On the welfare effect
of a wage subsidy on youth labor
(Italy's CFL program)

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Abstract

While a vast literature has analysed the wage and employment effects of active labor market programs (ALMPs), a welfare analysis of such programs is seldom implemented. In an attempt to measure the welfare effect of a wage subsidy on youth labor, this paper performs a rudimentary cost-benefit analysis of Italy's training and employment enhancing program directed at young workers (*CFL, Contratti di Formazione e Lavoro*).

In particular, the analysis highlights the fact that the welfare effect of a targeted wage subsidy – in the form of a payroll tax rebate for firms employing youth labor – crucially depends on whether the labor market is affected by previous fiscal distortions generated either by the absence of linkage between payroll tax revenues and workers' benefit, or by the presence of an implicit minimum wage.

Based on reasonable estimates of youth labor demand and labor supply elasticities, it turns out that, in the absence of linkage between payroll tax revenues and benefits to young workers, the introduction of a 15% wage subsidy can be expected to generate a small employment gain (1 to 3 percentage points), and a net welfare gain – measured by the Marshallian approximation of employers' and workers' surplus – of less than €30 million (around 5% of the total cost of the welfare programme).

On the other hand, in the presence of a minimum wage that equals the current wage of young *CFL* workers, and a *status quo* youth involuntary unemployment rate of 18%, it is estimated that the 15% wage subsidy can generate a youth employment rise of up to 15 percentage points, and a net welfare gain of over €300 million.

Finally, when considering the general equilibrium effects of the wage subsidy policy (in particular the substitution and displacement effects provoked onto non eligible workers), and under reasonable assumptions about the cross elasticities of the demand for non eligible labor, it turns out that the above welfare gains are likely to be partially or fully offset by deadweight, employment and welfare losses generated in other segments of the labor market.

JEL classification: D61; J30.
Key words: payroll tax; wage subsidy; minimum wage; cost-benefit analysis.

0. Introduction

A vast literature has grown in recent years on the evaluation of wage and employment effects of active labor market programs (ALMPs). Statistical evaluation methods provide the basic ingredients to perform welfare analyses, for instance, the estimation of demand and supply elasticities. But sound welfare analyses of such programs are seldom implemented. The aim of this paper is to perform a rudimentary cost-benefit analysis of Italy's "training and work" (CFL) program, directed at young workers.

In particular, the analysis highlights the fact that the welfare effect of a targeted wage subsidy – in the form of a payroll tax rebate for firms employing youth labor – crucially depends on whether the labor market is affected by previous fiscal distortions generated either by the absence of linkage between payroll tax revenues and workers' benefit, or by the presence of an implicit minimum wage.

Based on reasonable estimates of youth labor demand and labor supply elasticities, it turns out that, in the absence of linkage between payroll tax revenues and benefits to young workers, the introduction of a 15% wage subsidy can be expected to generate a small employment gain (1 to 3 percentage points), and a net welfare gain – measured by the Marshallian approximation of employers' and workers' surplus – of less than €30 million/year (around 5% of the total cost of the welfare programme).

On the other hand, in the presence of a minimum wage that equals the current wage of young *CFL* workers, and a *status quo* youth involuntary unemployment rate of 18% (VEDIAMO BENE SE CI SIAMO), it is estimated that the 15% wage subsidy can generate a youth employment rise of up to 15 percentage points, and a net welfare gain of over €300 million.

Finally, when considering the general equilibrium effects of the wage subsidy policy (in particular the substitution and displacement effects provoked onto non eligible workers), and under reasonable assumptions about the cross elasticities of the demand for non eligible labor, the above welfare gains are likely to be partially or fully offset by deadweight, employment and welfare losses generated in other segments of the labor market.

1 Some historical background

The reduction of payroll taxes (social security contributions) aimed at enhancing employment opportunities for low-wage earners has been on the agenda of many national governments for decades. In 1994 two authoritative European economists, J. Dreze and E. Malinvaud, advocated a general implementation of such measures, in parallel with the introduction of a carbon tax aimed at financing it.

In Western Europe generous rebates and/or holidays of social security contributions have been granted in various forms and areas since the Seventies. Many of such programs provided temporary wage subsidies for selected groups of new hires. Target groups have often included young workers, especially those who belong to disadvantaged groups and areas.

