The Impact of Labour Market Partial Reforms on Workers’ Productivity: The Italian Case

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Abstract According to a widespread point of view, flexibility in the labour market is considered a means to fight unemployment and to increase labour productivity. But if flexibility is introduced into the system at the margin (only for new contracts) then its effect may be ambiguous and even perverse as Blanchard and Landier (2002) argued. This work follows this strand and demonstrates that partial reforms do not necessarily stimulate diligence of workers. If there is a large amount of protected workers, flexible workers may perceive that diligence does not worth. Estimates with Italian data are presented and confirm this theoretical argumentation.

Keywords: Partial labour market reforms, efficiency wage, threshold model

JEL Classification: J24, J41, K31

1. Introduction

Many European countries have undertaken labour market reforms in the past decades. These reforms aim at increasing flexibility in the labour market; however, they generally operate at “the margin” in the sense that they regard new contracts (for an overview of these reforms see OECD, 1999, or European Commission, 2005). For example, the Italian labour market has experienced two important reforms in 1997 (the so called Legge Treu) and in 2003 (the so called Legge Biagi). By these reforms the labour market has become more flexible, giving the single employers and the employees the possibility of bargaining almost all features of the new job’s contracts, in particular, the wage and the duration. The share of new contracts which exploits the new laws was fast increasing.

So, many researches have been devoted to find the reason why firms want temporary contracts: Bronstein (1991) finds that European employers have three main reasons why they want a temporary job: temporary substitutions of permanent workers, unexpected demand fluctuations, screening for permanent positions. According to the analysis of Portugal and Varejao (2003) screening is the single most important reason why firms use this type of contracts. So, if temporary works are set for flexibility reasons (substitutions and demand fluctuations but not for screening) then these works do not provide access to permanent jobs meanwhile only screening reasons imply a conversion into permanent jobs. Atkinson et all (1996), Abraham (1988) and Houseman (2000) provide statistics about the reason why firms declare to prefer a temporary position. The reasons of screening are 20%, 16% and 43% of the total, respectively. For the Italian case, Ichino et all (2005) estimate that the probability of finding a permanent job increases of 14% after a temporary job. However, asymmetric information problems may arise, in the sense that workers do not necessarily know the true reason of the choice of a
temporary contract, hence they may perceive the frequency of the screening reason higher than the one declared by firms. Firms may cheat about the true reason of the vacancy because workers, during the screening job’s period may be stimulated to behave efficiently, (see Shapiro-Stiglitz, 1984): since jobs are temporary, workers know that the possibility of a job’s contract renewal (or conversion to a permanent job) depends on their diligence. However, workers may anticipate this behaviour, hence they must form a probability of a renewal which depends on several factors that this work aims to investigate. So, on the one side, these reforms, removing rigidity in the market, should increase labour productivity of flexible workers. Nickell (2003) shows the benefits in terms of employment from removing such kind of rigidities, in fact, these workers are not necessarily unionised, hence they cannot get mark-ups by the monopoly bargain and duration contracts can be also bargained, for all these facts, the market clears. However, Bertola (1990) argued that the long-run employment is not affected by the degree of flexibility in the labour market meanwhile flexibility may increase the variability of employment and efficiency of firms. On the other side, many research works cast many doubts on their positive effect on efficiency or on welfare. Blanchard and Landier (2002) highlighted the “perverse effects” of such a partial reforms since their main effect would be an increase in the turnover of fixed contracts and indicate the true reason why of such a kind of reforms on the opportunism of the politicians. Boeri and Garibaldi (2007) followed this strand and argued that these reforms cause a fall in the productivity of labour; Bentolila and Dolado (1994) also argued that the main effect of these reforms is to create a duality in the labour market.

In this study, the same conclusions are reached but from a different perspective: differently from Boeri and Garibaldi (2007) who consider productivity as a stochastic exogenous variable, here labour productivity is endogenous and it is determined by the optimising behaviour of workers; more precisely one may verify whether the reforms in question have indeed stimulate labour productivity as the “Efficiency Wage” theory predicts.

