WAGE DISPERSION AND LABOUR MARKET INSTITUTIONS: A CROSS COUNTRY STUDY

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ABSTRACT

This paper examines the issue of wage flexibility in an international context using sectoral wage dispersion data from fourteen OECD countries. An emphasis is placed on the evaluation of Australian institutions and data. We draw comparisons between a measure of wage dispersion and the degree of centralisation of a country's wage setting institution to determine whether decentralised wage setting institutions are necessarily associated with more flexible wages. Inter-country comparisons are drawn among the levels of wage dispersion over time, and the relationship between wages and demand conditions for labour, including productivity and relative prices, are examined. We observe that no strong systematic relationship exists between wage dispersion and the degree of centralisation of labour market institutions. We also find that relative to most other OECD countries for which data are available, Australian wages were strongly correlated both with labour demand conditions and productivity growth over the period 1975-90.

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The present trend of labour market reform towards an enterprise focus and away from occupational 'awards' is a belated recognition of the disaster that the Australian industrial relations system has inflicted on us (Blandy, 1993, p. 10).

...it should be appreciated that the push for labour flexibility is part of an economically and socially conservative agenda that includes an attack on trade union power and a reduction in the working conditions that are currently enshrined in Australia's industrial award system (Burgess and McDonald, 1989, p. 29).

Australian discussion of wage determination is parochial. There is an almost hypnotic fascination with the arbitral system and its trappings, with the result that appropriate perspective on wage fixing and economic problems is lost... this navel-gazing leads to the perpetuation of too many myths... (Withers, 1986, p. 243).

1.   INTRODUCTION

As the first two quotes above demonstrate, labour market reform - perhaps more than any other issue of Australian economic policy - generates much passionate rhetoric. The current labour market reform agenda in Australia has focused on issues concerning labour market flexibility, typically a poorly defined concept. On the basis that centralised wage setting institutions are too "rigid", policies have evolved to permit wage determination at the enterprise or firm level. The changes have been based on the belief that centralised systems do not permit sufficient relative wage flexibility. The resulting distorted price signals in the labour market contribute to supply and demand mismatches, impeding productivity growth and reducing the potential for improved economic prosperity in general.

In order to illustrate and analyse these issues, this paper examines data from fourteen OECD countries which encompass a wide spectrum of wage setting

institutions. We present quantitative measures of labour market flexibility based on wage dispersion across sectors, and determine whether a high degree of wage dispersion is necessarily linked with decentralised wage setting institutions. Given that a flexible labour market should be characterised by wages which adjust to conditions within the market, we test if such flexible relationships exist. The relationship among the deviation of sectoral wages from the mean wage and similarly, deviations of productivity, prices and growth across countries over a similar time horizon is estimated to determine if the expected positive relationship exists between these variables. The linkage between sectoral deviations of wages and employment growth is also analysed. In addition, we examine the relationships between our measure of flexibility and various indicators of macroeconomic performance.

We do not find a strong systematic relationship between our measure of wage dispersion and the degree of centralisation of wage setting institutions. Low wage dispersion can be associated with centralised wage setting institutions, but is not necessarily so. Insofar as we can compare absolute measures of wage dispersion across countries, we observe that Australia recorded a relatively high degree of dispersion in the 1980s compared to other countries despite having a centralised wage setting system. As expected, we generally find positive relationships among the deviations of wages across sectors and the deviations of sectoral productivity levels and prices. Relative to most other OECD countries examined, deviations of Australian wages are found be strongly related to deviations in productivity and prices across sectors. This suggests that, contrary to much popular perception, Australia's wage setting system has been flexible by international standards, at least according to this method of analysis.

The rest of the paper is organised as follows. In Section 2 we discuss the institutional background to the current policy debate in Australia. The existing literature relating labour market institutions and economic performance is reviewed in Section 3. In Section 4 we present a model which demonstrates the cost of relative wage rigidity, while in Section 5 we derive a structural model relating sectoral wages, productivity and prices. Our measures of wage dispersion are presented in Section 6 along with the results from our tests of labour market flexibility across countries. Section 7 concludes.

2. AUSTRALIAN LABOUR MARKET INSTITUTIONS: AN OVERVIEW

The Australian system of wage determination is unique among the systems found in industrial countries. Historically, it has tended to be highly centralised and has been characterised as a complex and varying mixture of compulsory arbitration and collective bargaining. Since the early years of this century, federal and state arbitral tribunals, which were established as independent judicial authorities under parliamentary acts, have played a key role in wage determination.

After a period of evolution away from a formal centralised wage setting system which started in the late 1960s, centralisation was reaffirmed in 1983 following an agreement between the Government and the Australian Council of Trade Unions (ACTU). Under the Prices and Incomes Accord, which came into effect in September 1983, unions agreed that they would make no wage claims beyond those which were agreed to under the Award System. Under the first version of the Accord, wages were indexed to a measure of the cost of living with the implication that there was little scope for relative wage changes.

The Accord endured several episodes of economic turmoil in the 1980s; this may have been in part because it was relatively more subtle than the automatic indexation systems which had been adopted by other countries. For example, the first renegotiation of the Accord took place in September 1985 in the context of a sharp fall in the terms of trade and the consequent depreciation of the Australian dollar. The parties agreed to discount the effects of the fall in the exchange rate on the CPI in order to preserve a real depreciation, and so reduce the negative effects of the fall in the terms of trade on employment.

Changes made to the Accord in 1987 increased the scope for adjustment of relative wages. It was agreed that the wage indexation process should be abandoned and that, implicitly, relative wages would be permitted more scope for change. A two-tier system of wage fixation was introduced. The first tier distributed a flat wage increase to all workers, with emphasis on low wage earners and nation-wide adjustments. The second tier required parties to enter primarily enterprise level negotiations to try to offset the cost of pay increases to employers by making the enterprise more competitive through restructuring and other efficiency enhancing changes.

In August 1988, the two-tier system was modified to give a prominent role to the Structural Efficiency Principle. This change formally linked part of the two-stage wage increases to the willingness of unions to cooperate in implementing measures to improve productivity. An emphasis was placed on strategies which would enhance microeconomic efficiency and reduce the problem of restrictive work practices.[1]

The main change to the institutional structure of wage fixing was the introduction of the Industrial Relations Act (1988), which was designed to provide a more effective legislative framework for award restructuring, workplace reform, and settlement of industrial disputes. The Industrial Relations Act is seen as having formally laid the foundations for more decentralised wage setting.

Proceedings of the 1990-91 National Wage Case revealed a broad consensus among employers and unions on the need to facilitate efficiency at the enterprise level. There was, however, strong reluctance to accept this policy direction on the part of the Industrial Relations Commission (the federal quasi-judicial body which arbitrates national wage increases). After initially rejecting the change in policy, the Commission formally accepted enterprise bargaining and, since October 1991, enterprise bargaining has been in place officially. In practice, the wage bargaining system has not changed profoundly. While the proportion of wage and salary earners covered by enterprise agreements has increased to about one fifth of total earners during the first half of 1994 from about one tenth during the same period a year earlier, a large proportion of the enterprise agreements were determined at the industry level (for example negotiations took place at the Commonwealth government and the metal trades industry levels). This has raised questions about the actual extent of the change in the wage bargaining system.

As it now exists, the Australian wage bargaining system is a hybrid of centralised and decentralised systems. While the opportunity for enterprise bargaining exists, the centralised wage setting infrastructure remains in place.

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[1] These included policies to help encourage skill-related career paths, eliminate impediments to multi-skilling and broaden the range of tasks that a worker might be required to perform.

3.   LITERATURE SURVEY

Much work has been done to evaluate the impact of labour market institutions on economic performance across countries. In a seminal work by Bruno and Sachs (1984) an index of the degree of centralisation of wage bargaining or 'corporatism' was constructed which produced a ranking of various countries.[2] Bruno and Sachs found that more corporatist countries (essentially the small non-EC countries of Europe such as Austria and Sweden) performed better in response to the first oil shock. In particular, it was concluded that in countries with near-universal union coverage and highly centralised negotiations, wages were kept closer to market-clearing levels than in more decentralised systems. This conclusion generated controversy and stimulated research by others in the area.

Calmfors and Driffill (1988) defined centralisation as the extent of inter-union and inter-employer cooperation in wage bargaining with the other side. They examined various measures of economic performance and concluded that economic performance was better in those countries which had either low or high levels of centralisation. Countries with moderate degrees of centralisation fared the worst in terms of performance. The reasoning behind this conclusion was that large trade unions inherently recognise their market power and take into account the effect wage increases have on inflation and unemployment. Conversely, unions operating at the individual firm or plant level have limited market power and competitive forces are seen to restrain wages. In intermediate cases where unions exert some market power but ignore the macroeconomic implications of their actions, relatively poor macroeconomic outcomes are observed. The result was a hump-shaped relationship which was related to work done by Olson (1982). Olson's idea was that organised interests may be most harmful when they are strong enough to cause major disruptions but not sufficiently encompassing to bear a significant fraction of the costs to society of their actions taken in their own interest.

Soskice (1990) challenged the conclusions of Calmfors and Driffill on the basis that key countries were wrongly classified.   Using an alternative measure of centralisation -- the effective degree of coordination -- the Calmfors and Driffill

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[2] Following work by Crouch (1985), Bruno and Sachs constructed an index based on the degree of union centralisation, the extent of shop-floor union power, employer coordination, and the presence of works councils (associations which represent non-unionised labourers in a unionised shop).

result collapsed in a sample of the countries selected. Soskice's approach measured the level at which coordination actually occurred as opposed to the formal location of bargaining. Soskice assigned numerical values to the degrees of economy-wide coordination and the strength of unions at a local (plant) level. Unemployment rates were regressed on these two variables. Soskice concluded that wage bargaining systems with a high degree of coordination are superior to more decentralised systems.

Freeman (1988) did not attempt to construct an index of corporatism given the inherent subjectivity of such an exercise. Instead, he used an index which included dispersion of industry earnings and union density,[3] arguing that high wage dispersion reflects decentralisation. Using this method, he found that both high and low wage dispersion were associated with stronger growth of employment relative to middle ranking levels of dispersion.

A similar pattern was found by Dowrick (1993) using total factor productivity as a measure of performance. An examination of OECD data from 18 different countries over the period 1960 through 1990 revealed a weak inverted hump-shaped relationship between the degree of centralisation and total factor productivity. That is, fully decentralised and fully centralised wage setting systems performed better in terms of productivity growth than partially centralised systems. The relationship, however, was found to be asymmetric, with the performance of fully decentralised systems somewhat better than fully centralised systems.

The major focus of these papers is on macroeconomic performance and the sensitivity of the wage bargaining system thereon. In a 1986 OECD study on flexibility in the labour market, an analysis of microeconomic aspects was presented with reference to different wage setting institutions. Using sectoral data from six OECD countries which encompassed a reasonably wide variety of institutional arrangements concerning labour, a simple model was tested to assess the sensitivity of changes of nominal wages to changes in nominal productivity. A statistically significant relationship was found between the two variables in the United States, Japan and Sweden. As the authors expected, Swedish wages were less responsive than those of the US and Japan to changes in productivity. The elasticity of sectoral wage changes with respect to sectoral value productivity changes was found to be

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[3]   Union density was defined to be the proportion of the workforce belonging to unions.

0.26 in the United States over the period 1958 to 1980, 0.21 in Japan over the period 1970 to 1979 and in Sweden (over the period 1964 to 1983) the elasticity was estimated to be 0.03. The OECD concluded that there was a relationship between changes in wages and productivity in countries with very different collective bargaining arrangements, with elasticities appearing to be higher in countries with more decentralised wage-setting mechanisms and collective bargaining. The consistency of this conclusion is contingent on the interpretation that Japan has a decentralised system.

