater value could therefore be extracted from these substantial investments by the dissemination of comparative microdata through PIEP-LISSY.

⚔ The PIEP project team has demonstrated the value of exposing EU data to the scrutiny of researchers. Its experience of working with ESES 1995 data enabled it to contribute to the efforts of a Eurostat task force to clarify and improve the regulation governing the collection of future ESES data. As noted by Eurostat, this type of input is essential for the refinement of techniques of data collection and preparation, and consequently for the improvement of the data used in making policy decisions. Evidently, the PIEP team's ability to contribute to this process hinged upon PIEP-LISSY's provision of access to comparative microdata.

⚔ Owing to financial constraints, Eurostat has recently chosen to restrict its internal dissemination capabilities. As a result, it appears the sole option for wider dissemination of European microdata lies in the type of entrepreneurial, partnership-oriented approach that created PIEP-LISSY. Given that the start-up costs of the system have already been absorbed, it represents a viable channel for the expansion of access to European comparative microdata of many kinds.

The major aim in keeping the PiEP-LISSY System operational, is to provide the wider research community with access to comparative European micro-data at a time when demand for this type of data is rapidly increasing.

Initially the aim would be to add the 2002 Structure of Earnings Survey data and open the system up to academic researchers outside the PiEP team. For this we have the support of Eurostat. In fact the Data Manager has already had initial discussions with Eurostat representatives, and they have sent a letter on our behalf to all member states and candidate countries that will be depositing SES 2002 data (see Appendix A).

In response to Eurostat's letter, Belgium, Hungary, Ireland, Italy and Spain all agreed to allow their 2002 ESES microdata to be accessed through PiEP-LISSY. Finland, France, Luxembourg, Slovenia and the UK are all checking their legal position with regard to data release.

DG Employment have also expressed a keen interest in the System (see Appendix A). They would like access to the PiEP-LISSY System as they have no way to directly access comparative European microdata for their own research. This would make the System of vital use in improving research into European Labour Market questions.

In spite of the original delays establishing the System at Eurostat, and the subsequent problems with stability that might be expected from a pioneering project such as this, the System has been very successful. There are currently 36 users registered to access the System of these 18 are active researchers, who between them have run approximately 20,000 statistical programs on the data. This gives a good indication of how valuable this kind of data access is, particularly when you take into account the age of the data (1995).

Unfortunately however, the Project's ability to continue to operate this System, and to add the 2002 data will depend on the availability of funding. At this present moment, none of our attempts to secure funding has been successful.

It is absolutely vital to Academic research that we have access to comparative European microdata, at present the PiEP-LISSY System is one of the very few places where such data is available. It is the only System that is acceptable to member states as a secure method of data access. Unless there are plans in place at Eurostat to replace PiEP-LISSY there is unlikely to be any secure way to expand the delivery of European microdata for some time to come.

Appendix A:

Letter 1

EUROPEAN COMMISSION
EUROSTAT

Directorate E: Social statistics
Unit E-1: Labour market

eurostat

Luxembourg, 18 September 2003
ESTAT/E-1/

AB/

To Members of the Working Group on Wages & Labour Costs Statistics

Structure of Earnings Survey (SES) for the year 2002:
PiEP-LISSY system : Remote access to 2002 SES data

A number of countries have expressed an interest in a European solution for the release of their own SES data. This letter addresses this issue.

On 15 April 2003, I sent you the Final Report of the Expert Group on SES data confidentiality. Section 6 (which I attach here) gave brief details of the PIEP-LISSY system which provides a European solution for the dissemination of microdata from the 2002 SES.

The PIEP-LISSY system was used for the 1995 SES results. It gives the NSIs and academic researchers secure access to the microdata, permitting detailed comparative analyses to be undertaken. A full description of the PIEP-LISSY system was given in the Eurostat document E1/Sal/17.4.02 entitled "*The PIEP approach: Remote access to microdata in the 2002 SES*". This paper was presented by Derek Bird to the WG in November 2002. In an earlier WG meeting, Professor David Marsden from the London School of Economics (LSE) gave a fuller presentation of the the PIEP system with regard to the 1995 SES.

This letter is to announce that the LSE are willing to provide a similar system for the 2002 SES and to ask the countries if they are interested in joining the project. I attach a note prepared by the LSE giving you some more background and a contact for more information.

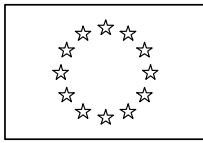This issue will be discussed during the October Working Group meeting.

