Nordic Journal of Political Economy

Solidarity Wage Policies and Industrial Productivity in Sweden

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The effects of wage dispersion on productive efficiency has been a common object of Scandinavian polemical debate and at the same time an issue almost barren of systematic econometric evidence. The Swedish record of enormous compression of relative wages under the institutional regime of solidarity bargaining, followed by substantial decompression of wages after central bargaining broke down, provides an almost ideal natural experiment for empirical testing of theories and opinions about the response of productive efficiency to shifts in wage distribution. Evidence presented in this paper from quantitative analyses of distribution-augmented production and labor productivity models yields no support of "fairness, morale and cohesiveness" theories implying that wage leveling within workplaces and industries may enhance productivity. We do

find substantial evidence, however, that reduction of inter-industry wage differentials contributed positively to output and productivity growth, most likely for the structural reasons emphasized by leading trade union economists almost a half century ago.

From 1956 up to 1983, without interruption, two peak bargaining organizations, LO[1] for workers and SAF[2] for employers, negotiated detailed "framework" wage agreements covering the entire blue-collar labor force in Swedish private industry[3]. Equality of wage distribution was a vital union goal[4], and wage dispersion data indicate that during this era of centralized "solidarity" bargaining LO succeeded in obtaining large changes in the structure of relative wage[5]. In fact, as the data graphed in Figure 1 illustrate, between the early 1960's and the breakdown of central wage formation in the early 1980's, the total variance of blue-collar relative wages declined by a whopping 75 percent[6]. At the inequality trough in 1983, the Swedish hourly wage distribution was so dense that a relative wage increase of only around 30 percent was enough to carry a blue-collar worker from the lowest decile of the distribution all the

way to the highest. By comparison, in the
same period a parallel jump across the blue-
collar hourly wage distribution in the United
Kingdom would have required a relative
increase of more than 200 percent and for a
US manufacturing employee the requisite
increase was over 400 percent[7].

The effects of wage distribution on
productive efficiency is a topic rich in theo-
retical conjecture, has been the object of
vigorous Scandinavian polemical debate, and
yet at the same time is an issue almost barren
of systematic econometric evidence. One
provocative body of theoretical literature,
prominently associated with the work of
Akerlof and Yellen (1988, 1990) and Levine
(1991), departs radically from traditional
neoclassical thinking by proposing that wit-
hin-firm wage distributions more compres-
sed than initial productivity differentials may
yield more harmonious labor relations, grea-
ter employee effort, and hence higher avera-
ge output per worker. By contrast, a com-
mon supposition among those familiar with
the Swedish experience is that the leveling of

wage differentials across skill groups within
work places was for the most part imposed
by strong central unions on reluctant
employers, creating large productivity-dimi-
nishing distortions of microeconomic incen-
tives. (Flam, 1987, Lundberg, 1985, Myrdal,
1991) On the other hand, almost a half cen-
tury ago leading Swedish trade union econo-
mists of the day argued that central union
wage policies aimed at squeezing pay diffe-
rentials between industries and plants could
enhance productive efficiency by speeding
up the movement of labor and capital from
low to high productivity activities (Rehn and
Meidner reprinted in translation to English
in Turvey, ed., 1952); a point reinforced in a
more formal manner by subsequent theoreti-
cal analyses (Agell and Lommerud, 1993,
Moene and Wallerstein, 1994).

The Swedish record of enormous
wage compression under the institutional
regime of centralized solidarity bargaining,
followed by substantial de-compression of
relative wages after central bargaining broke
down, provides an almost ideal natural expe-