A recent paper by Calmfors (1993) surveyed the theoretical arguments relating centralisation of wage bargaining systems to macroeconomic performance in a broader manner than his earlier work. The theoretical impact of centralisation on the average wage level, on relative wages, on hiring and investment decisions of firms and on employee effort were among the issues considered. Calmfors concluded that, on the basis of purely theoretical arguments, the diversity of the impact of the various factors renders it difficult to arrive at unambiguous policy conclusions concerning the degree of centralisation of wage bargaining systems. This policy conclusion is consistent with earlier empirical work carried out by Withers, Pitman and Whittingham (1986) who argued that there is not necessarily a relationship between the wage determination system and the degree to which change in relative wages reflect change in labour market conditions.

4. THE COSTS OF RELATIVE WAGE RIGIDITY

Although the cost of relative wage rigidity has been asserted many times in the Australian literature, there has been surprisingly little attempt to demonstrate this cost theoretically (or empirically).[4] In this section we present a simple diagrammatic analysis which illustrates the costs of relative wage rigidity. There are both welfare costs and losses in aggregate employment as well as a transfer of surplus from workers to firms.

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[4] Keating (1983) addressed this issue using Australian data over the period 1948/49 through 1979/80. Using a simple supply and demand model he concluded that notwithstanding Australia's highly centralised system of wage determination, wages have been permitted to move "in generally the right direction" over the period.

We assume that there are two sectors in the economy, services and manufacturing, with labour demand functions D and D' respectively, as shown in Figure 1. The labour supply curve facing each industry is labelled S. Equilibrium in services is given by (L_1, W_1) and in manufacturing by (L_2, W_2). These sectors are segmented so that labour cannot flow from the low to the high wage sector. Consumer surplus (the surplus of firms who demand labour) and producer surplus (the surplus of workers supplying the labour) in the services sector are therefore given by:
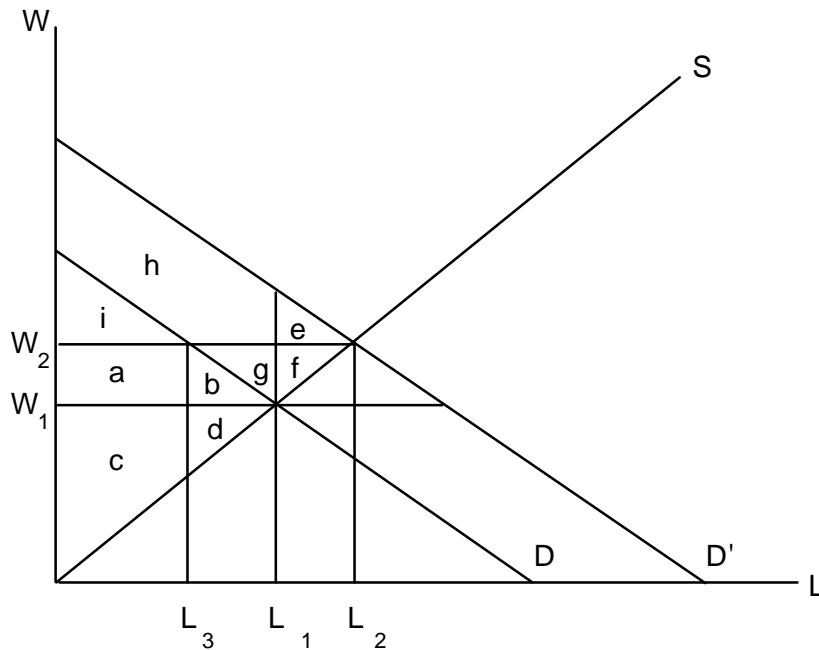
$$CS_{SER} = a + b + i \tag{1}$$

$$PS_{SER} = c + d \tag{2}$$

and similarly for manufacturing:

$$CS_{MAN} = e + h + i \tag{3}$$

$$PS_{MAN} = a + b + c + d + f + g. \tag{4}$$

Figure 1: The Welfare Costs of Relative Wage Rigidity

Suppose that the services demand curve shifts out to D' and the manufacturing demand curve shifts in to D with wages adjusting to restore equilibrium. Equilibrium in services is now given by (L_2, W_2) and in manufacturing by (L_1, W_1). By assumption, this equilibrium is established by labour supply responses within the two segmented labour markets, rather than between them. The change in consumer surplus in each sector is given by:

$$\Delta CS_{SER} = i + e + h - (i + a + b) \tag{5}$$

$$\Delta CS_{MAN} = i + a + b - (i + e + h) \tag{6}$$

while the changes in producer surplus are given by:

$$\Delta PS_{SER} = a + b + f + g \tag{7}$$

$$\Delta PS_{MAN} = -(a + b + f + g). \tag{8}$$

The net change in consumer surplus accruing in services is in two parts: the gain on the marginal units of labour e, the gain on the inframarginal units h and the loss on the inframarginal units a+b. Whether this net change is positive or negative depends on the slopes of the curves and the size of the shift in the demand curve.

The net gain in producer surplus in services can also be broken into two parts: the gain to the inframarginal units $a+b+g$ and the gain to the newly employed marginal units f. This net gain is unambiguously positive.

The overall gain (sum of **DCS** and **DPS**) in services is also unambiguously positive, and is given by the area $e+f+g+h$. Additionally, there is a redistribution of welfare from firms to workers of $a+b$.

The gains and losses in the manufacturing sector are the mirror image of those in services, so that the net welfare gain to the economy is zero. There is however a transfer of welfare from the contracting sector (manufacturing) to the expanding sector (services) of $e+f+g+h$.

Suppose now that, in the face of these demand shifts, the wage in each sector does not change i.e. the wage is fixed at W_1 in services and at W_2 in manufacturing.

Assume that labour employed is the minimum of demand and supply at the prevailing wage (the usual assumption in disequilibrium models).

The wage and employment levels in services are given by (W_1, L_1), i.e. the pre-demand shift equilibrium, with

$$CS_{SER} = a + b + g + h + i \qquad (9)$$

$$PS_{SER} = c + d. \qquad (10)$$

Relative to the post-demand shift, flexible wage equilibrium analysed above:

$$\Delta CS_{SER} = a + b + g + h + i - (e + h + i) = a + b + g - e \qquad (11)$$

$$\Delta PS_{SER} = c + d - (a + b + c + d + f + g) = -(a + b + f + g) \qquad (12)$$

The effects of the rigidity on the welfare of firms in services is ambiguous. On the one hand, they gain $a+b+g$ by not having to pay a higher wage to the inframarginal labour units. On the other hand, they lose the surplus on the marginal units they would have gained had the wage been allowed to rise, and these units been employed. This amount is given by the area e.

The effects of this rigidity on the welfare of workers in services is unambiguously negative. The inframarginal units lose $a+b+g$, the extra wage payments they would have received if the wage had been allowed to rise, while the marginal units of labour which are now not employed lose an amount given by f.

Welfare in the services sector as a whole is down by an amount equal to $e+f$, and there is a transfer from workers to firms equal to $a+b+g$. Employees are worse off compared to the flexible wage equilibrium because there are fewer of them (L_1 rather than L_2), and they are paid less (W_1 rather than W_2).

In the manufacturing sector the wage and employment levels are given by (W_2, L_3), with

$$CS_{MAN} = i \tag{13}$$

$$PS_{MAN} = a + c. \tag{14}$$

Relative to the flexible wage equilibrium analysed above:

$$\Delta CS_{MAN} = i - (a + b + i) = -(a + b) \tag{15}$$

$$\Delta PS_{MAN} = a + c - (c + d) = a - d \tag{16}$$

The firms lose an amount a from having to pay their inframarginal units more than if the wage were allowed to fall, and an amount b, the surplus from the marginal units they would employ in a flexible labour market, but now do not. Employees gain the amount a (the inframarginal workers do not now take a pay cut), but lose the amount d, the surplus to the workers who would be employed if the wage were allowed to fall.

Welfare in the manufacturing sector as a whole is down by $b+d$, and there is a transfer from firms to workers equal to a.

For the whole economy the rigidity of each wage leads to:[5]

- an efficiency loss of *(b+d+e+f)*;

- a loss of employment of $(L_2\text{-}L_3)$; and

- a transfer of *(b+g)* from employees to firms.

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[5] We have no way of knowing whether these static losses are large in practice. It is possible that, were they to be estimated, the amounts would be surprisingly small, just as the static welfare losses from restrictions on international trade are also usually estimated to be small (Deardorff and Stern, 1986). However, if these distortions have dynamic effects i.e. affect the growth rate of national income and not just its level, then the cost of relative wage rigidity will probably be quite large, as has recently been found for the dynamic effects of trade restrictions.

5.   A MODEL OF WAGE FLEXIBILITY

Our analysis in this section is based on a model with n countries each with m sectors containing a large number of identical firms.   Output in each sector can be interpreted as being generated by a constant returns to scale, constant elasticity of substitution (CES) production function:

$$Y_{ij} = (a_{ij}L_{ij}^{r_{ij}} + (1-a_{ij})K_{ij}^{r_{ij}})^{1/r_{ij}}, \qquad -\infty \le r_{ij} \le 1 \qquad (17)$$

where $i=1...m$ refers to a sector in country $j=1...n$, $e_{ij}=1/(1-r_{ij})$ is the elasticity of substitution, and where the supplies of labour and capital in each sector are assumed to be fixed. As is well known, this production function encompasses the special case of $r_{ij}=0$, implying $e_{ij}=1$, i.e. the Cobb-Douglas production function, with the labour share of output equal to a_{ij}, which is independent of the amount of labour and capital employed in production. A Cobb-Douglas production function may be a useful approximation for the economy in aggregate. Carmichael and Dews (1987) found this to be the case for Australia. For individual sectors, however, this may not be the case.   The CES function may be a more appropriate choice using disaggregated data given its more generalised formulation.

Firms are assumed to maximise profits subject to the production function, leading to the first order condition that the real wage is equal to the marginal product of labour:

$$\frac{W_{ij}}{P_{ij}} = \frac{\P Y_{ij}}{\P L_{ij}} = (a_{ij}L_{ij}^{r_{ij}} + (1-a_{ij})K_{ij}^{r_{ij}})^{1/r_{ij}-1} a_{ij}L_{ij}^{r_{ij}-1} \qquad (18)$$

and thus the labour share of output in sector i, country j is given by

$$\frac{W_{ij}L_{ij}}{P_{ij}Y_{ij}} = a_{ij}\frac{L_{ij}^{r_{ij}}}{a_{ij}L_{ij}^{r_{ij}} + (1-a_{ij})K_{ij}^{r_{ij}}}. \qquad (19)$$

Taking logs and rearranging:

$$w_{ij} - \overline{p_j} = (p_{ij} - \overline{p_j}) + (1-r_{ij})(y_{ij}-l_{ij}) + \ln a_{ij} \qquad (20)$$

where variables in lower case are in logarithms, and where $\overline{p_j}$ is the price level in country j (e.g. the consumer price index).

Equation (20) is an equilibrium relationship between real wages, relative prices and labour productivity which has an interesting implication for the conduct of enterprise bargaining negotiations. It appears to be the case that, under current enterprise bargaining arrangements, the *sine qua non* of any real wage increases is demonstrated productivity improvements of equal size. Yet, from equation (20), it immediately follows that the percentage change to the profit-maximising competitive wage in a particular sector (or firm) is not in general equal to the percentage change in average labour productivity. Only in the special case of Cobb-Douglas production (r_{ij}=0) and no relative price changes (i.e. $p_{ij} - \overline{p_j}$ constant over time) will this be so.[6]

More generally, even with unchanged relative prices, the warranted change in the real wage (in the sense of being consistent with a competitive market outcome) will exceed the change in productivity when the elasticity of substitution between labour and capital is small, with the converse true when this elasticity is large. *Thus, a policy which seeks to impose real wage increases equal to increases in average labour productivity levels throughout the economy is not generally consistent with an efficient and competitive labour market, and may lead to distorted patterns of wages and employment, which is exactly the problem that enterprise bargaining is supposed to avoid.*[7]

This policy issue aside, one way that we could uncover the degree of wage flexibility in each country would be to regress the real wage $w_{ij} - \overline{p_j}$ on the relative price variable $p_{ij} - \overline{p_j}$ and the average level of labour productivity and test whether the coefficient on the former is one and on the latter is 1-r_{ij}. However, this is impractical as we do not know the true value of the r_{ij}'s, and cannot estimate them in the absence of reliable data on sectoral capital stocks.