Yours sincerely,

Signed
Antonio   Baigorri
Head of Unit

Attached to this letter:
- Section 6 of the EG's Final Report

Letter 2

EUROPEAN COMMISSION
EMPLOYMENT AND SOCIAL AFFAIRS DG

Employment and ESF Policy Co-ordination
The Director

To Members of the Working Group on Wages & Labour Costs Statistics

Integrated system of earnings and labour cost statistics :
Structure of Earnings Survey (SES) for the year 2002:
PIEP-LISSY system : Remote access to 2002 SES data

Following on from the letter by Antonio Baigorri, Head of Unit of Eurostat Unit E.1, addressed to the members of the Working Group on Wages & Labour Cost Statistics in September 2003, I would herewith like to confirm the deep interest of DG EMPL that the dissemination of microdata from the Structure of Earnings Survey (SES) will be continued for the newly available 2002 SES data.

More specifically, I would like to stress that the PIEP-LISSY system which was developed by the London School of Economics (LSE) in the context of the 5th Framework research project on "Pay Inequalities and Economic Performance (PIEP)" proved an effective solution for the dissemination of microdata from the 1995 SES (see attachment 1 to this letter), in line with the requirements for data confidentiality.

Preliminary results of the PIEP project were presented and discussed at a seminar in DG EMPL in April 2004, providing an important input into the ongoing analytical work on the link between pay inequalities and business and employment performance in Europe at the micro level. The controversy about this link in the specialised literature - as reflected in the most recent OECD Employment Outlook 2004 - clearly shows the need for further analysis on this issue, based on the SES as the most appropriate source of timely and comparable microdata on wage structures in Europe. Continued access to the SES data is crucial in this respect.

A continued and further improved dissemination of SES data via the PIEP-LISSY system would, in addition, present multiple other potential benefits both to the European Commission and to external data users:

- Firstly, there is scope for immediate collaboration between analytical units in the Commission in general and in DG EMPL in particular and the PIEP team, helping to integrate results drawn from the 1995 SES microdata with our own work on pay structures and employment performance in the EU. In this context, DG EMPL would be keen on obtaining access in 2005 to the 1995 and 2002 SES microdata for its own analyses, while benefiting from the previous experience of the PIEP team.

- Secondly, in its ongoing attempt to set up a network of researchers performing comparative labour market analysis based on firm-level panel data and linked employer-employee data (see the Employment Incentives Measures Working Programme 2004), DG EMPL could possibly build in parts on the infrastructure in place without having to devote substantial shares of the related budget to the development of a new dissemination system.

- Thirdly, and more generally, the PIEP-LISSY system could possibly be further developed into an effective means of secure dissemination of multiple comparative microdata sets at European level, and as such provide a solution to the increasing needs for Commission services to obtain access to further comparative socio-economic microdata sets.

- Finally, a continued, and possibly extended, dissemination system for multiple comparative microdata sets at European level would further significantly expand the scope of future research in the field of socio-economic research.

Given the important investment in the development of the PIEP-LISSY system, the positive experience with its use in practice and its potential role in the further development of an integrated European system of earnings and labour cost statistics, I hope that an increasing number of Member States will make use of the PIEP-LISSY system to release and disseminate their own SES data and join the LSE project. I am confident that the continuation of the system and further improvements in its country coverage will not only improve data dissemination, but also and most importantly contribute to improving the knowledge base for policy-makers.

I will be glad to discuss this issue further in one of your future meetings if you wish.

Yours sincerely,

A.   Kastrissianakis

Attached to this letter:
- Information note "Continuation of the PiEP-LISSY system and access to the 2002 SES microdata", Tanvi Desai, London School of Economics
- Study report "The potential of firm-level panel data and linked employer-employee microdata for employment analysis", Prof. Tor Eriksson, Aarhus School of Business

C.C.:   Odile Quintin; Andrew Fielding
        Michel Glaude (ESTAT); Antonio Baigorri (ESTAT); Peter Fisch (RTD); David Marsden (LSE); Tanvi Desai (LSE); Tor Eriksson (Aarhus School of Business); Frank Siebern-Thomas; Paul Minty

IV. Conclusions and policy implications

The main analytical conclusions of the study have already been summarized in the introduction, as have the main methodological advances. The discussion of policy conclusions starts with those for economic and social policy, and then turns to those for the future of the ESES.

1.   Labour market and social policy conclusions

The initial proposal was partly motivated by the debate about the future of the 'European Social Model' at least as concerns its labour market component. Should its encompassing and broadly egalitarian orientation be maintained, or did such aspects as wage solidarity get in the way of running firms efficiently?

The answer, based mainly on analysis of ESES 1995, is that wage inequalities appear to play an important incentive role, especially within firms, and that firms seek out the most effective incentive systems for their type of operations. The latter point in particular emerged from analysis of the British WERS panel data on payment systems. Nevertheless, there is evidence that inequality raises incentives up to a certain point, and that beyond that, higher levels of inequality within firms do not increase performance proportionately.

