

Has work-sharing worked in Finland?*

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Abstract

The paper investigates the employment effects of working time reductions in Finland by dividing the economy into six main sectors from 1960 to 1996. Work-sharing works if there exists a tradeoff between the average working time and employment. This means that a reduction in average working hours delivers an increase in employment. The main result is that a reduction in actual average hours seems to deliver an increase in employment in the short run on condition that output does not deteriorate as a result of shorter average working time.

Theme: working hours

Keywords: employment, working hours, work-sharing

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1. Introduction

Europe's high unemployment trap has generated several ambitious plans to solve the dilemma. One of them is work-sharing. The underlying idea of work-sharing is to redistribute the available work to more people by reducing hours of work and thereby give a stake to the unemployed. Work-sharing works if (and only if) there exists a tradeoff between the average working time and employment. This means that a reduction in average (standard) working hours delivers an increase in employment. The tradeoff can exist in some sectors of the economy or at the aggregate level.

There has been lively debate about the issue of work-sharing, especially in Germany and France. In Germany the metal workers' union demanded a 35-hour week in the mid 80's and that objective was reached finally in 1995¹. The government of Lionel Jospin is about to introduce a 35-hour working week at the beginning of the 21st century in order to alleviate the high unemployment in France. The critics of the plan argue that it will only increase unit labour costs, reduce both productivity and output, put off foreign investors and thereby add to unemployment.

Though work-sharing is also a popular measure to tackle the unemployment problem in political rhetoric, the underlying empirical relationship of the average working time and employment has not been subject to intensive research efforts. This reflects, at least partly, the well-known fact that among mainstream economists work-sharing is not a popular measure to cure unemployment (see e.g. Layard, Nickell, & Jackman, 1991; Hamermesh, 1993; Layard, 1997; Nickell, 1997; van der Ploeg, 1998). The general "economist view"

¹ Hunt (1996a, 1996b) has studied the issue of work-sharing in Germany. She found out that the reduction in working hours has had ambiguous effects on employment, raising employment over the 1984–1989 period and reducing employment in the 1990s. A study by Cornilleau, Heyer and Timbeau (1998) is an interesting evaluation on the economic effects of a 35-hour working week in France.

seems to be that the idea of work-sharing assumes faultily a kind of free lunch in the sense that it is assumed to be possible to increase employment by reducing average working time without any loss of output (and real wages), and hence produce a Pareto improvement² (the so-called lump-of-output/work fallacy). Layard, Nickell, and Jackman (1991) strongly argue that the equilibrium unemployment rate (NAIRU) is independent of hours of work. Thus, if hours are reduced and employment rises for a while, wage pressure will soon increase and the amount of work available will to be reduced again. This implies that employment will revert to its former level.

The other commonly held (and equally controversial) view is that work-sharing will undermine the flexibility of labour markets by making it more difficult for firms to adjust their labour input. In particular, this seems to be the case in the situation where a reduction in standard hours is implemented with the restrictions of overtime. OECD (1998a, p. 18) suggests that increased working time flexibility and more part-time work may lead to higher employment, because the increased flexibility of labour inputs helps firms to contain labour costs while flexible forms of work can bring forward additional labour supply.

The aim of this paper is to fill the gap between various propositions on work-sharing and solid empirical knowledge at the aggregate level in the case of Finland. The study is conducted through the use of a panel data set, from 1960 to 1996. The main result of the analysis is that a reduction in the actual average working hours seems to deliver an increase in employment in the short run on condition that output does not deteriorate as a result of a shorter average working time. In most cases productivity gains have been sufficient to balance the negative effects of shorter hours and output has not fallen. The paper consists of five sections. The next section briefly reviews the present empirical evidence concerning the issue of work-sharing in Finland, and makes the case for this study. The treatment of present

² In this respect, the argument for work-sharing is somewhat similar to the so-called double-dividend hypothesis, which states that it is possible to increase employment by shifting the burden of taxation from labour markets to the activities that pollute the environment.

empirical evidence is not a survey of a vast literature on work-sharing³. The third section presents a simple model of labour demand and wage setting which tries to illuminate the basic feedback mechanisms from working time changes to employment. The fourth section contains a short description of the data set, and provides a justification for the choice of the variables. The section five reports the empirical results from a number of panel data estimations. The last section concludes with a few remarks.