In this paper, it is argued that during recessions, firms must evaluate to dismiss temporary contracts independently from what reason why firms wanted temporary contracts before the recession; consequently, it is argued that temporary workers may or may not be stimulated by the temporary feature of the contract. In fact, even if the possibility of a renewal of the contract may work as diligence stimulus, it seems also plausible that the chance of having again a job depends on the structure of job’s contracts the firms owns other than the business cycles: a recession, together with a large percentage of the permanent workers with respect to the all workers may induce temporary workers not to increase their productivity because the recession will hit them independently of their productivity since (one may assume) the permanent (unionised) workers cannot be fired in the short run; moreover, marginal productivity of temporary workers also depend on the total number of workers which includes the number of unionised workers. In other words, when recessions occur, firms may desire to dismiss some workers; those that will be dismissed would be the most unproductive unless they are unionised hence protected in the short run; if the share of these workers is high on the total personnel, then only some temporary workers will suffer the recession. So, the probability of a renewal of the contract largely depends on the business cycles and on the ratio between the number of temporary contracts and the total number of job’s contracts.

2. How Much Should the Optimising Temporary Worker Be Diligent?
Consider the profit function of a representative firm where \( p \) is the product price, \( y \) is the output, \( b \) is the business cycle parameter, \( f \) is the number of temporary workers, \( l \) is the number of unionised workers, \( w_f \) and \( w_l \) are their wages respectively; \( \alpha \) and \( \beta \) are parameters capturing the “effort” of temporary and unionised workers respectively.\(^6\)

\[
\Pi = py - w_f f - w_l l
\]  

(1)

with\(^7\) \( y = Y(f, l; \alpha, \beta) \) and \( p = P(Y(f, l; \alpha, \beta); b) \). In the short run, firms can only choose the number \( f \) meanwhile \( l \) remains fixed. So, the firms maximises their profit by choosing \( f \) appropriately:

\[
\frac{\partial \Pi}{\partial f} = P'YfY + PY_f' - w_f = 0; 
\]  

(2)

\[
y_f'(P'_y Y + P) = w_f. 
\]  

(3)

Specifying a production function it can be possible, in principle, to solve the last equation for \( f \). For example, if:\(^8\)

\[
y = Y(f, l; \alpha, \beta) = Y(\alpha f + \beta l) 
\]  

(4)

then:

\[
y_f' = \alpha \frac{\partial Y(\alpha f + \beta l)}{\partial q} \text{ with } q = \alpha f + \beta l; 
\]  

(5)

from eq. (3):

\[
y_f' = \alpha \frac{\partial Y(\alpha f + \beta l)}{\partial q} = \frac{w_f}{(P'_y Y + P)}, 
\]  

(6)

\[
\alpha f + \beta l = V \left[ \frac{w_f}{\alpha (P'_y Y + P)} \right] 
\]  

(7)

where \( V[f, \cdot] \) is the inverse function of \( \frac{\partial Y(\cdot)}{\partial q} \).

\[
f^* = \frac{1}{\alpha} V \left[ \frac{w_f}{\alpha (P'_y Y + P)} \right] - \frac{\beta l}{\alpha} 
\]  

(8)

Now define \( n \) as the number of workers in the labour force; hence \( f \leq n \) and the rate of employment when a temporary job is \( f/n \). Suppose that \( f/n \) can be interpreted as the probability of having a temporary job for the \( n \) people, next time. Considering eq. (8) this probability is now:

\[
\frac{f}{n} = \frac{1}{\alpha n} V \left[ \frac{w_f}{\alpha (P'_y Y + P)} \right] - \frac{\beta l}{\alpha n} 
\]  

(9)
Assuming a competitive market for the firms \( (P'_y = 0) \) the above equation can be rearranged as:

\[
\frac{f}{n} = \frac{1}{an} V \left[ \frac{w_f}{\alpha P} \right] \beta l - \frac{\beta l}{an} \tag{10}
\]