Figure 1, Wage Dispersion Among Blue-Collar Workers in Swedish Private Industries
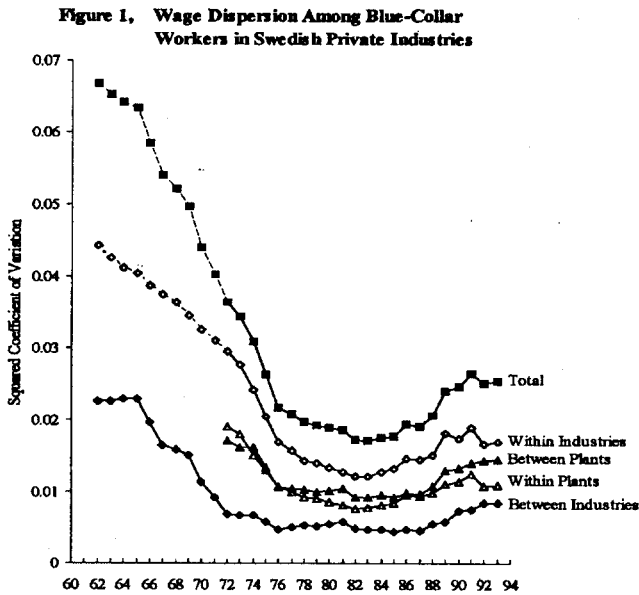
riment for empirical testing of these and related ideas about the response of productive efficiency to shifts in wage distribution. The remainder of the paper is organized as follows. The next part gives a brief history of postwar Swedish industrial relations, which identifies three distinct phases of the wage formation process that instruct interpretation of the empirical analyses to follow. Part three presents stylized facts about output and labor productivity performance in conjunction with an informal review of theory and opinion about the efficiency effects of changes in wage dispersions. The last part reports results of systematic empirical analyses and concludes by discussing their positive and normative implications.

Postwar Swedish Wage Formation
The concept of a centrally coordinated, "solidarity" wage policy was first voiced at the 1936 LO congress by the Metal-workers union as a mechanism for leveling wages across the entire labor force in order to make feasible wage equalization within their own industry. Right from the start SAF also took a leading role in promoting the development of national bargaining, because large-scale manufacturing firms comprising SAF's most important constituency believed that centralization would inhibit wage pressure from powerful unions in sheltered sectors from spilling over to wage settlements in the competitive, traded goods sectors[8]. By the 1950's these objectives had taken strong institutional form and, as already noted, between 1956 and 1983 LO and SAF forged framework agreements specifying the wages of all private blue-collar workers.

The history of Swedish wage formation since the 1950's is usefully divided into three phases: Two phases of centralized, solidarity bargaining associated with the enormous compression of relative wages just reviewed, followed in the last dozen years by a regime of decentralized industry and local level bargaining during which wage dispersion rapidly escalated.

Figure 2, Value Added and Net Inter-Industry
Wage Premia, Sweden and US, 1984
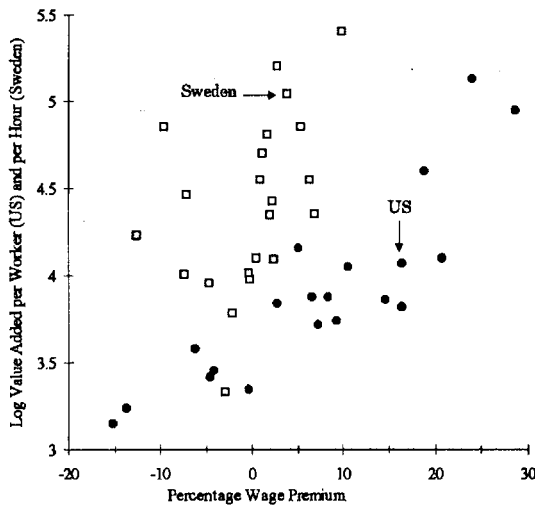
Sources: Computed by authors from data in Edin & Zetterberg (1992),
Statistics Sweden (1986) and Katz & Summers (1989).

Phase I Solidarity Wage Policy: Wage Leveling Between Industries and Plants

In the initial phase of solidarity bargaining, which dates from the first comprehensive framework agreement in 1956 up to the end of the 1960's, central bargaining was guided by the principal of "equal pay for equal work" regardless of firms' profitability or "ability to pay", as advocated in the late 1940's and early 1950's by the LO economists Gösta Rehn and Rudolf Meidner[9]. Under Phase I solidarity wage policy, weak industries and firms were therefore not permitted to survive by paying wages commensurate with their sub-par productivity and profitability. An active labor market policy, providing extensive job placement and retraining services, would ease the pain to dislocated workers created by the forced demise of inefficient firms as human and physical resources flowed to more efficient ones. Consistent with the policy, wage equalization during the 1960's in comparison to later years was disproportionately between industries and plants, rather than within industries and plants and across occupations and skill grades. (See Figure 1 above and Table 1 below)

The effects of Phase I central union pay policy doubtless help explain why wage levels across firms and industries in Sweden, by contrast to the United States and other countries with decentralized industrial relations, exhibit no "non-competitive" correlations with profitability, average productivity and capital intensity. Figure 2 documents the point by comparing Swedish and American data that have been aggregated to the industry-sectoral level after the underlying individual wages were purged of the effects of a broad set of human capital and working conditions variables. Unlike Sweden, the data on US industry wage premia appear to depart sharply from neoclassical norms about what a competitive, national wage market should look like. Hence the evidence suggests that Phase I centralized solidarity bargaining may have helped create a wage market more closely corresponding to the competitive model than the inter-industry rent-sharing pattern that seems to arise in decentralized wage formation systems, with or without the presence of trade unions.

