Expansionary Effects of the Welfare State in a Small Open Economy

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Abstract

We examine the role of economy-wide increasing returns to scale in shaping the relationship between welfare state policies and economic performance in a small open economy with free trade in final goods and international capital mobility. Contrary to the conventional wisdom, we find that a retrenchment of welfare programmes is not an inevitable consequence of economic integration. Instead, by improving the exploitation of aggregate scale economies, social insurance policies and international openness complement each other in facilitating the provision of a more generous welfare protection.

Keywords: welfare state; circular causation; international trade; capital mobility

JEL Classification: E6, F1, F4, H3, J5

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1. Introduction

The aim of this paper is to shed light on the contentious question of the compatibility between welfare state and globalisation which, despite its colossal policy importance, is still fairly unexplored at the theoretical level. In the last two decades, welfare state policies have come increasingly under attack by an emerging consensus that sees them as being inimical to economic growth and incompatible with successful participation in a highly integrated world economy. Two major arguments characterise this conventional wisdom: (i) the distortionary effects of redistribution policies and the taxation necessary to finance them translate into high firms' costs – this is the argument developed, for instance, by Alesina and Perotti (1997); and (ii) the revenue raising capacity of governments is hindered by increasing economic integration, thus making it more difficult for governments to finance these policies. From a normative point of view, the main implication of this view is the inevitability of welfare state retrenchment. However, despite the rhetorical calls for change (which have not been limited to centre-right governments), there is very little evidence that the increased extent of goods and capital market integration during the last few decades has contributed systematically to the rolling back of mature welfare states, and reforms have generally been limited to a restructuring of expenditure.[1]

In this paper we develop a theoretical model which shows that international openness does not inevitably reduce the revenue raising ability of governments; instead, openness can complement welfare state policies in improving economic performance and enhancing welfare. At the core of our argument lie the imperfectly competitive nature of markets and the fact that in a second best world economic policy can correct the effects of market imperfections.[2] Within a model characterised by imperfect competition in the labour market (in the form of unionisation) and in good markets (with a monopolistically competitive intermediate sector), we show that social security programmes can lead to higher levels of

[1] Despite wide cross-country variations in spending levels, social expenditure in OECD countries, with the exception of Norway, has increased up to the mid-1990s and whilst some areas of social protection have modestly declined, others have enjoyed stability or even a slow growth (European Commission, 2002).

[2] The macroeconomics literature has devoted comparatively little attention to welfare states and redistribution policies and has mostly shown how conventional tax-and-spend policies can reduce inefficiencies stemming from market imperfections – e.g., Devereux *et al.* (2000). Amongst the exceptions, van der Ploeg (2003) examines the effects of social policy on employment and growth and shows that conditional unemployment benefits may spur job creation.

economic efficiency by improving the exploitation of potential aggregate scale economies.[3] This channel is particularly relevant in mature industrial countries where unprecedented depths of the division of labour have resulted in highly complex economic systems and production externalities. We argue that the acknowledgment of these externalities – whose effects on the economy may not be easily predictable – is essential for any meaningful debate about the sustainability of welfare state programmes. Our findings challenge the view that free trade and capital mobility undermine governments' ability to pursue income redistribution. We show that, by enhancing the exploitation of aggregate scale economies, a more generous welfare state increases overall welfare regardless of the tax instrument used to finance the policy, even when the policy is financed through an increase in capital taxation that may initially stimulate a capital outflow. The rest of the paper is organised as follows. Section 2 outlines the model, Section 3 describes the general equilibrium and carries out the policy analysis, and Section 4 draws some conclusions.

2. The Model

We focus on a small open industrial country characterised by free international trade and capital mobility, and a government that uses distortionary taxation to pursue redistributive policies. The small-open-economy assumption is especially interesting because international economic integration is commonly purported as reducing the economic size of countries, their monopoly power in world markets, and their governments' ability to retain control over national policies.

To portray a typical advanced industrial economy, we assume that labour markets are unionised and that the production structure is characterised by inter-sectoral linkages that give rise to aggregate economies of scale. It is now widely accepted that a typical implication of industrial development is the increasing complexity and 'indirectness' of production processes, with final goods sectors relying progressively more on highly specialised intermediate inputs.[4] We thus assume an input-output structure with one

[3] In Acemouglu and Shimer (2000), unemployment insurance improves allocative efficiency by enabling workers to pursue riskier and more productive options. In De Grauwe and Polan (2003), social expenditure affects workers' productivity by entering directly the production function of the private sector. In our model, the effects of government policy on aggregate efficiency emerge *endogenously* and do not result from an *a priori* link between social transfers and productivity.

[4] Existing empirical evidence reveals that important inter-industry connections exist and lead to external returns to scale in manufacturing, e.g. Caballero and Lyons (1992) and Bartelsman, *et al* (1994). The theoretical importance of vertical linkages as a source of economy-wide increasing returns to scale has been widely acknowledged, e.g. Eithier (1982), Matsuyama (1995), and Venables (1996).

upstream monopolistically competitive industry and two downstream perfectly competitive sectors producing two homogenous final goods, whose quantities we denote by Y_1 and Y_2. The output of the upstream industry comes in a continuum of horizontally differentiated varieties $\left(x_i,\ \ i \in [0, N]\right)$ that can be thought of as consisting of highly specialised producer services and other intangible inputs such as knowledge. The larger is the mass of intermediates *N*, the higher will be the degree of specialisation in production and the resulting aggregate efficiency. Thus, to the extent that government policies influence market structure and the availability of the upstream varieties, they will also affect aggregate productivity, the economy's trade performance and the direction of international capital flows.