The effect of within-firm wage inequalities also depends on the type of human resource management policy, and it is possible that the positive effect on performance may be linked to the bureaucratic type of work system, generally associated with mass production, that is still widely used across the EU. More modern systems of flexible working and team work may well function better with more egalitarian pay structures. For example, the Epoc survey referred to in the main report shows that roughly one fifth of EU firms use team-based pay systems. Thus although adoption of new methods of work organisation has progressed, as in the US, they remain a minority practice.

The evidence on experimentation with incentive systems from Belfield and Marsden (2003) suggests that the best performance results are obtained when firms are able to experiment with pay systems and finally settle on those that provide the best fit with their work environment. An important question then is whether collective bargaining systems give firms enough freedom in this matter. At first sight, it might seem that single-employer bargaining, in which the employer agrees pay with the representatives of its own workforce should give the greatest scope for this. National and sectoral bargaining mean that individual employers often have to accept pay structures and systems that reflect the wishes of the majority of employers in their employer associations. British evidence of long-standing suggests that single employer bargaining does indeed give individual firms more flexibility, as shown by the greater variation in the pay levels reached under this arrangement. However, the comparative ESES evidence for other countries suggests a more complex picture. In Belgium and Italy, it was firms covered by national bargaining only that appeared to experience the greatest earnings variance. It is possible that this reflects levels of pay set in national agreements that are well below what some firms pay in practice. Alternatively, as suggested by the Italian team, single-employer bargaining outcomes may be coordinated by unions and employer organisations, hence the smaller earnings

variance associated with this type of agreement in these two countries. Thus recommending a winding down of corporatist bargaining arrangements in order to promote greater flexibility of pay levels and pay systems may not produce the results initially expected.

Judging the desirability of wage inequalities depends also on one's assumptions about the degree of competition in labour and other markets. If markets are competitive, there is reason to believe that outcomes reflect the mutual choices of firms and workers. However, if they are not, then there is more justification for public intervention. The work by the Irish, Spanish and Belgian teams on the intensity of low pay and on gender pay inequality is broadly consistent with a non-competitive view, at least for these categories. In the three countries with the greatest inequalities, there was also found a higher degree of segregation into low paid establishments indicative of the presence of barriers to job access. Here the authors continue the advocacy for public intervention to combat discrimination, and to ease the problems of low pay.

2. Methodological conclusions

Turning to conclusions of a methodological nature, it is widely recognised that the conduct of European labour market policy needs a good statistical basis. Eurostat and the NSIs have made great progress in recent decades building a European statistical system for internationally comparable pay and labour costs, but there is still a long way to go before we can be confident that we have the necessary degree of comparability among countries. The task ahead can be thought on two levels. First, there is the work by national statisticians to improve comparability. Second, there is the work of analysts, scientific and policy-oriented, who analyse the data, and in doing so uncover areas of inconsistency and non-comparability which can then be addressed by the national statisticians. Ideally, these two processes go hand in hand, with a dialogue between NSIs, researchers, and policy analysts and social partners.

Maintenance and extension of secure remote access to micro-data
The PiEP project has been an experiment in secure remote access to Eurostat micro-data. It has been remarkably successful, as outlined in the methodology section of this report. The best measure of this success is that Eurostat and number of NSIs are supporting its use for the 2002 ESES survey data, and possibly also for other data sets. The remote access system worked well, proving to be both practical for researchers, and secure for confidentiality. Perhaps even more important, there is now a much wider awareness among European researchers and policy analysts of the usefulness and accessibility of this data set. Given the great cost of carrying out the survey, both in terms of expenditure by the Commission and NSIs, and in terms of response burden on firms, this represents a great increase in value for money.

Confirmation of the generally good quality of ESES comparative data
Our study has been a vindication of the value of the ESES and the special efforts by Eurostat and the NSIs to collect comparable earnings statistics. ESES has never been tested as thoroughly by researchers in the past because it never attracted a great deal of research effort, partly because it remained in complex paper tables which are not easily amenable to modern statistical techniques. The work of our members looking at low pay and gender inequality benchmarked its results against those of other surveys, and showed its results to be generally of good quality.

New variables for measurement
The most important concerns the treatment of payment systems, bonuses, performance pay and such like, and how they relate to firms' human resource practices. When ESES was first run, in 1966, the chief concern of statisticians was simply to measure earnings levels and structures in the economies of the Six. National surveys were more rudimentary than now, and there was no easy way to judge for example whether labour costs were higher in France than in Italy or Germany. As mentioned earlier in this report, 'rate for the job' rules were widespread, and where performance incentives were used, they were very often connected with piecework. Piecework has declined greatly, but alternative methods of linking pay to performance have spread, particularly among white collar workers, and now in public services (eg. OECD 2005). As the Epoc survey cited earlier has shown, there have been substantial changes in work organisation, away from tayloristic patterns towards greater use of flexible working and team work, which have to be managed in different ways, with up to a third of workers covered by new work organisation systems in some countries.

