

Labour Tax Reform, The Good Jobs and The Bad Jobs[Ⓜ]

Henrik Jacobsen Kleven
Peter Birch Sørensen
Economic Policy Research Unit
Institute of Economics, University of Copenhagen

April 29, 1999

Abstract

We analyse recent proposals to shift the tax burden away from low-paid labour, assuming a dual labour market where the 'good' high-paying jobs are rationed. A shift in the tax burden from low-paid to high-paid workers has an ambiguous effect on the level of aggregate employment while the allocation of aggregate employment is likely to be further distorted. Even if the tax reform raises total employment, economic efficiency may be reduced because labour is reallocated from high-productive to low-productive jobs. Opportunities for on-the-job search have important implications for the policy effects. When these opportunities are small, the tax reform is more likely to raise employment and welfare.

Keywords: Labour tax reform; dual labour markets; efficiency wages
JEL code: H22, H24, J21, J41, J42

Address for correspondence:
Peter Birch Sørensen
Institute of Economics, University of Copenhagen
Studiestraede 6, 1455 Copenhagen K, Denmark

[Ⓜ]Without implicating them in any remaining shortcomings, we wish to thank Claus Thustrup Hansen, Knud Jørgen Munk, Wolfram Richter and Torben Tranæs for valuable comments on an earlier draft. The activities of the Economic Policy Research Unit are supported by a grant from the Danish National Research Foundation.

1. Introduction

During the past quarter century unskilled workers in most OECD countries have experienced a huge increase in unemployment or a sharp decline in their relative wages. Many economists have therefore argued that the tax burden should be shifted away from low-paid workers to improve their employment opportunities and to offset the tendency towards increased income inequality (e.g., Drèze and Malinvaud (1994), Alogoskou...s et alia (1995), Phelps (1997), Sørensen (1997), Haveman (1998), Van der Ploeg (1998)).

Shifting the tax burden away from low-paid labour will almost certainly require a higher tax burden on high-paid labour, for unless countries can coordinate their tax policies, international capital mobility seriously constrains the ability of individual countries to raise taxes on capital income. Recent research on the effects of taxation in imperfect labour markets suggests that increased progressivity of the labour income tax may indeed stimulate employment, since high marginal tax rates reduce the incentive for unions to push for higher wages and make it less profitable for employers to pay high efficiency wages (see for example Hoel (1990), Lockwood and Manning (1993), Bulkley and Myles (1996), Koskela and Vilmunen (1996), Pissarides (1998)). As unemployment benefits and welfare benefits tend to establish a floor for the wages of the unskilled, it is also possible that the labour supply schedule of these workers is rather flat whereas labour supply at higher

wage levels appears to be quite inelastic. Hence a shift of the tax burden away from the low-paid might also raise total employment by exploiting such differences in labour supply elasticities.

The one-sector models underlying the recent papers on tax progressivity and unemployment focus on the problem that the level of employment is inefficiently low. In the present paper we also allow for the fact that increased labour tax progressivity may have an undesirable impact on the allocation of employment by promoting 'bad' jobs at the expense of 'good' jobs. The basis for this result is the observation first made by Doeringer and Piore (1971) that the labour market has a 'dual' structure, being segmented into a 'primary' sector offering high-productive, high-wage career jobs, and a 'secondary' sector dominated by low-productive, low-paying routine jobs. As emphasized by Bulow and Summers (1986), one reason for such dualism in the labour market could be that some job functions are difficult to monitor, inducing employers to pay high efficiency wages to promote work effort on the job, whereas other jobs which can be easily monitored are remunerated by lower, competitive wages. Even for workers with similar skill levels, sectors with monitoring problems will thus pay persistently higher wages and have persistently higher productivity than sectors without such problems.

Over the years labour economists have gathered considerable evidence in favour of the dual labour market hypothesis (see, e.g., Dickens and Lang (1985) and the

survey by Saint-Paul (1996, pp.62-68)). The policy implication of this hypothesis, stressed by Bulow and Summers (1986), is that the government should aim at shifting resources from the low-productive secondary sector to the high-productive primary sector. From this perspective lower taxes on low-paid workers combined with higher taxes on high-paid workers seems an unattractive policy since it would tend to work like a tax on the primary sector combined with a subsidy to the secondary sector.

Below we offer an analysis of labour tax reform which tries to allow for the different policy concerns described above. We assume that a fixed level of unemployment benefits generates an inefficiently low level of aggregate employment by establishing a floor for the wages of low-paid workers. In addition, the allocation of employment is distorted, with employment in the primary sector being inefficiently low relative to employment in the secondary sector, as suggested by dual labour market theory. Within this framework, a shifting of taxes from low-paid to high-paid workers may raise total employment by inducing some of the unemployed to accept a job in the secondary sector. At the same time the allocation of employment is likely to be further distorted, and reduced activity in the primary sector may have negative feedback effects on activity in the secondary sector. One purpose of our analysis is to investigate the likely net effect on employment and welfare. More generally, we wish to explore the general equilibrium mechanisms

through which tax policy will work in an economy with a dual labour market.

We arrive at several conclusions which we believe to be interesting and non-trivial. First of all, allowing for the distortion between the primary and the secondary sector turns out to be very important for the evaluation of the welfare effects of public policy, in quantitative as well as in qualitative terms. A second related point is that, even if a policy measure succeeds in raising total employment, it may still reduce the expected utility of the representative worker by causing a reallocation away from the primary sector. Third, the opportunities for on-the-job search in the secondary sector may have important implications for the effects of tax policy and - by extension - for the effects of other public policies as well.

