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Does a Reduction in the Length of the Working Week Reduce Unemployment? Some Evidence from the Italian Economy During the Great Depression

Fabrizio Mattesini* and Beniamino Quintieri**

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Abstract

This paper studies the Italian labor market during the 1930s. Using monthly data on eight manufacturing sectors for the period 1929-39, we evaluate the effects of the introduction, at the end of 1934, of the 40 hours working week on the demand for labor. The results support the view that the reduction of the level of standard hours can be effective in stimulating employment provided that it does not imply an increase in hourly wage rates.

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Introduction

The view that a reduction in the length of the work week may be an effective remedy against unemployment has a long history. During the thirties, for example, when the Great Depression raised unemployment to unprecedented levels, the reduction of the level of standard hours was the subject of a heated debate similar to the one which has recently taken place in some European countries. The issue, then like now, was whether this type of intervention would be effective in the fight against unemployment or would instead be counterproductive.

The theoretical literature, although extremely useful in clarifying the channels through which work sharing can affect employment, does not provide conclusive results. Different conclusions can be obtained depending on the type of labor market investigated (competitive or unionized), on the assumptions concerning the firm’s objective function (cost minimization or profit maximization) and on the institutional and contractual setup (overtime pay, hiring and firing costs etc). In general, although economists are largely skeptical on the effectiveness of this policy instrument, theoretical models often achieve ambiguous results and do not exclude the possibility that this type of policy may be successful in increasing employment.

Also the empirical studies that have analyzed the experience of some European countries from the 1960s show conflicting results. Franz and Koenig (1987) and Hart (1987) for West Germany and Holm and Kiander (1993) for Finland found that the reduction in the length of the work-week produced positive employment effects while negative effects were found by Brunello (1989) for Japan and, more recently, by Hunt (1999) for West Germany. A major difficulty in assessing the effectiveness of work sharing arises from the fact that very few experiments are available and that these experiments often differ in the way this policy has been implemented.

In this respect a very interesting case study is provided by the experience of the Italian labor market during the Great Depression. Given the strong increase in unemployment during the period 1929-1933 as a result of the worldwide slump, the Italian government implemented at the end of 1934, a reduction in the length of the work-week from 48 hours to 40 hours. This experiment, which was preceded by heated debate, was one of the most decisive interventions among those undertaken during the thirties in the industrialized world. The measures enacted in Germany in 1930, which introduced subsidies for firms which hired new workers and at the same time reduced the length of the work week, and those introduced in the United States in 1933 with the National Industrial Recovery Act were not as radical and generalized as the Italian provisions. The Popular Front government of L. Blum in France promoted a radical intervention which forced entrepreneurs and

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trade unions to sign the Matignon Palace agreements introducing the 40 hour work week; these arrangements, however, remained largely unenforced.  

In this paper we study the performance of the Italian labor market during the period 1929-39 and we try to evaluate the effectiveness of the 1934 reduction in the level of standard hours in increasing employment. The availability of monthly data on some labor market variables allows us to use standard econometric techniques to obtain a quantitative assessment of the impact of the reduction of the work week.

The paper is structured in three sections. The first section contains a description of the economic conditions faced by Italy during the Great Depression, with particular reference to the effects of the crisis on the labor market. We also discuss the main institutional features of the Italian labor market during the 1930s and the policies adopted by the Fascist government. In Section 2 we analyze the theoretical issues that arise in the analysis of the employment effects of work sharing. In section 3 we investigate the employment effects of a reduction in the level of standard hours by estimating, at the industry level, a demand for workers and a demand for hours of work. We use, for this purpose, a panel derived from a survey of labor market conditions undertaken monthly by the Federation of Italian Industry for the period 1929-39.

1. The Italian labor market during the Great Depression

The depression that hit the world economy in 1929 had serious consequences in Italy comparable to those observed in the other major industrialized countries. As we analyzed in detail in Mattesini-Quintieri (1997), all the available data indicate that the contraction was extremely severe.

Industrial production between 1929 and 1932 fell by approximately 33%. This was accompanied by a similar fall in employment (Fig.1), and a halving of real exports, which went from 1,300 million lire at mid 1929 to about 650 million lire at the beginning of 1932.

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2 See also Bentivogli and Sestito (1997).
At the same time Italy experienced severe deflation with the wholesale price index passing from a value of 106 in March 1929 to its lowest value of 63 in April 1934 (Fig. 2). The cyclical downturn had its trough at the end of 1932 after which, with the exception of 1936, the Italian economy returned to growth until the beginning of the war. Beginning in 1934, prices started increasing, reaching at the end of the thirties the 1929 levels.

The consequences of the Great Depression on the Italian labor market were dramatic. The index of blue collar employment (Fig. 3) that was 100 in 1929 went below 80 in 1932, while the total hours worked fell by about 30 per cent during the same period. As we can see in Figure 4, the number of people registered at the employment offices quadrupled in three years.