It has been common in recent years to talk of a shift towards a 'performance culture' in the workplace, and away from one of command and control. There has also been a growing recognition that the 'wage' is more than a labour market price, determined by movements in labour supply and demand, and is increasingly used by firms to provide incentives within their organisations. The rapid growth of Personnel Economics in recent years also signals a growing interest among economists in the motivational policies of firms. Whereas it was once assumed that workers simply provided a given amount of labour service once hired, now there is widespread recognition that employees have a good deal of discretion over how hard and how creatively they work, and firms are keen to ensure their employees are motivated to work flexibly, and to give their best effort rather than whatever they need in order to avoid being disciplined. In the early days, the focus was on labour as a cost, and what needed to be paid in order to recruit and retain. Today, there is an increasing emphasis on how firms use their reward systems also to motivate their employees.

Without direct measures of the new kinds of pay systems to accompany changes in firms' reward strategies, our team has had to use the variance of earnings within establishments after controlling for factors such as education and skills in order to capture the effect of new types of reward systems. We made a strong assumption that greater residual variance was an indicator of firms' incentive policies. Although this was verified for the UK by data from the Workplace Employment Relations Survey (Belfield and Marsden, 2003), for the other countries it remained an untested assumption. Our results were consistent with those of other scholars cited in the report, but still the question remains.

Another example where improvements in measurement could be achieved concerns collective bargaining. The findings of the Italian, that single employer bargaining led to greater pay variance compared with national bargaining in some countries but not others suggests that greater thought needs to be given to how this variable is recorded in the survey.

Finally, one of the most useful variables, the ability to identify all the workers in the same establishment, which was present because of the way the data are collected in

some countries, proved to be one of the most valuable. On the basis of this, the team was able to compute within plant earnings dispersions, establishment workforce characteristics, and to make progress on the issues of low pay and gender inequality. In the latter cases, this enabled the researchers to conclude that women's employment is not just concentrated in certain industries, but more importantly, within such industries they are concentrated into low paid establishments. In the words of the researchers, there are 'women's establishments' as well as 'women's industries'.

Linking with other data sets
One of the key lessons of the Belgian team's experience has been the value added of being able to link earnings data from ESES with economic data on business performance from the Structure of Business Statistics. It was on this basis that the Belgian team could explore the effects of wage inequalities on productivity and on profits per employee. This was made possible in the Belgian case by the link at establishment level between the two data sets. Such linking of data sets increases the power of the data we have without adding to employers' response burden.

V. Dissemination and exploitation of results

The main strategy for dissemination of the project results has been by means of published papers and conference presentations. Several of the papers have either been published or are currently under review with major social science journals, including

Kyklos,
The Economic and Social Review
the International Journal of Manpower,
Socio-Economic Review
Brussels Economic Review
Reflets et Perspectives de la vie Économique
De Economist

And in various discussion paper series, for the PiEP project, the CEP Discussion Paper series, and the Quaderni dell'Istituto di Economia dell'Impresa e del Lavoro, Università Cattolica di Milano.

Papers have also been presented at the conferences of the Applied Econometrics Association, European Association of Labour Economists, the Society of Labor Economists, the Society for the Advancement of Socio-Economics, and the International Industrial Relations Association.

In addition, preliminary findings have been presented at a seminar organised by DGEmpl in April 2004, and at a mini-conference organised by the Université Libre de Bruxelles in January 2004 to which a number of researchers and policy experts from outside out team were invited.

We are working on an edited book based on the studies and on the final report.

Communications in International Conferences and Seminars

1. **"Wage Structure and Firm Productivity in Belgium"**
   (T. Lallemand and F. Rycx)
   - Invited paper, NBER Summer Institute Personnel Economics Workshop, Cambridge (USA), August 5-6, 2004.

2. **"Inter-Industry Wage Differentials and the Gender Wage Gap: Evidence from European Countries"**
   (B. Gannon, R. Plasman, F. Rycx, and I. Tojerow)
   - Accepted for presentation at the 2nd European Association of Labour Economists/Society of Labor Economists (EALE/SOLE) World Conference, San Francisco (USA), June 2-5, 2005.
   - 88th Conference of the Applied Econometrics Association (AEA) on the Econometrics of Labour Demand, Mons (Belgium), October 7-8, 2004.
   - 5th Day for Belgian Labour Economists, Université de Liège, May 17, 2004.
   - 9th Annual Meeting of the Society of Labor Economists, San Antonio (USA), April 30 - May 1, 2004.

3. **"What Is the Impact of Company Collective Bargaining on the Dispersion of Earnings? Evidence from 4 Corporatist Countries"**
   (M. Rusinek, R. Plasman, and F. Rycx)
   - Accepted for presentation at the 2nd European Association of Labour Economists/Society of Labor Economists (EALE/SOLE) World Conference, San Francisco (USA), June 2-5, 2005.