Much optimism was expressed in the past that well designed and targeted active labor market programs (ALMPs) could do much to help at-risk youths. Recently, however, optimistic views have become rare. As the OECD Employment Outlook 1999 put it "we know how difficult it is to develop effective labor market policies for this group. Evaluation of past policies have been fairly discouraging in the sense that few remedial or employment-insertion programs targeted at disadvantaged young people appear to have resulted in significant gains in employment or earnings after they have parteciped in the programs".

The extent of substitution between the target group and other workers with similar characteristics has been an important issue in Italy for several years (the so-called "young-in, old-out" effect[1]). Growing doubts have been expressed also on the long term impact of labour cost reductions aimed at protecting the least skilled in the labour force. High-skill workers may be crowded out by low-skill, high turnover workers: in the long run this may have serious implications on the waste of know-how and intellectual resources. Deadweight losses and displacement effects are relevant, especially in connection with the option, open mainly to small firms, of operating in the regular vs. the irregular (black / grey) economy. The re-emersion programs aimed at fighting the irregular economy were (and still are) mainly based on s.s.c. and other tax exemptions. Thus, on the one hand, if the incentives are too small and few firms decide to emerge, the displacement effect against "regular" firms persists. On the other hand, if the incentives produce visible effects, there could still be a large deadweight loss, as some firms may decide to leave the irregular economy independently of the incentive itself.

The displacement effect – it should be recalled - is the main source of concern of the European Commission in granting legitimacy to payroll tax rebates, on the grounds of potential unfair competition. As of today, targeted payroll tax rebates are legitimate (and may be financed via EU structural funds) only to the extent that new jobs are created by the same employer, in addition to existing ones.

The fundamental argument that we put forward in this paper is that, in order to investigate the welfare effect of the introduction of an employer side wage subsidy on youth labor, it is crucial to recognize and quantify the degree of previous fiscal distortions and inefficiencies to which the relevant labor market is subject to.

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[1] B. Contini and F. Rapiti (1994 and 2001)

In order to analyse how the welfare effects of the introduction of an employer side wage subsidy on youth labor depend on the characteristics of the youth labor market, we investigate three cases in the rest of the paper.

Section 2 describes the CFL program. Section 3 considers the effect of a wage subsidy in a labor market where a payroll tax generates a distortion (an excess burden), by creating a wedge between the wage received by employees and the labor cost borne by employers (Hamermesh, 1993). Since the equilibrium that one observes in a labor market with a payroll tax is not a Pareto-optimum, the wage subsidy might be thought to bring the equilibrium closer to the optimum.[2]

Section 4 studies the wage subsidy effect in the presence of a payroll tax with perfect tax/benefit linkage – in the sense that the payroll tax revenues are used to finance programs which only benefit workers, such as retirement benefits. Since, as shown by Summers (1989) and Gruber (1997), the payroll tax would in that case entirely respect the benefit principle and generate no excess burden, the wage subsidy can be thought of as a distortionary measure that tends to lead to a welfare loss.[3]

Section 5 analyses the impact of a wage subsidy in the presence of a minimum wage. As long as the minimum wage prevents the wage from adjusting in order to equate labor demand and supply, the introduction of a wage subsidy might lead to a welfare increase by easing the distortion provoked by the minimum wage.

Finally, section 6 tackles the general equilibrium consequences of a targeted wage subsidy, and section 7 concludes.

2   The "Contratto di Formazione – Lavoro"

The Italian 'Contratto di Formazione e Lavoro' (CFL, working and training contract) was introduced in 1985 to improve labour-market opportunities for young workers. Eligible people were, initially, workers younger than 30; over the years and across areas various age adjustments took place.
The programme provided employers willing to hire eligible workers with two key benefits:
• a **50** per cent rebate on the labour cost via a reduction in social security contributions (s.s.c.), amounting to 28% of gross pay;

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[2] Not considering, though, either the distortions that would be created in other markets in financing the subsidy (Goulder and Williams, 2003), or the possible negative effects on other types of labor (Sorensen, 1997).

[3] Reasonably, of course, welfare could increase for society as a whole in the above situation if, for instance, the young workers that were previously unemployed and that get a job as a result of the wage subsidy were previously engaging in criminal or other external-diseconomy generating activities (Phelps, 1994), or were receiving welfare/unemployment benefits paid by society (Bell and Orr, 1994; Snower, 1994; Bell et al., 1999), and if the wage subsidy is actually able to create new jobs in the economy and not simply inducing firms to replace high cost workers with low cost workers (Warburton and Frketich, 1996).