As an alternative, we construct sectoral wage, productivity and relative price variables for each country and conduct correlation and simple regression analysis to

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[6] We assume that the share parameter, $ln\ a_{ij}$, does not change over time.

[7] This was pointed out many years ago by John Pitchford (1972) in a prescient analysis of Australian wages policy.

analyse the relationship among these variables. The variables are defined to be the relative deviations from their respective cross-sectoral means. The results from the correlation and regression analysis are compared across countries to determine which countries have the most responsive wage setting system.

In this model, the supplies of capital and labour are fixed in each sector. If we allow for factor mobility, the flexibility concept changes. In an economy with homogeneous workers and perfect labour mobility, workers would immediately move from one sector to another in response to wage differentials such that wage and productivity levels should, in effect, be equalised instantaneously across sectors. Wages would not appear to be responsive to productivity and prices, and the dispersion of wages across sectors would be zero. Alternatively, consider the case of some small degree of heterogeneous labour or costly mobility across sectors. Although wage and productivity deviations may be small compared to the fixed factor case, we would expect the relationship between wages and productivity to still be as strong if the market is sending the appropriate signals or is flexible. For example, in the case of a low (high) degree of mobility of labour, there would be a large (small) deviation of wages from mean and, correspondingly, one would expect the deviation of productivity from the mean to be large (small) as well. Provided factor mobility is not perfect, the relationship between wage and productivity deviations as measured by the correlation and regression coefficients should be unaffected by the degree of labour mobility. This follows from the fact that both coefficients are independent of scale.

6. EMPIRICAL ANALYSIS

This section presents two measures of relative wage flexibility and draws conclusions from a cross-country comparison of these measures. Comparisons are drawn between wage dispersion and the degree of centralisation of a country's wage setting institution as defined in the existing literature in order to determine if decentralisation necessarily implies labour market flexibility. We analyse the relationships among sectoral wages, productivity, prices and growth using correlation and simple regression computations and examine the link between wages and employment. The section is concluded with an analysis of wage dispersion and several macroeconomic performance indicators.

6.1   Measuring Flexibility

We have chosen two summary statistics to be our quantitative measures of labour market flexibility. The statistics chosen enable comparison across countries and currencies; that is, scale effects have been removed. They are the variance of the logs of wages and the coefficient of variation of wages (the ratio of the standard error to the sample mean). Data are taken from the OECD National Accounts database, with the choice of countries determined by the availability of sectoral data.

Wages are calculated as the ratio of compensation of employees to the number of employees in each sector. Both data sets reflect full and part-time workers. Compensation of employees data is a national accounting concept which includes all payments made to labour. In the case of Australia, for example, both award and over-award payments are included in this wage measure.

Dispersion measures are constructed for both nominal wages and real product wages (the ratio of nominal wages to sectoral product deflators) and are presented in Appendix 1. There are no substantive differences among the series for the purposes of our analysis. For simplicity we focus on only one measure - the coefficient of variation of nominal wages.

The OECD data are broken down into ten main industrial sectors, and are on an annual basis. In some countries, certain sector data are amalgamated to achieve consistency across wages, employment and output measures. While highly disaggregated data would be desirable in this type of analysis, none is available on an internationally comparable basis, and our data at least capture inter-industry wage dispersion among the major sectors. See Appendix 2 for details. Certain sectors are more important (larger) than others in individual countries, and should therefore have greater influence on wage dispersion measures. In our measures, each sector is weighted by its share of total employment in that country. These weights (a_{ij}) are fixed over the sample period, and are the average employment share over that period.[8] Each sector's wage (W_{ijt}) - is weighted and then summed to construct a weighted mean (WM_{jt}) for each country in each time period (year):

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[8] Due to the limited availability of data for each country, the measures are constructed over different sample periods in many cases (see Appendix 2).

$$WM_{jt} = \sum_{i=1}^{m} a_{ij} W_{ijt} \tag{21}$$

where $i=1...m$ again refers to the industrial sector (m equals 10 in most cases) in country $j=1...n$. Squared deviations from this mean are then weighted before summing to form the weighted variance (WV_{jt}):

$$WV_{jt} = \sum_{i=1}^{m} a_{ij} (W_{ijt} - WM_{jt})^2 \tag{22}$$

The coefficient of variation measure (CV_{jt}) of wage dispersion is then:

$$CV_{jt} = \sqrt{WV_{jt}} \Big/ WM_{jt} \tag{23}$$

The variance of the logs measure of wage dispersion is simply WV_{jt} from equation 22 where W_{ijt} has been replaced by the log of W_{ijt} (w_{ijt}) in equations 21 and 22. The removal of scale effects by dividing the standard deviation of wages by the mean level of wages can influence measured dispersion when large changes in the aggregate level of mean wages occur. For example if aggregate mean wages increase sharply in the absence of large increases in the deviations of industry wages from the mean, the coefficient of variation will fall sharply.

While each measure has been used previously in the literature on wage dispersion, neither is ideal in theory. Wage structures may change while wage dispersion, as measured by either statistic, remains fixed if, for example, high and low-wage sectors switch position. In practice this is not believed to be a problem. For example, Freeman (1988) found rank order to persist among sectoral wage relativities.

Another, more profound problem with the measures is that increases in wage differentials can occur independently of labour market flexibility. Without information on the underlying sector-specific demand and supply elasticities, the magnitude of changes in wage differentials expected of a flexible relative wage structure is difficult to predict. In other words, the optimal degree of wage dispersion depends on the dispersion of fundamentals, some of which are

unobserved. The degree of labour mobility may be one of these fundamentals. High (low) labour mobility may be associated with low (high) wage dispersion. However, by using the same sectors for the calculation of dispersion across countries the international comparability of the measures are enhanced. The fact that the results are drawn from calculations using data from industrialised countries over a similar time period implies that differences in labour mobility may be small. Nevertheless industrial structure and labour mobility will differ to some extent from one country to another and this will influence our results.

6.2   Wage Dispersion as a Measure of Institutional Structure

How does wage dispersion perform as an indicator of the degree of centralisation or decentralisation of wage setting institutions? Figure 2 plots decadal averages of the coefficient of variation of nominal wages against the centralisation ranking of Calmfors and Driffill for the 1970s and 1980s as adapted by Dowrick (1993).[9] While some aspects of Calmfors and Driffill's quantitative ranking (based on the extent of inter-union and inter-employer cooperation in wage bargaining with the other side) has been challenged in the literature, it is a good general benchmark against which we can judge the performance of this quantitative measure.

As one might expect, the adapted index of Calmfors and Driffill shows that Australia was an intermediate country in terms of centralisation in the 1970s and moved towards the more centralised end of the scale in the 1980s. In level terms, Australian wage dispersion in the 1970s and 1980s was in the range of that of the United States, a country which is considered to have the most decentralised wage bargaining system among the industrialised countries. While direct comparisons of wage dispersion between countries are strictly valid only when labour mobility is identical in both countries, broad comparisons may still be acceptable for the reasons described in Section 6.1.

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[9] While Calmfors and Driffill's original analysis referred to institutional arrangements during the period 1973-85 only, Dowrick (1993) adapted the original indices to reflect decadal averages in the 1970s and 1980s.

Figure 2: Calmfors and Driffill Index of Centralisation and the Coefficient of Variation of Nominal Wages
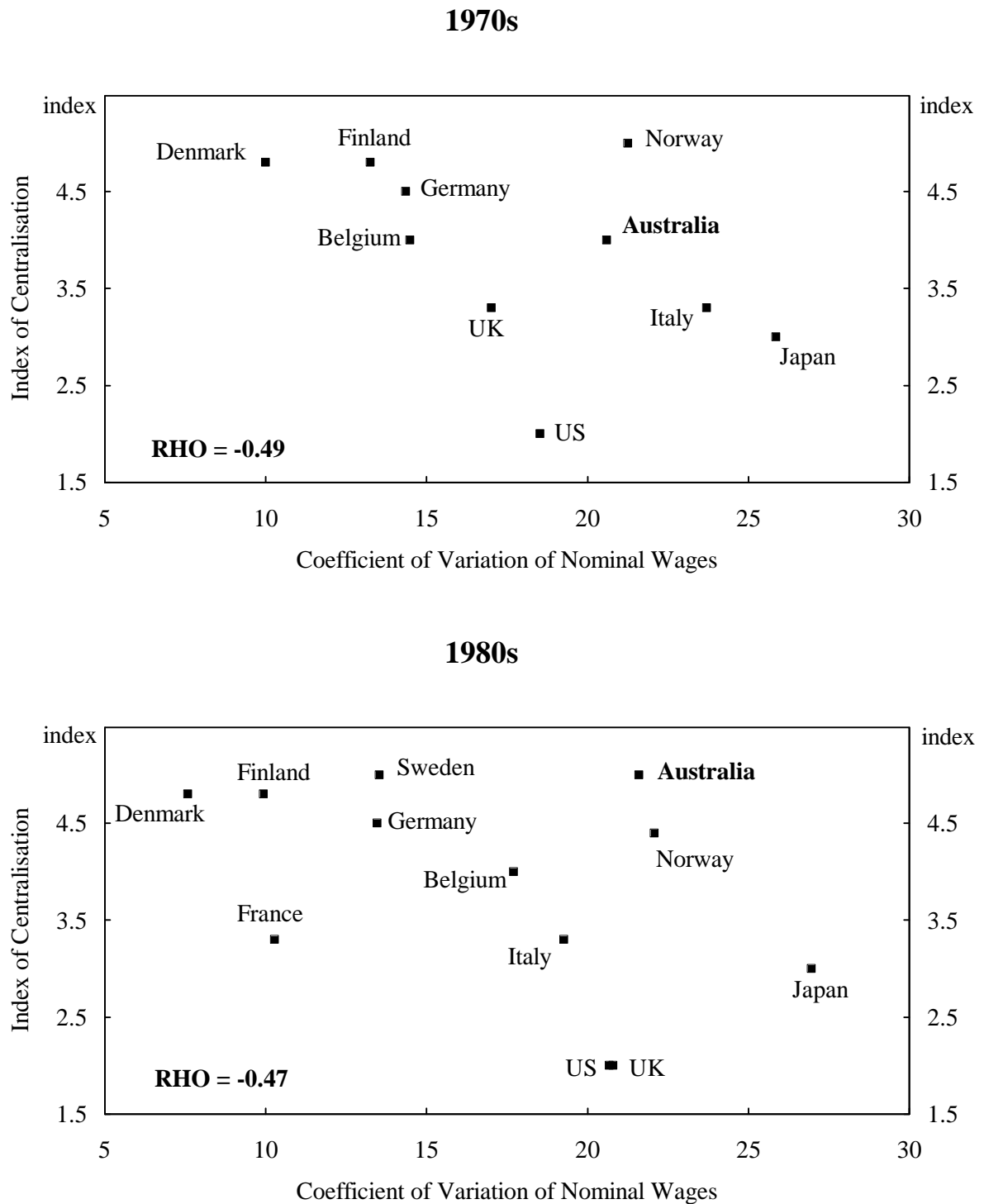
1970s

1980s

In overall terms, there is a negative relationship between the measure of wage dispersion and the Calmfors Driffill index of centralisation. The correlation

coefficients between the two series for the 1970s and 1980s are -0.49 and -0.47 respectively. On the one hand, countries with relatively high levels of wage dispersion such as the US, Japan, and Australia in the 1980s cover the entire spectrum of decentralised to centralised institutions.[10] On the other hand, there is a grouping of countries with low wage dispersion around the centralised end of the institutional scale. We conclude that low wage dispersion can be associated with centralised wage setting institutions, but is not necessarily so. Australia recorded a relatively high degree of wage dispersion in the 1980s despite having a centralised wage setting system.

