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Working Paper

Wages and employment in a unionized economy: Practical implications of theoretical considerations in the context of Finland

Bank of Finland Discussion Papers, No. 20/1988

Provided in Cooperation with:

Bank of Finland, Helsinki

Suggested Citation: Tyrväinen, Timo (1988) : Wages and employment in a unionized economy: Practical implications of theoretical considerations in the context of Finland, Bank of Finland Discussion Papers, No. 20/1988, ISBN 951-686-167-9, Bank of Finland, Helsinki, <https://nbn-resolving.de/urn:nbn:fi:bof-201908051327>

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ABSTRACT

This article evaluates the fundamental characteristics of Finnish labour markets. As the unionization rate in Finland is exceptionally high by international standards, a bargaining approach incorporating the unions' behaviour is used. The analysis is based on the study of basic trends in those theoretical considerations which imply as being relevant. The "wedge" between product wages and after tax consumption wages is evaluated with special care. It is stated that the wedge cannot be claimed to be a key factor contributing to the favourable trends seen in Finnish labour markets since the late 1970s. It is also argued that collective income policy measures have not been a major factor in the development of Finnish labour markets at least since the late 1970s.

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10.10.1988

20/88

WAGES AND EMPLOYMENT IN A UNIONIZED ECONOMY:
PRACTICAL IMPLICATIONS OF THEORETICAL CONSIDERATIONS
IN THE CONTEXT OF FINLAND

TIIVISTELMÄ

Tässä artikkelissa pyritään hahmottamaan suomalaisten työmarkkinoiden näkökuvaa. Koska järjestäytymisaste on Suomessa poikkeuksellisen korkea, neuvottelemat tuntuvat soveltuvan luontevalla tavalla työmarkkinoita. Käytetyssä kehikossa ammattiliittojen rooli tulee mukaan tarkasteluun. Teoreettinen malli korostaa, mihin suuntaan huolto tulisi kiinnittää, kun toteutunutta palkko- ja työllisyyskehitystä yritetään ymmärtää. Keskeisten muuttujien kehitystrendit kuvataan monipuolisesti. Erityisesti työntekijän reaalisen työvoimakustannuksen ja palkansaajan käteen jäävän reaalitulon välinen kero (ns. "wedge") kehitystä ja roolia analysoidaan huolellisesti. Tuloksena todetaan, että "wedge"-tekijä ei voi olla muuttamassa 1970-luvun lopun jälkeen tapahtunutta epätavallista työllisyyskehityksen kasvua selittäjä. Tässä suomalaisen kehityskuvan osaksi mainitaan muista maista. Lisäksi näyttää siltä, että kollektiivinen "tulopoliittinen" on ainakin joissakin tapauksissa soveltuvuttanut siihen, että sopetuminen ulkoisiin olosuhteisiin olisi ollut mahdollista.

Heinä 1988
ISSN 0924-6460-147-9
ISSN 0924-6460

Suomen Pankin monistuskeskus
Helsinki 1988
ISBN 951-686-167-9
ISSN 0785-3572

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Tässä artikkelissa pyritään hahmotamaan suomalaisen työmarkkinoiden näkökuvan. Koska järjestäytyneisyys on massana poikkeuksellisen korkea, neuvottelunmallit tunnustetaan luonteviksi lähtökohdiksi. Käytössä kehitetään ammattiliiton rooli tukee väkän tarkastelua. Teoreettinen malli kertoo, miten tuotteen hinta tulisi kiinnittyä, kun tuotannon palkka- ja kysyntäolosuhteissa yrittäjän ymmärrys keskeisten muuttujien kehitystrendejä kuvaavaa monipuolisesti. Eriytyessä työntekijän reaktion työolosuhteiden sen ja palkan välin kätteen jäähän reagoimaan väliin jäävän kistan (ns. "wedge") kehitystä ja roolia analysoidaan huolellisesti. Tulok- sena todetaan, että "wedge"-tekijä ei voi olla massana 1970-luvun lopun jälkeen tapahtuneen epäedullisen työllisyyskehityksen keskeinen selittäjä. Tässä suomalaisen kehityskuvan pohjana on otettu muista lähtökohdista näyttää siltä, että kollektiivinen "tulopoliittika" on ainakin jossakin tapauksessa myönteisvaikutuksen sijaan, että sopumattomuus ulkoisista tekijöistä on vähentänyt kansainvälisesti katsoen joustavuutta.

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1 INTRODUCTION

This article seeks to evaluate whether the use of union theories and bargaining models could shed additional light on the overall picture of the functioning of the Finnish labour market. Our examination begins with a general description of the role of labour unions in Finland. We then specify certain competing hypotheses concerning the equilibrium mechanism of the labour market. Chapter 3 explores a theoretical model chosen from the ones referred to above and provides us with a specific group of explanatory variables for wages and employment. The concept and the effects of union power are evaluated in a separate section. In Chapter 4 we examine Finland's experience of incomes policy and also consider the role of such policy on a more general level. Subsequently, there is an evaluation of trends in those time series which theoretical analysis imply as being relevant. After briefly referring to empirical estimations, some qualitative conclusions are presented.

2 FINNISH LABOUR MARKETS: INSTITUTIONAL BACKGROUND

The degree of unionization in Finland is high by international standards. Although the breakthrough occurred here later than in Sweden and Denmark, unionization took place more quickly. Table 1 shows that in 1965 only one in every three Finnish workers was a union member. At that time, the corresponding figure in Sweden and Denmark was twice as high. The rise in the degree of unionization has levelled off in Finland and Norway during the 1980s, whereas it has continued in Sweden and Denmark.

In every Nordic country there is one large wage-earner organization mainly consisting of manufacturing workers. In Denmark, unionization in manufacturing follows the trade tradition. In Sweden, Finland and Norway, organization is based on the industry principle. The most important trade unions in all the Nordic countries are led by Social Democrats, although communists have been in a strong position within the Central Organization of Finnish Labour Unions (SAK). Especially in certain industrial unions, the balance between the two labour parties remained relatively even until early 1980s. The political race has not been without effects on the labour market atmosphere.

In all the Nordic countries, the position of white-collar workers' organizations has been strengthened during the past 20 years. This is one of the important structural changes of the 1970s. The membership of the Central Organisation of the Finnish Labour Unions (SAK) has tripled from 1965¹ to 1980. The total number of members in TVK (a central organization of white-collar employees and civil servants), Akava (professionals and other persons with higher educations) and

¹In calculating the membership for 1965, the figure for the Central Organisation of Finnish Labour Unions (SAK) also includes the members of the Finnish Labour Organisation (SAJ). The two bodies amalgamated in 1966.

TABLE 1

CENTRAL UNIONS, THEIR MEMBERSHIP AND UNIONIZATION RATE IN THE NORDIC COUNTRIES IN 1965, 1970, 1975, 1980 and 1983/84

	1965	1970	1975	1980	1984
FINLAND					
1 Suomen Ammattiliittojen Keskusjärjestö (SAK)*	353 000 ¹	650 000	920 000	1 032 000	1 053 000
2 Toimihenkilö- ja Virkamiesjärjestöjen Keskusliitto (TVK)**	152 000	211 000	294 000	325 000	370 000
3 Akava***	-	42 000	130 000	162 000	207 000
4 Suomen Teknisten Toimihenkilöjärjestöjen Keskusliitto (STTK)***	-	27 000	87 000	115 000	120 000
5 Total (1 + 2 + 3 + 4)	505 000	930 000	1 431 000	1 634 000	1 750 000
6 Number of wage earners	1 526 000	1 646 000	1 846 000	1 903 000	2 035 000
7 Unionization rate (5/6)	33 %	57 %	78 %	86 %	86 %
SWEDEN					
1 Landsorganisationen (LO)*	1 565 000	1 680 000	1 918 000	2 127 000	2 196 000
2 Tjänstemännens centralorganisation (TCO)**	510 000	720 000	951 000	1 043 000	1 102 000
3 Sveriges akademikers centralorganisation (SACO-SR)***	87 000	134 000	165 000	225 000	258 000
4 Total (1 + 2 + 3)	2 162 000	2 534 000	3 034 000	3 395 000	3 556 000
5 Number of wage earners	3 397 000 ²	3 540 000	3 799 000	3 995 000	3 994 000
6 Unionization rate (4/5)	64 %	72 %	80 %	85 %	89 %
DENMARK					
1 Landsorganisationen i Danmark (LO)*	841 000	896 000	953 000	1 250 000	1 343 000
2 Faellersrådet for danske Tjenestemands- og Funktionærorganisationer (FTF)**	132 000	156 000	210 000	277 000	303 000
3 Statstjenestemaendenes Centralorganisation	38 000	45 000	47 000	43 000	48 000
4 FR-Hovedorganisationen for Arbejdsleder- og tekniske Funktionærforeninger in Danmark***	32 000	30 000	21 000	24 000	24 000
5 Akademikernes Centralorganisation (AC)***	-	-	44 000	70 000	66 000
6 Other Unions	32 000	36 000	81 000	129 000	156 000
7 Total (1 + 2 + 3 + 4 + 5 + 6)	1 068 000	1 161 000	1 356 000	1 793 000	1 940 000
8 Number of wage earners	1 761 000 ³	1 844 000	1 926 000	2 058 000	2 070 000
9 Unionization rate (7/8)	61 %	63 %	70 %	87 %	94 %
NORWAY					
1 Landsorganisasjonen i Norge (LO)*	574 000	594 000	655 000	748 000	745 000 ⁴
2 Yrkesorganisasjonenes Sentralforbund (YS)**	-	-	-	97 000	122 000
3 Akademikernes Fellesorganisasjon (AF)***	-	-	71 000	103 000	123 000
4 Total (1 + 2 + 3)	574 000	594 000	726 000	948 000	990 000
5 Number of wage earners	1 105 000	1 207 000	1 451 000	1 652 000	1 723 000
6 Unionization rate (4/5)	52 %	49 %	50 %	57 %	57 %

¹ Includes 105 000 members of former SAJ (Suomen ammattijärjestö) ² Figure for 1967.
³ Figure for 1966. ⁴ Figure for 1983.

* Mainly blue-collar workers.

** White-collar workers.

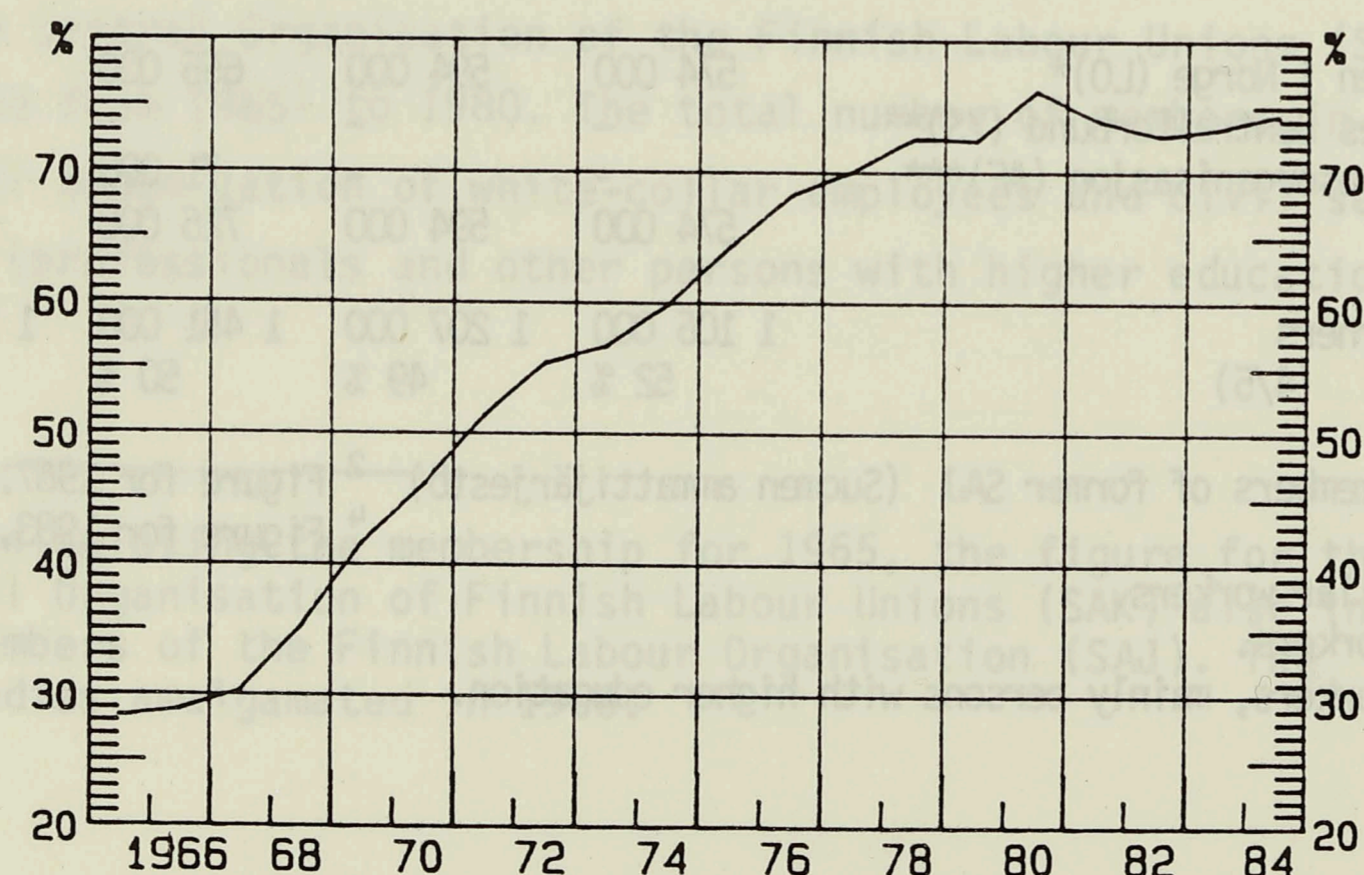
*** White-collar workers, mainly persons with higher education.