Our tool of analysis is a modified and extended version of the dual labour market model developed by Bulow and Summers (op.cit.). The economy's primary sector is characterized by non-competitive efficiency wage setting causing the 'good' high-paying jobs in that sector to be rationed, whereas the low-paying 'bad' jobs in the secondary sector are priced competitively. We extend this Bulow-Summers set-up by including taxation, unemployment benefits and the government budget constraint, by allowing for on-the-job search in the secondary sector, and by relaxing the awkward Bulow-Summers assumption that leisure (shirking on the job) and secondary sector goods are perfect substitutes. Moreover, while Bulow and Summers retain the assumption of Shapiro and Stiglitz (1984) that

the choice of work effort on the job is a zero-one decision (you can either work all the time or shirk all the time), we make the more realistic assumption that effort can be varied in a continuous manner.

Throughout our analysis we assume that the real after-tax rate of unemployment benefit is kept constant. Although our model implies that a cut in real net benefits could promote employment in both segments of the labour market, many OECD governments have been reluctant to undertake major cuts in benefits, because of concerns over income distribution. Hence it is relevant and interesting to investigate whether a labour tax reform could possibly raise total employment and welfare without cutting into the living standards of the unemployed.

Since we wish to highlight the effects of labour market dualism, we abstract from worker heterogeneity by assuming that all workers have the same preferences and skill endowments. Hence we do not account for the argument that tax cuts for low-paid workers might open up new job opportunities for individuals with below-normal productivity. In the concluding section we briefly discuss this limitation of our analysis.

Section 2 describes our model and sections 3 and 4 analyse employment and welfare effects of labour tax reform under two alternative benchmark assumptions regarding opportunities for on-the-job search. The concluding section 5 discusses our results and suggests directions for future research.

2. A model of a dual labour market

2.1. Households

We consider a stationary state in a closed economy inhabited by identical households with infinite horizons. The instantaneous utility of household i is given by

$$u_i = C_i - \frac{e_i^{1+\alpha}}{1+\alpha} \quad (2.1)$$

$$C_i = \beta^{-i} (1 - \beta)^i (1 - \beta)^{i-1} (C_{is} + C_{ip}) \quad (2.2)$$

The utility function is additively separable in utility from consumption, C_i , and disutility from work effort, e_i . The positive parameter α measures the elasticity of marginal disutility. C_i is a Cobb–Douglas aggregate of goods produced in the secondary sector, C_{is} , and goods produced in the primary sector, C_{ip} . Primary goods are chosen as the numeraire, and the price of secondary goods is denoted p_s .

Households employed in the primary sector

The primary production sector is described by an efficiency wage model of the ‘shirking’ variety, combining elements of Shapiro and Stiglitz (1984) and Pissano (1991). The effort of employees cannot be perfectly monitored. Hence primary workers have an incentive to shirk, thereby gaining utility from leisure on the job. However, since some monitoring does take place, more shirking involves a greater

risk of being sacked on grounds of poor work performance. Being sacked in turn implies an expected income loss, since the good high-paying jobs in the primary sector are rationed. Choosing the optimal level of shirking requires trading off the marginal expected income loss from the higher probability of being sacked against the marginal utility of leisure on the job.

Let us be a bit more specific. The pre-tax wage rate per unit of time is w_p . Official working time is institutionally fixed and normalized at unity, so w_p is also the pre-tax level of income for a primary worker. The tax rate on this income is t_p ; and the price level is given by the Cobb-Douglas consumer price index p_s . Since total real consumption must equal real net income, it follows from (2.1) that the flow utility of a worker employed in the primary sector is

$$u_p = \frac{w_p (1 - t_p)}{p_s} e_p^{1+\alpha} \quad (2.3)$$

The level of effort e_p affects not only flow-utility in equation (2.3), but also the probability of being sacked, s , which is assumed to be given by

$$s = \bar{s} \left(\frac{e_p}{\bar{e}} \right)^{\mu} ; \quad \bar{s} > 0; \quad \mu > 0 \quad (2.4)$$

where \bar{e} is the 'normal' effort exerted by workers in the firm. Thus, the higher the individual worker's effort relative to the average work norm, the lower his probability of being sacked for poor performance. Note that even if a worker lives up to the standard work norm ($e_p = \bar{e}$), he still faces some exogenous probability

$s = \delta$ of being fired because ongoing technological and organizational change generates continuing labour turnover.

Let V_p denote the expected lifetime utility of a worker employed in the primary sector, and let V^* indicate the lifetime utility in the best available outside option. V_p is equal to the present discounted value of the flow return to primary sector employment. This flow return is given by the flow utility, u_p , minus the expected 'capital loss' resulting from the probability of being fired, $s(V_p - V^*)$. If the exogenous discount rate is $\frac{1}{2}$, V_p equals

$$V_p = \frac{u_p - s(V_p - V^*)}{\frac{1}{2}}, \quad V_p = \frac{u_p + s(V^*)}{\frac{1}{2} + s} \quad (2.5)$$

The worker's problem is to choose his level of effort e_p so as to maximize (2.5) subject to (2.3) and (2.4). The first-order condition for the solution to this problem implies

$$\frac{\partial s}{\partial e_p} (V_p - V^*) = \frac{\partial u_p}{\partial e_p}, \quad \frac{\partial}{\partial e} (V_p - V^*) = e_p^* \quad (2.6)$$

The LHS of equation (2.6) measures the expected gain in lifetime utility resulting from a marginal increase in effort, given that greater effort reduces the probability of being fired. In optimum, this marginal benefit from effort must equal the marginal disutility from harder work, stated on the RHS of (2.6). Equation (2.6) implicitly defines e_p as a function of w_p . By implicit differentiation one can show that $\frac{\partial e_p}{\partial w_p}$ is always positive and that $\frac{\partial^2 e_p}{\partial w_p^2}$ will be negative if and only

if $\pm > 1$, i.e. if the agents are sufficiently risk averse. Hence the employer may induce higher effort by paying a higher efficiency wage, and $\pm > 1$ will guarantee that the effort function of the employee is concave.