4. **"Rent-sharing and the Gender Wage Gap in Belgium"**
   (R. Plasman, F. Rycx, and I. Tojerow)
   - Invited paper, Internal Seminar, National Bank of Belgium, Brussels (Belgium), October 21, 2004.
   - 5th Day for Belgian Labour Economists, Université de Liège, May 17, 2004.
   - Pay Inequality and Economic Performance Meeting, Université Libre de Bruxelles, January 15-16, 2004.
   - 15th Annual Conference of the European Association of Labour Economists (EALE), University Pablo de Olavide, Seville (Spain), September 18-21, 2003.
   - Pay Inequality and Economic Performance Meeting, Centre for Economic Performance, London School of Economics, London, June 3, 2002.
   - 79th Conference of the Applied Econometrics Association (AEA), Brussels (Belgium), May 28-29, 2002.

5. **"Intra-firm Wage Dispersion and Firm Productivity in Belgium"**
   (T. Lallemand, R. Plasman, and F. Rycx)
   - Invited paper, Internal Seminar, National Bank of Belgium, Brussels (Belgium), October 21, 2004.
   - 88th Conference of the Applied Econometrics Association (AEA) on the Econometrics of Labour Demand, Mons (Belgium), October 7-8, 2004.
   - 9th Annual Meeting of the Society of Labor Economists, San Antonio (USA), April 30 - May 1, 2004.

- Pay Inequality and Economic Performance Meeting, Université Libre de Bruxelles, January 15-16, 2004.
- Pay Inequality and Economic Performance Meeting, Centre for Economic Performance, London School of Economics, London, July 2-3, 2003.

6. **"The Wage Penalty Induced by Part-Time Work. Evidence from European Countries"**
   (S. O'Dorchai, R. Plasman, and F. Rycx)
   - 88th Conference of the Applied Econometrics Association (AEA) on the Econometrics of Labour Demand, Mons (Belgium), October 7-8, 2004.

7. **"Revisiting the Gender Wage Gap in an International Comparison"**
   (S. Sissoko and R. Plasman)
   - 88th Conference of the Applied Econometrics Association (AEA) on the Econometrics of Labour Demand, Mons (Belgium), October 7-8, 2004.
   - 7th IZA Summer School in Labor Economics, Bonn (Germany), April 19-25, 2004.

8. **"Establishment Size and Wage Level in Six European Countries: Evidence from Matched Employer-Employee Data"**
   (T. Lallemand, R. Plasman, and F. Rycx)
   - 88th Conference of the Applied Econometrics Association (AEA) on the Econometrics of Labour Demand, Mons (Belgium), October 7-8, 2004.

9. **"Union Wage Gaps in Multilevel Industrial Relations Systems"**
   (R. Plasman, M. Rusinek, and F. Rycx)
   - 88th Conference of the Applied Econometrics Association (AEA) on the Econometrics of Labour Demand, Mons (Belgium), October 7-8, 2004.
   - 9th Annual Meeting of the Society of Labor Economists, San Antonio (USA), April 30 - May 1, 2004.
   - 22nd Annual International Labour Process Conference, Amsterdam (Netherlands), 5 - 7 April 2004.

10. **"Inter-Industry Wage Differentials and the Gender Wage Gap in Belgium"**
    (I. Tojerow and F. Rycx)
    - 8th Annual Meeting of the Society of Labor Economists, Toronto (Canada), September 26-27, 2003.
    - IAFFE Conference (International Association for Feminist Economics), Barbados, June 27-29, 2003.

11. **"The Evolution of the Gender Wage Gap in the European Unions Between 1994 and 1998"**
    (A. Plasman, R. Plasman, M. Rusinek, and F. Rycx)
    - 8th Annual Meeting of the Society of Labor Economists, Toronto (Canada), September 26-27, 2003.
    - 79th Conference of the Applied Econometrics Association (AEA), Brussels (Belgium), May 28 - 29, 2002.

12. **"Inter-Industry Wage Differentials and the Bargaining Regime in a Corporatist Country: Belgium"**
    (F. Rycx)
    - 57th European Meeting of the Econometric Society, Venice (Italy), August 25 - 28, 2002.
    - 79th Conference of the Applied Econometrics Association (AEA), Brussels (Belgium), May 28-29, 2002.
    - 13th Annual Conference of the European Association of Labour Economists (EALE), University of Jyväskylä, Finland, September 13-16, 2001
    - Day for Belgian Labour Economists, PAI/UIAP Workshop, ECARES, Université Libre de Bruxelles, June 13, 2001.
    - Pay Inequality and Economic Performance Meeting, Centre for Economic Performance, London School of Economics, London, May 10-11, 2001.