STTK (a central association for technical employees) has quadrupled. Whereas 70 per cent of all organized labour were members of the Central Organization of Finnish Labour Unions SAK in the years 1965 and 1970, the share was over five percentage points lower in 1975 and 1980. In 1984 the share of the Central Organisation of Finnish Labour Unions in organized labour was 60 per cent. Nevertheless, SAK still dominates the field. The trend has been the same in Sweden: the share of Landsorganisation LÖ in organized labour was 72 per cent in 1965, and 10 per cent smaller in 1983. A fairly similar change has taken place in Denmark.

In Sweden, Norway and Denmark, the local LÖ is the only significant central organization representing employees in private sector wage negotiations. In Finland, the SAK is without doubt the most important, although the relative position of other central organizations has been strengthened.

In Finland, public sector employees belong to various central organisations. Nevertheless, they can be extracted quite reliably from the statistics. Calculated in this manner, the degree of unionization in the private sector (Figure 1) appears to be somewhat below the average for the economy as a whole; this reflects the lower union membership in the sector producing small-scale private services. The degree of unionization in the private sector peaked in 1980 and has subsequently stabilized at the level prevailing in the late 1970s.

FIGURE 1
Private sector unionization rate in Finland, 1965 - 1984



Comprehensive wage settlements in Finland in the 1960s - that is before the stabilization policy phase - generally covered a period longer than one year. Thereafter several one-year contracts followed until two-year agreements started to become more common again (Table 2).

The Central Organization of Finnish Labour Unions (SAK) may not conclude agreements that are binding on the member unions. Agreements settled at the central-organization level only reveal their actual nature when applied at the individual-union level. Here, the terms of the comprehensive settlements have at times been clearly exceeded. During the period between 1965 and 1984, there were three years when contracts were concluded at the union level.

In the 1970s, general pay rises were often of a mixed form (for example, X marks, but at least Z per cent). As far as the overall effect of the agreements is concerned, the significance of low-pay components has generally been relatively modest and they have been applied quite freely at the union level. "Solidaristic" features in wage policy have been less pronounced than for example in Sweden. They have mainly been represented in the markka-weighting of negotiated pay increases.

In Finland, wage indexation was effective for most of the 1960s. It was abolished by law in 1968. In the 1970s and 1980s the government has contributed towards the achievement of comprehensive wage settlements mainly through certain tax arrangements (inflation adjustments of income tax brackets, changes in employers' social security contributions etc.). There has, however, been some debate as to whether commitments accorded beforehand have really increased moderation in the agreements subsequently concluded.

TABLE 2

WAGE SETTLEMENTS IN FINLAND 1964 - 90

1964 - 65	Two-year central agreement. Index clause (2/3).
1966 - 68	Three-year central agreement. Index clause (1/2).
1968 -	"One-year" (9 months) central agreement, "stabilization pact" after large devaluation of the Finnish markka in October 1967. The prevailing three-years contract was suspended and compensations based on the index clause were given up. The indexation system was abolished in general. Price controls.
1969	One-year central agreement. Comprehensive wage and price controls.
1970	One-year central agreement. Wage and price controls continued.
1971 - 72	"One-year" (15 months) central agreement. Wage and price controls were gradually weakened. Pronounced strikes.
1972 - 73	One-year central agreement.
1973 - 74	One-year contracts on industry level. Large number of strikes.
1974 - 76	"Two-year" (22 months) central agreement. So-called follow-up clause for the second year. Earnings guarantee system introduced.
1976 - 77	One-year central agreement. Price freeze for 5 months. Large number of "wild cat" strikes.
1977 - 79	Two-year central agreement. Large number of strikes in 1977.
1979 - 80	One-year central agreement. An index clause if certain threshold exceeded.
1980 - 81	One-year contracts on industry level. Large number of strikes.
1981 - 83	Two-year central agreement. An index clause with threshold and partial compensation for changes in terms-of-trade. An earnings development guarantee.
1983 - 84	One-year contracts on industry level. Large number of strikes.
1984 - 86	Two-year central agreement. An index clause with threshold and partial compensation for terms-of-trade changes. Pronounced strikes in 1984.
1986 - 88	Two-year central agreement. An index clause with thresholds for each year. An earnings development guarantee. Pronounced strikes in 1986.
1988 - 90	Two-year contracts on industry level.

3 EQUILIBRIUM OF LABOUR MARKETS: COMPETING HYPOTHESIS

Labour market parties bargain over nominal wages. Wages are settled for certain period *ex ante*, and price expectations consequently play a crucial role in the bargaining process. It is hard, however, to disagree with the hypothesis that the basic targets of the parties concern real wages. But it is simply not possible to bargain over real wages.

According to one view wages are settled

- i) by the firm unilaterally. Efficiency wage theories are in line with this hypothesis.

Another kind of market-oriented thinking is incorporated in the model where wages are determined by

- ii) labour demand and supply, i.e. by market forces. When labour supply is set to equal labour demand, $N^d(w) = N^s(w)$, a unique equilibrium real wage w^* can be solved. Related employment N^* is then received from the labour demand function. This framework is usually called a market clearing model of labour markets, in which wages adjust to a level which comply with full employment equilibrium in labour markets.

Recent labour-market research has attempted to employ greater sophistication in taking account of the role played by institutional factors. Labour market bargaining has been analyzed as a game between

two optimising parties, unions and firms. The Nash-approach² is commonly applied for this purpose, and that also represents the starting point for the specifications below.

The three following models of wage and employment determination take account of the role of unions. These are assumed to have a well-defined quasi-concave utility function $U(w,N)$. Only later is the consumption wage that is relevant to the worker formally distinguished from the production wage that is relevant to the firm.

The first of the three union models is actually not a bargaining model at all. Here we refer to

- iii) the monopoly union model, where wages are determined unilaterally by the union. The profit (π) maximizing firm then chooses an appropriate level of employment. Its problem is $\max_N \pi(w,N)$. According to the solution, the firm operates on the labour demand curve, where $\pi_N = 0$, and thus $N^d = f(w)$. The union is assumed to be aware of the labour demand schedule and thus optimises, taking it into account. Formally, the problem of the monopoly union is

$$\max_w U(w,N) \quad \text{s.t. } \pi_N = 0.$$

This gives us the equilibrium wage w^* and connected employment N^* is received by substituting w^* into the labour demand schedule.

Two other commonly used union models incorporate the bargaining aspect.

²In the static axiomatic Nash-analysis, most of the information concerning the bargaining procedure and the environment within which bargaining operates is abstracted away. The dynamic strategic approach attempts to treat concretely these missing elements. Binmore & Rubinstein & Wolinsky (1986) is a bridging contribution between the two approaches. It clarifies some key interpretational problems and thus adds discipline to the use of the Nash-solution in economic models.

- iv) In the efficient-bargaining model, the firm and the union bargain over both wages and employment. If asymmetry in strength is allowed between parties, the relevant Nash-problem is

$$\max_{w,N} (U(w,N) - \underline{U})^\beta (\pi(w,N) - \underline{\pi})^{1-\beta}$$

where β measures the union power in the bargaining process and \underline{U} and $\underline{\pi}$ refer to the so-called threat points, i.e. to the fall-back utilities that become effective if an agreement is not reached.

- v) In the right-to-manage model, the firm decides on the level of employment after the wage has been settled in a bargain. A profit-maximising enterprise operates on the labour demand curve. An optimization condition incorporating this aspect gives this model different characteristics from the previous one. The problem is now

$$(1) \quad \max_{w,N} (U(w,N) - \underline{U})^\beta (\pi(w,N) - \underline{\pi})^{1-\beta} \quad \text{s.t. } \pi_N = 0$$

The right-to-manage optimization problem reduces to that of the monopoly union model if $\beta = 1$.

4 THEORETICAL CONSIDERATIONS

In what follows, the right-to-manage-specification is chosen. In addition we assume that the economy consists of a number (n) of identical imperfectly competitive firms. Each firm produces by a simple three factor Cobb-Douglas technology, where technical progress is of Harrod-neutral labour-augmenting nature. In each period the firm uses the capital stock (K) with which it begins the period: any investment undertaken during the period only influences the capital stock for the next period. In the production function, inputs (i.e. materials (m)) are separable from capital and labour. Immediate adjustment is assumed to occur in product markets: supply is therefore always equal to demand.

A model for a symmetric game between unions and firms is specified in Appendix. This piece of theory applies several explicit behavioural assumptions. These help us to define not only the variables in the relevant equations, but also their signs. Though derivations are not described in detail, the underlying assumptions are. This gives the reader an opportunity to see the channels through which each variable enters the final formulas. On the other hand, the results do not appear to be particularly sensitive to the choice of the underlying assumptions. Literature provides several examples of slightly differing models leading to broadly similar equations.

The concept of union power is at the core of bargaining models. This is why its role is discussed in detail here. The equations in appendix could have been derived also within an asymmetric specification (1), but the presentation would have become even more complicated.

In several studies, union power has been introduced *ad hoc*. Andrews & Nickell (1983) argue that the "fall-back" profit, π , is inversely related to it. Two estimates were employed as a measure of union power. One was union density and the other was the union/non-union

wage mark up. In estimations - not only in those of Andrews and Nickell but also more generally - the role of union power is often found to be insignificant and/or of minor importance. This may be due to problems in finding good proxies, but it can also be interpreted as a reflection of the lack of actual importance of unions in the countries concerned.

