Corporate Taxation and the Welfare State

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Abstract

The paper compares the impact of corporate taxation and social insurance on foreign direct investment (FDI) and unemployment. Four main results are derived: (i) the optimal size of the welfare state depends on the degree of risk-aversion and the unemployment rate as a measure of labor income risk. The unemployment rate partly reflects the country's exposure to globalization; (ii) corporate taxation and social insurance have equivalent effects on unemployment and outbound FDI; (iii) while an increase in the corporate tax can raise corporate tax revenue, it is rather likely to worsen the government's total fiscal stance. A corporate tax cut can thus be self-financing due to fiscal increasing returns in the presence of a large public sector; (iv) a corporate tax should be used to contribute to welfare state financing only in exceptional cases when job creation is excessive and unemployment is inefficiently low. These conditions are probably unlikely to hold in Europe's generous welfare states with high structural unemployment rates.

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1 Introduction

Globalization puts pressure on the welfare state in high wage economies. In an integrated world, globally acting companies find it increasingly easy to access cheap labor in developing countries to cut costs, or to move production closer to large markets rather than exporting from the parent country. Firms can escape domestic wage pressure, for example, by outsourcing labor intensive components to low wage economies or entirely relocating production by means of outbound foreign direct investment (FDI). The policy problem is that the need to raise tax revenue from mobile companies and the wage pressure resulting from the welfare state reinforce these business strategies, thereby eroding the tax base and the financial viability of the welfare state. It is widely recognized that the corporation tax as a source tax importantly affects FDI by its impact on the location choice of firms. The high replacement income available in the welfare state might prop up wages and thereby similarly drive out business investment to alternative locations.

These arguments are supported by substantial empirical evidence. Firms tend to locate production in countries with a low corporate tax burden. Hines (1996), Devereux and Griffith (1998) and, more recently, Barrios, Huizinga and Laeven (2008) show that FDI is sensitive to (average effective) corporate tax rates. Buettner and Ruf (2007) similarly report that effective marginal tax rates affect the scale and effective average rates the location of multinational investment. Devereux, Lockwood and Redoano (2008) find that countries compete over both average and marginal tax measures. Devereux (2007), Hines (1999, 2007) and OECD (2007) summarize the empirical evidence. The meta-study of De Mooij and Ederveen (2008) implies that aggregate investment seems to be more responsive to (statutory and average effective) tax rates on the extensive (FDI) margin compared to the impact of effective marginal tax rates on intensive investment. The present analysis emphasizes the impact of corporate taxes on aggregate investment via the entry and location margins. Djankov et al. (2008) estimate that a 10 percent increase in the effective corporate tax rate reduces the investment to GDP ratio by 2 percentage points. More importantly, the aggregate impact involves large effects on the

entry (entrepreneurship) and FDI margins which are at the center of this paper. In particular, a 10 percentage point decrease in the effective corporate tax rate is associated with an increase in the entry rate of 1.4 percentage points with the average entry rate being about 8 percent. Da Rin, Di Giacomo and Sembenelli (2008) similarly investigate the effect of the corporate tax rate on entrepreneurial entry rates and find strong and significant effects. In their preferred specification, a reduction of the corporate tax rate from the median (30.04%) to the first quartile (27.57%) implies a 0.880 percentage point increase in the entry rate, or 12.5% of the 7.02% mean entry rate.

Wages influence location decisions of multinationals as well, possibly even more than corporate taxes. By raising wages, the welfare state might induce outbound FDI much the same way as the corporate tax. Empirical evidence suggests that welfare policy boosts wages and outsourcing. Estimates of the elasticity of the reservation wage with respect to unemployment benefits range from .11-.17 (Lancaster and Chesher, 1983) to values around .4 (Feldstein and Poterba, 1984, Fishe, 1982, van den Berg, 1990). The high benefits in Europe (replacement rates are mostly 60% or more, see Nickell, 1997) thus significantly inflate wages. Díaz-Mora (2005) estimates that a one percent increase in firms' labor cost boosts the volume of outsourcing by 0.3%. Investigating outsourcing of Austrian firms to Eastern Europe, Egger and Egger (2003) find that countries with lower unit labor costs attract more outsourcing. Relative wage costs thus importantly contribute to the delocation of production. However, there seems to be little empirical evidence how wage taxes and, in particular, social benefits affect FDI. Indirectly, the results in Desai, Foley and Hines (2004) are consistent with our arguments. They report that indirect taxes have a substantial impact on FDI. Indirect taxes also erode real wages and could be shifted to employers. Egger and Radulescu (2008) consider wage taxes and social security contributions and find that effective labor tax rates significantly affect FDI, although less importantly than profit taxes.

The theoretical literature has given little attention to the interaction of corporate taxation and welfare state policies. This is the focus of the present paper which com-

pares the impact on unemployment, outbound FDI, income and welfare. Borrowing from Keuschnigg (2008) and Keuschnigg and Ribi (2009), a model of search unemployment and discrete location choice is proposed. It explains how outbound FDI responds to corporate taxes and social insurance. We also discuss the optimal size of the social insurance scheme when private markets for unemployment insurance are missing, and whether the corporate tax should be used to contribute to the financing of the welfare state.

The main results of the paper are four: (i) The optimal size of the welfare state depends on the degree of risk-aversion and the unemployment rate as a measure of labor income risk.[1] The unemployment rate partly reflects the country's exposure to globalization. (ii) Corporate taxation and social insurance can have equivalent effects on unemployment and outbound FDI. (iii) While a tax increase can raise corporate tax revenue, it is rather likely to worsen the government's total fiscal stance. A corporate tax cut can thus be self-financing due to fiscal increasing returns in the spirit of Blanchard and Summers (1987) if the savings in social spending and the growth in wage tax revenue are appropriately taken into account.[2] (iv) A corporate tax should be used to contribute to welfare state financing only in exceptional cases. This last result might not be surprising, given the result of Gordon (1986), reflecting the Diamond and Mirrlees (1971) production efficiency theorem in a perfectly competitive economy, that a source tax on profits should not be used. However, the economy in the present model is subject to distortions since labor market frictions lead to involuntary unemployment and private insurance markets are missing. Therefore, we find that a positive corporation tax could usefully complement the tax financed insurance scheme if firms are too strong in wage bargaining which leads to excessive job creation and inefficiently *low* unemployment, if the optimal size of the welfare state is small, and if the government has a strong redistributional objective. These

[1] We relate social insurance to the unemployment risk such as in Chetty (2006) and the literature cited there, and use a static model of job search similar to Boone and Bovenberg (2004).

[2] Blanchard and Summers (1987) pointed out that fiscal increasing returns are likely to emerge in the presence of a large public sector. Tax cuts can even be self-financing if they expand employment, thereby strengthening the wage tax base and leading to savings in welfare spending for the unemployed.

conditions are probably not very realistic in European countries with high structural unemployment rates and large welfare states.

The paper also complements the literature on tax incidence (see the overview of Fullerton and Metcalf, 2002). By the standard argument, the burden of the corporate tax in open economies falls to a large extent on labor since the tax reduces capital intensity and, thereby, wages (Hasset and Mathur, 2006, and Arulampalam, Devereux and Maffini, 2007, find substantial effects). This paper emphasizes another channel for tax incidence. In large welfare states with rigid wages, the burden of the corporate tax on workers might come in terms of higher unemployment. In reducing firm entry and raising outbound FDI, the corporate tax strongly reduces job creation and boosts unemployment. Keeping replacement rates constant, the labor tax burden must rise to balance fiscal budgets. Higher wage taxes are shifted to firms and thereby create further unemployment. Daveri and Tabellini (2000) estimate that the observed rise of 14 percentage points in labour tax rates between 1965 and 1995 in the EU might have accounted for a rise in the unemployment rate of roughly 4 percentage points.