Non-compensating profit-and productivity-related wage premia obviously provide an incentive for labor to migrate out of stagnating sectors to expanding and efficient ones, at the cost of "wage-taxing" profitable enterprises. But Phase I Swedish solidarity wage policy could in principle achieve the same efficiency enhancing movements of labor (and capital) by squeezing such wage premia to nil, thereby depriving older or inherently unproductive enterprises of a cheap labor lifeline without imposing any relative wage tax on newer, more profitable ones. For this reason the policy has been interpreted theoretically as akin to an industrial policy that rewarded "sunrise industries" (Agell and Lommerud, 1993) which, if wage levels were sufficiently restrained in the expanding sectors, might have boosted industrial output as well as productivity growth (Moene and Wallerstein, 1994, 1995). Yet although stylized interpretations of the Phase I solidarity policy appear to have some attractive properties in theory, whether an egalitarian wage formation regime that essentially sacrificed the carrot of wage premia in favor of the stick of wage-induced shrinkage and outright bankruptcy, in practice benefited aggregate output as well as productivity performance is controversial[10]. At bottom the issue can only be resolved empirically.

Phase II Solidarity Wage Policy: Wage Leveling Within Industries and Plants.

At the end of the 1960's wage solidarity took a more radically egalitarian form, moving away from the initial concept of leveling wages among jobs of comparable difficulty, risk and skill, in the direction of compressing relative wages more or less across-the-board. The shift to Phase II solidarity wage policy, which might be caricatured as a transformation of the idea "equal pay for equal work" to "equal pay for all work"[11], was marked by a concerted drive to improve the relative wages of the low paid, which clearly shows up in the distributional profiles of the central wage agreements negotiated by LO with SAF. Framework agreements with pronounced low wage provisions were a distinguishing feature of wage formation in Sweden from 1969-70 all the way up to 1983, when central bargaining broke down and the emphasis on equality in the wage formation process began to diminish. By contrast to Phase I solidarity policy, which as noted above was associated with deep compressions of wage differentials between industries and plants, Phase II policy yielded dramatic leveling of relative wages within plants and industries and across occupations and skill grades.

It is easy by appeal to economic first principles to identify unattractive consequences of union-imposed wage leveling that opens up large gaps between wage and marginal productivity distributions (See Flam, 1987, and Siven, 1987 for arguments oriented to Swedish experience), though, as noted in the introduction and expanded on in part 3 ahead, "morale and cohesiveness" theories propose that within-firm wage compression may enhance productive efficiency (Akerloff and Yellen, 1988, Levine, 1991). In any case, the radicalization of union wage policy

during the Phase II period prompted the employers confederation (SAF) to abandon its historical support of central bargaining and to launch throughout the 1970's an increasingly vigorous campaign to dismantle the traditional system. A SAF Director, Hans-Göran Myrdal, summed up the disillusionment of large-scale employers in the tradables sector with central bargaining after the transition from Phase I policy (during which "a generally encouraging climate of understanding and cooperation between the two sides" prevailed) to Phase II policy, by writing: "From around 1970, or thereabouts ... Swedish labour relations began to look quite different.... 'solidaristic wage policy' agreements ... included low-wage compensation of various types. Compared with the 50's and 60's, the structure of agreements in the 70's ... became increasingly rigid and detailed.... Wage settlements were to a large extent been looked upon as part of the political process for income distribution." (Myrdal, 1991, p.196,198)

Phase III Swedish Wage Formation: The Dissolution Of Central Bargaining
Whatever benefits in the form of wage restraint the dominant players in SAF got from Phase I solidarity policy (the analysis of Hibbs and Locking, 1995a, indicates that the picture was mixed) were by the mid-1970's evidently perceived as having been overwhelmed by union-imposed relative wage rigidity during an era of increasingly differentiated, "post-Fordist" industrial production. Central bargaining was formally broken in 1983, when Verkstadsföreningen (VF), which accounts for one-third of the LO-SAF labor force, achieved their long-standing goal of prying the industry's blue and white collar unions away from their central organizations, by negotiating separate

agreements. Appealing to distributional tensions within and between blue and white-collar unions, the 1983 VF agreements provided for much wider wage differentials than previously, and in subsequent years strongly egalitarian rules for within-plant leveling of wages, the hallmark of Phase II solidarity wage policy, disappeared from industrial wage agreements.