Decadal averages of wage dispersion mask some important changes in the profile of the measure, particularly in the case of Australia. Figure 3 illustrates the path of wage dispersion for Australia and other OECD countries over the periods for which data are available.[11]

Australian wage dispersion has varied widely over the period 1969 to 1990. There are three distinct periods characterised by different institutional developments. The first phase covers the end of the 1960s and first half of the 1970s and was characterised by sharp changes in wage dispersion and the erosion of the importance of the National Wage Case System. Between 1969/70 and 1974/75, the contribution of average male minimum wage increases specified under the national wage case system fell from 52.6 to 21.2 per cent (Hancock Report, 1985).

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[10] As noted above, there has been a debate in the literature about where Japan should appear on the centralisation scale, with Soskice (1990) arguing that Calmfors and Driffill incorrectly identified Japan as a decentralised system when in fact a high degree of coordination is in evidence. Dowrick constructed an alternative index to reflect Sockice's critique. Under Dowrick's alternative measure, Japan would be ranked as a country with highly centralised wage setting system (the index of centralisation on the vertical axis in Figure 2 would be 6 instead of 3). This would still support our conclusion that highly coordinated wage setting institutions do not necessarily have low wage dispersion.

[11] While the measure of dispersion in Figure 3 is the coefficient of variation of nominal wages, equivalent figures using the variance of the logs of nominal and real product wages and the coefficient of variation of real product wages can be found in Appendix 1. While the real product wage versions have higher variances, the overall pattern of wage dispersion is similar. We have chosen to discuss the nominal wage version in the main body of our text given it has a longer series available for Australia. (In addition, UK data are available only in the nominal series.)

Figure 3: Coefficient of Variation of Nominal Wages
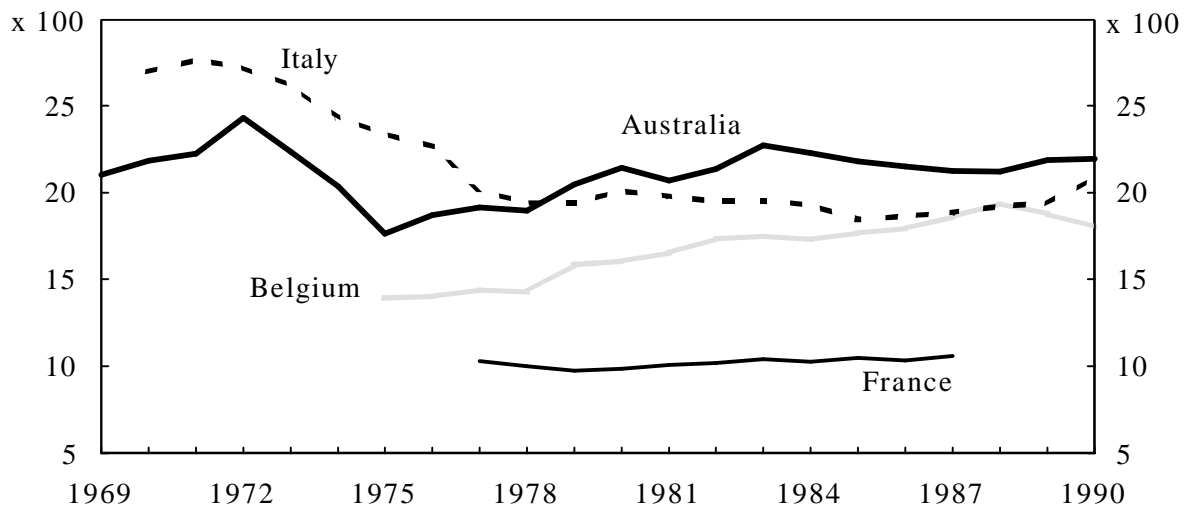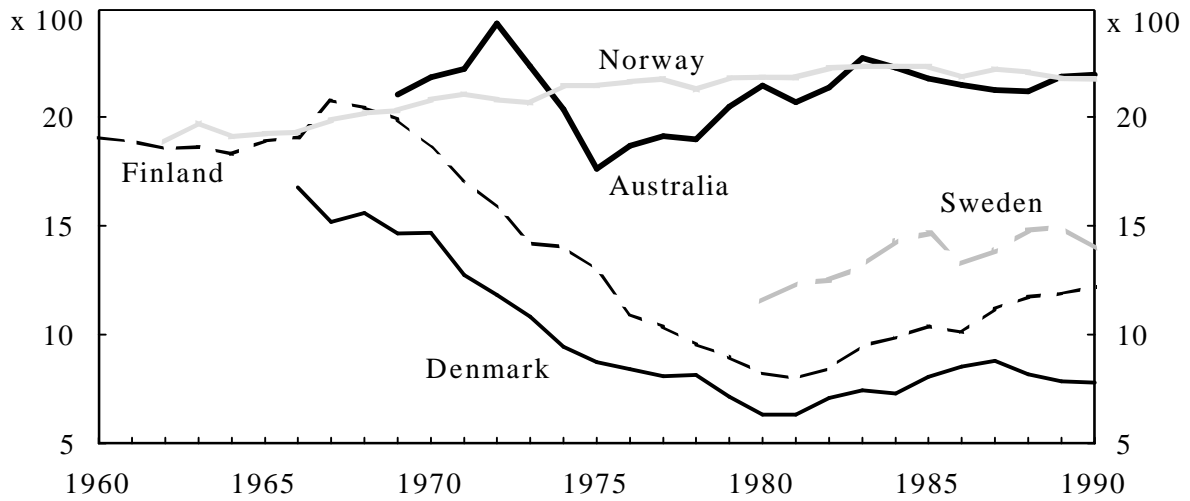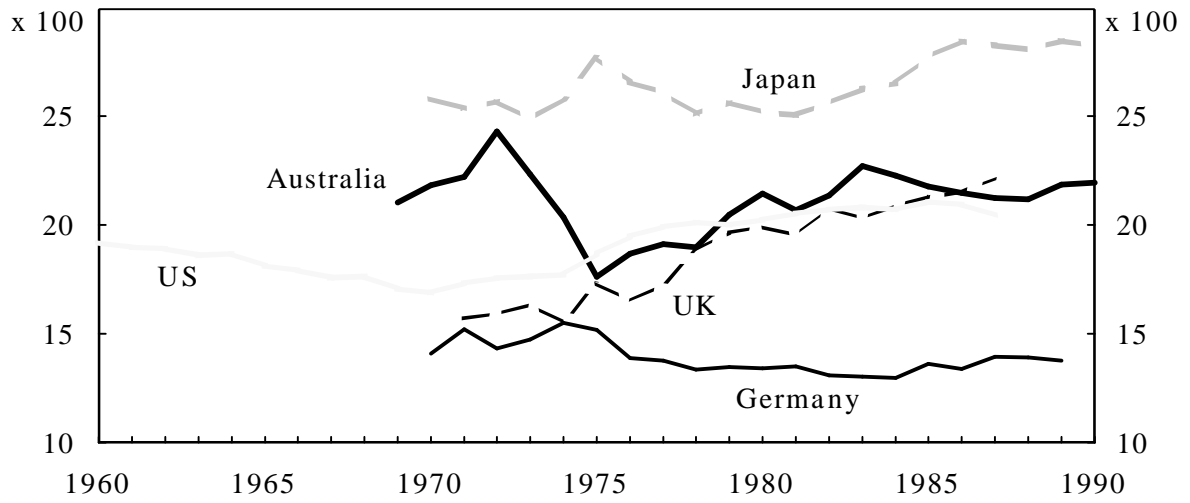
Consent agreements and over-award bargaining grew in importance and the arbitration system started to break down. Attempts were made by the Commission to regain control but these were unsuccessful. Wages increased in excess of the National Wage Case decisions even though, for example, the 1970 decision specified a 6 per cent increase when the inflation rate was only 3.9 per cent. By the end of the first quarter of 1975 average weekly earnings were increasing at an annual rate of about 28 per cent and inflation had accelerated to 17.7 per cent.

The erosion of the arbitration system had unpredictable effects on the level of wage dispersion. Between 1969 and 1972 the measure of wage dispersion increased sharply. This may have been a result of the breakdown of the national wage case system at a time when the labour market was tight. Over the period earnings in the lower wage sectors (community, social and personnel services, trade and agriculture) were increasing at a rate of about 10 per cent per annum while earnings in the higher wage sectors (financial and business services, general government, mining, construction, transport and utilities) were increasing at a rate of 15 per cent per year.

Between 1973 and 1975 the mean (weighted) wage increased at a rate of 24 per cent per annum. This large increase in the denominator of the coefficient of variation dominated the changes in the numerator (the weighted variance of wages) with the total effect being a sharp fall in the dispersion measure over the sub-period. During the sub-period wage dispersion was indeed falling (low and high wage sectors recorded 27 per cent and 20 per cent per annum increases respectively) but dispersion was not falling as rapidly as the coefficient of variation suggests. High nominal wage inflation had the same effect on the dispersion measures for Finland, Denmark and to a lesser extent, Italy. In the other OECD countries such as the US nominal wage inflation was not as significant. Nominal wages increased by about 8 per cent in the United States over the sub-period.

The second phase, between 1975 and 1983, was characterised by a mixture of full and partial indexation[12] until 1981, and a breakdown of indexation thereafter. A steady increase in wage dispersion was recorded over the period. The indexation

[12] Only some decisions by the Arbitration Commission provided full indexation; other decisions permitted adjustment of less than consumer price increases. Wages were adjusted on a quarterly basis from March 1975 until September 1978. Between 1978 and 1981 wages were adjusted on a six monthly basis.

guidelines permitted exceptional wage increases for change in work value. It also seems likely that the over-award and non-award sectors were able to gain from the erosion of the indexation system.

In 1980 and 1981 substantive wage increases were negotiated outside the indexation system and the indexation system was cancelled in July 1981. Economic conditions deteriorated towards the end of 1982[13] at which time a wages pause was introduced for workers covered by Federal awards. The wages pause lasted from December 1982 to until the introduction of the Accord in September 1983.

The start of the Accord marked the beginning of the third period. The Accord was associated with relatively little change in the level of dispersion until 1988 when institutional adjustments permitted a slight increase in wage dispersion.

How did changes in institutional structure affect wage dispersion in other countries (as illustrated in Figure 3)? Incomes policies were in place in the UK during the early 1970s; these may have contributed to the low level of wage dispersion. During the mid to late 1970s voluntary wage restraint programmes were adopted which may account for the upward drift of wage dispersion. It was the aim of the Thatcher Government, first elected in 1979, to reduce the power of the trade unions. Not surprisingly, wage dispersion drifted upwards during the Thatcher years.

The Scandinavian countries have had a history of highly coordinated wage negotiations. There is, however, a sharp contrast in the path of wage dispersion between Finland and Denmark on the one hand and Norway on the other over the ten year period starting in the mid 1960s. Norwegian wage dispersion remained relatively flat while that of Finland and Denmark fell conspicuously. The fall in wage dispersion in the latter two countries does not seem to be directly associated with any particular changes to their wage determination systems, but rather a combination of factors including differences in their wage indexation systems and the degree of influence of government in the process of income determination.[14] In Japan, the US, Germany, Belgium and France, no major changes were made to

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[13] The inflation rate exceeded eleven per cent and in November 1982, unemployment approached nine per cent.

[14] See Braun (1986) for a fuller exposition of the background factors.

wage setting institutions over the periods for which data are available. There are nevertheless some changes in wage dispersion recorded in these countries.

We can conclude that wage dispersion appears to be affected by the type of wage setting institution but not in any strong systematic manner. Centralised wage setting systems may deliver flat or decreased wage dispersion and decentralised systems may induce increased dispersion. However, other variables which affect wage dispersion, including labour mobility, industrial structure and labour market policies (such as minimum wage legislation) may also play an important role, implying that countries which introduce policies to decentralise wage setting may not necessarily experience an increase in labour market flexibility.