In focussing on the interaction of corporate taxes and welfare budgets, the paper necessarily abstracts from other economic roles of the corporate tax (see Auerbach, Devereux and Simpson, 2008, and Griffith, Hines and Sorensen, 2008, for comprehensive reviews). For example, a positive corporate tax could be useful to tax economic rents or income of foreigners when foreign ownership of national firms is important (see Fuest, 2005, and Huizinga and Nielsen, 1997 and 2002, for analytical arguments) or because it might serve as a backstop to personal income taxes (Sorensen, 2007, and Zodrow, 2006).

Section 2 now sets up a simple model of involuntary unemployment and outbound FDI. The basic function of the welfare state is to provide social insurance of risk-averse workers, assuming that private unemployment insurance is not possible. Section 3 derives comparative static results in response to policy shocks. Section 4 characterizes the welfare optimal level of unemployment insurance and then discusses the role of the corporate tax in the present framework. Section 5 concludes.

2 The Model

A stylized model of search unemployment and outbound FDI is proposed. The government spends on social insurance and levies wage and corporate taxes to raise revenue. The output good serves as *numeraire*. Firms are owned by risk-neutral investors. There is free entry of firms. Each firm invests a fixed amount of capital, decides on the location of the production unit, and hires labor if production is set up at home. In addition to variable hiring per firm, employment also depends on the number of firms staying local, giving rise to intensive and extensive margins of labor demand. Workers are risk-averse and subject to involuntary unemployment.

2.1 Workers and Firms

Workers: There is a mass one of risk-averse workers who are initially unemployed and search for a job. Expected utility of a worker is

$$V_L = e \cdot u\left(w - t\right) + \left(1 - e\right) \cdot u\left(b + h\right). \tag{1}$$

An employed worker supplies one unit of labor, earns a wage w and pays a specific wage tax t. Since labor supply on the job is fixed, it does not matter whether the wage tax is ad valorem or specific. Only the average tax rate t/w is economically relevant. When unemployed, individuals collect benefits b and enjoy the money equivalent value h of leisure or home production (see also Blanchard and Tirole, 2008). With independent risks, the ex ante probability e of getting employed is also the ex post employment rate, and $1-e$ is the unemployment rate. Similarly, expected income ex ante is equal to average income ex post, $c_L = e \cdot (w - t) + (1 - e) \cdot b$.

The concavity of the utility function reflects risk aversion, $u' > 0 > u''$. We use the notation $u_E \equiv u\left(w - t\right)$ and $u_B \equiv u\left(b + h\right)$, and similarly u'_E and u'_B, where indices E and B stand for the states of being employed or 'on benefits'. Taylor approximations yield $u_B \approx u_E - \left(w - t - b - h\right) u'_E$ and $u'_B \approx u'_E - \left(w - t - b - h\right) u''_E = \left(1 + \chi\rho\right) u'_E$

and will be used later on. The relative income gap between labor market states is $\chi \equiv (w-t-b-h)/(w-t)$ and $\rho \equiv -(w-t)\,u''_E/u'_E$ is the degree of relative risk-aversion. The worker's job surplus as a share of the wage will be denoted by $\Omega \equiv 1-t^*-h/w$ where $t^* \equiv (t+b)/w$ is the participation tax rate in the sense of Saez (2002) and Immervoll et al. (2007). The job surplus indicates the worker's income gain when switching from unemployment into a job. The participation tax measures the total fiscal burden imposed on the worker when accepting a job. Since it consists of the *sum* of the average wage tax burden and the foregone social benefits, it tends to be very high.

Firms: The timing of events is: (i) public policy; (ii) free entry of firms; (iii) choice of production location and location specific investment; (iv) job search by workers and locally operating firms; (v) matching and wage bargaining; (vi) production and income payments. Entry means that investors incur a development or start-up cost r in stage (ii) which allows them to draw an investment project of type $q' \in [0,1]$ from the distribution $G(q) = \int_0^q g(q')\,dq'$ where q' is the project specific success probability of investment i. The type q' of the investment project reflects the firm's luck in its innovation effort. After learning its type q', the firm chooses the plant location before the investment risk is resolved. Investment succeeds or fails with probability q' at the end of stage (iii). If the firm fails, it closes down with all prior investments being lost.

To set up production, firms must thus incur a risky investment i. The size of this investment is location specific and, importantly, is assumed to be larger abroad than at home. The firm must spend additional resources to prepare foreign production, adjust to different regulations and institutions etc. For simplicity, we normalize to zero the fixed investment at home so that i is the differential investment required when setting up production abroad. After success or failure is realized, firms are homogeneous within each group (domestic or foreign located).[3]

[3]In new trade theory, firms are heterogeneous in their factor productivity, see Helpman (2006) for a survey. The probabilistic formulation adopted here is the key simplification compared to these heterogeneous firm models.

For simplicity, we assume a fixed scale of firms and exclude an intensive margin of business growth. A firm thus consists of a fixed number of vacancies l which must be filled with suitable workers to start production. Due to mismatch of skills and required job qualifications, hiring is successful only with probability m which is taken as given by an individual firm but is endogenous in equilibrium, reflecting labor market tightness. Ignoring other search costs, expected cash-flow per domestic firm is

$$\pi = (y - w) \cdot ml, \tag{2}$$

where y is output of the firm-worker match and $y - w$ is the firm's job rent.[4] The firm's workforce is ml since only a fraction m of its vacancies are successfully filled.

Alternatively to hiring and producing at home, firms can relocate, earning a profit abroad and repatriating dividends equal to π_f. Given location specific start-up cost, a domestic investor of type q' sets up production locally if the expected net present value exceeds the alternative value of locating abroad, $(1 - \tau)\,\pi \cdot q' > \pi_f \cdot q' - i$, where τ is the corporate tax and π_f is the cash-flow and repatriated dividend of the foreign subsidiary, net of the foreign corporation tax. We assume that the home government applies the *exemption method* to avoid double taxation so that no further tax is levied on foreign source profits. The exemption method is the most commonly applied method in OECD countries. We do not explicitely model the foreign economy but take π_f to be larger than net of tax cash-flow earned at home. After all, the larger profit opportunities of accessing cheap labor in low wage economies, or of locating the plant close to foreign markets, are prime motivations of outbound FDI. Of course, the larger profit is available only if investment is successful, and must be set against the extra cost of locating abroad. As Figure 1 illustrates, it is thus too costly and not worthwhile for relatively unprofitable

[4]Labor productivity is constant. Investment reflects firm entry and FDI. We conjecture that adding scale effects would magnify the impact of the corporate tax on unemployment because job creation would be further discouraged by lower labor productivity y when firms reduce capital intensity. While beyond the scope of this paper, it might be worthwhile to consider this extension in future research.

firms (those with a low success probability) to go multinational. The pivotal firm is

$$q = \frac{i}{\Delta\pi}, \quad \Delta\pi \equiv \pi_f - (1-\tau)\,\pi > 0. \tag{3}$$

Prior to entry, firms expend innovation effort to develop their product line, giving rise to an entry cost r. Innovation results in an investment project of type q' with probability $g(q')$, which will make it worthwhile to stay local or go international, depending on condition (3). Ex ante, the probabilities of surviving and staying local or relocating are

$$s = \int_0^q q' dG(q'), \quad s_f = \int_q^1 q' dG(q'), \quad I = \int_q^1 i dG(q'). \tag{4}$$

Business failure results in $s + s_f < 1$. All firms must incur the entry cost but only part of them survive to the production stage when the cash-flow is generated.