2. Some earlier studies

The existing empirical evidence on work-sharing in Finland can be divided into two categories. The first category of empirical studies concerns the relationship of standard hours and employment in the manufacturing industry. A study by Ilmakunnas (1991) uses a pooled sample of five Finnish manufacturing industries from 1968 to 1986 (and from 1975 to 1986). The industry dummy variables were included in the estimated panel data models. Ilmakunnas (1991) concludes that reductions in working time have had a slight employment increasing effect, but no effect on overtime hours. A study by Ilmakunnas (1995) reveals that the long run effect of working time on employment has changed over time. In the 1970s reductions in hours have had positive long run employment effects, but in the 1980s positive short run impact has been neutralized in the long run.

Holm and Kiander (1993) have also studied the issue by using data from manufacturing industry. Their quarterly data is aggregate and covers the Finnish manufacturing sector from 1960:1 to 1987:4. They conclude that in the long run the time path of actual hours closely follows that of standard hours. It is important to note that this means that actual hours can be considered to be an exogenous variable with respect to employment. Their results also contradict the usual argument that a reduction in working hours fails to cure unemployment, because it merely induces firms to increase overtime (see e.g. Calmfors & Hoel, 1988; Brunello, 1989). It is apparent that the response of overtime with respect to reductions in

³ Eriksson (1996) is a pithy summary of theoretical notions and empirical evidence on work-sharing.

standard hours is a small one in Finland, because high overtime premia makes a permanent increase in overtime far too expensive for firms as a long-term arrangement.

A study by Böckerman and Kiander (1998) is another paper that uses aggregate data in the case of manufacturing industry. It is based on the yearly observations from 1960 to 1996. The elasticity of employment with respect to standard hours was found to be about (minus) 0.1 within a three-year period on condition that output does not deteriorate as a consequence of a shorter average working time. This means that a 10% drop in standard hours would deliver an 1% increase in employment within a three-year period. The study also confirmed the earlier-known fact that overtime is used in manufacturing industry only as a short-term adjustment mechanism.

The second category of more fragile empirical evidence is based on the studies that use aggregate data covering the whole economy. A study by Kiander (1998) is a good example of this kind of reasoning. He uses quarterly aggregate data from 1961:1 to 1994:1 and concludes by estimating a set of employment equations that there seem to exist a tradeoff between the actual average working time and employment in the Finnish economy⁴. This means that the present aggregate evidence tends to support the view that a reduction in the average working hours could increase labour demand in the case of Finland.

However, a major problem of the aggregate data is that there exists a great number of structural breaks in the estimated employment equation from 1960 to 1996. This feature is reflected in the instability of recursively estimated parameters of the employment equation. One apparent reason for this instability is that the Finnish economy has undergone a major structural transformation (from agriculture through manufacturing to the economy characterized by various services) during the past few decades. This makes it interesting to divide the Finnish economy into main sectors, and to construct a panel data set from 1960 to 1996 in order to clarify the issue of work-sharing in the whole economy. Through the use of a

⁴ A study by Böckerman and Kiander (1998) delivers the same conclusion with a set of error-correction models. The elasticity of employment with respect to actual hours per employment was found to be about (minus) 0.4.

set of panel data techniques, it is possible to take into account the structural transformation of the Finnish economy from 1960 to 1996, and to provide a somewhat more solid view of the issue of work-sharing at the aggregate level. This is the aim of the present study.