After 1982 central influence on wages therefore began to dissolve and Sweden experienced a change of wage formation regime --from tri-level bargaining with powerful framework coordination to a system dominated by industry and firm-level bargaining. Although central 'wage frames' covering the whole private blue collar work force were negotiated by LO and SAF in 1985 and 1986-87, the agreements were largely notional. Parties at industry negotiations were under no obligation to adhere to the distributional profiles of the frames, which in any event contained no 'low wage'

rules for within-plant, inter-occupational leveling. Traditional equality-oriented solidarity bargaining, which expired de facto in 1983, was terminated de jure in 1990 when the SAF Board of Directors simply shut down its bargaining unit. The devolution of power over wage setting to industry and local levels meant that national union authorities lost the institutional capacity to promote egalitarian wage policies. As a result, the ideas of "different pay for different work," extra compensation for the (high-skilled) "wrongly paid" and earnings based on company profitability ("ability to pay") began to drive the wage formation process.

The Phase III shift to decentralized bargaining arrangements is readily identified in the wage dispersion data graphed in Figure 1. (Also see the computations in Table 1 below.) 1983 marks the end of the decades long history of wage leveling. By the early 1990's the variance of relative wages among LO-SAF workers had risen by almost 50 per-

Table 1,   Changes In Wage Dispersions (CV²),
Blue-Collar Industrial Workers

	Phase I 1962-1970	Phase II 1970-1983	Phase III 1983-1993
Total Dispersion	-0.34	-0.61	+0.49
Within Industries	-0.26	-0.63	+0.39
Within Plants	NA	-0.598	+0.41
Between Industries	-0.50	-0.58	+0.76
Between Plants	NA	-0.46	+0.56

Sources: See Figure 1.

Notes: Changes computed $CV_t^2 / CV_{t-n}^2 - 1$; Phase II plant dispersions are for 1972-83.

cent from the 1983 trough, taking wage dispersion back to the levels of the early to mid-1970's[12]. Consequently, as Edin and Holmlund's (1992) empirical work shows, after 1983 a correlation began to arise between firm and industry wage levels and productivity and profitability. The striking absence of non-competitive industry wage premia (documented by data like those reported in Figure 2), which had characterized Swedish wage contours[13] since the early 1970's, was a visible casualty of the dissolution of the traditional system. All by itself, this is powerful evidence of the historical influence of centralized, solidarity bargaining arrangements on the structure of relative wages in Swedish industry.

Facts and Theories

Trends in Swedish industrial output and labor productivity growth over the last three to four decades conform at least superficially to the view that productive efficiency was, on

balance, affected positively by wage dispersion trends associated with Phase I solidarity policy, but was impaired by dispersion trends under Phase II policy, especially during its later years. The cumulative growth paths of Swedish industrial output and labor productivity, deviated from the corresponding national and foreign (OECD) average growth rates for the period, are graphed in Figure 3. By either standard of comparison-national or international-industrial output and labor productivity growth were relatively favorable in the 1960's, began to deteriorate at some point during the late 1960's to mid 1970's, and exhibited mixed patterns after the breakdown of central wage formation in the early 1980's.