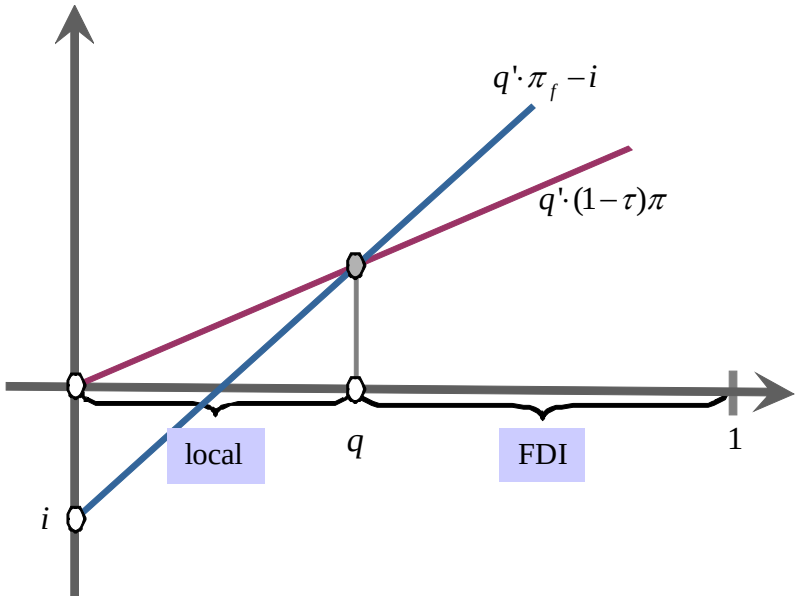

Fig. 1: Firm Selection

There is a mass one of risk-neutral investors who are endowed with one unit of wealth as well as entrepreneurial skills to create new firms. By way of contrast, workers are risk-averse, lack the managerial ability to run a firm, and also have no own wealth. This last assumption is consistent with the observed wealth concentration (see Wolff, 1998, for example). The expected value of a firm is $\pi_e = \int_0^q (1-\tau)\,\pi q' dG(q') + \int_q^1 (\pi_f q' - i)\, dG(q')$.

To start a new firm, an entrepreneur must invest her entire wealth and, in addition, incurs a managerial effort cost. Investors differ with respect to their entrepreneurial ability which is uniformly distributed in $n \in [0,1]$. Assuming an effort cost $r(n)$ such that $r(0) = 0$ and $r'(n) > 0$, implies that starting a firm is rather costly for types $n \to 1$ with low ability and high cost. Type n sets up a firm only if $\pi_e - r(n) > 1$, where the alternative is not to invest her wealth and save the effort cost. Interest is normalized to zero, making initial wealth equal to end of period wealth without any income to be taxed. When not investing, these agents simply live off their endowment. The marginal agent N is indifferent between investing her wealth or not. The indifference or free entry condition is

$$\pi_e = s \cdot (1-\tau)\,\pi + s_f \cdot \pi_f - I = 1 + r(N). \tag{5}$$

Taking account of business failure, the expected net present value must cover the fixed entry cost, $\pi_e \geqslant 1 + r$, reflecting the opportunity cost of capital and the initial research and development effort. Given a uniform distribution, the index for the marginal type is equal to the mass of firms created. End of period wealth of those who have not invested is $1 - N$. Total investment cost of all firms started consists of capital N (one unit of wealth invested per firm) and aggregate effort cost $R(N) = \int_0^N r(n)\,dn$. With N firms entering, a part sN survives and stays local, earning π gross of tax, and $s_f N$ plants are moved abroad. We also assume that capital investment is not deductible against corporate tax. Hence, corporate tax revenue amounts to $\tau \pi s N$.

2.2 Labor and Product Markets

Labor Market: Firms and workers meet on a matching labor market. Search effort of workers is fixed, leaving a mass 1 of job searchers. Each firm is endowed with l vacancies. Since only local firms hire in the domestic labor market, the number of vacancies is lsN. Job searchers and vacancies are matched according to $e \cdot 1 = M(1, lsN) = m \cdot lsN$. Skill mismatch leads to rationing subject to a standard linear homogeneous matching technology. Only a fraction m of vacancies and e of workers get matched, the remaing

part remains idle, leading to involuntary unemployment and waisted investments. Using an empirically validated Cobb Douglas technology $M = \phi 1^{\eta} (lsN)^{1-\eta}$ shows how the employment and hiring probabilities depend on labor market tightness $\theta \equiv lsN$. A tighter market, i.e. more demand per worker, boosts employment chances of workers but makes hiring by firms more difficult:[5]

$$e(\theta) = \phi\theta^{1-\eta}, \quad m(\theta) = \phi/\theta^{\eta}, \quad \theta m = e. \tag{6}$$

A successful match yields a rent to be shared by the worker firm pair. The wage follows from standard Nash bargaining, $w = \arg\max \ [u(w-t) - u(b+h)]^{\gamma} [y-w]^{1-\gamma}$, where γ reflects the worker's bargaining power.[6] The bargaining condition $\gamma u'_E \cdot (y-w) = (1-\gamma)(u_E - u_B)$ implicitely determines the gross wage. Using the approximation mentioned subsequent to (1), wage bargaining yields

$$w = \gamma y + (1-\gamma)(t+b+h). \tag{7}$$

Job rents $y - w = (1-\gamma)(y-t-b-h)$ and $w-t-b-h = \gamma(y-t-b-h)$ are a share of the joint surplus. They are are related by

$$\frac{y-w}{w} = \frac{1-\gamma}{\gamma} \cdot \Omega, \quad t^* \equiv \frac{t+b}{w}, \quad \Omega \equiv 1 - t^* - h/w, \tag{8}$$

where t^* is the participation tax rate, Ω is the worker's job surplus per unit of the wage. Similarly, $(y-w)/w$ is the firm's job surplus per wage unit.

Output Market: The government's budget constraint is

$$te + \tau\pi sN = (1-e)\, b. \tag{9}$$

Walras' Law implies goods market clearing. Workers consume $c_L = (w-t)\, e + b(1-e)$ and investors $c_E = 1 - N + \pi_e N$ at the end of period. Adding up, using the fiscal constraint

[5] The parameters l and ϕ are chosen to assure meaningful matching rates $e < 1$ and $m < 1$.

[6] Nash bargaining is standard in search models. Union wage bargaining might be an alternative, see Cahuc and Zylberberg (2004). However, both alternatives share the property that taxes and benefits are partly shifted to firms. This key transmission channel for policy effects is, thus, not affected.

and writing foreign source income (repatriated dividends) as $Y_f \equiv \pi_f s_f N - IN$, one gets $C = 1 - N + \pi sN + Y_f + we$, where $C = c_L + c_E$. Use $e = mlsN$ and $\pi sN = (y - w)\, e$. We thus obtain from the earlier equation the national income identity $Y = C$ where $Y \equiv 1 - N + ye + Y^f$ is GNP, consisting of GDP $ye + 1 - N$ plus foreign factor income. Equilibrium is solved in terms of a wage tax t which balances the fiscal budget, and a market tightness θ which clears the matching labor market.