2.1. Consumers and welfare

The population of consumers is divided into a mass $\bar{L}$ of individuals who form the labour force and a mass $\bar{R}$ of agents outside the labour force. The latter are either retired or are below the working age. Each individual in $\bar{L}$ is endowed with one unit of labour which it supplies inelastically if employed. The employed receive wages while the unemployed and those in $\bar{R}$ receive a benefit transfer income from the government.

Only final goods are consumed and the utility function of the representative consumer is

$$U = \frac{Y_1^{\mu} Y_2^{1-\mu}}{\mu^{\mu}(1-\mu)^{1-\mu}} + \tilde{V}\left(1-\xi\right), \tag{1}$$

where $0 < \mu < 1$, $\tilde{V}$ is the utility of leisure, and $\xi = 1$ if the individual belongs to the labour force and is employed and $\xi = 0$ otherwise. Maximising (1) subject to the appropriate budget constraint yields the demand functions

$$\begin{cases} Y_1^d = \mu \dfrac{M}{P_1}, \\ Y_2^d = (1-\mu)\dfrac{M}{P_2}, \end{cases} \tag{2}$$

where Y_h^d and P_h denote the quantity demanded and price of the final good h=1,2, and *M* is nominal disposable income (to be defined later).

The aggregate welfare, measured by the indirect utility, is obtained by substituting (2) back into (1), namely,

$$U = \frac{M}{P} + \tilde{V}\left(\overline{R} + \overline{L} - L\right), \qquad (3)$$

where $P = P_1^{\mu} P_2^{1-\mu}$ is the consumer price index, L denotes the employed workers, and $\left(\overline{R} + \overline{L} - L\right)$ is the measure of consumers who do not work and receive the benefit transfer from the government.

2.2. Producers

There are three primary inputs in the economy. We call these labour (L), land (Z), and capital (K), whose rates of return are respectively denoted by w, q and r. Whilst labour and land are internationally immobile, capital is allowed to flow freely in and out of the country. We shall treat K as physical capital, but the results of the analysis would not be qualitatively affected if K were interpreted as human capital – embodied in skilled labour – instead.

The two homogenous consumer goods produced by the downstream industries, Y_1 and Y_2, are assumed to be freely traded in world markets. We shall label these as 'high-tech' and 'low-tech' respectively and assume that labour is not directly required as a primary factor in their production; they are produced using capital, land and a CES basket of intermediate inputs, X. For a given set of intermediates, both final goods are produced with a constant returns to scale Cobb-Douglas technology, $Y_h = A_h K_h^{\alpha_h} Z_h^{\beta_h} X_h^{\lambda_h}$, where $0 < \alpha_h < 1$, $0 < \beta_h < 1$, $\lambda_h = 1 - \alpha_h - \beta_h > 0$ and we use the normalisation $A_h = \alpha_h^{-\alpha_h} \beta_h^{-\beta_h} \lambda_h^{-\lambda_h}$, for h=1,2. It is plausible to assume that the high-tech good (Y_1) is relatively more intensive in the intermediates and at least as intensive in capital as the low-tech good (Y_2), which is instead relatively more intensive in land. Such a production structure requires

$$\frac{\beta_1}{\beta_2} < 1 \le \frac{\alpha_1}{\alpha_2} < \frac{\lambda_1}{\lambda_2}. \qquad (4)$$

The intermediate input, assumed to be non-traded [5], consists of a mass N of horizontally differentiated varieties that are assembled into a CES composite input

[5] The non-tradability of intermediates is commonly assumed in the literature to capture the importance of *geographical proximity* of the intermediate sector to final good industries, e.g. Rodriguez-Clare (1996) and Rodrik (1996). Note, however, that in the presence of inter-sectoral linkages, this assumption does not imply that upstream sector producers are shielded from international competition.

$$X = \left(\int_{i \in N} x_i^{\frac{\sigma-1}{\sigma}} di \right)^{\frac{\sigma}{\sigma-1}}, \tag{5}$$

where x_i is the quantity of a typical variety i and σ is the elasticity of substitution between varieties. We assume σ >1, which means that no single variety is an essential input per se. This CES technology implies that there are increasing returns to the range of available varieties, since the productivity of the intermediate basket rises with N. The price index for the intermediate varieties, dual to the CES basket in (5), is

$$P_x = \left(\int_{i \in N} p_i^{1-\sigma} di \right)^{\frac{1}{1-\sigma}}, \tag{6}$$

where p_i is the price of intermediate variety i.

Given the downstream sectors' production technology, the minimum total cost of producing Y_h is

$$C_h = Y_h \left(r^{\alpha_h} q^{\beta_h} P_x^{\lambda_h} \right), \qquad h=1,2. \tag{7}$$

Since these two industries are perfectly competitive, their production levels are determined by the equality between price (or marginal revenue) and marginal (or average) cost,

$$P_h = r^{\alpha_h} q^{\beta_h} P_x^{\lambda_h}, \qquad h=1,2. \tag{8}$$

The small open economy and free trade assumptions imply that P_h are determined in world markets.