6.3   The Relationships Among Wages, Productivity, Prices and Growth

A flexible labour market should be characterised by wage rates which adjust to conditions within the market. The model presented in Section 5 suggests that the real wage in any particular sector should reflect the sectoral productivity level and the relative price of that sector's output. In this section these relationships are analysed along with one further proposition; that sectoral wages should reflect the relative rate of growth of a sector. The idea is that above average wages are required to attract new workers to faster growing sectors.

We begin by calculating some simple correlation coefficients of nominal wages with productivity, prices and growth individually for each sector[15] in each country. While we know that high labour mobility may be associated with low wage dispersion and small deviations of productivity from its mean, the strength of the correlation coefficient between these variables will not be affected for the reasons which we describe in Section 5.

For this correlation analysis, wages, productivity and prices variables are constructed as relative deviations from the weighted mean for each sector. The wages variables (DW_{ijt}), for example, are constructed as follows:

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[15] Three of the sectors used in the last section were removed before conducting the correlation analysis. These sectors are general government; community, social and personnel services; and finance, insurance, real estate and business services. The real output data for these sectors are constructed on an assumption of no labour productivity growth, and are therefore unsuitable for this analysis.

$$DW_{ijt} = (W_{ijt} - WM_{jt})/WM_{jt} \qquad (24)$$

The productivity and prices variables are relative deviations from the weighted mean of productivity and prices respectively. The growth variables are constructed as raw deviations from the weighted mean of annual output growth rates; that is, the deviations are not divided by the weighted mean as in equation 24.

Table 1: Correlations of Nominal Wages with Productivity, Prices and Growth

	Period	Sectors	Productivity	Prices	Growth
Australia	1975-90	7	0.46	-0.06	-0.16
Belgium	1976-90	5	-0.48	0.47	0.07
Denmark	1967-90	7	0.78	-0.68	-0.03
Finland	1961-90	7	0.30	0.04	0.02
France	1978-87	7	-0.30	0.11	-0.30
Germany	1970-89	7	0.63	0.25	-0.01
Iceland	1974-89	6	0.00	0.43	0.03
Italy	1971-90	6	0.61	-0.47	0.19
Japan	1970-90	7	0.36	-0.08	0.22
Luxembourg	1975-90	7	0.22	-0.08	-0.34
Norway	1963-90	7	-0.20	0.49	-0.17
Sweden	1980-90	7	0.36	-0.19	0.52
United States	1961-87	7	0.77	-0.57	-0.04
MEAN			0.27	-0.03	0.00
MEDIAN			0.36	-0.06	-0.01

Correlation coefficients are constructed for each sector, and are then weighted and summed to form an overall measure of the relationship in each country. The weights (a_{ij}) are again the average employment shares for each sector in each

country.[16] The results of these weighted sums are set out in Table 1. They reveal a high degree of disparity across countries. Given that all countries have some degree of heterogeneous labour and imperfect labour mobility, we would expect the coefficients to all be positive in sign, but this is not the case. Wages appear to be positively related to productivity in the majority of countries. Australia has a relatively high positive correlation coefficient on productivity, with only Denmark, Germany, Italy and the United States having higher correlations.

The results for the correlations between wages and prices, and between wages and growth, are more diverse. The averages over all countries are more or less zero in both cases. For the price variable, its effect on wages may depend on movements in productivity. Increases in productivity may lead to lower output prices, and if wages reflect changes in productivity (as they appear to), a negative relationship between wages and prices may result. Therefore, changes in productivity must be taken into account when attempting to determine the relationship between wages and prices.

The weak overall relationship between wages and growth may reflect the influence of the growing wholesale and retail trade, restaurants and hotels sector. This sector has been growing in employment share in most developed countries. This growth has been generally characterised by increased part-time employment, which may dampen the growth in the wage variable constructed for this analysis. As noted above, the wage rate is calculated as compensation of employees per employee, which may fall as the share of part-time employees rises. The portion of the service sector employing low skilled workers has also tended to have low relative wages and minimal relative wage increases.[17]

To account for the effect of productivity changes on the relationship between wages and prices, a simple regression analysis was conducted. Two models are estimated for each sector in each country: wages on prices and productivity (model 1), and wages on prices, productivity and growth (model 2). The same variables, sectors and sample period used in the correlation analysis are employed. The estimated

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[16] These shares were calculated using the total of employment for the seven (or less) productive sectors used in this part of the analysis only.

[17] The growth in employment in this portion of the services sector is linked to the phenomenon of the growing class of the "working poor" in many industrialised countries.

coefficients are weighted by average employment shares and summed across sectors, and the results are presented in Table 2.[18]

The findings here are closer to what might be expected. The coefficients on the prices and productivity variables are positive in the majority of cases. The coefficient on the growth term in model 2 is, however, negative in almost all cases.

Table 2: Regressions of Nominal Wages on Productivity, Prices and Growth
Dependent variable: Nominal Wages

	Model 1 Coefficient on:		Model 2 Coefficient on:		
	Productivity	Prices	Productivity	Prices	Growth
Australia	0.66	0.62	0.64	0.57	-0.10
Belgium	-0.77	-0.66	-0.73	-0.63	0.19
Denmark	0.37	0.03	0.39	0.03	-0.11
Finland	0.22	0.28	0.20	0.26	0.05
France	-0.06	0.04	-0.04	0.10	-0.09
Germany	0.63	0.49	0.69	0.50	-0.33
Iceland	0.22	0.28	0.25	0.29	-0.02
Italy	0.63	0.32	0.75	0.31	-0.08
Japan	0.17	0.17	0.18	0.18	-0.03
Luxembourg	0.13	0.03	0.15	0.08	-0.17
Norway	-0.04	0.16	-0.02	0.18	0.01
Sweden	0.46	-0.09	0.74	-0.09	-0.10
United States	0.73	0.34	0.76	0.39	-0.19
MEAN	0.26	0.15	0.30	0.17	-0.08
MEDIAN	0.22	0.17	0.25	0.18	-0.09

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[18] Since the weighted average of standard errors makes no sense they are not reported.

This is likely a consequence of the growth of the wholesale and retail trade, restaurants and hotels sector. Alongside the United States, Australia has some of the highest coefficients on productivity and prices among the countries in our sample. This tends to suggest that over the period 1975 through 1990 Australian wage setting behaviour generally reflected key factors related to the demand for labour.

In terms of the relationship between the level of wage dispersion and the strength of the relationship among wages, productivity and prices generally, there does not appear to be anything systematic. Moreover, the relationship does not appear to be a function of the degree of centralisation of wage setting institutions. For example, Italy and Germany both recorded high coefficients along with the US and Australia. Sweden and Denmark recorded weak relationships between wages and prices but strong ones between wages and productivity. These countries display a wide variation in both wage dispersion and degree of centralisation. This would imply that an increase in wage dispersion and/or a move towards a less centralised system may not necessarily bring about a stronger response of wages to demand conditions.

6.4   The Relationship between Employment and Wages

One major benefit of having a wage setting system where remuneration reflects the demand conditions for labour is that wages can act as a signal to potential employees to move from one sector to another. Higher wages in the more productive and more profitable sectors will attract workers to those sectors where they are more highly valued. In this section, the relationship between deviations of employment and wages from their respective means is analysed. Correlation coefficients are calculated for employment with wages for each sector[19] in each country. Coefficients are again weighted and summed in the manner employed above. The results are set out in Table 3.

The average across countries suggests that there is little systematic relationship between employment and wages. The correlation is negative for Australia. Apart from the potentially positive effect of wages on employment described above, there

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[19] The three sectors removed from the analysis in the previous section (namely general government, community, social and personnel servicesand finance, insurance, real estate and business services) have been included in the analysis here, as real output data are not employed.

may be other supply or demand influences. As workers move out of one sector and into another, changes in the supply of labour in each sector may raise wages in the former sector, and depress them in the latter. Changes in participation rates may also confound the relationship. For example, increased participation of women in sectors associated with relatively low wages may affect the relationship. On average, neither supply nor demand factors appear to dominate, implying that firm conclusions cannot be drawn from this analysis.

Table 3: Correlations of Employment with Nominal Wages

	Period	Sectors	Employment
Australia	1969-90	10	-0.17
Belgium	1976-90	8	0.29
Denmark	1967-90	10	0.27
Finland	1961-90	10	-0.17
France	1978-87	9	-0.21
Germany	1970-89	9	0.38
Iceland	1974-89	9	-0.17
Italy	1971-90	8	-0.08
Japan	1971-90	10	0.15
Luxembourg	1976-90	9	-0.33
Norway	1963-90	10	-0.25
Sweden	1981-90	10	0.49
United Kingdom	1972-87	10	0.22
United States	1961-87	10	-0.14
MEAN			0.02
MEDIAN			-0.14

6.5   The Relationships Among Wage Dispersion and Various Macroeconomic Performance Indicators

Does higher wage dispersion imply higher relative growth and/or lower relative inflation and unemployment? Figures 4 through 6 illustrate the relationships between wage dispersion and these three measures of macroeconomic performance. In an effort to capture the effects that the Wages and Incomes Accord might have had on wage dispersion in Australia, the data are split into two periods to reflect the pre and post-Accord periods.

Relative to most other countries, wage dispersion in Australia was higher during both periods while Australian unemployment and inflation performance was relatively worse in many cases. In terms of growth, Australia performed relatively better than the majority of other countries during both periods. In absolute terms, wage dispersion in Australia increased marginally from the pre to the post-Accord period while unemployment and growth increased and inflation fell.[20] In overall terms, neither relatively high wage dispersion in Australia across periods nor across countries translated into a consistently better macroeconomic performance.

More generally, our data set suggests that there is no consistently reliable relationship between relative wage dispersion and economic performance. While a positive linear relationship between wage dispersion and output growth is apparent in the 1984-90 period (Figure 6), this relationship is not reliable given its relative weakness during the 1974-83 period. The low correlation coefficients between wage dispersion and unemployment during the two periods on the one hand and between dispersion and inflation on the other imply that there is no strong systematic relationship between these variables. It appears that a country's macroeconomic performance is not obviously related to its wage setting institutions in either a linear or other (say hump shaped) fashion.

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[20] It might seem curious that higher growth was coincident with a poorer unemployment performance in the second period, but this was an experience common to most of the countries for which we have data.