3. A simple model

Consider a linear labour demand relation, where the real labour cost reduces employment with fixed elasticity and where heads and hours are imperfect substitutes:

$$n = \alpha(p - w - s) - \beta h, \quad [1]$$

in which n is employment, p is producer price, w is hourly wage rate, s is the payroll tax and h is the number of working hours per employee. All variables are in logs. In the light of the most usual estimates⁵ it is reasonable to assume that the elasticity of substitution between employment and working hours is close to unity (although it is likely to be less than in one at least in short run) and hence higher in absolute terms than the wage elasticity of labour demand: $1 > \beta > \alpha > 0$. If this condition holds, then it is straightforward to see that any reduction in average working time will improve employment, if and only if the wage response is moderate enough:

$$\Delta(w - p) < -\frac{\beta}{\alpha} \Delta h - \Delta s. \quad [2]$$

In other words, the change of real hourly product wage has to be less than the joint effect of working hours and payroll tax changes. As a simplification one may assume that $\frac{\beta}{\alpha}$ equals one. Then the necessary condition for any employment gains is that the relative increase of real hourly wage does not exceed the absolute value of the relative reduction of the working

⁵ See e.g. Hamermesh (1995) for an extensive survey of labour demand estimations.

time.

It is hence clear that the wage determination is in crucial role in work-sharing. In order to clarify the potential wage responses, consider a simple and conventional wage equation. Let us assume that the real wage is affected by the deviation of the actual unemployment from its natural rate, and by income taxes and working hours. The higher are taxes, the higher is the equilibrium wage. Working time reductions are assumed to increase hourly wage, too:

$$\Delta w = \Delta p + \eta(\tilde{u} - u) - \mu\Delta\theta - \delta\Delta h, \quad [3]$$

where \tilde{u} is the natural rate of unemployment, u is the actual rate of unemployment, $\theta = 1 - t$ and t is the income tax rate. If unemployment equals its natural level and taxes and working hours do not change, then the wage increase should be equal to the increase of producer price⁶. If the wage equation is known, one can conclude whether a working time reduction will increase employment or not. By combining equation (3) with the condition (2) one obtains the following:

$$\Delta n > 0 \Leftrightarrow \left(\delta - \frac{\beta}{\alpha}\right)\Delta h > \eta(\tilde{u} - u) + \Delta s - \mu\Delta\theta \quad [4]$$

In words, employment can be improved by work-sharing only if this condition is fulfilled. Now much depends on the sign of the left-hand side of the inequation. Without any tax changes and no excess demand for labour the condition reduces to

$$\Delta n > 0 \Leftrightarrow \delta < \frac{\beta}{\alpha}, \quad [5]$$

⁶ The producer price variable (p) may include also productivity improvements.

which states that the employees may not seek full compensation for income lost due to shorter hours. It is of course an empirical question whether this condition holds; it was argued above that $\frac{\beta}{\alpha} > 1$ (or that the elasticity of substitution between heads and hours has a higher absolute value than the wage elasticity of labour demand); on the other hand, it is also possible that $\delta < 1$ or that the employees do not require a full compensation for lost income when working time is reduced⁷.

It is important to notice, that according to condition (3), there are additional factors which affect the outcome. First, if there is significant unemployment, the workers may be willing to accept less than full compensation in hourly wages⁸. Furthermore, also the labour taxes have an impact on the employment effects of working time reductions. Lower payroll taxes seem to be more effective in boosting employment than lower income taxes, but both measures are useful. They may also be justifiable on the grounds that succesful work-sharing decreases unemployment and public spending.

3. The data

The employment effect of work-sharing in Finland is studied by dividing the economy into six main sectors. The sectors are agriculture, forestry and logging (SIC95⁹:A, B), manufacturing

⁷ If the employees give some positive value for the increased leisure, they should not demand full compensation for lost income. However, if the trade union set the working times, then it is likely that the labour supply of workers is rationed and they would be willing to work longer hours. In that case it is possible that exogenous reductions in working hours may even lead to overcompensation in terms of pay rises.

⁸ This is also an almost necessary precondition for work-sharing; if there were not excessive unemployment, there would not be a case to ration labour supply. This condition holds only if the actual unemployment clearly exceeds the structural unemployment and for some reason there is no scope for stimulating demand.

⁹ SIC refers to Standard Industry Classification.

(SIC95, C-E), construction (SIC95:F), wholesale and retail trade (SIC95, G), transportation (SIC95, I) and public activities (SIC95, L-N). The study is based on the yearly observations from 1960 to 1996. Figs. 1–6 illustrate the structural transformation of the Finnish economy in terms of the sectoral composition of employment during the past few decades.