The input demands by the two final good industries can be obtained by applying Sheppard's Lemma to (7). Using (8), these can be written as

$$\begin{cases} X_h^d = \lambda_h Y_h^s \dfrac{P_h}{P_x}, \\ Z_h^d = \beta_h Y_h^s \dfrac{P_h}{q}, \\ K_h^d = \alpha_h Y_h^s \dfrac{P_h}{r}. \end{cases} \qquad h=1,\ 2 \tag{9}$$

Sheppard's Lemma can also be used to obtain, from (7), a system of demand equations for the varieties of the intermediate input used by the two final good industries. Given (6), these can be written as

$$x_i = \left(X_1^d + X_2^d\right)\left(\frac{p_i}{P_x}\right)^{-\sigma}. \quad (10)$$

The intermediate input varieties are produced by an endogenously determined (via free-entry and exit) mass of identical firms. Labour is the only factor of production, used as both fixed and variable input. The labour requirement of a typical firm *i* is

$$l_i = \delta x_i + \gamma, \quad (11)$$

where l_i is the labour required to produce output x_i and δ >0 and γ >0 are the marginal and fixed input coefficients, assumed to be the same across firms. The existence of a fixed production cost, by giving rise to internal increasing returns to scale and to an incentive to specialisation, ensures the one-to-one correspondence between the mass of firms and that of available varieties. The firm's profit thus is

$$\pi_i = p_i x_i - w_i l_i, \quad (12)$$

where w_i is the wage rate it pays its workforce. Taking w_i as given and choosing p_i to maximise (12) subject to (10) and (11), it can be shown that the optimal price rule for a typical firm *i* is $p_i = [\sigma/(\sigma-1)]\delta w_i$. Using, for simplicity, the normalisation $(\sigma-1)/\sigma = \delta$, we write this price setting rule as

$$p_i = w_i. \quad (13)$$

In the free-entry equilibrium, each firm will break even. Substituting from (11) and (13) into (12) and setting the resulting equation equal to zero, we obtain the equilibrium output scale of a typical firm in the intermediate good industry,

$$x_i = \sigma\gamma. \quad (14)$$

The constant elasticity of substitution assumption and the lack of strategic interaction between firms imply that the optimal output scale – and the extent to which each firm exploits internal increasing returns to scale – is constant. Hence, changes in market size do not affect the mark-up and the size of firms but only the size of the product range *N*.

2.3. Factor markets

Markets for land and capital are assumed to be perfectly competitive and factor prices *q* and *r* adjust to satisfy the respective market clearing resource constraint,

$$\overline{Z} = Z_1^d + Z_2^d \,, \tag{15}$$

$$\overline{K} + K^* = K_1^d + K_2^d \,, \tag{16}$$

where $\overline{Z}$ and $\overline{K}$ are the economy's endowments of these factors. With capital mobility, the stock of available capital can differ from the country's endowment by an amount K^* that denotes the capital inflow or outflow. Assuming perfect substitutability and full mobility of capital, arbitrage in the international capital market ensures that the capital flow ceases when the parity condition,

$$(1-\rho)\, r = \left(1-\rho^*\right) r^* \,, \tag{17}$$

is attained. The left-hand-side of (17) is the net of tax domestic return on capital and the right-hand-side is the (exogenous and net) foreign return.

The labour market in the intermediate sector is unionised, with unions having monopoly over wages and firms determining employment levels. For simplicity, we assume that unions are firm specific and a typical union *i* embraces the workers of, and sets the wage rate for, firm *i*. Unionisation implies that involuntary unemployment persists in equilibrium and that each union will have some unemployed members – i.e. $l_i < \overline{l}_i$, where l_i and $\overline{l}_i$ are the union's employed and total members respectively. Each union is assumed to maximise the expected real income of its typical member subject to its labour demand. Hence, union *i*'s objective function, given by the 'expected' utility of its typical member, can be obtained from (1) and is

$$U_i = \frac{l_i}{\overline{l}_i} \frac{(1-\tau) w_i}{P} + \frac{\overline{l}_i - l_i}{\overline{l}_i} \frac{b}{P} + \frac{\overline{l}_i - l_i}{\overline{l}_i} \tilde{V} \,, \tag{18}$$

where τ and b are respectively the labour income tax rate and the unemployment benefit payment. The latter, which we assume not to be taxed, is a net transfer. The union will choose w_i to maximise (18) recognising that l_i is determined by the firm but is affected by its choice of w_i through (10), (11) and (13). This maximisation yields the wage setting rule

$$\frac{(1-\tau) w_i}{P} = \left(\frac{\varepsilon_i}{\varepsilon_i - 1} \right) \left(\frac{b}{P} + \tilde{V} \right), \tag{19}$$

where ε_i is the wage elasticity of labour demand facing a typical union and provides an inverse measure of its monopoly power. It can be shown that (see the Appendix)[6]

$$\varepsilon_i \equiv -\frac{d\log l_i}{d\log w_i} = \sigma - 1. \tag{20}$$

As equation (19) shows, the real net-of-tax wage results from a mark-up on the union's ‘reservation wage’ $\left(b/P + \tilde{V}\right)$, where the mark-up factor $\varepsilon_i/(\varepsilon_i - 1)$ is negatively related to the labour demand elasticity, ε_i, and thus is increasing in union’s monopoly power. Also, the optimal real wage set by the union is positively related to both the labour income tax rate and the real value of unemployment benefit payment, since: **(i)** a ceteris paribus increase in τ reduces the after tax wage; and **(ii)** a higher real benefit rate *b/P* reduces the utility difference between being employed and unemployed.