The above probability is generally a non-monotonic function of \( P, l, \) and \( \alpha \); for \( Y(.) \) hence \( V(.) \) having the usual properties it positively depends on \( P \) and \( \alpha \) and negatively on \( l \). For example, if 

\[
y = Y(\alpha f + \beta l) = \log(\alpha f + \beta l + 1) \]

then it becomes:

\[
\frac{f}{n} = \frac{1}{an} \left( \frac{w_f}{\alpha P} \right)^{-1} \beta l + 1 - \frac{\beta l}{an} = \frac{P}{w_f n} - \frac{\beta l}{an} - \frac{1}{an} \tag{11}
\]

The above equation implies that during recessions \( (b \text{ is low}) \) \( P \) is low, hence workers may increase their effort \( \alpha \) in order to compensate the adverse product market condition; the same situation occurs when \( l \) is high. However increasing \( \alpha \) has a cost (sacrifice); hence workers choose it so as to balance its marginal cost with its marginal benefit. Suppose that workers maximise the following utility function:

\[
\text{Argmax } U(c_0, \alpha) + \delta E[U(c_1)]
\]

where \( U(.) \) is concave with respect to \( c_0 \) and convex with respect to \( \alpha \) and:

\[
E[U(c_1)] = \frac{f}{n} U(c_1^{\text{high}}) + \left(1 - \frac{f}{n}\right) U(c_1^{\text{low}}) \tag{13}
\]

From eq. (11) specify \( f / n = pr(\alpha) \). The first order conditions for \( \alpha \) imply:

\[
\frac{\partial U(c_0, \alpha)}{\partial \alpha} + \delta \left( \frac{\partial pr(\alpha)}{\partial \alpha} U(c_1^{\text{high}}) - \frac{\partial pr(\alpha)}{\partial \alpha} U(c_1^{\text{low}}) \right) = 0; \tag{14}
\]

or

\[
\frac{\partial U(c_0, \alpha)}{\partial \alpha} = \frac{\partial pr(\alpha)}{\partial \alpha} \left[ U(c_1^{\text{high}}) - U(c_1^{\text{low}}) \right] \tag{15}
\]

Eq. (15) states that the level of diligence \( \alpha \) should be chosen such that the marginal decrease of utility in period 0, should equal the discounted increase of the utility (in period 1) due to the contract’s renewal (i.e. when \( c \) is high) times the increase of the probability \( f / n = pr(\alpha) \) of the contract’s renewal. Holding the second factor of the right-hand side of eq. (15), the effort the worker is willing to make depends on its impact on the probability of the contract’s renewal.
Since \( pr(\alpha) = f/n \) is not a monotonic function of \( \alpha, l \) and \( P \) then \( \frac{\partial pr(\alpha)}{\partial \alpha} \) may be also small for some values of \( P \) and \( l \). It implies that the value \( \alpha \) can be also small. For example, if the firm hiring flexible workers experiences large losses (\( P \) is very low) then increasing \( \alpha \) does not sufficiently increase the probability of having next period a job; hence maximising utility for workers means choosing a low level of \( \alpha \), that is behaving unproductive. More importantly, the impact of \( \alpha \) also depends on \( l \), the number of unionised workers. Larger is \( l \) lower is this impact, hence lower is the choice of \( \alpha \). Intuitively, marginal productivity of flexible workers also depends on the total number of workers in the firm because output is a concave function of the sum of workers, having weighted each worker by his/her specific productivity \( \beta, \alpha \); hence higher is \( l \) lower must be the productivity of flexible workers who, at the same time, are on the “margin” in the sense that the marginal adjustments of firms in order to equal the marginal productivity of labour to the real wage are made by hiring or firing the flexible workers.