The fall in employment became a source of deep concern for the Fascist government, which
was consolidating its strategy of consensus. The discontent among workers was widespread\(^3\), and even though the propaganda of the regime tended to project an optimistic view of the future of the country, the authorities became aware of the need to intervene in the labor market.

![Figure 3 - Employment and hours of work indexes](image-url)

It is important to observe that the Fascist regime had been very involved in the previous years in a creation of a new system of industrial relations denoted as corporatism (corporativismo). According to this system the legitimate but often conflicting interests of employers and employees

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\(^3\) An interesting way to measure the situation of the labor market in a non-democratic regime is given by police reports. As shown by De Felice (1996b), police reports of unauthorized riots and demonstrations show a significant increase up
had to be reconciled with the supreme interests of the state. The corporatist system was based on
three main principles: i) only the official unions, recognized and subject to the control of the state,
had the right to legally represent the categories of employees and employers and to stipulate labor
contracts; ii) the reconciliation of interests between employers and employees should be achieved
inside the corporations, institutions formed by the representatives of both workers and employers
belonging to the same sector; iii) controversies, both concerning the existing contracts or the
formation of new contracts, had to be regulated by the state through a set of special magistrates,
called labor magistrates, and any form of strike was illegal.

Through the tight control over wages and labor market contracts, the corporatist system
allowed the regime to pursue a set of active policies in the labor market. The two major types of
intervention undertaken in order to fight unemployment were a policy of wage cuts and the
promotion of work sharing. A reduction of wages had been already implemented during the period
1926-27 when Italy pursued a very drastic deflationary policy in order to reenter the Gold Standard
at the pre-war parity. When the Great Depression hit Italy, the need to control the increase in real
wages, caused by the ensuing deflation, became again a priority. In November 1930 the regime
imposed a generalized 8% wage cut. By the middle of 1931, however, employers started pressuring
for a new reduction in nominal wages. The government did not authorize another generalized wage
cut, but rather allowed a gradual reduction of wages to take place under the pressures created by the
crisis of the labor market. A new generalized wage cut was imposed only in May 1934. According
to this provision all the industries that had not reduced wages since November 1930 had to reduce
them by 7% and all the industries that had partially reduced wages had to adjust them further in
order to achieve a 7% reduction.

Nominal hourly wages showed a decreasing trend until 1935. However the fall in wages was
not sufficient to prevent the increase in real labor costs due to the strong reduction in the price level.
As we can see from Figure 5 real wages, computed by using the wholesale price index as a deflator,
increased by about 40% between 1929 and the beginning of 1934. Such an increase is quite
remarkable considering that it occurred in a period of rapid fall in aggregate demand.

4 As the Carta del Lavoro, the social manifesto of the regime approved in 1926 stated, “production as a whole is a unit
from the national point of view; its objective is unitary and can be summarized in the welfare of individuals and in the
development of national power” (De Felice 1996a).
The reduction of working time was probably the most interesting among the labor market policies of the Fascist regime. During the Great Depression in all major countries the request for a 40-hour work week was at the center of the trade unions’ policy against unemployment. As is well documented by Piva and Toniolo (1987), the Italian official trade unions made work sharing one of the pillars of their strategy and this gave rise to heated debate. While entrepreneurs and economists like Einaudi largely opposed the reduction in working time⁵, on the grounds that it would increase labor costs and therefore unemployment, the government was sympathetic to the position of the trade unions. However, being afraid that the adoption of the 40 hour work week independently of other countries would undermine the competitiveness of the Italian economy, the Italian authorities tried to promote the reduction of working time in the international arena.⁶

As diplomatic initiatives did not produce significant results, the regime decided to introduce the 40 hours work week in the Italian system by promoting an agreement, on October 11 1934, between the trade unions and the Federation of the Italian Industry. According to this agreement all firms in which working time was greater than 40 hours a week had to reduce the work week, and monthly or weekly wages had to be reduced accordingly, in proportion with the reduction of the working time. The agreement also abolished overtime, apart from exceptional cases which required 24 hour notice to the local trade union. In order to partially compensate workers for the loss of income, a subsidy to workers with large families was introduced, financed partly from a 5% tax on

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⁵ An indication of this is the strong opposition of entrepreneurs to the opinions expressed by Giovanni Agnelli, in an interview with the United Press, in which the chairman of Fiat proposed a 36 hour work week as a means of reducing technological unemployment.

⁶ As documented by Piva and Toniolo (1987) the issue was debated at length inside the ILO, with the active involvement of the Italian delegate De Michelis. The debate culminated in the Geneva Conference of 1935 but disagreements among governments impeded the adoption of the emergency measures favored by the Italian government.
the wages of workers for the hours exceeding 40 hours a week. Analogous provisions were taken for white-collar workers and a similar agreement was signed between the trade unions and the association of employers in agriculture. The 40 hour work week was then established by law on October 26, 1937.