2.4. Government budget constraint, national income and balance of payment

The government provides welfare protection in the form of net transfer to those who do not receive wage from employment. This is financed through the taxation of primary factors’ income. We use the source principle as the tax rule, so that income generated by the inflow of capital is taxed before it is repatriated. Noting that $\overline{L} = \int_i \bar{l}_i di \geq L = \int_i l_i di$, and assuming that the government pays the same lump-sum benefit *b* to all individuals who do not receive income from employment, the government budget constraint is

$$b(\overline{R} + \overline{L} - L) = \int_i \tau w_i l_i + \rho r(\overline{K} + K^*) + \phi q\overline{Z},$$

where ϕ and ρ are, respectively, the land and capital income tax rates. Given the symmetry across both firms and unions, this yields

$$b(\overline{R} + \overline{L} - L) = \tau wL + \rho r(\overline{K} + K^*) + \phi q\overline{Z}. \tag{21}$$

Aggregate income (*M*) is determined by total returns to primary factors and transfers between the public and private sectors which can be written as follows

[6] Given the small open economy and free trade assumptions, P_1 and P_2 are fixed at world prices and hence *P* is exogenous. Thus, fixing *b* in nominal terms does not affect the analysis that follows. We follow the literature in assuming that unemployed workers from other unions cannot be employed in a given union’s firm before the latter’s unemployed members are hired. Also, in maximising their objective function, each union takes the mass of firms and the government policy variables as given – which is equivalent to assuming that entry into the industry and the government choice of policy instruments occur prior to unions’ setting of wages. The results would not change if we assumed there to be a fixed (but sufficiently large) number of identical unions as in Alesina and Perotti (1997).

$$M = (\bar{R} + \bar{L} - L)b + (1-\tau)\, wL + (1-\rho)\, r\bar{K} + (1-\phi)\, q\bar{Z} \,. \qquad (22)$$

It is worth noting that, using (21) and (22), M is simply the sum of primary factors' gross income, i.e., $M = wL + r\bar{K} + q\bar{Z} + \rho r K^*$, where the last term on the right-hand-side reflects the taxation of income accrued to mobile capital.

Finally, the balance of payments equation sets the value of net exports to zero and is given by

$$P_1(Y_1^S - Y_1^d) + P_2(Y_2^S - Y_2^d) - (1-\rho) r K^* = 0 \,. \qquad (23)$$

3. General Equilibrium and the Effects of Welfare Policies

Table A.1 in the Appendix gives the general equilibrium equations of the model that determine the 11 endogenous variables, q, r, w, P_x, X, N, L, K^*, M, U and one of the tax rates τ, ρ, or ϕ which the government will allow to vary to balance its budget. In this section we study the consequences of a move to a more generous welfare system by analysing the impact of a rise in b on the endogenous variables. Before doing so, however, it is useful to highlight the main characteristics of the model.

Let us assume, for simplicity, that ϕ is the endogenous tax rate. Equations (A1)-(A3) imply that r, q and P_x are ultimately determined regardless of the rest of the model. It then follows from equations (A4) and (A5) that increases in the wage rate are associated with a larger mass of firms and a higher aggregate employment, as long as σ exceeds unity and is finite. This positive relationship between the wage rate and the number of firms and employment is not intuitively obvious and critically rests on the existence of increasing returns to the range of available intermediates which implies that the equilibrium mass of varieties (and firms) may be suboptimal[7]. In these circumstances, therefore, a higher wage can contribute to correcting the effects of the market imperfection.

To appreciate this result, let us examine the effects of a rise in w for the case in which b is kept constant so that there is no immediate change on the 'expenditure' side of the government budget constraint. We therefore assume that the higher wage is induced by an exogenous rise in the utility of leisure, $\tilde{V}$. For a given N, the exogenous rise in w will imply a higher disposable income which, by stimulating final goods' consumption, will result in a higher demand for all factors of production, X, K, Z. The higher demand for capital will exert

[7] Matsuyama (1995) explains how such suboptimalities emerge when markets are monopolistically competitive. For a further discussion of the nature of the suboptimality that arises in the above context see Molana and Montagna (2005).

an upward pressure on r that will result in a capital inflow until the parity condition is restored. The larger capital stock will in turn increase the marginal product of the other factors used in both downstream industries, thus further boosting the demand for X. The increase in the demand for X will foster entry into the upstream sector and result in a deeper division of labour within the economy, i.e., a rise in both N and L.[8]

Following the expansion in the range of intermediates, average production costs will decline in both downstream industries, but particularly more so in the production of the high-tech good which is relatively more intensive in the intermediate input. Resources will thus shift from the low-tech to the high-tech sector, but any contraction of the former will release less intermediates (and less capital, if the high-tech good is also relatively intensive in capital – i.e. if $\alpha_1/\alpha_2>1$) than the corresponding expansion of the high-tech sector requires at the given factor prices. This will lead to an excess demand for both X and K, implying further entry of firms in the upstream industry and of capital into the country. In sum, the original wage shock will result in a virtuous circular causation process of rising demand for intermediates, entry of new firms into the upstream sector, and increased specialisation in the high-tech good that will amount to an increase in the level of economic activity, i.e. higher employment in the upstream sector and higher output of intermediates and final goods. It can also be shown that this expansion will result in a higher aggregate income and welfare. In this context, therefore, there is clearly a strong motive for the government to induce a wage rise as long as the financing consequences of the policy do not crowd out its positive effects.

In the remainder of this section we shall examine the effects of an expansionary welfare policy shock, i.e., a rise in b when the government uses each of τ or ρ to balance its budget. To carry out the policy analysis, it proves useful to reduce the model in Table A.1 in the Appendix to two equations and two unknowns, w and either τ or ρ. We obtain these equations from the unions' wage setting rule and the government budget constraint.[9] The graphs of these equations in the (w,τ) space – or, in the (w,ρ) space – can then be used to analyse the determination of the general equilibrium values of w and τ – or w and ρ.