3. Evidence

Suppose in the economy there are a large number of identical representative firms so that aggregate values can be considered. The empirical evidence can be found in two manners. Firstly, one can verify whether eq. (11) is consistent with the considered data, that is whether the rate of employment of flexible workers depends on the right-hand side variables of eq. (11). Secondly, one can verify whether, when the ratio between the number of unionised workers and the labour force increases, the effort of flexible workers (measured by \( \alpha \) ) decreases, as predicted by eq. (15). Eq. (11) can be estimated by regressing the rate of flexible employment \( f/n \) on a constant, on the real wage divided by labour force, on the rate of unionised employment and on the inverse of the employment level. The relevant coefficient is the one associated to the rate of unionised employment and it measures the ratio between \( \beta \) and \( \alpha \). To verify the relative change on \( \alpha \) with respect to \( \beta \) caused by the increase of the rate of unionised employment, a Threshold model can be used, see Granger and Terasvirta (1993). By means of a Threshold model (TM) the sample is split in two clusters, the first one including the data when \( l/n \) is below a given threshold and the second one when \( l/n \) is above the threshold. Given these two sub-samples, it is possible to estimate two values of the ratio between \( \beta \) and \( \alpha \) on for each cluster. The threshold value is found by minimising the sum of the two residual sums of squared, one for each sub-sample. So, the sub-samples are, respectively, characterized by lower and higher values of \( l/n \), with respect to the threshold level. The threshold rate can be ranged between the minimum and the maximum observed \( l/n \).

Quarterly data for Italy are considered, ranging between 1996:1 and 2006:3; they are provided by Eurostat. Call \( \text{tempr} \) the ratio between the number of fixed-term contracts’ stock on the number of total contracts’ stock. The percentage of flexible workers on employment (\( f/n \)) has been obtained by multiplying \( \text{tempr} \) times the employment rate.\(^{11}\) The percentage of permanent workers on employment (\( l/n \)) has been obtained by multiplying one minus \( \text{tempr} \) times the employment rate.\(^{12}\) Also, define the series \( rclf \) as the real labour cost times labour force. According to eq. (11) the relevant variables are:

- the rate of flexible workers on the labour force, \( f/n \);
- the rate of permanent workers on the labour force, \( l/n \);
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- the inverse of the product between the average real wage of flexible workers times the labour force, $1/rclf$;
- the inverse of the labour force, $1/lf$.

Before implementing the above mentioned analysis, the stationarity properties of the series must be verified. By a graphical inspection, the series $f/n$, $1/rclf$ and $1/lf$ are suspected either to have a deterministic or a stochastic trend over time. Hence the null hypothesis of one unit root is compared to the alternative of deterministic trend. Table 1 shows the ADF tests for each series with the relevant alternative hypothesis and the decision met.

According to the table 1 results the series $f/n$, $1/rclf$, are stationary after one differentiation. $1/lf$ is stationary after having removed a deterministic trend and the series $l/n$ can be considered also stationary. Hence the relevant regression is shown in table 2. The regression results do not show any signs of misspecification. Coefficients have the expected sign and the one of $l/n$ is significant at the usual levels of significance.

It is important now to verify whether this ratio changes if $l/n$ changes. As already said, by means of the threshold model (TM), one can verify whether the coefficient of $l/n$ estimating the ratio between $\beta$ and $\alpha$ changes; more particularly whether it increases when $l/n$ is high implying a decrease in $\alpha$ (when $l/n$) as the theoretical part predicts.

The threshold model splits the sample in two clusters. The sample of 42 observations is split in one with 24 observations such that for all of them $l/n$ is smaller than the threshold value and the other sample, with 18 observations such that $l/n$ is larger than the threshold value. The coefficient of the first sub-sample is $-0.04 (0.26)$; for the second one it is $-0.85 (0.25)$. Since in absolute value, 0.85 is larger than 0.32 it means that $\alpha$ has decreased with respect to $\beta$ when the value of $l/n$ increases, that is what the theoretical model predicts.

4. Conclusions

Partial labour market reforms that are reforms “at the margin” have been implemented throughout in Europe despite many criticisms like Blanchard and Landier (2002) or Boeri and Garibaldi (2007). This work follows this strand and it is argued that labour productivity of workers does not necessarily increase with temporary jobs if temporary workers cannot affect the probability of a contract renewal. This is the case when the firm business cycle is low and when there is a relatively large number of protected workers aside the temporary ones. In facts, during recessions firms may desire to reduce the personnel, however they cannot dismiss some permanent workers without some firing costs; so, the separation of temporary workers may be realistic even if their productivity is higher than permanent workers. This is exactly the situation occurred through the partial reforms. Evidence for the Italian case is provided: the probability of contract’ renewal negatively depends on the share of protected workers on the labour force and the labour productivity of temporary workers decreases when this share increases.