3 Equilibrium in the Welfare State

Except when stated otherwise, we compute logarithmic changes relative to an initial equilibrium, $\hat{w} = dw/w$. It is convenient to define the change in (specific) taxes and social spending relative to the gross wage, $\hat{t} \equiv dt/w$ and $\hat{b} \equiv db/w$, while the relative change in the corporate tax rate is defined as $\hat{\tau} = d\tau/(1 - \tau)$. The exogenously chosen instruments are b and τ, the wage tax is endogenously set to balance the fiscal budget.

3.1 Wages, Profits and Investment

We first show how labor market tightness and the wage tax determine employment, wages, profits as well as national and foreign investment. Market tightness directly determines employment by the matching probabilities in (6),

$$\hat{e} = (1 - \eta) \cdot \hat{\theta}, \quad \hat{m} = -\eta \cdot \hat{\theta}, \quad \hat{\theta} = \hat{s} + \hat{N}. \tag{10}$$

The wage rate is set by decentralized wage bargaining. Bargaining partly shifts taxes and benefits to employers, leading to a higher gross wage. From (7),

$$\hat{w} = (1 - \gamma) \cdot \left(\hat{b} + \hat{t}\right). \tag{11}$$

The expected gross profit of a domestic plant reflects wage costs and firms' hiring chances. Substituting the results above and using (8) to replace firm rent yields

$$\hat{\pi} = \hat{m} - \frac{w}{y - w} \cdot \hat{w} = -\eta \cdot \hat{\theta} - \frac{\gamma}{\Omega} \cdot \left(\hat{b} + \hat{t}\right). \tag{12}$$

If producing abroad becomes more profitable relative to production at home, more firms will choose outbound FDI. To illustrate the consequences of globalization for the welfare state, we allow for an exogenous increase in profits π_f from foreign production. Obviously, improved prospects of accessing cheap labor or locating near large foreign markets leads firms to opt for FDI more frequently. Linearizing (3) shows how the identity of the pivotal firm changes,

$$\hat{q} = \frac{(1-\tau)\,\pi}{\Delta\pi} \cdot (\hat{\pi} - \hat{\tau}) - \frac{\pi_f}{\Delta\pi} \cdot \hat{\pi}_f. \tag{13}$$

The expected value π_e of a new firm depends importantly on selection effects, as reflected in the probabilities s. From (4),

$$\hat{s} = \frac{q^2 g\,(q)}{s} \cdot \hat{q}, \quad \hat{s}_f = -\frac{s}{s_f} \cdot \hat{s}. \tag{14}$$

The impact of a change in q on expected profit π_e is zero to the first order which reflects the discrete choice condition (3), i.e. $d\pi_e/dq = \{[(1-\tau)\,\pi - \pi_f]\,q + i\}\,g\,(q) = 0$. The scarcety of the managerial resource implies diminishing returns and makes entry less than perfectly elastic. The free entry condition (5) thus changes by

$$\hat{\pi}_e = \frac{s\,(1-\tau)\,\pi}{\pi_e} \cdot (\hat{\pi} - \hat{\tau}) + \frac{s_f \pi_f}{\pi_e} \cdot \hat{\pi}_f = \sigma \cdot \hat{N}, \quad \sigma \equiv \frac{r' \cdot N}{1+r}. \tag{15}$$

The case $r' = \sigma = 0$ reflects perfectly elastic entry where the entry cost $1 + r$ remains fixed. A high value of σ, in contrast, means inelastic entry (strongly decreasing returns).

3.2 Unemployment and Taxes

Labor Market: Labor market tightness depends on the number of locally built plants, $\hat{\theta} = \hat{s} + \hat{N}$, where $\hat{s}$ reflects location choice. Substituting (13-15) and rearranging yields

$$\hat{\theta} = \mu \cdot (\hat{\pi} - \hat{\tau}) + \mu_f \cdot \hat{\pi}_f, \tag{16}$$

with elasticities defined as

$$\mu \equiv \frac{s\,(1-\tau)\,\pi}{\sigma \pi_e} + \frac{q^2 g\,(q)}{s} \frac{(1-\tau)\,\pi}{\Delta\pi} > 0, \quad \mu_f \equiv \frac{s_f \pi_f}{\sigma \pi_e} - \frac{q^2 g\,(q)}{s} \frac{\pi_f}{\Delta\pi}.$$

These elasticities capture the level effect from free entry (the strength depends on σ) and the selection effect from location choice (the strength depends on $q^2 g(q)/s$). For example, local production becoming more profitable not only encourages overall entry investment but also leads firms to establish a larger share of plants at home. An increase in foreign profits also boosts the overall expected return to investment and attracts entry but, on the other hand, leads firms to locate more often abroad, making the overall effect on θ ambiguous. Obviously, the level effect dominates if entry is sufficiently elastic (σ is small, entry cost increases little with N), implying $\mu_f > 0$. An increase in foreign profits would strongly encourage business creation and thereby lead to a larger number of local plants even if the share of local plants in all investments declines.

Via entry and location choice, higher profits lead to a tighter labor market. On the other hand, a tighter market makes hiring more expensive and depresses profitability which works in the opposite direction. To obtain the equilibrium adjustment of labor market tightness, we substitute (12) and rearrange,

$$(1+\mu\eta)\cdot\hat{\theta} = -(\mu\gamma/\Omega)\cdot\left(\hat{t}+\hat{b}\right) - \mu\cdot\hat{\tau} + \mu_f\cdot\hat{\pi}_f. \tag{17}$$

In raising wages, welfare policy not only reduces profits and entry but also boosts outbound FDI. Market tightness falls. The labor market locus is negatively sloped.

Fiscal Balance: To analyze the public budget, consider first the adjustment of the corporate tax base. Noting $\theta = lsN$, we have from (12)

$$\widehat{\pi sN} = \hat{\pi} + \hat{\theta} = (1-\eta)\cdot\hat{\theta} - \frac{\gamma}{\Omega}\cdot\left(\hat{b}+\hat{t}\right). \tag{18}$$

Fiscal balance in (9) requires $(1-e)\,w\hat{b} = ew\hat{t} + t^* ew\hat{e} + (1-\tau)\,\pi sN\hat{\tau} + \tau\pi sN\widehat{\pi sN}$. Substituting from above, dividing by ew and using $\pi sN = (y-w)\,e$ together with (8) as well as $\hat{e} = (1-\eta)\,\hat{\theta}$ yields

$$\begin{aligned}[1-(1-\gamma)\tau]\cdot\hat{t} \;=\; & -\left[t^* + \tau\tfrac{1-\gamma}{\gamma}\Omega\right](1-\eta)\cdot\hat{\theta} \\ & + \left[\tfrac{1-e}{e} + (1-\gamma)\tau\right]\cdot\hat{b} - (1-\tau)\tfrac{1-\gamma}{\gamma}\Omega\cdot\hat{\tau}.\end{aligned} \tag{19}$$

A tighter labor market is associated with higher employment and improves the fiscal stance, allowing for a lower wage tax. The fiscal gain is proportional to the participation tax rate t^*. On the other hand, a tighter labor market also reflects more entry, i.e. a larger number of firms and corporate tax payers, which further allows to reduce the wage tax. Higher benefits directly raise social spending. In addition, benefits also inflate wage claims and thereby reduce profits and firm entry which erodes the corporate tax base. For both reasons, a higher wage tax is required.