• automatic termination of the contract after a maximum of two years (i.e. zero firing costs).

In principle, the programme should have featured an on-the-job training component. In fact, it seems that most times it was not implemented. Over the years several reforms of the programme took place. In June 1988 the s.s.c. rebate was reduced to **40**%. Since January 1991 the rebate was further reduced in the Centre-North of Italy to **25**%. Moreover, a more stringent rule was introduced, stating that a CFL-hire during year t would be allowed provided that at least 50 per cent of the CFL workers completing their employment spell with the same employer during years t-1 and t-2 be retained on a permanent basis.

To properly measure the CFL programme impact one has to take into account the interaction of the programme with other concurrent incentive schemes.

The main one provided firms operating in the South with a ten-year 100 % holiday on s.s.c. for each worker newly hired on a permanent basis, irrespective of age. As a result, firms operating in the South could choose between two options:

    (a) hiring a young worker under the CFL program:
    (b) hiring any worker under the special conditions accorded to the Mezzogiorno.

Not surprisingly, option (a) was seldom preferred, and very few CLF workers were hired in the South until December 1991 when the special scheme for the Mezzogiorno was cancelled.

In recent years the CFL scheme has been slowly phased out, as new policy instruments and more flexible working contracts have been introduced under the so-called "Pacchetto Treu" of 1996.

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3   A wage subsidy in a tax distorted labor market

Assume that a selective wage subsidy is introduced in a market that suffers from previous fiscal distortions, in the sense that employers are subject to a payroll tax, and there is no

linkage between payroll tax revenues and benefits received by workers. Say that the payroll tax equals 30% of the wage received by workers.

Within a frictionless labor market, depicted in figure 1, the labor demand function in the absence of the tax is D, the labor supply function is S, and the Pareto optimum equilibrium is at point O. As a consequence of the wage tax, the labor demand schedule shifts down to D_0, while the labor supply function S does not shift.[4]

The equilibrium with the payroll tax t=0.3 is at point H, with equilibrium wage IJ, employment IL_H, and labor cost IN (=1.30 × IJ). Given the market demand and supply of labor (D and S), the Marshallian approximations to employers' and workers' surplus (Hausman, 1981) are represented by areas MAN and JHG in figure 2, with NAHJ being the total payroll tax yield that funds general public spending, and AOH the deadweight loss caused by the payroll tax.

Now consider the introduction of an employer side wage subsidy. Assume that the subsidy is a payroll tax reduction for firms employing young workers, such that employers pay 15% (instead of 30%) on top of the wage. Since we are tackling here the case of no payroll tax/workers' benefit linkage, we can assume for the moment that, as a consequence of the wage subsidy, the government raises revenues equal to 15% of the wage in a non distortionary way, and we can disregard what those revenues are spent on.[5]

Labor demand goes back up to D_1, with an equilibrium at point C. Net wage for workers goes up from IJ to IP. Labor cost goes down from IN (=1.30 × IJ) to IQ (=1.15 × IP).

It is straightforward to see that welfare increases by area ABCH in figure 1. The welfare gain can be attributed to the excess burden fall (from area AOH to area BOC) that is obtained through the drop in the distortionary tax, under the assumption that the government can raise in a non-distortionary way an amount of revenue equal to the foregone payroll tax yield.

Using reliable estimates of the labor demand elasticity (η_D) and labor supply elasticity (ε_S) of young eligible workers (Katz, 1996), and starting from the observed equilibrium in the youth labor market (employment=450,000; wage=€8,300; point C in figure 1), we want to compute a measure of the welfare impact of the labor market program consisting of a wage subsidy as a fraction s=0.15 of the wage.[6]

As a first approximation, the Marshallian measures of employers' and workers' surplus are used to compute the welfare change (Slesnick, 1998). Table 1 shows the estimated

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[4] But see section 3 below for perfect tax\benefit linkage.

[5] This assumption will be relaxed in section 5.

[6] With 450,000 eligible workers, the cost of the program amounts to €560 million / year.

counterfactuals – that is the level of employment and wage that would be observed in the absence of the wage subsidy (point H in figure 1) – under different hypotheses about the labor demand and supply schedules.