Endnotes
1. For Italy, from these reforms on, the unemployment rate has been falling but so the labour productivity and, consequently, the GDP growth seems to be unaffected. So, these reforms making the labour market competitive, have dramatically reduced the voluntary unemployment but their effect on labour productivity is not so apparent as it has been falling, in the considered period.

2. There is an adverse selection problem that is firms may promise a renewal if the workers behave diligently also when jobs are demanded for other reasons.

3. In principle, temporary jobs may be rolled over forever.

4. Nor they have unemployment benefits.

5. By large firing costs.

6. Lower case letters indicate variables and upper case letters indicate functions.

7. The production function $Y(.)$ and the demand curve $P(.)$ have the usual properties.

8. Of course the function $Y(.)$ is now partly specified.

9. The utility function $U(.)$ has also the other usual properties. $E[.]$ is the expected operator based on the probability $f/n$.

10. More particularly, for each sample observation, if the value of $l/n$ is below the specified threshold value, then the observation belongs, say, to the first sub-sample; if it is above the threshold values, the observation belongs to the other sub-sample. A routine is constructed so as to specify all possible threshold values of $l/n$ and to estimate the relevant parameters. The minimum value of the threshold $l/n$ equals the lowest value of the (entire) sample plus a positive constant $k$ (otherwise the sub-sample with values lower than the threshold would collapse); the maximum value equals the highest value of the sample less $k$. A step is specified in order to obtain the array of all possible threshold values; for each of these values the TM is estimated and parameters’ values stored.

11. Both in decimal terms.

12. Both in decimal terms.

13. The variables’ lags are selected according to the Schwartz-Bayesian criterion.

14. Usual tests are performed such as: serial correlation LM test, White Heteroscedasticity test, RESET test, Normality test, CUSUM and CUSUMQ tests.

15. The threshold value of $l/n$ minimising the sum of squared is 0.818. The mean of observations of the first sub-sample is 0.811, of the second sub-sample is 0.824.

16. Standard errors are put in brackets.
References


Table 1. ADF Tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>augmented Dickey-Fuller test</th>
<th>alternative hypothesis</th>
<th>decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>f/n</td>
<td>0.8991</td>
<td>deterministic trend</td>
<td>H0</td>
</tr>
<tr>
<td>1/rclf</td>
<td>0.8015</td>
<td>deterministic trend</td>
<td>H0</td>
</tr>
<tr>
<td>1/lf</td>
<td>0.0972</td>
<td>deterministic trend</td>
<td>H1</td>
</tr>
<tr>
<td>l/n</td>
<td>0.0056</td>
<td>stationarity</td>
<td>H1</td>
</tr>
</tbody>
</table>

Table 2. Regression Results

Dependent Variable: \( d(f/n) \)

Sample(adjusted): 1996:2 2006:3

Included observations: 42 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>0.26</td>
<td>0.08</td>
<td>3.24</td>
<td>0.0025</td>
</tr>
<tr>
<td>((1/rclf)-(1/rclf(-1)))</td>
<td>1.49</td>
<td>1.52</td>
<td>0.98</td>
<td>0.3299</td>
</tr>
<tr>
<td>1(lf)</td>
<td>-1.25</td>
<td>3.25</td>
<td>-3.85</td>
<td>0.0004</td>
</tr>
<tr>
<td>l/n</td>
<td>-0.32</td>
<td>0.09</td>
<td>-3.22</td>
<td>0.0026</td>
</tr>
</tbody>
</table>

R-squared         | 0.44        | Prob(F-statistic) | 0.000051   |
Adjusted R-squared| 0.40        | Durbin-Watson stat | 1.85      |