Figure 4: Unemployment Rates and the Coefficient of Variation of Nominal Wages
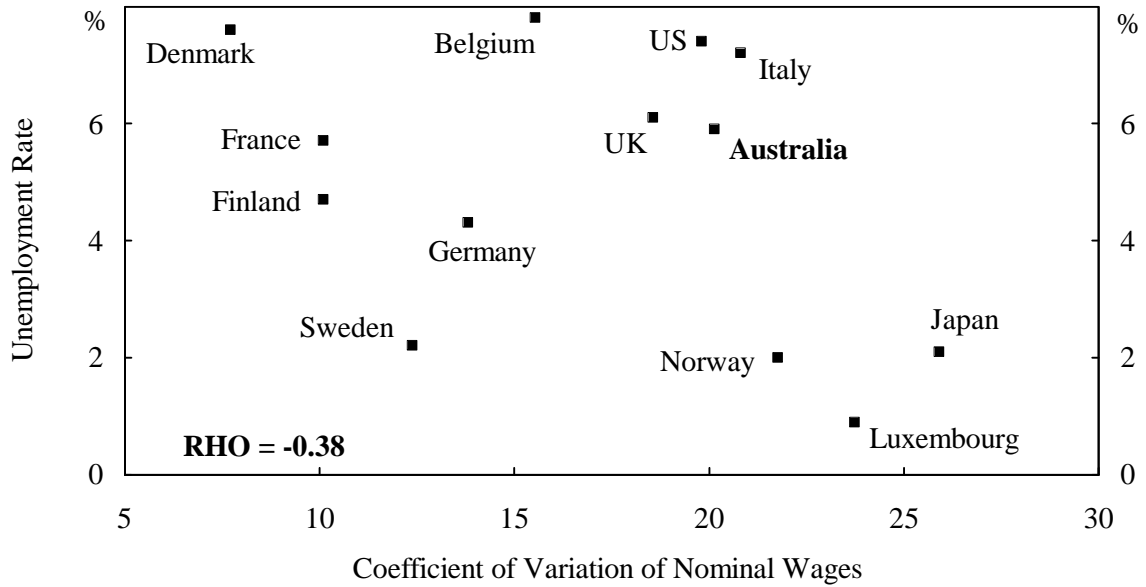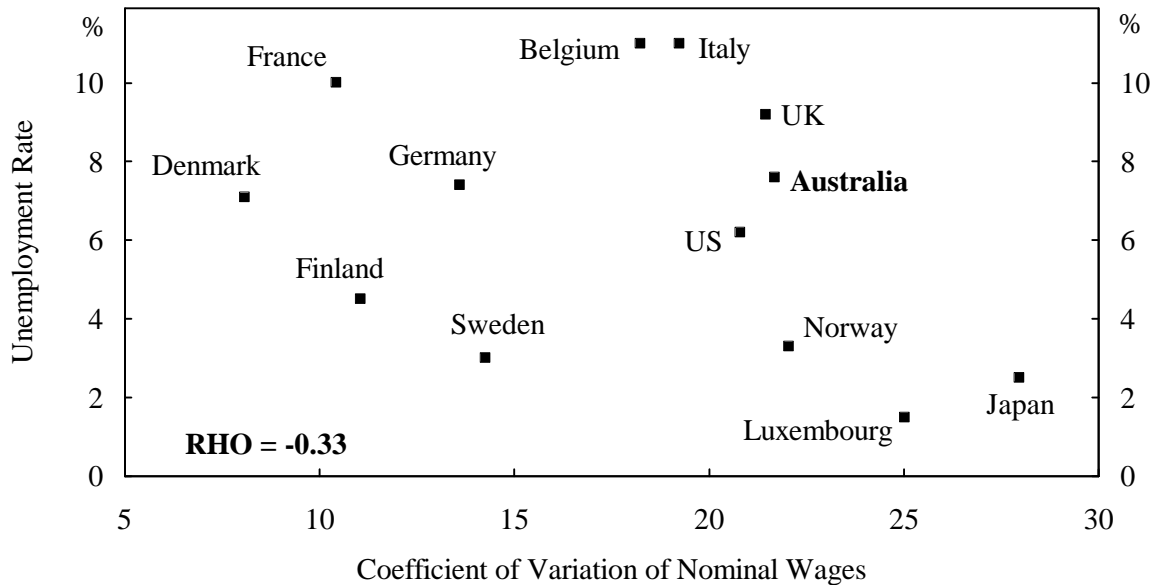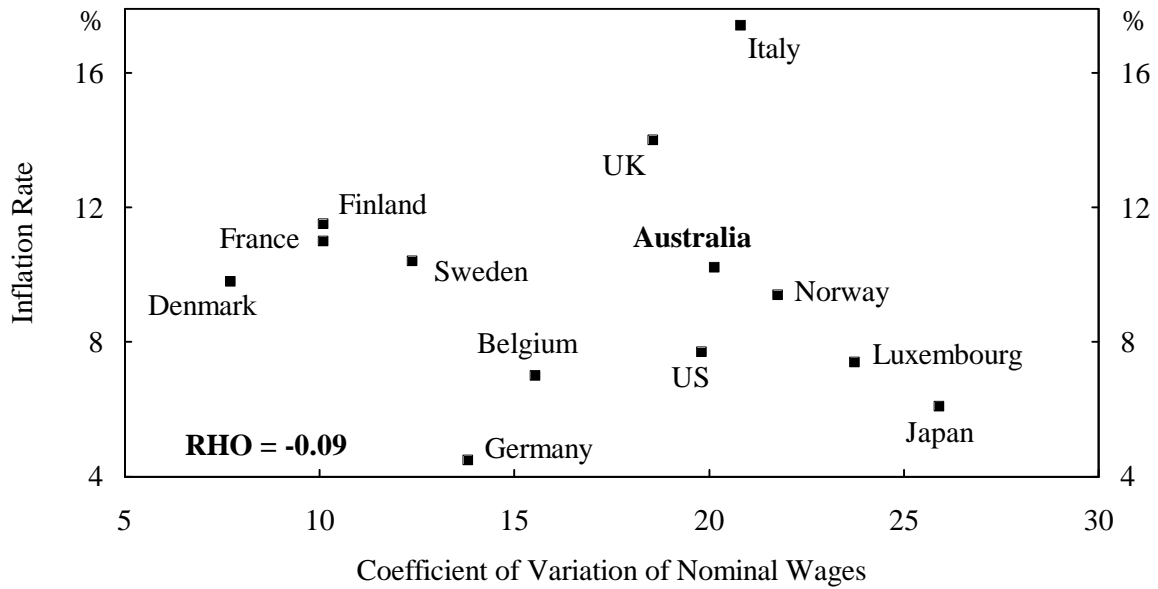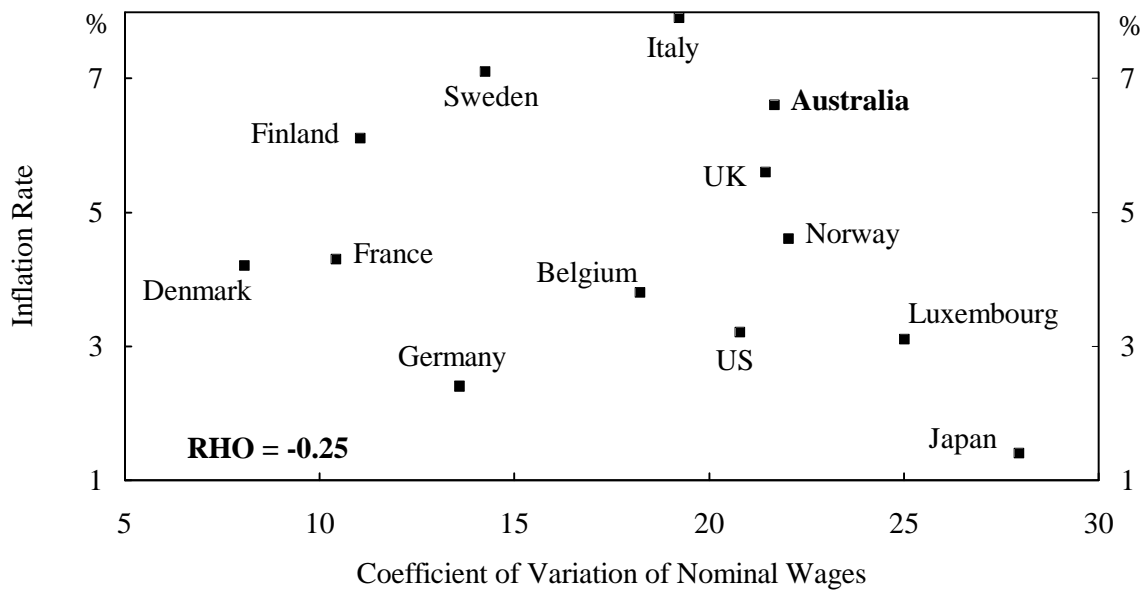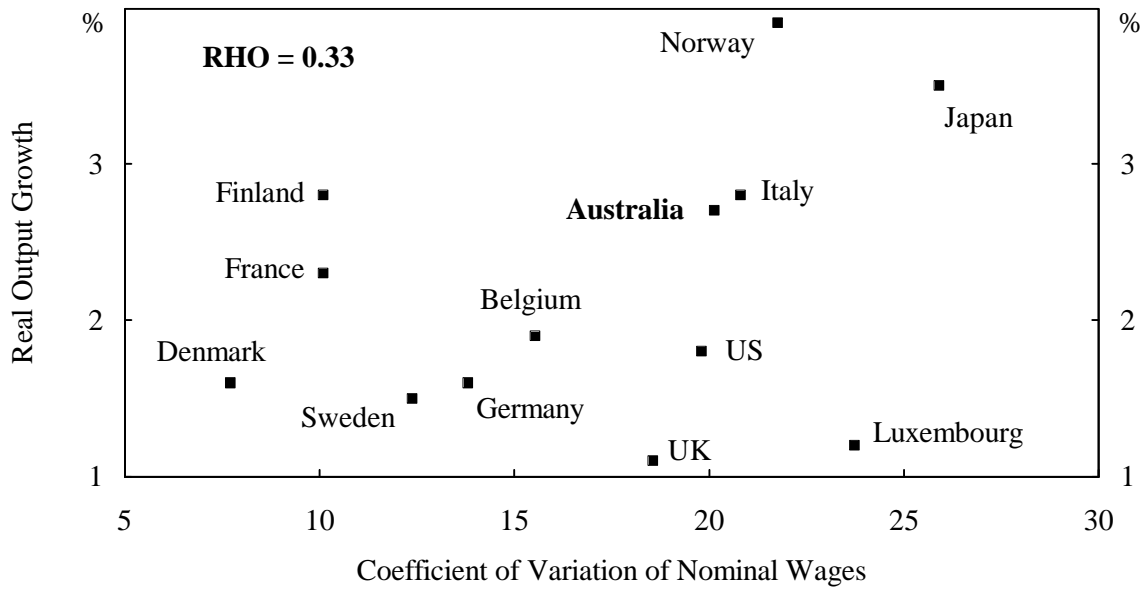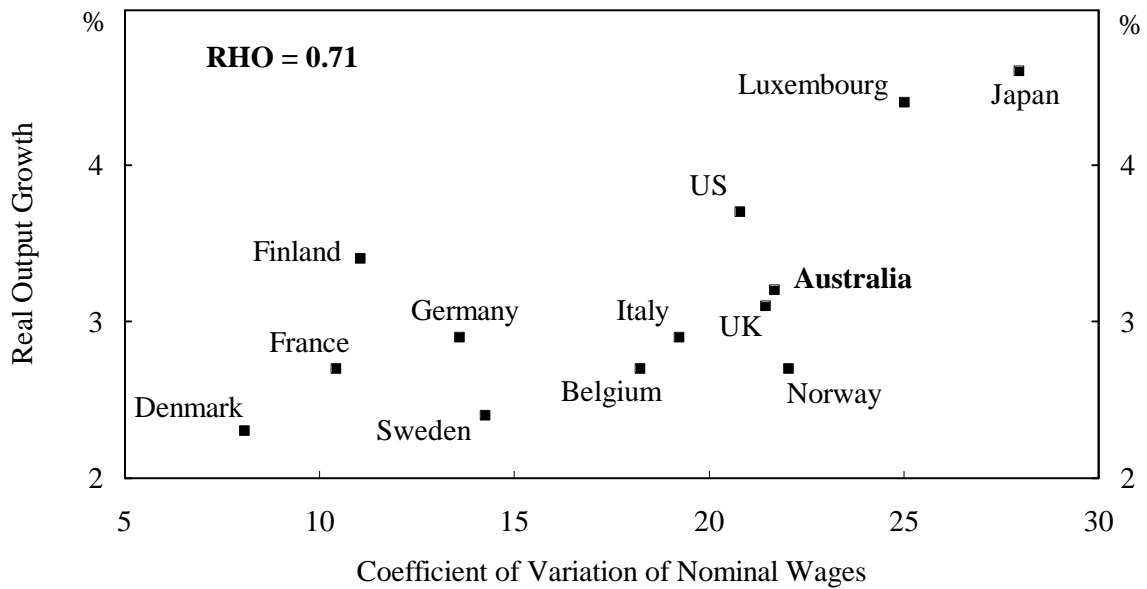
1974 to 1983

1984 to 1990

Figure 5: Inflation Rates and the Coefficient of Variation of Nominal Wages

1974 to 1983

1984 to 1990

Figure 6: Real Output Growth and the Coefficient of Variation of Nominal Wages

1974 to 1983

1984 to 1990

7. CONCLUSION

Our cross-country analysis of relative wage data suggests that the Australian labour market may have been relatively more flexible over the 1970s and 1980s than popular perception holds. Insofar as cross-country comparisons of wage flexibility (as measured by wage dispersion across ten sectors) can be made, we observe that Australian wage flexibility was on the scale of that in the United States - a country which is considered to have a flexible labour market. Moreover, Australian wages appear to have been relatively strongly correlated with factors influencing labour demand, a desirable property when labour is heterogeneous. In fact, the relationship between Australian sectoral wages, productivity and relative prices was among the strongest in the OECD countries for which data were available.