Households outside the primary sector

Workers who do not obtain a job in the primary sector have two alternative options: they can either choose to go unemployed, receiving real after-tax benefits b and having probability a_u of future employment in the primary sector, or they can accept a job in the secondary sector. In this sector there are no moral hazard problems, since work efforts can be perfectly monitored, and the secondary labour market is therefore perfectly competitive. A secondary sector job involves a fixed working time normalized at unity and pays a wage w_s which is subject to the tax rate t_s : Workers employed in the secondary sector have probability a_s of obtaining a primary sector job.

Since effective working time equals official working time, we have $e_s = 1$ for a secondary worker, while an unemployed worker clearly has no disutility from work. Using (2.1), the flow utilities of the two groups may thus be written in the following way:

$$u_s = \frac{w_s (1 - t_s)}{p_s} \cdot \frac{1}{1 + \pm} \quad (2.7)$$

$$u_u = b \quad (2.8)$$

The lifetime utility of households outside the primary sector is given by the present

discounted value of the flow-return to unemployment and by the return to secondary sector employment, respectively. The flow-return in each of these two states equals the flow-utility enjoyed in that state plus the expected 'capital gain' arising from the probability of obtaining a job in the primary sector:

$$V_s = \frac{u_s + a_s \delta (V_p - V_s)}{\frac{1}{2}} \quad , \quad V_s = \frac{u_s + a_s \delta V_p}{\frac{1}{2} + a_s} \quad (2.9)$$

$$V_u = \frac{u_u + a_u \delta (V_p - V_u)}{\frac{1}{2}} \quad , \quad V_u = \frac{u_u + a_u \delta V_p}{\frac{1}{2} + a_u} \quad (2.10)$$

Since the secondary labour market is perfectly competitive, an unemployed person always has the option of taking a secondary sector job, thereby enjoying lifetime utility V_s . Similarly, a secondary sector worker can choose to quit his job in order to join the ranks of the unemployed, receiving lifetime utility V_u . In equilibrium the unemployed individuals prefer not to take a job ($V_u \geq V_s$), and workers in the secondary sector prefer not to quit ($V_s \geq V_u$), implying the arbitrage condition

$$V_u = V_s = V^* \quad (2.11)$$

As emphasized by Bulow and Summers (1986), unemployment in this economy is both voluntary and involuntary at the same time. It is involuntary in the sense that an unemployed person cannot get a job in the primary sector even though he is fully qualified and willing to accept such a job at the going primary sector wage. On the other hand, unemployment is voluntary in the sense that the unemployed turn down available jobs, because these secondary sector jobs are not sufficiently

attractive at the given level of government taxes and transfers.¹

2.2. Firms

Production technology is linear in both sectors of the economy. With N_p denoting the number of persons employed in the primary sector (each putting e_p units of effort into the job), output in this sector is $e_p \zeta N_p$. Since the official working time is equal to 1, the primary sector profit is

$$\pi_p = e_p \zeta N_p - w_p \zeta N_p \quad (2.12)$$

where e_p is a function of w_p , implicitly defined by equation (2.6). The representative wage-setting primary sector firm maximizes profit with respect to N_p and w_p ; and its first-order conditions are

$$e_p = w_p \quad (2.13)$$

$$\frac{\partial e_p}{\partial w_p} \zeta \frac{w_p}{e_p} = 1 \quad (2.14)$$

Equation (2.13) is a zero-profit condition, and equation (2.14) is the well-known Solow-condition [Solow (1979)], obtained by calculating the first-order condition for w_p and inserting (2.13). The second-order conditions for this problem reduce to the requirement that the effort function of workers be concave. As noted above this is the case if $\alpha \pm > 1$.

¹In the terminology of Saint-Paul (1996) the unemployment is semi-involuntary.

In the secondary sector the profit is given by

$$\pi_s = p_s \cdot N_s - w_s \cdot N_s \quad (2.15)$$

where N_s is the number of persons employed in the secondary sector, and each secondary worker is supplying 1 unit of labour. By maximizing π_s with respect to N_s ; we get the zero-profit condition for the secondary sector

$$w_s = p_s \quad (2.16)$$

2.3. Wage formation

Wage curve in the primary sector

The elasticity of effort with respect to the wage can be calculated by implicit differentiation of equation (2.6), using (2.3) through (2.5):

$$\frac{\partial e_p}{\partial w_p} \cdot \frac{w_p}{e_p} = \frac{w_p \cdot (1 - t_p)}{p_s} \cdot \frac{1}{\pm \cdot (\frac{1}{2} + s)} \cdot \frac{e_p^{\pm}}{\bar{e}} \quad (2.17)$$

Inserting the effort elasticity (2.17) into the Solow-condition (2.14) and imposing the symmetry condition $e_p = \bar{e}$, we get²

$$e_p = \frac{w_p \cdot (1 - t_p)}{p_s} \cdot \frac{1}{\pm \cdot (\frac{1}{2} + s)} \quad \#_{1=(1+\pm)} \quad (2.18)$$

Next we insert the first order condition for effort (2.6), along with the symmetry condition, into equation (2.18)

$$\frac{w_p \cdot (1 - t_p)}{p_s} = \pm \cdot (\frac{1}{2} + s) \cdot (V_p - V^a) \quad (2.19)$$

²Notice from (2.6) that, in symmetric equilibrium, the job destruction rate $s = \tau_j$ for the representative worker becomes exogenous.