Equilibrium: The linearized fiscal constraint in (19) and the labor market free entry condition (17) form a simultaneous system in θ, t. In particular, the labor market locus must be steeper to satisfy the stability condition.[7] Hence, the determinant of the system, written in matrix form, must be positive,

$$\nabla \equiv 1 + \mu\eta - t^* (1-\eta) \mu\gamma/\Omega - \tau (1-\gamma)(1+\mu) > 0. \tag{20}$$

In fact, the determinant is guaranteed to be positive if taxes are small, leaving $\nabla = 1+\mu\eta$. The solution for the equilibrium adjustment in market tightness and the wage tax is

$$\begin{aligned}
\hat{\theta} &= \frac{1-\tau(1-\gamma)}{\nabla}\mu_f \cdot \hat{\pi}_f - \frac{\gamma\mu}{\nabla} \cdot \hat{\tau} - \frac{\mu}{\nabla e}\frac{\gamma}{\Omega} \cdot \hat{b}, \\
\hat{t} &= -\left[t^* + \tau\Omega(1-\gamma)/\gamma\right](1-\eta)\frac{\mu_f}{\nabla} \cdot \hat{\pi}_f \\
&: \quad -\left[\left[1+\mu\eta-\tau(1+\mu)\right]\frac{1-\gamma}{\gamma}\Omega - t^*(1-\eta)\mu\right]\frac{1}{\nabla} \cdot \hat{\tau} \\
&: \quad +\left[(1+\mu\eta)\frac{1-e}{e} + t^*(1-\eta)\mu\frac{\gamma}{\Omega} + \tau(1-\gamma)(1+\mu)\right]\frac{1}{\nabla} \cdot \hat{b}.
\end{aligned} \tag{21}$$

From now on, with the exception of section 3.3, we focus on national policy and suppress the changes in foreign profits π_f. The equilibrium impact on labor market tightness and the wage tax pin down all other variables. In particular, we are interested how firm entry, national investment and FDI respond to public policy. Given constant foreign profits, entry in (15) is driven by changing domestic profits net of corporate tax,

[7] Both conditions are downward sloping in θ, t-space. A graphical argument shows that stability requires the fiscal constraint to be flatter than the labor market locus which is equivalent to $\nabla > 0$ below.

$\hat{\pi} - \hat{\tau}$. Combining (13-14) shows that the same holds for the composition of investment, s and s_f:

$$\hat{N} = \frac{s\,(1-\tau)\,\pi}{\sigma \pi_e} \cdot (\hat{\pi} - \hat{\tau})\,, \quad \hat{s} = \frac{q^2 g\,(q)}{s} \frac{(1-\tau)\,\pi}{\Delta \pi} \cdot (\hat{\pi} - \hat{\tau})\,. \tag{22}$$

In the present model, the level of national investment is equal to labor market tightness, $\theta = lsN$, which is related in (16) to net of tax profit at home, $\hat{\pi} - \hat{\tau} = \hat{\theta}/\mu$. The equilibrium solution in (21) therefore directly reveals how the impact on national investment reflects firm entry and location choice. The same holds for the level of FDI which we denote by $F = s_f N$. Noting $\hat{s}_f = -\,(s/s_f)\,\hat{s}$, we find from (22)

$$\hat{F} = \hat{s}_f + \hat{N} = \left[\frac{(1-\tau)\,\pi s}{\sigma \pi_e} - \frac{q^2 g\,(q)}{s_f} \frac{(1-\tau)\,\pi}{\Delta \pi} \right] \cdot (\hat{\pi} - \hat{\tau})\,. \tag{23}$$

3.3 Globalization

Firms are able to better exploit business opportunities abroad and earn larger profits from foreign operations when the world economy becomes increasingly integrated. In our simple model, we may thus interpret the impact of globalization as in increase in π_f. The immediate effect illustrated in Figure 1 is that a larger share of firms invests abroad rather than at home. However, outbound FDI might not come at the expense of domestic employment. More profitable foreign operations strengthen firm creation and entry which boosts investment both at home and abroad. The elasticity μ_f in (16) shows that globalization involves a positive level effect on domestic employment but a negative selection effect. If entry responds very elastically to higher expected profits π_e, i.e. if σ is low, then the level effect clearly dominates ($\mu_f > 0$), leaving a positive impact on employment. Globalization boosts job creation and reduces unemployment.

Tax revenues grow on two margins. Since firms create – on net – a larger number of plants at home, the corporate tax base expands, raising tax revenues. Possibly even more important, higher employment results in a twofold fiscal gain since the number of tax payers rises while the number of welfare recipients shrinks. Hence, tax revenues grow in proportion to the participation tax t^*. Given an improved fiscal stance, the government is

able to cut the wage tax which reinforces the positive effects. The lower tax reduces wage demands, strengthens domestic profits, thereby partly reverses the trend to outbound FDI and further boosts employment. In equilibrium, the wage tax falls and market tightness rises. Despite of a declining gross wage, the net of tax wage grows due to a lower tax, $\hat{w} - \hat{t} = -\gamma\hat{t}$ by (11). If entry and thereby job creation are elastic, domestic workers unambiguously gain in two ways. They not only reveive higher take home salaries, they also benefit from a higher employment rate. By (A.3) in the Appendix, welfare of domestic workers rises. However, if entry is inelastic (σ high, making μ_f negative), the results are reversed and globalization harms domestic workers.

Proposition 1 ***(Globalization)*** *When entry is elastic, domestic employment rises, the wage tax can be reduced, and domestic workers gain in welfare. These results are reversed when entry is inelastic.*

4 Public Policy

4.1 Welfare State Reform

Expanding social spending financed with a wage tax raises unemployment and forces the government to strongly raise taxes to finance benefit entitlements ($\hat{b} > 0$ in 21). The transmission mechanism is well understood from section 3.1. More generous benefits strengthen the workers' fall back position. Further, the wage tax gets partly shifted to employers as well. For these reasons, social protection inflates firms' wage costs and reduces profits from domestic activity. The expected return on business creation declines. Not only is total investment reduced, a larger part of it is shifted to foreign locations. National employment falls which is reflected in a lower labor market tightness. The total level of FDI, however, is ambiguous since the selection effect favors and the entry effect subtracts from FDI.

The general equilibrium feedback reinforces this negative trend. As unemployment picks up and more tax payers turn into welfare recipients, the government suffers a double loss. It must spend more on social benefits and, at the same time, collects less wage tax revenue. The fiscal stance deteriorates in proportion to the participation tax t^*. Furthermore, when investment declines and a larger part of it is allocated to foreign locations, both the level and selection effects work to erode the national corporate tax base. The government must thus raise the wage tax even more to balance the budget. In the end, unemployment is up and the business sector not only scales down total investment but increasingly opts for outbound FDI.

On the positive side, workers enjoy better protection against job losses when benefits are more generous. Providing insurance to risk-averse individuals in the face of uninsurable labor income risk and missing private markets is a fundamental reason for the existence of the welfare state. At least a small level of social insurance is welfare increasing. Setting all taxes to zero in the initial equilibrium and introducing a small social insurance scheme raises the wage tax in (21) by $\hat{t} = \frac{1-e}{e} \cdot \hat{b}$, where $\nabla = 1 + \mu\eta$ in this case. Substituting this into the welfare effect noted in (A.2) yields

$$\hat{V}_L = \left[(1-e)\,\chi\rho + \frac{\eta^* - \gamma}{\eta^*} \right] \frac{1}{e} \cdot \hat{b}, \quad 1 > \eta^* \equiv \frac{1+\mu\eta}{1+\mu} > \eta. \tag{24}$$

The first term reflects the gains from insurance where ρ is the degree of relative risk-aversion, χ measures the income gap between work and unemployment, and $1-e$ is the unemployment rate and measures income risk. The gains from insurance arise because of missing markets. In addition, workers might gain or loose from redistributional effects. Wage bargaining boosts the gross wage and thereby shifts taxes and unemployment benefits to firms. A higher wage clearly benefits workers and reduces the job rent of firms. Welfare policy thus harms investors, see (A.4) which is negative since tightness declines. Equation (A.6) shows that the redistribution exactly cancels in the aggregate if the so-called 'Hosios condition' $\gamma = \eta$ is fulfilled. In general, the unemployment rate in a search labor market could be too high or too low, compared to the socially optimal rate because the bargaining power of workers and firms is not aligned with their relative effectiveness

in job search (Hosios, 1990). If the bargaining power satisfies the Hosios condition, the equilibrium unemployment rate is not distorted. In this case, workers get a share γ of the joint surplus from job creation. This share exactly corresponds to their effectiveness in creating the surplus which is measured by the elasticity η of the matching function. Intuitively, workers get only a share of the joint surplus but also contribute only the same share to the creation of it. The labor market is efficient, and the welfare gains purely reflect the gains from insurance. Hence, in (A.6), the excess burden of welfare policy is zero, $\Gamma = \gamma - \eta = 0$ in the absence of government.