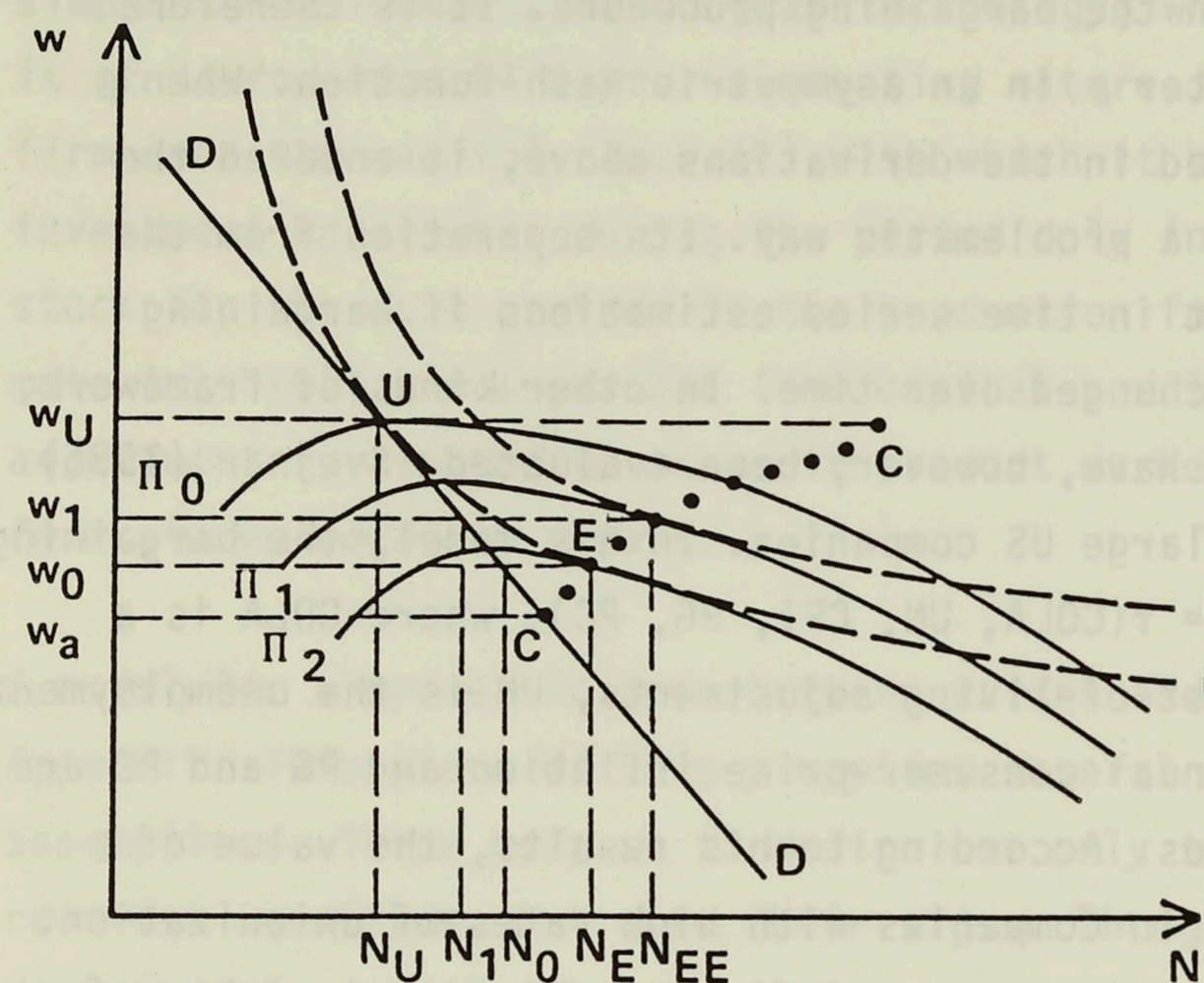
In what follows, union power is introduced as a parameter contributing to asymmetry in the bargaining procedure. It is therefore related to the parameter β in an asymmetric Nash-function. When β was explicitly included in the derivations above, it entered the theoretic formulas in a problematic way. Its separation from the intercept is difficult in time series estimations if bargaining power has remained unchanged over time. In other kinds of framework, numerical values of β have, however, been evaluated. Svejnar (1986) uses data on several large US companies. In his model, the bargaining power of unions is $\beta = f(\text{COLA}, \text{UN}, \text{CPI}, \text{PG}, \text{PC})$, where COLA is a dummy referring to cost-of-living adjustments, UN is the unemployment rate, CPI measures annual consumer-price inflation and PG and PC are incomes policy dummies. According to his results, the value of β varies greatly - even in companies with high rates of unionization. Rowlatt (1987) introduces a wage equation in which the weights of targets relevant to firms on the one hand and unions on the other are estimated using macrodata for manufacturing industry in the United Kingdom. According to her results, workers' targets have received a weight four times greater than those of employers.

Nevertheless, careful consideration should be given to the question of whether relative bargaining positions can be assumed to remain unchanged over time. The answer should depend on empirical findings and is clearly both country- and period-specific. There is no doubt that the relative strength of Finnish unions is today very different from that of 20 years ago.

The effects of changes in β on the (w, N)-outcome are analyzed in Figure 2. Let us assume that a bargaining outcome has been found at point E, where the iso-profit curve π_2 and iso-utility curve I_1 meet

each other. This outcome (w_0, N_E) lies on the contract curve, CC, and is pareto-efficient. On the other hand, the right-to-manage hypothesis argues that an optimising enterprise operates on the labour demand curve, DD. One possible outcome could be (w_0, N_0) . It should be noted that in this case the employment connected with wage level w_0 is lower than in the efficient-bargaining model as $N_0 < N_E$.

FIGURE 2
Union power, wages and employment



If the union had been stronger than in the previous example, its share of total utility would have grown larger. In an efficient-bargaining model the outcome could be found at (w_1, N_{EE}) , where the iso-utility curve I_2 meets the iso-profit curve π_1 which indicates lower profits than before. It is easy to see that in efficient bargains a growing union pushes up both wages and employment. On the other hand, in the right-to-manage model the outcome would have moved up along the labour demand curve. In that case, the rise in union utility manifests itself in a combination of higher wages but decreased employment.

It should be noted that if firms permanently operate on the labour demand curve, the motivation of a union to engage in bargaining vanishes when it grows stronger. Lack of opportunities to influence employment leads to a tendency for strengthening unions to impose wages unilaterally. When the value of β -parameter approaches one,

the right-to-manage model approaches the monopoly union model, where employment is N_U and wage level, w_U . The outcome U is found at the point where the iso-utility curve I_1 meets the labour demand curve, DD. It is interesting to note that U is the best outcome available for the union if the firm acts in line with the right-to-manage hypothesis.

Another result with profound implications is that the outcome U gives the firm less profit than any relevant³ alternative in line with either the efficient-bargaining or right-to-manage model. Conventional reasoning behind the right-to-manage hypothesis argues that a firm cannot be obliged to keep any employment obligations. The above sheds new light on this. At least in some cases, the firm may reach a lower, i.e. a more favourable, iso-profit curve if it can also trade credibly with employment. The right-to-manage model is often described as a more realistic intermediate case between the monopoly union model and the efficient-bargaining model. Now it also appears to be a restricted special case.

In a more general setting, the effects of the strengthening of unions on the (w, N) -pair remains unsettled, particularly since in time series estimations the outcome may even reflect the speed of adjustment in relation to time aggregation. Even when firms tend to adjust employment towards the labour demand curve and thus behave fundamentally in accordance with the right-to-manage hypothesis, estimations may not show a negative effect of union power on employment if adjustment is slow. This means that one must be very careful when interpreting results concerning the effects of union power on employment. Behaviour may also vary from one branch to another. Furthermore, the shape of the contract curve depends on the degree of the union's risk aversion. A vertical contract curve is relevant for a risk-neutral union. In this case, a change in the bargaining power of the unions has no effect on employment.

³The minimum profit condition $\pi > \pi_0$ restricts the part of contract curve above π_0 outside the set of relevant outcomes.

Manning (1987) introduces a generalised model which gives all other relevant union models as special cases. Bargaining is modelled as a two-stage process: wages are determined in the first stage and employment in the second. The power of the union to obtain a favourable outcome may not be the same in both stages. The second phase can be expressed as a Nash-function.

$$(2) \quad \max_N (U(w, N) - \underline{U})^\alpha (\pi(w, N) - \underline{\pi})^{1-\alpha},$$

where α expresses the ability of the unions to influence employment. From (2) a unique labour demand curve $N(w, \alpha)$ can be solved.

The first phase is

$$(3) \quad \max (U(w, N(w, \alpha)) - \underline{U})^\beta (\pi(w, N(w, \alpha)) - \underline{\pi})^{1-\beta},$$

where β measures union power in wage negotiations.

This model differs from the right-to-manage model with regard to the determination of labour demand. In the former, the profit-maximising firm unilaterally chooses a level of employment consistent with given wages. The Manning-model reduces to an identical specification when $\alpha = 0$ and thus the union has no influence on employment. If on the other hand $\alpha = \beta$, the bargaining power of the unions is equal with respect to wages and employment. In this case, the model reduces to the efficient-bargaining model. If $\alpha = 0$ and $\beta = 1$, we have a monopoly union model. In standard specifications there are discrete jumps from one model to another. In the generalized model this discontinuity does not occur.

It is not hard to believe that $\alpha \neq \beta$ on real labour markets. Manning refers to evidence from the United Kingdom which suggests that wage negotiations are carried out on a higher hierarchy level. On the other hand, it is not even possible to specify employment throughout a large enterprise or an industry in a formal collective bargaining process. Employment decisions are more commonly discussed at the

level of the plant or place of work. Moreover, a strike threat is more credible when it concerns wages than the number of employed persons. Wages concern all union members, while the issue of unemployment touches a much smaller proportion. A similar argument is also relevant for Finland.

Manning shows that the inefficiency of the outcomes is not caused by unions per se but rather by variations in union power across different issues. In other words, unions do not exercise the same amount of influence on employment and wages. The greater the value of $|\beta - \alpha|$, the more severe is the inefficiency. If $\beta > \alpha$, both sides may gain if union influence on employment increases.

The sign of β in the employment equation was discussed above. Manning considers a wage-employment bargain between risk-neutral employers and a risk-neutral utilitarian union. In this case, an increase of union power in the field of wages leads to lower equilibrium employment, whereas an increase of union power in the field of employment raises equilibrium employment, that is $N_\beta^* < 0$ ja $N_\alpha^* > 0$. This additionally emphasizes the importance of empirical findings in drawing any conclusions. At the same time, however, it highlights the need for care in the interpretation of estimation results. If β and α are proxied by the same variables, it may be hard to find an unambiguous alternative - a positive coefficient of union power proxy in an employment equation may rather imply that within a certain period union influence on employment has increased more than that on wages. In such circumstances, the second of the two partial derivatives above would have dominated the picture.

In the static analysis most often applied when bargaining models are analyzed it is not possible to analyze a temporary production stoppage caused by a strike. The fall-back income in the event of a breakdown in negotiations was specified as the alternative wage, W_a , in Appendix. If strike were allowed, i.e. if the analysis were dynamic, the income at the threat point could be operationalised as the strike allowance, S . On the other hand, the alternative wage in the welfare function of a utilitarian union (see (6') in Appendix) refers to an income for

members with no union job. It is operationalised as the unemployment benefit, B. Here then is our final model in its most general form:⁴

$$(4) \quad N^* = N(\tau_1, \tau_2, \tau_3, \beta, P, P_m, Q, B, S, K, t)$$

$\begin{matrix} - & - & - & ? & + & - & + & - & - & ? & ? \\ \tau_1 & \tau_2 & \tau_3 & \beta & P & P_m & Q & B & S & K & t \end{matrix}$

$$(5) \quad W^* = W(\tau_1, \tau_2, \tau_3, \beta, P, P_m, Q, B, S, K, t)$$

$\begin{matrix} + & + & + & + & + & - & + & + & + & + & + \\ \tau_1 & \tau_2 & \tau_3 & \beta & P & P_m & Q & B & S & K & t \end{matrix}$

It should be noted that equations (4) - (5) can be interpreted as a kind of reduced forms. Wages are not explained by employment nor vice versa. Instead, there is an activity variable in both equations, which entered the analysis via the product demand function. The reasoning behind the chosen expressions could be the following one:

"What does it mean to say that high unemployment is caused by high real wages? Are not real wage rates and unemployment both endogenous variables in any reasonable picture of a modern capitalist economy?... We have to adopt the right procedure, which is to look for the true exogenous variables."

Robert Solow (1986, s. 24-25)

Thus we argue that in the longer run both wages and employment - and fundamentally their combination - adjust to changes in the tax structure, the growth trend of production, relative prices etc. The last-mentioned are considered exogenous⁵ in our analysis. It would be rather difficult to incorporate this kind of idea into the structural forms more commonly considered in literature.

⁴The variables are: 1) τ_1 = employers' social security contributions, 2) τ_2 = income taxes, 3) τ_3 = indirect taxes, 4) β = union power, 5) P = producer prices, 6) P_m = prices of raw materials (incl. energy), 7) Q = gross production, 8) B = unemployment benefits, 9) S = strike allowances, 10) K = capital stock (predetermined), and 11) t = technical progress.