Since (2.11) implies that V^u is equal to V_u , we can insert equations (2.3), (2.5), (2.8), (2.10), and (2.18) into (2.19) to get the following wage curve

$$\frac{w_p \left((1 - t_p) \right)}{p_s} = \frac{1}{c} \left(b \right) \quad (2.20)$$

where

$$c = 1 + \frac{(1 + \tau) \left(\frac{1}{2} + s + a_u \right) + \tau}{\tau \left((1 + \tau) \left(\frac{1}{2} + s \right) \right)} < 1 \quad (2.21)$$

The variable c is the (endogenous) net replacement ratio in the primary sector. Net wages in the primary sector are simply a mark-up over net unemployment benefits, and according to (2.20) and (2.21) the mark-up is positively related to the job finding probability a_u . The higher a_u , the easier it is to get another primary job if you are forced for shirking. This reduces the cost of shirking, and to offset the resulting tendency for labour productivity to fall, employers pay higher wages.

Wage curve in the secondary sector

The reservation wage in the secondary sector can be found by rewriting the arbitrage condition (2.11). Inserting (2.9) and (2.10) into (2.11), we find a relation between flow utilities,

$$u_s = u_p \left(\frac{a_u + a_s}{\frac{1}{2} + s + a_u} \right) + u_u \left(\frac{\frac{1}{2} + s + a_s}{\frac{1}{2} + s + a_u} \right) \quad (2.22)$$

Substituting (2.3), (2.7), (2.8), (2.18) and (2.20) into (2.22), we get the wage curve

$$\frac{w_s (1 - t_s)}{p_s} = \frac{1}{1 + \tau} + b + \frac{a_u - a_s}{\tau (1/2 + s)} - \frac{b}{c} \quad (2.23)$$

The secondary sector wage must settle at a level ensuring that the welfare of a secondary worker equals the welfare of an unemployed person. If the probability of finding a future primary job does not depend on whether the worker is unemployed or employed in the secondary sector ($a_u = a_s$), this arbitrage condition is met when the real after-tax wage rate equals the real net unemployment benefit plus a mark-up compensating for the disutility of work. If the probability of finding primary sector employment is higher for the unemployed ($a_u > a_s$), the market clearing secondary wage includes an additional compensation for the expected capital loss resulting from the less favourable employment prospects. By contrast, if a_u were less than a_s the wage in the secondary sector would fall below the sum of the benefit rate and the disutility of work. Equation (2.23) formalizes these intuitive insights.

2.4. Closing the model

To close the model we need the government budget constraint

$$b N_u = t_p \frac{W_p}{p_s} N_p + t_s \frac{W_s}{p_s} N_s \quad (2.24)$$

where N_u is the number of unemployed persons. We assume that the real after-tax rate of unemployment benefit (b) and the tax rate on secondary workers (t_s) are set

exogenously, and that the tax rate on primary workers (t_p) adjusts endogenously to ensure budget balance.

In general equilibrium product markets must clear. Using the government budget constraint (2.24), the zero profit conditions (2.13) and (2.16) and the demand function implied by the Cobb-Douglas utility function (2.2), we can write the condition for clearing of the market for secondary sector output as

$$p_s \ell N_s = \bar{\omega} \ell [e_p \ell N_p + p_s \ell N_s] \quad (2.25)$$

stating that the value of secondary sector output (LHS) must equal the total expenditure on secondary goods (RHS) which is a constant share ($\bar{\omega}$) of national income.

In a stationary state the outflow of workers from the primary sector equals the inflow of workers into the sector

$$s \ell N_p = a_u \ell N_u + a_s \ell N_s \quad (2.26)$$

where

$$a_s = \ell a_u; \quad \omega_s \geq 0 \quad (2.27)$$

The parameter ω_s depends on the structural characteristics of the labour market determining the opportunities for on-the-job search in the secondary sector.

Finally, by normalizing total population at unity, we have the following identity

$$N_u + N_p + N_s = 1 \quad (2.28)$$

The complete model can now be summarized by the equations (2.13), (2.16), (2.18), (2.20), (2.21), (2.23), (2.24), (2.25), (2.26), (2.27), (2.28) determining the variables N_p ; N_s ; e_p ; w_p ; c ; w_s ; t_p ; p_s ; a_u ; a_s ; and N_u .

3. A special case: $a_s = a_u$

The convention in the theory of dual labour markets has been to set a_s () equal to zero, thus ruling out on-the-job-search in the secondary sector. This assumption goes back to the classical contribution by Harris and Todaro (1970) studying rural migration and urban unemployment in developing countries. In that setting it seems natural to assume that secondary sector workers have no opportunity of obtaining primary sector jobs, since the secondary (rural) and primary (urban) sectors are geographically separated. The Harris–Todaro assumption has been maintained in the subsequent literature on dual labour markets analysing developing countries [Stiglitz (1974), Calvo (1978)] as well as developed countries [Bulow and Summers (1986)]. However, in a developed economy the secondary and primary sectors are not geographically separated, and thus the original reasoning behind the Harris–Todaro assumption does not apply. Instead it has been argued that secondary workers cannot search as efficiently as unemployed workers because they have less time available for job search purposes. But as pointed out by Lindbeck and Snower (1990) this argument is inconsistent with substantial empirical evidence suggesting that on-the-job search is very common, and

that workers coming directly from another job account for a large fraction of new hirings. We will therefore analyse another benchmark case in which it is equally possible for a secondary worker and for an unemployed person to find a job in the primary sector ($a_s = a_u$). In section 4 we will then compare this case with the Harris–Todaro case.