In the benchmark case of $\gamma = \eta$, workers gain in proportion to $\eta^* - \eta > 0$ in (24) which just matches the corresponding loss of investors, so that redistribution cancels in the aggregate, leaving $\Gamma = 0$ in (A.6). However, if workers are weak ($\Gamma = \gamma - \eta < 0$), corresponding to an equilibrium with an inefficiently low unemployment rate, the total welfare gains from introducing unemployment insurance in (A.6) would become larger than the pure gains from insurance. The policy would indirectly strengthen workers' bargaining power via their fall back position in wage negotiations and bring the overly low unemployment rate closer to the efficient level. However, in an economy with a strong bargaining position of workers ($\Gamma > 0$) and an overly high unemployment rate, the welfare gains from insurance are partly offset by the welfare losses from reduced efficiency of the search equilibrium.

In considering the optimal size of welfare policy, one must evaluate the consequences for the entire population of workers and investors. Hence, an optimal unemployment insurance scheme must be based on (A.6) rather than (24). When labor market distortions are not too large ($\gamma = \eta$), social spending should be expanded until the gains from insurance are offset by the increasing excess burden from tax financing. It is now important to evaluate the comparative static effects in the presence of positive tax rates, giving rise to tax base effects. Substituting again the equilibrium tax rate into the total welfare effect, and keeping τ constant, eventually yields (see A.6)

$$\hat{V} = \left[(1-e)\,\chi\rho - \Gamma\right] \cdot \hat{b}, \quad \Gamma \equiv \left[t^* \cdot (1-\eta)\,\frac{\gamma}{\Omega} + \tau \cdot (1-\gamma) + (\gamma - \eta)\right] \frac{\mu}{\nabla}. \qquad (25)$$

Optimal policy must balance the gains from insurance with the excess burden of welfare state financing, $(1-e)\,\chi\rho = \Gamma$. The excess burden shows up not only in the welfare system (proportional to the participation tax t^*) but also in the corporate tax (proportional to the rate τ). Since social insurance pushes up wages, it erodes profit per domestic firm, the number of firms located at home (reduced entry and a shift towards FDI both reduce national investment) and thereby erodes corporate tax revenue. The excess burden is augmented or reduced by the last term in Γ, reflecting the potential labor market distortions from search externalities.

Proposition 2 ***(Welfare State)*** *Expanding the welfare state boosts wages, cuts profits and reduces national investment and job creation due to reduced entry and a shift towards FDI. Unemployment rises. If the labor market is close to efficient ($\gamma = \eta$), a small insurance scheme creates first order gains from insurance. The scheme is optimally expanded until the gains from insurance are offset by the excess burden of welfare state financing.*

4.2 Corporate Taxation

For given gross profits which do not directly depend on the corporate tax, the immediate impact of the tax is to reduce net profits from local production which leads firms to shift towards FDI. Figure 1 illustrates by rotating down the line $q' \cdot (1-\tau)\,\pi$. A lower net profit from local production also reduces expected profit π_e and, thereby, reduces firm entry. Both the selection effect towards FDI and the reduced entry diminish local job creation, leading to more unemployment. In equilibrium, labor market tightness unambiguously declines. In consequence, as stated in (22), both firm entry and the share of local investments fall. In constrast, the level of outbound FDI in (23) remains inherently ambiguous, reflecting a negative entry and a positive selection effect.

While an increase in the corporate tax rate definitely raises corporate tax revenue, the total impact on the fiscal stance is less clear when the government must also levy wage taxes to finance social spending. For each worker ending up unemployed, the government

looses net tax revenue (net of social spending) in proportion to the participation tax t^*. While the corporate tax raises more corporate tax revenue (as long as the term $1+\mu\eta-\tau\left(1+\mu\right)$ in (21) is positive which is the case if the tax rate is not too large), it also triggers substantial fiscal losses in wage tax revenue and inflates welfare spending. For this reason, the total impact of a higher corporate tax on the fiscal stance is ambiguous a priori. If the net effect is to improve the fiscal stance, the wage tax may be cut which leads to wage concession, thereby strengthens profits, and partly reverses the negative direct effects on national investment. However, if the fiscal stance deteriorates, the feedback effect magnifies the negative consequences of a higher corporate tax.

Proposition 3 ***(Corporate Tax)*** *The corporate tax reduces net of tax profit from domestic plants, impairs firm entry and leads to a relocation of investment towards foreign destinations. Unemployment rises due to a strong decline in national investment and job creation. The total fiscal stance may improve or deteriorate, leading to an ambiguous adjustment in the wage tax.*

Both corporate taxation and unemployment insurance add to unemployment. To compare the relative impact of the two policies on the unemployment rate, we now combine them in a way that is just offsetting. We ask the following question: if we raise the corporation tax by $\hat{\tau}$ percent, by how much do we need to reduce benefits to prevent an increase in unemployment? Since employment is proportional to market tightness, we can combine the policy changes in (21) in a way that keeps θ and, thus, the unemployment rate constant. Using $\Omega\equiv1-t^*-h/w$ yields

$$\hat{b}=-\left(1-t^*-h/w\right)e\cdot\hat{\tau}\quad\Rightarrow\quad\hat{e}=\left(1-\eta\right)\cdot\hat{\theta}=0. \tag{26}$$

Although the model is surely too stylized to give a reliable evaluation of the issue, it does point to an important trade-off. Taking the model literally, one can calibrate the employment rate and participation tax rate to attain realistic values. Suppose $\tau=0$ initially, then the budget $et=\left(1-e\right)b$ implies $et^*=b/w$. If unemployment is at 10%

($e = 9/10$) and the replacement rate is 1/2, then a participation tax of $t^* = b/(we) = 5/9$ is required, around 56%. If the monetary valuation of leisure during unemployment were zero ($h = 0$), then $(1 - t^*)\, e = 2/5$. If we introduced a corporation tax with a rate of 10% ($\hat{\tau} = d\tau = 1/10$), then one would need according to (26) to cut the replacement rate by $\hat{b} = db/w = -2/50$ or 4 percentage points, from 50% to 46%, to offset the impact of the corporation tax. While there is always a trade-off between a higher corporate tax and larger benefits, the magnitude of this trade-off is reduced if leisure value during unemployment were positive.[8]

Proposition 4 ***(Relative Impact on Unemployment)*** *Raising the corporate tax by $\hat{\tau}$ percent and benefits by $\hat{b} = (1 - t^* - h/w)\, e \cdot \hat{\tau}$ percent have the same effect on the unemployment rate.*

While it is recognized that the average corporate tax rate significantly affects FDI, the potential of the welfare state to influence FDI flows was not investigated to the same extent. How does the corporation tax compare with the welfare state to influence FDI? FDI reflects both a level (entry) and a composition effect. Equation (23) shows that these two effects tend to offset each other so that national policy in general has an ambiguous impact on outbound FDI. FDI adjusts in proportion to net of tax profit at home which changes in line with labor market tightness, $\hat{\pi} - \hat{\tau} = \hat{\theta}/\mu$ in (16). If firm entry is very elastic ($\sigma \to 0$), the entry effect clearly dominates and FDI increases whenever firms earn larger net of tax profit from home operations. If entry is inelastic (σ large), the selection effect dominates and FDI declines in response to the same shock. Whatever the sign of the net effect, the same policy combination that keeps θ and, thus, domestic unemployment constant, also keeps net of tax profits and outbound FDI in (23) constant.