⁵Taken literally, this is of course open to counter-arguments, as in more general systems most of the variables listed here can be considered endogenous.

5 INCOMES POLICY IN FINLAND

The implications of union theories for the analysis of labour market developments were discussed above. We must now deal with the concept of incomes policy - an essential concept in the Finnish labour market debate since the late 1960s. What role can it have here?

In 1967 the Economic Council nominated by the Finnish government defined incomes policy as follows:

"Incomes policy is to be regarded as a rather extensive part of economic policy, the effects of which are reflected in price formation, income distribution and the allocation of resources... Incomes policy is not regulatory policy nor just wage policy, but examination and arbitration activity concerning all incomes and income recipient groups, with the aim of guiding price and income formation in the way required by the goals set in economic policy."

The above is a very extensive and ambitious definition. In actual fact, nearly all the comprehensive agreements made during the 1970s and 1980s have been referred to in the same breath as incomes policy in public discussion, even though the nature of the settlements has varied greatly. Whereas in literature the key role of the government (through guidelines for wage setting) has been an important criterion for defining incomes policy, discussion in Finland has hardly paid any attention to conceptual questions.

When discussing incomes policy, it is useful to make a distinction between short-term stabilization policy, a sort of shock treatment, and incomes policy as a permanent policy rule with definite longer-term goals. - In October 1967 the Finnish markka was devaluated by more than 30 per cent with respect to other currencies. This action

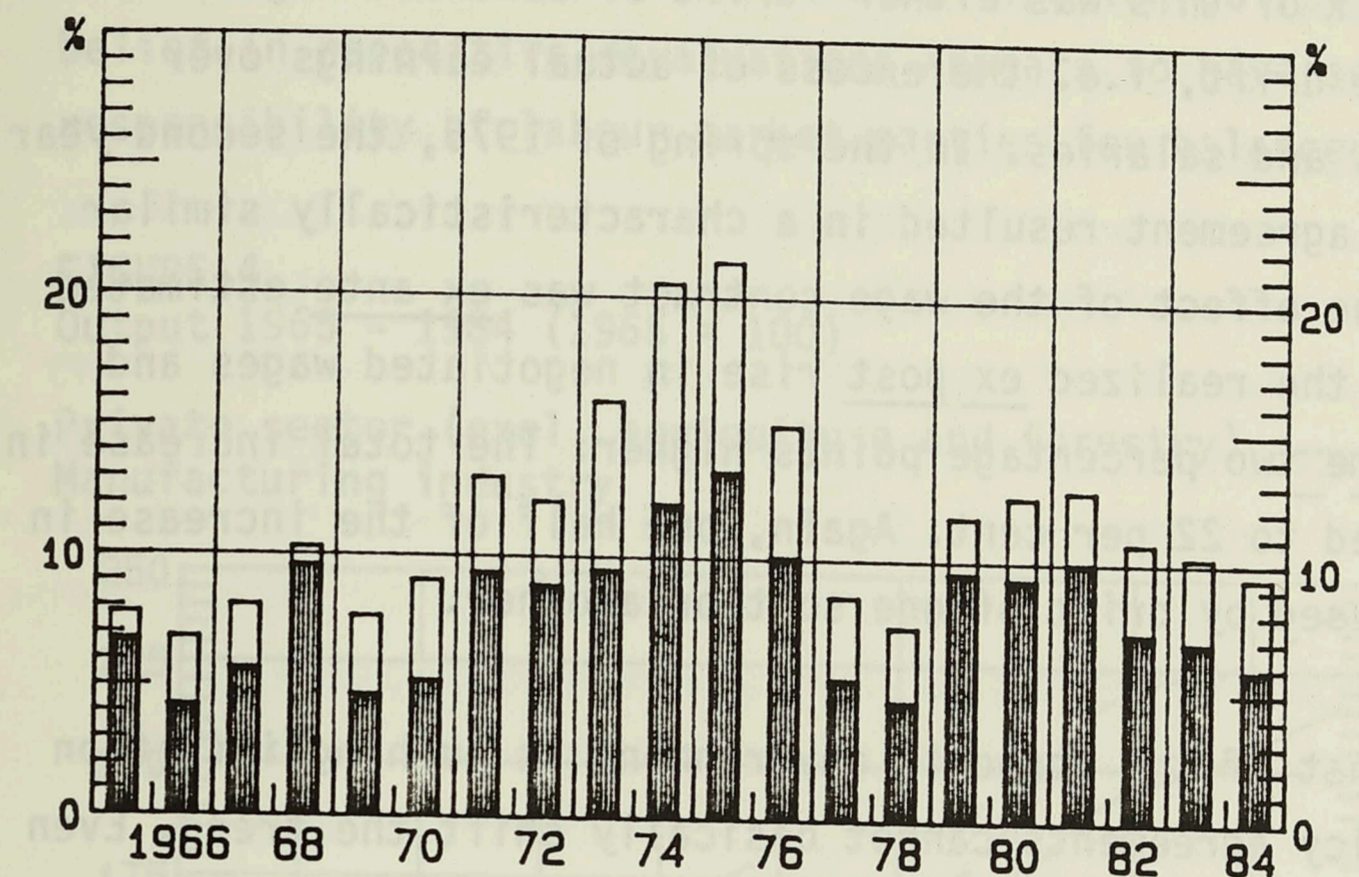
was designed to support the competitiveness of Finnish exports and maintain corporate profitability. Price inflation accelerated as a result. Existing index linkages threatened to bring about an inflationary spiral and a rapid loss of the benefits derived from the devaluation. In order to stop the vicious circle, a stabilization pact was concluded in March 1968, and this is regarded as the dawn of "the era of incomes policy." As a condition for their co-operation the unions demanded that the government be given the authority to regulate not only wages and salaries but also prices, rents and various other charges. They also required the dismantlement of indexation in general.

The degree of success was astonishing. Consumer prices rose by 2 1/2 per cent during one year, and from April 1968 to end-1970 by only 7 per cent, although the immediate inflationary impact of import price increases was about five percentage points. Wages and salaries rose by about twenty per cent over the same period. If one looks at the years 1968 - 1970 as a whole, it is difficult to argue that stabilization policy curbed wage rises compared to previous years (Figure 3). Viewed against the background of the economic environment, however, stabilization policy did hold wage inflation in check.

The "inflation miracle" of the stabilization years was the product of a number of happy coincidences. It was primarily based on extraordinary productivity gains: in 1967 - 1970, labour productivity improved by more than 25 per cent. The pressures on prices remained low, despite large rises in nominal earnings. Even though real earnings increased, the trend in income distribution favoured the corporate sector - the devaluation was a contributory factor, here. Towards the end of the 1960s, as the international upswing began to carry export volumes upwards, the corporate position improved still further, fences were ready to be torn down and the fruits of the stabilization period were eaten up quickly. Already in 1971 Finland belonged to the top league of OECD countries as far as consumer price inflation was concerned. The phase of slow domestic inflation was nothing more than a veil hiding the continued strength of fundamental inflation processes.

FIGURE 3
Level of earnings and wage contracts in the private sector
in 1965 - 1984

The level of earnings index, percentage change
Effect of wage contracts on earnings index



Despite the reservations presented above - or rather because of them - the success of incomes policy should not be evaluated by looking at one agreement period in isolation. Pressures passed on from one period to the next deserve attention. Compensatory claims that have smoldered for a longer time tend to lead to overshoots and a spiral of imbalances.

Curbing the rise in the price and cost level has often been presented as a general aim of incomes policy. The agreements made in 1974 - 1976 provide a demonstration of the possibilities for success in the conditions of an upswing - and perhaps also generally in conditions of excess demand for labour. Developments in these years were strongly influenced by a forceful cost and demand shock stemming from foreign trade prices. No attempt was made to alleviate these effects by means of economic policy measures. The upswing overheated the economy, causing the emergence of an excess demand for labour.

It was estimated that the agreement concluded in the spring of 1974 (one of the agreements mentioned above) would raise earnings by about 10 per cent. The realized impact was nearly 3 percentage points

greater! Even though it is difficult to estimate the actual effects of complex agreements, a large part of this deviation reveals that the contracts made at union level exceeded the pay increases agreed centrally. When the total level of earnings rose by over 20 per cent in 1974, one half of this was either "drift of contract wages" or traditional wage drift, i.e. the excess of actual earnings over negotiated wages and salaries. In the spring of 1975, the second-year revision of the agreement resulted in a characteristically similar outcome. When the effect of the wage contract was *ex ante* estimated at 11 per cent, the realized *ex post* rise in negotiated wages and salaries was some two percentage points higher. The total increase in earnings amounted to 22 per cent. Again, one half of the increase in earnings was caused by drift of one sort or another.

It is evident that if the economic environment is pushing inflation up, incomes policy agreements cannot basically shift the trend. Even an impressive incomes policy manoeuvre is doomed to failure unless it is in line with the rest of the economic policy.

Let us once more return to the experiences of the 1970s. By the middle of the decade, the balance in the economy was badly shaken. The current account had gotten badly out of hand, and the rate of inflation was approaching twenty per cent. Although the growth of output had come to an halt, labour was "hoarded" and employment remained high.

Neither monetary nor fiscal policy was able to curb the price-wage spiral that was being exacerbated by domestic factors. The incomes policy settlement concluded in the spring of 1976 raised earnings by 10 per cent, and wages still drifted by nearly 5 per cent in excess of this. Although the international recession was already on its way, there was little sign of worry in the Finnish labour market. This might be due confidence in the helping hand of the central bank after competitiveness had been eroded away. - An essential adjustment of wages and salaries only started after output had exhibited no growth for two years (cf. Figure 4) and the rate of unemployment had tripled from 2 per cent in 1975 to 6 per cent in 1977. Contract wage and salary increases in the spring of 1977 were reduced to 5 per cent, and even wage drift was small in comparison with previous years.

Experiences of incomes policy that have been gained thus far seem to indicate that the consensus required for a successful and ambitious incomes policy is only born out of compulsion, in other words, when the economic balance has already been deviated from. The consensus is easily broken, as the collapse of the stabilization policy showed. The learned belief in repetitive devaluations appears to have served to lessen the responsibility of labour market parties for balanced development.

FIGURE 4
Output 1965 - 1984 (1965 = 100)

Private sector (excl. agriculture and forestry) ———
Manufacturing industry - - - - -