3.1. Reducing the system

Given $a_s = a_u$ ($\alpha = 1$), we are able to reduce the system further. Using the zero profit condition (2.16), the wage curve in the secondary sector (2.23) can be written as

$$w_s = \frac{1 + b(1 + \alpha)}{(1 - t_s)(1 + \alpha)} \quad (3.1)$$

Since b and t_s are exogenous, this equation uniquely determines the equilibrium wage in the secondary sector. By inserting (2.16) and (2.18) into the zero profit condition for the primary sector (2.13), we get

$$w_p = \frac{1 - t_p}{w_s} \frac{1}{\alpha(1/2 + s)} \quad (3.2)$$

Using (2.16), (2.26) and (2.28), we may rewrite the wage curve in the primary sector (2.20)–(2.21) as

$$w_p = \frac{b + w_s}{1 - t_p} \frac{1}{\alpha} \frac{(1 + \alpha)^2 \left(\frac{1}{2} + \frac{s}{1 - N_p} \right) + 1}{\alpha(1 + \alpha)(1/2 + s)} \quad (3.3)$$

This equation is analogous to the No-Shirking-Condition in Shapiro and Stiglitz (1984) and Bulow and Summers (1986): an increase in primary sector employment

reduces the cost of shirking, inducing firms to pay higher wages to prevent too much shirking.

The product market clearing condition for the secondary sector (2.25) can be written as

$$w_s = \frac{\bar{A} - \alpha}{1 - \alpha} \left(w_p \frac{N_p}{N_s} \right) \quad (3.4)$$

where we have used (2.13) and (2.16). To close the system we need the government budget constraint. By inserting (2.16) and (2.28) into (2.24), we get

$$b \left(w_s \frac{N_p}{N_s} \right) = t_p w_p \frac{N_p}{N_s} + t_s w_s \frac{N_s}{N_s} \quad (3.5)$$

Equations (3.1)–(3.5) define the system determining w_p , w_s , N_p , N_s , and t_p . To gain a better understanding of the model, let us ignore the government budget constraint for a while and treat t_p as an exogenous variable. Given t_p the system is recursive: the wage curve in the secondary sector (3.1) determines w_s , and knowing w_s we can infer the value of w_p from the zero profit condition for the primary sector (3.2). Given w_s and w_p , the wage curve in the primary sector (3.3) determines primary sector employment N_p , and secondary sector employment N_s is then finally found from the equilibrium condition for secondary sector goods (3.4).

The general equilibrium of the dual labour market model is illustrated in Figure 3.1. The vertical axis indicates wage rates in the two sectors, measured in units of the primary sector numeraire good. The length of the horizontal

axis equals the total labour force. From left to right we measure primary sector employment, N_p , and from right to left we measure employment in the secondary sector, N_s . The horizontal distance between N_p and N_s is equal to the number of unemployed persons, N_u . The horizontal w_s -curve corresponds to equation (3.1) above. Given the location of the w_s -curve, we can draw the zero profit condition for the primary sector ZPC_p (equation (3.2)) and the w_p -curve (equation (3.3)). The intersection of the w_p - and ZPC_p -curves determines wages, employment, and thus total income in the primary sector. Knowing primary sector income, we can draw the product market clearing condition for the secondary sector, PMC_s , from equation (3.4). The equilibrium level of employment in the secondary sector is given by the intersection of the PMC_s - and w_s -curves.

It is not coincidental that the primary sector wage is higher than the secondary sector wage in Figure 3.1. If this were not the case, a primary worker would suffer no loss in case he were fired for poor work performance. Hence primary workers would shirk all the time, implying a zero level of primary sector output. In equilibrium primary workers must therefore earn a rent compared to their less fortunate colleagues in the secondary sector and in the unemployment pool. The resulting wage and productivity gap implies an intersectoral distortion in disfavour of the primary sector. A reallocation of workers from secondary to primary employment would generate a welfare gain stemming from an increase in

Figure 3.1: General Equilibrium in the Dual Labour Market Model

average labour productivity. This is the reasoning underlying the industrial policy proposals discussed in Bulow and Summers (1986) suggesting that the government should subsidize high-wage sectors at the expense of low-wage sectors.

Actually there are two 'sector' distortions in this economy. First, efficiency wage setting in the primary sector causes too many persons to be outside that sector. Second, the tax-transfer system causes too many of the remaining persons to opt for unemployment. Concern about the first distortion calls for a lower tax on high-paid workers, whereas concern about the second distortion suggests the need for a lower tax on low-paid workers. However, reducing both taxes at the same time is not feasible unless there are Laffer curve effects. Absent such

effects, a lower tax burden on one type of workers must be financed by a higher tax burden on the other type of workers. A priori one cannot conclude in which direction the tax burden should be shifted in order to improve employment and welfare.

3.2. Shifting the tax burden from low-paid workers to high-paid workers: a graphical illustration

In figures 3.2 and 3.3 we illustrate the effects of shifting the tax burden away from low-paid labour (reducing t_s) towards high-paid labour (increasing t_p). In practice this might be implemented by introducing an Earned Income Tax Credit targeted at low paid workers, financed by raising the marginal and average tax rate on higher levels of labour income³. A lower tax rate for secondary sector workers (figure 3.2) reduces the reservation wage of unemployed persons, and thus the w_s -curve shifts downwards. The reduction in secondary sector wages causes the price of secondary sector goods to fall. Hence the real consumer wage in the primary sector goes up, inducing primary workers to increase their work effort. With a greater work effort the product wages in the primary sector will have to increase to prevent the emergence of positive profits. This explains the upward shift in the ZPC_p -curve. At the same time the reduction in the relative price of secondary

³A targeted Earned Income Tax Credit which is phased out as labour income goes up would raise the effective marginal tax rate for low-paid workers while at the same time lowering their average tax rate. However, in our model where individual work hours for secondary workers are fixed, the behaviour of secondary workers is independent of the marginal tax rate, depending only on the average tax rate.

goods implies that firms in the primary sector can maintain a given level of real consumer wages (and hence a given level of effort) with a lower real product wage. As a result the w_p -curve moves downwards, and the new equilibrium in the primary sector is characterized by wage level w_p^* and employment level N_p^* . Because of higher wages and employment in the primary sector the total income generated in that sector goes up, causing higher demand for goods produced in the secondary sector. Hence the PMC_s -curve shifts upwards, so the new equilibrium level of secondary sector employment is given by N_s^* . Thus, reducing the average tax rate in the secondary sector has a positive effect on employment in both sectors of the economy. There is a direct boost to secondary sector employment through the arbitrage condition for unemployed workers. This effect improves the terms of trade for the primary sector, thereby stimulating employment in that sector as well, and higher primary employment in turn reinforces the rise in secondary employment via the product market for secondary goods.