A short description and the source of the variables is provided in Appendix 1. Through the use of a panel data estimation, employment is explained by a reduced form equation with output, tax wedge, gross capital formation and annual actual hours per worker as explaining variables¹⁰. Figs. 1–6 also show the evolution of actual hours per worker in six sectors of this study. The decline in actual hours per worker is evident in the case of all sectors from 1960 to 1996. However, it is important to note that there also exists an interesting variation in the behaviour of actual hours per worker across the sectors. This variation is naturally masked in the aggregate data.

An important feature of the data set is that the sectoral variation in a tax wedge variable is totally generated by one component of the tax wedge, namely by “social security contributions / wages”. The following panel data estimations was also conducted with a specification that includes only “social security contributions / wages” as a tax wedge variable. However, the results reported in the next section of this paper are robust with respect to that specification.

It is essential to note that Phelps (1994) has argued that the real interest rate has been one of the key variables in the determination of employment during the past few decades. Nickell and Nicolitsas (1995) have also studied the effect of financial factors on employment by using panel data from a large number of UK companies. In the following panel data estimations, the financial factors are not included in the analysis. This is due to the fact that there is no useful data on financial variables (lending rates and the tightness of credit) on a

¹⁰ Real wage is not included among regressors due to the fact that the earlier study with the aggregate data indicated that it is a problematic variable in the employment equation (Böckerman & Kiander, 1998, p. 12). This means that, in the following estimations, the tax wedge is the variable that is used to cover labour costs. Daveri and Tabellini (1997) argue that labour taxes have a strong positive effect on unemployment only in Europe and not in other industrial countries.

sectoral basis at all. This is a major lack, because Piekkola (1998) has found out by using a panel data set that various financial variables (including liquidity constraints) are important in the determination of employment in Finland.

The study also contains another potential weakness, because it is not possible to get a disaggregated data on standard hours and overtime covering the whole period from 1960 to 1996. However, this is not a major problem, because – as noted by Holm and Kiander (1993) – in the long run the time path of actual working hours closely follows that of standard hours, at least in the case of Finnish manufacturing¹¹. Fig. 2 illustrates the evolution of standard hours and actual hours per worker in the Finnish manufacturing industry from 1960 to 1996. The permanent gap between standard hours and actual hours per worker is mainly due to sickness and parental leaves. The rapid fall in actual hours per worker during the great slump of the early 1990s is a consequence of sweeping layoffs. The relationship of standard hours and actual hours per worker in other sectors of economy is not known, but there is no particular reason to think that firms could use overtime as a long-term arrangement in the other sectors of the economy. A permanent increase in overtime is due to the high overtime premia a far too expensive way to adjust labour input from the point of view of firms. However, it must be stressed that the lack of information on standard hours and overtime is evidently a problem in the analysis. This issue will be discussed in a more detailed way in the next section.

¹¹ However, an application of Johansen's (1995) procedure reveals that the log of standard hours and the log of actual working hours per worker in Finnish manufacturing are not cointegrated variables. This result is not generated purely by the observations from the great slump of the early 1990s. Jacobson and Ohlsson (1996, p. 15–17) have investigated the long run relationship of standard hours and actual hours per worker in the case of the Swedish private sector from 1963:1–1993:4. They concluded that the log of standard hours and the log of actual hours per worker are cointegrated variables.

4. The results

It is convenient to set up a dynamic fixed effects model in order to investigate the determination of employment in Finland, as follows:

$$\begin{aligned} \text{LogNI}_{it} = & v_i + \mu_t + b_1 \text{Log}(Q_{it}) + b_2 \text{Log}(Q_{it-1}) + b_3 \text{Log}(Q_{it-2}) + b_4 \text{TAXWEDGE}_{it} + \\ & b_5 \text{Log}(\text{WH/NI})_{it} + b_6 \text{Log}(K_{it}) + b_7 \text{Log}(K_{it-1}) + e_{it} \end{aligned} \quad [6]$$

where NI stands for employment, Q for value added in basic values, WH for performed working hours, K for gross capital formation and v_i is an industry factor. It captures all the industry-specific characteristics (such as the labour-intensity of production) that remain stable over time. μ_t includes all factors that are common to industries and tend to vary over time (such as interest rate hikes, recessions and the changes in taxation etc.). This model can be estimated by using the Arellano-Bond panel data procedures of Ox (Doornik, Draisma & Ooms, 1997). The employment equation (6) is estimated in first differences, which eliminates the industry-specific effects. The one-step estimation results (without and with year dummies) are reported in Table 1. It is evident that the limited sample size of this study does not allow a two-step estimation of the employment equation (see e.g. Arellano & Bond, 1991, p. 288–293).