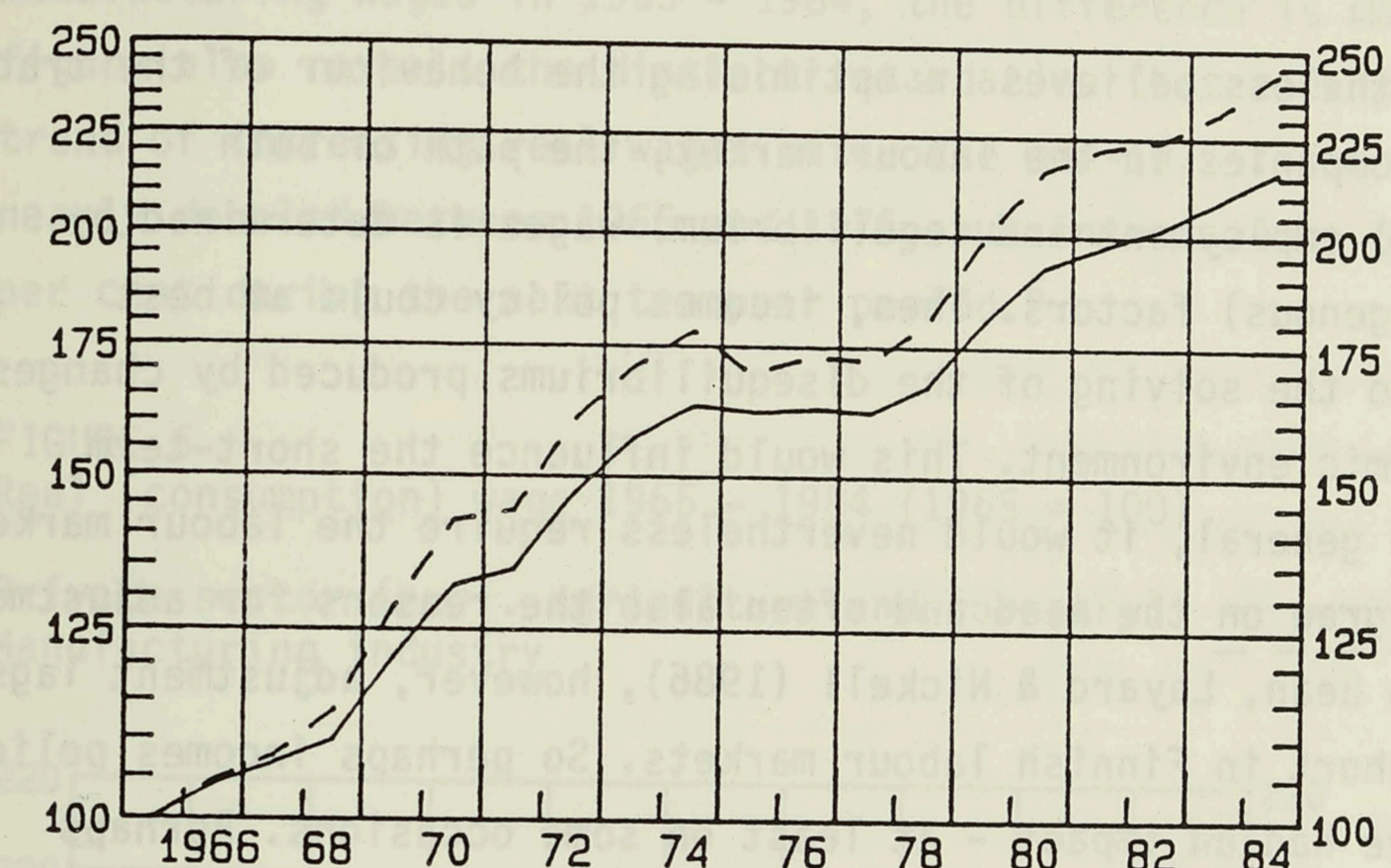
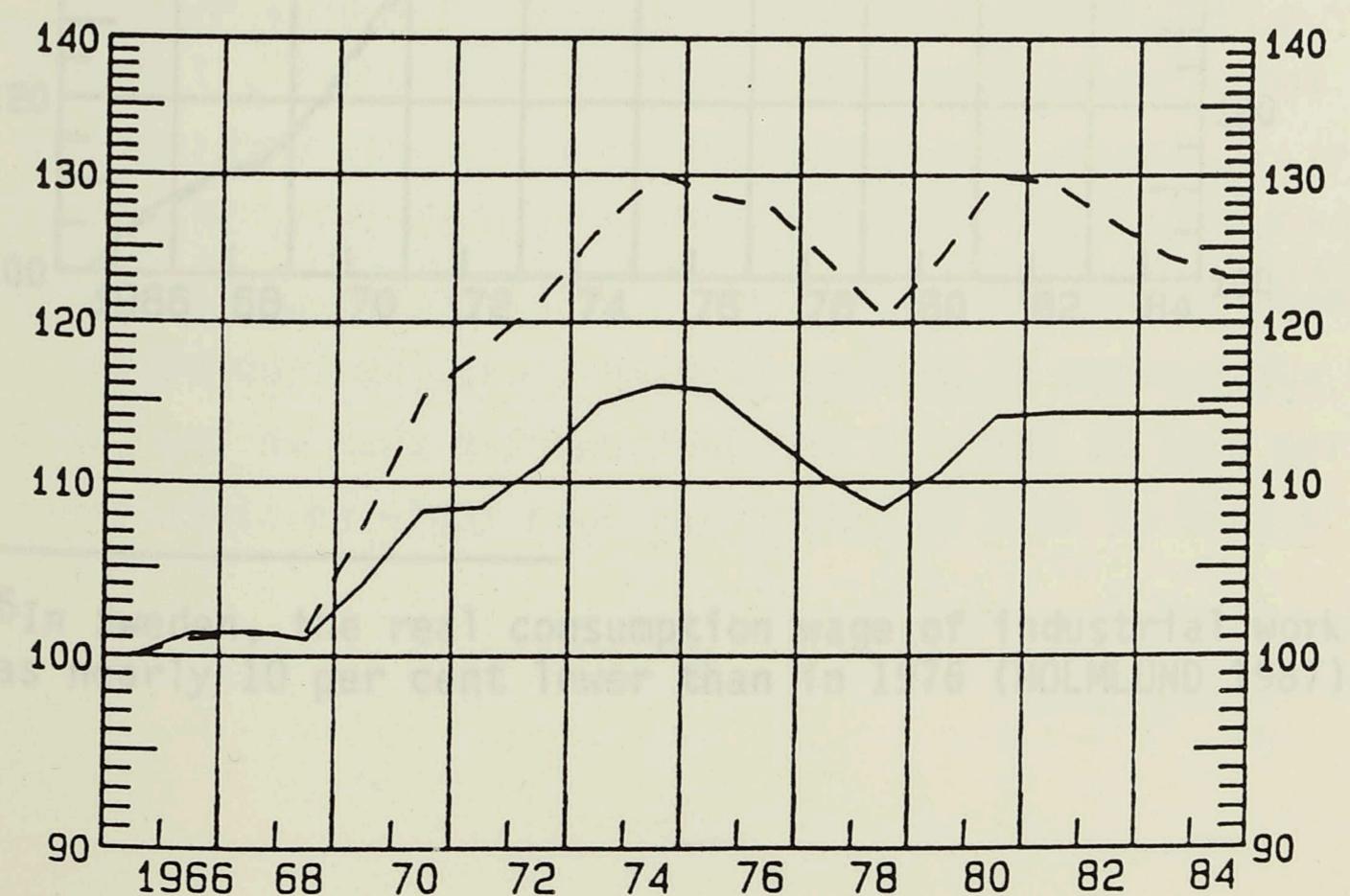


FIGURE 5
Employment 1965 - 1984 (1965 = 100)

Private sector (excl. agriculture and forestry) ———
Manufacturing industry - - - - -



We have discussed incomes policy above. From 1968 up until the present day, the concept of incomes policy has become progressively looser and more indefinite in the public debate. In present usage, it appears to resemble the concept of a centralized wage settlement. In this sense, talking about incomes policy is not far from shadow boxing. If, however, it is considered desirable to give incomes policy more ambitious aims - as did the Economic Council in 1967 - they can only be realized when incomes policy and other economics policy march in step. - The source of problems in the "incomes policy era" has rarely been in incomes policy itself. As has already been suggested, it may have a more pronounced role only as part of economic policy in general.

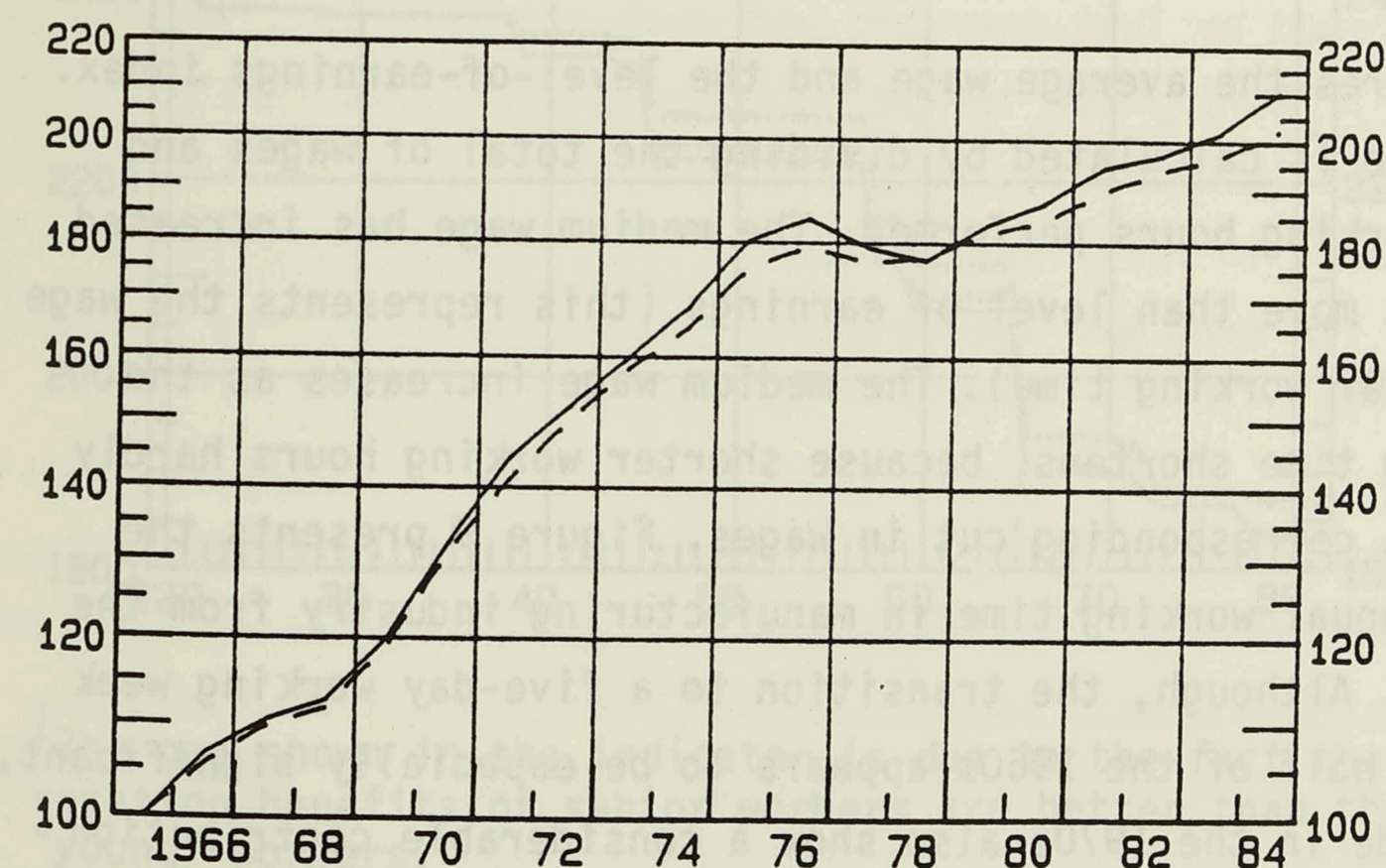
If one nevertheless believes in optimising the behaviour of the trade unions and companies in the labour market, the path of both (equilibrium) employment and (equilibrium) wages is determined by certain (exogenous) factors. Then, incomes policy could at best contribute to the solving of the disequilibriums produced by changes in the economic environment. This would influence the short-term dynamics. In general, it would nevertheless require the labour market parties to agree on the need and often also the reasons for adjustment. According to Bean, Layard & Nickell (1986), however, adjustment lags are rather short in Finnish labour markets. So perhaps incomes policy measures have had an impact - at least on some occasions. Perhaps Finland's collective consensus policy has been able to contribute towards a shortening of the adjustment lags, at least in comparison with other countries.