Table 2 shows the estimated effects – in terms of percentage increases – on employment and wages of young workers as a result of the 15% wage subsidy, as well as the estimated welfare change (area ABCH in figure 1). Two series of analytical results are presented, based on different hypotheses on the functional form of the demand and supply schedules: linear and constant elasticity. The employment and wage effects of the 15% subsidy are roughly similar under the linearity and constant elasticity hypotheses, and correspond to the approximated effect based on equations (1) and (2) below (Hamermesh, 1993; Katz, 1996):

$$\frac{d \ln L}{ds} = \frac{\eta_D \varepsilon_S}{\eta_D + \varepsilon_S} \tag{1}$$

$$\frac{d \ln w}{ds} = \frac{\eta_D}{\eta_D + \varepsilon_S} \tag{2}$$

While the employment effect of the wage subsidy is estimated to range from 1% to 3.5%, depending on the labor demand and supply elasticities, the welfare increase ranges from 8.5 to 27 million euros.[7]

4   A wage subsidy in a perfect tax/benefit linkage labor market

Assume now that, as a consequence of the t=0.3 wage tax, both the labor demand and the labor supply schedules move, due to perfect tax/benefit linkage. While, as before, the labor demand schedule shifts down to D_0, the labor supply function S shifts down to S_0: since workers value the benefits that are "bought" with payroll taxes, they are willing to accept lower money wages (Gruber, 1997).

The equilibrium – depicted in figure 2 – with the payroll tax t=0.3 is at point K, with equilibrium wage IH, the same equilibrium employment as in the no tax case (IL_O), and the same labor cost as in the no tax case: IV (=1,30 × IH). No deadweight loss is caused by the payroll tax in this case, as it is entirely shifted onto the employees, and it works as a perfect benefit tax.

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[7] Moreover, it should be taken into account that raising revenues to compensate the payroll tax reduction might well generate an excess burden and welfare losses in other markets See section 5 below.

Now let us consider the introduction of the wage subsidy. Assume again that the subsidy is a payroll tax reduction for firms employing young workers, such that employers pay 15% (instead of 30%) on top of the wage, with the other 15% being borne by government.

Labor demand goes back up to D_1, with an equilibrium at point Z and employment at L_Z. Labor supply does not move because workers keep on receiving the entire benefit (PZ), which is partly paid for by employers (UZ) and partly by government (PU). Net wage to workers goes up from IH to IT. Labor cost goes down from IV (=1.30 × IH) to IR (=1,15 × IT). The total cost of the subsidy for the government (amounting to €560 million) is QPUR, while the cost of the payroll tax for firms (€560 million) is RUZT.

With respect to the no subsidy and full payroll tax equilibrium, firms' surplus has increased by the area VOUR. It is easy to see that workers' surplus has increased by the area QPOV. As the government bears the cost of the subsidy equal to the area QPUR, overall welfare as a consequence of the subsidy has fallen by the area of the triangle POU.

Tables 3 and 4 show that the wage subsidy has a small employment effect, and that the welfare loss represented by area POU ranges from €3 million to about €10 million, depending on the elasticities. To this loss, though, it should be added the likely excess burden that has been created in other markets in raising an amount of revenues equal to QPUR, as well as the potential welfare loss for substitution of non eligible workers.

5   A wage subsidy in a market with an implicit minimum wage

Finally, consider the presence of an implicit minimum wage in the youth labor market, and assume – sticking to a purely neoclassical framework – that such minimum wage prevents the labor market from clearing, causing involuntary unemployment. Figure 3 shows: a) the no tax labor market equilibrium (point O); b) the labor market equilibrium with a 30% payroll tax, perfect tax/benefit linkage, and no minimum wage (point O'); c) the labor market equilibrium with a 30% payroll tax, perfect tax/benefit linkage, and a minimum wage IW (point A).

In the latter instance, involuntary unemployment is AB and total surplus is given by area YAEF (=KMRQ): employers' surplus is KMH (≡YAW) and workers' surplus is WAEF=WARQ+QREF, where QREF (≡HMAW) is the benefit received by employees and financed by the payroll tax on firms.

Consider now a 15% wage subsidy. With reference to figure 3, labor demand shifts up to D_1, with equilibrium at G and unemployment equal to GB. Employment raises by AG, employers' surplus raises by HMPC, workers' surplus raises by AGJE, and the cost of the

subsidy is HNPC ($\equiv$CPGW). Consequently, as MNP$\equiv$AGL by construction, welfare goes up for society as a whole by ALJE.