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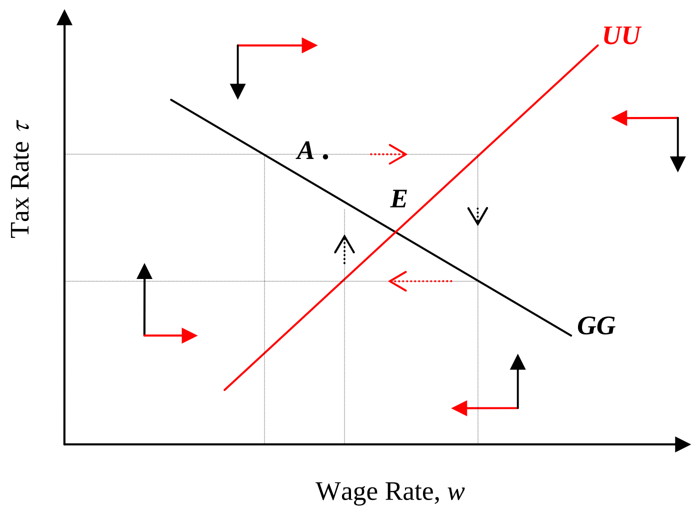
[8] For a given N, the increase in w will initially result in a rise in the upstream sector's marginal production cost and prices. As a result, P_x will initially rise, leading – in both final good sectors – to a substitution away from X and towards K and Z, hence exerting an upward pressure on these factors' prices that will reinforce the inflow of capital. It is tedious but straightforward to show that although this first effect will partially offset the increase in the demand for X and the ensuing rise in N, it will not dominate, i.e., the net effect of the policy will be to increase the demand for X, leading to entry into the sector.

[9] In terms of the equations in Table A.1 in the appendix, we solve (A1)-(A7) for q, r, P_x, N, L, X and K^* and substitute the solution into (A8) and (A9).

Figure 1 sketches the graphs of the two equations when the government uses τ to balance its budget. These graphs are approximated by straight lines in the neighbourhood of the equilibrium[10]; the line labelled *UU* depicts unions' wage setting rule in equation – obtained from (A8) – and the government budget constraint – obtained from (A9) – is shown by the line labelled *GG*. The intuition underlying the slopes of these lines is straightforward. The *UU* is upward sloping because, starting from any point on the line, an increase in τ will rise unions' wage demand; the horizontal arrows in Figure 1 indicate the direction in which the wage rate will move above and below the *UU*. The *GG* slopes downward because a higher *w* enables the government to reduce τ, given the existence of a positive relationship between *w* and *L* determined in the rest of the economy (i.e. excluding unions' action and the government budget constraint); the vertical arrows indicate the direction in which the tax rate will move above and below the *GG*. The equilibrium therefore will be stable as long as the *GG* is flatter than the *UU*, so that starting from any arbitrary initial point, such as *A*, the economy converges to *E*, as shown in Figure 1.

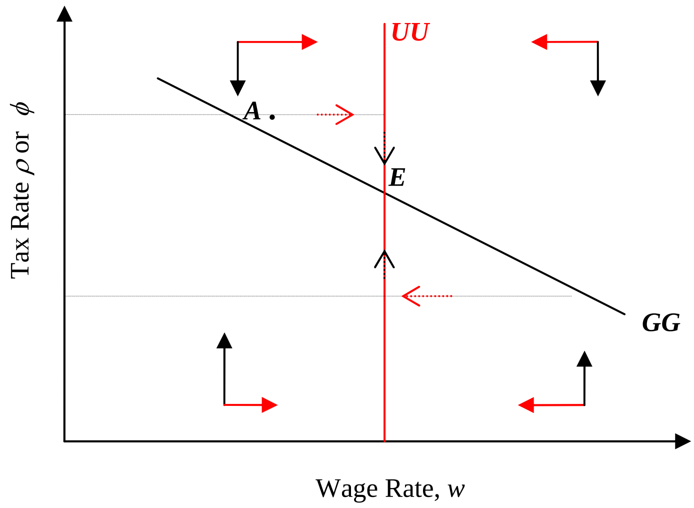
Figure 1 – Equilibrium when τ is used as instrument



When the tax rate ρ is used as the instrument to balance the government budget, the *UU* will be vertical in the (w,ρ) space since ρ does not feature in (A8). Figure 2 illustrates the situation. In this case the equilibrium will always be stable since, starting from any arbitrary initial point such as *A*, the economy will move towards the *UU* and then converge to point *E* along it, as shown in Figure 2.

[10] We have verified the uniqueness of equilibrium numerically for plausible values of the relevant parameters. It is possible to derive the condition analytically but the algebraic expressions are not easily interpretable.

Figure 2 – Equilibrium when ρ *or* ϕ is used as instrument



The figures constructed above can be used to examine the effects of a rise in the welfare payment, *b*. This involves analysing how the two lines shift and, hence, the equilibrium values of *w* and τ (or *w* and ρ) change as *b* rises. Given the complexity of the algebra involved, we do not provide, in the paper, the analytical expressions for the equilibrium solutions that occur at the intersection of the two lines and instead present in Figures 3 and 4 below the numerically simulated versions of the *UU* and the *GG*.[11] The solid lines depict an initial situation and the broken lines show the effect of a rise in *b*. First consider Figure 3 which corresponds to the case in which the government uses τ. The rise in *b* shifts the *UU* to the right because, for any given τ, it leads unions to set a higher wage rate. It also shifts the *GG* up since, for any given *w*, a higher τ is needed to balance the budget. The broken lines correspond to a 5% rise in *b* and their intersection shows that in the new equilibrium *w* is higher and τ is lower. Next, consider Figure 4 which depicts the case in which the government uses ρ. Again, the broken lines show the effect of a 5% rise in *b* and their intersection implies that *w* rises and ρ falls in the new equilibrium. Thus, in both cases, the increase in *b* – by triggering the virtuous circle of higher wages, entry into the intermediate sector and higher income – leads to a *reduction* in the tax rate. In the latter case, the reduction in the tax rate also stimulates a larger capital inflow.