VI. Acknowledgements and References

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VII. Annex 1. Publications by national teams

1.   Belgian team publications from PiEP

Lallemand T., Plasman R. and Rycx F. (2004) "Intra-firm Wage Dispersion and Firm Performance: Evidence from Linked Employer-employee Data", *Kyklos* Vol. 57, Fasc. 4, p. 533-558.

Lallemand, Thierry; Plasman, Robert and Rycx, François (2005) The establishment-size wage premium: evidence from European countries. PiEP Working Paper.

Lallemand T., Plasman R. and Rycx F. (forthcoming) "Intra-firm Wage Dispersion and Firm Performance: A Review and Empirical Tests on Belgian Data", *Brussels Economic Review*.

Lallemand T., Plasman R. and Rycx F. (forthcoming) "La dispersion salariale au sein d'une firme influence-t-elle sa performance ? ", *Reflets et Perspectives de la vie Économique*.

Lallemand T., Plasman R. and Rycx F. (2005 a, forthcoming) "Why Do Large Firms Pay Higher Wages ? Evidence from Matched Worker-Firm Data", *International Journal of Manpower*.

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2. French team

Hori, Haruhiko, and Nohara, Hiroatsu (2002) Factor analysis of the male-female wage differential gap between Japan and France.

Koubi, Abdelmalik and Roux, Sébastien (2004) Inégalités de rémunération et performance des entreprises: le rôle de la coopération entre les salaries.

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Nohara, Hiroatsu (2004) An international comparison of labour markets for engineers and scientists: strategic behaviours and collective capacity for innovation. PiEP working paper, April 2004.

3. German team

Frick, Bernd, Prinz, Joachim and Gesine, Stephan (2004) Firm-specific Tenure Effects on Wages in Europe.

4. Irish team

Barrett, Alan, Callan, Tim, Doris, Aedín, and Russell, Helen (2004) Closing the Gap: Male-Female Wage Differentials in Ireland.

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Simon, Hipólito and Russell, Helen (2004) Firms and the Gender Pay Gap: A Cross-National Comparison: Belgium Denmark, Ireland, Italy, Spain and the UK

5.   Italian team papers and publications

Checchi, Daniele, and Pagani, Laura (2004) The effects of unions on wage inequality: The Italian case in the nineties. PiEP working paper.

Dell'Aringa, Carlo, Ghinetti, Paolo and Lucifora, Claudio (2002) Work Organisation, Employment Relations and Pay Setting: Evidence for Ten European Countries.

Dell'Aringa, Carlo, Lucifora, Claudio, and Orlando, Nicola (2003) Bargaining Structure and Intra-Establishment Pay Inequality in Italy: Evidence from Matched Employer-Employee Data. PiEP Working Paper.

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Lucifora, Claudio, McKnight, Abigail, and Salverda, Wiemer (2005) Low-Wage Employment in Europe: A Review of the Evidence. Forthcoming in the *Socio-Economic Review*, 3: 2.

6.   Spanish team papers

Fernández, Melchor; Meixide, Alberto; Nolan, Brian; and Simon, Hipólito (2004) Low Wage Employment in Europe. PiEP Working Paper.

Simon, Hipólito (2004) ¿Por qué son los salarios relativos de las mujeres bajos en España? Un análisis internacional de las diferencias salariales por razón de sexo con la descomposición Juhn-Murphy-Pierce*

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Simon, Hipolito J. (2004) Inter-Industry Wage Differentials and Collective Bargaining: What Can We Learn from Spain? PiEP Working paper.

7.   UK team

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A list including the name of publications, conference presentations and any other output from the project should be attached to the report. A list of the agreed deliverables should also be supplied and the status (completed, partially completed, abandoned) should be mentioned. Any other complementary information should be provided as separate annexes; these could include, for example, more detailed reports of the results, country reports, etc.

VIII. Annexe 2 Agreed deliverables and their status

Appendix Table 1 displays the summary of wrok packages and deliverables, showing which ones have been achieved, marked 'done'.

Appendix Table 1. Detailed project work plan and timetable

Work Packages, duration and objectives.	Development of the Data Interface	Research work	Resource allocation and researchers involved	Output
Work Package 1 (months 1-6) Objective: Agreement of a detailed plan for earnings data access and linking with data on performance, bargaining structures, training, and personnel policies.	1. Development of access agreements with NSIs to national earnings data sets; 2. Agreement on basic framework for micro-data set with NSIs. 3. Setting up directory system, and security structures. 4. Preparations for the merged multi-country earnings data set. 5. Evaluation of web technology for project management and initial researcher-data interface;	Evaluation of EU and national data sources on institutional arrangements and employer personnel policies (most likely sources listed in Table 4 of the original proposal). The most readily comparable will be selected in WP1, and others decided in WP2. Researchers finalise their chosen research themes and methods of joint work. Work starts on research themes at national level, and using comparative data from NewCronos data base. Work on SBS and national data sets for indicators of economic performance and assess their quality;	First meeting of the full Steering Group of NSIs and researchers. Research Assistants of national research teams may be seconded to NSIs for a limited period to facilitate data preparation. Purchase of major items of IT equipment and software required.	First report on a) the economic performance indicators of the SBS and how far they can be supplemented from national sources; DONE b) detailed proposals for institutional and personnel policy analysis for the next work packages; DONE c) first analysis of research themes based on NewCronos and national data; DONE