Unfortunately, the government budget constraint implies that, in order to reap the above benefits, it is necessary to raise the tax rate on the high-paid workers in the primary sector (still assuming no Laffer curve effects). The effects of this less attractive component of the policy experiment are illustrated in Figure 3.3. A higher marginal tax rate reduces the effort exerted by workers in the primary sector, thus shifting down the zero profit condition ZPC_p . At the same time

Figure 3.2: Reducing the Average Tax Rate in the Secondary Sector

Figure 3.3: Increasing the Average Tax Rate in the Primary Sector

the w_p -curve shifts upwards since primary sector firms have to pay higher pre-tax wages to maintain a given level of effort. In the new equilibrium wages and employment in the primary sector are lower, implying a fall in total primary sector income which reduces the demand for secondary sector goods, thereby reducing employment in that sector as well.

In other words, although the graphical analysis highlights the various mechanisms involved in shifting the tax-burden from low-paid labour to high-paid labour, it does not allow any conclusions regarding the net effect on employment in either of the two sectors. We will now look further into this question, taking explicit account of the government budget constraint.

3.3. Shifting the tax burden from low-paid workers to high-paid workers: an analytical solution

The multipliers for the system (3.1)–(3.5) are derived on the assumption that the initial equilibrium is characterized by purely proportional taxation ($t_p = t_s$). When the tax rate on low-paid workers is cut, the necessary change in the tax rate on high-paid workers is given by⁴

$$\frac{dt_p}{dt_s} = \frac{\alpha(1-t_s)}{\Phi} \left[\frac{\bar{A}}{1-\alpha} + \frac{\alpha(1-t_s)}{\alpha+b} \left(\frac{N_p}{1-t_p} + \frac{1}{\alpha N_p} \right) \right] \quad (3.6)$$

where

$$\Phi = \alpha(1-t_s) \left[\frac{1}{\alpha N_p} + \frac{\mu(1-t_s)}{c} \left(\frac{N_p}{1-t_p} \right) \right] \quad (3.7)$$

⁴The results reported in this section are derived in an appendix available from the authors.

The parameter $\mu = \frac{1}{1+\epsilon}$ is the elasticity of work effort with respect to the real net wage (see (2.18)), and σ is the numerical elasticity of w_p with respect to $1 - N_p$ along the wage curve for the primary sector, $1 - N_p$ being the number of persons applying for a job in that sector. In the present two-sector model σ is analogous to the elasticity of the wage with respect to unemployment in one-sector models. Since $\mu < 1$, it follows from (3.7) that Φ will surely be negative for all feasible values of $N_p < 1$ as long as σ does not exceed unity. According to the extensive cross-country evidence provided by Blanchflower and Oswald (1994), a value of σ around 0.1 seems to be a remarkably robust estimate. Hence we may safely assume that Φ is negative. From (3.6) we see that a value of σ below unity is also sufficient (but far from necessary) to guarantee that a lower tax rate on secondary workers must be accompanied by a higher tax rate on primary workers, thus ruling out Laffer curve effects.

The effects of the tax reform on employment are found to be

$$\frac{dN_p}{dt_s} = \frac{1}{1 - \mu} \left[\frac{b + \mu t_s}{\mu + b} + \frac{\bar{A}}{c} + \frac{\sigma (1 - t_s)}{\mu + b} \right] N_p \left[\frac{1}{\Phi} \right] \quad (3.8)$$

$$\frac{dN_s}{dt_s} = \frac{1}{c} \frac{\bar{A}}{1 - \mu} - \frac{\bar{A}}{\mu + b} - \mu \frac{N_p}{1 - t_s} \left[\frac{dN_p}{dt_s} \right] + \frac{\bar{A}}{1 - \mu} \frac{\sigma N_p}{1 - N_p} \left[\frac{dN_p}{dt_s} \right] \quad (3.9)$$

Assuming $\Phi < 0$ and recalling that $c < 1$, we have $dN_p/dt_s > 0$; implying that a shift in the tax burden in favour of low-paid labour reduces employment in the

primary sector. According to (3.9) the effect on secondary sector employment is ambiguous. The reason is that the tax reform elicits two offsetting effects on the demand for secondary sector output. On the one hand secondary employment is stimulated by a tendency for the relative wage and price of the secondary sector to fall (an effect captured by the first product in the square bracket on the RHS of (3.9)), but on the other hand the demand for secondary output is reduced by falling employment in the primary sector (reflected by the last term on the RHS of (3.9)).

4. The importance of on-the-job search

The preceding analysis assumed that a worker has the same probability of finding a primary sector job whether he is unemployed or engaged in secondary sector work ($a_s = a_u$). By contrast, conventional dual labour market theory assumes that workers must line up in the unemployment queue before they can hope to obtain a job in the primary sector ($a_s = 0$, the Harris–Todaro case). As noted earlier, the Harris–Todaro assumption is contradicted by a substantial body of evidence indicating that on-the-job search plays an important role in real world labour markets (see Clark and Summers (1979), Jackman (1983) and Pissarides and Wadsworth (1994)). Yet there is no reason to believe that the probability of finding a primary sector job is exactly the same for secondary sector workers and for the unemployed. Although the value of a_s seems to be positive, it may be

considerably lower (or higher) than the value of a_u , so in principle we cannot say whether the $a_s = a_u$ case is more or less realistic than the Harris–Todaro case. Hence it is relevant to study whether the effects of tax reform are significantly affected by the assumption made about labour market flows.