6 WAGES, EMPLOYMENT AND CONTRIBUTORY FACTORS

In ordinary language the term "real wage" usually refers to nominal earnings of wage and salary earners, deflated by consumer prices. In theoretical discussion this is called the real consumption wage. It is to be distinguished from the labour cost paid by the employer, the product wage. Figure 6 shows that even though the real consumption wage of the aggregate private sector has risen slightly faster than manufacturing wages in 1965 - 1984, the difference is marginal. The figure also reveals the distinct retardation that took place in the trend of increasing real wages after the mid-1970s. The real wages nearly doubled between 1965 and 1975, but increased by only 10 - 15 per cent during the next ten year period.⁶

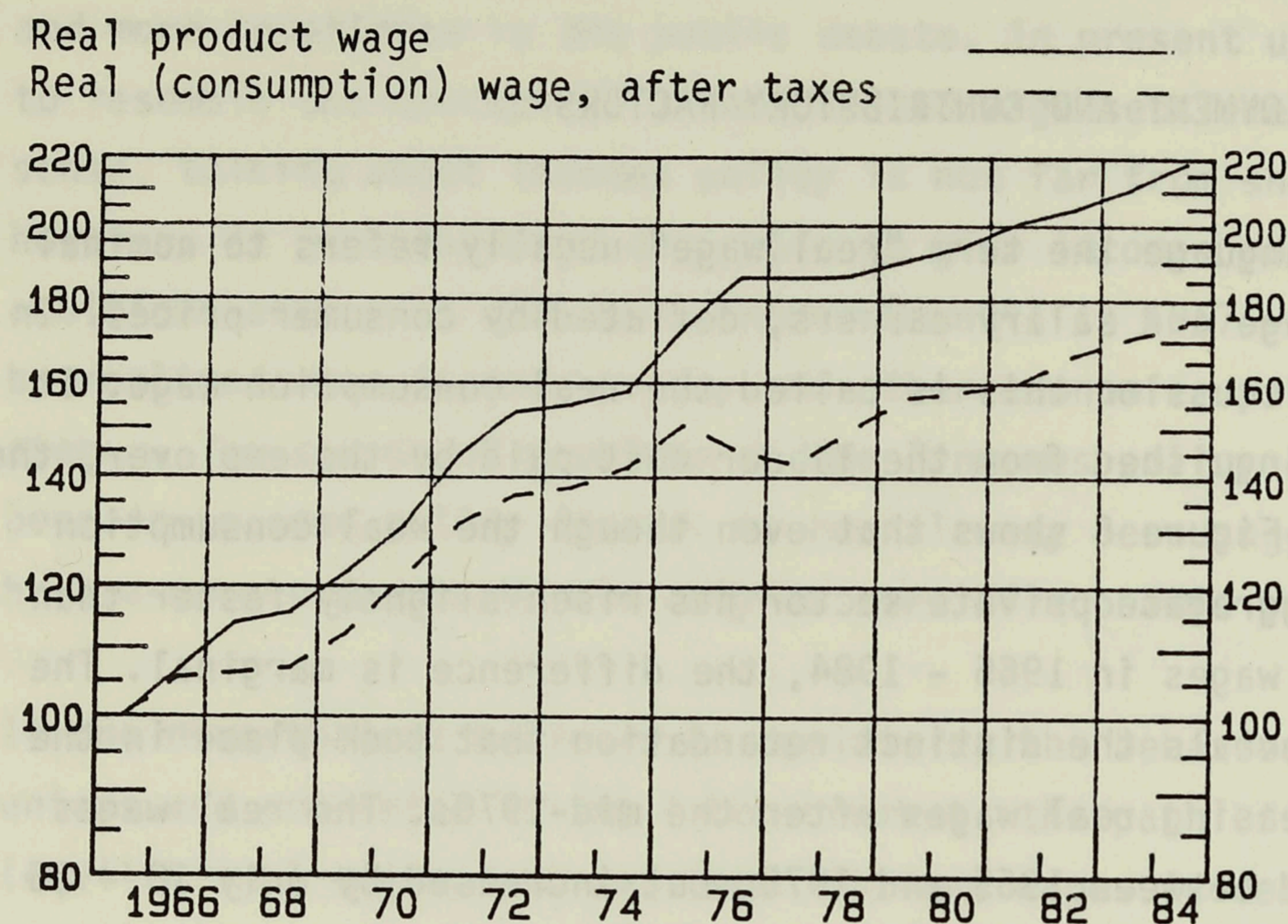
FIGURE 6
Real (consumption) wage 1965 - 1984 (1965 = 100)

Private sector (excl. agriculture and forestry) ———
Manufacturing industry - - - - -



⁶In Sweden, the real consumption wage of industrial workers in 1984 was nearly 10 per cent lower than in 1976 (HOLMLUND 1987).

FIGURE 7
Various real wage concepts, private sector (1965 = 100)



In the foregoing we have emphasized the difference between the relevant real wage concepts for companies and wage earners. Figure 7 shows how large the divergence has become. While real take-home pay grew by 75 per cent during twenty years, real labour costs increased by almost 50 per cent more.

Figure 8 compares the average wage and the level-of-earnings index. The medium wage is calculated by dividing the total of wages and salaries by working hours performed. The medium wage has increased by 40 per cent more than level of earnings (this represents the wage paid for regular working time). The medium wage increases as the annual working time shortens, because shorter working hours hardly ever involve a corresponding cut in wages. Figure 9 presents the theoretical annual working time in manufacturing industry from the 1920s onwards. Although, the transition to a five-day working week in the latter half of the 1960s appears to be especially significant, agreements made in the 1970s also show a considerable contribution towards the achievement of shorter working time. The theoretical annual working time is today 25 per cent shorter than in the 1920s, and roughly a half of that reduction has been achieved since the mid-1960s.

FIGURE 8
Medium wages/level-of-earnings index, private sector, 1965-1984
(1965 = 100)

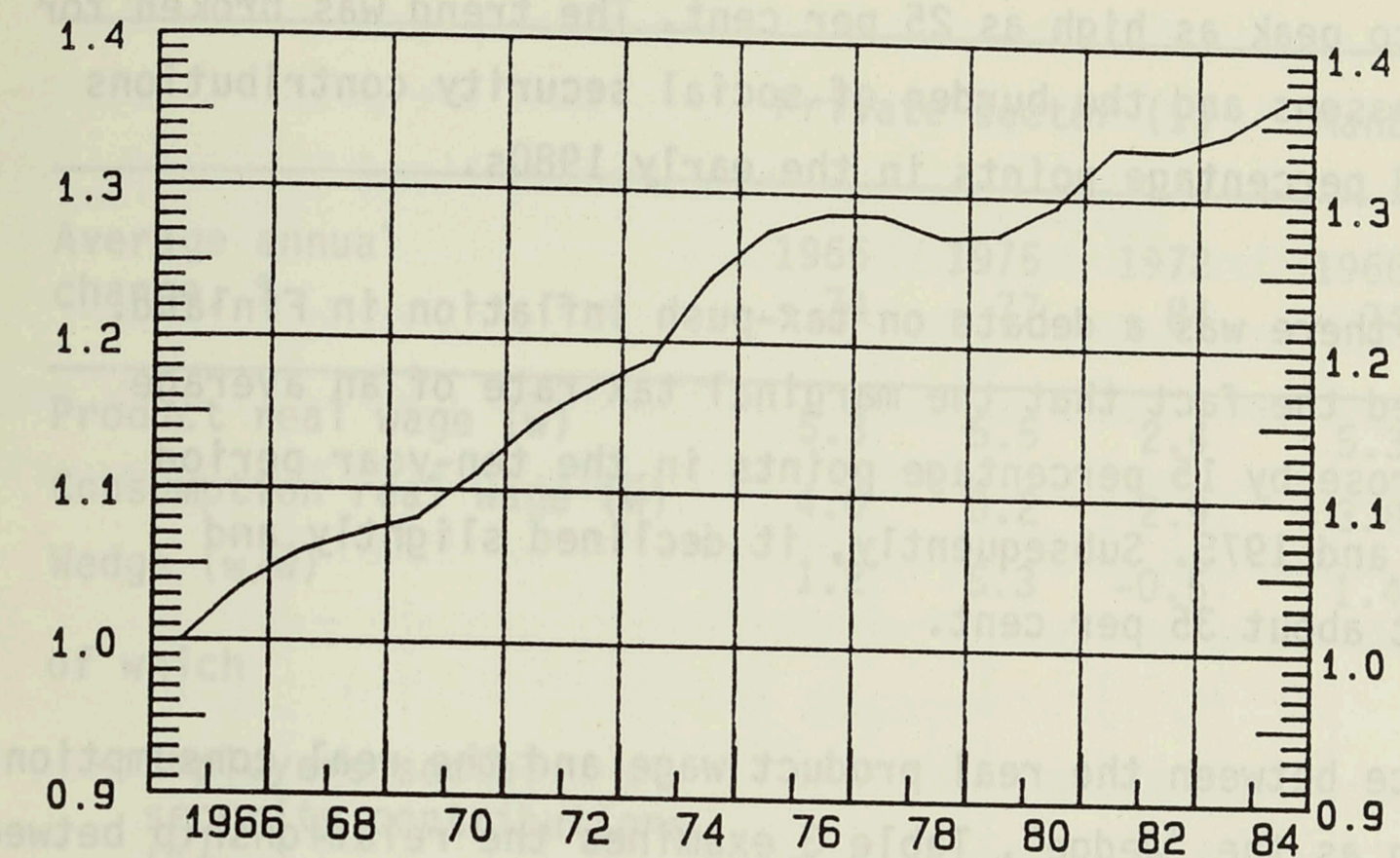
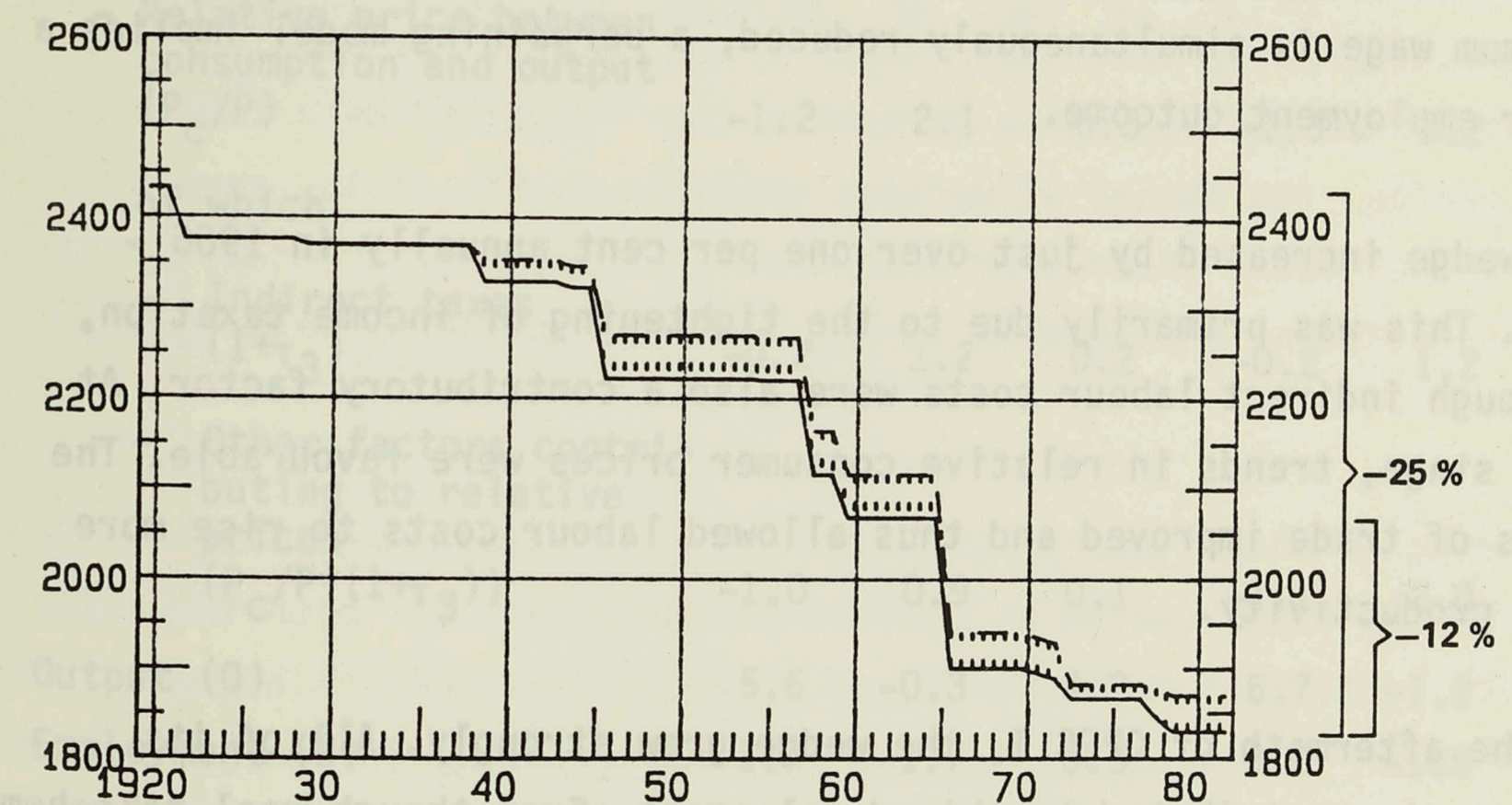


FIGURE 9
Theoretical annual working time¹, manufacturing industry, 1920-1982



¹The gap shown in the indicator is due to the fact that the vacation benefits of senior workers are better than those of "young" workers.