Proposition 5 ***(Relative Impact on FDI)*** *Raising the corporate tax by $\hat{\tau}$ percent and benefits by $\hat{b} = (1 - t^* - h/w)\, e \cdot \hat{\tau}$ percent have the same effect on outbound FDI.*

[8] On the other hand, unemployed workers might suffer from social stigma which might be associated with a negative value of h.

Given missing insurance markets, the government should always protect workers and establish a welfare state. Hence, the corporation tax should be evaluated in the presence of other taxes and spending. We now investigate the ambiguity noted in Proposition 3 and clarify the conditions under which a higher corporate tax is indeed able to improve the fiscal stance. Evaluating (21) and using the definition of η^* in (24), leading to $(1-\eta^*)/\eta^* = (1-\eta)\mu/(1+\mu\eta)$, yields

$$\hat{t} = \left[\frac{t^*}{\Omega} - (1-\tau/\eta^*)\frac{\eta^*}{1-\eta^*}\frac{1-\gamma}{\gamma}\right]\frac{\Omega(1-\eta)\mu}{\nabla}\cdot\hat{\tau}. \tag{27}$$

Inserting the definition of $\Omega = 1 - t^* - h/w$ gives the following result:

Proposition 6 ***(Corporation Tax and Fiscal Stance)*** *Introducing a small corporate tax deteriorates the fiscal stance if the participation tax rate is large,*

$$t^* > (1-h/w)\frac{(1-\tau/\eta^*)\alpha}{1+(1-\tau/\eta^*)\alpha}, \quad \alpha \equiv \frac{\eta^*}{1-\eta^*}\frac{1-\gamma}{\gamma}. \tag{28}$$

Suppose that workers are endowed with high bargaining power such that $\gamma = \eta^* > \eta$, and the unemployment rate is inefficiently high. Then $\alpha = 1$ holds. Further assume that $\tau = 0$ and the value of home production h which raises reservation wages beyond the influence of fiscal variables, is zero as well. In this case, a small corporate tax reduces the fiscal stance if the participation tax rate is larger than a half ($t^* > 1/2$). Immervoll et al. (2007) show that participation tax rates are rather high and larger than 50% in most European countries with a large welfare state.[9] The condition could thus easily be fulfilled in a country with high unemployment, meaning that an increase in the tax rate, although raising more corporation tax, could potentially worsen the total fiscal stance. The upshot is that one must take into account the wage tax revenue and social spending if one wants to evaluate the corporation tax in the welfare state. Given that the largest part of tax revenue in many countries is collected from wage income, and the largest part of public spending is for social purposes, the result could be important.

[9] The preceding section identifies the economic parameters that call for a large or small welfare state.

The condition is even more likely to be fulfilled if the value of home production or the money equivalent value of leisure (see Blanchard and Tirole, 2008) is positive, and if the corporate tax rate is positive. Home production inflates reservation wages beyond the influence of the wage tax and unemployment benefits. The resulting wage demands squeeze profits from domestic production and thereby impair national investment and job creation, resulting in a high unemployment rate. A further increase in unemployment due to a rise in the corporate tax would be particularly costly in terms of net tax revenue (wage tax minus social spending). Finally, the condition is more likely to hold when the bargaining power of workers and, therefore, unemployment is inefficiently high. With unemployment approaching the efficient level on account of a lower bargaining power ($\gamma \to \eta$), the condition is somewhat less likely to be fulfilled, i.e. the threshold rate of the participation tax rises.

An important issue is whether the corporate tax should be used at all to contribute to welfare state financing when participation tax rates are high and labor market distortions are potentially large. One might conclude that a small corporate tax could be welfare increasing since its revenue can be used to cut the typically large participation tax. Given the results on the fiscal stance, it seems unlikely, although not impossible, that the corporate tax could play a useful role in the welfare state. First note, that on pure efficiency grounds, a corporate tax should never be used, since $\hat{V} = -\Gamma\Omega e \cdot \hat{\tau}$ in (A.6). Since a preexisting welfare state to insure workers implies $\Gamma > 0$, even a small corporate tax rate unambiguously reduces aggregate welfare. Looking at distributional effects, investors always loose from the tax, $\hat{V}_E < 0$ in (A.4) since the tax reduces market tightness. Using the corporate tax to complement the wage tax could then only be justified on distributional grounds if it raises worker welfare. Evaluating (A.2) at $\tau = 0$ and substituting the solution of the wage tax rate in (21) yields

$$\hat{V}_L = \frac{[1 - \gamma + (\eta - \gamma)\,\mu]\,\Omega - t^* \cdot (1 - \eta)\,\mu\gamma}{\nabla} e \cdot \hat{\tau}. \tag{29}$$

If bargaining power is high such that $\gamma = \eta^* > \eta$, the coefficient of Ω becomes zero, $1 - \gamma + (\eta - \gamma)\,\mu = 0$, leaving a negative welfare effect on workers. If workers are also

very risk-averse, the scale of the insurance scheme should be large, leading to a high participation tax t^*. Hence, if workers' bargaining power is strong, the introduction of even a small corporate tax would be a Pareto inferior policy change. So the corporate tax should not be used to contribute to welfare state financing, even if the participation tax is very high, pointing to a high tax distortion in wage taxation. But *because* the participation tax is high, the corporate tax also involves a very high excess burden which is seen not in the erosion of the corporate tax base but elsewhere in the system. It destroys jobs and thereby causes large fiscal losses due to lower wage tax revenue and inflated social spending. For this reason, the corporate tax involves a high excess burden even if its rate is small or zero.

A case for a positive corporate tax rate can be constructed if the workers' bargaining power is very weak, making the first term in the numerator positive while the coefficient of t^* is reduced in size. Under these conditions, the unemployment rate is inefficiently low and the labor market distortion, as measured by the gap $\eta - \gamma$, is relatively large. A low unemployment rate also means that little labor income risk is to be insured. If, in addition, the workers' risk-aversion is small, there is little demand for social insurance. In consequence, the benefit level, the wage tax and, thus, the participation tax rate are small. The welfare state reduces entry and national job creation and thereby relaxes market tightness, as is required in an equilibrium with $\eta > \gamma$. However, when the optimal size of the welfare state is relatively small, it might not be enough to offset the labor market distortion. For efficiency reasons alone, see (A.6), the government could then additionally levy a corporate tax to relax the labor market and restore an efficient unemployment rate. The gains accrue to workers while investors always loose. This scenario would then justify a positive corporate tax under a sufficiently high redistribution objective.