Yet movements in labor and capital inputs to production, in average wage levels, in the cost of capital, and in other established determinants of output and productivity performance may of course be sufficient to account for the patterns, obviating the need

Figure 3,   Cumulative Growth of Log Industrial Output
and Log Industrial Labor Productivity, 1961-1993
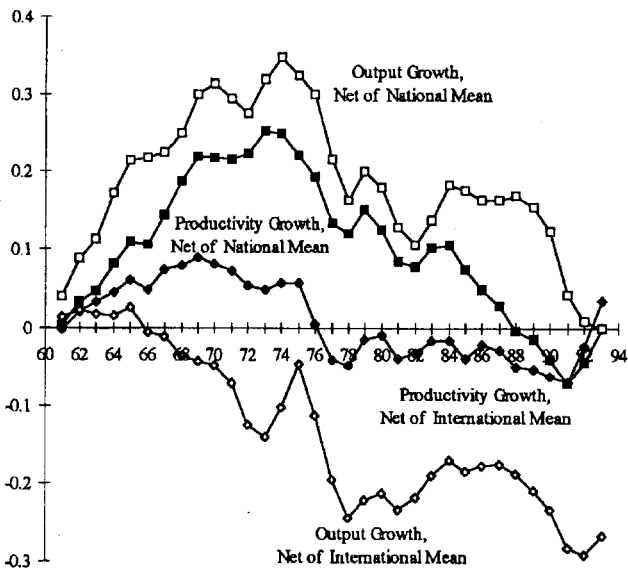
to consider unconventional wage dispersion variables. We have addressed this issue by estimation of distribution-augmented production functions, derived labor productivity functions and times series models.

Predictions
from Theory and Observation
In standard neoclassical theory, workers are emotionless commodities, conceptually equivalent to machines, whose notional marginal productivities are predetermined with respect to wages (and wage distributions). Positively, the theory asserts that factors of production in a competitive economy are, in equilibrium, paid their marginal revenue products. Normatively, the neoclassical tradition holds that factor payments should be equated to marginal productivities in order to sustain economic efficiency.

During the last decade such mainstream thinking has been challenged. Drawing on social exchange theory, equity theory and related thinking in sociology and social psychology, as well as on firm-level case studies and laboratory research by experimental psychologists, Akerlof and Yellen argue that a policy of wage leveling within the firm may yield favorable effects on output and productivity. They begin by maintaining the empirical proposition that "workers regard a fair wage system as one with pay differentials which are more compressed than productivity differentials." Hence, "firms with less variance in their compensation will have more harmonious labor relations and thus achieve higher output per worker. ... effort increases as a consequence of the decrease in the variance of wages..." (Akerlof and Yellen, 1988, p.45,48. Also see and Akerlof and Yellen, 1990) Similarly, Levine (1991), perusing the same literature, devises theoretical demonstrations of the closely related hypothesis that "narrowing wage dispersion can increase cohesiveness, and in participatory firms cohesiveness can increase

Table 2, Predicted Effects of Shifts in Wage Dispersions on Output and Productivity,
Different Theoretical Views

Change In: Response Of:	Dispersion Between industries and plants $CV^2(B)$	Dispersion Within Industries and plants $CV^2(W)$
Output	"structural": <0 (if wage moderation in expanding sectors) "conventional": >0	"fairness": <0 "conventional": >0
Labor Productivity	"structural": <0 "conventional": <0	"fairness": <0 "conventional" >0

productivity." (p.237)

These notions lead Levine, Akerlof and Yellen and others to propose models of production in which the firm's productivity depends positively on the effectiveness (cohesiveness, morale) of labor, and effectiveness depends negatively on wage dispersion. Accordingly, firms have motivation to promote a distribution of wages more compressed than initial-condition marginal productivities. This reasoning runs counter to a fairly general presumption in Swedish debate about Phase II solidarity wage policy ("equal pay for all work") which, as we pointed out before, drastically compressed within-plant, inter-occupational wage differentials. Such wage equalizations are usually viewed as having been imposed on recalcitrant employers by powerful unions in ways that substantially distorted conventional microeconomic effort-reward incentives, thereby diminishing the effectiveness of labor inputs to production. And perhaps by intention from the unions' point of view, if equality of wage distribution was consciously traded-off against productive efficiency (and hence the sustainable rate of growth of average wages).

As noted earlier, Scandinavian theoretical work points to the influence of pay compression on industrial structure, rather than to the behavioral mechanisms featured in the Akerlof and Yellen and Levine stories, as the place to look for productivity-enhancing wage leveling effects. In Swedish context, this means looking to the Phase I solidarity wage policy ("equal pay for equal work"), which squeezed wage differentials between industries and plants and, consequently, potentially accelerated the flow of labor and capital out of low productivity enterprises into high productivity ones.