[11] See Table A.2 in the Appendix for the initial values used in all numerical analysis. We have verified that the results are robust qualitatively for a plausible numerical range of the parameters involved.

Figure 3 – Effect of a 5% rise in *b* financed by τ

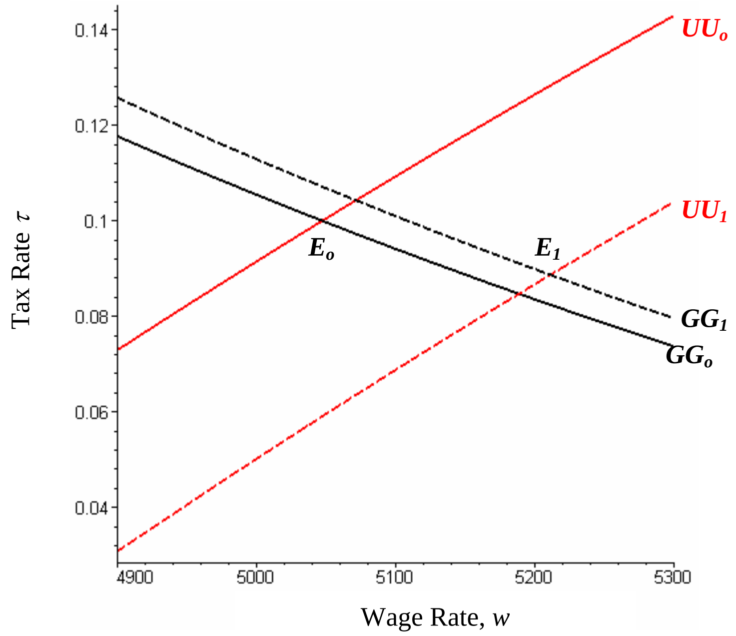
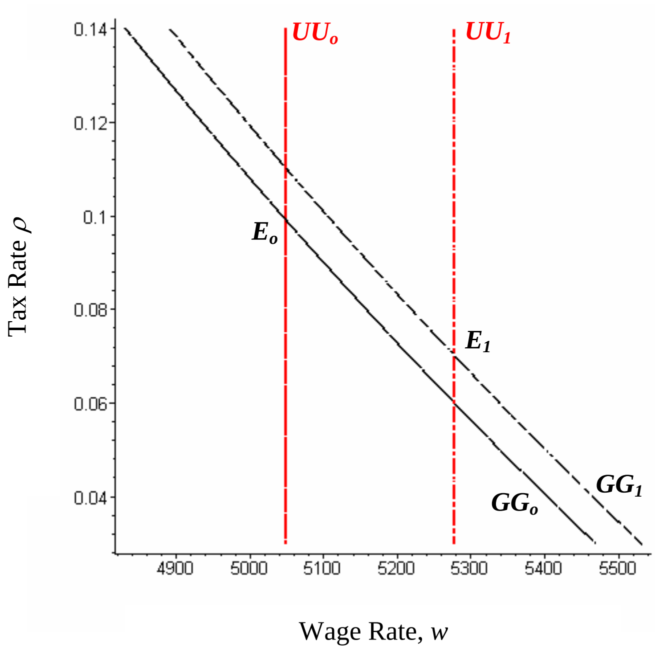


Figure 4 – Effect of a 5% rise in *b* financed by ρ



To summarise, our results show that despite free trade and capital mobility, and regardless of the tax instrument used, an increase in the generosity of the welfare state typically leads to a higher welfare. By increasing the upstream sector's wage, a higher welfare protection deepens the division of labour within the economy and raises both aggregate income and the extent to which the country specialises in the high-tech sector.[12]

[12] Clearly, the expansionary effects of the policy reduce as the economy's labour resource constraint tightens.

When the government finances the policy by taxing immobile factors, this virtuous circle is unambiguously reinforced by a capital inflow that increases the demand for the intermediate good and may strengthen the shift of resources towards the high-tech good – to the extent that the latter is more intensive in the use of capital. The use of capital taxation to finance the policy shock does not substantially alter the above results, but strengthens the virtuous circle triggered by the policy by reducing the tax rate on capital. On the whole, these results cast doubt on the conventional wisdom according to which openness and in particular capital mobility – by leading to a 'shrinking tax base' – hinders the use of redistribution policies.

4. Concluding Remarks

This paper has examined the role of economy-wide increasing returns to scale in shaping the relationship between welfare state policies and economic performance in a small open economy with free trade in final goods and international capital mobility. Contrary to the conventional wisdom, we find that a retrenchment of welfare programmes is not an inevitable consequence of economic integration. Instead, by improving the exploitation of aggregate scale economies, social insurance policies and international openness can complement each other in facilitating the provision of a more generous welfare protection.

These findings – which are consistent with, and help to explain, the evidence that goods and capital markets integration has not led to *significant* reductions in welfare states and tax burdens in OECD countries – crucially rest on the imperfectly competitive nature of the labour market and the intermediate sector of the economy. In the former, unionisation results in equilibrium wages being positively related to the unemployment benefit and income tax rates. In the latter, the existence of monopolistic competition leads to the emergence of increasing returns to the range of available varieties of the intermediate input. As a result, the expansionary effects of unemployment benefits and higher wages trigger a virtuous circle of entry in the intermediate sector, greater aggregate productivity, and higher income. This virtuous circle is not weakened by free mobility of capital.