Since the technical analysis gets quite complicated when $a_s \neq a_u$ ($\neq 1$), we resort to computer simulations, assigning numerical values to all parameters in the model. The elasticity of the marginal disutility of work effort (\pm) is set equal to 9. This implies an elasticity of work effort w.r.t. the real net wage equal to 0.1, in line with typical estimates of labour supply elasticities. The budget share of goods produced in the secondary sector ($\bar{\alpha}$) is set at 0.3, and the rate of time preference (β) is calibrated so as to generate an numerical elasticity of w_p with respect to $1 - N_p$ equal to 0.1 along the wage curve for the primary sector. The equilibrium rate of labour turnover $s = \tau_j \bar{\alpha}$ in the primary sector (s) is taken to be 0.25, and the sensitivity of the individual worker's firing probability with respect to the level of work effort (γ) is calibrated such that the net replacement ratio is 0.6 in the initial equilibrium. Finally, the absolute level of the real net unemployment benefit (b) is determined by the requirement that the model be able to generate an equilibrium unemployment rate equal to 0.08. Given these parameter values we simulate the effects of a 5 percentage point cut in the tax rate on low-paid (secondary) labour, allowing the model to determine the required rise

in the tax rate on high-paid (primary) labour. The results are presented in table 1.

Table 1. Labour Tax Reform and the Opportunities for On-the-job Search

Change expressed in percentages:	$a_s = a_u$	$a_s = 0$
Tax rate in secondary sector ^a	-5.0	-5.0
Tax rate in primary sector ^a	2.4	2.0
Employment in secondary sector	4.2	5.1
Employment in primary sector	-3.0	-2.1
Unemployment ^a	0.2	-0.2
<u>Welfare effects (percent of GDP):</u>		
Change in sectoral allocation	-0.44	-0.88
Change in total employment	-0.03	0.83
Total welfare change	-0.47	-0.05

^a The change is expressed in percentage points

In the first column we show the effects in the $a_s = a_u$ case. The simulation results confirm the analytical findings from the previous section. Cutting t_s by 5 percentage points requires increasing t_p by 2.4 percentage points. Such a policy will increase employment in the secondary sector by 4.2 percent while reducing employment in the primary sector by 3.0 percent, causing an overall increase in the unemployment rate from 8 to 8.2 percent.

The welfare effect of the tax reform is measured by its impact on the expected lifetime utility of the representative worker, i.e., the lifetime utility which the worker expects ex ante before knowing his employment status. Using (2.3), (2.5), (2.8), (2.10), (2.18), (2.20), (2.21), (2.26), (2.27), (2.28) and the arbitrage condition $V_s = V_u$, we find that expected lifetime utility V^e may be written as

$$\begin{aligned}
V^e(N; n_p) &= N_p V_p + N_s V_s + (1 - N_p - N_s) V_u = N_p (V_p - V_u) + V_u \\
&= b \left[\mu \left(\frac{s \epsilon (1 + \epsilon) \epsilon n_p}{N^{i-1} + \epsilon (1 - n_p)^{i-1}} \right)^{\frac{1}{i-1}} n_p \epsilon N \epsilon (1 + \epsilon) + \frac{\mu}{\frac{1}{2}} \right] \quad (4.1)
\end{aligned}$$

$$N \uparrow \Rightarrow N_p + N_s; \quad n_p \uparrow \Rightarrow N_p = N; \quad \mu \uparrow \Rightarrow (1 + \epsilon) \left(\frac{1}{2} + s \right) \left(\epsilon \uparrow \right)^{i-1}$$

As noted earlier, our model economy is characterized by an inefficiently low level of aggregate employment and by an inefficiently low primary sector share of total employment. Accordingly, equation (4.1) implies that expected utility will unambiguously increase in case of a rise in total employment, N ; or in case of a rise in the primary sector employment share, n_p .

The total welfare effects given in the bottom row of Table 1 are measured by the ex ante equivalent variation, defined as the hypothetical increase in lump sum income which would generate the same change in expected utility as the labour tax reform considered⁵. In the third row from the bottom of Table 1 we report the isolated welfare effect of the change in the primary sector share of total employment (n_p), keeping total employment N constant at its initial level. In the second row from the bottom the residual part of the total welfare effect is then ascribed to the change in aggregate employment. In the $a_s = a_u$ case ($\epsilon = 1$) we

⁵This welfare measure is in the spirit of Helms (1985).

see from Table 1 that the labour tax reform causes a drop in welfare corresponding to roughly half a percent of initial GDP. It is interesting to note that the sectoral shift from primary to secondary sector employment accounts for almost all of the fall in welfare, whereas the fall in total employment contributes very little to the negative welfare effect.

We now turn to the other benchmark case where $a_s = 0$ ($\beta = 0$), i.e., the Harris-Todaro assumption usually adopted in dual labour market models. To understand the differences between the $a_s = a_u$ scenario and the $a_s = 0$ scenario, let us consider how the tax reform will affect wage formation in the two sectors of the economy, noting from Table 1 that both scenarios involve a reduction in N_p and an increase in N_s . In both cases the fall in N_p reduces the number of new hirings in the primary sector and increases the number of people applying for a primary sector job. Clearly this reduces the employment probability for all job applicants. But in the Harris-Todaro case there is an offsetting effect, since the reallocation of people from unemployment to secondary sector employment (the increase in N_s) will reduce the number of people applying for primary sector jobs. Ceteris paribus, this will increase the employment probability for those remaining in the unemployment pool. The isolated effect of this tendency for a_u to increase will be to drive up wages in the primary sector, thereby causing a further reduction of employment in that sector. This additional effect arising in the Harris-Todaro

case may be termed the 'primary sector wage effect'.