Our empirical analyses of aggregate industrial productive efficiency therefore

admit the possibility of 'good' (efficiency increasing) and 'bad' (efficiency diminishing) wage compressions by decomposing the variance of individual relative wages Within and Between plants and industries. (See Figure 1 and Table 1) The behavioral reasoning of Akerlof and Yellen and Levine implies that compression of wages Within plants (and Within industries) enhances productive efficiency, and is silent about the effects of wage compressions Between plants or industries. Formal results in some Scandinavian theoretical literature (Agell and Lommerud, 1993; Flam, 1987; Moene and Wallerstein, 1994,1995), as well as the conventionally grounded observations of partisans to Swedish central bargaining (for example, Myrdal, 1991), are taken together more compatible with the hypotheses that Within plant and Within industry wage leveling adversely affected productive efficiency, whereas policies yielding compression of wages Between plants and industries exerted favorable effects.

The conventional arguments of Lundberg (1985) and Jonsson and Siven (1986) also imply negative output and productiviy responses to Within plant and Within industry wage equalization and at the same time acknowlege that LO's Phase I wage policy Interindustry wage leveling likely enhanced labor productivity. However, they believe that labor productivity improvements during Phase I were achieved at the price of stagnating aggregate industrial output --in the same way that a monetary policy led contraction may simultaneously raise labor productivity and lower output by driving the least productive firms into bankruptcy and the least productive workers out of employment. Hence, Lundberg and Jonsson and Siven maintain that Between industry wage compression depressed aggre-

gate industrial output[14]. Table 2 summari-
zes predictions associated with the 'fairness',
'structural' and more 'conventional views.

Empirical Analyses, Results and Implications
Our empirical analyses are based on wage
dispersion-augmented log industrial output
and log labor productivity functions, derived
from Cobb-Douglas, CES and Translog
models of production and from a-theoretical
autoregressive time series models with deter-
ministic trends [15]. Since our objective was to
detect wage distribution effects on producti-
ve efficiency that are not dependent on parti-
cular (and ultimately somewhat arbitrary)
assumptions about functional form, we view
the diversity of approaches as an asset rather
than a liability.

Parametrically unconstrained regres-
sion equations, fit to annual data for
1963/64-1993, yielded parameter estimates
for Within plant and Within industry dis-
persion effects that were uniformly positive
in sign, whereas estimates for Between plant
and Between industry dispersion effects were
in every case negative. The wage dispersion
coefficients were generally significant at con-
ventional test levels and, as illustrated in
Figure 4 and 5 below, implied substantively
important responses of output and producti-
vity to shifts in pay distribution. One impor-
tant message of the regression experiments
was that the large reductions in the variances
of relative wages Within plants and Within
industries, which from the early 1960's until
the breakdown of central bargaining in the
first part of the 1980's were on the order of
72 percent, most likely depressed both out-
put and labor productivity growth. Hence
the regressions supplied no support of the
thesis promoted by Akerlof and Yellen and
Levine that wage leveling Within workplaces
or Within industries enhances productive

efficiency; at least when interest focuses on
macroeconomic effects and so output, pro-
ductivity, wage dispersions and other rele-
vant variables are aggregated up to the indus-
try level.

It is of course possible that wage
leveling in Sweden went far beyond the
(unspecified) magnitudes that advocates of
'fairness, morale and cohesiveness' theories
have in mind. But no functional form we

Figure 4, Cumulative Wage Dispersion Effects on
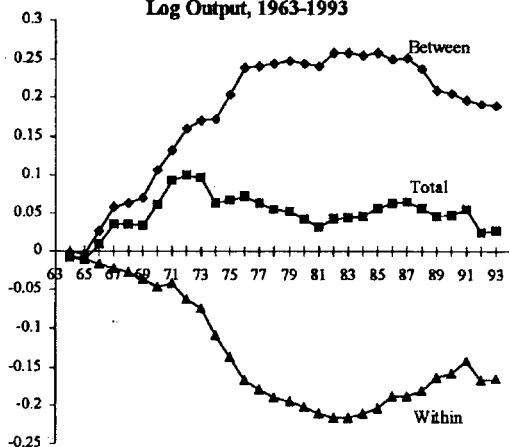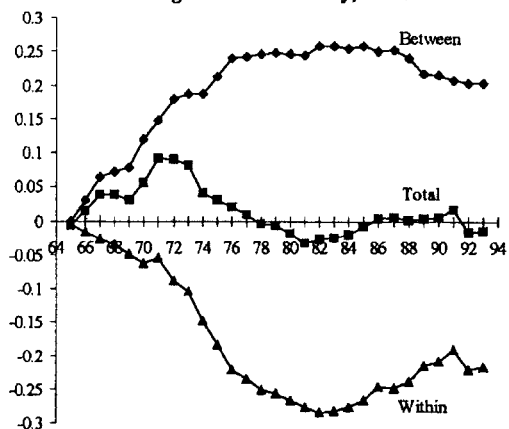Log Output, 1963-1993