Evaluating the effects of the reduction in the level of standard hours requires careful econometric analysis which is the main contribution of this paper. However even a brief look at the data indicates that this policy might have had a significant impact on the Italian labor market. As we can see from Figure 6, which shows the average hours of work in the industrial sector, at the end of 1934 there was a significant and permanent fall in the average hours of work which suggests the occurrence of a structural change. Looking again at Figure 3, which shows together the index of blue collar employment and the index of total hours of work we see that from the end of 1934, with the recovery of industrial production, employment grew at a faster rate than total hours of work. This seems to suggest that the policy of the regime was successful to some extent in achieving work sharing.

![Figure 6 - Average weekly hours of work](image)

2. The demand for workers and for hours of work: theoretical issues

The literature on the effects of work sharing on employment is extensive and includes many possible specifications of the labor market such as simple models of the demand for workers and hours of work (Ehrengberg 1971, Calmfors and Hoel 1988) or more complex models which consider also the competitive supply of labor (Brunello 1989) or include unions and analyze the bargaining process in the labor market (Booth and Schiantarelli 1987). Although many studies conclude that “a reduction in normal working time is quite likely to be counterproductive as an employment
promoting measure” (Calmfors and Hoel 1988, p 60), the results obtained by the large majority of the models vary significantly depending on the specification adopted. In some important cases that cannot be easily dismissed as irrelevant, work-sharing appears to be effective in increasing employment.

To illustrate the possibility that a cut in the level of standard hours can have positive employment effects it is sufficient to consider the simple model of a competitive firm that chooses the number of hours H and the number of workers N in order to maximize profits, given unit labor costs W. Allowing for the existence of overtime, and denoting by w the hourly real wage rate, by b the fixed cost of employing an extra worker and by \( \theta w \) (\( \theta > 1 \)) the overtime pay for any hour worked beyond the standard time \( H_o \), unit labor costs are given by

\[
W = b + wH \quad \text{for} \quad H \leq H_o \quad (1)
\]

\[
W = b + wH_o + \theta w(H - H_o) \quad \text{for} \quad H \geq H_o \quad (2)
\]

If we also assume that there is a limit \( \bar{H} \) to the number of overtime hours that a firm can employ, so that

\[
H - H_o \leq \bar{H} \quad (3)
\]

and, following Feldstein (1967) we assume that technology is represented by a Cobb-Douglas production function\(^7\) \( Y = H^\gamma N^\alpha \) where \( 0 < \alpha < 1 \) and \( 0 < \gamma < 1,\)\(^8\) the maximization problem of the firm can be stated as the problem of choosing the level of H and N that maximize profits

\[
\Pi(H, N) = H^\gamma N^\alpha - WN \quad (4)
\]

subject to (1), (2) and (3). In the Appendix we show that by solving this problem we can derive the demand for workers and the demand for hours of work as a function of the relevant parameters of

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\(^7\) An alternative popular specification is the one proposed by Ehrenberg (1971), \( F(H, N) = G(H)N \), where \( G(H) \) is the productivity per hour of each employee and \( G(0) = 0, G'(H) > 0, G''(H) < 0 \) and \( \gamma = G'(H)H/G(H) < 1. \) We use the Cobb Douglas specification in order to obtain sharper results in our analysis.

\(^8\) By assuming that the elasticity of output with respect to hours is less than 1 we assume that the intensity of work decreases with the length of the workday. The alternative assumption \( \gamma > 1 \) would imply that as hours increase output increases more than proportionally, because the hours used for setting up and closing down operations represent an increasingly smaller proportion of output.
the model, i.e. as a function of \( H_0, \tilde{H}, w, b \) and \( \theta \).

The presence of the non-negativity constraints (1), (2) and (3) renders the relationship between the demand for workers and the level of standard hours particularly interesting. The analysis shows, in fact, that the employment effect of a cut in standard hours is zero when firms are operating below standard hours but becomes positive when firms are operating near standard hours (provided fixed costs are not too high). When firms are already operating with overtime a cut in standard hours will instead have negative effects on employment but, if workers are working near the maximum level of overtime allowed by the legislation (provided fixed costs are not too high), a reduction in \( H_0 \) has again positive employment effects.

In practice, when the maximization problem allows for an interior solution, a cut in the length of the workweek has either no effect or negative effects on employment, but when the solution is found at a corner, then the same measure has positive effects on employment. Since there is no reason for excluding corner solutions from the analysis, especially in a context like the one analyzed in this paper where it is unlikely that firms were using worker overtime on a constant basis, we conclude that positive employment effects from a cut in the level of standard hours are a relevant theoretical possibility.

Further positive employment effects of work sharing could be found if, as is the case in many countries today, the legislation imposes limits on the minimum amount of hours of work for each employee. This case, which has recently been analyzed by Hunt (1999) does not apply to the pre-war Italian labor market and therefore will not be taken into account here.