Table 1. The estimation results of dynamic fixed effects models for employment in Finland, from 1960 to 1996 (dependent variable: labour demand ΔLogNI_{it}). “MODEL1” is estimated without year dummies and “MODEL2” with year dummies

	MODEL1	MODEL2
Independent variables	Coefficient (and t-value)	Coefficient (and t-value)
$\Delta\text{Log}(Q_{it})$	0.49 (7.01)	0.49 (5.66)
$\Delta\text{Log}(Q_{it-1})$	0.12 (2.89)	0.07 (2.28)
$\Delta\text{Log}(Q_{it-2})$	0.08 (4.85)	0.12 (2.44)
$\Delta\text{TAXWEDGE}_{it}$	-0.10 (-1.11)	0.13 (0.80)
$\Delta\text{Log}(\text{WH}/\text{NI})_{it}$	-0.59 (-4.36)	-0.72 (-3.71)
$\Delta\text{Log}(K_{it})$	0.02 (4.45)	0.01 (2.31)
$\Delta\text{Log}(K_{it-1})$	0.03 (5.58)	0.02 (8.58)
RSS	0.12	0.09
R^2	0.73	0.79
AR(1) test	1.95 (0.05)	2.13 (0.033)
AR(2) test	0.70 (0.48)	0.54 (0.591)

It is interesting to note that the year dummies (μ_t) included were statistically significant during the great slump in Finland in the early 1990s (and also in the beginning of the estimation period). This feature reflects, at least partly, the fact that the estimated dynamic model (without year dummies) is not able to capture the deterioration in employment due to high (and also volatile) interest rates in the period of the early 1990s (see e.g. Kiander & Pehkonen, 1998). All industry dummies (v_i) are also statistically significant ones. This means that the role of the main sectors of the economy is essential in the determination of employment in the short run.

The results indicate that a reduction in average actual working hours leads to an increase in employment¹². As Table 1 indicates, the result is also robust to the inclusion of year

¹² OECD (1998b, p. 180) argues that reductions in unemployment are likely to be smaller than gains in employment. The reason is that hours reductions may cause additional growth in the labour supply, because jobs of shorter hours may be more attractive to a number of potential labour force entrants.

dummies. This means that a dynamic panel data analysis tends to give support to the view that work-sharing has indeed worked in Finland. In other words, there seems to be a tradeoff between the average actual hours per worker and aggregate employment in the short run on condition that output does not deteriorate as a result of a shorter average working time. The dynamic analysis also indicates that an increase in gross capital formation can give a small boost to employment, which is a result one might expect. It is also interesting to note that the estimation results reveal that the effect of the tax wedge on employment is not as robust as it is usually thought to be. In particular, the inclusion of year dummies wipes out the whole effect of the tax wedge on employment. This result is in sharp contrast with the earlier aggregate evidence.

The aggregate data delivers the result that the elasticity of employment with respect to actual hours per employment is about (minus) 0.4 (Kiander 1998; Böckerman & Kiander, 1998). The elasticity (-0.6) reported in Table 1 is somewhat higher than the one in the case of the aggregate data. However, it must be recalled that in the short run a major part of the variation in actual hours per worker is, in fact, due to the layoffs¹³. This means that the estimated parameter of actual hours per worker is biased to give support to the very idea of work-sharing (namely, that there is a tradeoff between average standard working hours and aggregate employment¹⁴). The bias is somewhat reduced by the fact that the estimated employment equation also includes a output variable with lags up to two years. The reason is that layoffs are usually (but not always) due to firms' declining sales and output.