Figure 5, Cumulative Wage Dispersion Effects on
Log Labor Productivity, 1964-1993

were able to devise (including parabolic forms allowing sign reversals, threshold effects and so on) managed to detect any positive output or productivity response to the large variations in Within plant and Within industry wage dispersion observed from the early 1960's, at which time wage inequality in Sweden was about the same as in the United States (Edin and Topel, 1995).

Estimation results for the effects of wage compressions Between plants and industries, however, conform wholly to the arguments first advanced by the LO economists Gösta Rehn and Rudolf Meidner in the 1940's, and written down with more formal precision almost a half century later by Agell and Lommerud, and Moene and Wallerstein. Equalization of relative wages Between plants and industries evidently raised aggregate output and productivity significantly, presumably, as Edin and Topel's (1995) empirical analyses strongly indicate, by expediting the flow of labor and capital resources from less to more efficient activities.

The magnitudes of wage of distribution effects implied by the regression evidence, cumulated over the 1963 to 1993 period studied, and averaged over all equations estimated[16], are graphed in Figures 4 and 5. Given the stylized theoretical foundations of the models and the aggregated, non-experimental econometric methodology employed, it should be emphasized that the Figures convey only a rough idea of magnitudes, though the time profiles of the cumulative dispersion effects are probably tracked with reasonably good accuracy. As would be anticipated from the brief account of Swedish wage formation history given in Part 1, the positive impact of Between industry wage compression dominated Total dispersion effects during the 1960's up to the early

1970's. LO's Phase I solidarity policy of "equal pay for equal work" therefore appears to have augmented industrial productive efficiency, raising industrial output and labor productivity by eight to fourteen percentage points at the peaks, if the Total effects graphed in Figures 4 and 5 are taken at face value. Whatever the precise magnitudes, wage distribution-induced enhancements to productivity evidently were not achieved at the cost of lower aggregate output, as Lundberg (1985) and Jonsson and Siven (1986), among others, have asserted.

The radicalization of solidarity wage policy during the 1970's, however, appears to have eroded much, if not all, of the favorable legacy of Phase I policy. Wage differentials Within plants and Within industries (across occupations and skill-grades) were leveled drastically during the Phase II period. Our computations indicate that improvements to labor productivity under Phase I policy were as a result offset completely (and maybe worse) and that Phase I enhancements to gross output were reduced by two-thirds or more. Yet the dissolution of traditional centralized wage formation after 1982, which ushered in an era of local and industry-specific bargaining that nullified the institutional capacity to influence wage distribution from the top, yielded large increases in pay dispersion both Between and Within plants and industries. (Figure 1 and Table 1) Consequently, the calculations depicted in Figures 4 and 5 imply that the positive (most likely incentive-based) effects arising from expansions of wage differentials Within workplaces were neutralized almost entirely during the last dozen years by the negative (most likely structurally-based) effects created by the growth of inter-industry pay differentials. Viewed from the mid-1990's, it is as if union wage distribution

policies had never existed, leaving output and productivity just about where they would have been in the absence of the great compression and de-compression of Swedish industrial wages.

    Perhaps the clearest normative message of the Swedish experience is that a centrally coordinated wage policy that helps enforce standard rates of pay across firms and industries and eliminates profitability as a wage setting norm, but at the same time makes no attempt to achieve radical wage equalizations across occupations and skill groups, is the most promising way that central union action might augment productive efficiency. Yet the Swedish record also suggests that once a powerful central union motivated by egalitarian norms develops the capacity and inclination to influence the structure of relative pay, restricting wage interventions to the structural objectives initially advocated by Rehn and Meidner may not be possible for internal political reasons. A positive analysis of this issue, however, is beyond the scope of this paper and is in any case moot in the current decentralized bargaining regime.