3. Empirical evidence

3.1 The data

We study the effects of the reduction in the number of standard hours by estimating, in line with the theoretical results of the previous section, a demand function for workers and a demand function for hours of work. We use, for this purpose, a panel derived by a monthly survey on labor market conditions undertaken by the Federation of Italian Industry (Confindustria) during the period 1929-39.\(^9\)

The survey was conducted every three months (with one month of overlap) on a sample of firms, which although probably not stratified, represented a relevant percentage of the total number of firms and covered a substantial fraction of total employment. The survey provides monthly data, at the industry level, on the number of workers employed, the number of hours worked, the total amount of wages and the hourly wage rate. The survey includes also data, collected every three
months, on the number of workers registered by the surveyed firms at employment offices to make them eligible for “union” benefits and reports the same number as a percentage of the total number of workers registered in each sector. These workers can be considered the pool of workers from which firms drew for actual employment depending on production needs.

From the survey therefore, we can obtain, every three months, the total number of workers registered with firms and, at the monthly level, the number of workers that the firms surveyed were actually employing. In order to obtain monthly data on total employment at the sector level we applied the workers’ utilization rate to the data on registered workers. By dividing the total number of hours worked by the number of workers we also obtained the per capita number of hours worked by each employee.

The survey contains information on eleven major sectors up to December 1931. After this date, the data are reported at the level of sub-sectors and we aggregated them in order to make them compatible with the data on the first two years. This choice was dictated by the consideration that the first two years of the depression were actually very important and we preferred not to drop them in order to obtain a finer disaggregation. In this study we consider only eight of the eleven sectors included in the survey. Three of these industries in fact (food, beverages and agricultural products, energy and illumination and various) contained significant discontinuities that made them very difficult to analyze.

The data on total employment for each of the eight sectors are shown in Figure 7. In all the sectors we find a tendency of employment to decrease during the first years of the depression and then a sharp recovery from the beginning of 1935. In two sectors (construction and construction materials) we can observe a strong seasonality due to the particular characteristic of the production activity, which tends to decrease in the winter months. It is interesting to notice that the growth in employment per firm was particularly significant in the mechanical sector, starting from 1935, stimulated also by the increase in military spending due to the Ethiopian War, the intervention of Italy in the Spanish civil war, and the general re-armament process which preceded World War II. On the contrary employment in the textile sector, which represented a large part of Italian industrial production, shows some growth after 1933, but never returns to the level of 1929 probably because this sector was particularly hit by the protectionist measures that were adopted in the pre-War period by most countries.

As we can see from Figure 8 in all industries nominal hourly wage rates follow a similar pattern: a steady decline until 1935 and an increase from 1936 onward. Because of the strong

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9 The data obtained were published periodically in Bollettino di Ricerche Economiche, various issues.
deflation that occurred since the beginning of 1929, instead, real wages\textsuperscript{10}, shown in Figure 9, have an opposite dynamics, increasing in all sectors until 1934 and decreasing in the following period.

In Figure 10 we show our data on weekly per capita hours of work. In all the graphs we observe that work hours have a clear negative trend during the whole decade, even though, in the years following 1934, employment grew in all sectors. Quite evident, in all the figures, is also the sudden drop in per capita hours of work which seems to have occurred in the aftermath of the agreement of October 11, 1934.

\textsuperscript{10} Real wages have been computed by dividing the nominal wages by the sectoral wholesale price index when available ("textile", mechanics", “paper and paper products”), and by the general wholesale price index in all other cases.
Figure 7 - Employment

- Paper products and printing
- Chemical
- Construction
- Mining
- Construction materials
- Wood and wood products
- Mechanic
- Textile
Figure 8 - Average hourly nominal wages

[Graphs showing average hourly nominal wages for different sectors: paper products and printing, chemical, construction, mining, wood and wood products, construction materials, mechanic, textile.]
Figure 9 - Average hourly real wages

- Paper products and printing
- Chemical
- Construction
- Mining
- Wood and wood products
- Construction materials
- Mechanic
- Textile
Figure 10 - Per capita weekly hours of work

- paper products and printing
- chemical
- construction
- mining
- wood and wood products
- construction materials
- mechanic
- textile
3.2 Econometric analysis

Consistently with the results obtained in section 2 we estimate a demand for workers and a demand for hours of work which are both function of the real hourly wage rate and a variable representing the policy change i.e. the reduction in the length of the work-week. By doing this, we implicitly assume that changes in hours and employment must be ascribed mainly to the demand for labor by firms and not to supply factors. In other words, we implicitly assume an infinitely elastic labor supply in manufacturing.

Although unsatisfactory, there are good reasons to believe that this assumption is reasonable, given the structure of the Italian economy in the 1930s. The Italian labor market, in fact, was very similar to the one that characterizes less developed countries today, with a small manufacturing sector and an agricultural sector employing over 50% of the total labor force. Widespread underemployment in agriculture implied the existence of a large “reservation army” of workers willing to migrate from the country in response to changes in the demand for labor in the manufacturing sector and therefore the existence of very elastic supply of labor.