It is a fact that standard hours are the real policy variable instead of actual hours per worker in the conduct of work-sharing. However, the evidence of the relationship of standard hours and employment in the manufacturing industry gives support to the view that the above-reported short run tradeoff between average actual hours per worker and employment at the

¹³ This feature is the main motivation to limit the study to yearly observations and to six main sectors of the economy. It is a basic result in econometrics that aggregation tends to increase the smoothness of the time-series variables (Granger, 1990).

¹⁴ On the other hand, one might argue that a layoff is a kind of temporary work-sharing arrangement.

aggregate level is not totally a figment of data (see e.g. Ilmakunnas, 1991; Holm & Kiander, 1993; Böckerman & Kiander, 1998). It is important to note that the existence of a tradeoff between average working time and employment is a necessary, but not a sufficient, condition that work-sharing can be used as an instrument of economic policy¹⁵. In particular, the relationship of average working time and employment is likely to change from the reported one in the case that a reduction in average working time is forced by legislation instead of a voluntary agreement between management and workers.

¹⁵ This is due to the celebrated Lucas critique (see e. g. Romer, 1996, p. 250–252).

5. Concluding remarks

A major problem of the aggregate data is that there exists few breaks in the estimated employment equation from 1960 to 1996. This feature is reflected in the instability of the recursively estimated parameters of the employment equation. One apparent reason for this instability is that the Finnish economy has undergone a major structural transformation (from agriculture as a largest sector through manufacturing to the services) during the past four decades. However, through the use of panel data techniques it is possible to take into account this structural transformation of the Finnish economy.

The economy was divided into six main sectors in order to shed light on the issue of work-sharing at the aggregate level in Finland. The sectors were agriculture, forestry and logging, manufacturing, construction, wholesale and retail trade, transportation and public services. The estimation period was from 1960 to 1996.

Putting together the empirical evidence presented in this paper on average working hours and employment in Finland, the answer to the title question of this paper is that a reduction in actual average hours seems to deliver an increase in employment in the short run on condition that output does not deteriorate as a result of shorter working time. The very maintenance of the output level in the case of shorter average working hours is indeed a challenging task. It requires in some cases a major restructuring of the production process and, in particular, the use of more flexible working hours in order to take full advantage of a firm's capital stock.

6. References

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Appendix 1. The description of the variables and their sources. “Direct taxes / household income” (TAXW1) and “Indirect taxes / consumption expenditures” (TAXW2) are not sectoral variables. The sectoral variation in tax wedge ($TAXWEDGE^{16} = TAXW1 + TAXW2 + TAXW3$) is totally generated by “social security contributions / wages” (TAXW3).

Variable	Source
Value added in basic values (Q)	National Accounts
Direct taxes / household income (TAXW1)	National Accounts
Indirect taxes / consumption expenditures (TAXW2)	
Social security contributions / wages (TAXW3)	
$TAXWEDGE = TAXW1 + TAXW2 + TAXW3$	
Performed working hours (WH)	National Accounts
Employed persons (NI)	National Accounts
Gross capital formation (K)	National Accounts

¹⁶ Nickell and Layard (1997, p. 36) prefer this specification.

Fig. 1. An evolution of employment (thousand persons, left-hand scale) and annual actual hours per worker (right-hand scale) in agriculture, forestry, and logging from 1960 to 1996 (Source: National Accounts)