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Notes

1. The central organization of blue-collar unions.
2. The central confederation of private employers.
3. The system is more precisely described as a highly integrated, three-tier process: a central framework agreement negotiated by LO and SAF (or SAF and PTK, the central organization of private white-collar workers), followed by industry bargaining, and then plant level negotiations to implement the arrangements contracted above. LO and SAF and their constituent organizations acted like a single organization engaging in multi-level bargaining and throughout the paper we refer to this tri-level process as the 'centralized' institutional regime. The detailed structure of the central framework agreements are formalized and described in Hibbs, 1990a and an excellent account of the broader institutional context is given in Nilsson, 1993. Hibbs and Locking, 1995a, present evidence showing that central bargaining outcomes completely determined the time path of total wage inflation.
4. As Rudolf Meidner, who for many years directed LO's Research Department put it: "The history of [LO's] wages policy is the story of the efforts on the part of a pragmatic trade union movement to transform a sophisticated ideology of equality into a reality for the labour market and the national economy." (Meidner, 1974, p.30)
5. Extensive evidence that wage dispersion trends were driven by central agreements incorporating LO's egalitarian objectives, rather than by normal market forces, is given in Edin and Topel, 1995, Hibbs, 1990a, 1990b, 1991 and Jonsson and Siven, 1986.
6. The total variance of relative wages is measured here by the squared coefficient of variation, , the ratio of the variance and squared mean of individual wages. When Between Industry and Between Plant variances are weighted by the respective employment shares, as in Figure 1 and ahead, the squared coefficient of variation is decomposable, and equals the sum of Between and within components. Micro wage data for white-collar workers are not as comprehensive as the data for blue-collar workers, but union-induced compressions of white-collar wages were most likely of comparable magnitude, especially among middle and lower-echelon white-collar employees. See Hibbs, 1990a, 1991.
7. The computations are documented in Hibbs, 1990a. Broader samples of international data on individual and inter-industry relative wages also show Sweden to have had exceptionally low wage dispersion in the 1970's and 1980's. See, for example, Björklund and Freeman, 1994, Davis, 1992, and Rowthorn, 1992.
8. In fact, SAF's initial adamant insistence on centralization was probably decisive to its implementation. As an LO official would later observe: "SAF's uncompro

mising [favorable] attitude on the question of a cen-
tralwage bargain was immensely helpful to us. Without
this position we would not have been able to convince
the unions." (Heclo and Madsen, 1987, galley copy at
p.115)
9. In Rehn's words: "Large wage differentials, which
cannot be accepted as fair premiums for different
degrees of skill, accident risks and the like, must not
exist. ... wage rates should not be determined exclusive-
ly by the profitability of the particular industry or the
bargaining strength of the parties." In Turvey ed.,
1952, p.31,43.
10. For example, Erik Lundberg flatly asserted (wit-
hout systematic evidence): "The rapid rise in producti-
vity, especially during the second half of the 1960's
[Phase I policy], was achieved at the cost of growth in
total industrial production." (1985, p.20) Jonsson
and Siven, make the same assertion: "...increase in
productivity in industry has occurred at the price of
lower industrial employment and stagnating industrial
output." (1986, p.98)
11. Our use of 'caricatured' may be unnecessarily reser-
ved. Rudolf Meidner, LO's former Director of
Research, described the policy shift as "a simple stri-
ving for the elimination of all wage differentials, howe-
ver caused." (Meidner, 1974, p.41)
12. The data may understate the de-compression of the
wage structure after 1983 as they do not include all
remuneration in the form of bonus payments, profit-
sharing, savings schemes and similar profit and pro-
ductivity related earnings components introduced by
employers after the erosion of central bargaining.
13. And the wage contours of the other Nordic coun-
tries during the period of comparatively highly centra-
lized bargaining arrangements. See Holmlund and
Zetterberg, 1991.
14. Note also that the predictions of increased output
from between plant and between industry wage leve-
ling in the models of Agell and Lommerud and Moene
and Wallerstein are conditional on union policy delive-
ring restraint of average real wages in expanding enter-
prises. Absent restraint, wage distribution effects on
both output and labor productivity are the same as
those claimed by Jonsson and Siven and Lundberg.
15. For technical details of the specifications and docu-
mentation of the estimates see Hibbs and Locking,
1995b.
16. The time profiles of effects computed separately for
each regression model are nearly identical to the avera-
ge results shown. Magnitudes exhibit greater diversity,
but nonetheless are broadly similar across models.