International experience shows that wage dispersion may be affected by changes to wage setting institutions within some countries. However, a strong relationship was not found between the degree of centralisation of wage setting institutions and wage dispersion across countries. Countries with similar levels of wage dispersion displayed a diversity of labour market institutions. While we did find positive correlations between wages, productivity and prices in the majority of countries, the cross-country evidence was insufficient to draw general conclusions. Overall, the sensitivity of wages to demand conditions does not appear to be systematically related to the degree of centralisation of the wage setting system.

APPENDIX 1: WAGE DISPERSION SUMMARY STATISTICS

Table A1.1: Coefficient of Variation of Nominal Wages (x 100)

	Period	Sectors	1960-73	1974-83	1984-90
Australia	1969-90	10	22.3	20.1	21.7
Belgium	1975-90	8		15.5	18.2
Denmark	1966-90	10	14.0	7.7	8.1
Finland	1960-90	10	18.5	10.1	11.1
France	1977-87	9		10.1	10.4
Germany	1970-89	9	14.6	13.8	13.6
Iceland	1973-89	9	18.7	17.3	19.2
Italy	1970-90	8	27.0	20.8	19.2
Japan	1970-90	10	25.4	25.9	28.0
Luxembourg	1975-90	9		23.7	25.0
Norway	1962-90	10	20.0	21.8	22.0
Sweden	1980-90	10		12.4	14.3
United Kingdom	1971-87	10	16.0	18.6	21.5
United States	1960-87	10	18.0	19.8	20.8
AVERAGE			19.5	17.0	18.1

Table A1.2: Variance of the Log of Nominal Wages (x 100)

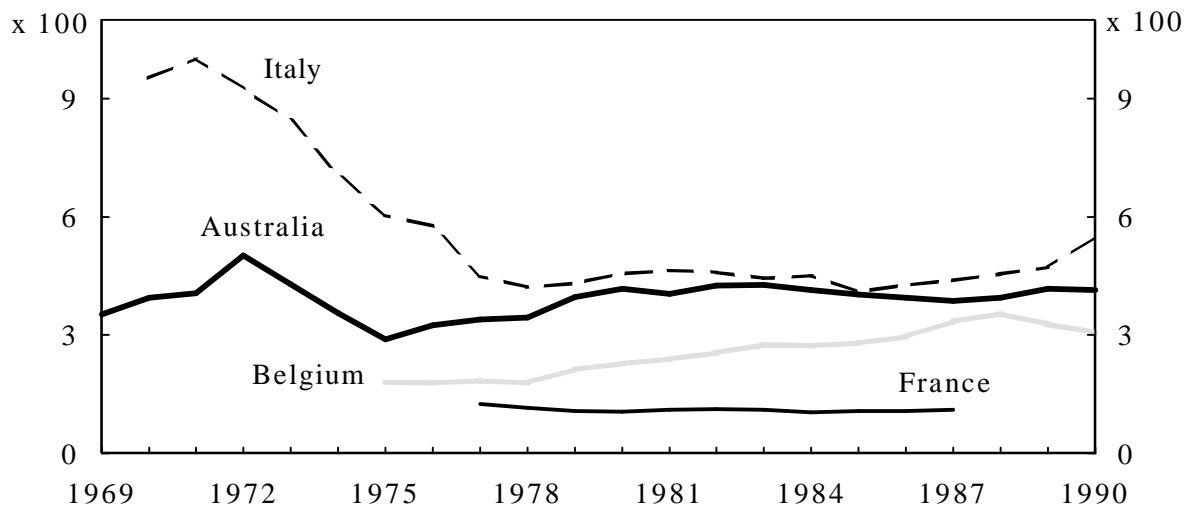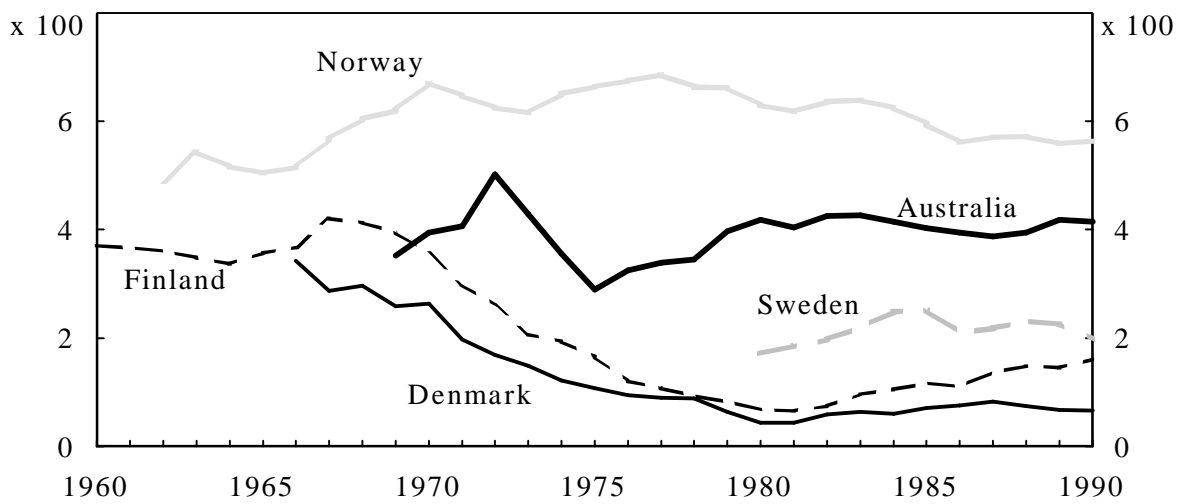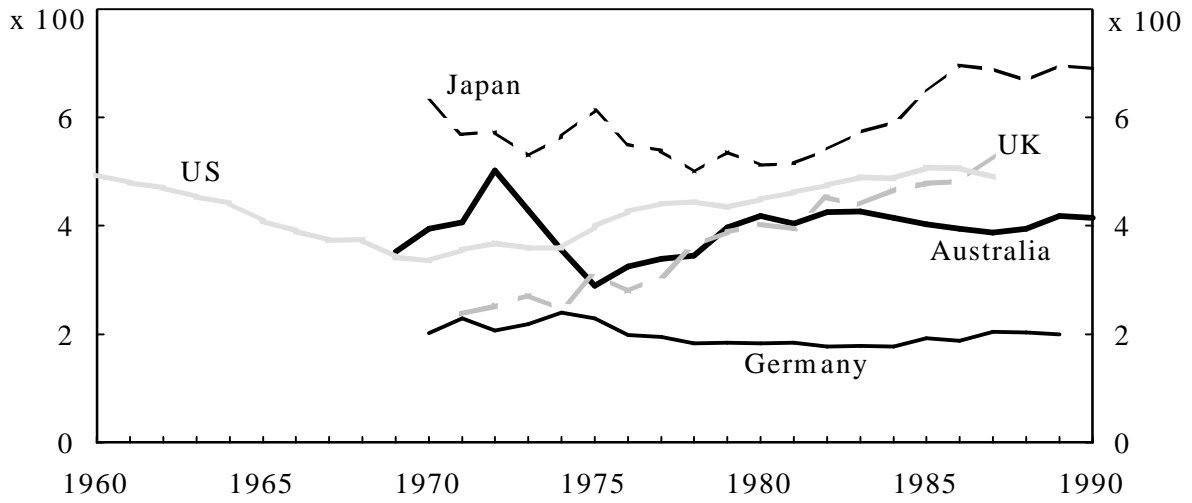|	Period	Sectors	1960-73	1974-83	1984-90
Australia	1969-90	10	4.17	3.73	4.04
Belgium	1975-90	8		2.15	3.10
Denmark	1966-90	10	2.46	0.78	0.71
Finland	1960-90	10	3.47	1.07	1.32
France	1977-87	9		1.12	1.08
Germany	1970-89	9	2.14	1.95	1.94
Iceland	1973-89	9	3.33	2.72	2.86
Italy	1970-90	8	9.31	5.01	4.58
Japan	1970-90	10	5.75	5.45	6.68
Luxembourg	1975-90	9		5.65	6.54
Norway	1962-90	10	5.77	6.52	5.78
Sweden	1980-90	10		1.93	2.26
United Kingdom	1971-87	10	2.54	3.58	4.89
United States	1960-87	10	4.03	4.38	4.98
AVERAGE			4.30	3.29	3.63

Figure A1.1: Variance of the Logs of Nominal Wages

Table A1.3: Coefficient of Variation of Real Product Wages (x 100)

	Period	Sectors	1960-73	1974-83	1984-90
Australia	1974-90	10		20.9	28.2
Belgium	1975-90	8		16.2	20.3
Denmark	1966-90	10	23.8	8.6	12.7
Finland	1960-90	10	30.2	14.6	10.1
France	1977-87	9		10.6	11.1
Germany	1970-89	9	22.4	16.0	14.1
Iceland	1973-89	9	22.6	18.0	24.1
Italy	1970-90	8	39.6	28.8	17.4
Japan	1970-90	10	44.2	31.6	27.0
Luxembourg	1975-90	9		26.5	27.5
Norway	1962-90	10	28.0	23.9	40.9
Sweden	1980-90	10		12.8	14.5
United States	1960-87	10	35.9	21.7	24.0
AVERAGE			30.8	19.2	20.9