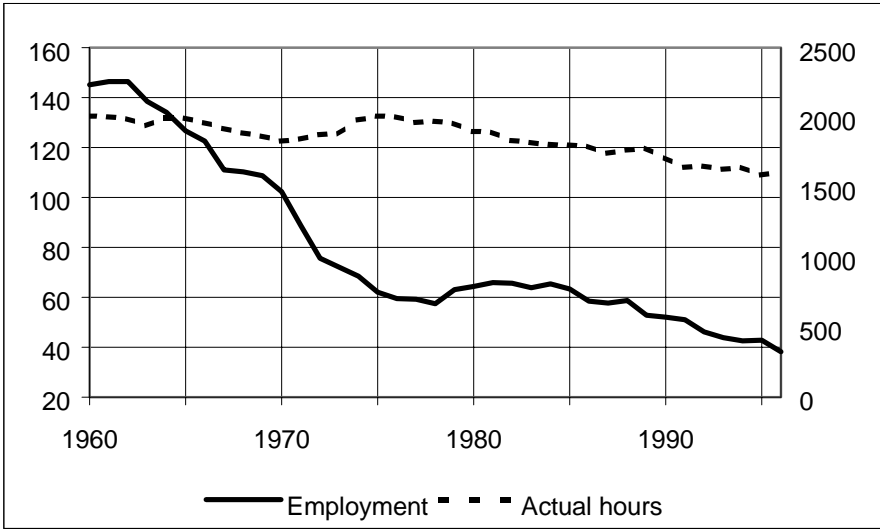


Fig. 2. An evolution of employment, and standard hours and annual actual hours per worker in manufacturing from 1960 to 1996 (Source: The Confederation of Finnish Industry and Employers & National Accounts)

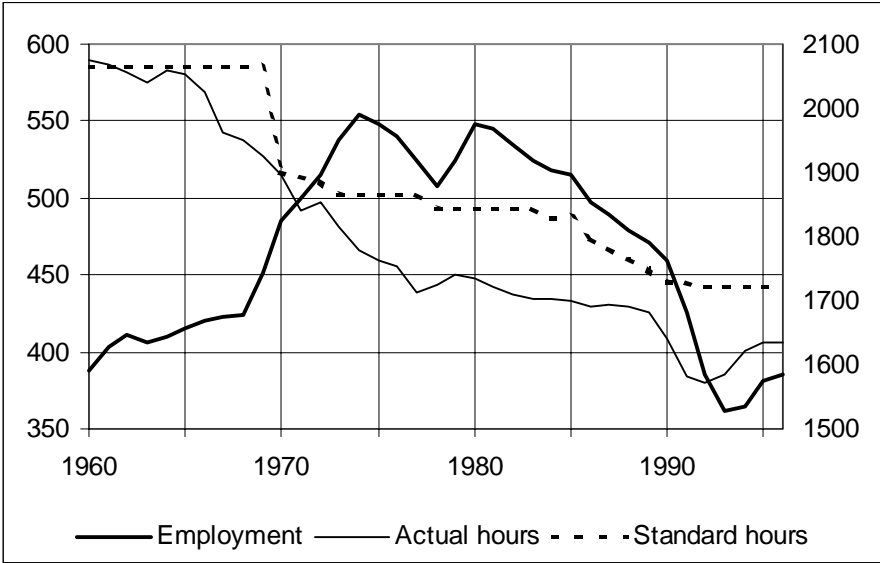


Fig. 3. An evolution of employment and annual actual hours per worker in construction from 1960 to 1996 (Source: National Accounts)

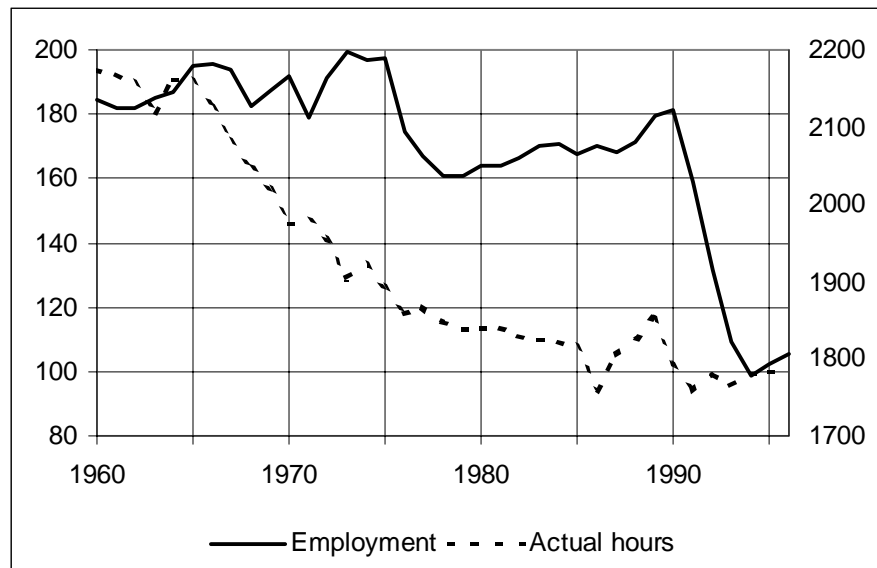


Fig. 4. An evolution of employment and annual actual hours per worker in the wholesale and retail trades from 1960 to 1996 (Source: National Accounts)