Tables 5 and 6 show a simulation of the Marshallian welfare impact of the subsidy in this case. Based on a 18% rate of youth unemployment in the presence of the subsidy (GB = 100,000 unemployed youths in figure 3), observed youth employment (L_G) of 450,000, and minimum wage (IW) of €8,300, it turns out that, relative to the no subsidy counterfactual, the payroll tax cut can generate an employment effect of up to 15 percentage points (L_A to L_G in figure 3).

In terms of employers' surplus, labor cost falls from €10,790 ($=1.30 \times €8,300=$IH in figure 3) to €9,545 ($=1.15 \times €8,300=$IC), leading to an increase in employers' surplus of over €500 million (area HMPC). As for workers, employment of previously unemployed youths at the €8,300 wage generates a surplus gain (area AGJE) of up to €375 million. Since the cost of the subsidy amounts to €560 million, the net welfare gain can be as large as 338 million euros.

Even though the analysis up to this point does not consider the potential excess burden generated through taxation to finance the subsidy, or the welfare loss from displaced workers in other markets, still the consideration of the inefficiency caused by a minimum wage makes a very strong argument in favour of a wage subsidy targeted at low skill workers.

6 Welfare analysis: general equilibrium   (RESTA COSI' ?)

In the perfect tax/benefit linkage case with a minimum wage, welfare increases because the minimum wage determines an inefficient allocation of resources, and the wage subsidy moves the market closer to the optimum (alternatively, the wage rate should decrease to clear the market).

However, general equilibrium considerations (Sorensen, 1997; Goulder and Williams, 2003) suggest that it might be the case that the reduced labor cost of young workers after the subsidy depresses the demand for other types of labor (Snower, 1994), therefore decreasing welfare in other markets (non eligible workers).

Moreover, it should be taken into account that raising revenues to compensate the payroll tax reduction might well generate an excess burden in other markets, that could partially or totally offset the welfare gain in the youth labor market.

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7   Concluding remarks

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References (manca qualcosa, Card 1994, ...?)

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Figure 1
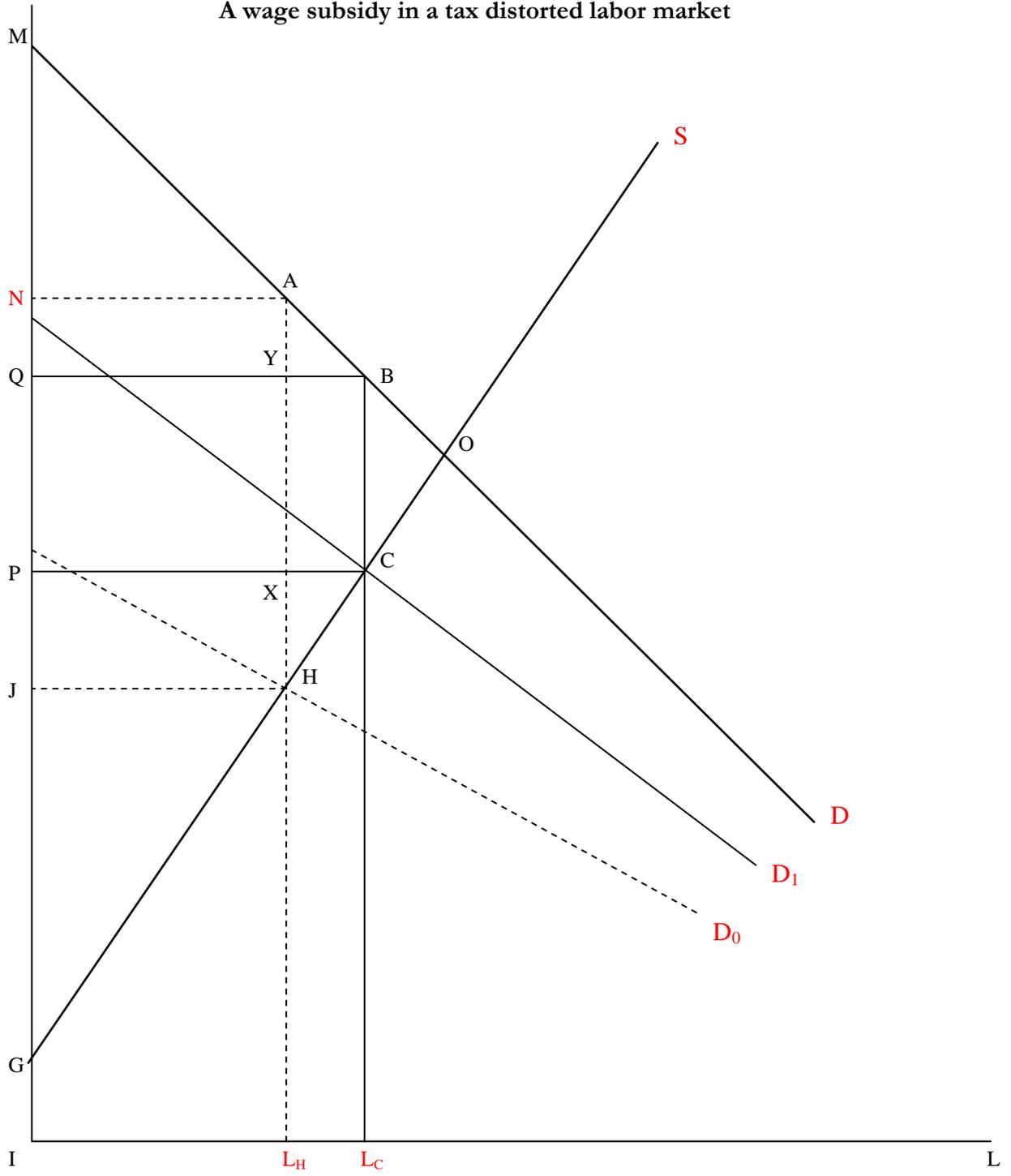**A wage subsidy in a tax distorted labor market**