The product wage paid by the company includes all labour costs. Employers' social security contributions increased rapidly in 1965 - 1977. In manufacturing, their share in labour costs rose from 12 per cent to peak as high as 25 per cent. The trend was broken for employment reasons and the burden of social security contributions fell by 2 - 3 percentage points in the early 1980s.

In the 1970s there was a debate on tax-push inflation in Finland. This reflected the fact that the marginal tax rate of an average wage earner rose by 15 percentage points in the ten-year period between 1965 and 1975. Subsequently, it declined slightly and stabilized at about 35 per cent.

The difference between the real product wage and the real consumption wage is known as the "wedge". Table 3 examines the relationship between productivity and labour costs on the one hand, and changes in the wedge on the other. According to theoretical examination, an increased wedge raises the real-wage targets of the unions. As a company's optimum wage is simultaneously reduced, a bargaining model implies a lower employment outcome.

The wedge increased by just over one per cent annually in 1966 - 1974. This was primarily due to the tightening of income taxation, although indirect labour costs were also a contributory factor. At this stage, trends in relative consumer prices were favourable. The terms of trade improved and thus allowed labour costs to rise more than productivity.

In the aftermath of OPEC I, the wedge grew strongly. All of its components contributed to this development. Even though real take-home pay did not increase at all in 1975 - 1977, corporate labour costs rose at an annual rate of 5 to 6 per cent - considerably more than the productivity gains realized during the recessionary stage of the economy. The result was a contraction of employment (Figure 5).

TABLE 3
DECOMPOSITION OF PRODUCT REAL WAGE CHANGES

	Private sector (1)			Manufacturing		
	1966 - 74	1975 - 77	1978 - 84	1966 - 74	1975 - 77	1978 - 84
Average annual change, %						
Product real wage (\hat{w})	5.3	5.5	2.4	5.3	6.6	2.4
Consumption real wage (\tilde{w})	4.0	0.2	2.9	3.8	0.3	2.6
Wedge (\hat{w}/\tilde{w})	1.2	5.3	-0.5	1.4	6.3	-0.2
of which						
- Employers social security contributions ($1+\tau_1$)	0.6	1.2	-0.3	0.8	1.0	-0.2
- Income tax factor ($1-\tau_2$)	1.9	1.9	-0.6	1.9	1.9	-0.6
- Relative price between consumption and output (P_c/P)	-1.2	2.1	0.3	-1.3	3.2	0.6
of which						
- Indirect taxes ($1+\tau_3$)	-0.2	1.2	0.2	-0.2	1.2	0.2
- Other factors contributing to relative prices ($P_c/P*(1+\tau_3)$)	-1.0	0.9	0.1	-1.1	2.0	0.4
Output (Q)	5.6	-0.3	4.3	6.7	-1.2	5.1
Employment (N)	1.7	-1.7	0.5	3.0	-1.6	-0.1
Labour productivity (Q/N)	3.9	1.4	3.7	3.6	0.5	5.2

(1) Agriculture and forestry excluded.

Table 3 shows that the upward trend in the wedge was broken in years 1978 - 1984. This differs markedly from the experience in Sweden, for example.⁷ On the other hand, both Finland and Sweden have seen the growth of real wage costs remain below productivity growth. At the same time, real take-home pay has risen more than the product wage in Finland. However, in Sweden real-take home pay declined in 1977 - 1985. The difference in trends is dramatic, here.

The observations made above suggest that the wedge ought not be blamed for the weakening of employment that has taken place in recent years in Finland. Slackening growth of production is an essential contributory factor.

With exception of the years after OPEC I, economic growth in Finland has been fairly rapid - at least in comparison with other OECD countries. The rate of increase in employment has, however, been significantly slower than the growth of production. Between 1965 and 1984 manufacturing output increased by a factor of 2.2, while employment grew by less than 15 per cent.⁸ During the same period, production in the aggregate private sector increased by a factor of 2.5, whereas the number of persons employed in the sector rose by just over 20 per cent. These same years saw a doubling of the capital stock in manufacturing and an even larger increase in the private aggregate sector.

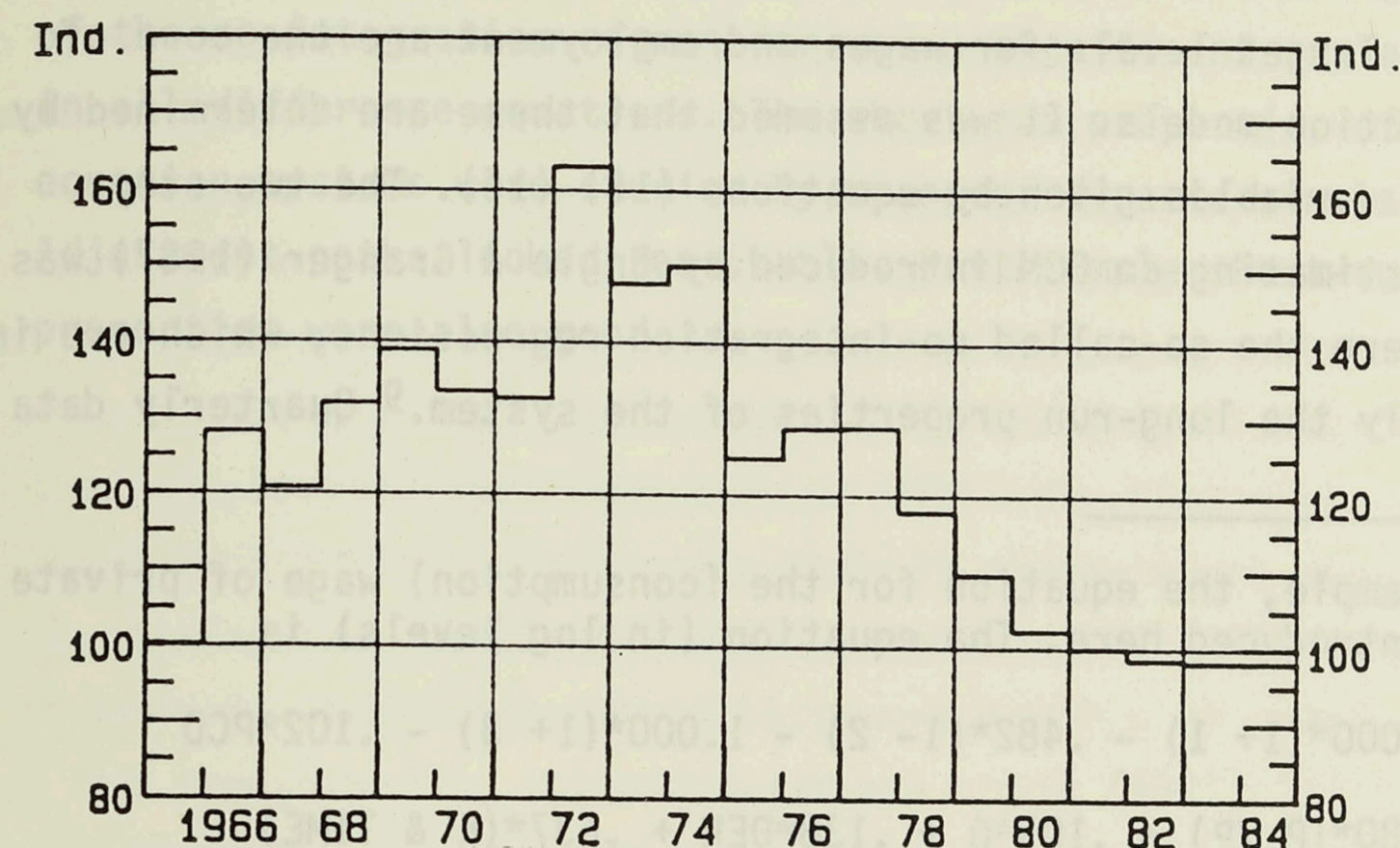
According to union theories, an increase in unemployment benefits (B) reduces the costs caused by diminished employment for both the union and its individual members. Figure 10 shows that the replacement ratio (B/W) rose up until 1972 but has subsequently fallen back to the level of the mid-1960s. Averaged out over the period under study, union members accounted for one tenth of the financing of unemployment and the proportion has varied procyclically. On the whole, the

⁷See Calmfors & Forslund (1988).

⁸In Sweden, the number of industrial workers declined in the same period by about 15 per cent.

replacement ratio did not exhibit any permanent shifts of the kind that should have contributed to an overall change in the equilibrium real wage or employment during the period discussed.

FIGURE 10
Replacement ratio (B/W) 1965 - 84, (1965=100)



7 ESTIMATIONS: A SHORT NOTE

Detailed estimation results will be published separately in the Bank of Finland Discussion Papers, and only a very short description is given here. Target levels for wages and employment are the core of error correction models. It was assumed that these are determined by the sets of variables given by equations (15)-(16). The two-step method of estimating an ECM introduced by Engle & Granger (1987) was employed. Here the so-called co-integration regressions, which are in levels, imply the long-run properties of the system.⁹ Quarterly data

⁹As an example, the equation for the (consumption) wage of private sector is introduced here. The equation (in log levels) is

$$W = P_c - 1.000*(1+ 1) - .482*(1- 2) - 1.000*(1+ 3) - .102*PCD \\ - .080*(P_m/P) + .105*Q + .138*DEN + .637*(K \& TIME)$$

with R2 = .980, R2C = .978, CRDW = 2.111, ADF = 5.87, SE = .019.

Between nominal wages and consumer prices first order homogeneity was assumed to hold in the long-run. In a free estimation the coefficient of the price term was marginally - but never significantly - different from one. The coefficient of social security contributions and the coefficient of indirect taxes were less than -1 in the free estimations. As this was considered an inconvenient property, these coefficients were restricted to equal -1 in the final estimations. The data easily accepted this. The introduction of restrictions had a minor impact on other coefficients as well as on the statistical properties of the equation in general.

The dependent variable in the corresponding error correction equation is the relative change of nominal wages from the previous quarter. In estimations the coefficient of the lagged residual of the level equation was -.450 with White's heteroscedasticity adjusted t-value 5.55. Other relevant statistics of the ECM are R2 = .945, R2C = .928, DW = 2.430, SE = .008.

According to dynamic simulations, a shock in the exogenous variables affecting target wages is largely absorbed into actual wages within 4 quarters and almost wholly in two years.

Note: In the equation above, the dependent variable is the consumption wage instead of product wage. In the theoretical part it was more convenient to write the equations with the latter on left hand side. Nothing in theory implies that it should be so in empirical applications. However, the expected sign of $(1+\tau_1)$ in the wage equation shifts from positive to negative when the equation is modified in the expressed way.

for Finnish manufacturing and the private aggregate sector was used. The estimation period was 1965Q1-1984Q4 in most cases.

Sets of series received through the operationalisation of theoretical equations passed the co-integration tests (ADF and CRDW) in all relevant cases. Error correction equations representing the second step of the method in question also worked well. The lagged residual of the co-integration regression was a significant explanatory variable in all difference equations. The short-run properties of the two equation systems were studied by means of dynamic simulations. Adjustment paths looked reasonable. Post-sample short-run forecasting properties were also good.

8 ON THE RELEVANCY OF THE BARGAINING APPROACH IN FINLAND

According to our estimations, the error correction hypothesis seems to fit well with Finnish data. As adjustment lags are rather short, it may be argued that the development of actual employment - if it is considered unfavourable - cannot be mainly due to "too slow" adjustment of wages, that is, wage rigidity.¹⁰

Unions are often accused of having exacerbated labour market rigidities. The conclusions of the study referred to, here, questions this view in the case of Finland. In addition, Manning (1987) argues that the possible pareto-inefficiency of wage outcomes is not due to unions per se but rather to their relative inability to bargain over employment. There is a third connected piece of evidence. Bean & Layard & Nickell (1986) study the determination of employment and wages in 19 countries. Their framework is not too far removed from the one applied here. According to their results, the degree of corporatism¹¹

¹⁰This is in line with studies (i.e. OECD (1986)) arguing that real wages have been more flexible in Finland than in most other OECD-countries.