Given the high frequency of the data in our panel, the employment equation and the hours of work equation we estimate have a dynamic form and include lagged values of the dependent and independent variables. The dynamic employment equation is given by

\[ h_{it} = \sum_{j=1}^{m} \alpha_{1j} h_{i,t-j} + \sum_{j=0}^{p} \alpha_{2j} w_{i,t-j} + \sum_{i=1}^{8} \alpha_{3i} \bar{h}_{i} + \lambda_{t} + \eta_{i} + u_{it} \]  

(5)

while the dynamic hours of work equation is given by

\[ n_{it} = \sum_{j=1}^{m} \beta_{1j} n_{i,t-j} + \sum_{j=0}^{p} \beta_{2j} w_{i,t-j} + \sum_{i=1}^{9} \beta_{3i} \bar{h}_{i} + \lambda_{t} + \eta_{i} + u_{it} \]  

(6)

The variable \( n_{it} \) is the logarithm of the number of workers employed in industry \( i \) at time \( t \), \( h_{it} \) is the logarithm of the average number of hours worked per week by each worker in industry \( i \) at time \( t \), \( w_{it} \) is the logarithm of the hourly wage rate in industry \( i \) at time \( t \), deflated by the producer price index for that industry, \( \bar{h}_{i} \) is a dummy variable that, for industry \( i \), takes the value of 1 from January 1929 to December 1934 and the value of 0 for the remaining period. The use of a dummy to represent the policy change is necessary since the level of standard hours changed from sector to sector and according to the holidays and no detailed data is available on the issue. Each equation contains also a time effect \( \lambda_{t} \) that is represented by a monthly dummy and is common to all sectors, and a permanent but sector specific effect \( \eta_{i} \). The error terms of the employment equation and that of the hours equation are respectively \( u_{it} \) and \( v_{it} \).
The monthly time dummies in the two equations are introduced to control for any macroeconomic effect that might have influenced the evolution of the labor market, while the fixed effects are introduced to control for unobserved industry heterogeneity. Since in this paper we focus on the effects of a reduction in the level of standard hours on employment and hours of work, we allow for the possibility that mandatory changes in the length of the work-week affect differently hours and employment in each sector. We instead restrict changes in wages to have the same effect on employment and hours independently of the sector.

The dynamic panel is estimated using the Arellano-Bond GMM estimator. This estimator optimally exploits all the linear moment restrictions that follow from the assumption of no serial correlation in the error terms and provides consistent estimates in panels which contain individual effects, lagged dependent variables and no strictly exogenous variables. This last aspect is particularly important in our case since the main explanatory variable in the two equations, beside the dummies representing the policy change, is the real hourly wage rate, which cannot obviously be treated as a strictly exogenous variable. In our estimate we treat \( w_{it} \) as predetermined (i.e. we assume that \( E(w_{it}u_{it}) \neq 0, E(w_{it}v_{it}) \neq 0, \) for \( s > t \) and \( E(w_{it}u_{it}) = 0, E(w_{it}v_{it}) = 0, \) for \( s \leq t \) ) and we use lagged values of the dependent and independent variables as instruments.

In table 1 we report the estimates of equation (5) obtained by including among the regressors \( m = 3 \) lags of the dependent variable and \( p = 3 \) lags of the independent variable. In the first part of the table we report the estimates of the hours of work equation under the assumption that the error term is homoskedastic while in the second part we allow for heteroskedasticity and we report the results obtained by using the Arellano-Bond one-step robust estimator. For expositional convenience, we omit from the table the coefficients of the time dummies.

As we can see from both estimates, the dummies representing the reduction in the length of the work-week are all highly significant and all have a positive sign, indicating that, as expected, a reduction in the number of standard hours had the effect of reducing the number of hours worked by each individual. All the lagged values of the dependent variable enter significantly in our hours of work equation while only the current level of the real wage rate and the one month lag of this variable are significant. The coefficient estimates of the model imply a long-run wage elasticity of \(-0.074\) suggesting that the increase in real wages induced by the strong deflation that occurred in the first half of the 1930s had a negative but very small impact on the number of hours worked. In general, the results of the robust case are very similar to the results of the homoskedastic case but, as expected, the standard errors are sometimes higher in the robust case.
Table 1
Hours of work equation
GMM estimates (all variables in first differences)