Work Package 2: (months 7-12) Objective: Establishment of the common European earnings data set and linking with economic performance data. First analysis of research hypotheses using this data set.	6. Setting up central server, mounting individual country data on server according to agreements with NSIs. To be completed in WP3. 7. Linking all NSI and National research centres to central server. 8. Assessing system for convenience of use and levels of security - on going. Encourage researchers to communicate problems in interface with data manager - constant evaluation and improvement of systems.	National research teams work on building up national data sets to supplement data available at the European level. For example, in most countries this will involve obtaining supplementary data on workplace characteristics from other national data sources. This may spread over WP 2 and 3. Analysis of the research hypotheses begins using the national micro-data sets.	Second meeting of full Steering Group and further close work between research teams and NSIs. Research Assistants of national research teams may be seconded to NSIs for a limited period to facilitate data preparation.	Second report: a) A set of initial comparative studies using the ESES and performance data for each research theme. Presentation at a seminar with invited specialists from research and NSIs and the EC. This work is also to serve as a check on the first analysis of micro-data. DONE b) an analysis of the literature relevant to the themes covered by the project. This will be selective and focus specifically on the issues we intend to cover. DONE
Work Package 3: (months 13-18) Objective: Completion of national micro-data sets, merging them to create a multi-country one, and first major work on the research hypotheses.	Continuation of §6 for some countries 9. Permission to access other data sets to link with ESES. 10. Mounting other national data sets on server. Security issues. 11. Cleaning and merging other national data sets.	Continuation of work integrating institutional and personnel policy data into the national data sets. **This should be complete by the end of WP 3.** Continuation of analysis of research hypotheses using national micro-data sets. First work on European micro-data set of ESES & testing of system by users.	Third meeting of the full Steering Group to discuss outcomes of researcher-NSI collaboration, and working of data set.	Third report to contain: First comparative analyses of micro-data using the interface. DONE Initial analyses of user interface and agreement on final design of data-interface. DONE Preliminary recommendations to Eurostat on future organisation of ESES and procedures for future micro-data access. DONE

Work Package 4: (months 19-24) Objective: Preparation of research papers for the first conference (possible venue: European Commission).	Continuation of §10 for some countries. 12. Ongoing help for researchers in such areas as conferencing/ communication problems, data incompatibility, data inaccuracy, security and access issues.	Fuller research linking with material from other data sets. Preparation of papers for the conference. These should relate to the research hypotheses and methodological issues.	Fourth meeting of the full Steering Group, possibly merged with proposed conference on micro-data results.	Conference on first micro-data results, open to outside researchers and NSIs. To diffuse research results and encourage wider use of the interface. DONE Fourth report to include analysis of methodological issues and summary of conference research papers. DONE
Work Package 5: (months 25-30) Objective: Preparation of book chapters and evaluation of data access system.	13. Overall evaluation of interface & preparation of wider access to other researchers	Continued intensive econometric work on the research hypotheses, and preparation of first drafts of chapters of book.	Fifth meeting of the Steering Group.	First drafts of chapters of the collective book and final report. WORKING PAPERS DONE, BOOK IN PREPARATION
Work Package 6: (months 31-36) Objective: Completion of draft chapters for publication. Completion of work on interface for wider research use.	14. Produce a web interface for the ESES, whereby accurate useful data can be accessed along with relevant documentation. This could eventually be a valuable resource for the research community.	Preparation of final report, and analysis of the six research hypotheses as chapters in a collective book.	Sixth meeting of the Steering Group.	Conference on the project final results. This will include the draft chapters of the collective book on the project. DONE AT BRUSSELS CONFERENCE OF Jan 2004, and DGEmpl seminar April 2004, and in April 2005. Submission of the book to a first class English language academic publisher, eg. Oxford University Press, or MIT Press to ensure wide diffusion. Development of (i) a means of accessing the ESES data by other researchers; (ii) a large European data set adding many variables to the original ESES and which could be used for further policy and theoretical research REPORT DONE, BOOK BASED ON WORKING PAPERS - IN PROGRESS.