Figure 2
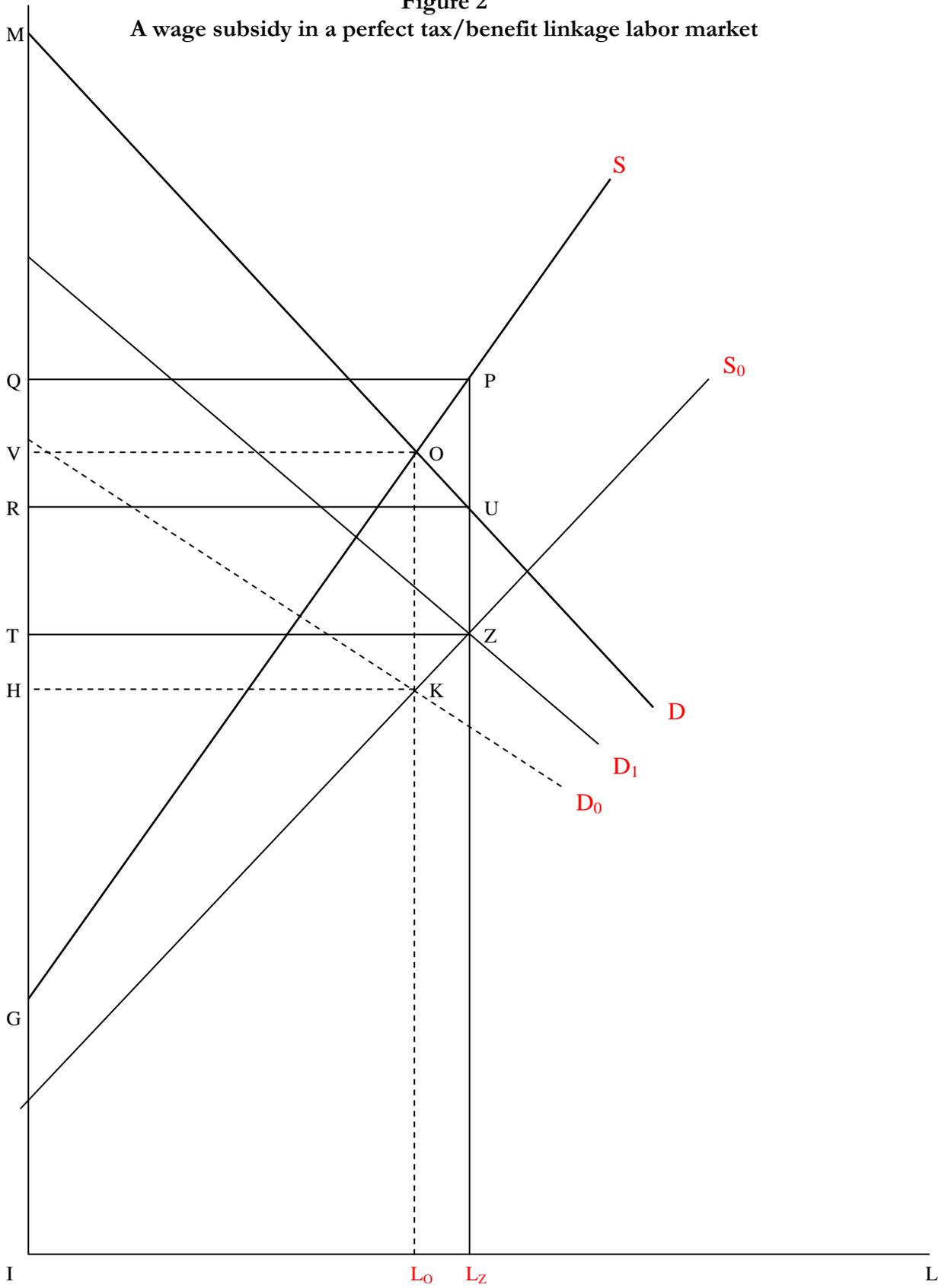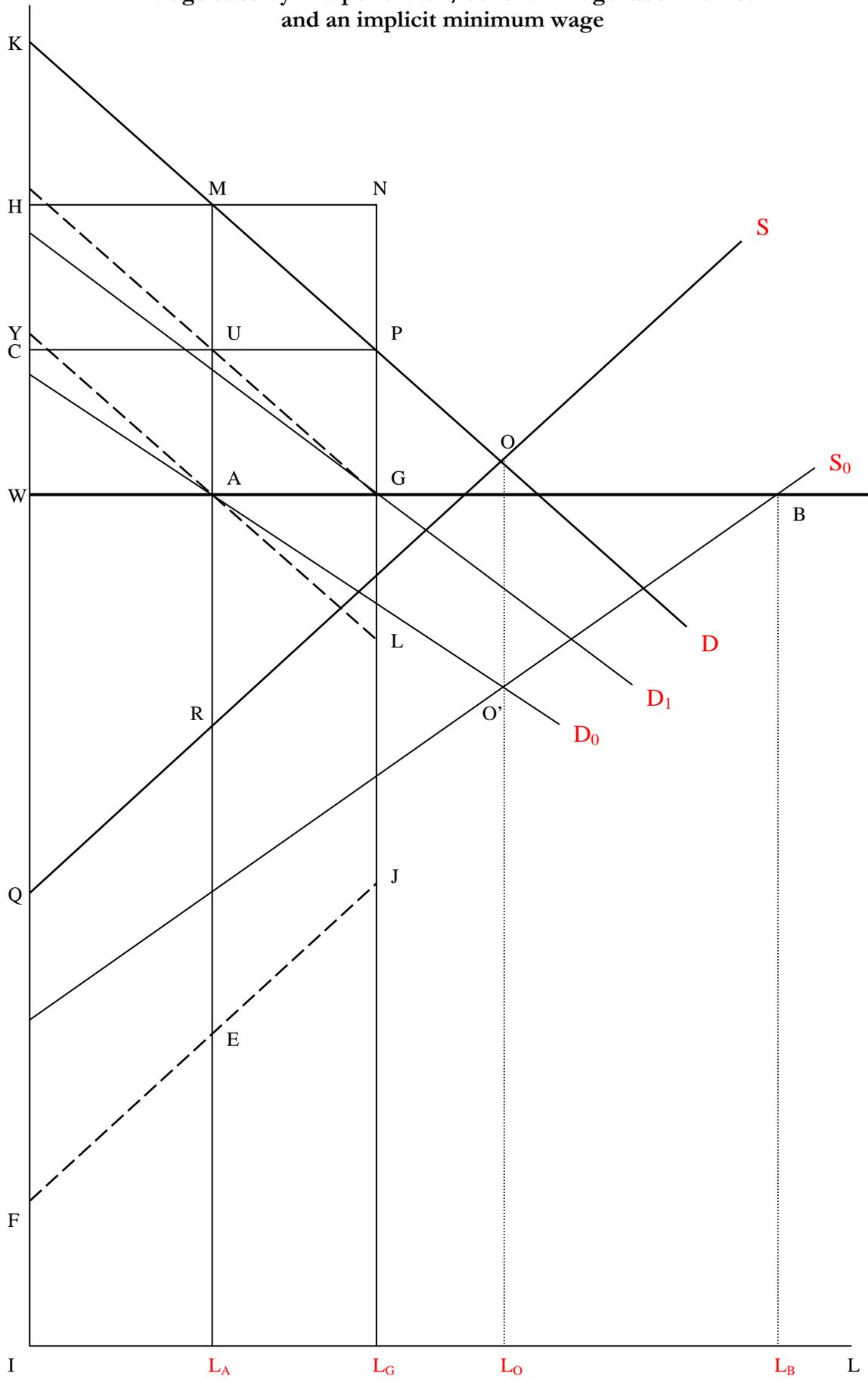## A wage subsidy in a perfect tax/benefit linkage labor market