Unions play a crucial role in the transmission mechanism between government policies and economic performance: with unionisation, welfare state policies have distortionary effects since unions transfer the burden of taxation on to firms via higher wages. We find, however, that *even* with the high degrees of distortion associated with non-internalising unions, increases in social protection can have positive effects on aggregate welfare. The reason for this is that unions' rent-seeking activity contributes, by raising income, to the emergence of a virtuous circle that reduces the sub-optimality in the provision of intermediate varieties. This clearly suggests that encompassing unions – typical of corporatists industrial relations systems – are not (as is often suggested, e.g., Garrett, 1998) *necessary* to ensure compatibility between welfare states and high degrees of international openness, and that production externalities can severely influence the way different labour market institutions affect economic performance. Given the existence of convincing evidence that countries exhibit different degrees of external economies of scale (e.g., Caballero and Lyons, 1990), the empirical study of how such external economies affect the relationship between the extent of international openness and the size of the welfare state is a fruitful line for future research.

It is important to stress, however, that the existence of unionisation is not necessary for the above results to emerge. Any form of labour market imperfection (e.g., efficiency wages) that gives rise to a positive link between wages and policy instruments would most likely lead to similar conclusions. Similarly, our conclusions do not crucially depend on the specific structure of the model we have used in this paper; it is not difficult to show that the fundamental forces at work are not altered when some of the assumptions – such as (i) small-open-economy, (ii) non-tradability of intermediates, and (iii) absence of unionisation in the final good sectors – are relaxed.[13] Finally, it is also true that welfare state policies are not the only way by which governments may trigger the virtuous process of cumulative causation described above. One lesson of economic policy is that policy intervention should be applied as closely as possible to the desired target. Thus, given that in this case the market imperfection leads to a sub-optimal production of varieties, industrial policy may well be more effective in correcting the distortion. This consideration, however, does not diminish the relevance of our analysis whose aim is to question the generality of the existence of a conflict between welfare state and economic globalisation. The welfare state has played a specific social and political role in advanced industrial economies and various attempts to retrench it are being met by oppositions that could lead to a backlash against trade and capital markets liberalisation. Our concern in this paper has been to assess the extent to which openness and this type of policies are incompatible, and our findings suggest that they need not be.

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[13] Molana and Montagna (2005) derive optimal unemployment benefit policy in a two-country model with tradable intermediates and unions in final good sectors. Their findings are consistent with those above.

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Appendix

A1. Derivation of equation (19) and the expression for ε

The wage setting equation for of union *i* derived by choosing w_i to maximise (18). The first order condition is $\frac{1}{\bar{l}_i}\left[\frac{(1-\tau)}{P}\left(l_i + w_i\frac{dl_i}{dw_i}\right) - \frac{b}{P}\frac{dl_i}{dw_i} - \tilde{V}\frac{dl_i}{dw_i}\right] = 0$. Using $\varepsilon_i \equiv -\frac{w_i}{l_i}\frac{dl_i}{dw_i}$, the expression in the square brackets can be rearranged as $(1-\varepsilon_i)(1-\tau)w_i + \varepsilon_i\left(b + P\tilde{V}\right) = 0$ whose solution for w_i yields equation (19). The expression for ε_i in the right-hand-side of (20) is derived as follows. Using firms' labour demand $l_i = \delta x_i + \gamma$ and taking account of their mark-up rule $p_i = w_i$, given by equations (11) and (13) respectively, we obtain, $\varepsilon_i = -\frac{d\log l_i}{d\log w_i} = -\frac{d\log(\delta x_i + \gamma)}{d\log p_i} = -\frac{p_i}{\delta x_i + \gamma}\cdot\frac{\delta\, dx_i}{dp_i}$. Noting that the demand facing the firm is $x_i = \left(\frac{X^d}{P_x}\right)\left(\frac{p_i}{P_x}\right)^{-\sigma}$, it follows that $\frac{dx_i}{dp_i} = -\sigma\left(\frac{x_i}{p_i}\right)$, since $X^d = \lambda_1 P_1 Y_1^s + \lambda_2 P_2 Y_2^s$ and P_x are taken as given. Substituting this in the expression for ε_i we obtain $\varepsilon_i = \frac{\sigma\,\delta\, x_i}{\delta\, x_i + \gamma}$. Finally, recalling the normalisation $(\sigma-1)/\sigma = \delta$ and that firms' optimal output scale – in equation (14) – is $x_i = \sigma\,\gamma$, we obtain $\varepsilon_i = \sigma - 1$.

A2. Solving for general equilibrium

Table A.1 below gives the equations that determine the endogenous variables. Equations (A1) to (A9) can be solved for *q, r, w,* P_x, K^*, *L, X, N* and one of the tax rates – τ, ρ, or ϕ. These solutions can then be substituted into (A10)-(A11) to determine *M* and *U*. The last column of the table explains how each equation originates from the model where the numbers in italics refer to the equations in the paper. Recall that $\lambda_h = 1 - \alpha_h - \beta_h > 0$, *h*=1,2, and that $\frac{\beta_1}{\beta_2} < 1 \le \frac{\alpha_1}{\alpha_2} < \frac{\lambda_1}{\lambda_2}$ by assumption. The other parameters used in the equations in Table A1 are defined as follows:

$$\Delta \equiv \beta_2\lambda_1 - \beta_1\lambda_2 > 0; \qquad \theta_x \equiv \left(\alpha_2\beta_1 - \alpha_1\beta_2\right)/\Delta < 0; \quad \text{and} \quad \theta_z \equiv \left(\alpha_2\lambda_1 - \alpha_1\lambda_2\right)/\Delta > 0.$$

Table A.1. Equations of the model (1)