<table>
<thead>
<tr>
<th>Dependent variable: $h_{it}$</th>
<th>Homoskedastic estimation</th>
<th></th>
<th>Robust estimation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ind. var.</td>
<td>Coeff.</td>
<td>St. Er.</td>
<td>z</td>
<td>P&gt;</td>
</tr>
<tr>
<td>$h_{i,t-1}$</td>
<td>0.3112</td>
<td>0.0355</td>
<td>8.77</td>
<td>0.000</td>
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<tr>
<td>$h_{i,t-2}$</td>
<td>0.1421</td>
<td>0.0362</td>
<td>3.93</td>
<td>0.000</td>
</tr>
<tr>
<td>$h_{i,t-3}$</td>
<td>0.1962</td>
<td>0.0352</td>
<td>0.56</td>
<td>0.577</td>
</tr>
<tr>
<td>$w_{i,t}$</td>
<td>-0.2922</td>
<td>0.0598</td>
<td>-4.88</td>
<td>0.000</td>
</tr>
<tr>
<td>$w_{i,t-1}$</td>
<td>0.3037</td>
<td>0.0776</td>
<td>3.91</td>
<td>0.000</td>
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<tr>
<td>$w_{i,t-2}$</td>
<td>-0.0899</td>
<td>0.0765</td>
<td>-1.17</td>
<td>0.240</td>
</tr>
<tr>
<td>$w_{i,t-3}$</td>
<td>0.3923</td>
<td>0.0583</td>
<td>0.67</td>
<td>0.501</td>
</tr>
<tr>
<td>$\overline{h}_1$</td>
<td>0.8355</td>
<td>0.1881</td>
<td>4.44</td>
<td>0.000</td>
</tr>
<tr>
<td>$\overline{h}_2$</td>
<td>0.7405</td>
<td>0.0185</td>
<td>4.01</td>
<td>0.000</td>
</tr>
<tr>
<td>$\overline{h}_3$</td>
<td>0.1030</td>
<td>0.0195</td>
<td>5.28</td>
<td>0.000</td>
</tr>
<tr>
<td>$\overline{h}_4$</td>
<td>0.0563</td>
<td>0.0184</td>
<td>3.06</td>
<td>0.002</td>
</tr>
<tr>
<td>$\overline{h}_5$</td>
<td>0.0868</td>
<td>0.0191</td>
<td>4.55</td>
<td>0.000</td>
</tr>
<tr>
<td>$\overline{h}_6$</td>
<td>0.0869</td>
<td>0.0189</td>
<td>4.60</td>
<td>0.000</td>
</tr>
<tr>
<td>$\overline{h}_7$</td>
<td>0.0532</td>
<td>0.0183</td>
<td>2.90</td>
<td>0.004</td>
</tr>
<tr>
<td>$\overline{h}_8$</td>
<td>0.0794</td>
<td>0.1881</td>
<td>4.22</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Sargan test:
$\chi^2(944) = 817.3 \quad \text{Pr} > \chi^2 = 0.9988$

Arellano-Bond tests:
$H_0$: no autocorrelation of order 1:
$z = -27.56 \quad \text{Pr} > z = 0.000$
$H_0$: no autocorrelation of order 2
$z = 0.54 \quad \text{Pr} > z = 0.5920$

Instruments: four lags of \(h_{it}\) and \(w_{it}\)

Arellano-Bond tests:
$H_0$: no autocorrelation of order 1:
$z = -1.96 \quad \text{Pr} > z = 0.0501$
$H_0$: no autocorrelation of order 2
$z = -0.82 \quad \text{Pr} > z = 0.4121$

Instruments: four lags of \(h_{it}\) and \(w_{it}\)
# Table 2

## Employment equation

GMM estimates (all variables in first differences)

<table>
<thead>
<tr>
<th>Dependent variable: $n_{it}$</th>
<th>Homoskedastic estimation</th>
<th>Robust estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ind. var.</strong></td>
<td><strong>Coeff.</strong></td>
<td><strong>St. Er.</strong></td>
</tr>
<tr>
<td>$n_{i,t-1}$</td>
<td>0.9327</td>
<td>0.0332</td>
</tr>
<tr>
<td>$n_{i,t-2}$</td>
<td>-0.2400</td>
<td>-0.0328</td>
</tr>
<tr>
<td>$w_{i,t}$</td>
<td>-0.1376</td>
<td>0.0632</td>
</tr>
<tr>
<td>$w_{i,t-1}$</td>
<td>0.0469</td>
<td>0.0808</td>
</tr>
<tr>
<td>$w_{i,t-2}$</td>
<td>-0.0299</td>
<td>0.0791</td>
</tr>
<tr>
<td>$w_{i,t-3}$</td>
<td>0.1475</td>
<td>0.0616</td>
</tr>
<tr>
<td>$\bar{h}_{1}$</td>
<td>-0.0926</td>
<td>0.0229</td>
</tr>
<tr>
<td>$\bar{h}_{2}$</td>
<td>-0.0922</td>
<td>0.0237</td>
</tr>
<tr>
<td>$\bar{h}_{3}$</td>
<td>-0.0287</td>
<td>0.0235</td>
</tr>
<tr>
<td>$\bar{h}_{4}$</td>
<td>-0.0807</td>
<td>0.0254</td>
</tr>
<tr>
<td>$\bar{h}_{5}$</td>
<td>-0.1114</td>
<td>0.0237</td>
</tr>
<tr>
<td>$\bar{h}_{6}$</td>
<td>-0.0771</td>
<td>0.0243</td>
</tr>
<tr>
<td>$\bar{h}_{7}$</td>
<td>-0.1528</td>
<td>0.0240</td>
</tr>
<tr>
<td>$\bar{h}_{8}$</td>
<td>-0.0303</td>
<td>0.0229</td>
</tr>
</tbody>
</table>

Sargan test

$\chi^2(827) = 816.35$ \hspace{1em} Pr $> \chi^2 = 0.5973$

Arellano-Bond tests:

$H_0$: no autocorrelation of order 1:

$z = -17.34$ \hspace{1em} Pr $> z = 0.000$

$H_0$: no autocorrelation of order 2

$z = -1.20$ \hspace{1em} Pr $> z = 0.2314$

Instruments: three lags of $h_{it}$ and $w_{it}$

---

**Arellano-Bond tests:**

$H_0$: no autocorrelation of order 1:

$z = -2.02$ \hspace{1em} Pr $> z = 0.0436$

$H_0$: no autocorrelation of order 2

$z = -1.00$ \hspace{1em} Pr $> z = 0.3173$

Instruments: three lags of $h_{it}$ and $w_{it}$
Since an estimator that uses lags as instruments would lose its consistency if in fact errors were serially correlated, we also report tests of the validity of the instrumental variables, i.e. tests of lack of serial correlation. We consider therefore the results of tests of first and second order serial correlation and the results of the Sargan test of over-identifying restrictions. This last one is reported only for the homoskedastic case since only in this event the Sargan test has an asymptotic $\chi^2$ distribution. As we can see from table 1 the Sargan test from the homoskedastic estimator cannot reject the hypothesis that the over-identifying restrictions are valid. In both the homoskedastic and the robust cases the null of no first-order autocorrelation in the differenced residuals is rejected, but this is not a problem since $u_{it}$ and $v_{it}$ are first differences of serially uncorrelated errors and therefore $E(u_{it}u_{i,t-1})$ need not to be zero. More importantly, we cannot reject the null hypothesis of no second order serial correlation, which is crucial since the consistency of the Arellano-Bond estimator hinges heavily upon the assumption $E(u_{it}u_{i,t-2}) = 0$.

In table 2 we report the estimates of equation (6) obtained by including among the regressors $m = 2$ lags of the dependent variable and $p = 3$ lags of the independent variable. In both the homoskedastic case and the robust cases all the dummy variables $\bar{h}_i$ that represent the reduction in the level of standard hours in all industries have a negative sign indicating a negative relationship between the length of the work-week and employment. For six out of eight industries the mandatory change in the length of the work-week is significant, while in two sectors (construction and textile) the variable $\bar{h}_i$ has the right sign but is not significant.

It is important to notice that this result is consistent with the results of the model discussed in section 2, which indicated that the employment effect of a cut in standard hours is zero when firms are operating below standard hours while it is positive when firms are operating near standard hours. As we show in table 3, where we report the average number of hours worked per week by each individual worker in the months before the policy change (i.e. the period going from January 1934 to October 1934), the two sectors where the per capita number of hours worked was the lowest were the construction and textile sectors, i.e. the industries for which we could not detect a significant effect of the policy change on employment. Since it is likely that the industries with the lowest average number of hours worked per week were the ones operating below standard hours, and it is also likely that most firms, in a period of depression like the one we consider in this paper, were not employing workers overtime, the sectors where we would expect not to find a positive effect of the cut in hours on employment are exactly the two sectors where the variable $\bar{h}_i$ was not
significant.

Table 3
Average number of hours worked per week
in the period January 1934 – October 1934

<table>
<thead>
<tr>
<th>Industry</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper and paper products</td>
<td>42.6</td>
</tr>
<tr>
<td>Chemical</td>
<td>43.5</td>
</tr>
<tr>
<td>Construction</td>
<td>36.8</td>
</tr>
<tr>
<td>Minino</td>
<td>38.9</td>
</tr>
<tr>
<td>Wood and furniture</td>
<td>39.0</td>
</tr>
<tr>
<td>Construction materials</td>
<td>40.3</td>
</tr>
<tr>
<td>Mechanic</td>
<td>43.0</td>
</tr>
<tr>
<td>Textile</td>
<td>38.8</td>
</tr>
</tbody>
</table>

In both the homoskedastic and the robust cases reported in table 2 the lagged values of the dependent variable are significant. The current value of the wage rate has a significant, negative impact on employment, but the long run elasticity, although very small, is positive (0.0293), indicating a very mild procyclicality of real wages on employment.

As in the previous equation the Sargan test from the homoskedastic estimator cannot eject the hypothesis that the over-identifying restrictions are valid. The consistency of the estimates in table 2 is guaranteed by the fact that, in both the homoskedastic and the robust cases, the Arellano-Bond test cannot reject the null hypothesis of no second order serial correlation.

Summing up, our estimates reported in table 1 and 2 show that the reduction in the number of standard hours had an important impact on the Italian labor market during the 1930s. Controlling for macroeconomic effects through the use of time dummies, our estimates show that the implementation of the agreement signed by the trade unions and the association of Italian entrepreneurs at the end of 1934 induced a significant reduction on the average number of hours worked and, in most industries, had a positive effect on employment.

Conclusions

This paper is a first attempt to analyze empirically the impact of the adoption of the forty hours work-week on the Italian labor market during the Great Depression, which was introduced by the Fascist government as an explicit measure aimed at reducing unemployment. Our empirical

11 Unfortunately, since we do not have the number of standard hours in each sector, we cannot provide precise calculations on this issue.
analysis on eight industrial sectors produces results that are consistent with the view that a reduction in the level of standard hours may be an effective remedy against unemployment.