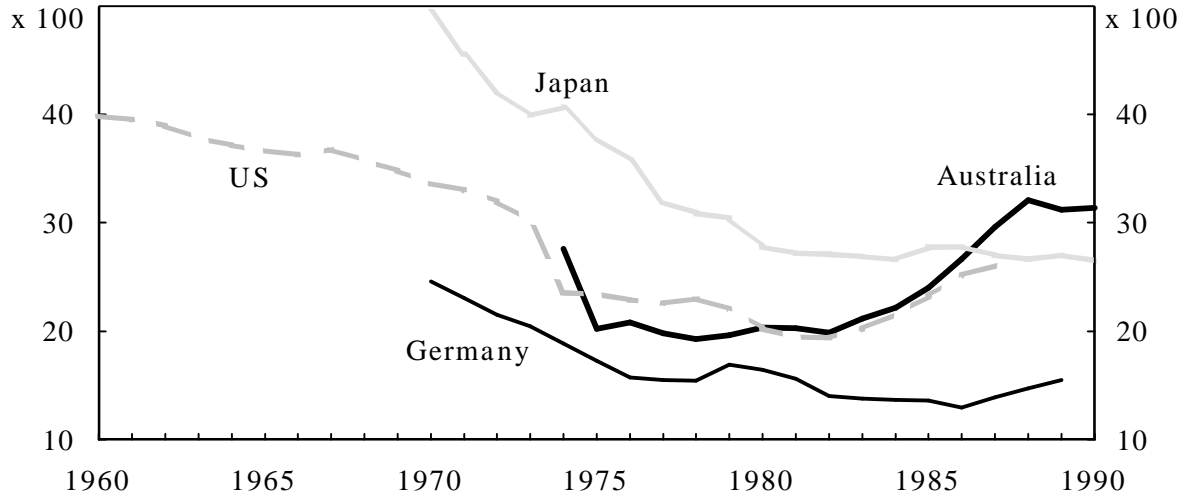**Figure A1.2: Coefficient of Variation of Real Product Wages**
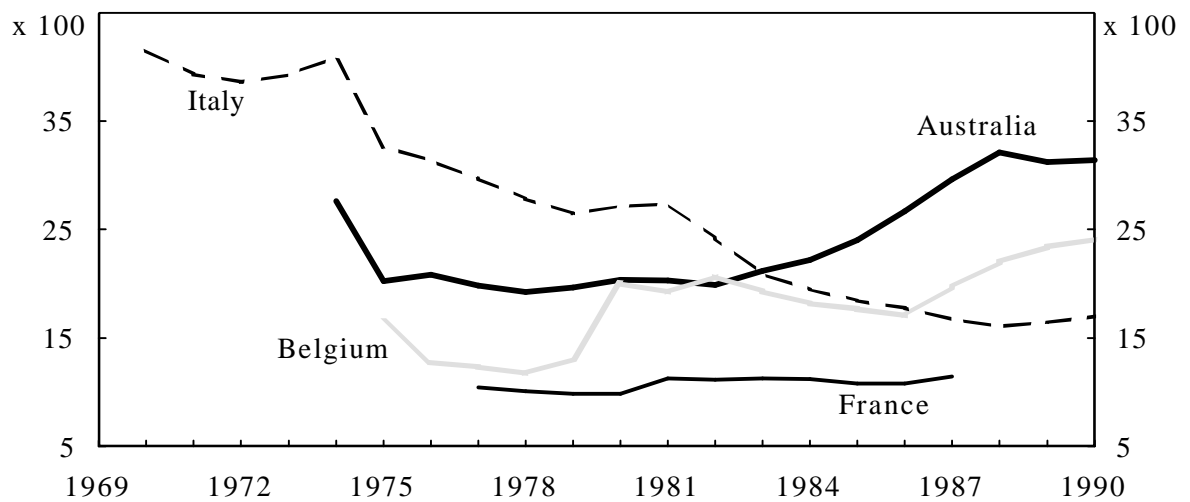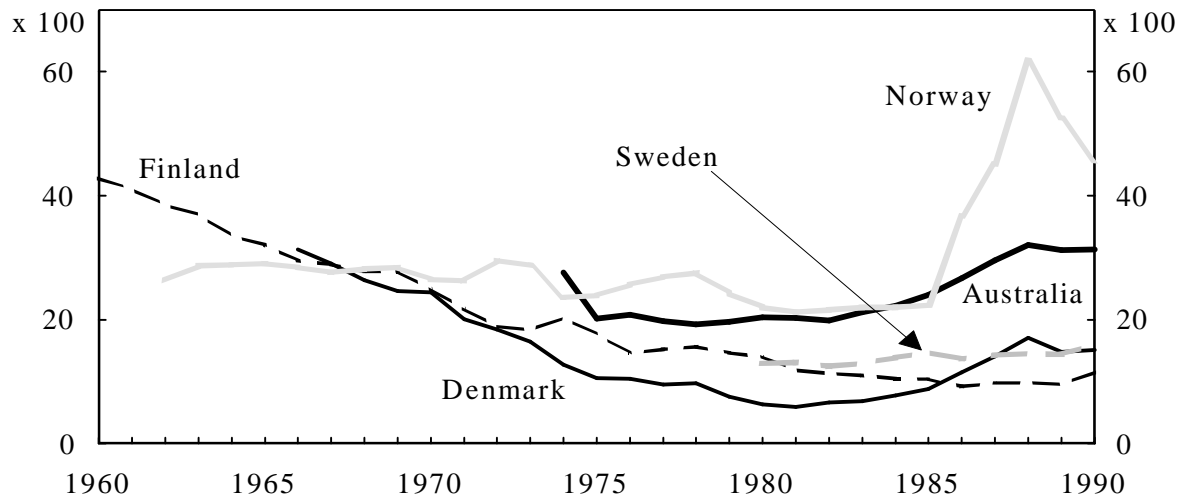
Table A1.4: Variance of the Log of Real Product Wages (x 100)

	Period	Sectors	1960-73	1974-83	1984-90
Australia	1974-90	10		3.84	6.16
Belgium	1975-90	8		2.36	3.58
Denmark	1966-90	10	6.93	1.00	0.95
Finland	1960-90	10	8.14	2.17	1.11
France	1977-87	9		1.27	1.15
Germany	1970-89	9	4.45	2.51	1.95
Iceland	1973-89	9	4.48	2.86	5.03
Italy	1970-90	8	17.98	9.15	3.64
Japan	1970-90	10	14.10	7.57	6.63
Luxembourg	1975-90	9		6.92	8.22
Norway	1962-90	10	8.20	7.33	7.26
Sweden	1980-90	10		1.93	2.44
United States	1960-87	10	7.46	4.75	5.55
AVERAGE			8.97	4.13	4.13

Figure A1.3: Variance of the Logs of Real Product Wages
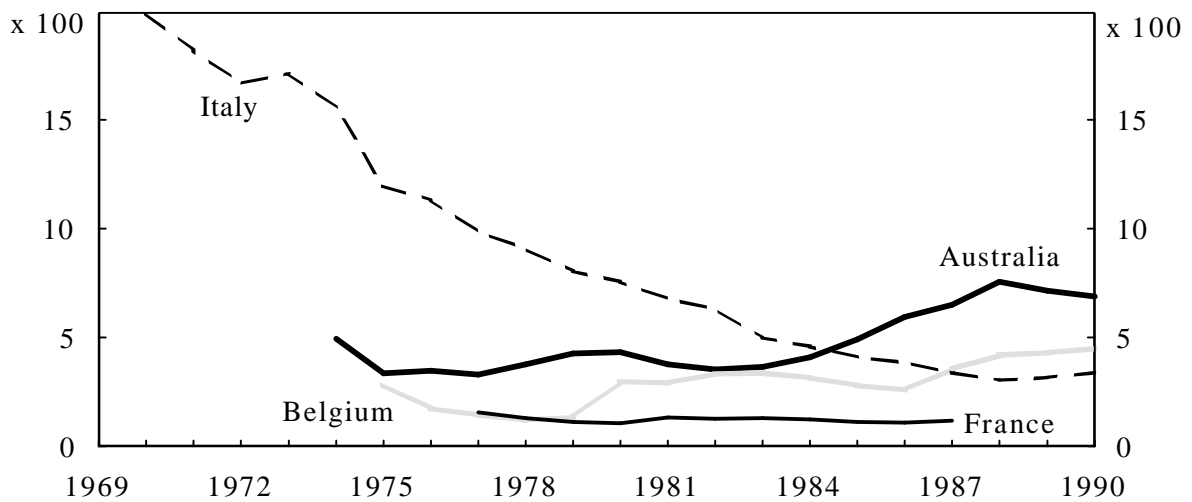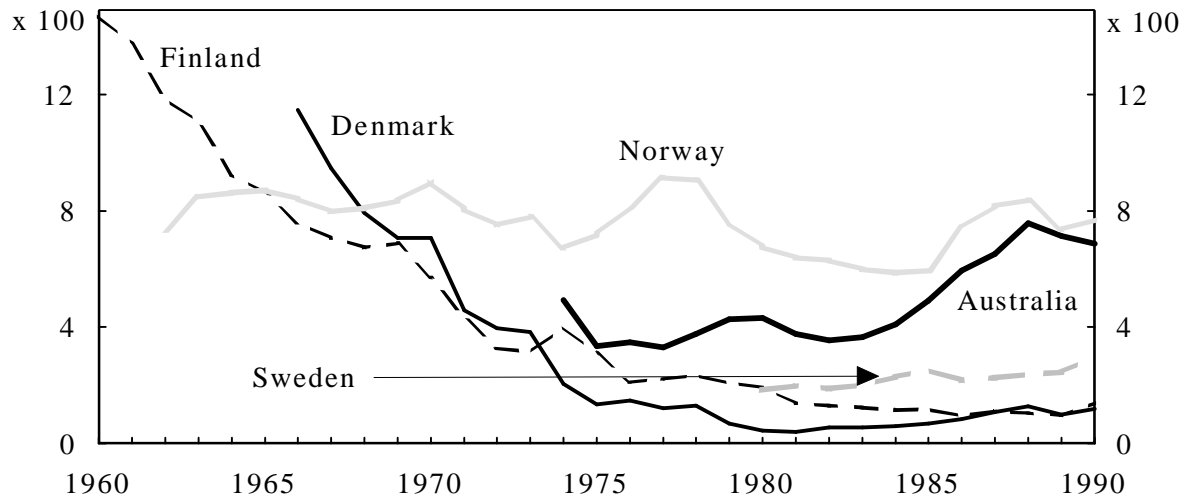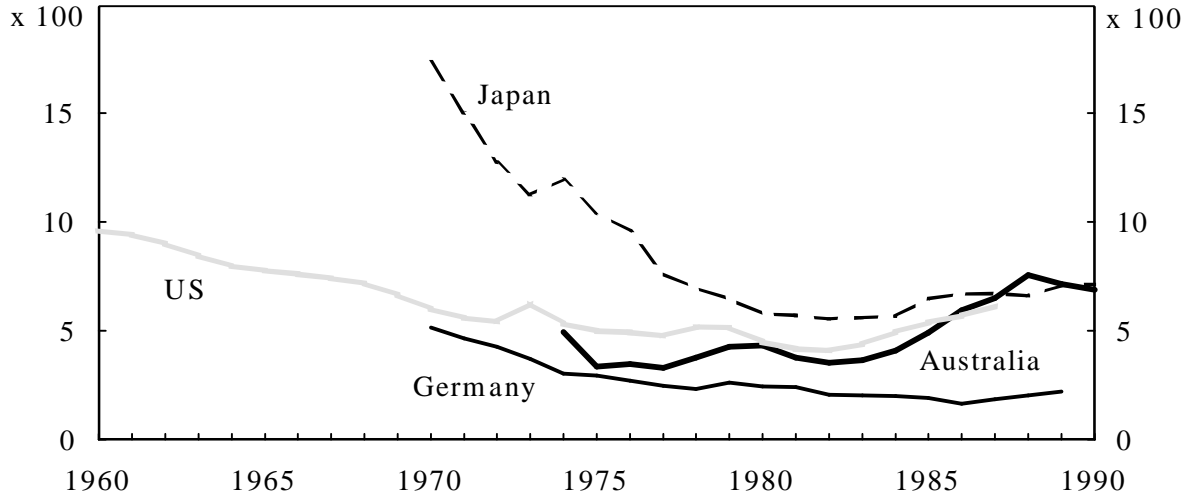
APPENDIX 2: DATA SOURCES

The sectoral data used in the analysis was taken from the OECD's "National Accounts", Vol. 2, on magnetic tape. Data from tables 1, 12, 13 and 15 were employed. Unemployment data were obtained from the OECD Economic Outlook, no. 52.

The disaggregated sectors are as follows:

1.   Agriculture, hunting, forestry and fishing

2.   Mining and quarrying

3.   Manufacturing

4.   Electricity, gas and water

5.   Construction

6.   Wholesale and retail trade, restaurants and hotels

7.   Transport, storage and communication

8.   Finance, insurance, real estate and business services

9.   Community, social and personnel services

10.   Producers of government services

Sectors 8, 9 and 10 were excluded from the correlation and regression analysis. The real output data for these sectors are generally constructed using an assumption of no employment productivity growth, and were thus unsuitable for this part of the analysis.

In some cases, certain sectors were amalgamated or omitted to gain consistency among the wages, employment and output data. These changes are as follows:

Australia   no changes

Belgium   sector two omitted, sectors six and seven amalgamated

Denmark   no changes

Finland   no changes

France   sectors eight and nine amalgamated

Germany   sectors eight and nine amalgamated

Iceland   sector two omitted

Italy   sector two included in sector three, sectors eight and nine amalgamated

Japan   no changes

Luxembourg   sectors eight and nine amalgamated

Norway   no changes

Sweden   no changes

United Kingdom   no changes (no real output data available)

United States   no changes

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