Proposition 7 ***(Corporate Tax and Welfare)*** *If the unemployment rate is inefficiently high, even a small corporate tax yields Pareto inferior welfare changes. A positive tax rate could possibly be rationalized under strong redistributional objectives when the unemployment rate is inefficiently low and there is little demand for social insurance.*

The case for levying a corporate tax seems rather weak. It is not even sure that it helps to improve the fiscal stance when the government needs to operate a large welfare state to provide social insurance. The increase in corporate tax revenue might be smaller than the fiscal losses that result from inflated social spending and declining wage taxes. From a welfare theoretic point of view, a corporate tax could possibly be rationalized in an economy with little demand for social insurance due to low risk-aversion and an excessively low unemployment rate resulting from an overly strong bargaining position of firms. The role of the corporate tax is then to reduce excessive job creation, and not so much in generating revenue to reduce other distorting taxes. The case for using the corporate tax is further advanced when there is a strong desire to redistribute from investors with financial wealth to workers subject to wage income risk. It might be doubted that this potential function of the corporate tax is particularly relevant in reality. In any case, the condition is unlikely to be fulfilled when risk aversion and the demand for insurance are large so that the government willingly accepts a high participation tax rate. Using the corporate tax will then even harm the workers.

5 Conclusions

A major problem of the welfare state is the delocation of investment and the resulting loss of jobs. The purpose of the paper was to compare the consequences for employment and outbound FDI of corporate and labor taxes in the welfare state. The main results are that these policies are largely equivalent in their impact on unemployment and FDI. Based on an admittedly overly stylized back of the envelope calculation, we found that an increase in the corporate tax by 10 percentage points might have the same impact on unemployment and FDI than an increase in the replacement rate of unemployment insurance by 4 percentage points. Another result is that the corporate tax, while raising corporate tax revenue, could easily worsen a country's overall fiscal stance. By raising unemployment, it inflates social spending and erodes wage tax revenue. The excess burden of the corporate tax is therefore only to a minor extent due to the erosion of the corporate

tax base but rather lies in the inflated cost of the welfare state. Even if it does raise enough revenue to improve the overall fiscal stance, the case for using the corporate tax in an advanced welfare state seems weak. Based on an explicit welfare analysis, we found that the corporate tax could play a useful role only if social insurance is optimally kept at a small scale, e.g. because of small risk-aversion, if the labor market is distorted towards excessive job creation, and if there is a strong desire to redistribute from investors to workers. One might conclude that these conditions are hardly fulfilled in European economies with high structural unemployment rates and a large welfare state.

Appendix: Welfare Analysis

Workers: Expected utility changes by $dV_L = (u_E - u_B)\, de + eu'_E\,(dw - dt) + (1-e)\, u'_B db$. Divide by w and use the Taylor approximations noted in (1). Note the definition of the participation tax t^* and substitute wage adjustment $\hat{w} = (1-\gamma)\left(\hat{b} + \hat{t}\right)$ to get the welfare change. In dividing by u'_E, we express the welfare change in income equivalent units. Dividing by w, we express it in percent of an employed worker's salary,

$$\hat{V}_L \equiv \frac{dV_L}{wu'_E} = \Omega e \cdot \hat{e} + (1-\gamma)\, e \cdot \hat{b} - \gamma e \cdot \hat{t} + \frac{1-e}{e}\frac{u'_B}{u'_E} e \cdot \hat{b}. \tag{A.1}$$

The term $\frac{1-e}{e}\frac{u'_B}{u'_E}$ is the marginal rate of substitution of income between good and bad states. Use $u'_B/u'_E = 1 + \chi\rho$ and replace $\hat{e} = (1-\eta)\,\hat{\theta}$ from the labor market locus (17),

$$\hat{V}_L = \left[(1-e)\,\chi\rho + 1 - \frac{\gamma}{\eta^*} e\right] \hat{b} - \frac{\Omega\,(1-\eta)\,\mu}{1+\mu\eta} e\hat{\tau} - \frac{\gamma}{\eta^*} e\hat{t} + \frac{\Omega\,(1-\eta)\,\mu_f}{1+\mu\eta} e\hat{\pi}_f, \tag{A.2}$$

where $\eta^* \equiv \frac{1+\mu\eta}{1+\mu} < 1$ is defined in (24).

To see how globalization affects worker welfare, substitute the equilibrium solution of the wage tax in (21). For example, if entry is elastic and $\mu_f > 0$, globalization allows to cut the wage tax so that welfare of domestic workers rises (Proposition 1),

$$\hat{V}_L = \Omega \frac{1-\eta}{1+\mu\eta} \mu_f e \cdot \hat{\pi}_f - \frac{\gamma}{\eta^*} e \cdot \hat{t} \gtrless 0 \quad \Leftrightarrow \quad \mu_f \gtrless 0. \tag{A.3}$$

Investors: Entrepreneurs receive profit income. Since inframarginal firms yield a strictly positive surplus, welfare of investors changes as well. Utility is $v_e = \pi_e - r(n)$ for type $n \leqslant N$ and $v_e = 1$ else, giving $V_E = 1 - N + \pi_e N - R(N)$, where $R(N) = \int_0^N r(n)\, dn$. Since the surplus of the marginal investor is zero due to free entry, more entry doesn't marginally change welfare, ceteris paribus, $dV_E/dN = \pi_e - 1 - r = 0$. However, profits of inframarginal firms are affected in equilibrium, and these changes are related to entry by $\pi_e = 1 + r(N)$, yielding $\hat{\pi}_e = \sigma \hat{N}$. The income equivalent welfare change of investors is, thus, in percent of wage income, $\hat{V}_E \equiv dV_E/w = (\pi_e N/w)\, \hat{\pi}_e = (\pi_e N/w)\, \sigma \hat{N}$. Entry is given in (22), and (16) shows how entry and investor welfare change with market tightness. Since the following analysis is concerned with public policy only, we set $\hat{\pi}_f = 0$. Use $\pi s N = (y - w)\, e$ as well as (8) in the first term to get

$$\hat{V}_E = (1 - \tau) \frac{1 - \gamma}{\gamma} \frac{\Omega}{\mu} e \cdot \hat{\theta}. \tag{A.4}$$

Aggregate Welfare: The total welfare effect adds the income equivalent welfare changes of risk-averse workers and risk-neutral investors, $dV = dV_L/u'_E + dV_E$, or $\hat{V} \equiv \hat{V}_L + \hat{V}_E$, if expressing it in percent of wage income. Adding up (A.2) and (A.4) yields ($\hat{\pi}_f$ is no longer needed and omitted),

$$\hat{V} = \left[(1 - e)\, \chi \rho + 1 - \frac{\gamma e}{\eta^*} \right] \hat{b} - \frac{\Omega (1 - \eta)\, \mu e}{1 + \mu \eta} \hat{\tau} - \frac{\gamma}{\eta^*} e \hat{t} + (1 - \tau) \frac{1 - \gamma}{\gamma} \frac{\Omega e}{\mu} \hat{\theta}. \tag{A.5}$$

The final form obtains by substituting the equilibrium solutions in (21). Using the determinant in (20) and η^* in (24), yields, after some tedious rearrangements,

$$\begin{aligned} \hat{V} &= [(1 - e)\, \chi \rho - \Gamma] \cdot \hat{b} - \Gamma \Omega e \cdot \hat{\tau}, \\ \Gamma &\equiv \left[(\gamma - \eta) + t^* (1 - \eta) \frac{\gamma}{\Omega} + \tau (1 - \gamma) \right] \frac{\mu}{\nabla}. \end{aligned} \tag{A.6}$$

The coefficient Γ is a measure of the excess burden, and is zero in the absence of government and other market distortions ($\gamma = \eta$ and $t = b = \tau = 0$).

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