(A1)	$(1-\rho)r=(1-\rho^*)r^*$	*(17)*
(A2)	$q=\left(P_1^{-\lambda_2}P_2^{\lambda_1}\right)^{\frac{1}{\Delta}}r^{-\theta_z}$	*(8)*
(A3)	$P_x=\left(P_1^{\beta_2}P_2^{-\beta_1}\right)^{\frac{1}{\Delta}}r^{\theta_x}$	*(8)*
(A4)	$P_x=N^{\frac{1}{1-\sigma}}w$	*(6), (13)*
(A5)	$L=\gamma\sigma N$	*(11), (14),* $\delta=(\sigma-1)/\sigma$, $L=N\,l$
(A6)	$P_xX=wL$	setting $\pi=0$ in *(12),* $P_xX=N\,p\,x$
(A7)	$\left(\overline{K}+K^*\right)=\left(\theta_zq\overline{Z}-\theta_xP_xX\right)/r$	see explanations below the table
(A8)	$(1-\tau)w=\left(\dfrac{\sigma-1}{\sigma-2}\right)\left(b+P\tilde{V}\right)$	*(19)*
(A9)	$b(\overline{R}+\overline{L}-L)=\tau wL+\rho r\left(\overline{K}+K^*\right)+\phi q\overline{Z}$	*(21)*
(A10)	$M=wL+r\overline{K}+q\overline{Z}+\rho rK^*$	*(22)*
(A11)	$U=\dfrac{M}{P}+\tilde{V}\left(\overline{R}+\overline{L}-L\right)$	*(3)*

(1) We have dropped the subscript *i* by imposing symmetry across unions and firms.

Equation (A7) is derived as follows. Using (15), (16) and noting that $X=X_1^d+X_2^d$, we obtain the following three resource constraints from (9)

$$\begin{cases} X=X_1^d+X_2^d=\lambda_1\dfrac{P_1}{P_x}Y_1^s+\lambda_2\dfrac{P_2}{P_x}Y_2^s, \\ \overline{Z}=Z_1^d+Z_2^d=\beta_1\dfrac{P_1}{q}Y_1^s+\beta_2\dfrac{P_2}{q}Y_2^s, \\ K^*+\overline{K}=K_1^d+K_2^d=\alpha_1\dfrac{P_1}{r}Y_1^s+\alpha_2\dfrac{P_2}{r}Y_2^s. \end{cases}$$

Solving the first two equations for Y_1^s and Y_2^s yields, $P_1Y_1^s=\dfrac{\beta_2P_xX-\lambda_2q\overline{Z}}{\beta_2\lambda_1-\beta_1\lambda_2}$, and $P_2Y_2^s=\dfrac{\lambda_1q\overline{Z}-\beta_1P_xX}{\beta_2\lambda_1-\beta_1\lambda_2}$. Substituting these into the third equation yields

$$r\left(\overline{K}+K^*\right)=\left(\frac{\alpha_2\lambda_1-\alpha_1\lambda_2}{\beta_2\lambda_1-\beta_1\lambda_2}\right)q\overline{Z}-\left(\frac{\alpha_2\beta_1-\alpha_1\beta_2}{\beta_2\lambda_1-\beta_1\lambda_2}\right)P_xX,$$

which can be re-written as (A7) using the definitions of θ_x and θ_z given above.

Table A.2. Initial and after-shock values of the variables and the associated multipliers[1]

		U	M	L	N	X	K^*	w	P_x	r	q	tax rate used	welfare bill [2]
INITIAL VALUES:		47.83	4496	0.85	3712	476	33259	5047	9.06	0.06	2.35	0.10	616
τ-Financed	**VALUE AFTER THE SHOCK [3]**	51.39	4839	0.89	3869	512	35795	5211	9.06	0.06	2.35	0.09	610
	IMPLIED MULTIPLIER [4]	0.71	68.58	0.01	31.50	7.26	507.28	32.79	0.00	0.00	0.00	0.00	-1.09
	IMPLIED ELASTICITY [5]	1.39	1.42	0.81	0.81	1.42	1.42	0.63	0.00	0.00	0.00	-2.55	-0.18
ρ-Financed	**VALUE AFTER THE SHOCK [3]**	51.38	4839	0.89	3868	508	37284	5277	9.18	0.05	2.38	0.07	611
	IMPLIED MULTIPLIER [4]	0.71	68.52	0.01	31.43	6.48	805.14	45.89	0.02	0.00	0.01	-0.01	-1.07
	IMPLIED ELASTICITY [5]	1.39	1.42	0.81	0.81	1.28	2.16	0.87	0.25	-0.66	0.31	-8.49	-0.18

(1) The initial values used for parameters and exogenous variables in numerical analysis are: $P_1 = 1.5$; $P_2 = 1$; $(1-\rho^*)r^* = 0.05$; $\bar{R} = 0.5\bar{L}$; $V = 0.1b/P$; $b = 953$; $\tau = \phi = \rho = 0.1$; $\gamma = 0.0001\bar{L}$; $\sigma = 2.3$; $\alpha_1 = \alpha_2 = 0.3$; $\beta_1 = 0.2$; $\beta_2 = 0.5$, $\bar{Z} = \bar{K} = \bar{L} = 1$. We have verified that the results are robust qualitatively for a plausible numerical range of the parameters involved.

(2) Welfare bill is the total amount transferred by the government, $b(\bar{R} + \bar{L} - L)$.

(3) The shock is $\%\Delta b$=5.

(4) The multiplier, for a variable Z, is calculated as $\Delta Z / \Delta b$.

(5) The elasticity, for a variable Z, is calculated as $\%\Delta Z / \%\Delta b$.