The second difference between the two cases relates to wage formation in the secondary sector. In the $a_s = a_u$ case the secondary sector wage equals the sum of the unemployment benefit and the disutility of work, but in the Harris–Todaro case the secondary sector wage also includes a wage premium compensating for the forgone chance of obtaining a job in the primary sector. This wage premium is proportional to the product of an unemployed worker's probability of obtaining a primary sector job (a_u) and the real net wage in the primary sector (which is positively related to a_u). A lower value of a_u thus implies a lower wage premium. In the Harris–Todaro case the tax reform involves both a positive and a negative effect on a_u since the increase in N_s reduces the number of job applicants, whereas the reduction in N_p implies both fewer hirings and more job applicants. If the latter effect is stronger (and this turns out to be the case in the simulation experiment) a_u will go down, thereby generating a lower secondary sector wage and a greater rise in secondary employment in the Harris–Todaro case relative to the $a_s = a_u$ case. We will term this the 'secondary sector wage effect'.

If the secondary sector wage effect on employment is positive and outweighs the primary sector wage effect, the impact of the labour tax reform will be more beneficial in the Harris-Todaro scenario. Comparing the two columns in Table 1, we see that this is indeed the case, given our plausible parameter values. Thus,

when $a_s = 0$ the contraction in primary sector employment is smaller, and the expansion in secondary sector employment is greater than when $a_s = a_u$. As a result unemployment is reduced from 8.0 to 7.8 percent of the labour force. Despite the rise in total employment, the effect on consumer welfare measured by the ex ante equivalent variation is slightly negative. The decomposition shows that the total welfare effect is the net result of two almost offsetting effects: on the one hand there is a large negative welfare effect from the deterioration in the sectoral allocation of employment, but on the other hand there is a large positive effect from the rise in total employment.

The policy effects reported in Table 1 obviously depend on the specific parameter values mentioned earlier. However, experiments with different plausible calibrations confirmed that the effects of the labour tax reform are in fact more beneficial in the Harris-Todaro case, and that the sign of the total welfare effect may even turn from negative to positive when going from $a_s = a_u$ to $a_s = 0$.

5. Concluding remarks

The point of departure for this paper was the observation that the labour market tends to be segmented into a primary sector offering 'good' high-paying jobs and a secondary sector offering 'bad' low-paying jobs. Our analysis suggested that it may be very important to allow for such dualism in the labour market when evaluating the welfare effects of recent proposals to shift the tax burden away from low-paid

labour. The reason is that the implementation of such proposals might shift employment from 'good' jobs to 'bad' jobs. Our specific model of a dual labour market implied that, even if a labour tax reform succeeds in raising aggregate employment, it may not improve economic efficiency if it causes a reallocation from high-productive primary jobs to low-productive secondary jobs. As a byproduct of our analysis, we also demonstrated that opportunities for on-the-job search may have very important implications for the effects of labour tax reform - and potentially for other public policies as well - because on-the-job search affects wage formation in both sectors of the economy. Indeed, we saw that the conventional but unrealistic assumption that only the unemployed can search for jobs may give an overoptimistic picture of the effects of labour tax reform.

While we presented our model as one of intersectoral dualism across different production sectors, several other writers have focussed on intrasectoral dualism, i.e. the phenomenon that 'good' jobs may coexist with 'bad' jobs within each sector or firm (e.g., Saint Paul (1991), (1996), Rebitzer and Taylor (1991), Albrecht and Vroman (1992)). It can be shown that our model can easily be reinterpreted as a model of intrasectoral dualism⁶. In this reinterpretation we consider an economy with one production sector using two types of labour; i.e., primary workers (say, those in the administration) and secondary workers (say, those along the assembly line). All workers are identical, but it is more costly to monitor effort

⁶The proof of this proposition is given in an appendix available from the authors.

in the administrative offices than along the assembly line. Hence primary workers are paid efficiency wages, whereas secondary workers are paid the competitive wage. This one-sector model turns out to be formally equivalent to the two-sector model developed above when aggregate labour input (and hence aggregate output) is modelled as a Cobb-Douglas aggregate of the two types of labour in the same way as the two consumption goods are aggregated in the two-sector model. Thus our analysis is more general than it might seem.

It goes without saying that our simplified model does not necessarily destroy the case for a labour tax reform shifting the tax burden away from low-paid labour. For one thing, if such a reform succeeds in raising total employment, policy makers may well see this as a social gain even if it does not improve the economist's measure of efficiency. Furthermore, if wage formation in the secondary sector is monopsonistic rather than competitive, a tax cut for the low-paid could have an additional beneficial effect by offsetting the depressing effect of monopsony on secondary employment. More generally, proponents of tax cuts for low-paid workers have argued that such a policy will a) create a stronger incentive for the unemployed and for individuals working in the informal economy to accept available jobs, and b) create new jobs for low-productive unemployed workers by paving the way for lower wages at the bottom end of the pay scale. On the cost side, critics have argued that, once one accounts for the need to finance the

tax cuts for low-paid workers through higher taxes on high-paid workers, the tax reform will c) reallocate labour from primary to secondary employment, and d) increase the relative supply of low-skilled labour by weakening the incentive for education and upgrading of skills. The present paper only accounts for effects a) and c), and it has tried to highlight the significance of the distinction between 'good' jobs and 'bad' jobs. However, because we neglected worker heterogeneity and the associated distributional concerns, we were unable to account for effect b), i.e., the fact that 'bad' jobs may be better than no jobs for those who are currently excluded from the labour market because they cannot live up to normal productivity standards. Allowing for this phenomenon and for the impact of tax progressivity on skill formation are important tasks for future research on the effects of labour tax reform.

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