¹¹Corporatism is identified as a mode of social organization in which groups rather than individuals wield power and transact affairs. Several structural characteristics have been used as indicators of corporatism. These are: whether negotiations take place at a national or local level; the power of national vis-à-vis local labour organizations; the extent of employer co-ordination; and the power of local union stewards. Nations are deemed to be corporatist if wage bargaining is highly centralized, wage agreements do not have to be ratified at a local level, employers are organized, and local union officials have limited influence.

It is here worth pausing to correct an error in BRUNO & SACHS (1985). According to Table 11.3. on page 225, the average unionisation rate in Finland was 43.3 % in 1965 - 77. This figure does not appear to include all the central unions as it underestimates the actual rate (see also Table 1 and Figure 1 in this issue). This error has been transferred to BEAN et. al. (1986, p. 7). Had the correct figure been used in the last-mentioned study, it would have added to the evidence supporting the conclusions expressed by the authors.

is related to the ability of an economy to adjust to exogenous shocks. Finland belongs to those countries in which adjustment takes place rapidly. The authors therefore conclude that "the results are not very supportive of the notion that unions per se inhibit the efficient functioning of the labour market" (p. 19).

The theoretical considerations above defined a set of variables which is supposed to determine equilibrium wages and employment. If it is intended that actual employment and wages are to be influenced, it should be through these contributory factors. If employment is discussed, an increase in demand and thus production seems to be the most important element here. The effects of a positive demand shock on employment are, however, partly absorbed by productivity gains. This results in lower employment per produced unit. Furthermore, higher activity tends to lead to higher wages. This is why we can expect to see lower elasticities of labour in relation to production when "reduced" form equations are estimated.

Tax cuts have favourable effects on employment as well as wages: the equilibrium wage is lower and employment higher. The result is similar to that of supply side economics, although the reasoning here is rather different. The structure of fiscal policy seems to be as important as the rate of its expansivity measured in terms of the changes in the budget balance. Tax measures do not have the unfavourable secondary effects on wage inflation that accompany an increase in public sector demand.

Union models contribute to an understanding of the labour market hysteresis. This is the title given to evidence which suggests that it is not the level of unemployment that influences wage trends but rather the change in unemployment. In unionised economies this could be a consequence of unions showing more concern for the welfare of their members than that of non-members. The case is clarified further when some additional aspects are pointed out. In each period, some unemployed members quit the union. This is obvious especially when one considers the likely behaviour of the long-term unemployed. On the other hand, high youth unemployment means that there are many

among the unemployed who have never been union members. Furthermore, because a person's professional skill gradually deteriorates when he is out of work, the ability of the above-mentioned groups to compete with those actually employed is restricted. Thus they do not represent a very relevant optimization restriction for a union maximizing the utility of its members.

Union power in Finland has undoubtedly increased since the mid-sixties. Whereas only one third of wage earners were organized in 1965, the union density has now reached 80 - 90 per cent. In bargaining models, parameter β which measures union power should be in the set of explanatory variables. It was proxied by the union density here. The estimations support the bargaining approach. The union density is an important right-hand-side variable in the co-integration regressions. According to our results, it could have responsible for 10 - 15 per cent of the increase in the equilibrium real wage.¹²

¹²It is interesting to note that according to LEWIS (1986), in the US the wage difference between organized and non-organized workers of equal quality has averaged 14 per cent.

APPENDIX

THE BASIC MODEL

Let us start with a three factor Cobb-Douglas technology $F(N,K,m)$, which relates output to inputs of labour, capital and raw-materials. Gross production or the supply of commodities can be written as

$$(1') \quad Q = Y^a m^{1-a}, \quad \text{where } 0 < a < 1,$$

and Y is value added which is

$$(2') \quad Y = AN^\alpha, \quad \text{where } 0 < \alpha < 1$$

Here, $A = Be^{\lambda t} K^{1-\alpha}$. The explicit formula for gross production is received by substituting A and (2') to (1'). That is

$$(3') \quad Q = G^a e^{\lambda a t} N^{\alpha a} K^{a(1-\alpha)} m^{(1-a)}.$$

The technology in question implies constant returns to scale as $\alpha + a(1-\alpha) + (1-a) = 1$. Technological development is embodied in parameter t .

The price of gross production, producer price (P), can also be written as a weighted combination of the value added deflator (P_Y) and the prices of commodities and semi-products (P_m):

$$(4') \quad P = P_Y^a P_m^{1-a},$$

and accordingly the value added deflator is equal to $P_Y = P^{\frac{1}{a}} P_m^{-\frac{1-a}{a}}$.

The profit of a firm is defined as the difference between its returns and production costs:

$$(5') \quad \pi = PQ - \hat{W}N - P_m m - C$$

It should be clear, that variable \hat{W} includes payroll taxes and is therefore the so-called product wage.

When substituting the value added identity, $P_Y Y = PQ - P_m m$, into (5'), we get an alternative expression for profits

$$(5'') \quad \pi = P_Y Y - \hat{W}N - C$$

The firm stays in business only if its profits exceed an exogenously given minimum level π_0 . For an active enterprise $\pi > \pi_0$. Let us assume that the threat point familiar from the Nash-solution relates to a situation in which the firm gives up because this minimum profit condition has been violated. Here, the profit (=loss) equals constant production costs, $\pi = -C$.

In Finland, strike action is the relevant alternative to an agreement. When the uncertainty aspect of a bargaining process is the risk of a breakdown in negotiations, a von Neumann-Morgenstern specification is a utility function consistent with the game in question (see Binmore et al. (1986)). So, let us consider a union that maximizes a utilitarian welfare function. Its welfare depends on the after-tax real wage (\tilde{w}) of its members and employment. Membership M is taken as exogenous. The utility function applied is therefore of the following form:

$$(6') \quad U = U(\tilde{w}, N) = N \cdot u(\tilde{w}) + (M-N)u(\tilde{w}_a)$$

At the threat point, all the union members receive an alternative income (\tilde{w}_a). The union's utility is here

$$\underline{U} = M \cdot u(\tilde{w}_a)$$

So, the excess of the pay off over the threat payoff familiar from the Nash-formula, can be written for union as

$$U - \underline{U} = N \cdot (u(\tilde{w}) - u(\tilde{w}_a))$$

Let us go on by supposing that labour and raw-materials are used in such a way that their relative marginal products equal to their relative prices, that is

$$(7') \quad \frac{F_N}{F_m} = \frac{\hat{w}}{p_m}$$

According to (7'), the optimal use of raw-materials can be solved as

$$(8') \quad m^* = \frac{1-a}{\alpha a} \cdot N \cdot \frac{\hat{w}}{p_m}$$

Let us assume that the firm sells its products on imperfectly competitive markets. It optimizes with regard to the price of its own product, P , facing a well-behaved log-linear downward sloping demand curve, which is defined as:

$$(9') \quad \hat{Q}^d = f(\hat{P})Z^{-1} = \gamma_0 \hat{P}^\gamma Z^{-1},$$

$$\text{where } Z = p^\gamma D^{-\gamma} 1, \quad \gamma_1 > 0.$$

D is the shift parameter and P is the price of competitors. It is often assumed that the eigen value of the price elasticity of demand is greater than one, $\gamma < -1$. It is useful to note that if the demand curve is kinked, it may be that $-1 < \gamma < 0$. It has also been shown that a similar result may occur due to aggregation, even when the firm in question is competitive. Thus in reasonable cases the elasticity of demand in relation to prices can be anywhere between zero and (minus) infinity. (See also Layard & Walters (1978)).

In what follows it is finally assumed that an immediate adjustment takes place on product markets, so that $Q^d = Q^s = Q$. Thus, production equals demand (also on the aggregate level) and the

counterpart of the shift parameter D is Q .

The demand curve (9') gives us a pricing rule of the following type:

$$(10') \quad \hat{P} = \gamma_0^{-\frac{1}{\gamma}} \frac{1}{Q^{\frac{1}{\gamma}}} \frac{1}{Z^{\frac{1}{\gamma}}}$$

As the technology is identical in all firms, the deflator of value added is, thus

$$(11') \quad \hat{P}_Y = \mu_0 \hat{Q}^\mu Z^\mu p_m^{-\frac{1-a}{a}} = \mu_0 A^{\alpha\mu} N^{\alpha\mu} m^{(1-a)\mu} Z^\mu p_m^{-\frac{1-a}{a}}$$

where $\mu_0 = \gamma_0^{-\frac{1}{a\gamma}}$ and $\mu = \frac{1}{a\gamma}$, and $-1 < \mu < 0$, if $\gamma < -1$.

Equation (8') implying optimal use of raw-material inputs is then substituted into price equation (11'). When using information concerning the production function and the pricing rule, the formula for profits (5'') can be written as:

$$\begin{aligned} \pi &= \hat{P}_Y Y - \hat{w}N - C \\ &= e_1 A^{1+\alpha\mu} N^{(1-\alpha+\alpha\mu)\mu+\alpha} \hat{w}^{(1-a)\mu} p_m^{-\frac{(1-a)(1+\alpha\mu)}{a}} Z^\mu - \hat{w}N - C, \end{aligned}$$

$$\text{where } e_1 = \mu_0 \left(\frac{1-a}{\alpha a} \right)^{(1-a)\mu}$$

From this we can solve the formula for the marginal product of labour, π_N . In equilibrium the firm operates on the labour demand curve, where $\pi_N = 0$. Consequently, we can solve the equilibrium condition of the right-to-manage model concerning N .

Let us, for the sake of simplicity, consider a symmetric bargaining game. In section 3, the parameter β reflecting asymmetry in bargaining is discussed and the implications of its introduction are analyzed. Here, we will carry out the optimization exercise in terms of value-added¹³ and assume that the right-to-manage hypothesis is valid. According to Nash cooperative solution the unique solution is obtained at payoffs which maximize the product of the excess of the payoffs of the two parties over the threat payoffs. Our problem can therefore be formalised as follows:

$$\max_{W, N} (U(\tilde{w}, N) - \underline{U})(\pi(\hat{w}, N) - \underline{\pi}) = (N(u(\tilde{w}) - u(\tilde{w}_a)))(\hat{P}_Y Y - \hat{w}N)$$

s.t.

$$N = e_2 A^{-\frac{1+\alpha\mu}{(1-\alpha+\alpha a)\mu+\alpha-1}} \hat{w}^{\frac{1-(1-a)\mu}{(1-\alpha+\alpha a)\mu+\alpha-1}} p_m^{\frac{(1-a)(1+\alpha\mu)}{a[(1-\alpha+\alpha a)\mu+\alpha-1]}} Z^{-\frac{\mu}{(1-\alpha+\alpha a)\mu+\alpha-1}}$$

¹³See also ANDREWS (1987).

$$\text{where } e_2 = (e_1(1-a+\alpha)\mu + \alpha)^{-\frac{1}{(1-a+\alpha)\mu+\alpha-1}}$$

The optimization condition incorporates the right-to-manage hypothesis, according to which firms use labour optimally. When the formula for the target wage has been solved, optimal employment is found by substituting W^* into the equilibrium condition stated above. When written in logarithmic form, the equations for equilibrium employment and wages are:

$$\log(N^*) = b_0 - b_1 \log(1+\tau_1) + b_1 \log(1-\tau_2) - b_1 \log(1+\tau_3) + b_2 \log(\tilde{w}_a) + b_3 \log(P_m) + b_4 \log(P) + b_5 \log(Q) + b_6 \log(A)$$

and

$$\log(\hat{W}^*) = b_{10} - b_{11} \log(1+\tau_1) + b_{11} \log(1-\tau_2) - b_{11} \log(1+\tau_3) + b_{12} \log(\tilde{w}_a) + b_{13} \log(P_m) + b_{14} \log(P) + b_{15} \log(Q) + b_{16} \log(A).$$

In connection with the assumptions introduced above, the signs of coefficients are expected to be

$$b_1 > 0, b_2 < 0, b_3 < 0, b_4 > 0, b_5 > 0, b_6 > 0, \text{ when }^{14} \gamma < -1,$$

$$b_{11} < 0, b_{12} > 0, b_{13} < 0, b_{14} > 0, b_{15} > 0, b_{16} > 0$$

¹⁴Earlier in this section it was noted that in some relevant cases γ can get values between (0, -1). In that case $b_6 < 0$.

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