Appendix Table 2. Contexts, type of pay inequality and economic performance *(taken from original project proposal)*

Market and Management Contexts	*Type of variable boosting/depressing economic performance*	*Illutrations of PiEP Papers dealing with these issues*
Market organisation contexts:		
Competitive labour and product markets	Investments in skills, and job mobility	Dell'Aringa, Carlo and Pagani, Laura, (2003) Regional Wage Floor Effects. Lallemand T., Plasman R. and Rycx F. (2004) "Intra-firm Wage Dispersion and Firm Performance: Evidence from Linked Employer-employee Data", *Kyklos* Vol. 57, Fasc. 4, p. 533-558.
Non-competitive, decentralised market power	Lack of product market competition leads to bargaining of big pay differences between firms and industries. (Eg. Gender pay differences, also if there is monopsony in labour markets).	Barrett, Alan, Callan, Tim, Doris, Aedín, and Russell, Helen (2004) Closing the Gap: Male-Female Wage Differentials in Ireland.. Fernández, Melchor; Meixide, Alberto; Nolan, Brian; and Simon, Hipólito (2004) Low Wage Employment in Europe. PiEP Working Paper. Simon, Hipólito and Russell, Helen (2004) Firms and the Gender Pay Gap: A Cross-National Comparison: Belgium Denmark, Ireland, Italy, Spain and the UK Lucifora, Claudio, McKnight, Abigail, and Salverda, Wiemer (2005) Low-Wage Employment in Europe: A Review of the Evidence. Forthcoming in the *Socio-Economic Review*, 3: 2. Rycx F. and Tojerow I. (2004) "Rent Sharing and the Gender Wage Gap in Belgium", *International Journal of Manpower*, Vol. 25, No. 3/4, p. 279-299. Hori, Haruhiko, and Nohara, Hiroatsu (2002) Factor analysis of the male-female wage differential gap between Japan and France

Non-competitive 'corporatist' bargaining;	Bargaining structure overrides potential gains from employers' monopoly power; reduces 'rent-sharing' behaviour.	Rycx F. (2003) "Industry Wage Differentials and the Bargaining Regime in a Corporatist Country", *International Journal of Manpower*, Vol. 24, No. 4, p. 347-66. Dell'Aringa, Carlo, Lucifora, Claudio, Orlando, Nicola and Cottini, Elena (2004) Bargaining structure and intra-establishment pay inequality in four European countries: evidence from matched employer-employee data. PiEP Working Paper. Simon, Hipolito J. (2004) Inter-Industry Wage Differentials and Collective Bargaining: What Can We Learn from Spain? PiEP Working paper.
'Personnel management' contexts:		
Different patterns of employee management;	Pay systems tailor incentives to the type of performance firms require.	Dell'Aringa, Carlo, Ghinetti, Paolo and Lucifora, Claudio (2002) Work Organisation, Employment Relations and Pay Setting: Evidence for Ten European Countries. Belfield, Richard, and Marsden, David W. (2003) Performance Pay, Monitoring Environments, and Establishment Performance. *International Journal of Manpower*, 24: 4 Belfield, Richard and Marsden David (2004) Intra-establishment Pay Inequality and Performance Effects in Comparative Perspective. PiEP working paper. Frick, Bernd, Prinz, Joachim and Gesine, Stephan (2004) Firm-specific Tenure Effects on Wages in Europe. Lallemand T., Plasman R. and Rycx F. (forthcoming) Wage Structure and Firm Productivity in Belgium. Paper presented at the NBER Empirical Personnel Economics Workshop, Cambridge (Mass.), August 5-6, 2004. Forthcoming in: Lazear E. et K. Shaw (eds.), *Empirical Personnel Economics*.

| Different kinds of workplace training systems; | Skills establish key pay contours across occupational markets. In firm internal labour markets, rewards are tied to internal upgrading and promotion, often proxied by length of service or age. | Marsden, David, Nohara, Hiroatsu and Ryan, Paul (2004) Youth employment and pay structures in the European Union.

Nohara, Hiroatsu (2004) An international comparison of labour markets for engineers and scientists: strategic behaviours and collective capacity for innovation. PiEP working paper, April 2004.
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| 'Cooperative' and 'adversarial' workplace industrial relations. | Cooperative workplace relations tend to compress inequalities and adversarial relations tend to increase differences between bargaining groups. | Lallemand T., Plasman R. and Rycx F. (forthcoming) "Intra-firm Wage Dispersion and Firm Performance: A Review and Empirical Tests on Belgian Data", *Brussels Economic Review*.

Dell'Aringa, Carlo, Lucifora, Claudio, Orlando, Nicola and Cottini, Elena (2004) Bargaining structure and intra-establishment pay inequality in four European countries: evidence from matched employer-employee data. PiEP Working Paper. |

IX. List of members of the PiEP research team.

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Lucifora	Claudio	Università Cattolica di Milano
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