Can these findings shed any light on the current debate on work sharing? The main message of this paper is that the reduction in the hours of work should not be excluded *a priori* as an instrument to stimulate employment. However, as always happens when we analyze historical episodes, it is important to stress the very different context in which this measure was undertaken. Not only was Italy subject to an authoritarian regime but also, as in most countries during the thirties, labor markets were highly flexible and technological conditions allowed for a high degree of substitutability between insiders and outsiders.

More importantly, the reduction in the level of standard hours was accompanied by a corresponding reduction in the level of wages earned by individual workers and therefore did not give rise to an increase in the effective hourly wage rate. This aspect was essential in determining the success of work sharing in Italy during the Great Depression and represents a major difference with respect to the current proposals which do not imply a simultaneous reduction of hours worked and monthly wages.

**References**


Let us consider the problem of choosing the level of $H$ and the level of $N$ that maximize (4) given equations (1), (2) and (3). Taking derivatives with respect to $N$ and equating to zero we obtain

\[ \alpha H^\gamma N^{\alpha-1} - b - wH = 0 \quad \text{for} \quad H \leq H_o \quad (a1) \]

\[ \alpha H^\gamma N^{\alpha-1} - b - wH_o - \theta w(H - H_o) = 0 \quad \text{for} \quad H > H_o \quad (a2) \]

and taking derivatives with respect to $H$ and equating to zero we obtain

\[ \gamma H^{\gamma-1} N^\alpha - wN = 0 \quad \text{for} \quad H \leq H_o \quad (a3) \]

\[ \gamma H^{\gamma-1} N^\alpha - wH_o N - \theta wN = 0 \quad \text{for} \quad H > H_o \quad (a4) \]

Let us now define by $H_1 = \frac{\gamma b}{(\alpha - \gamma)w}$ the value of $H$ obtained by substituting (a3) in (a1) and by $H_2 = \frac{\gamma b - (\theta - 1)wH_o}{(\alpha - \gamma)w}$ the value of $H$ obtained by substituting (a4) in (a2). Notice that always $H_1 > H_2$. Moreover, let us denote by $\Pi(H)$ the implicit function obtained by substituting (a3) and (a4) in equation (4) in the text.

If $\alpha > \gamma$, depending on parameter values, we can distinguish three important cases.

i) If $H_1 < H_o$ (and therefore $H_2 < H_o$), profits are maximized for $H = H_1$. Since, as we can immediately see substituting $H_1$ in (a3) the optimal level of employment, $N^*$ does not depend on $H_o$, a reduction in the number of standard hours does not have any effect on employment.

ii) if $H_2 > H_o$ (and therefore $H_1 > H_o$), which can only happen if $\gamma b > (\theta - 1)wH_o$, profits are maximized for $H = H_2$. In this case $N^* = N^*(H_2)$ and, differentiating, we can immediately see that $dN^*/dH_o \geq 0$ i.e. a reduction in standard hours has a negative effect on employment. This result which has been derived in other contexts also by Ehrenberg (1971), Hart (1984), Calmfors and Hoel (1988) can be explained by the fact that, when firms are already operating with overtime, a decrease in $H_o$ is equivalent to an increase in the fixed cost $b$ per worker, i.e. it implies an increase in the cost per worker, but leaves the marginal cost of overtime unchanged. As a result, firms are induced to substitute longer working time for employment.

iii) If $H_1 > H_o > H_2$ we have a corner solution. Analyzing the function $\Pi(H)$, we immediately see that profits are increasing up to the point $H_o$ and decreasing from $H_o$ onward, which implies that the corner solution represents a maximum. In this case $N^* = N^*(H_o)$ and $dN^*/dH_o < 0$ provided that $\gamma b > (\theta - 1)wH_o$. When fixed costs are not too large and firms are operating with a level of hours near standard hours, a reduction in standard hours will induce firms to reduce working time and to increase employment.

Let us now consider the case $\alpha < \gamma$. We see that when $H \leq H_o$, the function $\Pi(H)$ is always increasing in $H$. When $H \geq H_o$ instead the function is always increasing in $H$ if $\gamma b \geq (\theta - 1)wH_o$, while it has a stationary point if $\gamma b < (\theta - 1)wH_o$. Since at this point however $\Pi(H)$ is convex, this stationary point cannot be a maximum. The only maximum can be found, therefore, at the boundary, i.e. either at $H = H_o$, in which case we are back to case iii) above, or at the point in which $H = H_o + \bar{H}$. In this case $N^*(H) = N^*(H_o + \bar{H})$ and $dN^*/dH_o < 0$, if
\( \gamma b < (\theta - \gamma)wH_\theta + (1 - \gamma)\theta w\tilde{H} \). If fixed costs are not too large, a reduction in the level of standard hours will have a positive effect on employment.