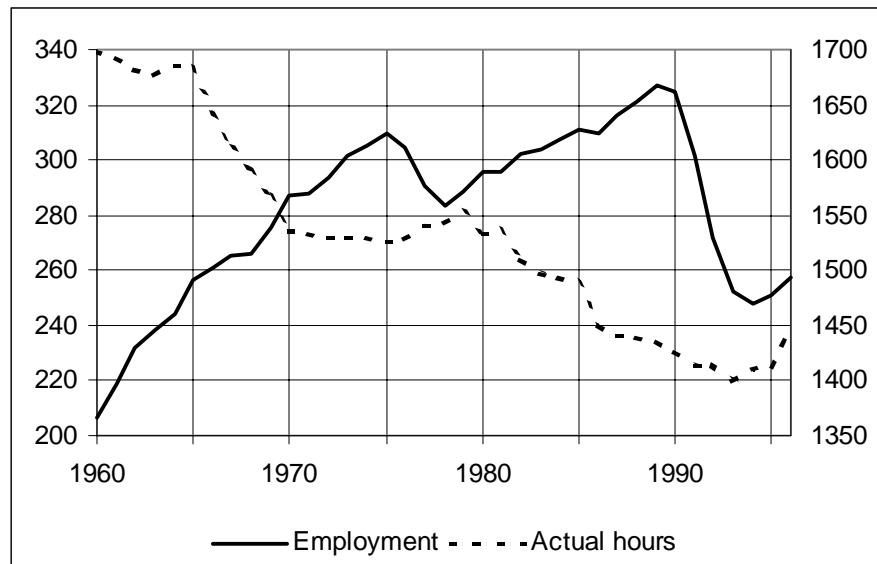


Fig. 5. An evolution of employment and annual actual hours per worker in transportation from 1960 to 1996 (Source: National Accounts)

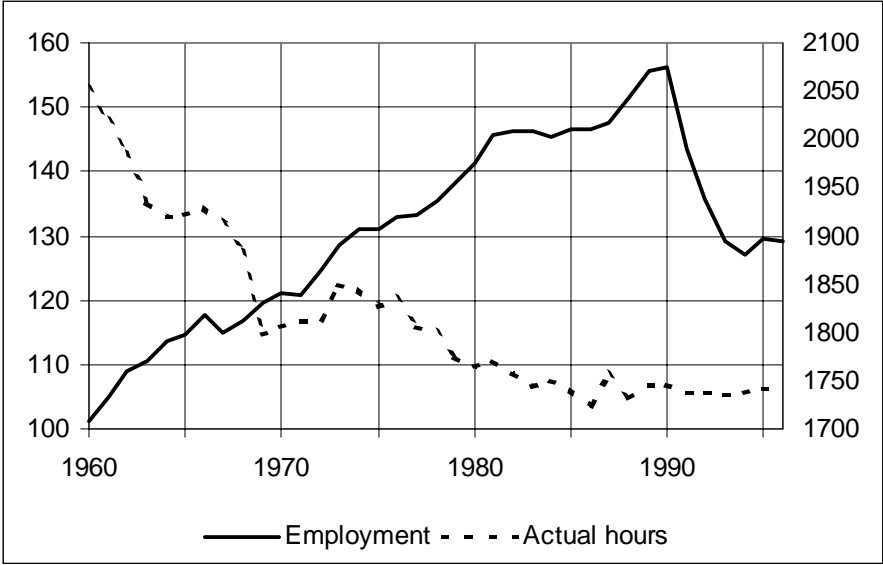


Fig. 6. An evolution of employment and annual actual hours per worker in public activities from 1960 to 1996 (Source: National Accounts)