Figure 3
A wage subsidy in a perfect tax/benefit linkage labor market
and an implicit minimum wage

Table 1
Estimated counterfactual in a tax distorted labor market (figure 1)

Labor demand elasticity	Labor supply elasticity	Functional form	Employment (,000)	Wage (€)	Labor cost (€)
-0.1	0.4	linear	445.4	8,100	10,520
-0.5	0.4	linear	437.8	7,740	10,050
-1.0	0.4	linear	434.7	7,600	9,880
-0.1	0.4	constant elasticity	445.6	8,100	10,520
-0.5	0.4	constant elasticity	437.9	7,750	10,070
-1.0	0.4	constant elasticity	434.5	7,600	9,880

Notes
1) observed market equilibrium with 15% subsidy is at: employment = 450,000; annual wage = €8,300; labor cost = €9,545;
2) with linear demand and supply schedules, the elasticities are evaluated at the observed market equilibrium;
3) labor cost = wage × (1 + 0.3).

Table 2
Impact of 15% wage subsidy in a tax distorted labor market (figure 1)

Labor demand elasticity	Labor supply elasticity	Functional form	Employment % increase	Wage % increase	Welfare change (million €)
-0.1	0.4	linear	1.03	2.47	+8.5
-0.5	0.4	linear	2.79	7.24	+21.7
-1.0	0.4	linear	3.52	9.21	+27.0

Notes
1) observed market equilibrium with 15% subsidy is at: employment = 450,000; annual wage = €8,300.

Table 3
Estimated counterfactual in a perfect tax/benefit linkage labor market (figure 2)

Labor demand elasticity	Labor supply elasticity	Functional form	Employment (,000)	Wage (€)	Labor cost (€)
-0.1	0.4	linear	445.4	8,100	10,520
-0.5	0.4	linear	437.8	7,740	10,050
-1.0	0.4	linear	434.7	7,600	9,880

Notes
1) observed market equilibrium with 15% subsidy is at: employment = 450,000; annual wage = €8,300; labor cost = €9,545;
2) labor cost = wage × (1 + 0.3).

Table 4
Impact of 15% wage subsidy in a perfect tax/benefit linkage labor market (figure 2)

Labor demand elasticity	Labor supply elasticity	Functional form	Employment % increase	Wage % increase	Welfare change (million €)
-0.1	0.4	linear	1.03	2.47	-2.9
-0.5	0.4	linear	2.79	7.24	-7.6
-1.0	0.4	linear	3.52	9.21	-9.5

Notes
1) observed market equilibrium with 15% subsidy is at: employment = 450,000; annual wage = €8,300.

Table 5
Estimated counterfactual in a perfect tax/benefit linkage labor market
and an implicit minimum wage (figure 3)

Labor demand elasticity	Labor supply elasticity	Functional form	Employment (,000)	Wage (€)	Labor cost (€)
-0.1	0.4	linear	444.1	8,300	10,790
-0.5	0.4	linear	420.6	8,300	10,790
-1.0	0.4	linear	391.4	8,300	10,790

Notes
1) observed market equilibrium with 15% subsidy is at: employment = 450,000; annual wage = €8,300 (minimum wage); labor cost = €9,545; involuntary unemployment = 100,000; unemployment rate = 18%.
2) labor cost = wage × (1 + 0.3).

Table 6
Impact of 15% wage subsidy in a perfect tax/benefit linkage labor market
and an implicit minimum wage (figure 3)

Labor demand elasticity	Labor supply elasticity	Functional form	Employment % increase	Wage % increase	Welfare change (million €)
-0.1	0.4	linear	1.33	--	+26.3
-0.5	0.4	linear	6.99	--	+148.2
-1.0	0.4	linear	14.97	--	+337.8

Notes
1) observed market equilibrium with 15% subsidy is at: employment = 450,000; annual wage = €8,300 (minimum wage); involuntary unemployment = 100,000; unemployment rate = 18%.